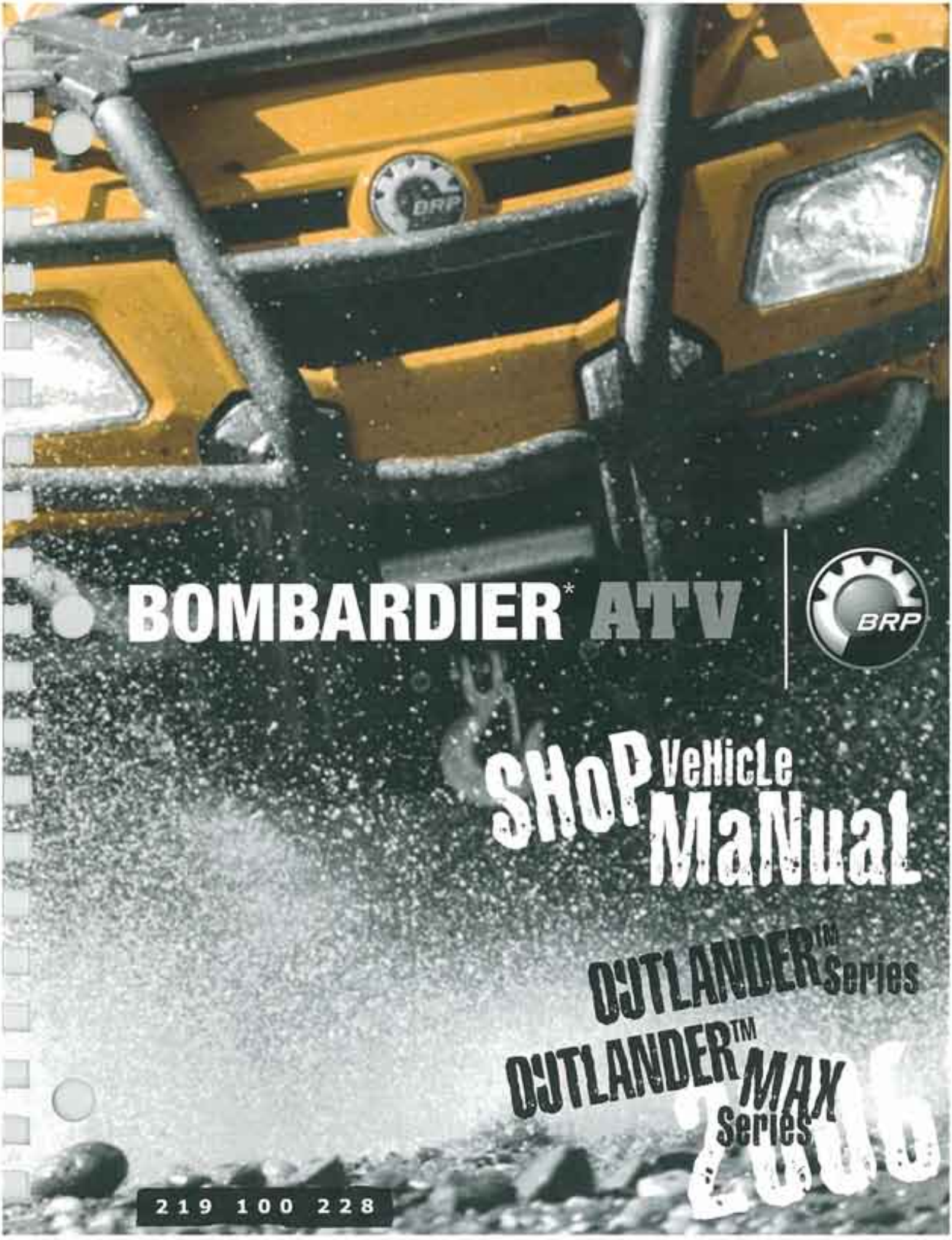

BOMBARDIER* ATV

BRP

SHOP VEHICLE MANUAL

OUTLANDER™ Series

OUTLANDER™ MAX Series

2008

219 100 228

2006
Vehicle Shop Manual

Outlander™ Series

BOMBARDIER ATV

Legal deposit:

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Valcourt (Quebec) Canada

Printed in Canada

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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair 2006 Outlander™ and Outlander™ MAX Series ATVs as describe in the model list in the *INTRODUCTION*.

This edition was primarily published to be used by mechanical technicians who are already familiar with all service procedures relating to BRP products. Mechanical technicians should attend training courses given by BRP Training Dept.

Please note that the instructions will apply only if proper hand tools and special service tools are used.

This Vehicle Shop Manual uses technical terms which may be slightly different from the ones used in the *PARTS CATALOG*.

It is understood that this manual may be translated into another language. In the event of any discrepancy, the English version shall prevail.

The content depicts parts and/or procedures applicable to the particular product at time of writing. Service and Warranty Bulletins may be published to update the content of this manual. Make sure to read and understand these. It does not include dealer modifications, whether authorized or not by BRP, after manufacturing the product.

In addition, the sole purpose of the illustrations throughout the manual, is to assist identification of the general configuration of the parts. They are not to be interpreted as technical drawings or exact replicas of the parts.

The use of BRP parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those for which it was designed.

⚠ WARNING

Unless otherwise specified, engine should be turned OFF and cold for all maintenance and repair procedures.

This manual emphasizes particular information denoted by the wording and symbols:

⚠ WARNING

Identifies an instruction which, if not followed, could cause serious personal injury including possibility of death.

CAUTION: Denotes an instruction which, if not followed, could severely damage vehicle components.

NOTE: Indicates supplementary information needed to fully complete an instruction.

Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use. Always use common shop safety practice.

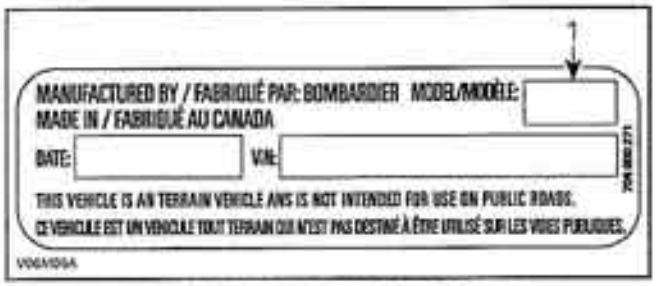
This information relates to the preparation and use of Bombardier ATV and has been utilized safely and effectively by BRP. However, BRP disclaims liability for all damages and/or injuries resulting from the improper use of the contents. We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic. It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

INTRODUCTION

GENERAL INFORMATION

This Vehicle Shop Manual covers the following BRP made 2006 Outlander™ and Outlander™ MAX Series ATVs. It should be used in conjunction with the appropriate *ENGINE SHOP MANUAL*.

MODEL	MODEL NUMBER
Outlander ™ 400	All
Outlander™ XT 400	All
Outlander™ MAX 400	All
Outlander™ MAX XT 400	All
Outlander™ 800	All
Outlander™ XT 800	All
Outlander™ MAX 800	All
Outlander™ MAX XT 800	All



TYPICAL — VEHICLE SERIAL NUMBER LABEL
1. Model number

The use of RIGHT and LEFT indications in the text, always refers to the driving position (sitting on the vehicle).

1. Left
2. Right

The information and component/system descriptions contained in this manual are correct at time of writing. BRP however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on products previously manufactured.

Due to late changes, there may be some differences between the manufactured product and the description and/or specifications in this document.

BRP reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligation.

This Vehicle Shop Manual uses technical terms which may be different from the ones of the *PARTS CATALOGS*.

When ordering parts always refer to the specific model *PARTS CATALOGS*.

VEHICLE IDENTIFICATION NUMBER (V.I.N.)

TYPICAL
1. V.I.N. (Vehicle Identification Number)

ENGINE IDENTIFICATION NUMBER (E.I.N.)

Refer to the appropriate *ENGINE SHOP MANUAL*.

ARRANGEMENT OF THIS MANUAL, ILLUSTRATIONS AND PROCEDURES

The manual is divided into many major sections as you can see in the main table of contents at the beginning of the manual.

Each section is divided in various subsections, and again, each subsection has one or more division.

The illustrations show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown, however, they represent parts which have the same or a similar function.

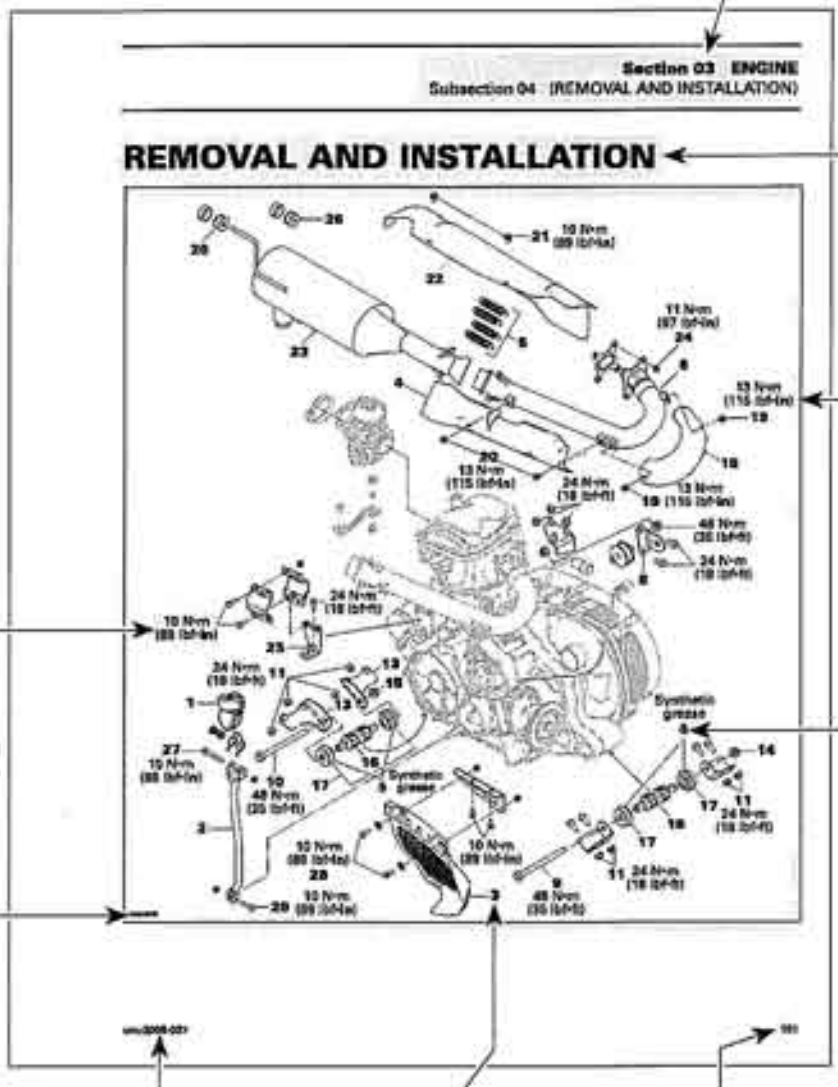
CAUTION: Most components in the vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice-versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

As many of the procedures in this manual are interrelated, we suggest that before undertaking any task, you read and thoroughly understand the entire section or subsection in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Before starting any procedure, be sure that you have on hand all required tools, or approved equivalents.

This *Shop Manual* uses technical terms wich may be slightly different from the ones in the parts catalog.

TYPICAL PAGE



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TYPICAL PAGE

Section 03 ENGINE
Subsection 06 (MAGNETO SYSTEM)

Title indicates main procedure to be carried-out.

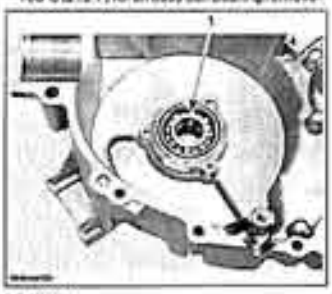
BEARING

Inspection

Ball bearing no. 10 must rotate freely. Otherwise, replace it.

Removal

– Heat up the magneto housing cover to about 100°C (212°F) for an easy ball bearing removal.



Call-outs for above illustration.

1. Ball bearing

Installation

For installation, also heat the magneto housing up to about 100°C (212°F) to put ball bearing in place.

Place new ball bearing in freezer for 10 minutes approximately.

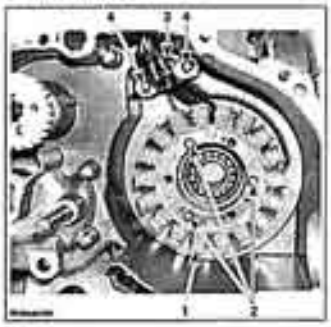
Reinstall other removed parts in the reverse order.

STATOR AND TRIGGER COIL

Removal

Remove:

- magneto housing cover no. 7
- screw no. 11 and 12
- stator with trigger coil no. 13



1. Stator
2. Stator screws
3. Trigger coil
4. Trigger coil screws

Inspection

Check stator and trigger coil condition. If damaged replace the faulty part.

For electrical inspection, refer to CHARGING SYSTEM for the stator and IGNITION SYSTEM for the trigger coil.

Bold face number following part name refers to exploded view at beginning of subsection.

Reference to look up a certain section and subsection. In this case it concerns IGNITION SYSTEM.

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ENGINE EMISSIONS INFORMATION

Manufacturer's Responsibility

Manufacturers of ATVs engines must determine the exhaust emission levels for each engine horsepower family and certify these engines with the United States of America *ENVIRONMENTAL PROTECTION AGENCY (EPA)*. An emissions control information label, showing emission levels and engine specifications, must be placed on each vehicle at the time of manufacture.

Dealer Responsibility

When performing service on ATVs that carry an emissions control information label, adjustments must be kept within published factory specifications.

Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the prescribed certification standards.

Dealers are not to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications.

Exceptions include manufacturer's prescribed changes, such as altitude adjustments for example.

Owner Responsibility

The owner/operator is required to have engine maintenance performed to maintain emission levels within prescribed certification standards.

The owner/operator is not to, and should not allow anyone to modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

EPA Emission Regulations

Some ATVs manufactured by BRP are certified to the EPA as conforming to the requirements of the regulations for the control of air pollution from new watercraft engines. This certification is contingent on certain adjustments being set to factory standards. For this reason, the factory procedure for servicing the product must be strictly followed and, whenever practicable, returned to the original intent of the design.

The responsibilities listed above are general and in no way a complete listing of the rules and regulations pertaining to the EPA requirements on exhaust emissions for ATVs products. For more detailed information on this subject, you may contact the following locations:

FOR ALL COURIER SERVICES:
U.S. Environmental Protection Agency
Office of Transportation and Air Quality
1310 L Street NW
Washington D.C. 20005

REGULAR US POSTAL MAIL:
1200 Pennsylvania Ave. NW
Mail Code 6403J
Washington D.C. 20460

INTERNET: http://www.epa.gov/otaq/

E-MAIL: otaqpublicweb@epa.gov

SELF-LOCKING FASTENERS PROCEDURE

The following describes the most common application procedures when working with self-locking fasteners.

Use a metal brush or a screwtap to clean the hole properly then use a solvent (Methyl-Chloride), let act during 30 minutes and wipe off. The solvent utilization is to ensure the adhesive works properly.

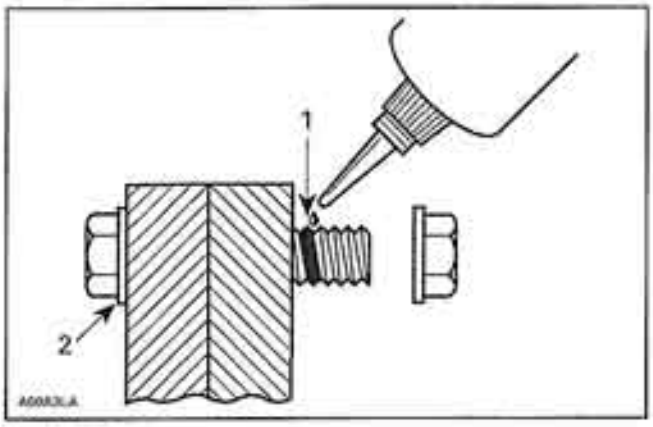
LOCTITE APPLICATION PROCEDURE

The following describes the most common application procedures when working with Loctite products.

NOTE: Always use proper strength Loctite product as recommended in this Shop Manual.

Threadlocker

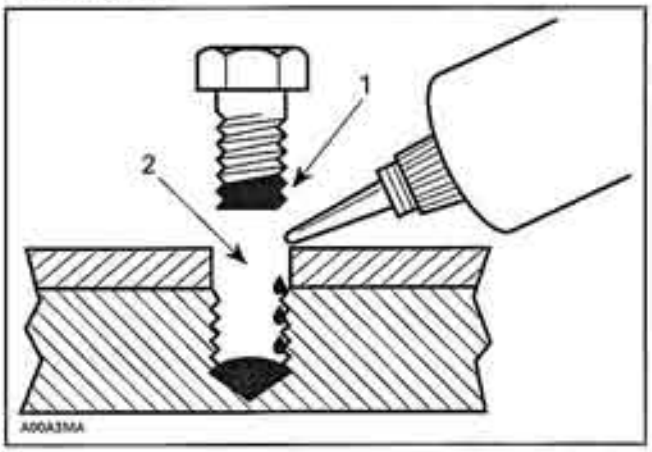
Uncovered Holes (bolts and nuts)



1. Apply here
2. Do not apply

- Clean threads (bolt and nut) with solvent.
- Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
- Choose proper strength Loctite threadlocker.
- Fit bolt in the hole.
- Apply a few drops of threadlocker at proposed tightened nut engagement area.
- Position nut and tighten as required.

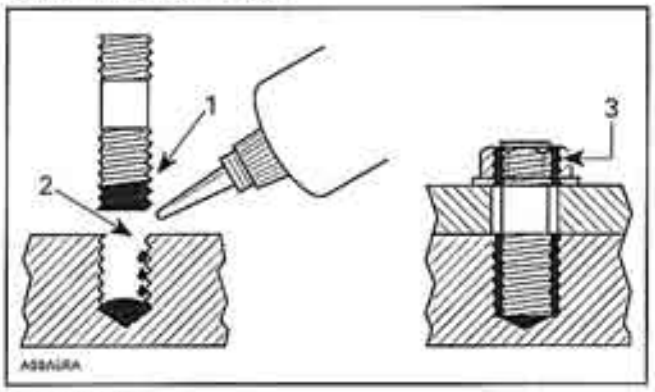
Blind Holes



1. On threads
2. On threads and at the bottom of hole

- Clean threads (bolt and hole) with solvent.
- Apply Loctite Primer N (P/N 293 800 041) on threads (bolt and nut) and allow to dry for 30 seconds.
- Choose proper strength Loctite threadlocker.
- Apply several drops along the threaded hole and at the bottom of the hole.
- Apply several drops on bolt threads.
- Tighten as required.

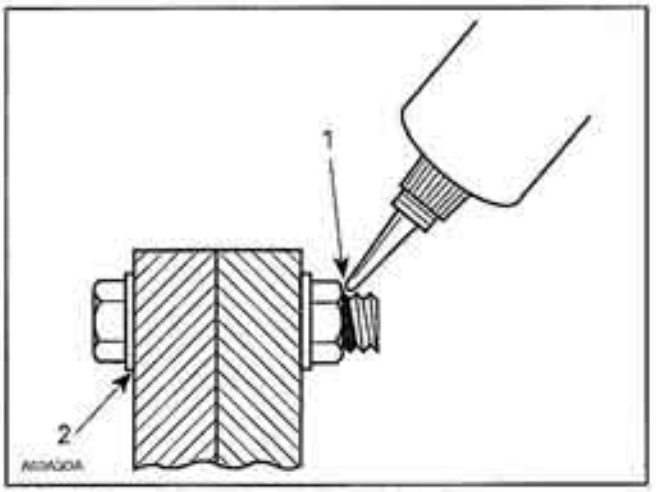
Stud in Blind Holes



1. On threads
2. On threads and in the hole
3. Onto nut threads

- Clean threads (stud and hole) with solvent.
- Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
- Put several drops of proper strength Loctite threadlocker on female threads and in hole.
- Apply several drops of proper strength Loctite on stud threads.
- Install stud.
- Install cover, etc.
- Apply drops of proper strength Loctite on uncovered threads.
- Tighten nuts as required.

Preassembled Parts



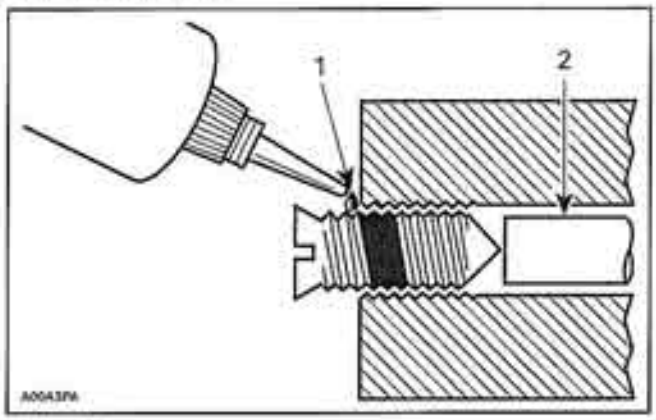
1. Apply here
2. Do not apply

- Clean bolts and nuts with solvent.
- Assemble components.
- Tighten nuts.
- Apply drops of proper strength Loctite on bolt/nut contact surfaces.

– Avoid touching metal with tip of flask.

NOTE: For preventive maintenance on existing equipment, retighten nuts and apply proper strength Loctite on bolt/nut contact surfaces.

Adjusting Screw

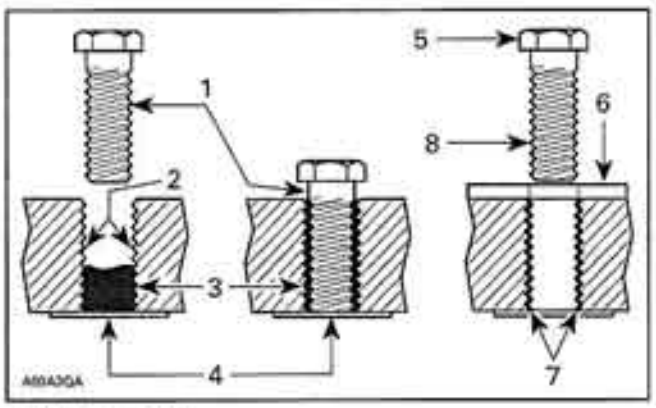


1. Apply here
2. Plunger

– Adjust screw to proper setting.
– Apply drops of proper strength Loctite threadlocker on screw/body contact surfaces.
– Avoid touching metal with tip of flask.

NOTE: if it is difficult to readjust, heat screw with a soldering iron (232°C (450°F)).

Stripped Thread Repair



1. Release agent
2. Stripped threads
3. Form-A-Thread
4. Tapes
5. Cleaned bolt
6. Plate
7. New threads
8. Threadlocker

Standard Thread Repair

– Follow instructions on Loctite FORM-A-THREAD 81668 package.
– if a plate is used to align bolt:

a. Apply release agent on mating surfaces.
b. Put waxed paper or similar film on the surfaces.

– Twist bolt when inserting it to improve thread conformation.

NOTE: NOT intended for engine stud repairs.

Repair of Small Holes/Fine Threads

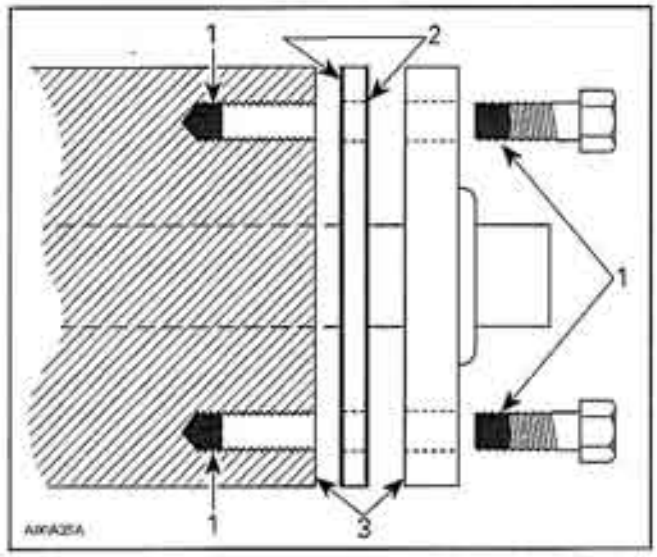
Option 1: Enlarge damaged hole, then follow *STANDARD THREAD REPAIR* procedure.

Option 2: Apply FORM-A-THREAD on the screw and insert in damaged hole.

Permanent Stud Installation (light duty)

– Use a stud or thread on desired length.
– DO NOT apply release agent on stud.
– Do a STANDARD THREAD REPAIR.
– Allow to cure for 30 minutes.
– Assemble.

Gasket Compound



1. Proper strength Loctite
2. Loctite Primer N (P/N 293 800 041) and Gasket Eliminator 518 (P/N 293 800 038) on both sides of gasket
3. Loctite Primer N only

– Remove old gasket and other contaminants with Loctite Chisel remover (P/N 413 708 500). Use a mechanical mean if necessary.

NOTE: Avoid grinding.

– Clean both mating surfaces with solvent.
– Spray Loctite Primer N on both mating surfaces and on both sides of gasket. Allow to dry 1 or 2 minutes.
– Apply GASKET ELIMINATOR 518 (P/N 293 800 038) on both sides of gasket, using a clean applicator.

- Place gasket on mating surfaces and assemble immediately.

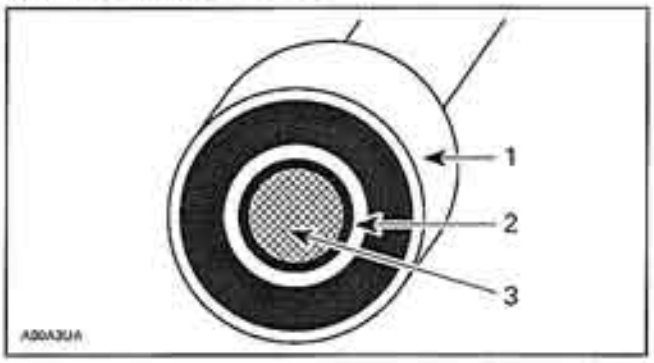
NOTE: If the cover is bolted to blind holes (above), apply proper strength Loctite in the hole and on threads. Tighten.

If holes are sunken, apply proper strength Loctite on bolt threads.

- Tighten as usual.

Mounting on Shaft

Mounting with a Press



1. Bearing
2. Proper strength Loctite
3. Shaft

- Clean shaft external part and element internal part.
- Apply a strip of proper strength Loctite on shaft circumference at insert or engagement point.

NOTE: Retaining compound is always forced out when applied on shaft.

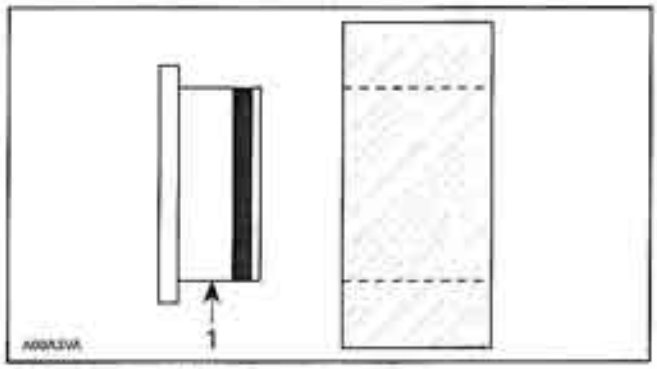
- DO NOT use anti-seize Loctite or any similar product.
- No curing period is required.

Mounting in Tandem

1. Apply retaining compound on internal element bore.
2. Continue to assemble as shown above.

Case-in Components

Metallic Gaskets



1. Proper strength Loctite

- Clean inner housing diameter and outer gasket diameter.
- Spray housing and gasket with Loctite Primer N (P/N 293 800 041).
- Apply a strip of proper strength Loctite on leading edge of outer metallic gasket diameter.

NOTE: Any Loctite product can be used here. A low strength liquid is recommended as normal strength and gap are required.

- Install according to standard procedure.
- Wipe off surplus.
- Allow it to cure for 30 minutes.

NOTE: Normally used on worn-out housings to prevent leaking or sliding.

It is generally not necessary to remove gasket compound applied on outer gasket diameter.

TIGHTENING TORQUES

Tighten fasteners to torque mentioned in exploded views and/or text, When they are not specified, refer to following table.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

In order to avoid a poor assembling, tighten screws, bolts or nuts in accordance with the following procedure:

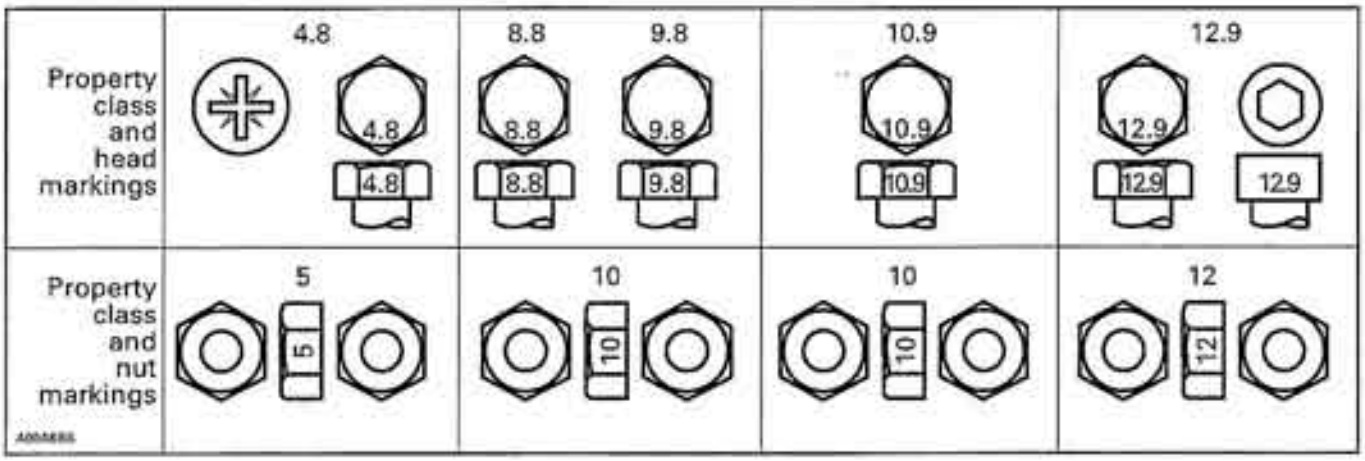
- Manually screw all screws, bolts and/or nuts.
- Apply the half of the recommended torque value.

CAUTION: Be sure to use the proper tightening torque for the proper strength grade.

NOTE: When possible, always apply torque on the nut.

- Torque to the recommended torque value.

NOTE: Always torque screws, bolts and/or nuts in a criss-cross sequence.



FASTENER SIZE	FASTENER GRADE/TORQUE			
	5.8 Grade	**8.8** Grade	**10.9** Grade	**12.9** Grade
M4	1.5 — 2 N•m (13 — 18 lbf•**in**)	2.5 — 3 N•m (22 — 27 lbf•**in**)	3.5 — 4 N•m (31 — 35 lbf•**in**)	4 — 5 N•m (35 — 44 lbf•**in**)
M5	3 — 3.5 N•m (27 — 31 lbf•**in**)	4.5 — 5.5 N•m (40 — 47 lbf•**in**)	7 — 8.5 N•m (62 — 75 lbf•**in**)	8 — 10 N•m (71 — 89 lbf•**in**)
M6	6.5 — 8.5 N•m (58 — 75 lbf•**in**)	8 — 12 N•m (71 — 106 lbf•**in**)	10.5 — 15 N•m (93 — 133 lbf•**in**)	16 N•m (142 lbf•**in**)
M8	15 N•m (11 lbf•ft)	24.5 N•m (18 lbf•ft)	31.5 N•m (23 lbf•ft)	40 N•m (30 lbf•ft)
M10	29 N•m (21 lbf•ft)	48 N•m (35 lbf•ft)	61 N•m (45 lbf•ft)	72.5 N•m (53 lbf•ft)
M12	52 N•m (38 lbf•ft)	85 N•m (63 lbf•ft)	105 N•m (77 lbf•ft)	127.5 N•m (94 lbf•ft)
M14	85 N•m (63 lbf•ft)	135 N•m (100 lbf•ft)	170 N•m (125 lbf•ft)	200 N•m (148 lbf•ft)

MAINTENANCE CHART

NOISE EMISSION CONTROL SYSTEM REGULATION

Tampering with noise control system is prohibited!

U.S. Federal law and Canadian provincial laws may prohibit the following acts or the causing there of:

1. The removal or rendering inoperative by any person other than for purposes of maintenance, repair or replacement of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use or,
2. The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Among those acts presumed to constitute tampering are the acts listed below:

1. Removal or alteration or the puncturing of the muffler or any engine component which conducts removal of engine exhaust gases.
2. Removal or alteration or the puncturing of any part of the intake system.
3. Replacing any moving parts of the vehicle or parts of the exhaust or intake system, with parts other than those specified by the manufacturer.
4. Lack of proper maintenance.

MAINTENANCE CHART

The schedule should be adjusted according to operating conditions and use.

NOTE: The chart gives an equivalence between number of hours and months/year. Perform the maintenance operation to whatever time comes first.

IMPORTANT: ATV rental operations or intensive use of ATV, will require greater frequency of inspection and maintenance.

Outlander 400 Series

OUTLANDER 400 SERIES						
A: ADJUST C: CLEAN I: INSPECT L: LUBRICATE R: REPLACE T: PROCEED WITH TASK	INITIAL INSPECTION 10 HOURS OR 300 KM (185 mi) (The initial maintenance is very important and must not be neglected.)	EVERY 25 HOURS OR 750 KM (470 mi)	EVERY 50 HOURS OR 1500 KM (930 mi)	EVERY 100 HOURS OR 3000 KM (1865 mi) OR 1 YEAR	EVERY 200 HOURS OR 6000 KM (3730 mi) OR 2 YEAR	REFER TO
PART/TASK						
ENGINE						
Engine/transmission oil and filter	R		R			*LUBRICATION*
Engine/transmission oil strainer cleaning					C	
Valve adjustment	I, A			I, A		*ENGINE SHOP MANUAL FOR ROTAX® 400*
Rewind starter rope condition				I		
Condition of engine seals	I			I		
Engine mount fasteners	I			I		*REMOVAL AND INSTALLATION*
Air filter (1)		C		R		*AIR INTAKE SILENCER*
Exhaust system	I			I		*EXHAUST SYSTEM*
Spark arrester				C		
Coolant	I			I (2)	R	*COOLING SYSTEM*
Radiator cap/cooling system pressure test	T				T	
Radiator condition/cleanliness (radiator fins)	I		I			
FUEL SYSTEM						
Throttle cable	I, A		I, A, L			*CARBURETOR*
Carburetor	I			I, L		
Choke	I			I, A		
Fuel lines, connections and fuel tank pressure test (4)	I			I		*FUEL TANK AND FUEL PUMP*
Fuel tank strainers					R	
ELECTRICAL SYSTEM						
Spark plug (3) (4)	I			R		*IGNITION SYSTEM*
Battery connections	I		I			*CHARGING SYSTEM*
Wiring harness, cables and lines	I			I		*LIGHTS, INSTRUMENTS AND ACCESSORIES*
Condition of ignition switch, start button and engine stop switch	I			I		
Condition of lighting system (HI/LO intensity, brake light, beam aiming, etc.)	I			I		
Winch connections	Refer to *ATV WINCH OPERATOR'S MANUAL*					N.A.

OUTLANDER 400 SERIES						
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PART/TASK						**REFER TO**
TRANSMISSION						
Drive belt				I		*CVT*
Drive and driven pulleys				I, C		
One-way bearing inside CVT				I, L		
CVT air inlet	I		I, C			
DRIVE TRAIN						
4 x 4 coupling unit	I			I		*4 X 4 COUPLING UNIT*
Drive shaft boots and protectors	I	I				*FRONT DRIVE AND REAR DRIVE*
Rear propeller shaft joints (1)	I		I, L			
Drive shaft joints			I			
Wheel bearings				I		
Wheel nuts/studs	I		I			
Tire wear and pressure	Every inspection					
Front and rear differentials oil level, seals and vents	I		I		R	
STEERING SYSTEM						
Handlebar fastener				I		*STEERING SYSTEM*
Steering system mechanism (1)	I			I		
Tie rod ends			I			
Front wheel alignment	I			I, A		
SUSPENSION						
Trailing arms				I		*REAR SUSPENSION*
Trailing arm bearings					I	
Shock absorbers			I			
A-arms			I			*FRONT SUSPENSION*
McPherson struts			I			
Ball joints		I				
BRAKES						
Brake fluid	I	I			R	*HYDRAULIC BRAKES*
Brake system (discs, hoses, etc.)				I		
Brake pads		I				

OUTLANDER 400 SERIES						
A: ADJUST C: CLEAN I: INSPECT L: LUBRICATE R: REPLACE T: PROCEED WITH TASK	INITIAL INSPECTION 10 HOURS OR 300 KM (185 mi) (The initial maintenance is very important and must not be neglected.)	EVERY 25 HOURS OR 750 KM (470 mi)	EVERY 50 HOURS OR 1500 KM (930 mi)	EVERY 100 HOURS OR 3000 KM (1865 mi) OR 1 YEAR	EVERY 200 HOURS OR 6000 KM (3730 mi) OR 2 YEAR	
PART/TASK						**REFER TO**
BODY/FRAME						
Frame fastener			I			*BODY AND FRAME*
Hitch/trailer ball condition (if installed)	I		I			
Seat fasteners			I			
Frame				I		
Vehicle cleaning and protection	Every inspection					
Storage cover latches	Every inspection					
Grab handles	Every inspection					
Backrest	Every inspection					

(1) More often under severe use such as dusty area, sand, snow, wet or muddy conditions.

(2) Every 100 hours, check coolant strength.

(3) Make sure that the spark plug gap is correct.

(4) Emission-related component.

N.A.: Not Applicable

Outlander 800 Series

OUTLANDER 800 SERIES						
A: ADJUST C: CLEAN I: INSPECT L: LUBRICATE R: REPLACE T: PROCEED WITH TASK	INITIAL INSPECTION 10 HOURS OR 300 KM (185 mi) (The initial maintenance is very important and must not be neglected.)	EVERY 25 HOURS OR 750 KM (470 mi	EVERY 50 HOURS OR 1500 KM (930 mi)	EVERY 100 HOURS OR 3000 KM (1865 mi) OR 1 YEAR	EVERY 200 HOURS OR 6000 KM (3730 mi) OR 2 YEAR	
PART/TASK						**REFER TO**
Engine						
Engine oil and filter	R			R		*LUBRICATION*
Engine oil strainer					C	
Valve adjustment	I, A			I, A		*ENGINE SHOP MANUAL FOR ROTAX® V-810*
Condition of engine seals	I			I		
Engine mount fasteners	I			I		*REMOVAL AND INSTALLATION*
Air filter (1)		C	R			*AIR INTAKE SILENCER*
Exhaust system	I			I		*EXHAUST SYSTEM*
Spark arrester				C		
Coolant	I			I (2)	R	*COOLING SYSTEM*
Radiator cap/cooling system pressure test	T				T	
Radiator condition/cleanliness (radiator fins)	I		I			
ENGINE MANAGEMENT SYSTEM						
Sensors (4)	I			I		*ENGINE MANAGEMENT*
Fault code reading (4)				I		
FUEL SYSTEM						
Throttle body	I			I, L		*ENGINE MANAGEMENT*
Throttle cable	I, A		I, A, L			
Fuel lines, fuel rail, connections, check valves and fuel tank pressure test (4)	I				I	*FUEL TANK AND FUEL PUMP*
In-line fuel filter				R		
Fuel pump pressure test				T		
ELECTRICAL SYSTEM						
Spark plug (3) (4)	I				R	*IGNITION SYSTEM*
Battery connections	I		I			*CHARGING SYSTEM*
ECM connectors				I		*ELECTRICAL CONNECTORS*
Electrical connections and fastening (ignition system, starting system, fuel injectors etc.)	I			I		
Digitally Encoded Security System	I			I		*DIGITALLY ENCODED SECURITY SYSTEM*
Condition of start button and engine stop switch	I			I		*LIGHTS, INSTRUMENTS AND ACCESSORIES*
Condition of lighting system (HI/LO intensity, brake light, beam aiming, etc.)	I			I		
Winch connections	Refer to *ATV WINCH OPERATOR'S MANUAL*					N.A.

OUTLANDER 800 SERIES						
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PART/TASK						**REFER TO**
TRANSMISSION						
Drive belt				I		*CVT*
Drive and driven pulleys				I, C		
One-way bearing inside CVT				I, L		
CVT air inlet	I		I, C			
Gearbox oil (1)	R			I	R	*GEARBOX*
4 x 4 coupling unit	I			I		
DRIVE TRAIN						
Drive shaft boots and protectors	I	I				*FRONT DRIVE AND REAR DRIVE*
Rear propeller shaft joints (1)	I		I, L			
Drive shaft joints			I			
Wheel bearings				I		
Wheel nuts/studs	I		I			
Tire wear and pressure	Every inspection					
Front and rear differentials oil level, seals and vents	I		I		R	
STEERING SYSTEM						
Handlebar fastener				I		*STEERING SYSTEM*
Steering system mechanism (2)	I			I		
Tie rod ends			I			
Front wheel alignment	I			I, A		
SUSPENSION						
Trailing arms				I		*REAR SUSPENSION*
Trailing arm bearings					I	
Shock absorbers			I			*FRONT AND REAR SUSPENSION*
A-arms			I			*FRONT SUSPENSION*
Ball joints		I				
BRAKES						
Brake fluid	I	I			R	*HYDRAULIC BRAKES*
Brake system (discs, hoses, etc.)				I		
Brake pads		I				

OUTLANDER 800 SERIES						
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PART/TASK						**REFER TO**
BODY/FRAME						
Frame fastener			I			*BODY AND FRAME*
Hitch/trailer ball condition (if installed)	I		I			
Seat fasteners			I			
Frame				I		
Vehicle cleaning and protection	Every inspection					
Storage cover latches	Every inspection					
Grab handles	Every inspection					
Backrest	Every inspection					

(1) More often under severe use such as dusty area, sand, snow, wet or muddy conditions.

(2) Every 100 hours, check coolant strength.

(3) Make sure that the spark plug gap is correct.

(4) Emission-related component.

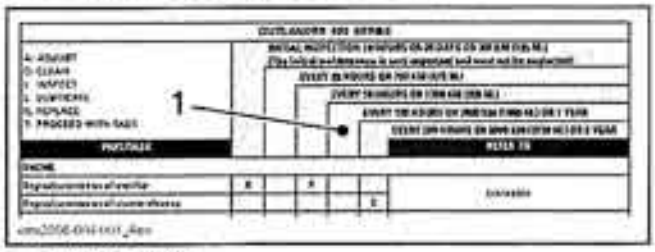
N.A.: Not Applicable.

PRESEASON PREPARATION

Prior to use vehicle, proper vehicle preparation is required if vehicle was not used for more than four consecutive months or after performing the storage procedure.

Any worn, broken or damaged parts found during the storage procedure should have been replaced. If not, proceed with the replacement.

Using the maintenance chart, performed items in the column indicated: EVERY 100 HOURS OR 3000 KM (1865 MI) OR 1 YEAR.



1. Use this column

Furthermore, proceed with the following:

Vehicles Prepared as per Storage Procedure

- Remove rags from: CVT inlet and outlet hoses, engine air intake and muffler.
- Test drive vehicle to confirm proper operation.

Vehicles Not Prepared as per Storage Procedure

- Replace engine oil and filter.
- Drain fuel tank and fill with fresh fuel.
- Test drive vehicle to confirm proper operation.

STORAGE PROCEDURES

SERVICE PRODUCTS

Description	Part Number	Page
Bombardier Cleaner (4 L)	293 110 002	11
Bombardier Cleaner (400 g)	293 110 001	11
BOMBARDIER LUBE	293 600 016	11, 13
Bombardier Vinyl & Plastic Cleaner	413 711 200	11
fuel stabilizer	413 408 600	11
storage oil (US)	413 711 900	11–12
storage oil	413 711 600	11–12

If the ATV is to be stored for an extended period of time, more than 1 month, be sure to thoroughly check the vehicle for repairs and have them performed.

VEHICLE CLEANING

To facilitate the inspection and ensure adequate lubrication of components, it is recommended to clean the entire vehicle.

Wash and dry the vehicle.

CAUTION: Never use a high pressure washer to clean the vehicle. USE LOW PRESSURE ONLY (like a garden hose). The high pressure can cause electrical or mechanical damages.

Remove any dirt or rust.

To clean the vinyl or plastic parts, use only flannel clothes with Bombardier Vinyl & Plastic Cleaner (P/N 413 711 200).

CAUTION: It is necessary to use flannel cloths on plastic parts to avoid damaging surfaces. Never clean plastic parts with strong detergent, degreasing agent, paint thinner, acetone, products containing chlorine, etc.

To clean the entire vehicle, including metallic parts use Bombardier Cleaner (400 g) (P/N 293 110 001) or Bombardier Cleaner (4 L) (P/N 293 110 002).

Inspect the vehicle and repair any damage. Touch up all metal spots where paint has been scratched off. Spray all metal parts with BOMBARDIER LUBE (P/N 293 600 016).

FUEL STABILIZER

With the new fuel additives, it is critical to use the fuel stabilizer (P/N 413 408 600) to prevent fuel deterioration, gum formation and fuel system components corrosion. Follow the manufacturer's instructions for proper use.

CAUTION: Fuel stabilizer should be added prior to engine lubrication to protect fuel components (carburetor or injectors) against varnish deposits.

Pour fuel stabilizer in fuel tank. Fill up fuel tank.

Do not drain fuel system.

ENGINE LUBRICATION

Engine internal parts must be lubricated to protect them from rust formation during the storage period.

⚠ WARNING

This procedure must only be performed in a well-ventilated area. Do not run engine during storage period.

Proceed as follows:

- Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.
- Stop the engine.
- Change engine oil and filter. Refer to *LUBRICATION SYSTEM.*

Outlander 400 Series

- Remove air box cover and air filter to spray storage oil (P/N 413 711 600) into carburetor bore.

NOTE: For US citizens, use storage oil (US) (P/N 413 711 900) only.

- Restart engine and run at idle speed.
- Inject storage oil until the engine stalls or until a sufficient quantity of oil has entered the engine (approximately a quarter of can).
- Remove spark plug(s) and spray storage oil into cylinder. Press start button, 1 or 2 seconds maximum, to lubricate cylinder.

- Stop the engine and remove the battery. Store it in dry and cool place out of the sun, refer to *BATTERY* in *CHARGING SYSTEM*.
- Reinstall the spark plug(s), air filter and air box cover.
- Turn the fuel valve to OFF and drain carburetor.

Outlander 800 EFI Series

- Remove spark plugs and spray storage oil (P/N 413 711 600) into each cylinder.

NOTE: For US citizens, use storage oil (US) (P/N 413 711 900) only.

CAUTION: Do not inject storage oil into throttle body bore to avoid blocking idle bypass valve.

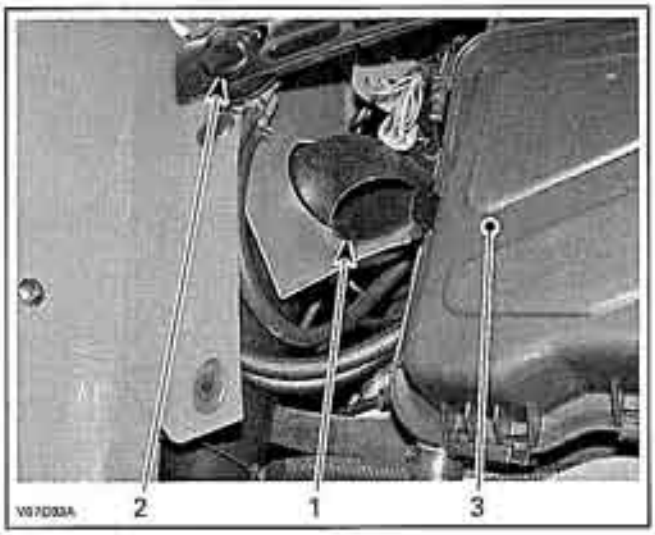
- Press start button, 1 or 2 seconds maximum, to lubricate cylinders.
- Reinstall the spark plugs.
- Remove the battery. Store it in dry and cool place out of the sun, refer to *BATTERY* in *CHARGING SYSTEM*.

RAGS INSTALLATION

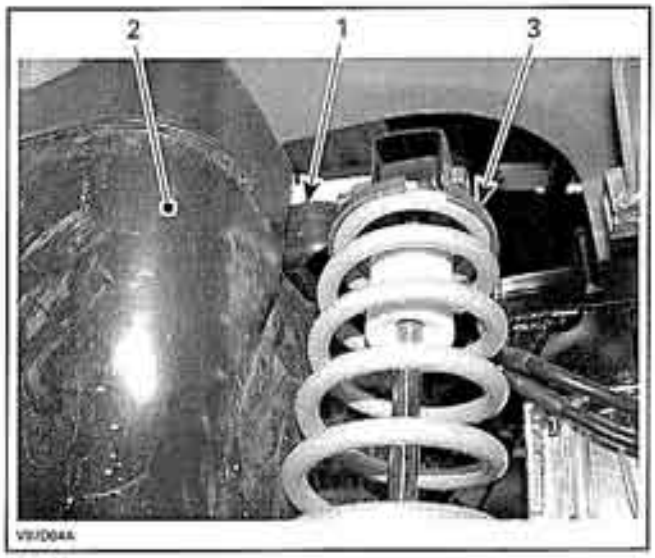
Using cleans rags, block the following locations: CVT inlet and outlet hoses, air intake inlet and muffler. The rags will prevent the intrusion of small animals, leaves or other debris.

CAUTION: Do not forget, these rags must be removed during preseason preparation before starting the vehicle.

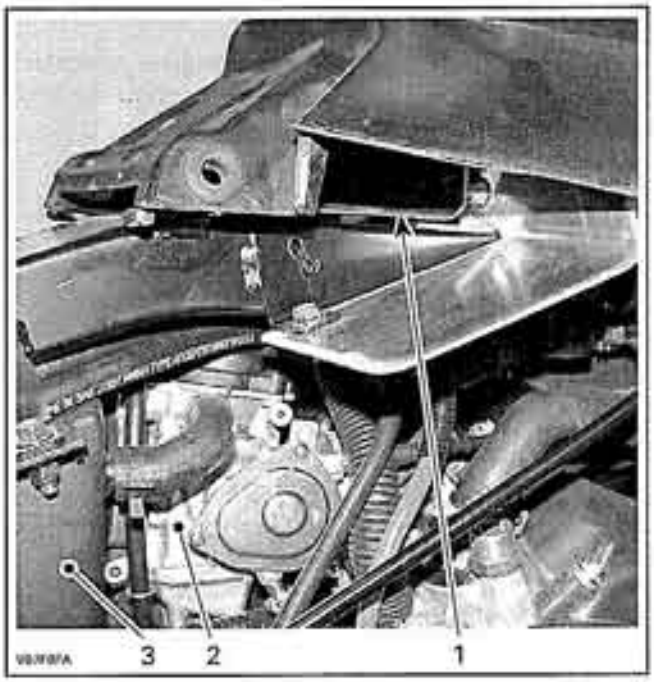
Outlander 400 Series



CVT INLET HOSE
1. CVT inlet hose
2. Fuel valve
3. Air filter box cover



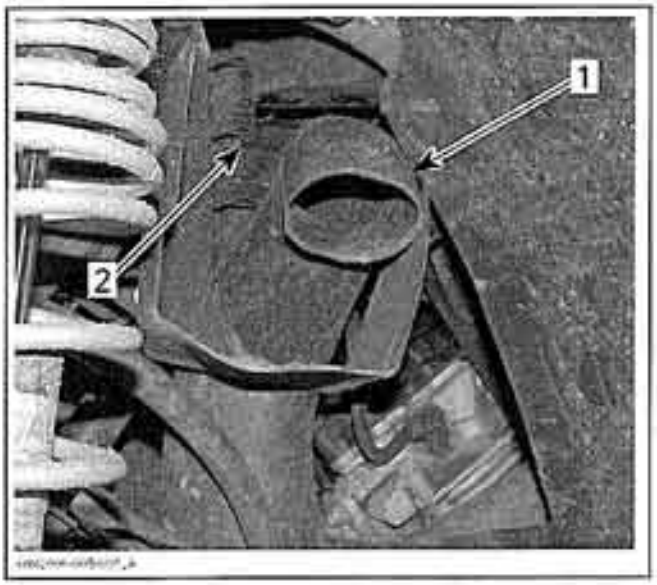
CVT OUTLET HOSE
1. CVT outlet hose
2. Fuel tank
3. LH rear shock absorber



AIR INTAKE INLET
1. Air intake inlet
2. Carburetor
3. Air filter box

Outlander 800 EFI Series

To reach the CVT inlet hose and the air intake inlet, remove the front inner fender on the left side of vehicle.



1. CVT inlet hose
2. Air intake inlet

The CVT outlet hose is located at the rear of engine, against vertical frame beam. The removal of the left side panel is necessary to reach the hose.

COOLANT DENSITY

Test coolant density using an antifreeze hydrometer.

NOTE: Follow manufacturer's instructions for proper use.

A 50/50 mixture of antifreeze and distilled water will provide the optimum cooling, corrosion protection and antifreeze protection.

CAUTION: Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system. Straight water will cause the system to freeze while straight antifreeze will cause system temperature problems.

Change coolant if necessary. Refer to *COOLING SYSTEM*.

DRIVE AND DRIVEN PULLEYS PROTECTION

Remove drive belt from pulleys.

Inspect and clean pulleys then spray BOMBARDIER LUBE (P/N 293 600 016) on pulley faces.

Do not reinstall drive belt. Close CVT cover.

VEHICLE PROTECTION

Protect the vehicle with a cover to prevent dust accumulation during storage.

CAUTION: The vehicle has to be stored in a cool and dry place and covered with an opaque tarpaulin. This will prevent sun rays and grime from affecting plastic components and vehicle finish.

SPECIAL PROCEDURES

SERVICE PRODUCTS

Description	Part Number	Page
BOMBARDIER LUBE	293 600 016	15–16

TURN OVER

If the oil pressure light (**Outlander 400 Series**) or the check engine indicator light (**Outlander 800 EFI Series**) stays ON after starting engine and the engine oil level is good, check the following:

- Oil filter for contamination.
  - Replace oil filter and oil.
- Oil pressure regulator valve stays open in the crankcase due to contamination (metallic particles).
  - Clean and/or replace the valve.
- Valve piston stuck in the oil pump housing.
  - Repair valve piston.
- Oil pressure switch for damages.
  - Replace it if necessary.
- Oil pump cleanliness and working.
  - Clean and/or replace oil pump if necessary.
- Oil strainer cleanliness and damages.
  - Clean and/or replace oil strainer.

ATV IMMERSION

ATV Submerged for a Long Time (over one hour)

Disassemble engine and transmission to clean the internal parts and check if there is no rust or corrosion on any internal parts. Refer to the specific *ENGINE SHOP MANUAL*.

Drain air box then clean and dry air filter.

Remove muffler and empty it. Let muffler dry then reinstall it on the vehicle.

Flush fuel tank and refill with new gas.

Clean carburetor (**Outlander 400 Series**) or lubricate throttle body (**Outlander 800 EFI Series**). Refer to *CARBURETOR* or *ENGINE MANAGEMENT*.

Look for water in:

- brake system (replace brake fluid)
- differentials (drain oil and check internal parts for rust or corrosion then refill).

Lubricate all cables. Check if the cables operate properly.

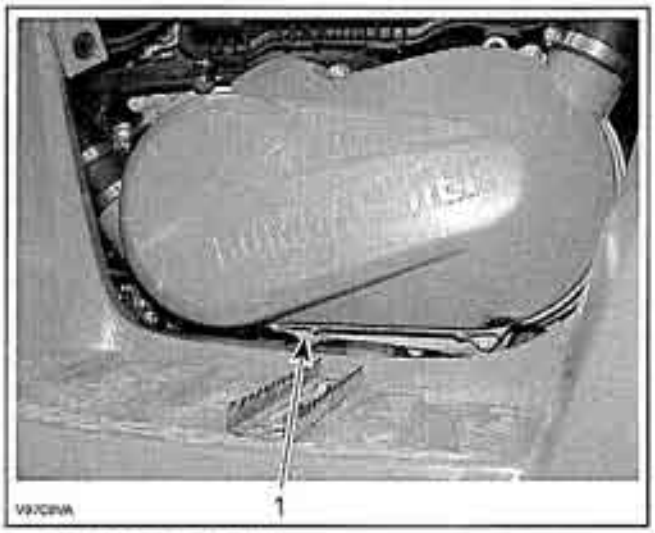
Spray all metal parts with BOMBARDIER LUBE (P/N 293 600 016).

Test drive to confirm all is working well (electrical and mechanical components).

ATV Submerged for a Short Time (fewer one hour)

Check if engine oil is contaminated (oil will be milky). If so, perform the following instructions.

- Drain engine oil.
- Drain air box then clean and dry air filter.
- Look for water in fuel tank, in doubt, flush fuel tank and refill with new gas.
- Drain the CVT housing. Remove the CVT cover then clean and check all parts of CVT. Refer to *CVT*.



OUTLANDER 400 SHOWN
1. CVT cover drain plug

- Lubricate all cables. Check if the cables operate properly.
- Remove spark plug(s) then crank engine slowly several times.

- Add a small quantity of engine oil in cylinder(s) (approximately 2 teaspoonfuls). Do not reinstall spark plug(s) at this moment.
- Refill engine at the proper level with the recommended oil. Crank engine several times.
- Check condition of spark plug. If spark plug appears good reinstall it, if not install a new one. On **Outlander 800 EFI Series**, check both spark plugs.
- Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.
- Stop the engine.
- Change engine oil and filter.

NOTE: Change oil as many times as necessary, until there is no white appearance in engine oil.

Spray all metal parts with BOMBARDIER LUBE (P/N 293 600 016).

Test drive to confirm all is working well (electrical and mechanical components).

TROUBLESHOOTING CHART

OUTLANDER 400 SERIES

The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline. This section pertains to engine mechanical components only. Some related problems can come from other systems such as ignition system, fuel system, etc. and have an impact on the engine. Ensure to check the other systems prior to concluding that the engine is in fault.

COOLING SYSTEM

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check coolant level. a. Coolant less than recommended level. Refill.
	2. Check temperature sensor for electrical/mechanical failure. a. Temperature sensor defective. Replace.
	3. Check thermostat. a. Thermostat defective. Replace.
	4. Check gasket(s) underneath water pump cover. a. Leakage in water pump cover area. Retighten screws and/or replace gasket.
	5. Check leak indicator hole (water pump housing area MAG side) if coolant leaks. a. Coolant leaking from leak indicator hole means a damaged rotary seal inside magneto cover. Replace both rotary seal and oil seal (refer to *COOLING SYSTEM* and *MAGNETO SYSTEM*).
	6. Check coolant bleeding screw on thermostat housing. a. Screw is loosed/missing and/or gasket ring is missing/broken. Retighten/add screw and replace gasket ring.
	7. Check condition of hoses and hose clamps fixation. a. Hoses are brittle and/or hard. Replace. b. Hose clamps are loose. Retighten clamps.
	8. Check condition of impeller located on the water pump shaft. a. Impeller wings broken and/or impeller thread is damaged. Replace.
	9. Check coolant drain screw on water pump housing MAG side (marked "Drain"). a. Copper ring on drain screw leaks. Retighten screw and/or replace copper gasket ring.

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
	10. Check cooling fan and connection. a. Fan motor faulty. Replace. b. Wire harness is brittle or hard (no connection). Replace.
	11. Check cylinder head and/or cylinder base gasket. a. Worn out gasket(s) is (are) causing water leakage. Replace gasket(s) and refill with coolant and oil (refer to *COOLING/LUBRICATION SYSTEM* and *TECHNICAL DATA*).
	12. Check intermediate gear(s) behind magneto cover. a. Worn out and/or broken gear(s) is (are) causing less coolant supply. Replace worn out and/or broken gear(s) (refer to *LUBRICATION/MAGNETO SYSTEM*).
	13. Check radiator fan switch and fuse 20 A. a. Faulty fan switch and/or faulty fuse. Replace defective part(s).
	14. Check radiator condition for leakage. a. Radiator cracked or deformed. Replace radiator.
	15. Check mud/dust in radiator fins. a. Radiator fin obstructed, hard air cooling. Clean radiator fins.
	16. Check if water pump shaft is seized. a. Water pump shaft does not turn. Replace defective part(s).

MAGNETO SYSTEM

SYMPTOM	NO SPARK.
CONDITION	NORMAL USE.
Test/Inspection	1. Check engine stop switch position. a. Engine stop switch is in OFF position. Place engine stop switch to RUN position.
	2. Check battery. a. Battery shows less power. Reload battery. b. Battery has electrical failure. Replace battery.
	3. Check condition of fuse(s). a. Faulty fuse(s). Replace.

SYMPTOM	NO SPARK.
CONDITION	NORMAL USE.
	4. Check spark plug electrode condition. a. Gap is too big. Readjust gap (refer to *TECHNICAL DATA*). b. Spark plug condition is bad. Diagnose spark plug condition and replace it (refer to *IGNITION SYSTEM*).
	5. Check spark plug cable and ignition wire. a. Cable and/or ignition wire is (are) damaged and/or shows electrical failure. Replace damaged part(s).
	6. Check ignition coil for damage and/or electrical failure. a. Ignition coil damaged and/or resistance value out of specification (refer to *TECHNICAL DATA*). Replace ignition coil. b. Connector is corroded or ignition coil shows electrical failure. Clean connector area and/or replace ignition coil. c. Wire harness is brittle or hard (no connection). Replace.
	7. Check CPS (crankshaft position sensor) for damage and/or electrical failure. a. Sensor shows electrical failure and/or damages. Replace CPS. b. Connector is corroded. Clean and reconnect. c. Resistance value is out of specification (refer to *TECHNICAL DATA*). Replace CPS.
	8. Check wire harness for cracks or other damages. a. Harness shows electrical failure and/or other damages. Replace wire harness and/or damaged wire section.
	9. Check magneto for damage and/or electrical failure. a. Radial position of rotor wrong due to a broken Woodruff key. Replace Woodruff key. b. Connector on magneto is damaged and/or has electrical failure. Repair and clean contacts of connector. c. Coating on stator winding is damaged. Replace magneto. d. Resistance value is out of specification (refer to *TECHNICAL DATA*). Replace magneto.
	10. Check electronic module. a. Module shows electrical failure or damages. Replace electronic module. b. Connectors are corroded. Clean and reconnect. c. Electronic module has bad ground to the vehicle frame. Clean metal surface for good ground.

LUBRICATION

SYMPTOM	LOW OR NO OIL PRESSURE/HIGH OIL CONSUMPTION.
CONDITION	NORMAL USE.
Test/Inspection	1. Check oil level and search for leakage on crankcase and/or defective seals. a. Crankcase is leaking due to damage. Rebuild engine with new crankcase and gasket parts. Use a high quality oil (refer to *TECHNICAL DATA*). b. Crankcase is leaking due to loose screws. Retighten screws with recommended torque. c. Sealing rings, O-rings and/or gaskets are brittle and/or hard or damaged. Replace damaged parts. d. Piston rings worn out (blue-colored engine exhaust emission). Replace piston rings (refer to *CYLINDER AND HEAD*). e. Piston rings are broken (low compression and blue-colored engine exhaust emission). Replace piston rings (refer to *CYLINDER AND HEAD*). f. Valve stem seal damaged and/or sealing lip is hard and/or brittle. Replace all valve stem seals.
	2. Check oil filter for contamination. a. Oil filter clogged. Replace oil filter and oil at the same time. Use a high quality oil (refer to *TECHNICAL DATA*).
	3. Check oil pressure regulator valve (spring) function. a. Valve spring damaged (valve always open). Replace spring. b. Valve stays open in crankcase PTO due to contamination (metallic particles). Clean and/or repair valve piston.
	4. Check oil drain plug on engine bottom. a. Plug is loosed and/or gasket ring is missing. Retighten the plug and/or place gasket ring.
	5. Check oil strainer on engine bottom. a. Screw(s) is (are) loosed and/or gasket is damaged, brittle or hard. Retighten screw and/or replace gasket. b. Oil strainer is clogged due to contamination. Clean or replace strainer and diagnose causes. Replace possible damaged parts. Use high quality oil (refer to *TECHNICAL DATA*).
	6. Check leak indicator hole for oil leaks (water pump housing area MAG side). a. Oil leaking from leak indicator hole means a damaged oil seal inside magneto cover on water pump shaft. Replace both rotary seal and oil seal (refer to *COOLING SYSTEM* and *MAGNETO SYSTEM*).
	7. Check oil pressure switch function. a. Oil pressure switch damaged. Replace oil pressure switch.
	8. Check oil orifice(s) on the oil pump suction side. a. Oil orifice(s) is (are) clogged. Clean from contamination. Replace oil and oil filter if necessary (refer to *MAINTENANCE* or *LUBRICATION*).

SYMPTOM	LOW OR NO OIL PRESSURE/HIGH OIL CONSUMPTION.
CONDITION	NORMAL USE.
	9. Check oil pump operation. a. Oil pump rotor is out of wear limit. Replace oil pump shaft (refer to *LUBRICATION*). b. Oil pump seized due to oil leakage and/or air inclusion. Replace oil pump (refer to *LUBRICATION*). c. Gears driving oil pump are broken or damaged. Replace gears. d. Incorrect oil being used. Use a high quality oil (refer to *TECHNICAL DATA*).
	10. Check plain bearings in crankcase for heavy wear. a. Plain bearings out of specification (increased clearance). Replace all plain bearings at the same time (refer to *CRANKSHAFT*).

SYMPTOM	OIL CONTAMINATION (white appearance).
CONDITION	NORMAL USE.
Test/Inspection	1. Check leak indicator hole (water pump housing area MAG side) if water and oil leaks. a. Leakage of oil/water mixture from leak indicator hole means damaged oil seal and rotary seal inside magneto cover on water pump shaft. Replace both rotary seal and oil seal and refill with recommended oil and/or coolant (refer to *COOLING SYSTEM* and *MAGNETO SYSTEM*).
	2. Check cylinder head and/or cylinder base gasket. a. Gasket damaged or leaking. Retighten cylinder head with recommended torque and/or replace gasket.
	3. Check screws for torque. a. Screws not fixed. Retighten screws with recommended torque and/or replace oil.
	4. Check oil for particles (may indicate possible damages inside the engine). a. Oil contamination due to metal or plastic particles. Replace possibly damaged parts. Use a high quality oil (refer to *TECHNICAL DATA*).

CYLINDER AND HEAD

SYMPTOM	UNUSUAL ENGINE NOISE AND/OR VIBRATION IN IDLE SPEED.
CONDITION	NORMAL USE.
Test/Inspection	1. Check operation of decompressor located on camshaft. a. Decompressor shaft sticks and/or torsion spring is damaged. Replace spring and/or decompressor mechanism. b. Loose camshaft gear. Retighten camshaft gear (refer to *CYLINDER AND HEAD*).
	2. Check chain tensioner operation. a. Faulty chain tensioner. Replace spring and/or mechanism.
	3. Check valve adjustment. a. Intake and/or exhaust valves not adjusted correctly. Adjust valves.

SYMPTOM	UNUSUAL ENGINE NOISE AND/OR VIBRATION WHILE OPERATING.
CONDITION	NORMAL USE.
Test/Inspection	1. Check items 1 and 2 of *UNUSUAL ENGINE NOISE AND/OR VIBRATION IN IDLE SPEED.*
	2. Check noise coming from cylinder head area. a. Check valve clearance. Readjust valve clearance and/or replace defective part(s). b. Chain guide worn out. Replace chain guide. c. Stretched chain and/or worn out sprocket. Replace chain and sprocket at the same time. d. Sprocket screw got loose. Retighten screw with recommended torque. e. Rocker arm(s) is (are) worn out (valve adjustment). Readjust valve clearance and/or replace rocker arm(s). f. Thrust washer(s) on rocker arm shaft is (are) missing. Fit thrust washer(s) (refer to *CYLINDER AND HEAD*).

SYMPTOM	OIL CONTAMINATION ON CYLINDER AND/OR HEAD.
CONDITION	NORMAL USE.
Test/Inspection	1. Check screws for torque. a. Loose screws. Retighten screws with recommended torque. b. Gaskets are brittle, hard, worn out or damaged. Replace damaged gasket(s).

CRANKSHAFT AND BALANCER SHAFT

SYMPTOM	UNUSUAL ENGINE NOISE AND/OR VIBRATIONS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check for possible plain bearing failure. a. Oil pressure is out of specified values. Replace damaged parts (refer to *LUBRICATION*). b. Connecting rod small end bearing is damaged and/or out of specification. Replace damaged and/or worn out part(s). c. Connecting rod big end clearance is out of specification. Replace damaged and/or worn out part(s). d. Crankshaft plain bearing MAG/PTO side is damaged and/or out of specification. Replace crankshaft and plain bearing MAG/PTO at the same time (refer to *CRANKSHAFT*).
	2. Check ball bearing(s) on balancer shaft end(s). a. Ball bearing(s) do(es) not move freely. Replace bearing(s).
	3. Check that mark on balancer shaft is aligned with crankshaft position mark. a. Mark on balancer shaft and crankshaft are not aligned. Readjust position of balancer shaft and crankshaft (refer to *CRANKSHAFT/BALANCER SHAFT*).

GEARBOX

SYMPTOM	UNUSUAL ENGINE NOISE AND/OR VIBRATIONS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check oil level in engine. a. Oil leakage from engine. Replace damaged gasket(s) and/or oil seal(s), torque screws and refill with oil up to specified level (refer to *TECHNICAL DATA*).
	2. Check bearings in the gearbox for free movement. a. Bearing(s) do(es) not move freely. Replace bearing(s).
	3. Check for knocking noise. a. Tooth of gears are damaged and/or worn. Replace respective gears.

SYMPTOM	GEAR INDICATION FAILS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check wire harness connector pins (gear indicator) and/or electronical system. a. Connector pins are corroded and/or damaged. Clean connector and/or replace wire harness if damaged. b. Electronical system failed and/or damaged. Repair and/or replace damaged part(s).
	2. Check contact screws on PTO side (behind CVT driven pulley) for damage and/or wear. a. Shifting indicator switch(es) pin(s) is (are) worn and/or damaged. Replace shifting indicator switch(es). b. Contact(s) is (are) corroded and/or contact screw for wire harness got loose. Clean contact surface and retighten contact screw(s) with recommended torque. c. Wire harness has broken cables. Replace wire harness.

SYMPTOM	GEAR(S) IS (ARE) HARD TO SHIFT.
CONDITION	NORMAL USE.
Test/Inspection	1. Check shift shaft spline and/or shift forks for wear and/or damages. a. Shift shaft is worn out and/or shows damaged splines. Replace shift shaft. b. Shift drum track(s) and/or splines is (are) worn out or damaged. Replace shift drum and damaged part(s). c. Shift fork(s) is (are) worn out and/or engagement pins are damaged. Replace shift fork(s). d. Shift fork(s) is (are) worn out and/or fork(s) is (are) damaged. Replace shift fork(s). e. Shift gear(s) is (are) worn out. Replace shift gear(s). f. Shifting indicator switch(es) pin(s) is (are) worn out (no roundings on top of pin). Replace shifting indicator switch(es).
	2. Check engine idle speed (choke in use). a. Idle speed is too high (CVT starts to work). Adjust idle speed. b. Choke is in use and increases the engine RPM. Release choke.
	3. Check CVT one way clutch on drive pulley. a. CVT one way clutch was not lubricated correctly. Lubricate CVT one way clutch (refer to *CVT*). b. CVT one way clutch is worn out or damaged. Replace defective part(s) (refer to *CVT*).
	4. Check transmission lever and connecting rod. a. Ball joint and/or ball joint nut is (are) loose. Retighten or replace the ball joint.
	5. Check spring on shifter plate. a. Broken spring. Replace the spring.
	6. Check for any mud intrusions. a. CVT parts dirty. Clean all CVT parts.

REWIND STARTER

SYMPTOM	REWIND STARTER ROPE DOES NOT REWIND.
CONDITION	NORMAL USE.
Test/Inspection	1. Check rewind spring. a. Broken spring. Replace spring (refer to *REWIND STARTER*).

SYMPTOM	REWIND STARTER PAWL DOES NOT ENGAGE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check stop spring. a. Broken stop spring. Replace.
	2. Check pawl and pawl lock. a. Pawl and pawl lock are stuck together because of heat. Replace.
	3. Check pawl and rope sheaves. a. Pawl and rope sheaves are stuck together because of heat. Replace.

CVT

SYMPTOM	THE ATV ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt condition. a. Belt is too narrow (drive belt engagement is higher in drive pulley). Replace belt if width is less than specified (refer to *CVT* and/or *TECHNICAL DATA*).
	2. Check roller(s) on governor cup and/or lever condition on drive pulley sliding half. a. Roller(s) is (are) worn and/or damaged (refer to *CVT*). Replace governor cup assembly. b. Lever(s) on drive pulley sliding half is (are) worn and/or damaged (refer to *CVT*). Replace all levers at the same time (lever kit).
	3. Check drive pulley sliding half for free axial movement. a. Sliding half is stuck (refer to *CVT*). Replace damaged part(s).
	4. Check condition of drive/driven pulley spring. a. Drive pulley spring tension is too smooth and/or damaged (refer to *CVT*). Replace spring. b. Driven pulley spring tension is too stiff (refer to *CVT*). Replace spring.
	5. Check carburetor adjustment and/or high altitude calibration. a. Carburetor is not adjusted according to specified values and/or high altitude calibration. Readjust carburetor.
	6. Check engine condition. a. Low engine compression. Replace defective part(s).
	7. Check ignition condition. a. Faulty spark plug. Install new spark plug(s).
	8. Check valve adjustment. a. Intake and/or exhaust valves are not adjusted correctly. Adjust valves.
	9. Check differentials operation. a. Vehicle on Neutral is hard to move. Repair or replace defective part(s).

SYMPTOM	ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED.
CONDITION	NORMAL USE.
Test/Inspection	1. Check items 1 to 3 of *THE ATV ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.*
	2. Check drive/driven pulley spring tension. a. Drive pulley spring tension is too stiff. Replace spring (recommended Bombardier spring). b. Driven pulley spring tension is too smooth and/or damaged (refer to *CVT*). Replace spring.
	3. Check drive/driven pulley area for contamination and/or water intrusion. a. CVT area is contaminated with water, dirt or oil. Clean CVT system and replace damaged part(s).

SYMPTOM	DRIVE PULLEY NOISE IN IDLE SPEED.
CONDITION	NORMAL USE.
Test/Inspection	1. Check slider shoes (drive pulley). a. Worn slider shoes (increased clearance between governor cup and drive pulley sliding half). Replace all slider shoes at the same time (slider shoes kit).
	2. Check driven pulley sliding mechanism (between driven pulley outer and inner half). a. Mechanism is stuck and/or damaged. Replace driven pulley assembly.
	3. Check roller(s) and/or levers for wear (located on sliding half of drive pulley). a. Roller(s) on governor cup is (are) worn out and/or damaged (refer to *CVT*). Replace governor cup assembly. b. Lever(s) on drive pulley sliding half is (are) worn out and/or damaged (refer to *CVT*). Replace all levers at the same time (lever kit).
	4. Check drive pulley screw for torque. a. Loose screw. Retighten screw with recommended torque.
	5. Check one-way clutch condition on drive pulley sliding half. a. Bearing(s) do(es) not move freely. Replace damaged part(s) and lubricate inside of one-way clutch (refer to *CVT*). b. Spring sleeve(s) inside one-way clutch is (are) worn out. Replace both sleeves and springs and lubricate inside of one-way clutch (refer to *CVT*). c. Spring(s) inside one-way clutch is (are) worn out. Replace both pins and springs and lubricate inside of one-way clutch (refer to *CVT*).

SYMPTOM	DRIVE PULLEY NOISE WHEN ACCELERATING/DECELERATING.
CONDITION	NORMAL USE.
Test/Inspection	1. Check items 1 to 5 of drive pulley noise in idle speed.
	2. Check if belt runs in dry conditions. a. Drive pulley area is wet/contaminated due to water/dirt intrusion. Clean driven pulley area and/or drain water out of CVT cover.
	3. Check drive/driven pulley screw for torque. a. Loose screw on drive and/or driven pulley. Retighten screw with recommended torque.
	4. Check cam and driven pulley fixed half for wear. a. Cam and/or drive pulley fixed half out of wear limit and/or damaged. Replace damaged part(s).
	5. Check torque gear fixed in driven pulley sliding half for wear. a. Torque gear out of wear limit and/or damaged. Replace torque gear (refer to *CVT*).
	6. Check for foreign particles in CVT area (stones, dirt, etc.). a. Small particles damaged belt and/or pulley surface(s). Clean system and replace damaged parts (refer to *CVT*).

SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVE PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	1. Check tightening torque of drive pulley nut. a. Moving sliding half. Retighten nut.
	2. Check fixed half bushings. a. Excessive gap between bushings and fixed half shaft, thus restraining sliding half movements. Replace fixed half assembly.
	3. Check starter ring gear condition. a. Starter ring gear loosened. Retighten ring gear and/or mount it in original position (balanced system).
	4. Check if slider shoes are present and/or placed in correct position. a. Slider shoe(s) is (are) missing and/or damaged. Replace all slider shoes at the same time (slider shoes kit).

SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	1. Check fixed and sliding half bushings on driven pulley. a. Excessive gap between bushings and CVT shaft, thus restraining sliding half movements. Replace fixed and/or sliding half of driven pulley, polish CVT shaft area with fine emery cloth and wipe clean with a cloth.

SYMPTOM	PULLEYS DO NOT DOWN/UP SHIFT PROPERLY.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive pulley bushings (cleanliness, wear, etc.). a. Bushings stick to fixed half pulley shaft. Clean or replace. b. Spring seat sticks to sliding half pulley bushing. Clean system and/or replace sliding half pulley. c. One-way clutch does not operate properly. Clean system and/or replace damaged part(s).
	2. Check driven pulley spring tension. a. Driven pulley spring tension is too weak and/or broken. Replace. b. Driven pulley cam is worn or damaged. Replace.

SYMPTOM	BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check if CVT air intake and/or outlet is clogged. a. CVT area heats up due to contamination. Clean air intake and/or outlet from contamination. b. Fans located on drive pulley fixed half (underneath ring gear) are clogged. Clean from contamination.
	2. Check if pulley halves are clean. a. Oil on pulley surfaces. Clean pulley halves and replace belt. b. Water intrusion in CVT area. Find root cause and repair. Drain water and replace belt.

SYMPTOM	BELT WORN EXCESSIVELY IN TOP WIDTH.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt width. a. Considerable wear. Replace belt if narrower than specified (refer to *CVT* or *TECHNICAL DATA*).
	2. Check drive belt identification number. a. Improper belt angle (wrong type of belt). Replace belt with an appropriate drive belt.
	3. Check for localized belt wear caused by belt slippage. a. Localized wear. Replace belt.

SYMPTOM	BELT DISINTEGRATION.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt identification number. a. Excessive belt speed. Using unspecified type of belt. Replace belt with proper type of belt (refer to *TECHNICAL DATA*).
	2. Check if pulley halves are clean. a. Oil on pulley surfaces. Clean pulley surfaces with fine emery cloth and wipe clean using Pulley Flange Cleaner (P/N 413 711 809) and a cloth. b. Drive/driven pulley halves are damaged through stones inside CVT area. Clean pulley surfaces with fine emery cloth, wipe clean with a cloth or replace drive/driven pulley halves and belt.

SYMPTOM	FLEX CRACKS BETWEEN COGS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt condition. a. Considerable use, belt wearing out. Replace. b. Brittle belt condition through aging. Replace belt.

ENGINE GENERAL

SYMPTOM	ENGINE BACKFIRES.
CONDITION	NORMAL USE.
Test/Inspection	1. Check spark plug and/or electrical system. a. Carbon accumulation caused by defective spark plug. Clean carbon accumulation and replace spark plug. b. Electrical system has failure. Replace defective part(s).
	2. Check leakage on intake manifold. a. Air leak on intake system. Retighten screws and/or replace intake manifold.
	3. Check exhaust air leaking. a. Exhaust gasket is leaking. Retighten screws and/or replace exhaust gasket.
	4. Check intake valve(s) for leaking. a. Intake valve(s) is (are) leaking. Repair or replace valve(s).
	5. Check if fuel supply is insufficient at high RPM. a. Fuel line is contaminated and/or bent (engine gets lean). Clean and/or replace defective part(s).
	6. Check carburetion. a. Faulty carburetor settings. Adjust carburetor.

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	1. Check spark plug cap contact and/or cable. a. Spark plug cap loose. Replug cap. b. Spark plug cable melted and/or damaged. Replace spark plug cable.
	2. Check condition of spark plug (blue spark ideal). a. Red, jumping spark means a damaged spark plug. Replace spark plug with appropriate heat range (refer to *TECHNICAL DATA*). b. Condition of spark plug. Readjust carburetor and/or replace spark plug.
	3. Check fuel supply to engine intake. a. Fuel valve is switched off. Turn on fuel valve. b. Run out of fuel. Turn fuel valve to "RES" position and refill. c. Poor quality and/or wrong fuel. Clean from contamination and use appropriate fuel (refer to *TECHNICAL DATA*). d. Carburetor contaminated. Clean jets and carburetor float chamber from contamination. e. Fuel line clogged and/or bent. Clean fuel supply from contamination and/or replace defective part(s). f. Fuel supply insufficient at high RPM. Clean fuel supply from contamination.
	4. Perform engine leak test. Refer to *ENGINE LEAK TEST* procedure. Check for possible piston seizure. a. Damaged head gasket and/or seal and/or leaking inlet/exhaust valve(s). Replace and/or repair defective parts.
	5. Piston seizure (piston ring(s) damaged and/or cylinder shows grooves). a. Spark plug heat range is too low. Replace damaged parts and install spark plug with appropriate heat range (refer to *TECHNICAL DATA*). b. Compression ratio is too high. Install genuine parts. c. Poor oil quality. Use a high quality oil. d. Leaks at air intake manifold (engine gets too lean). Retighten screws or replace air intake manifold. e. Contamination (like sand) through engine intake. Replace defective part(s) and use new air filter.
	6. Melted and/or perforated piston dome; melted section at ring end gap. a. Spark plug heat range is too low. Install recommended spark plug (refer to *TECHNICAL DATA*). b. Coolant less than recommended level (engine gets too hot). Repair cooling circuit and/or refill with recommended liquid.
	7. Cracked or broken piston. a. Cracked or broken piston due to excessive piston/cylinder clearance or engine overreving. Replace piston. Check piston/cylinder clearance (refer to *CYLINDER AND HEAD*).

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	8. Check connecting rod, crankshaft, rocker arm rollers movement. a. Connecting rod failure due to lack of oil. Repair and replace defective parts and use a high quality oil. b. Crankshaft failure due to lack of oil. Repair and replace defective parts and use a high quality oil. c. Oil contamination due to clogged oil filter. Replace oil filter and oil at the same time, replace defective part(s) (refer to *MAINTENANCE CHART*).
	9. Check valve springs exhaust/inlet. a. Broken valve spring damages the cylinder head, valve(s), rocker arm(s)/piston. Replace defective part(s) and do the valve adjustment.
	10. Check for water intrusion through intake system into combustion chamber. a. Water in intake system and/or combustion chamber. Replace defective part(s).

SYMPTOM	ENGINE TURNS OVER BUT FAILS TO START.
CONDITION	NORMAL USE.
Test/Inspection	1. Check items of engine does not start — no spark at spark plug.
	2. Check spark plug. a. Inspect spark plug (no spark) or wrong spark plug gap. Readjust gap and clean spark plug or replace.
	3. Check for fuel on spark plug. a. Flooded engine (spark plug wet when removed). Do not overchoke. Remove wet spark plug, turn ignition switch to OFF and crank engine several times. Install clean dry spark plug. Start engine following usual starting procedure.
	4. Check engine compression. a. Insufficient engine compression. Replace defective part(s) (ex.: piston, ring(s), etc.). b. Valve seat worn and/or damaged. Repair by performing valve guide procedure (refer to *CYLINDER AND HEAD*). Readjust valve clearance.

SYMPTOM	ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM.
CONDITION	NORMAL USE.
Test/Inspection	1. Check items of engine suddenly turns off.
	2. Check air intake system. a. Air filter is clogged due to contamination. Replace air filter.
	3. Check spark plug condition and/or gap. a. Fouled spark plug or wrong spark plug gap. Readjust gap and clean spark plug or replace.
	4. Check spark plug type. a. Improper spark plug heat range. Install recommended spark plug (refer to *TECHNICAL DATA*).
	5. Check engine compression and perform engine leak test. Refer to *ENGINE LEAK TEST* procedure. Check for possible piston seizure. a. Damaged head gasket and/or seal and/or leaking inlet/exhaust valve(s). Replace and/or repair defective parts. b. Worn piston and/or piston ring(s). Replace (refer to *CYLINDER AND HEAD*).
	6. Check for water in fuel (wrong fuel). a. There is water in fuel or wrong fuel. Drain fuel system, search for leakage and refill it with appropriate fuel.
	7. Check drive belt/CVT condition. a. Worn belt. Replace belt if width is less than specified (refer to *CVT*).

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check if cooling system shows any failure (see *COOLING SYSTEM*). a. System is leaking. Repair and/or replace damaged part(s).
	2. Check condition and heat range of spark plug. a. Melted spark plug tip or inadequate heat range. Install recommended spark plug (refer to *TECHNICAL DATA*).
	3. Check air inlet and outlet of the CVT cover. a. Air circulation is clogged (overheating). Clean air circulation from contamination. b. Drive belt worn and/or damaged. Replace belt with an appropriate drive belt (refer to *TECHNICAL DATA*).

SYMPTOM	STARTER TURNS, BUT ENGINE DOES NOT CRANK.
CONDITION	NORMAL USE.
Test/Inspection	1. Check gear condition on electric starter. a. Worn and/or damaged starter gear. Replace electric starter and/or starter drive.
	2. Check condition of starter pinion gear. a. Worn and/or damaged starter pinion and/or ring gear. Replace starter drive and/or drive pulley fixed half.
	3. Check splines on starter drive. a. Poor movement of pinion gear on splines. Clean and/or replace starter drive.

SYMPTOM	ENGINE DOES NOT START — NO SPARK AT SPARK PLUG (see *MAGNETO SYSTEM*).
CONDITION	AT ENGINE CRANKING.
Test/Inspection	1. Verify spark plug condition. a. Defective, improperly set, worn out, fouled. Identify source of problem and correct. Replace spark plug.
	2. Verify condition of ignition coil and resistance with an ohmmeter. a. Mechanically damaged part. Vibration problem. Electrically damaged part. Replace ignition coil.
	3. Verify condition of CPS and resistance with an ohmmeter and connector condition. a. Defective CPS. Corroded connector terminal. Replace CPS. Clean terminals and apply silicone dielectric grease. b. Mechanically damaged part. Vibration problem. Electrically damaged part. Replace CPS and/or tighten mounting screw(s). c. Metallic particles caused a short circuit between the soldered connections. Clean CPS from metallic dust.
	4. Check magneto for damage and/or electrical failure. a. Windings of stator have electrical failure (no charging causes an empty battery). Replace magneto.

TROUBLESHOOTING CHART

OUTLANDER 800 SERIES

The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline. This section pertains to engine mechanical components only. Some related problems can come from other systems such as ignition system, fuel system etc. and have an impact on the engine. Ensure to check the other systems before concluding that the engine is faulty.

COOLING SYSTEM

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check coolant level. a. Coolant level lower than recommended. Refill (refer to *COOLING SYSTEM*).
	2. Check for air bubbles in cooling system. a. Air in cooling system. Refill and bleed cooling system (refer to *COOLING SYSTEM*).
	3. Check temperature sensor for electrical/mechanical failure. a. Temperature sensor defective. Replace.
	4. Check thermostat. a. Thermostat defective (does not open when engine gets hot). Replace (refer to *COOLING SYSTEM*).
	5. Check leak indicator hole (in crankcase MAG side-water pump housing area) if coolant leaks. a. Coolant leaking from indicator hole means a damaged water pump rotary seal. Replace rotary seal (refer to *COOLING SYSTEM*).
	6. Check condition of hoses and hose clamps fixation. a. Hoses are brittle and/or hard. Replace. b. Hose clamps are loose. Retighten clamps.
	7. Check condition of impeller located on the water pump shaft. a. Impeller wings broken and/or impeller threads are damaged. Replace (refer to *COOLING SYSTEM*).
	8. Check gasket on water pump housing. a. Gasket on water pump housing leaks. Retighten screws and/or replace gasket.
	9. Check cylinder head and/or cylinder base gasket. a. Worn out gasket(s) is (are) causing coolant leakage. Replace.
	10. Check coolant drain screw on water pump housing MAG side (marked "DRAIN"). a. Copper ring on drain screw leaks. Retighten screw and/or replace copper ring.

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
	11. Check intermediate gear(s) behind of PTO cover. a. Worn out and/or broken gear(s) is/are causing less coolant supply. Replace worn out and/or broken gear(s) (refer to *BOTTOM END*).
	12. Check if water pump shaft is seized. a. Water pump shaft does not turn. Replace defective part(s).

MAGNETO SYSTEM

SYMPTOM	NOT CHARGING AT ALL OR CHARGING VOLTAGE INADEQUATE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check magneto for damage and/or electrical failure. a. Radial position of rotor wrong due to broken Woodruff key. Replace Woodruff key. b. Coating on stator winding is damaged. Replace magneto. c. Resistance value is out of specification (refer to *TECHNICAL DATA*). Replace magneto. d. Connector on magneto is damaged and/or has electrical failure. Repair and clean contacts of connector.
	2. Check wiring harness for cracks or other damages. a. Harness shows electrical failure and/or other damages. Replace/repair wiring harness.
	3. Check battery. a. Battery has electrical failure. Replace.

LUBRICATION

SYMPTOM	LOW OR NO OIL PRESSURE/HIGH OIL CONSUMPTION.
CONDITION	NORMAL USE.
Test/Inspection	1. Check oil level and search for leakage on crankcase and/or sealing parts. a. Crankcase is leaking due to damage. Rebuild engine with new crankcase and gasket parts. Use high quality oil (refer to *TECHNICAL DATA*). b. Crankcase is leaking due to loose screws. Retighten screws with recommended torque. c. Sealing rings, O-rings and/or gaskets are brittle, hard or damaged. Replace damaged parts. d. Piston rings worn out (blue colored engine exhaust emission). Replace piston rings (refer to *CYLINDER AND HEAD*). e. Piston rings are broken (low compression). Replace piston rings (refer to *CYLINDER AND HEAD*). f. Valve stem seal damaged and/or sealing lip is hard and/or brittle. Replace all valve stem seals.
	2. Check oil filter for contamination. a. Oil filter clogged. Replace oil and oil filter at the same time. Use high quality oil (refer to *TECHNICAL DATA*).
	3. Check oil drain plug on engine bottom. a. Plug is loose and/or gasket ring is missing. Retighten the plug and/or place gasket ring.
	4. Check leak indicator hole if oil leaks (in crankcase MAG side-water pump housing area). a. Oil leaking from leak indicator hole means a damaged oil seal on water pump shaft. Replace oil seal (refer to *COOLING SYSTEM*).
	5. Check oil pressure switch function. a. Oil pressure switch damaged. Replace oil pressure switch.

SYMPTOM	LOW OR NO OIL PRESSURE/HIGH OIL CONSUMPTION.
CONDITION	NORMAL USE.
Test/Inspection	6. Check oil orifice(s) on the oil pump suction side. a. Oil orifice(s) is (are) clogged. Clean from contamination. Replace oil and oil filter if necessary (refer to *MAINTENANCE* or *LUBRICATION SYSTEM*).
	7. Check oil pump function. a. Oil pump rotor is out of wear limit. Replace oil pump (refer to *LUBRICATION SYSTEM*). b. Oil pump seized due to oil leakage and/or air inclusion. Replace oil pump (refer to *LUBRICATION SYSTEM*). c. Gears driving oil pump are broken or otherwise damaged. Replace gears. d. Incorrect oil being used. Use high quality oil (refer to *TECHNICAL DATA*).
	8. Check oil pressure regulator valve (spring) function. a. Valve spring damaged (valve always open). Replace spring. b. Valve piston is worn or broken. Replace valve piston (refer to *LUBRICATION SYSTEM*). c. Valve piston stays open due to contamination. Clean or repair valve piston.
	9. Check plain bearings in crankcase for heavy wear. a. Plain bearings out of specification (increased clearance). Replace plain bearings (refer to *BOTTOM END*).
	10. Check engine oil strainer in crankcase. a. Oil strainer is clogged due to contamination. Clean or replace strainer and diagnose causes. Replace possible damaged parts (refer to *BOTTOM END*).

SYMPTOM	OIL CONTAMINATION (white appearance).
CONDITION	NORMAL USE.
Test/Inspection	1. Check leak indicator hole (in crankcase MAG side-water pump housing area) if water and oil leaks. a. Leakage of oil/water mixture from indicator bore means damaged water pump seal ring and rotary seal. Replace sealing ring, rotary seal and change oil, oil filter and/or coolant (refer to *LUBRICATION SYSTEM, COOLING SYSTEM* and *BOTTOM END*).
	2. Check cylinder head and/or cylinder base gasket. a. Gasket damaged or leaking. Retighten cylinder head with recommended torque and/or replace gasket.
	3. Check tightening torque of cylinder head screws. a. Screws not properly tightened. Retighten screws to recommended torque and replace oil.
	4. Check oil for particles (may indicate possible engine internal damages). a. Oil contamination due to metal or plastic particles. Replace possibly damaged part(s) including oil and oil filter. Use high quality oil (refer to *TECHNICAL DATA*).

CYLINDER AND HEAD

SYMPTOM	UNUSUAL ENGINE NOISE AND/OR VIBRATION.
CONDITION	NORMAL USE.
Test/Inspection	1. Check noise coming from cylinder head area. a. Improper valve clearance adjustment. Readjust valve clearance and/or replace defective part(s). b. Faulty chain tensioner. Replace spring and/or mechanism. c. Chain guide worn out. Replace chain guide. d. Stretched chain and/or worn out sprockets. Replace chain and sprockets. e. Sprocket screws got loose. Retighten screws with recommended torque. f. Rocker arm(s) is (are) worn out (valve adjustment). Readjust valve clearance and/or replace rocker arm(s). g. Incorrect camshaft timing adjustment. Replace damaged components and readjust camshaft timing (refer to *CYLINDER AND HEAD*).

SYMPTOM	OIL CONTAMINATION ON CYLINDER AND/OR HEAD.
CONDITION	NORMAL USE.
Test/Inspection	1. Check screws for torque. a. Loose screws. Retighten screws with recommended torque. b. Gaskets are brittle, hard, worn out or otherwise damaged. Replace damaged gaskets, O-rings or the V-ring on breather.

CRANKSHAFT

SYMPTOM	UNUSUAL ENGINE NOISE AND/OR VIBRATIONS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check noise coming from crankshaft area. a. Crankshaft plain bearings are damaged. Replace crankshaft plain bearings (refer to *BOTTOM END*). b. Connecting rod plain bearings are damaged. Replace connecting rod plain bearings (refer to *BOTTOM END*). c. Magneto rotor got loose. Replace damaged components and retighten rotor retaining screw with recommended torque (refer to *MAGNETO SYSTEM*).

GEARBOX

SYMPTOM	UNUSUAL GEARBOX NOISE AND/OR VIBRATIONS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check oil level in gearbox. a. Oil leakage from gearbox. Replace damaged gasket(s) and/or oil seal(s), torque screws and refill with oil up to specified level (refer to *TECHNICAL DATA* and *GEARBOX*).
	2. Check bearings in the gearbox for free movement. a. Bearing(s) do(es) not move freely. Replace bearing(s).
	3. Check for knocking noise. a. Tooth of gears are damaged and/or worn. Replace respective gears.

SYMPTOM	GEAR INDICATION FAILS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check contact screws on gear housing center. a. Check contact screw outside for contamination and wetness. Clean contact screw and screw for wiring harness. b. Contact(s) is (are) corroded and/or contact screw for wiring harness got loose. Clean contact surface and retighten contact screw(s) with recommended torque. c. Wiring harness has broken cables. Replace wiring harness. d. Shifting indicator switch(es) pin(s) is (are) worn and/or damaged. Replace shifting indicator switch(es).

SYMPTOM	GEAR(S) IS (ARE) HARD TO SHIFT.
CONDITION	NORMAL USE.
Test/Inspection	1. Check shift shaft spline and/or shift forks for wear and/or damages. a. Shift shaft is worn out and/or shows damaged splines. Replace shift shaft. b. Shift drum track(s) and/or splines is (are) worn out or damaged. Replace shift drum and damaged part(s). c. Shift fork(s) is (are) worn out and/or engagement pins are damaged. Replace shift fork(s). d. Shift fork(s) is (are) worn out and/or fork(s) is (are) damaged. Replace shift fork(s). e. Shift gear(s) is (are) worn out. Replace shift gear(s). f. Shifting indicator switch(es) pin(s) is (are) worn out (no roundings on top of pin). Replace shifting indicator switch(es).
	2. Check engine idle speed. a. Check throttle cable and throttle adjustment. b. Check bypass idle valve and connectors.
	3. Check CVT one way clutch on drive pulley. a. CVT one way clutch was not lubricated correctly. Lubricate CVT one way clutch (refer to *CVT*). b. CVT one way clutch is worn out or damaged. Replace defective part(s) (refer to *CVT*). c. Check if friction washer at one way clutch is worn. Replace friction washer (refer to *CVT*).
	4. Check transmission lever and connecting rod. a. Ball joint and/or ball joint nut is (are) loose. Retighten or replace the ball joint.
	5. Check spring on shift shaft in gearbox. a. Broken spring. Replace the spring (refer to *GEARBOX*).
	6. Check for any mud intrusions. a. CVT parts dirty. Clean all CVT parts.

DISCONNECT UNIT

SYMPTOM	4 WHEEL DRIVE INDICATION FAILS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check contact screw on gear housing right side for damage and/or wear. a. Shifting indicator switch pin is worn and/or damaged. Replace shifting indicator switch (refer to *GEARBOX*). b. Contact is corroded and/or contact screw for wiring harness got loose. Clean contact surface and retighten contact screw with recommended torque. c. Wiring harness has broken cable. Replace wiring harness.

SYMPTOM	4 WHEEL DRIVE DOES NOT ENGAGE OR DISENGAGE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check actuator and/or actuator shifting fork for wear and/or damages. a. Check if selector works properly. If so, check actuator, see point c) and d) below. b. If selector is out of specifications, check wires, connectors and/or replace selector. c. Actuator shifting fork is worn out and/or damaged. Replace shifting fork of actuator. d. Check function of actuator. Replace if actuator is not turning, refer to *GEARBOX*.
	2. Check shifting sleeve spline and/or shifting fork for wear and/or damages. a. Shifting sleeve shows damaged splines. Replace shifting sleeve (refer to *GEARBOX*). b. Shifting fork is worn out and/or engagement pin is damaged. Replace shifting fork.

CVT

SYMPTOM	UNUSUAL ACCELERATION BEHAVIOR.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt condition. a. Belt is too narrow (drive belt engagement is higher in drive pulley). Replace belt if width is less than specified (refer to *CVT* and/or *TECHNICAL DATA*).
	2. Check lever condition on drive pulley sliding half and/or roller(s) on governor cup. a. Lever(s) on drive pulley sliding half is (are) worn and/or damaged (refer to *CVT*). Replace all levers at the same time (lever kit). b. Roller(s) is (are) worn and/or damaged (refer to *CVT*). Replace governor cup assembly.
	3. Check drive/driven pulley sliding half for free axial movement. a. Sliding half is stuck (refer to *CVT*). Replace damaged part(s).
	4. Check condition of drive/driven pulley spring. a. Drive pulley spring tension is too smooth and/or damaged (refer to *CVT*). Replace spring. b. Driven pulley spring tension is too stiff (refer to *CVT*). Replace spring.
	5. Check if cam of driven pulley is worn. Replace if out of specifications; refer to *CVT*.
	6. Check surface of fixed and sliding halves (drive and driven pulley) for grooves or other damages; refer to *CVT*.
	7. Check with B.U.D.S. at diagnostic communication port for failure

SYMPTOM	UNUSUAL ACCELERATION BEHAVIOR.
CONDITION	NORMAL USE.
	8. Check valve adjustment. a. Intake and/or exhaust valves are not adjusted correctly. Adjust valves.
	9. Check engine condition. a. Low engine compression; refer to *LEAK TEST*.
	10. Check ignition condition. a. Faulty spark plug. Install new spark plug(s).
	11. Check differentials operation. a. Vehicle on Neutral is hard to move. Repair or replace defective part(s).

SYMPTOM	ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive/driven pulley area for contamination and/or water intrusion. a. CVT area is contaminated with water, dirt or oil. Clean CVT system and replace damaged part(s).
	2. Check items 1 to 3 of *UNUSUAL ACCELERATION BEHAVIOR*.
	3. Check drive/driven pulley spring tension. a. Drive pulley spring tension is too stiff. Replace spring (recommended Bombardier spring). b. Driven pulley spring tension is too smooth and/or damaged (refer to *CVT*). Replace spring.

SYMPTOM	DRIVE PULLEY NOISE IN IDLE SPEED.
CONDITION	NORMAL USE.
Test/Inspection	1. Check slider shoes (drive pulley). a. Worn slider shoes (increased clearance between governor cup and drive pulley sliding half). Replace all slider shoes at the same time (slider shoes kit).
	2. Check driven pulley sliding mechanism (between driven pulley outer and inner half). a. Mechanism is stuck and/or damaged. Replace driven pulley assembly.
	3. Check roller(s) and/or levers for wear (located on sliding half of drive pulley). a. Roller(s) on governor cup is (are) worn out and/or damaged (refer to *CVT*). Replace governor cup assembly. b. Lever(s) on drive pulley sliding half is (are) worn out and/or damaged (refer to *CVT*). Replace all levers at the same time (lever kit).

SYMPTOM	DRIVE PULLEY NOISE IN IDLE SPEED.
CONDITION	NORMAL USE.
	4. Check drive pulley screw for torque. a. Loose screw. Retighten screw with recommended torque.
	5. Check one-way clutch condition on drive pulley sliding half. a. Bearing(s) do(es) not move freely. Replace damaged part(s) and lubricate inside of one-way clutch (refer to *CVT*). b. Spring sleeve(s) inside one-way clutch is (are) worn out. Replace both sleeves and springs and lubricate inside of one-way clutch (refer to *CVT*). c. Spring(s) inside one-way clutch is (are) worn out. Replace both pins and springs and lubricate inside of one-way clutch (refer to CVT).

SYMPTOM	DRIVE PULLEY NOISE WHEN ACCELERATING/DECELERATING.
CONDITION	NORMAL USE.
Test/Inspection	1. Check items 1 to 5 of drive pulley noise in idle speed.
	2. Check if belt runs in dry conditions. a. Drive pulley area is wet/contaminated due to water/dirt intrusion. Clean driven pulley area and/or drain water out of CVT cover.
	3. Check drive/driven pulley screw for torque. a. Loose screw on drive and/or driven pulley. Retighten screw with recommended torque.
	4. Check cam and driven pulley fixed half for wear. a. Cam and/or drive pulley fixed half out of wear limit and/or damaged. Replace damaged part(s).
	5. Check torque gear fixed in driven pulley sliding half for wear. a. Torque gear out of wear limit and/or damaged. Replace torque gear (refer to *CVT*).
	6. Check for foreign particles in CVT area (stones, dirt, etc.). a. Small particles damaged belt and/or pulley surface(s). Clean system and replace damaged parts (refer to *CVT*).

SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVE PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	1. Check tightening torque of drive pulley screw. a. Moving sliding half. Retighten screw.
	2. Check fixed half bushings. a. Excessive gap between bushings and fixed half shaft, thus restraining sliding half movements. Replace fixed half assembly.
	3. Check if slider shoes are present and/or placed in correct position. a. Slider shoe(s) is (are) missing and/or damaged. Replace all slider shoes at the same time (slider shoes kit).

SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.
CONDITION	NORMAL USE.
Test/Inspection	1. Check fixed and sliding half bushings on driven pulley. a. Excessive gap between bushings and CVT shaft, thus restraining sliding half movements. Replace fixed and/or sliding half of driven pulley, polish CVT shaft area with fine emery cloth and wipe clean with a cloth.

SYMPTOM	PULLEYS DO NOT DOWN/UP SHIFT PROPERLY.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive pulley bushings (cleanliness, wear, etc.). a. Check items 1 and 2 of *UNUSUAL ACCELERATION BEHAVIOR*. b. Bushings stick to fixed half pulley shaft. Clean or replace. c. Spring seat sticks to sliding half pulley bushing. Clean system and/or replace sliding half pulley. d. One-way clutch does not operate properly. Clean system and/or replace damaged part(s).
	2. Check driven pulley spring tension. a. Driven pulley spring tension is too weak and/or broken. Replace. b. Driven pulley cam is worn or damaged. Replace.

SYMPTOM	BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check if CVT air intake and/or outlet is clogged. a. CVT area heats up due to contamination. Clean air intake and/or outlet from contamination. b. Fans located on drive pulley fixed half are clogged. Clean from contamination.
	2. Check if pulley halves are clean. a. Oil on pulley surfaces. Clean pulley halves and replace belt. b. Water intrusion in CVT area. Find root cause and repair. Drain water and replace belt.

SYMPTOM	BELT WORN EXCESSIVELY IN TOP WIDTH.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt width. a. Considerable wear. Replace belt if narrower than specified (refer to *CVT* or *TECHNICAL DATA*).
	2. Check drive belt identification number. a. Wrong type of belt. Replace belt with an appropriate drive belt.
	3. Check for localized belt wear caused by belt slippage. a. Localized wear. Replace belt.

SYMPTOM	BELT DISINTEGRATION.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt lifetime is exceeded. a. Clean CVT system and rebuild with a new drive belt.
	2. Check drive belt identification number. a. Excessive belt speed. Using unspecified type of belt. Replace belt with proper type of belt (refer to *TECHNICAL DATA*).
	3. Check if pulley halves are clean. a. Oil on pulley surfaces. Clean pulley surfaces with fine emery cloth and wipe clean using Pulley Flange Cleaner (P/N 413 711 809) and a cloth. b. Drive/driven pulley halves are damaged through stones inside CVT area. Clean pulley surfaces with fine emery cloth, wipe clean with a cloth or replace drive/driven pulley halves and belt.

SYMPTOM	CRACKS BETWEEN COGS.
CONDITION	NORMAL USE.
Test/Inspection	1. Check drive belt condition. a. Considerable use, belt wearing out. Replace. b. Brittle belt condition through aging. Replace belt.

ENGINE GENERAL

SYMPTOM	ENGINE DOES NOT CRANK — STARTER DOES NOT TURN.
CONDITION	NORMAL USE.
Test/Inspection	Refer to *STARTING SYSTEM*.

SYMPTOM	ENGINE DOES NOT CRANK — STARTER TURNS.
CONDITION	NORMAL USE.
Test/Inspection	Refer to *STARTING SYSTEM*.

SYMPTOM	ENGINE CRANKS BUT FAILS TO START.
CONDITION	NORMAL USE.
Test/Inspection	1. Check if spark plug connector fits on spark plug (refer to *IGNITION SYSTEM*).
	2. Check spark plug. a. Define spark plug (no spark) or wrong spark plug gap. Readjust gap and clean spark plug or replace.
	3. Check for fuel on spark plug. a. Flooded engine (spark plug wet when removed). Activate engine drowned mode and crank engine with rags over the spark plug holes (refer to *OVERVIEW* in EMS system).
	4. Check battery voltage. a. Battery is discharged and starter works not properly. Charge battery.
	5. Check fuel level in fuel tank and fuel pressure. Ensure fuel pump was not disabled by B.U.D.S. a. Low or no fuel pressure. Replace defective part(s) (refer to *FUEL TANK AND FUEL PUMP*).
	6. Check fuel injectors. a. Plugged or faulty injector(s). Replace defective part(s) (refer to *ENGINE MANAGEMENT*).
	7. Check idle bypass valve. a. Stuck or defective. Refer to *ENGINE MANAGEMENT*.
	8. Check encoder wheel. a. Bent tooth. Refer to *MAGNETO SYSTEM*.
	9. Check engine compression. a. Insufficient engine compression. Replace defective part(s) (refer to *LEAK TEST*).
	10. Check fault codes in B.U.D.S system. a. Check if electrical actuator(s) is/are defective. Replace defective part(s) (refer to *COMPONENT INSPECTION AND ADJUSTMENT*).

SYMPTOM	ENGINE DOES NOT START — NO SPARK AT SPARK PLUG.
CONDITION	AT ENGINE CRANKING.
Test/Inspection	1. Verify spark plug condition. a. Defective, improperly set, worn out, fouled. Identify source of problem and correct. Replace spark plug.
	2. Check ignition coil (refer to *IGNITION SYSTEM*). a. Defective part. Replace ignition coil.
	3. Check crankshaft position sensor (refer to *COMPONENT INSPECTION AND ADJUSTMENT*). a. Defective crankshaft position sensor. Corroded connector terminals. Replace crankshaft position sensor. Clean terminals and apply silicone dielectric grease.
	4. Check condition of wiring harness and connectors. a. Cables and/or connectors are damaged and/or corroded. Replace connectors or complete wiring harness (refer to *COMPONENT INSPECTION AND ADJUSTMENT*). Clean terminals and apply silicone dielectric grease.
	5. Check fault codes in B.U.D.S. system. a. Check if electrical actuator(s) is/are defective. Replace defective part(s) (refer to *COMPONENT INSPECTION AND ADJUSTMENT*).

SYMPTOM	ENGINE HARD TO START.
CONDITION	NORMAL USE.
Test/Inspection	1. Check idle bypass valve. a. Stuck or defective. Refer to *ENGINE MANAGEMENT*.
	2. Check closed throttle and idle actuator with B.U.D.S. a. Wrong TPS zero setting/idle bypass valve reset. Refer to *ENGINE MANAGEMENT*.
	3. Check throttle cable adjustment. a. Wrong adjustment (likely too tight). Refer to *ENGINE MANAGEMENT*.
	4. Check engine compression. a. Insufficient engine compression. Replace defective part(s) (refer to *LEAK TEST*).
	5. Verify spark plug condition. a. Defective, improperly set, worn out, fouled. Identify source of problem and correct. Replace spark plug.
	6. Check fuel level in fuel tank and fuel pressure. a. Low or no fuel pressure. Replace defective part(s) (refer to *FUEL TANK AND FUEL PUMP*).
	7. Check CAPS (camshaft position sensor). a. Defective sensor/wiring. Refer to *ENGINE MANAGEMENT*.

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	1. Perform engine leak test. Refer to *ENGINE LEAK TEST* procedure. Check for possible piston seizure. a. Damaged head gasket and/or seal and/or leaking inlet/exhaust valve(s). Replace and/or repair defective parts.
	2. Check spark plug condition and/or gap. a. Fouled spark plug or wrong spark plug gap. Readjust gap and clean spark plug or replace spark plug.
	3. Piston seizure. a. Spark plug heat range is too hot. Install spark plug with appropriate heat range (refer to *TECHNICAL DATA*). b. Compression ratio is too high. Install genuine parts. c. Poor oil quality. Use high quality oil. d. Leaks at air intake manifold (engine gets too lean). Retighten screws or replace air intake manifold gasket. e. Snow/water intrusion through intake system into combustion chamber. Clean intake system and replace defective part(s).
	4. Melted and/or perforated piston dome; melted section at ring end gap. a. Spark plug heat range is too hot. Install recommended spark plug (refer to *TECHNICAL DATA*). b. Coolant less than recommended level (engine gets too hot). Repair cooling circuit and/or refill with recommended liquid. c. Poor quality and/or wrong fuel. Clean from contamination and use appropriate fuel (refer to *TECHNICAL DATA*).
	5. Piston color is dark due to seizure on intake and exhaust sides. a. Cooling system leaks and lowers coolant level. Tighten clamps or replace defective parts. Add antifreeze in cooling system until appropriate level is reached. Replace damaged parts.
	6. Cracked or broken piston. a. Cracked or broken piston due to excessive piston/cylinder clearance or engine overreving. Replace piston. Check piston/cylinder clearance (refer to *CYLINDER AND HEAD*).

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	7. Check piston rings and cylinder surface for grooves. a. Poor oil quality. Use high quality oil. b. Contamination through engine intake. Replace defective part(s) and use new air filter.
	8. Check crankshaft, rocker arms movement. a. Oil pump failure due to lack of oil. Repair and replace defective parts and use high quality oil. b. Oil contamination due to clogged oil filter/oil strainer. Replace oil and oil filter at the same time, replace defective part(s) (refer to *MAINTENANCE CHART* and *LUBRICATION SYSTEM*).
	9. Check valve springs exhaust/intake. a. Broken valve spring damages the cylinder head, valve(s), rocker arm(s), piston, piston rings and connecting rod. Replace defective part(s).
	10. Check if fuel supply is sufficient. a. Low fuel level. b. Clogged fuel filter or fuel injector filter. c. Fuel line is contaminated and/or bent. Clean and/or replace defective part(s).
	11. Check fault codes in B.U.D.S. system. a. Check if electrical actuator(s) is/are defective. Replace defective part(s) (refer to *COMPONENT INSPECTION AND ADJUSTMENT*).

SYMPTOM	ENGINE BACKFIRES.
CONDITION	NORMAL USE.
Test/Inspection	1. Check spark plug. a. Carbon accumulation caused by defective spark plug. Replace spark plug.
	2. Check leakage on intake manifold. a. Air leak on intake system. Retighten screws and/or replace intake manifold gasket.
	3. Check exhaust air leaking. a. Exhaust gasket is leaking. Retighten screws and/or replace exhaust gasket.
	4. Check intake valve(s) for leaking. a. Intake valve(s) is (are) leaking. Repair or replace valve(s).
	5. Check if fuel supply is sufficient. a. Fuel line is contaminated and/or bent (engine gets lean). Clean and/or replace defective part(s).
	6. Check engine ground. a. Poor engine ground. Clean.
	7. Check fault codes in B.U.D.S. system. a. Check if electrical actuator(s) is/are defective. Replace defective part(s) (refer to *COMPONENT INSPECTION AND ADJUSTMENT*).

SYMPTOM	ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM.
CONDITION	NORMAL USE.
Test/Inspection	1. Check spark plug condition and/or gap. a. Fouled spark plug or wrong spark plug gap. Readjust gap and clean spark plug or replace.
	2. Check spark plug type. a. Improper spark plug heat range. Install recommended spark plug (refer to *TECHNICAL DATA*).
	3. Perform engine leak test. Refer to *ENGINE LEAK TEST* procedure. Check for possible piston seizure. a. Damaged head gasket and/or seal and/or leaking intake/exhaust valve(s). Replace and/or repair defective parts.
	4. Check for water in fuel (wrong fuel). a. There is water in fuel or wrong fuel. Drain fuel system, search for leakage and refill it with appropriate fuel.
	5. Check engine compression. a. Worn piston(s) and/or piston ring(s). Replace defective part(s) (refer to *CYLINDER AND HEAD* and *LEAK TEST*).
	6. Check fuel pressure. a. Low fuel pressure. Perform fuel pressure test (refer to *FUEL SYSTEM*).
	7. Check air intake system. a. Air filter is clogged due to contamination. Replace air filter.
	8. Check if EMS (engine management system) is in limp home mode. Check fault codes in B.U.D.S system. a. Check if electrical actuator(s) is/are defective. Replace defective part(s) (refer to *COMPONENT INSPECTION AND ADJUSTMENT*).
	9. Check drive belt. a. Worn Replace belt if its width is less than specified (refer to *CVT*).

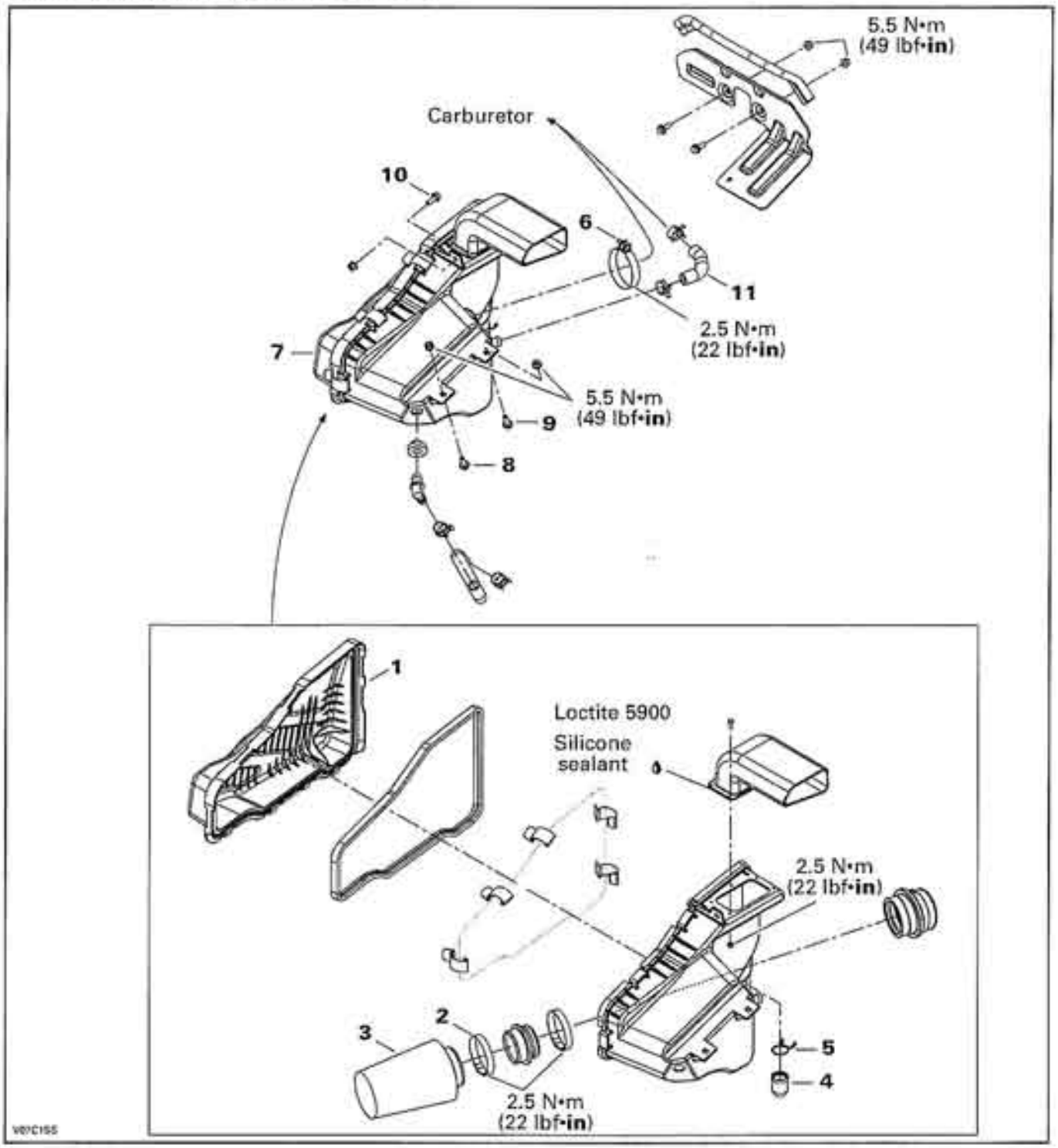
SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE.
CONDITION	NORMAL USE.
Test/Inspection	1. Check if cooling system shows any failure (see *COOLING SYSTEM*). a. System is leaking. Repair and/or replace damaged part(s).
	2. Check function of lubrication system (see *LUBRICATION SYSTEM*). a. Lubrication is not working properly. Repair and/or replace damaged part(s).
	3. Check condition and heat range of spark plug. a. Melted spark plug tip or inadequate heat range. Replace.
	4. Check air leakage on engine intake. a. Leakage causes overheating. Replace/repair damaged part(s).
	5. Check air inlet and outlet of the CVT cover. a. Air circulation is clogged (overheating). Clean air circulation from contamination. b. Drive belt worn and/or damaged. Replace belt with an appropriate drive belt (refer to *TECHNICAL DATA*).

AIR INTAKE SILENCER

SERVICE PRODUCTS

Description	Part Number	Page
air filter cleaning solution	219 700 341	58, 61
air filter oil	219 700 340	58
Loctite 5910	293 800 081	63

OUTLANDER 400 SERIES



GENERAL

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

PROCEDURES

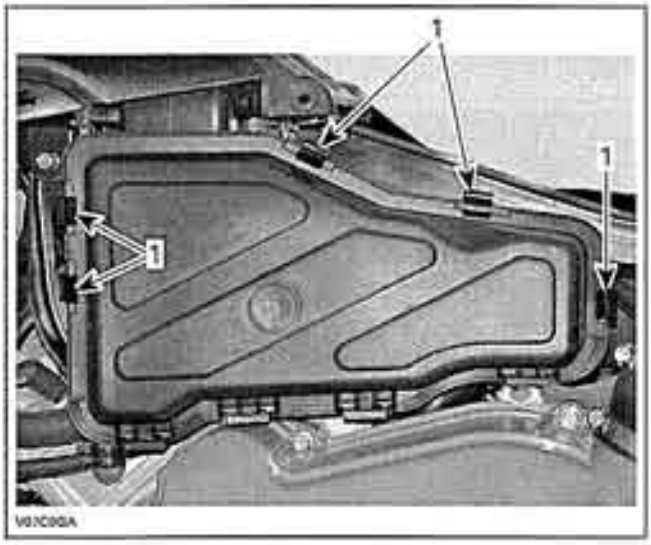
AIR FILTER

Removal

CAUTION: Never remove or modify any component in the air box. The engine carburetion is calibrated to operate specifically with these components. Otherwise, engine performance degradation or damage can occur.

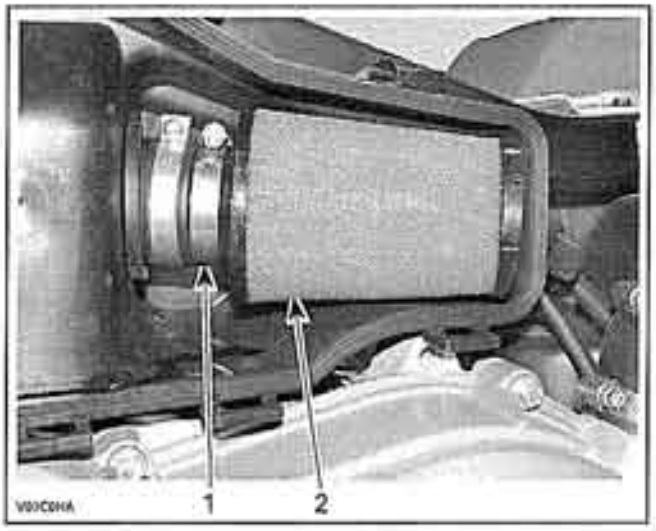
Remove seat and LH side panel.

Release clamps and remove air filter box cover no. 1.



1. Release clamps

Loosen clamp no. 2 and remove air filter no. 3.



TYPICAL
1. Clamp
2. Air filter

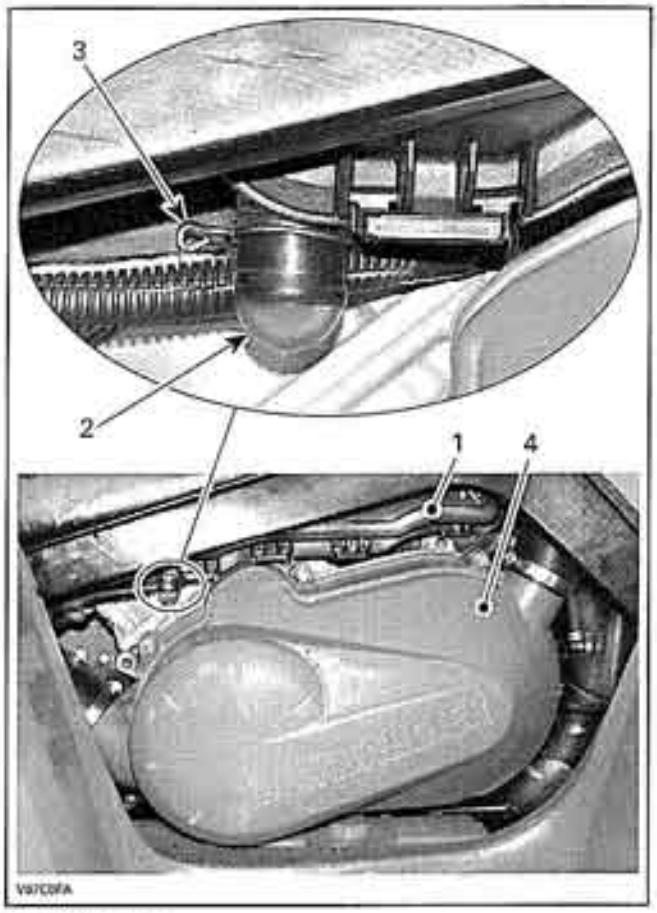
Installation

Properly reinstall removed parts in the reverse order of their removal.

NOTE: Apply air filter oil on air filter.

AIR FILTER BOX CLEANING/DRAINING

Periodically inspect air filter box drain tube no. 4 for liquid or deposits.



1. Air filter box
2. Drain tube
3. Clamp
4. CVT cover

NOTE: If vehicle is used in dusty area, inspect more frequently than specified in maintenance chart.

If liquid/deposits are found, squeeze and remove the clamp no. 5. Pull drain tube no. 4 out and empty it.

CAUTION: Do not start engine if liquid or deposit are found in the drain tube. If there is oil in the air box, check engine oil level. Maybe oil level is too high.

NOTE: After air filter installation, you can find a small quantity of air filter oil in the drain tube.

Remove air filter.

NOTE: When liquid/deposits are found, the air filter must be inspected/dried/replaced depending on its condition.

Pour air filter cleaning solution (P/N 219 700 341) or an equivalent into a bucket. Put the filter in to soak.

While filter soaks, clean inside of air box.

Rinse filter with warm water and let it dry completely.

When the filter is dried, re-oil with air filter oil (P/N 219 700 340) or an equivalent.

AIR FILTER BOX

Removal

Remove seat and console (refer to *BODY*).

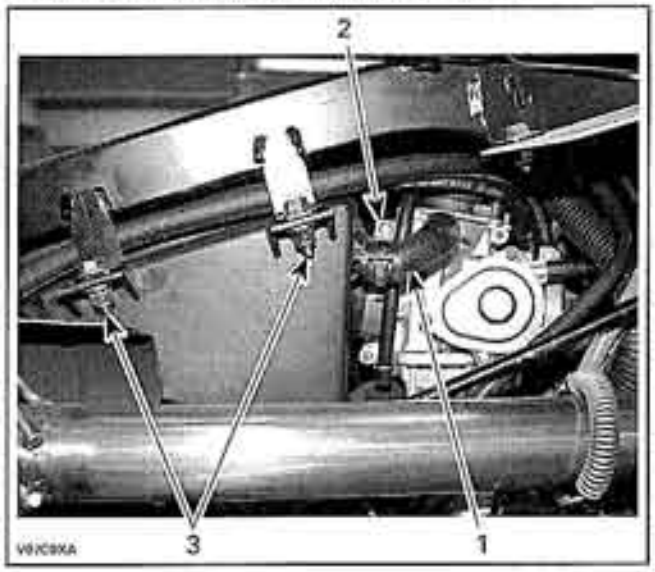
On right side of vehicle, perform the following:

Remove the RH side panel.

Unplug the carburetor vent hose.

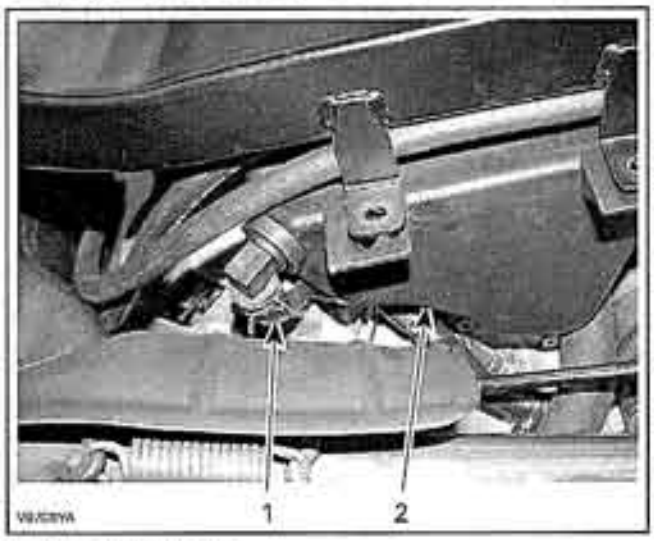
Unscrew:

- carburetor clamp no. 6 on air filter box no. 7
- air filter box screws no. 8 and no. 9.



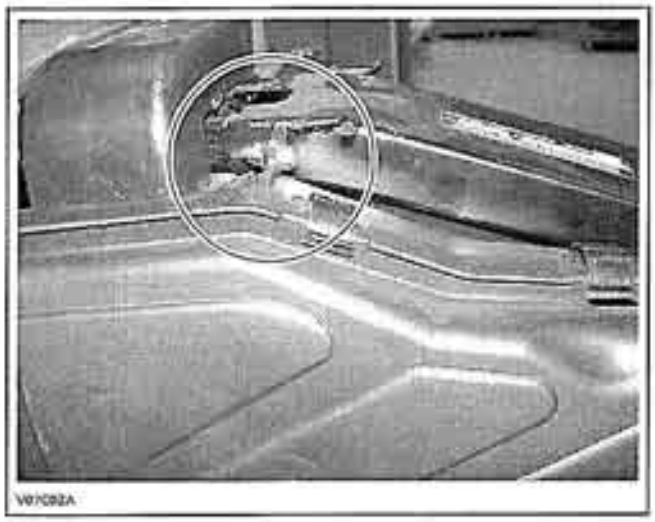
1. Carburetor vent hose
2. Carburetor clamp
3. Air filter box screws

Unplug engine blow-by hose no. 11 from air box.



1. Engine blow-by hose
2. Air box

On LH side of vehicle, do the following:
Remove the LH side panel.
Unscrew air filter box screw no. 10.



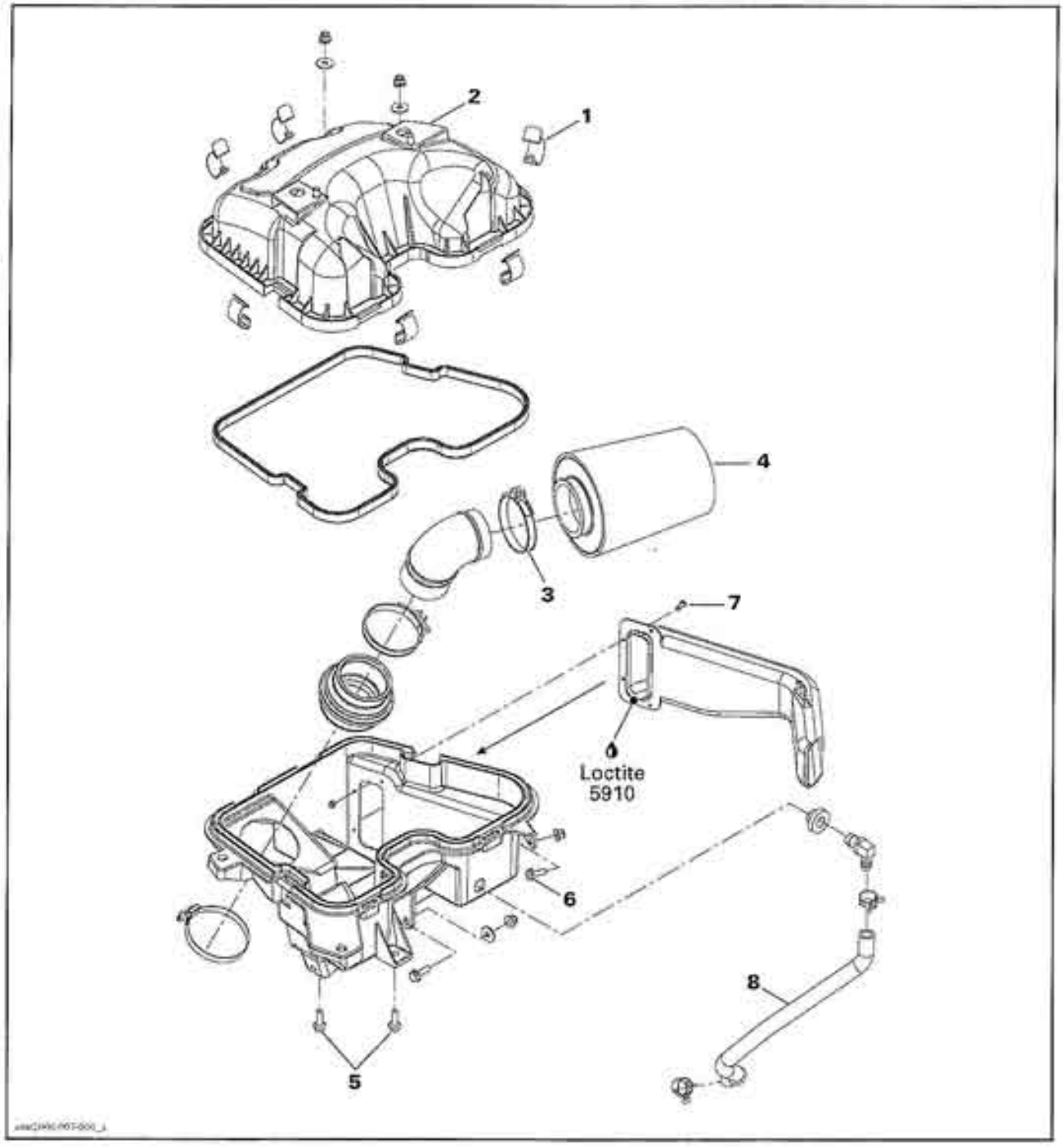
Pull out air filter box.

Installation

For installation, reverse the removal procedure.

CAUTION: Pay attention to fuel hoses and fittings on fuel tank.

OUTLANDER 800 SERIES



GENERAL

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Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

PROCEDURES

AIR FILTER

Removal

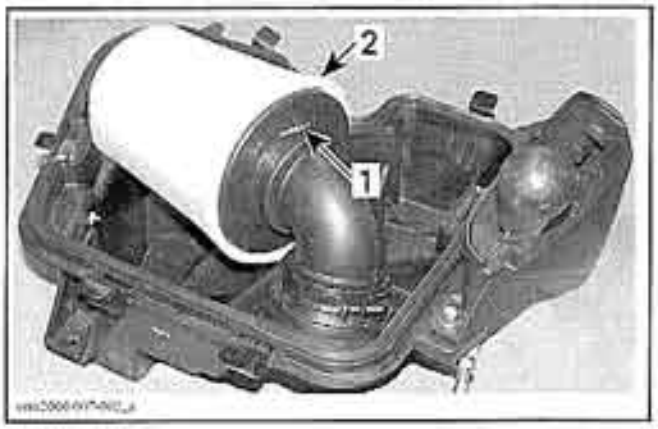
CAUTION: Never remove or modify any component in the air box. The engine management system is calibrated to operate specifically with these components. Otherwise, engine performance degradation or damage can occur.

Remove seat, side panels, center console and dashboard. Refer to *BODY*.

Release clamps no. 1 and remove air filter box cover no. 2.

1. Clamps
2. Cover

Loosen clamp no. 3 and remove air filter no. 4.



1. Clamp
2. Air filter

NOTE: If vehicle is used in dusty area, inspect more frequently than specified in maintenance chart.

If liquid/deposits are found, squeeze and dry the foam filter. Replace filter element if damaged.

CAUTION: Do not start engine if liquid or deposit are found. If there is oil in the air box, check engine oil level. Oil level may be too high.

Pour air filter cleaning solution (P/N 219 700 341) or an equivalent into a bucket. Put the foam filter in to soak. Do not wash filter element.

While filter soaks, clean inside of air box.

Rinse foam filter with warm water and let it dry completely.

Blow low pressure compressed air on filter element to clean it.

Installation

Properly reinstall removed parts in the reverse order of their removal.

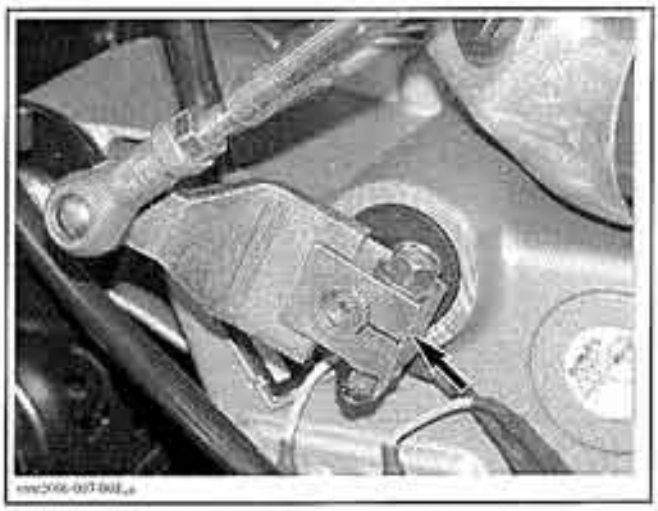
AIR FILTER BOX

Removal

Remove seat, side panels, center console and dashboard. Refer to *BODY*.

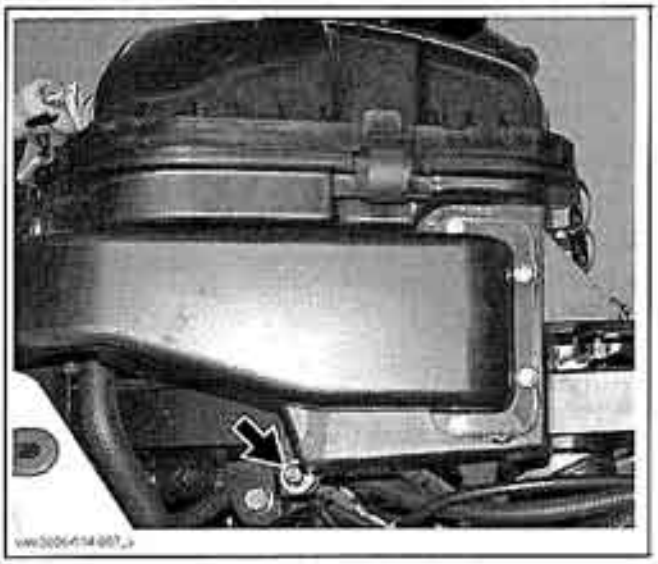
Set shifter lever to PARK.

Disconnect shifter from transmission shaft.

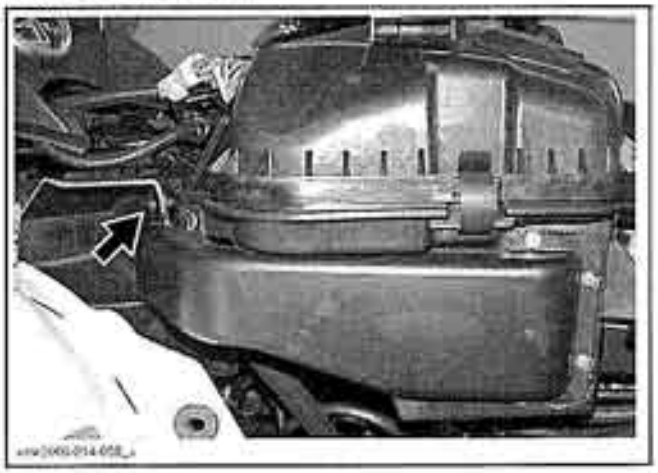


Detach throttle cable from shifter panel.

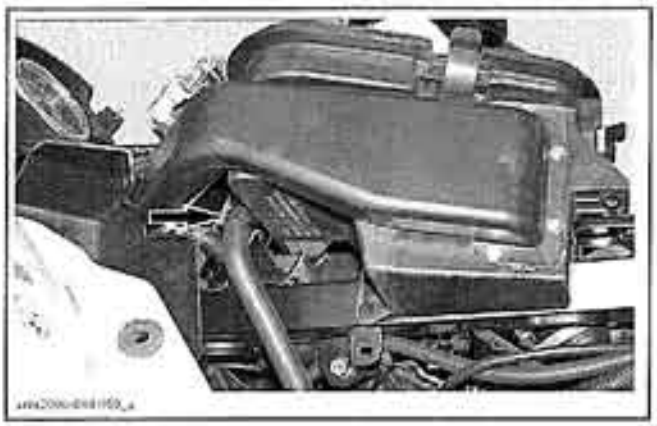
Remove retaining fasteners no. 5 and no. 6.



Remove dart no. 7.



Disconnect vent tube no. 8.



Pull air box out.

Installation

For installation, reverse the removal procedure but pay attention to the following.

If the baffle is removed, reseal it with Loctite 5910 (P/N 293 800 081) and replace rivets by screws (M4 x 12 mm) and elastic stop nuts.

Set shifter lever to PARK then reinstall shifter to transmission shaft. Check its operation and adjust as necessary. Refer to *GEARBOX*.

Secure throttle cable to shifter panel.

Gently pull throttle cable toward rear to have a gap between cable and shifter mechanism.

GAP HERE

⚠ WARNING

Ensure shifter mechanism does not touch throttle cable. Depress throttle lever several times to ensure it properly returns.

LUBRICATION SYSTEM

OUTLANDER 400 SERIES

GENERAL

Prior to change the oil, ensure vehicle is on a level surface.

Oil and oil filter must be replaced at the same time. Oil change and oil filter replacement should be done with a warm engine.

⚠ WARNING

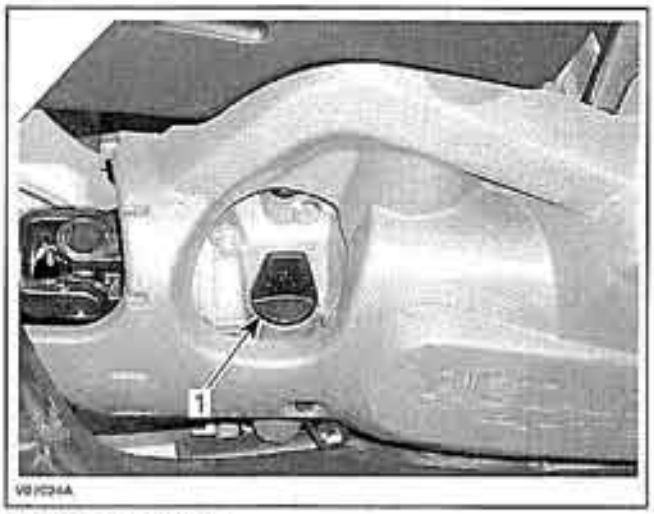
The engine oil can be very hot. Wait until engine oil is warm.

Dispose oil and filter as per your local environmental regulations.

PROCEDURES

OIL LEVEL CHECK

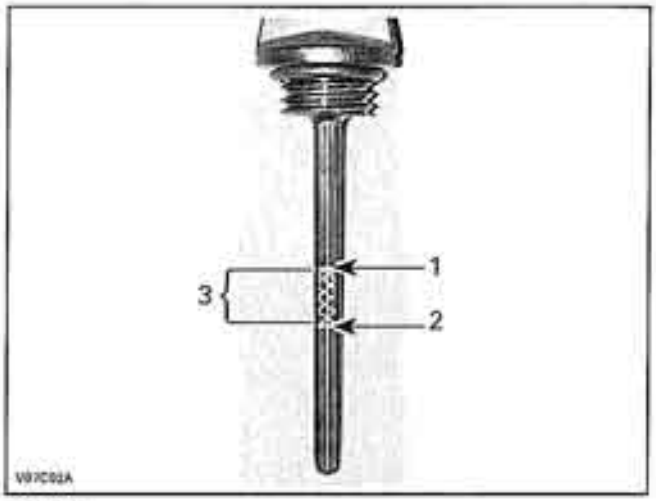
CAUTION: Check level frequently and refill if necessary. Do not overfill. Operating the engine/transmission with an improper level may severely damage engine/transmission. Wipe off any spillage.



RH SIDE OF ENGINE
1. Dipstick

With vehicle on a level surface and engine cold, not running, check the oil level as follows:

1. Unscrew dipstick then remove it and wipe clean.
2. Reinstall dipstick, screw in it completely.
3. Remove and check oil level. It should be near or equal to the upper mark.



TYPICAL
1. Full
2. Add
3. Operating range

To add oil, remove the dipstick. Place a funnel into the dipstick tube to avoid spillage.

Add a small amount of recommended oil and recheck oil level.

Repeat the above procedures until oil level reaches the dipstick's upper mark. **Do not overfill.**

Properly tighten dipstick.

OIL CHANGE

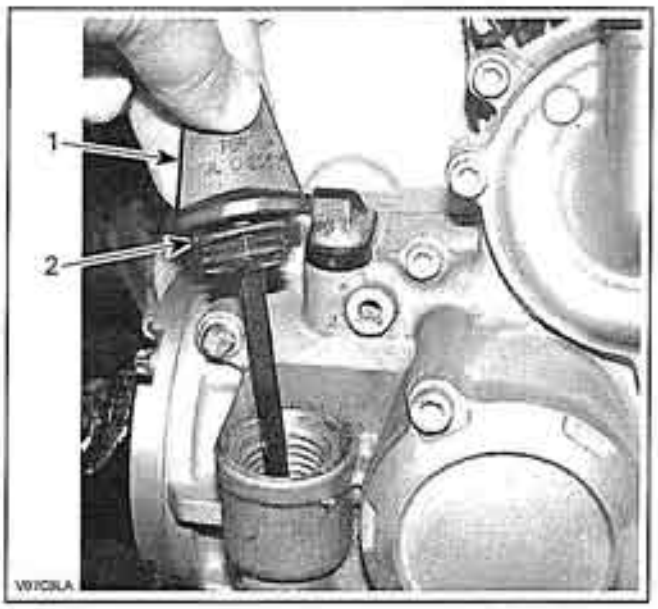
Removal

Place a drain pan under the engine magnetic drain plug area.

Clean the magnetic drain plug area.

Unscrew magnetic drain plug then remove dipstick.

CAUTION: Pay attention not to lose the O-ring on dipstick.



1. *Dipstick*
2. *O-ring*

Wait a while to allow oil to flow out of oil filter.

Inspection

Oil condition gives information about the engine condition. See *TROUBLESHOOTING* section.

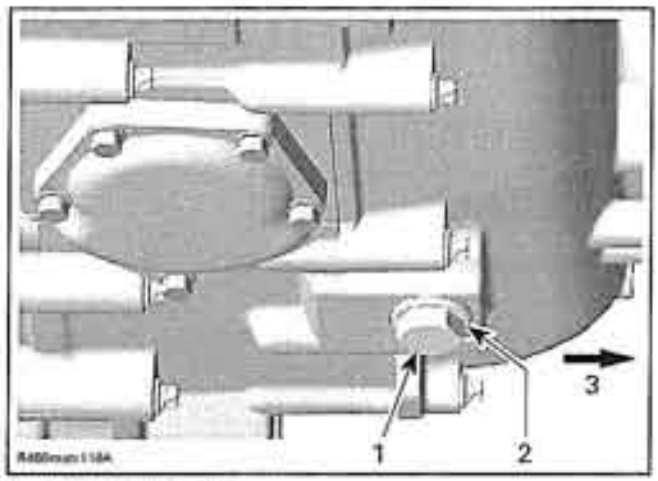
Clean the magnetic drain plug from metal shavings and dirt. Presence of debris gives an indication of failure inside the engine. Check engine to correct the problem.

Change gasket ring on magnetic drain plug if damaged.

Installation

The installation is the reverse of removal procedure.

CAUTION: Never use the gasket ring a second time. Always replace by a new one.



1. *Magnetic drain plug*
2. *Gasket ring*
3. *Engine MAG side*

System Capacity

Oil change with filter: 3 L (3.17 qt).

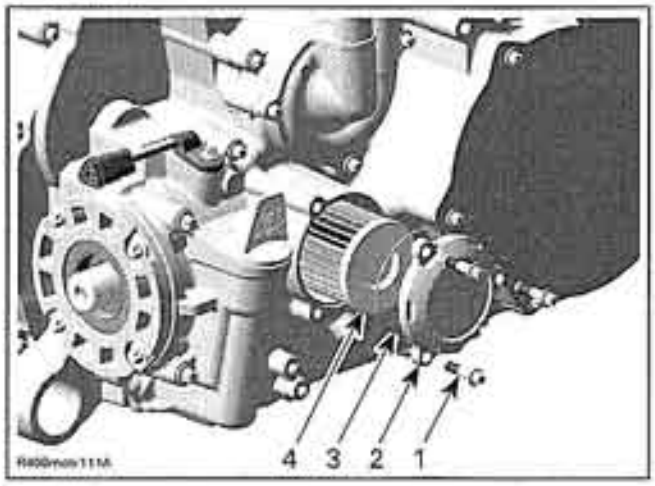
After filling, check the oil level with the dipstick. Refer to *OIL LEVEL CHECK* above.

NOTE: Run engine to ensure oil filter and drain plug areas are not leaking.

OIL FILTER

Removal

Remove:
- engine oil (refer to *OIL CHANGE*)
- oil filter screws
- oil filter cover
- oil filter.

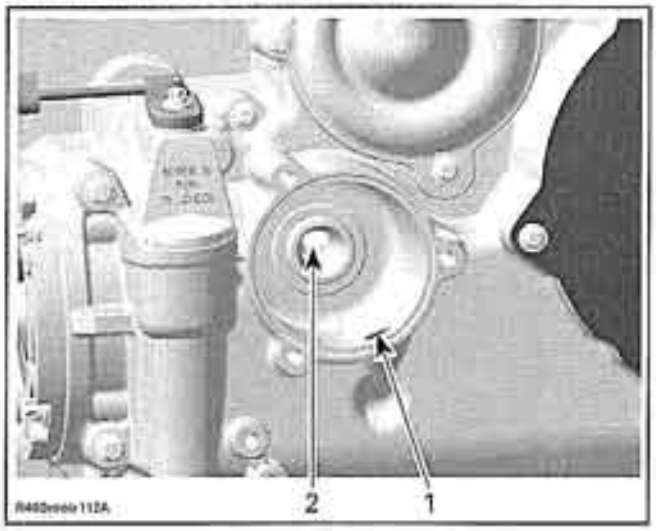


1. *Oil filter screws*
2. *Oil filter cover*
3. *O-ring*
4. *Oil filter*

Inspection

Check oil filter cover O-ring, change it if necessary.

Check and clean the oil filter inlet and outlet area for dirt and other contaminations.



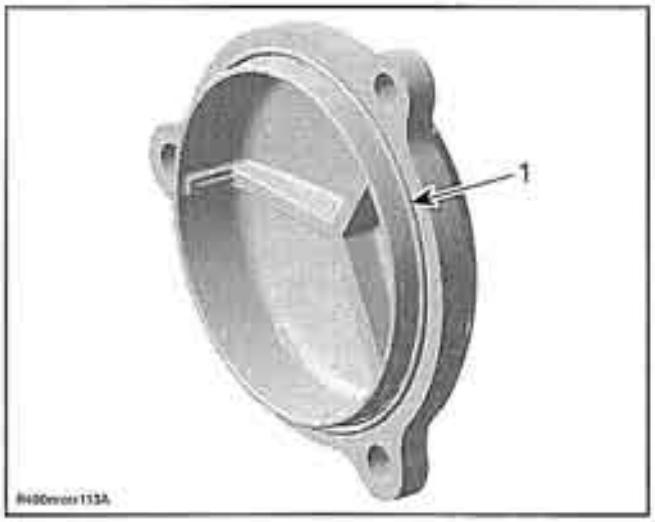
1. Inlet bore from the oil pump to the oil filter
2. Outlet bore to the engine oil prowding system

Installation

The installation is the opposite of the removal procedure. Pay attention to the following details.

Apply oil on rubber seal of oil filter to ensure proper installation.

Install O-ring on oil filter cover.



1. O-ring in place

OUTLANDER 800 SERIES

GENERAL

Prior to change the oil, ensure vehicle is on a level surface.

Oil and oil filter must be replaced at the same time. Oil change and oil filter replacement should be done with a warm engine.

⚠ WARNING

The engine oil can be very hot. Wait until engine oil is warm.

Dispose oil and filter as per your local environmental regulations.

PROCEDURES

OIL LEVEL CHECK

NOTE: Strictly follow this procedure, otherwise wrong oil level may be indicated.

Ensure vehicle is on a level surface.

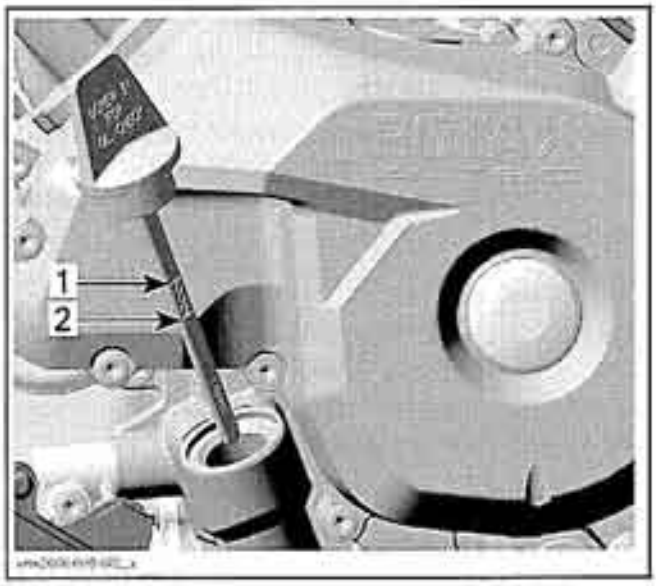
Start engine and let idle for a few minutes.

Stop engine. Wait a few minutes to allow oil to flow down to crankcase then check oil level.

Fully screw in dipstick to check oil level.

Remove dipstick and read oil level.

Oil level must be between minimum and maximum marks on dipstick.



TYPICAL — FULLY SCREW DIPSTICK TO CHECK OIL LEVEL
1. Maximum
2. Minimum

There is a capacity of 300 mL (10 U.S. oz) between the two marks.

Refill oil as necessary. Do not overfill.

Reinstall dipstick.

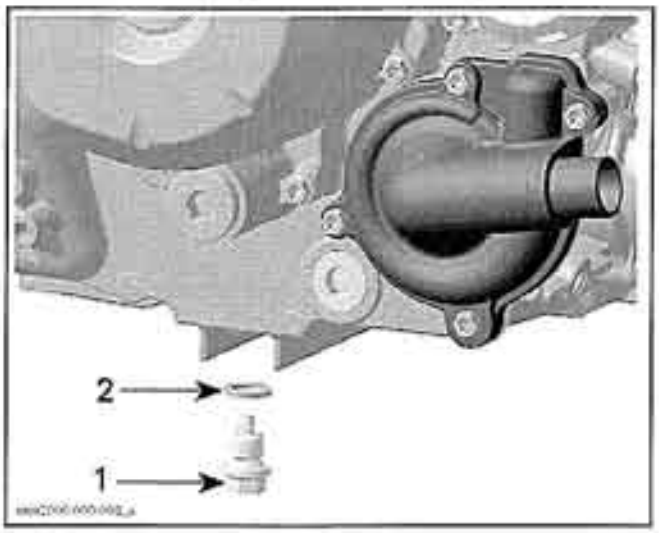
OIL CHANGE

Removal

Place a drain pan under the engine drain plug area.

Clean the magnetic drain plug area.

Unscrew drain plug then remove dipstick.



1. Drain plug
2. Gasket ring

Wait a while to allow oil to flow out of oil filter.

Inspection

Oil condition gives information about the engine condition. See *TROUBLESHOOTING* section.

Clean the magnetic drain plug from metal shavings and dirt. Presence of debris gives an indication of failure inside the engine. Check engine to correct the problem.

Installation

The installation is the reverse of removal procedure. Pay attention to the following details.

Install a new gasket ring on drain plug. Torque drain plug to 20 N•m(15 lbf•ft).

System Capacity

Oil change with filter: 1.7 - 2 L (1.8 - 2.11 qt).

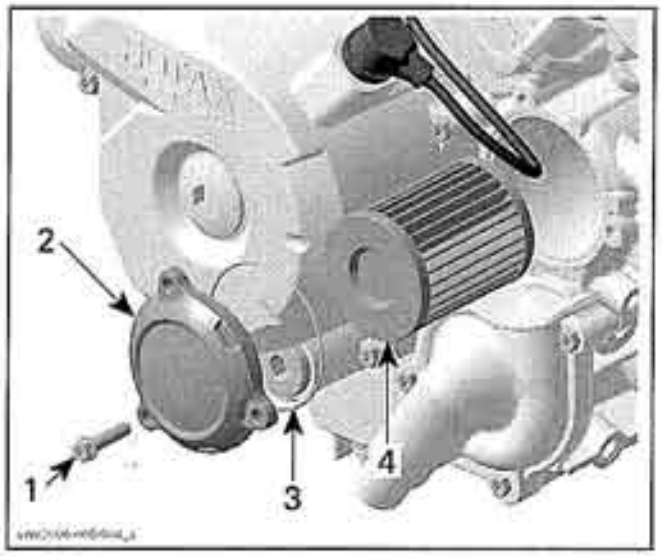
After filling, check the oil level with the dipstick. Refer to *OIL LEVEL CHECK* above.

NOTE: Run engine to ensure oil filter and drain plug areas are not leaking.

OIL FILTER

Removal

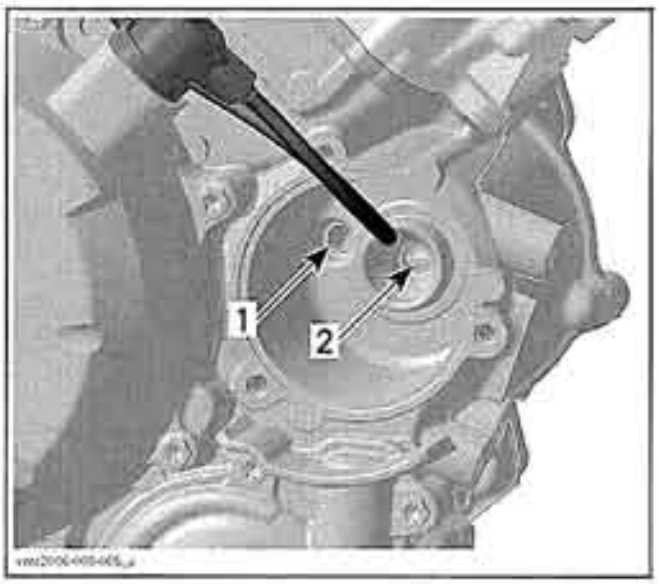
Remove:
- engine oil (refer to *OIL CHANGE*)
- oil filter screws
- oil filter cover
- oil filter.



1. Oil filter screw
2. Oil filter cover
3. O-ring
4. Oil filter

Inspection

Check and clean the oil filter inlet and outlet area for dirt and other contaminations.



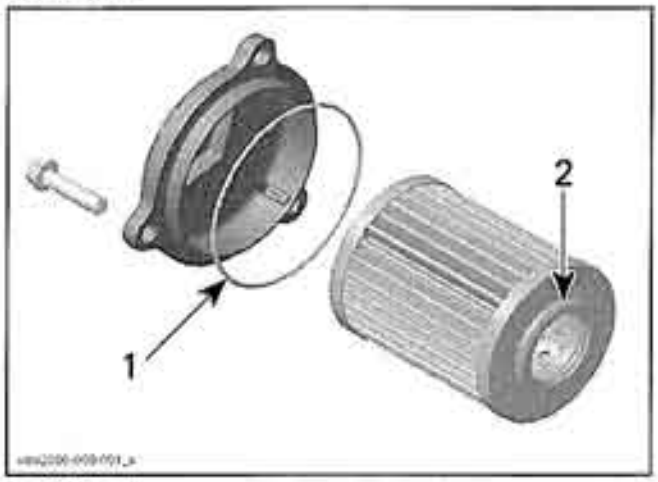
1. Inlet bore from the oil pump to the oil filter
2. Outlet bore to the engine oil providing system

Installation

The installation is the reverse of the removal procedure. Pay attention to the following details.

Install a new gasket on oil filter cover.

To ease assembly and prevent displacement of the gasket during installation, refer to following illustration.



1. Slightly oil
2. Slightly grease

COOLING SYSTEM

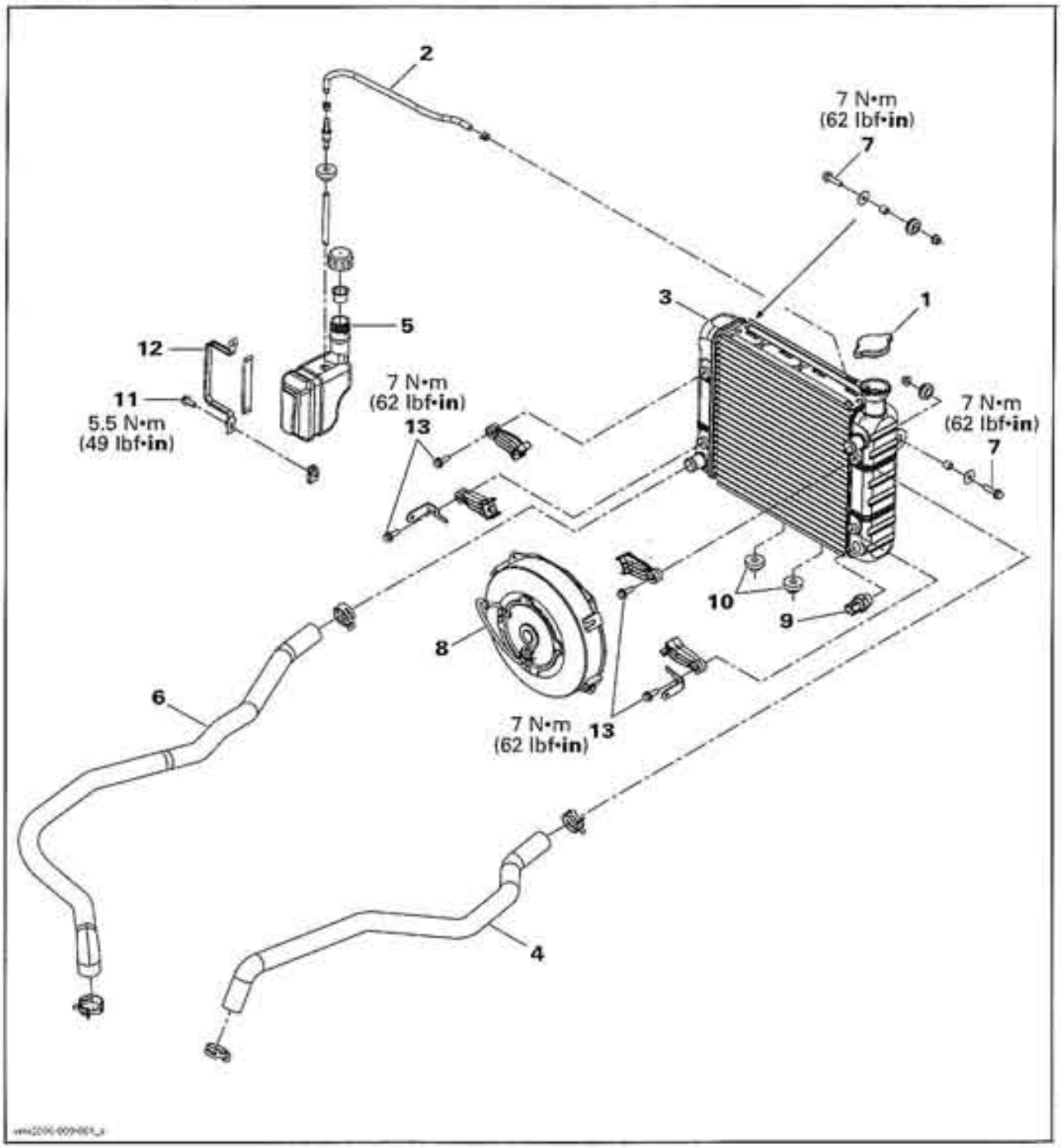
SERVICE TOOLS

Description	Part Number	Page
large hose pincher	529 032 500	76, 81
multimeter FLUKE 111	529 035 868	81–82
pressure/vacuum pump	529 021 800	74
small hose pincher	295 000 076	74
test cap	529 035 991	74

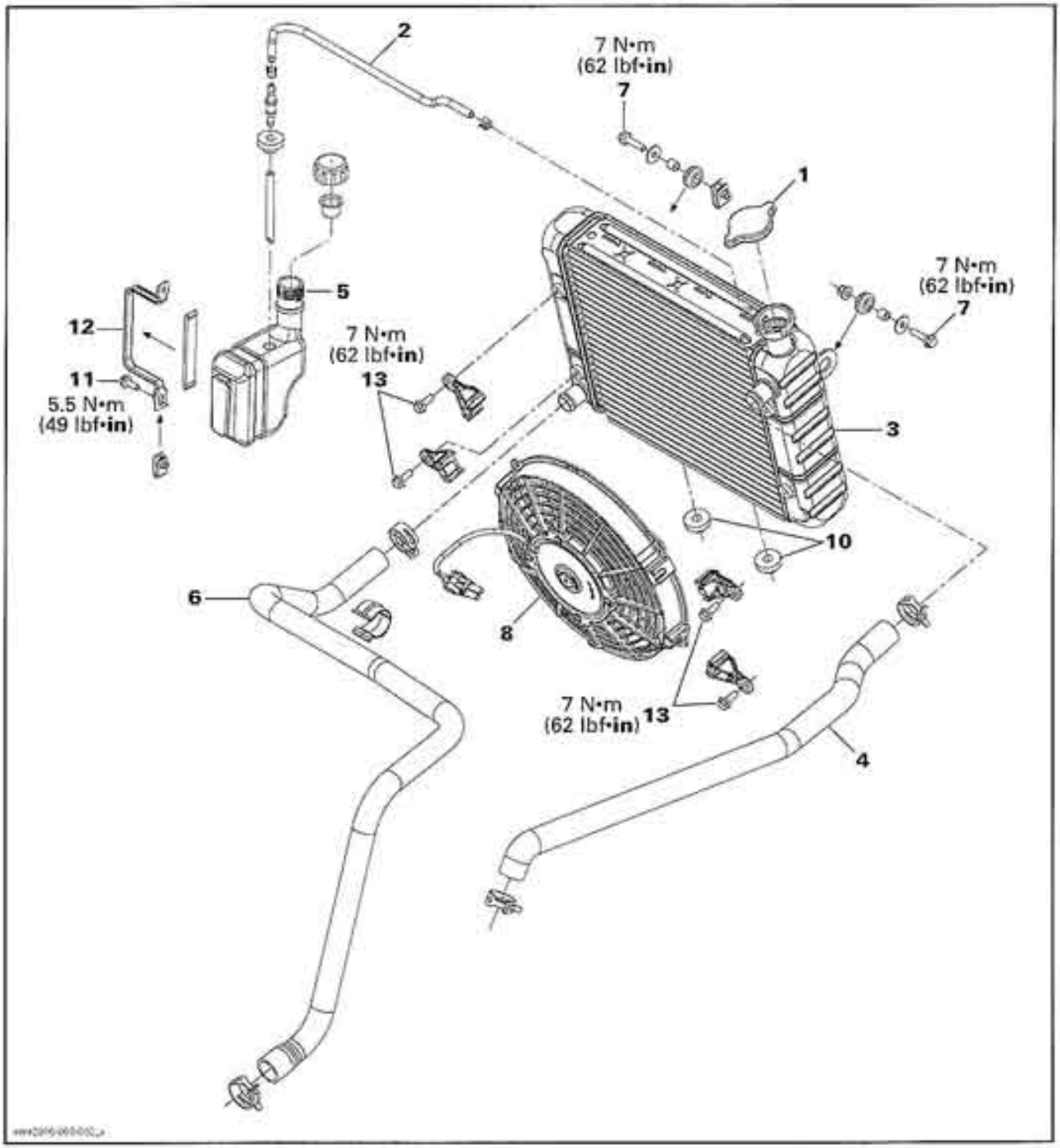
SERVICE PRODUCTS

Description	Part Number	Page
Bombardier premixed coolant	219 700 362	75

Outlander 400 Series



Outlander 800 Series



GENERAL

⚠ WARNING

Never start engine without coolant. Engine parts and ceramic seal on water pump shaft can be damaged.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

PROCEDURES

COOLING SYSTEM LEAK TEST

⚠ WARNING

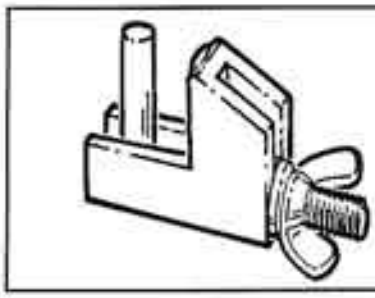
To avoid potential burns, do not remove the radiator cap or loosen the cooling drain plug if the engine is hot.

Open the access panel and remove the radiator cap no. 1.

Install the test cap (P/N 529 035 991) and a small hose pincher (P/N 295 000 076) on overflow hose no. 2.

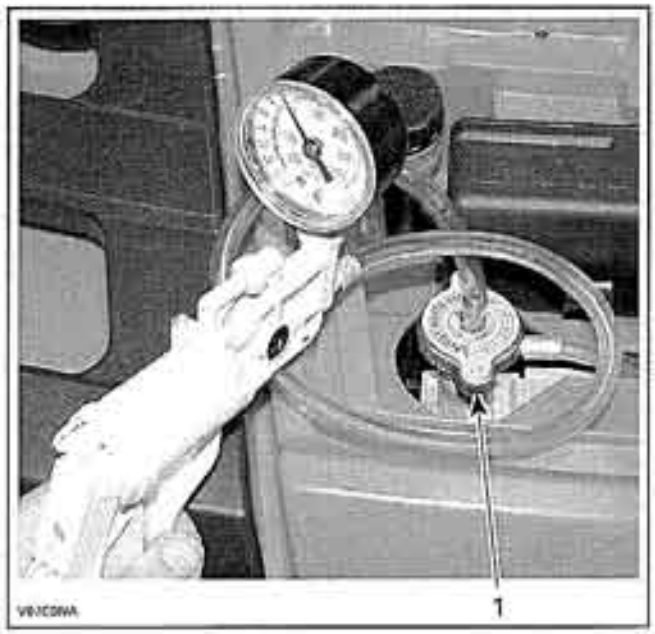
Using pressure/vacuum pump (P/N 529 021 800), pressurize system to 103 kPa (15 PSI).

529 035 991



295 000 076

1. Hose pincher
2. Overflow hose



TYPICAL
1. Special radiator cap

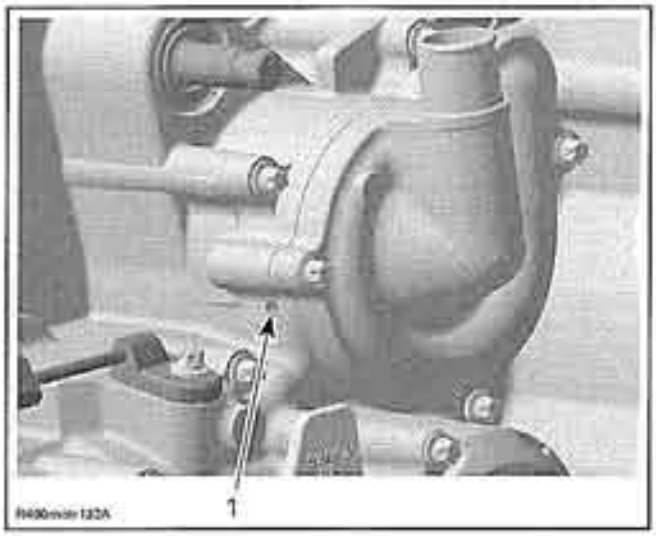
Check all hoses, radiator no. 3 and cylinder(s)/base for coolant leaks or air bubbles.

Inspection

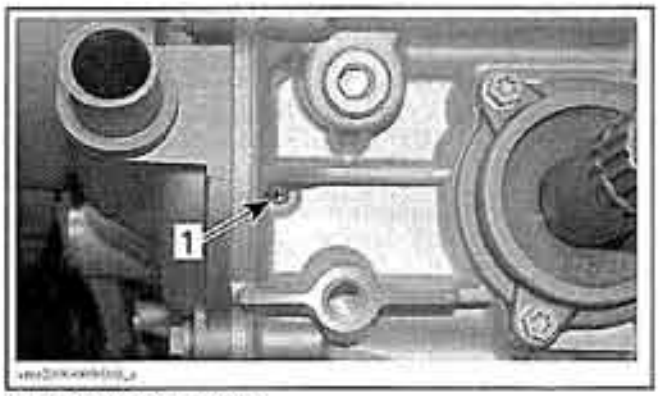
Check general condition of hoses and clamps tightness.

Check the leak indicator hole if there is oil or coolant.

NOTE: Flowing coolant indicates a damaged rotary seal. Oil indicates a non working oil seal. Refer to appropriate *ENGINE SHOP MANUAL* for repair procedure.

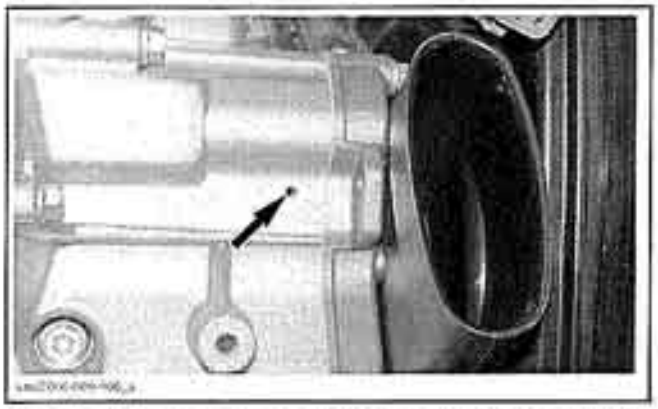


OUTLANDER 400 SERIES
1. Leak indicator hole



OUTLANDER 800 SERIES
1. Leak indicator hole

On Outlander 800 Series, an other leak indicator hole is visible on the PTO side. It indicate if the PTO gasket is in good condition. If a liquid leaks by this hole, the PTO gasket replacement is necessary.



Refer to the appropriate *ENGINE SHOP MANUAL* to repair the leak.

COOLANT REPLACEMENT

⚠ WARNING

To avoid potential burns, do not remove the radiator cap or loosen the cooling drain plug if the engine is hot.

Recommended Coolant

Use Bombardier premixed coolant (P/N 219 700 362) or a blend of 50% antifreeze with 50% water.

To prevent antifreeze deterioration, always use the same brand. Never mix different brands unless cooling system is completely flushed and refilled.

CAUTION: To prevent rust formation or freezing condition, always replenish the system with the Bombardier premixed coolant or with 50% antifreeze and 50% water. Do not use tap water, straight antifreeze or straight water in the system. Tap water contains minerals and impurities which build up in the system. During cold weather, straight water causes the system to freeze while straight antifreeze thickens and does not have the same efficiency. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

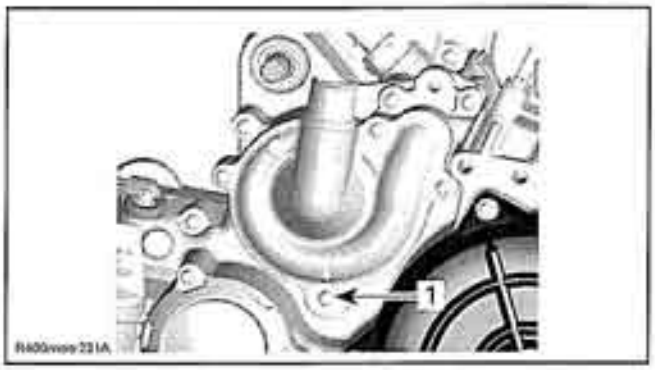
Draining the System

⚠ WARNING

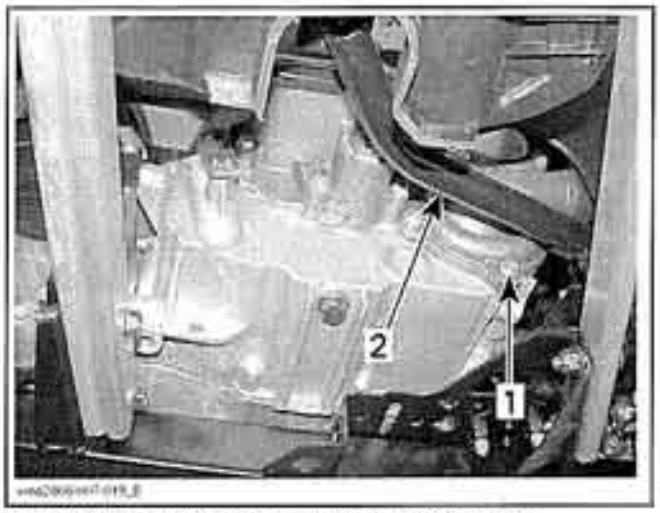
Never drain or refill cooling system when engine is hot.

Remove radiator cap no. 1.

Partially unscrew cooling drain plug located below coolant pump housing.



OUTLANDER 400 SERIES
1. Cooling drain plug



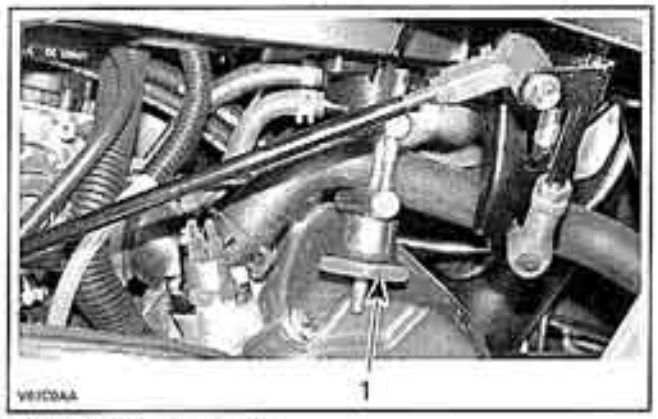
OUTLANDER 800 SERIES — UNDER RH FOOTREST
1. Cooling drain plug
2. Brake pedal

When cooling system is drained completely, remove cooling drain plug completely and install a new gasket ring. Screw the cooling drain plug and torque it to 10 N•m (89 lbf•**in**).

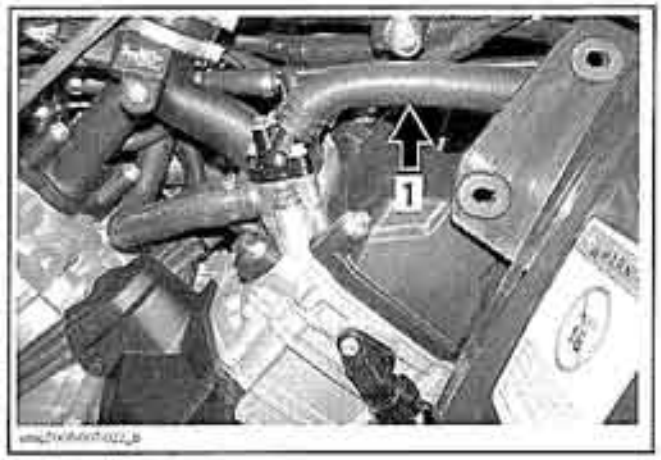
Refilling the System

Remove the RH side panel.

Pinch radiator inlet hose no. 4 between radiator and thermostat housing with a large hose pincher (P/N 529 032 500).

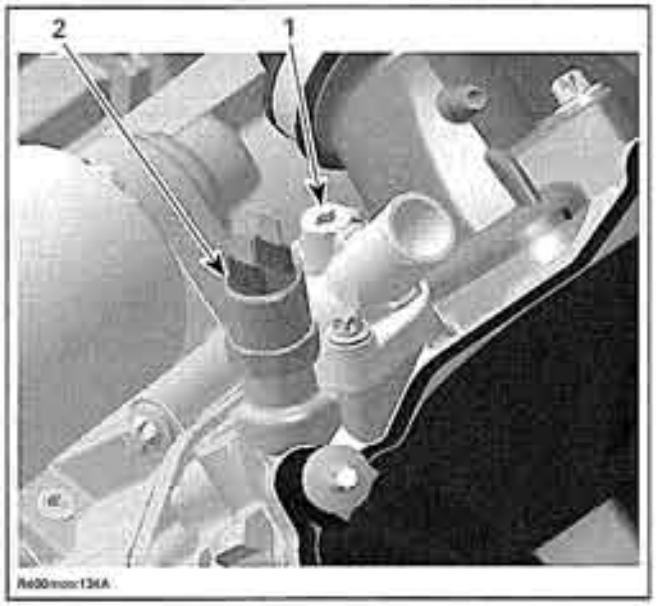


OUTLANDER 400 SERIES
1. Hose pincher



OUTLANDER 800 SERIES
1. Place hose pincher here

Unscrew bleeding screw(s) on top of thermostat housing.

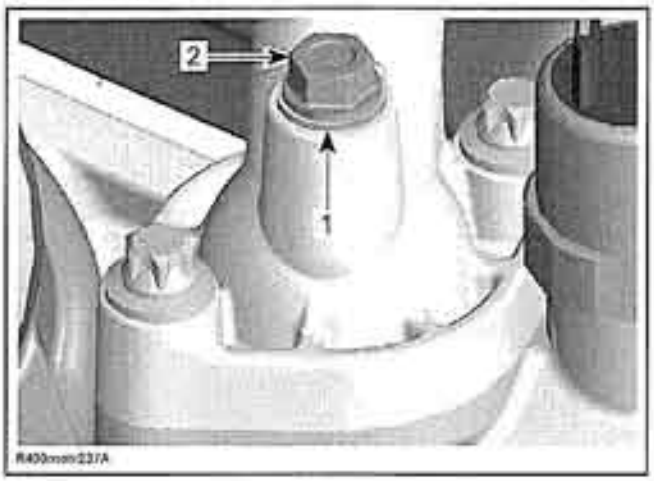


OUTLANDER 400 SERIES
1. Bleeding screw area
2. Coolant temperature sensor

OUTLANDER 800 SERIES
1. Bleeding screws

NOTE: On the V-810 engine, both cylinders must be bled.

With vehicle on a flat surface, engine cold, refill radiator no. 3. When the coolant comes out by the thermostat housing hole, install the bleeding screw with its gasket ring and torque to 5 N•m (44 lbf•in).



TYPICAL
1. Gasket ring
2. Bleeding screw

Remove hose pincher, fill up the radiator then install radiator cap.

Refill coolant tank no. 5 up to cold level mark. Install the coolant tank cap. Run engine until thermostat opens then stop engine.

When engine has completely cooled down, recheck coolant level in radiator and coolant tank and top up if necessary. The level in the coolant tank should be between MIN. and MAX. marks.

NOTE: Each year or every 100 hours or when vehicle reaches 3000 km (1865 mi), check coolant concentration (freezing point) with proper tester.

THERMOSTAT

The thermostat is a single action type.

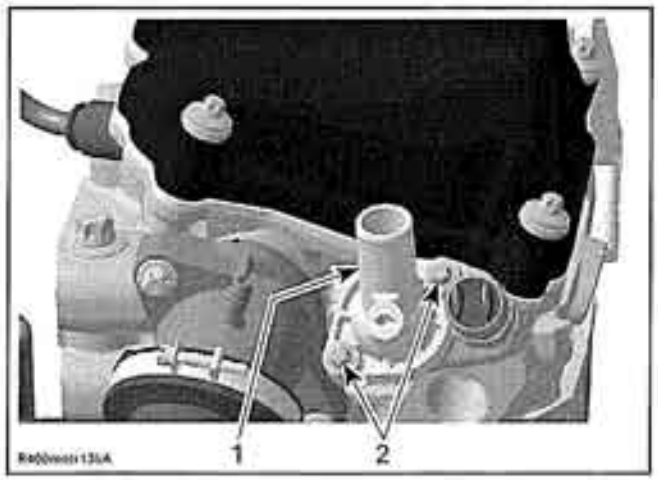
Removal

NOTE: The thermostat is located on the top of cylinder head, on intake side (front cylinder on the Outlander 800 Series).

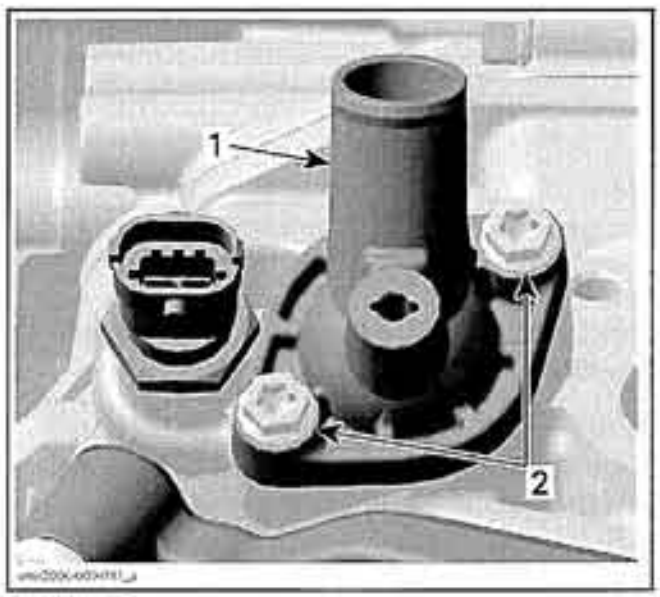
Install a hose pincher on both radiator hoses.

Remove:

– thermostat housing screws and pull thermostat cover

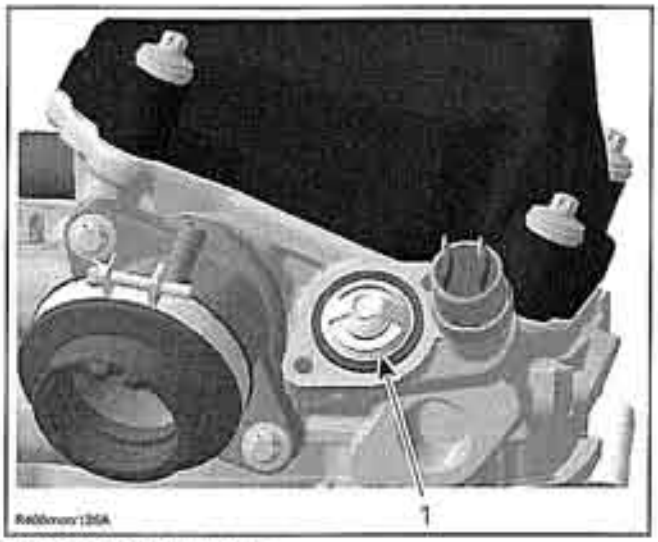


OUTLANDER 400 SERIES
1. Thermostat cover
2. Screws

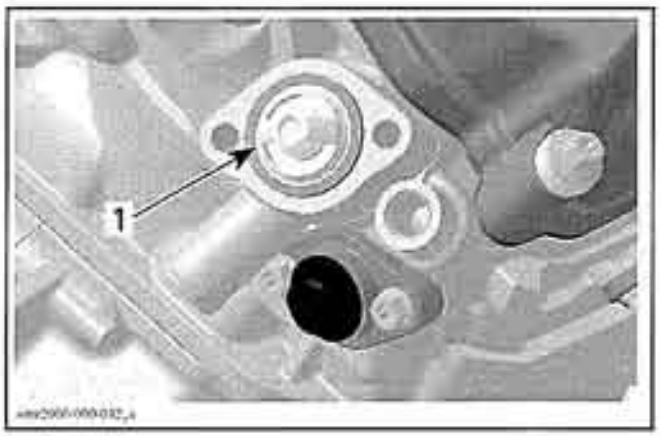


OUTLANDER 800 SERIES
1. Thermostat cover
2. Screws

– thermostat with gasket out of the hole.



OUTLANDER 400 SERIES
1. Thermostat with gasket



OUTLANDER 800 SERIES
1. Thermostat with gasket

Test

To check thermostat, put in water and heat water. Thermostat should open when water temperature reaches 65°C (149°F).

Check if the gasket is brittle, hard or damaged. If so, replace gasket.

Installation

For installation, reverse the removal procedure, pay attention to the following details.

Install the thermostat cover then torque screws to 6 N•m (53 lbf•**in**).

Check coolant level in radiator and coolant tank and top up if necessary.

CAUTION: Do not forget to bleed the cooling system. Refer to *COOLANT REPLACEMENT* above.

RADIATOR CAP

Using a pressure cap tester, check the efficiency of radiator cap no. 1. If the efficiency is feeble, install a new 110 kPa (16 PSI) cap (do not exceed this pressure).

RADIATOR

Inspection

Check radiating fins for clogging or damage.

Remove insects, mud or other obstructions with compressed air or low pressure water.

Removal

Drain cooling system.

Outlander 400 Series

Remove front fascia and both inner fenders, refer to *BODY*.

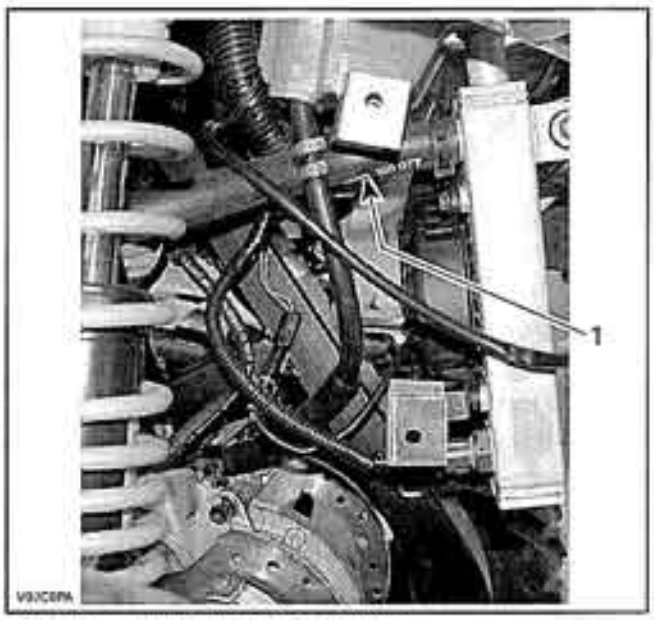
Outlander 800 Series

Remove front fascia and radiator shroud, refer to *BODY*.

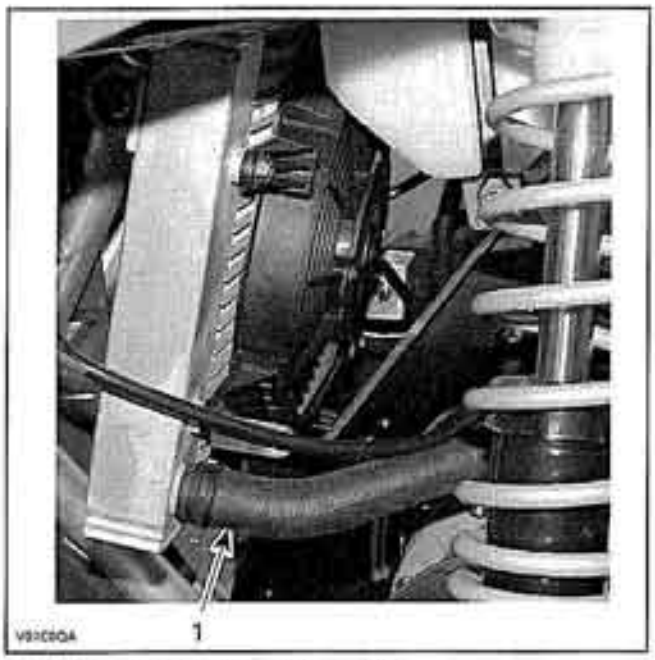
All Models

Remove:

- radiator inlet no. 4 and radiator outlet no. 6 hoses

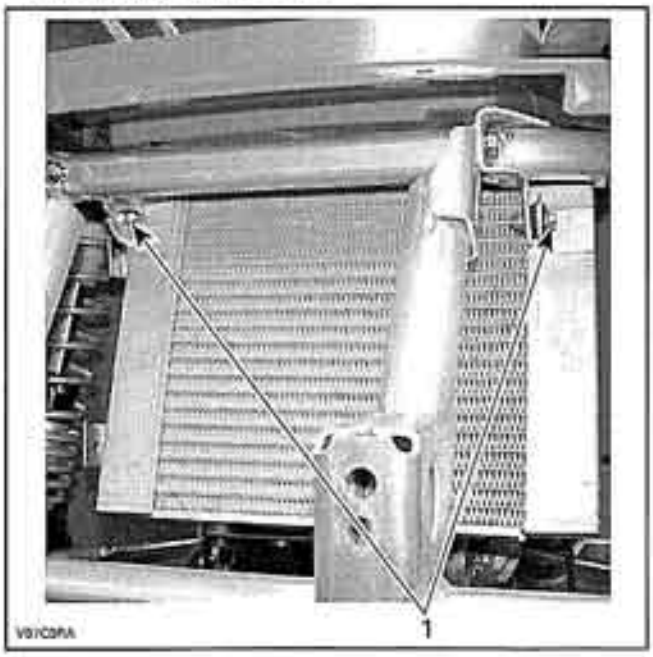


TYPICAL — OUTLANDER 400 SHOWN
1. Radiator inlet hose



TYPICAL — OUTLANDER 400 SHOWN
1. Radiator outlet hose

- overflow hose no. 2
- mounting bolts no. 7.



TYPICAL
1. Radiator mounting bolts

Unplug radiator fan no. 8.

On Outlander 400 Series, unplug the fan activation switch no. 9.

Remove radiator no. 3.

Installation

For installation, reverse the removal procedure. Pay attention to the following detail.

Install rubber bushings no. 10 between the bottom of radiator and radiator supports.

Fill up the radiator. Refer to *COOLANT REPLACEMENT*, above in this section.

Check for any coolant leakage from radiator and hoses.

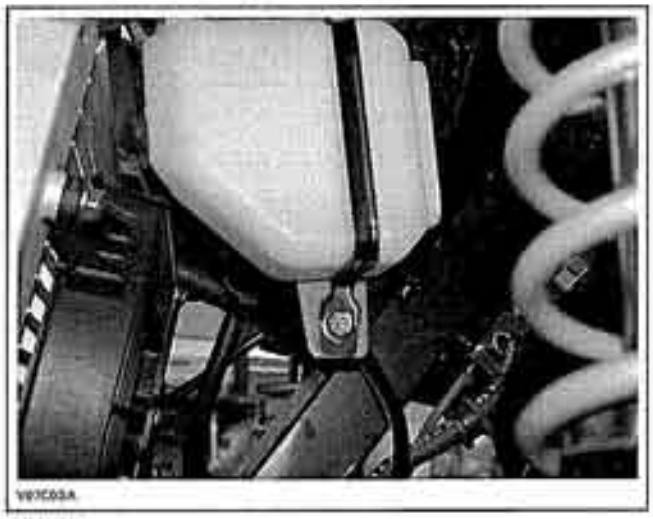
COOLANT TANK

The coolant expands as the temperature (up to 100 - 110°C (212 - 230°F)) and pressure rise in the system. If the limiting system working pressure cap is reached 110 kPa (16 PSI), the pressure relief valve in the pressure cap is lifted from its seat and allows coolant to flow through the overflow hose into the overflow coolant tank no. 5.

Removal

Remove:

- LH inner fender (refer to *BODY*)
- coolant tank support bolt no. 11



TYPICAL

- overflow hose no. 2
- support no. 12 and coolant tank no. 5.

Empty coolant tank.

Installation

The installation is the reverse of the removal procedure.

RADIATOR FAN

Test

Outlander 400 Series

NOTE: It is not required to turn the ignition key to ON for this test.

Unplug the fan activation switch connector.

Install a jumper wire end in connector. Replace the radiator fan no. 8 if it does not work.

If radiator fan works well, check the fan activation switch. Refer to the end of this section.

If necessary, check wiring harness and connector.

Outlander 800 Models

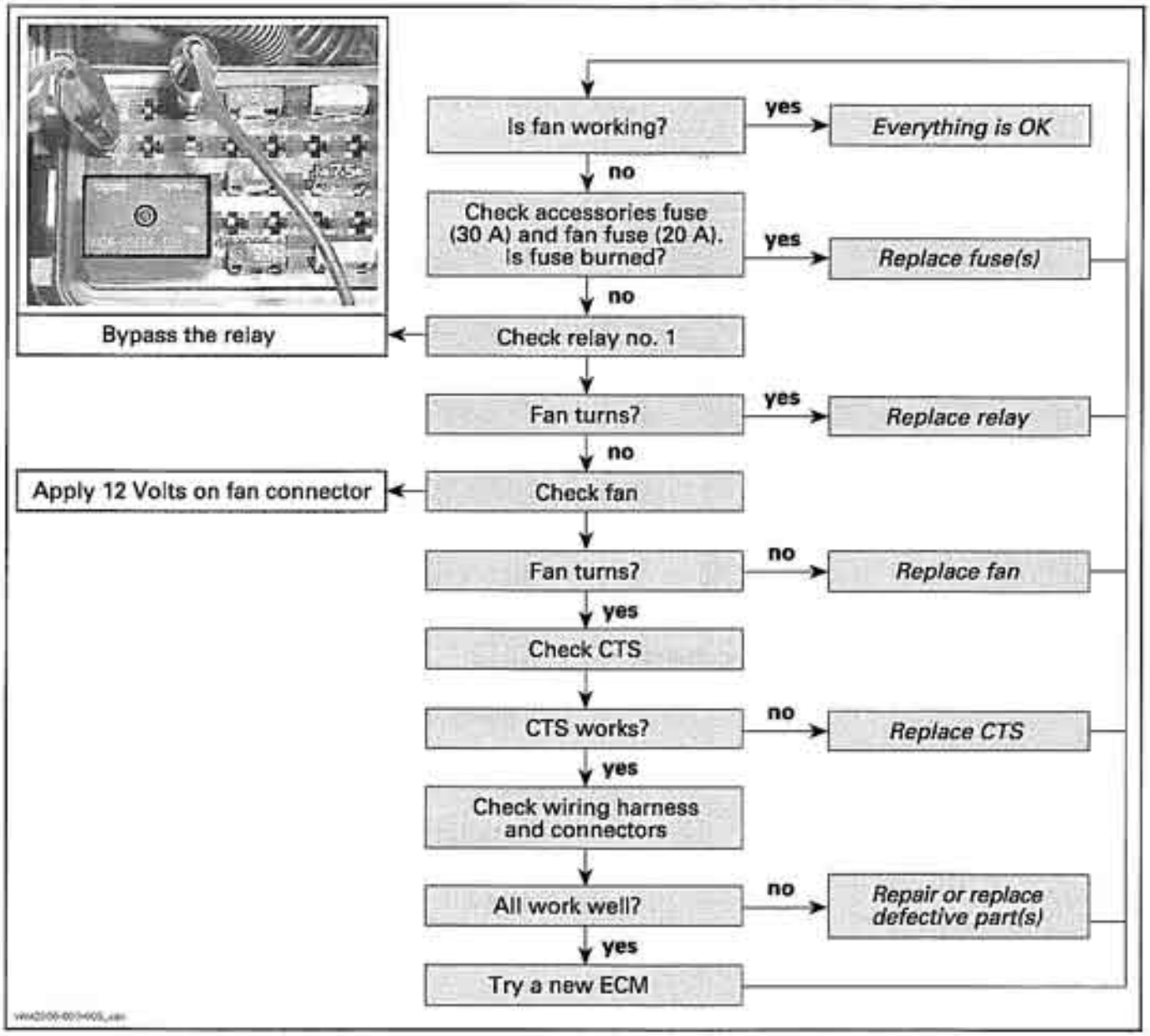
NOTE: The ECM controls the radiator fan via the input of the coolant temperature sensor (CTS). The radiator fan should turn on when coolant temperature reaches 98°C (208°F) and should turn off when the coolant cools down at 95°C (203°F).

Connect the vehicle to B.U.D.S. Refer to *ENGINE MANAGEMENT* for procedure and connector location.

In ACTIVATION folder, press COOLANT FAN button.

If fan turns, check CTS, wiring harness and connectors. If all parts are good, replace the ECM.

If fan does not turn when COOLANT FAN button is pressed, use the following troubleshooting chart to resolve the problem.



Removal

Outlander 400 Series

Remove both inner fenders. Refer to *BODY*.

Unplug radiator fan connector.

Remove bolts no. 13.

Remove the radiator fan.

Outlander 800 Series

Remove radiator shroud.

Remove bolts no. 13.

Remove the radiator fan.

Installation

For the installation, reverse the removal procedure.

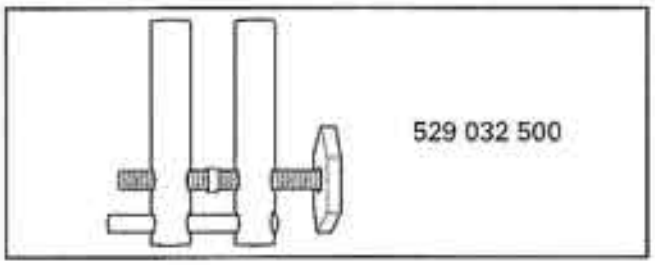
COOLANT TEMPERATURE SENSOR (CTS)

Outlander 400 Series

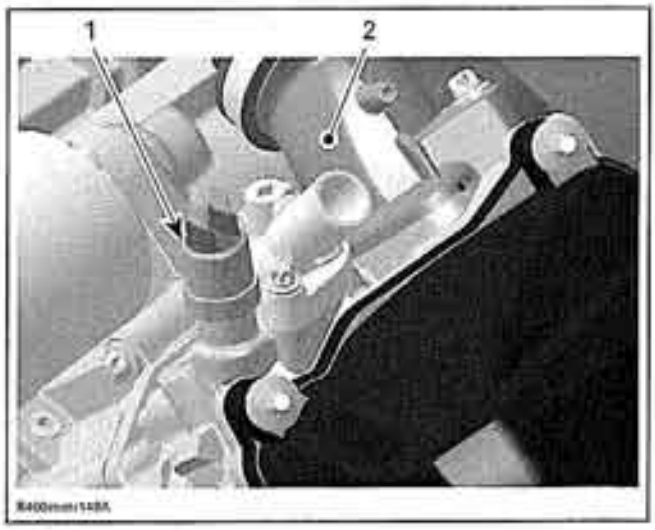
Removal

NOTE: The CTS is located on the top of cylinder head, on intake side.

Install a large hose pincher (P/N 529 032 500) on both radiator hoses.



Unplug the CTS then remove it.



1. CTS
2. Intake port

Test

To check CTS, do the following:

- Pour coolant in a small container.
- Place the CTS end in the coolant (without touching the container).
- Connect the probes of multimeter FLUKE 111 (P/N 529 035 868) on CTS connectors.
- Place a thermometer in the container and heat coolant.
- The CTS should operate when coolant temperature reaches 115°C (239°F).

Replace CTS if necessary.

Installation

For installation, reverse the removal procedure.

CAUTION: Never use the gasket ring a second time. Always install a new one.

Torque temperature switch to 16 N•m (142 lbf•**in**).

Check coolant level in radiator and coolant tank and top up if necessary.

Outlander 800 Series

Refer to *ENGINE MANAGEMENT* section for testing and replacement procedures of the coolant temperature sensor (CTS).

FAN ACTIVATION SWITCH (FAS)

Outlander 400 Series Only

Test

Remove FAS no. 9, see below for procedure.

To check FAS, do the following:
- Pour water in a small container.
- Place the FAS end in the water (without touching the container).
- Connect the probes of multimeter FLUKE 111 (P/N 529 035 868) on FAS connectors.
- Place a thermometer in the container and heat water.
- The FAS should closed when coolant temperature reaches 95°C (203°F) and reopened when the coolant cools down around 90°C (194°F).

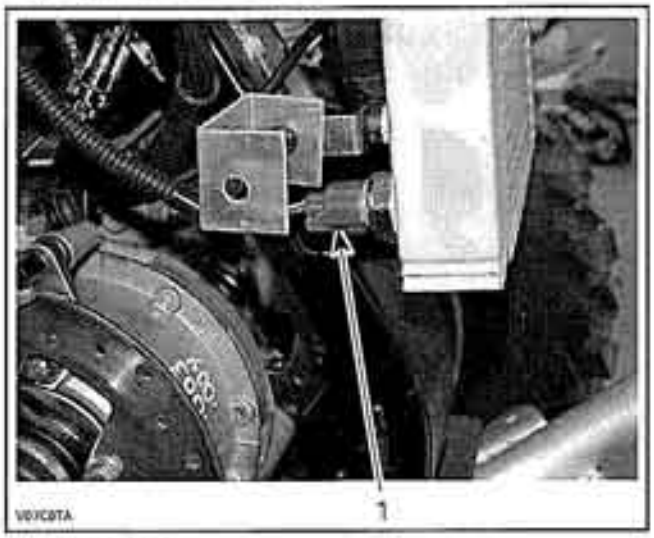
Change FAS if resistance does not change when water temperature is equal or over specification.

Removal

Drain coolant.

Remove the RH inner fender (refer to *BODY*).

Unplug FAS connector.



1. FAS connector

Unscrew FAS **no. 9**.

Installation

The installation is the reverse of the removal procedure, pay attention to the following details.

Check O-ring and change if necessary.

CAUTION: Do not apply any product on the threads or on the O-ring.

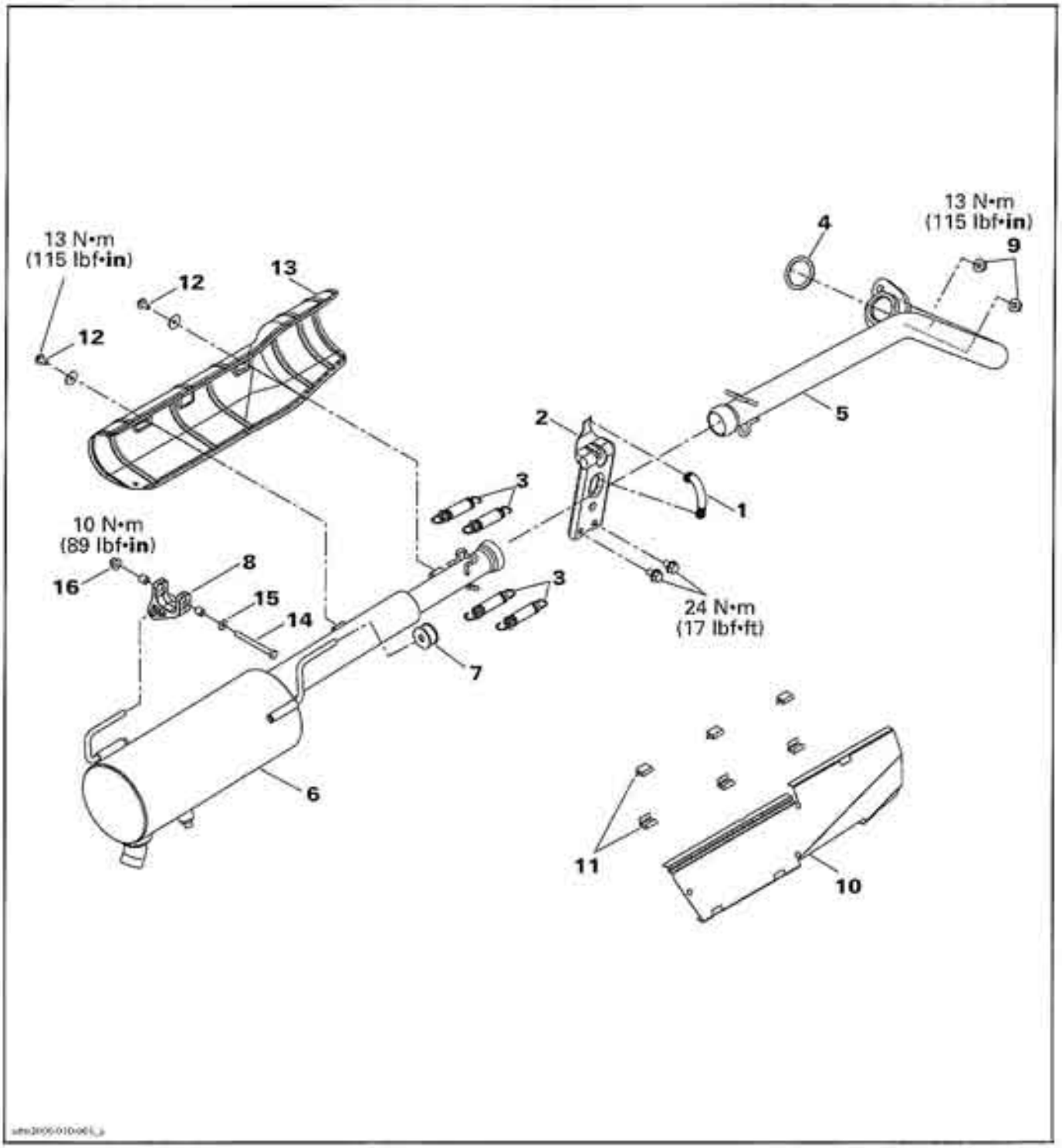
Torque FAS to 11 N•m (97 lbf•**in**).

EXHAUST SYSTEM

SERVICE TOOLS

Description	Part Number	Page
exhaust spring tool	529 035 983	85-86, 90-91

OUTLANDER 400 SERIES



GENERAL

⚠ WARNING

To avoid potential burns, never touch exhaust system components immediately after the engine has been run because these components are very hot. Let engine and exhaust system cool down before performing any servicing.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

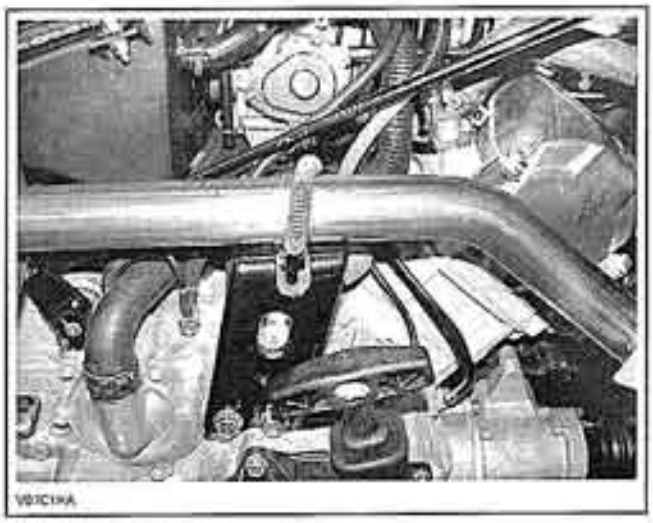
Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pin, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

PROCEDURES

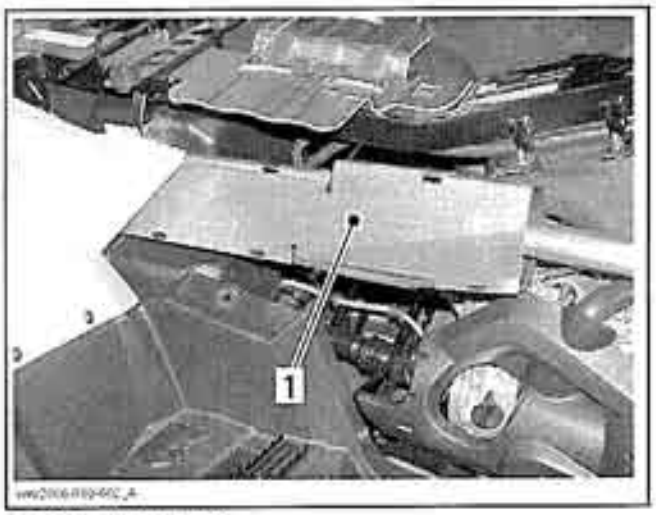
EXHAUST PIPE

Removal

Remove:
- RH side panel
- retaining spring no. 1 from exhaust pipe support no. 2

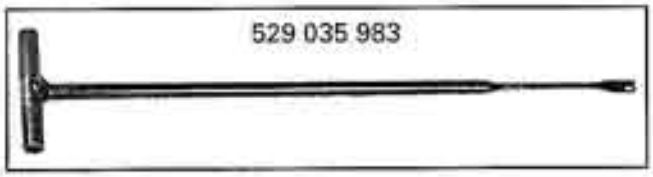


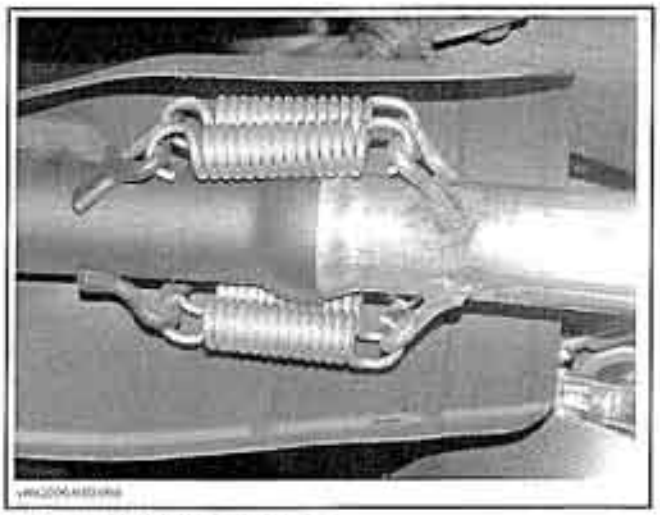
- external heat shield



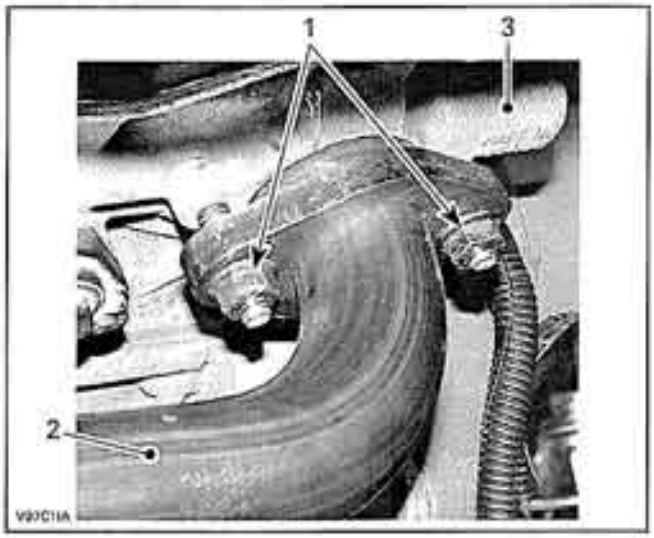
1. External heat shield

- exhaust springs no. 3, use exhaust spring tool (P/N 529 035 983)





– the exhaust pipe nuts.



1. Nut
2. Exhaust pipe
3. Cylinder head

Push the exhaust pipe forward then remove it.

Remove the exhaust gasket no. 4 from engine exhaust port.

Inspection

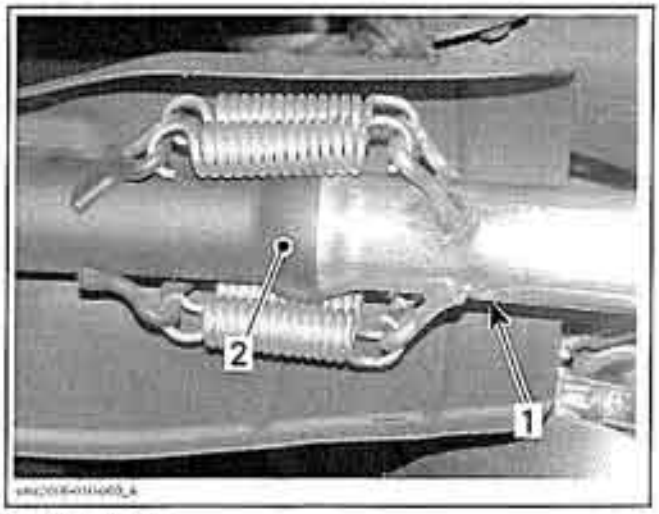
Check exhaust pipe no. 5 for cracks, bending or other damages. Replace if necessary.

Installation

Install a new exhaust gasket no. 4 on exhaust pipe end (cylinder head side).

With muffler no. 6 secured in its rubber mounts no. 7 and no. 8, secure exhaust pipe on cylinder head with exhaust nuts no. 9.

Tighten nuts, making sure exhaust pipe is properly aligned inside muffler ball socket then install exhaust springs no. 3 after pushing muffler forward over exhaust pipe.



1. Exhaust pipe
2. Muffler ball socket

Install the retaining spring no. 1.

MUFFLER

Removal

Remove external heat shield no. 10 then the exhaust springs no. 3. Use the exhaust spring tool (P/N 529 035 983).

Pull muffler no. 6 backward to remove muffler rods from rubber bushing no. 7 and muffler support no. 8.

Inspection

Check muffler and retaining rods for cracks or other damages. Replace if necessary.

Installation

For the installation, reverse the removal procedure.

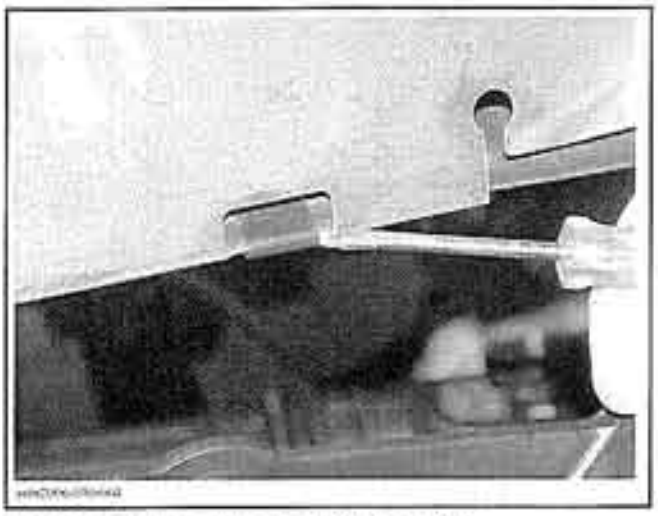
HEAT SHIELD

Removal

External Heat Shield

Remove RH side panel.

Using a small screwdriver, remove heat shield clips no. 11.

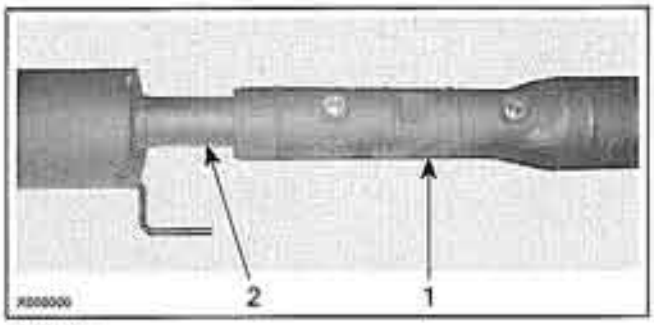


Remove external heat shield no. 10.

Formed Heat Shield

Remove the muffler no. 6.

Unscrew bolts no. 12 retaining formed heat shield no. 13 to muffler tube.



TYPICAL
1. Formed heat shield
2. Muffler tube

Inspection

Check if the heat shields are cracked or damaged. Replace it if necessary.

Installation

The installation is the reverse of the removal procedure.

MUFFLER SUPPORT

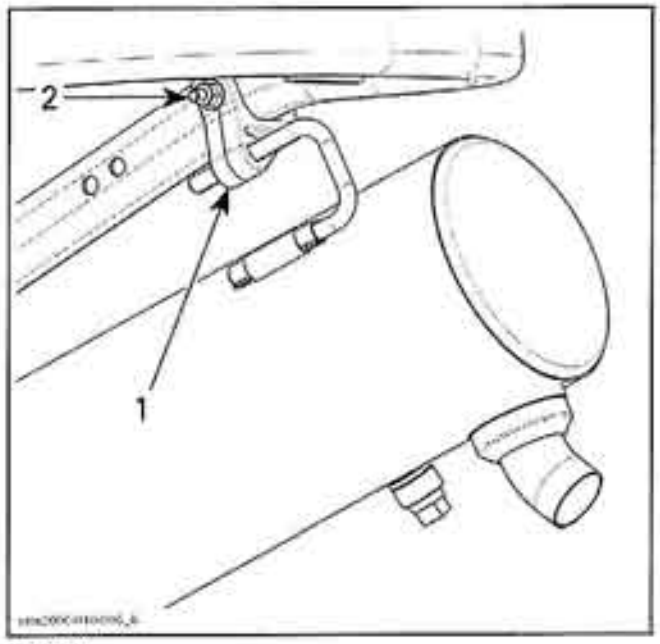
Inspection

Check muffler support condition. If cracked or otherwise damaged, replace it.

Removal

Attach muffler no. 6 to frame with a rope or an elastic tie before removing muffler support no. 8.

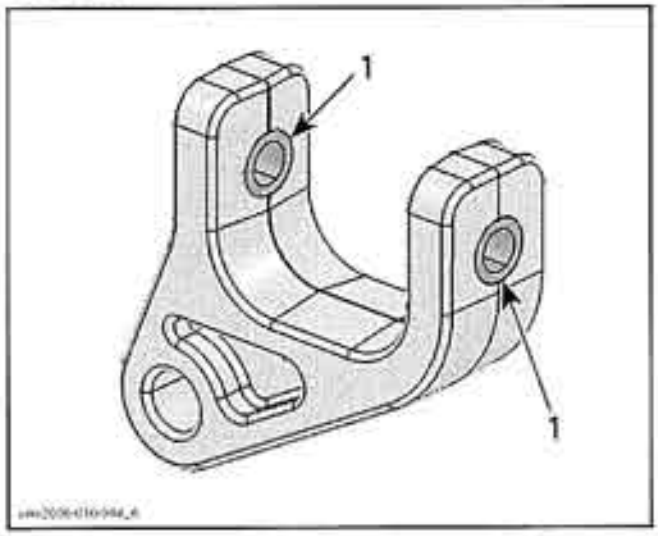
Remove bolt no. 14 and its flat washer no. 15 holding the muffler support to the frame.



TYPICAL
1. Muffler support
2. Bolt

Slide the muffler support no. 8 on the muffler rod to remove it.

NOTE: Two sleeves (one of each side) are inserted into muffler support arms. Pay attention not to loose them.



TYPICAL
1. Sleeves

Installation

The installation is the reverse of the removal procedure.

Torque the muffler support nut no. 16 to 8 N•m (71 lbf•**in**).

RUBBER BUSHING

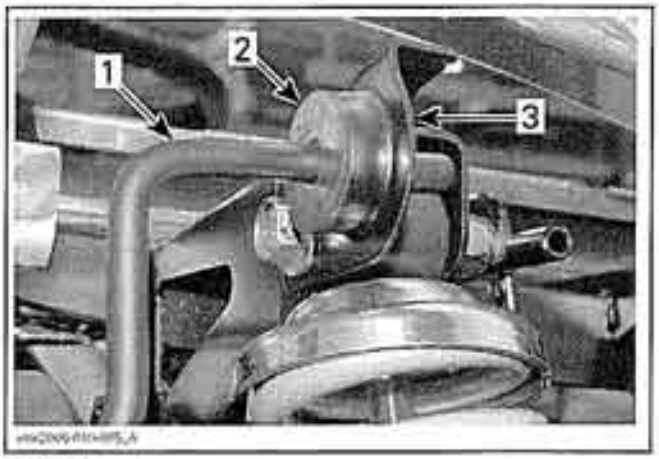
Inspection

Check the rubber bushing condition. If hard, brittle or damaged, replace it.

Removal

Remove muffler no. 6 from vehicle. See above for the procedure.

Push the rubber bushing no. 7 out of its bracket.

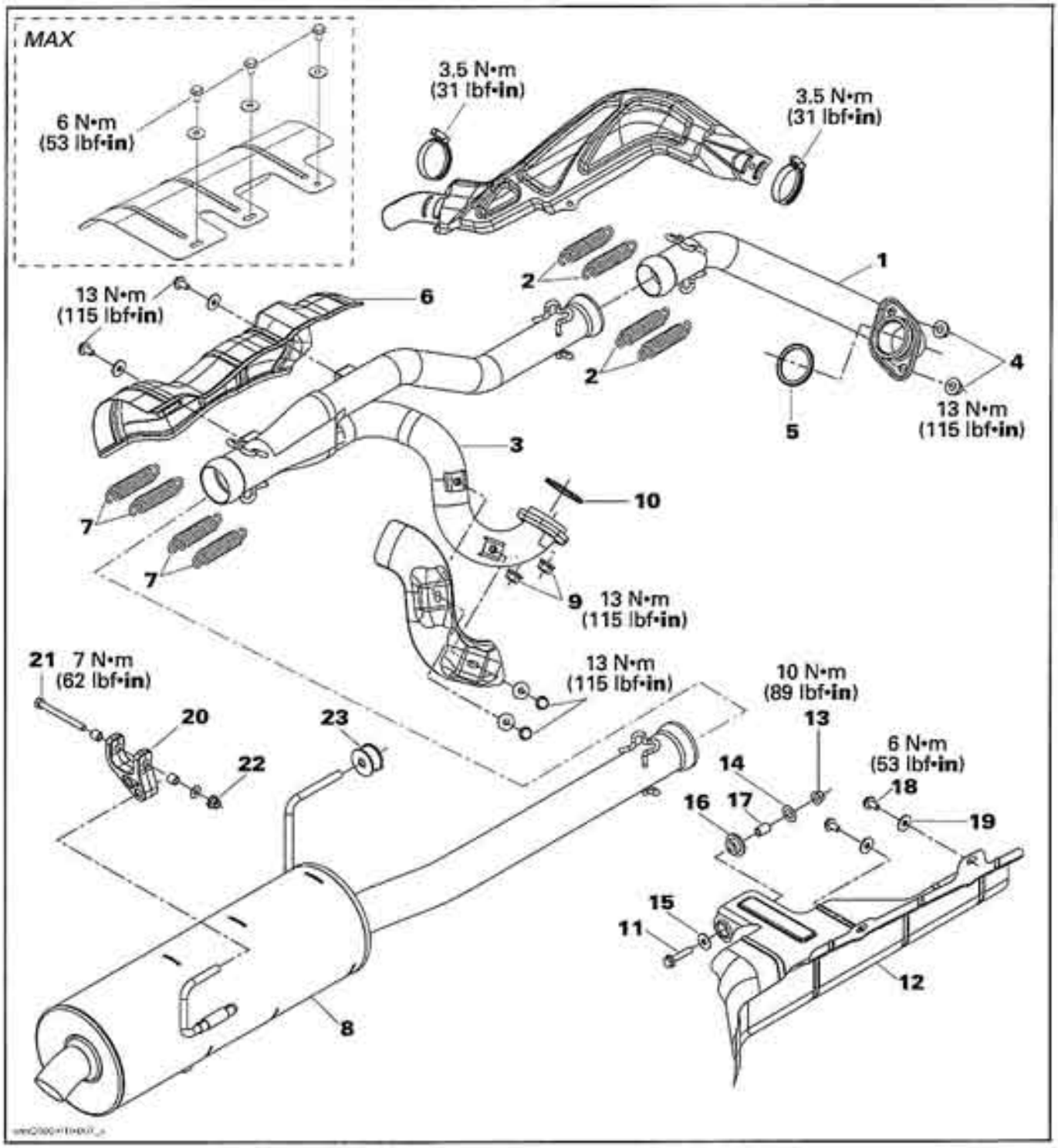


TYPICAL
1. *Muffler rod*
2. *Rubber bushing*
3. *Bushing bracket*

Installation

The installation is the reverse of the removal procedure.

OUTLANDER 800 SERIES



GENERAL

⚠ WARNING

To avoid potential burns, never touch exhaust system components immediately after the engine has been run because these components are very hot. Let engine and exhaust system cool down before performing any servicing.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pin, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

PROCEDURES

FRONT EXHAUST PIPE

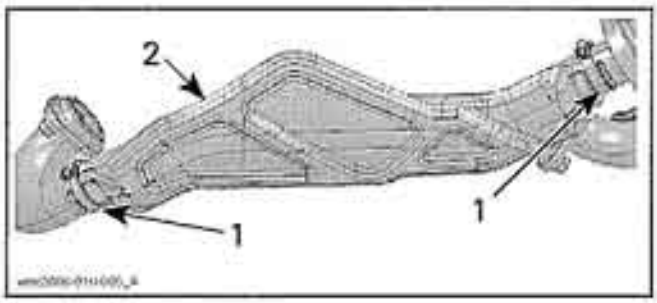
Inspection

Check for cracks, bending or other damages. Replace if necessary.

Removal

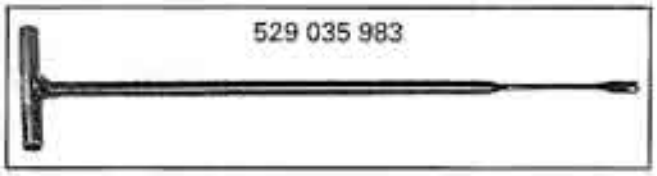
Remove LH side panel.

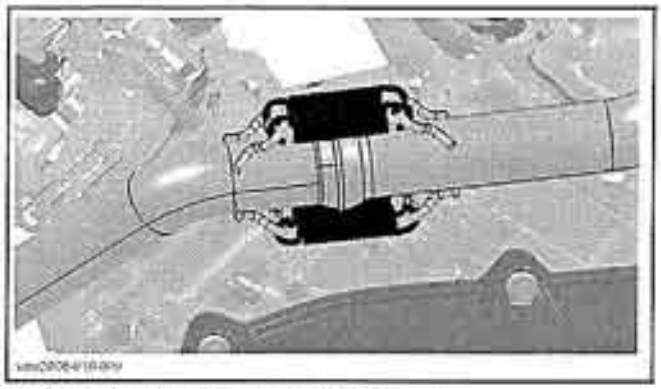
Unscrew both clamps that attach heat shield to front exhaust pipe no. 1.



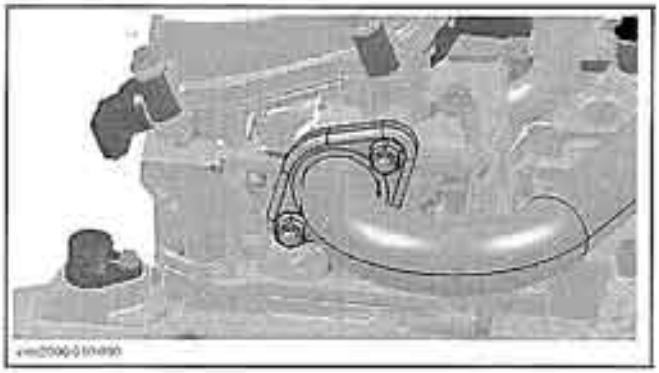
1. Heat shield clamps
2. Heat shield of front exhaust pipe

Using the exhaust spring tool (P/N 529 035 983), remove exhaust springs no. 2 holding front exhaust pipe no. 1 to "Y" exhaust pipe no. 3.





Unscrew exhaust pipe nuts no. 4.



Move front exhaust pipe forward then remove it.

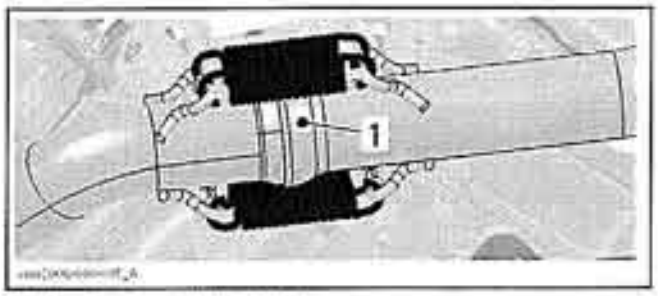
Remove exhaust gasket no. 5 from engine exhaust port.

Installation

Install a new exhaust gasket on front exhaust pipe end.

Secure front exhaust pipe on cylinder head with exhaust nuts. Do not torque yet.

Make sure front exhaust pipe end is properly aligned inside ball socket of "Y" exhaust pipe. Install exhaust springs.



1. Y exhaust pipe ball socket

Torque exhaust nuts to 13 N•m (115 lbf•**in**).

Install all other removed parts.

"Y" EXHAUST PIPE

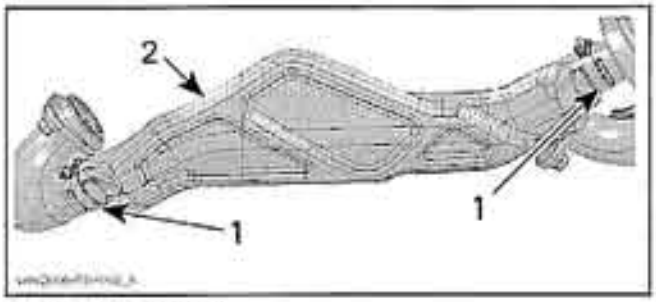
Inspection

Check for cracks, bending or other damages. Replace if necessary.

Removal

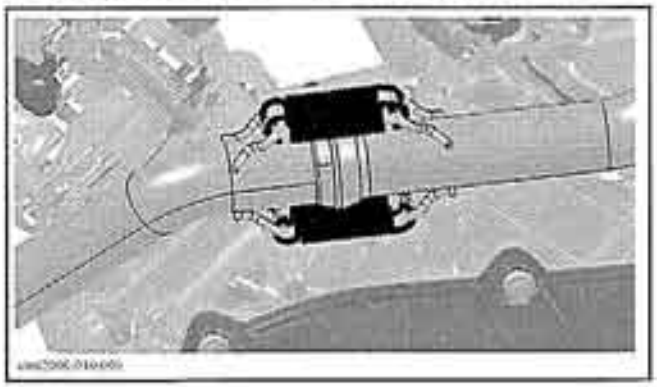
Remove muffler no. 8.

Unscrew both clamps that attach heat shield to front exhaust pipe no. 1.



1. Heat shield clamps
2. Heat shield of front exhaust pipe

Using the exhaust spring tool (P/N 529 035 983), remove exhaust springs no. 7 that attach "Y" exhaust pipe no. 3 to front exhaust pipe no. 8.



MAX MODELS SHOWN

Unscrew exhaust nuts no. 9 then remove "Y" exhaust pipe.

Remove exhaust gasket no. 10 from engine exhaust port.

Installation

Install a new exhaust gasket on "Y" exhaust pipe end.

Secure "Y" exhaust pipe on cylinder head with exhaust nuts. Do not torque yet.

Make sure "Y" exhaust pipe end is properly aligned with the end of front exhaust pipe. Install exhaust springs.

Torque exhaust nuts to 13 N•m (115 lbf•**in**).

Install muffler and all other removed parts.

FUEL TANK PROTECTOR

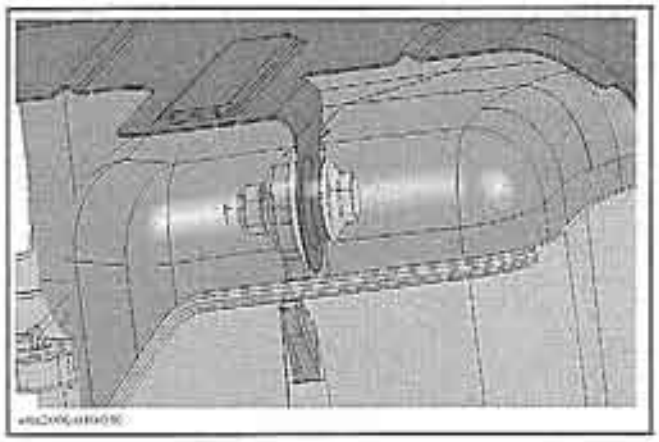
Inspection

Check for wear, cracks or other damages. Replace if necessary.

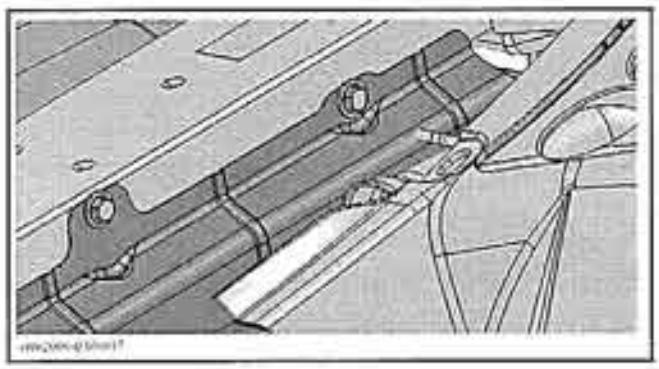
Removal

Remove muffler.

Unscrew bolt no. 11 that attach fuel tank protector no. 12 to fuel tank. Keep nut no. 13, washers no. 14 and no. 15, bushing no. 16 and sleeve no. 17.



Unscrew upper bolts no. 18 retaining the fuel tank protector to frame. Keep washers no. 19.



Remove fuel tank protector.

Installation

The installation is the reverse of the removal procedure.

Install all bolts before applying the torque. Tighten nut no. 13 to 10 N•m (89 lbf•**in**) then upper bolts no. 18 to 6 N•m (53 lbf•**in**).

HEAT SHIELD

NOTE: On 800 EFI engines models, 2 types of heat shield are installed, with bolts and with clamps. The following instructions are generic. Body parts removal can be necessary to reach heat shields.

Inspection

Check for wear, cracks or other damages. Replace if necessary.

Removal

Bolted Heat Shield

Remove heat shield bolts and flat washers.

Then remove heat shield.

Clamped Heat Shield

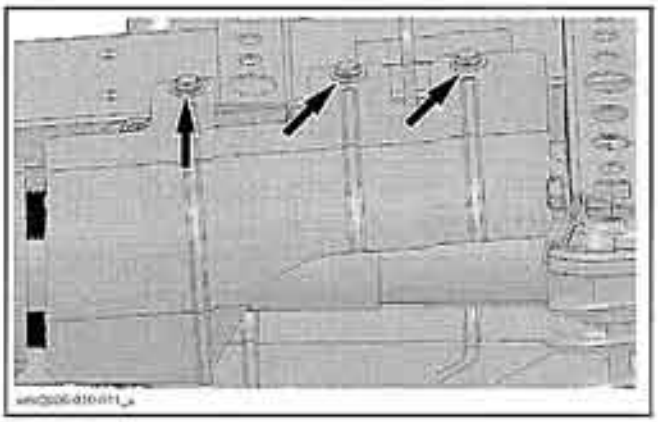
Loosen clamps then remove heat shield.

Installation

Bolted Heat Shield

Torque all heat shield bolts to 13 N•m (115 lbf•**in**) except the rear heat shield on the MAX models.

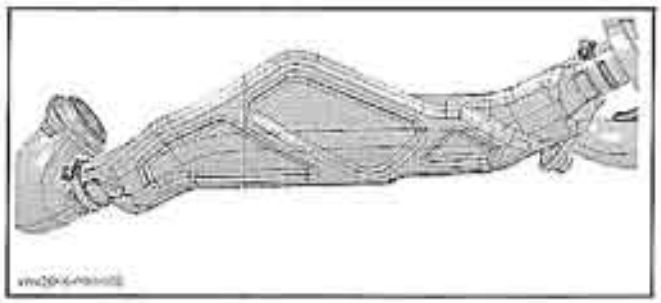
Torque rear heat shield bolts to 6 N•m (53 lbf•**in**).



REAR HEAT SHIELD — MAX/MAX XT MODELS

Clamped Heat Shield

Position clamps in accordance with the following illustrations to avoid interferences with other parts.



FRONT HEAT SHIELD

Torque all heat shield clamps to 3.5 N•m (31 lbf•**in**).

MUFFLER SUPPORT

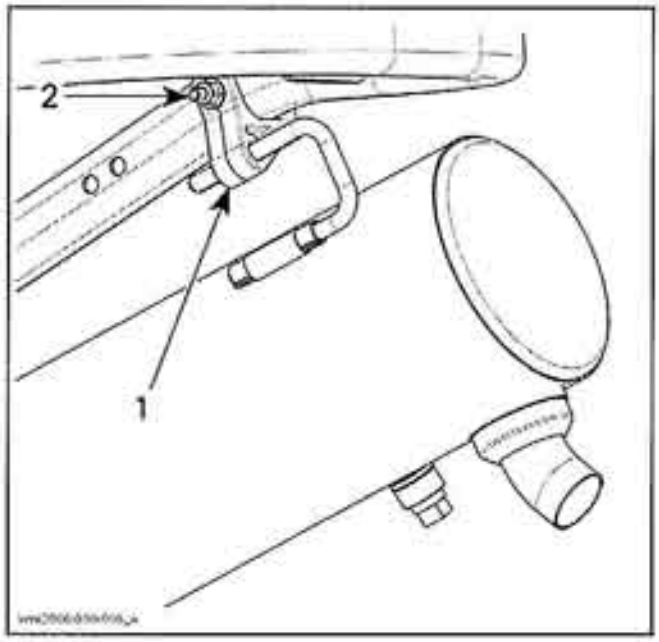
Inspection

Check muffler support condition. If crack or otherwise damaged, replace it.

Removal

Attach muffler no. 8 to frame with a rope or an elastic tie before removing muffler support no. 20.

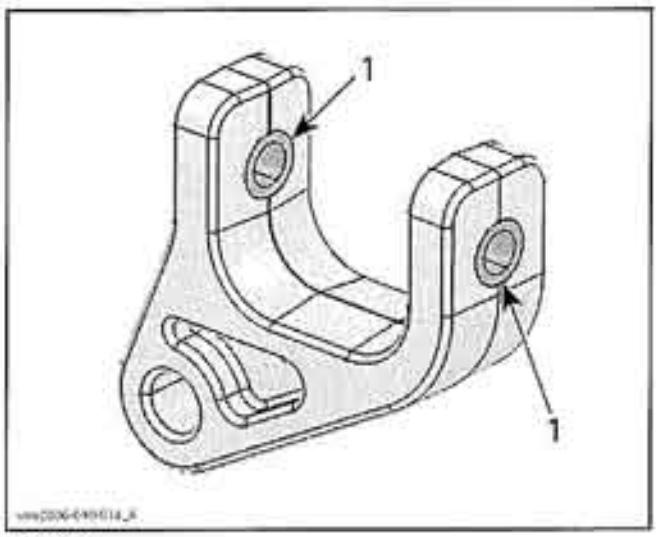
Remove bolt no. 21 holding the muffler support to the frame.



TYPICAL
1. Muffler support
2. Bolt

Slide the muffler support no. 20 on the muffler rod to remove it.

NOTE: Two sleeves (one of each side) are inserted into muffler support arms. Pay attention not to lose them.



TYPICAL
1. Sleeves

Installation

The installation is the reverse of the removal procedure.

Torque the muffler support nut no. 22 to 8 N•m (71 lbf•**in**).

RUBBER BUSHING

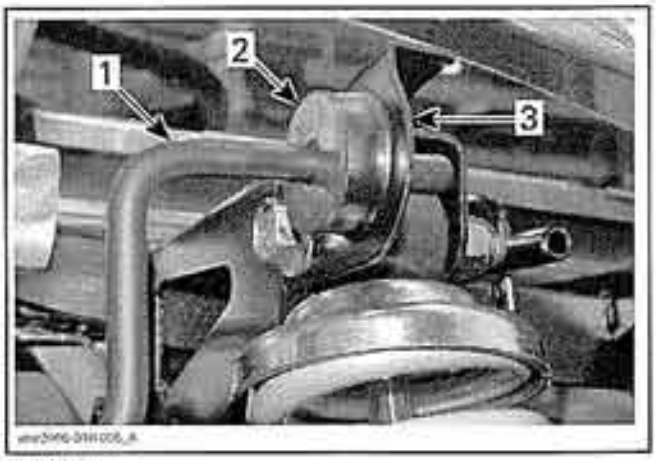
Inspection

Check the rubber bushing condition. If hard, brittle or damaged, replace it.

Removal

Remove muffler no. 8 from vehicle. See above for the procedure.

Push the rubber bushing no. 23 out of its bracket.



TYPICAL
1. Muffler rod
2. Rubber bushing
3. Bushing bracket

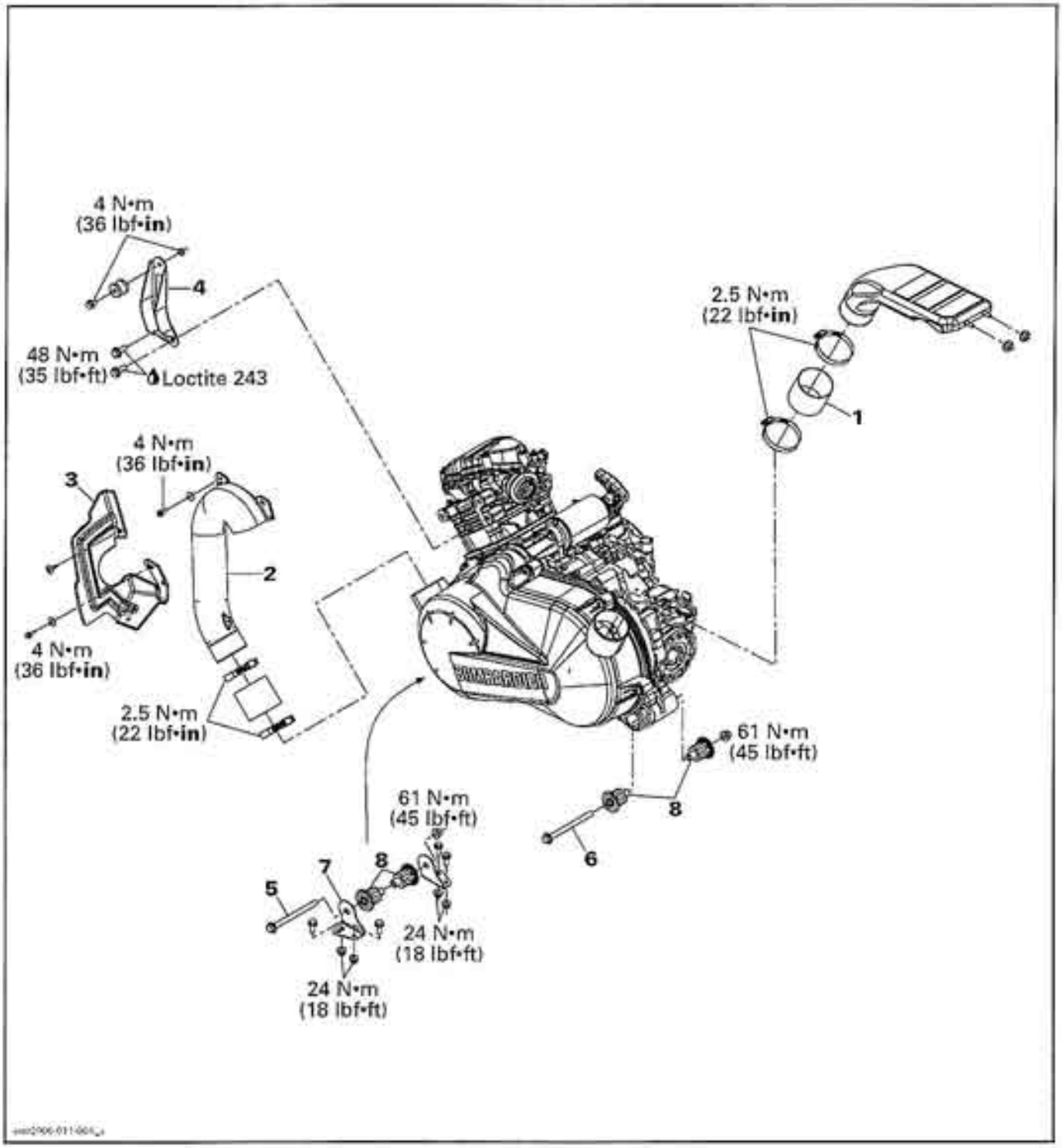
Installation

The installation is the reverse of the removal procedure.

ENGINE REMOVAL AND INSTALLATION

SERVICE TOOLS

OUTLANDER 400 SERIES



GENERAL

⚠ WARNING

To avoid potential burns, let engine and exhaust system cool down before performing any servicing.

During assembly/installation, use the torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pin, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

PROCEDURES

ENGINE REMOVAL

Vehicle and Engine Preparation

Place the vehicle on a workstation that will have access to an engine-lifting hoist. Then start with initial preparation of vehicle by doing the following.

Place the transmission lever on P position.

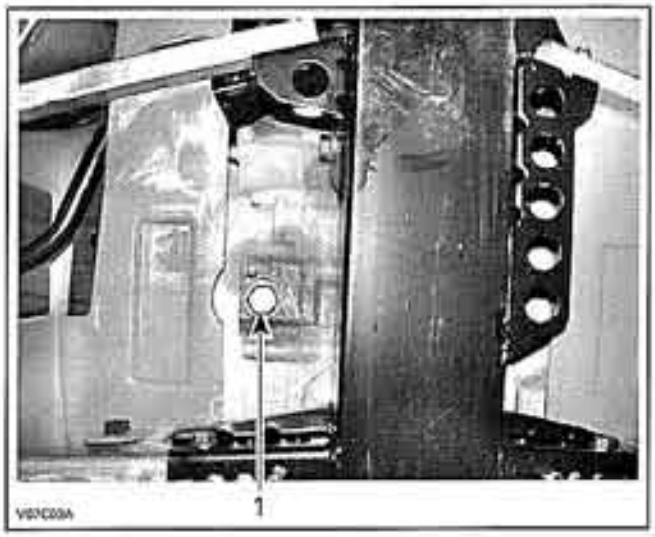
Turn fuel valve OFF.

Disconnect BLACK (-) cable from battery, then RED (+) cable.

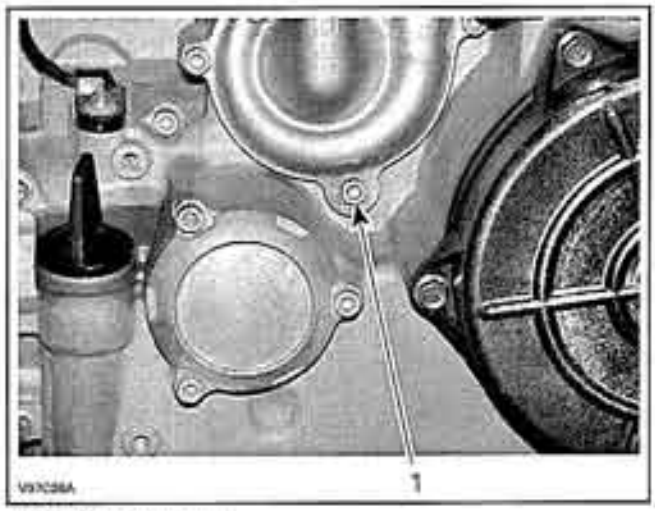
⚠ WARNING

Always disconnect battery or starter cables exactly in the specified order, BLACK (-) cable first. It is recommended to disconnect electrical connections prior to disconnecting fuel lines.

Drain engine oil and engine coolant.



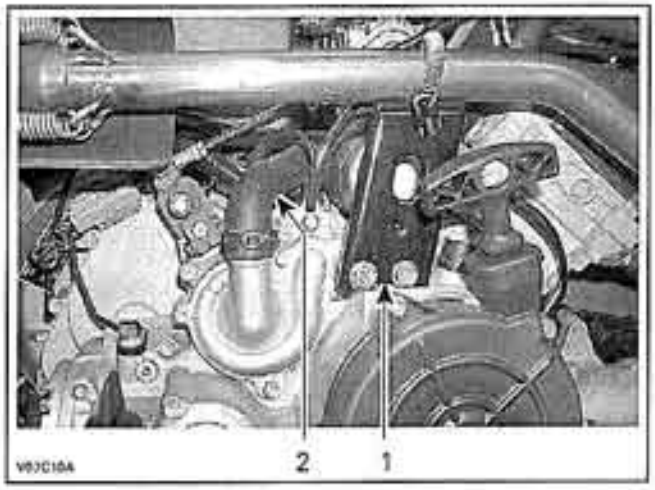
1. Oil drain plug



1. Cooling drain plug

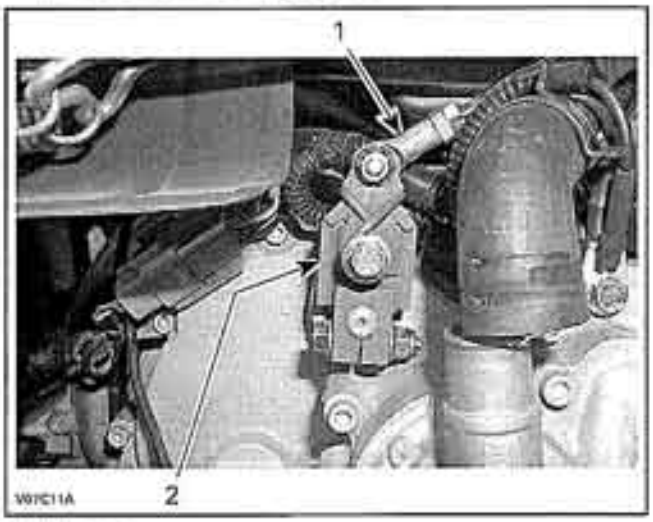
To remove the following parts refer to *BODY*:
- seat
- LH and RH side panels
- LH and RH footrests
- console screws.

On right side of vehicle, remove or disconnect the following:
- engine cover
- exhaust pipe support
- radiator outlet hose



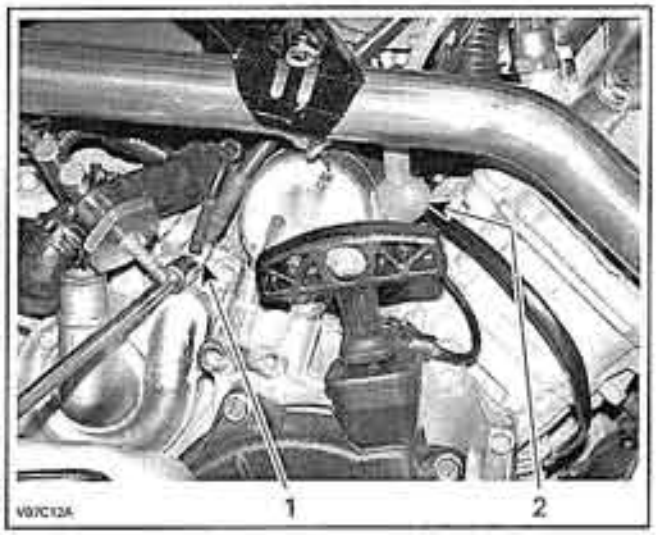
1. Exhaust pipe support
2. Radiator outlet hose

– link rod from shifting plate



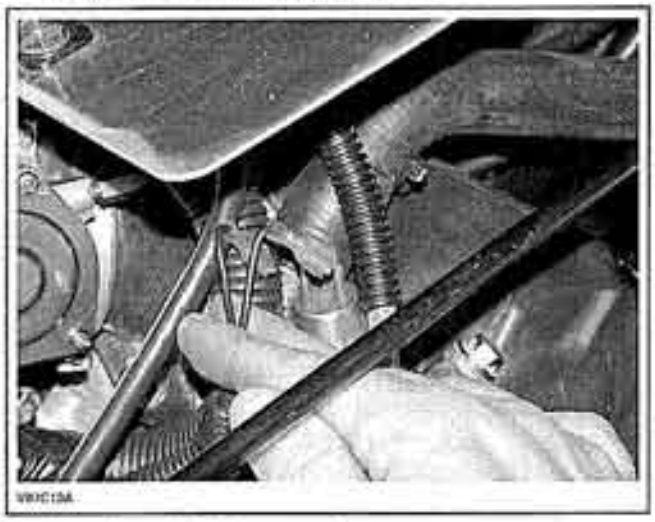
1. Link rod
2. Shifting plate

– engine ground cables
– RED starter cable

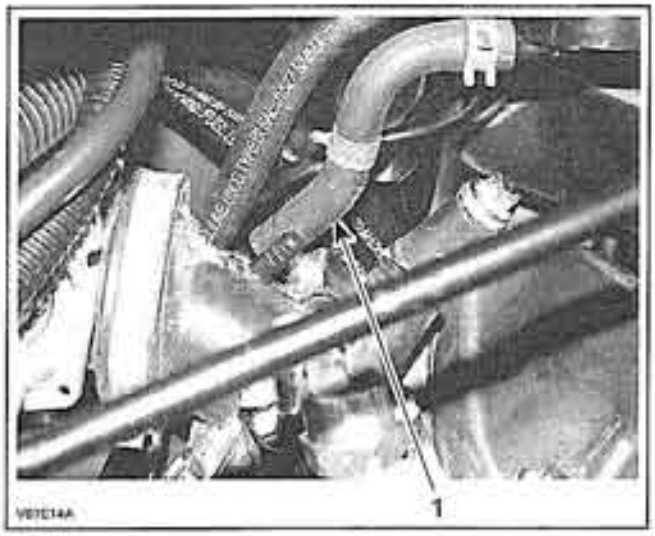


1. Engine ground cables
2. Starter cable

– temperature switch connectors

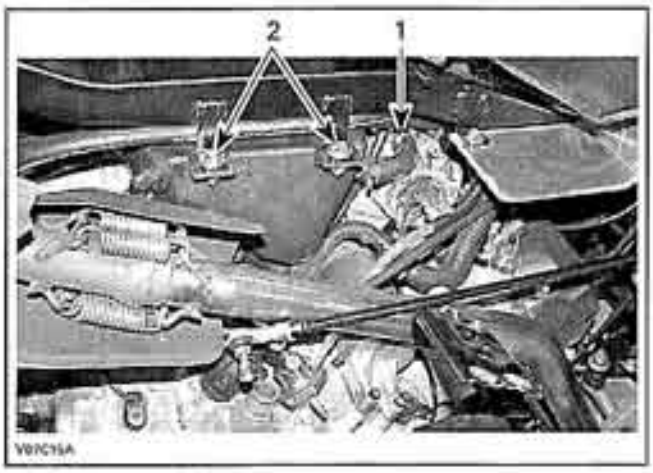


– throttle cable from carburetor
– radiator inlet hose
– impulse line



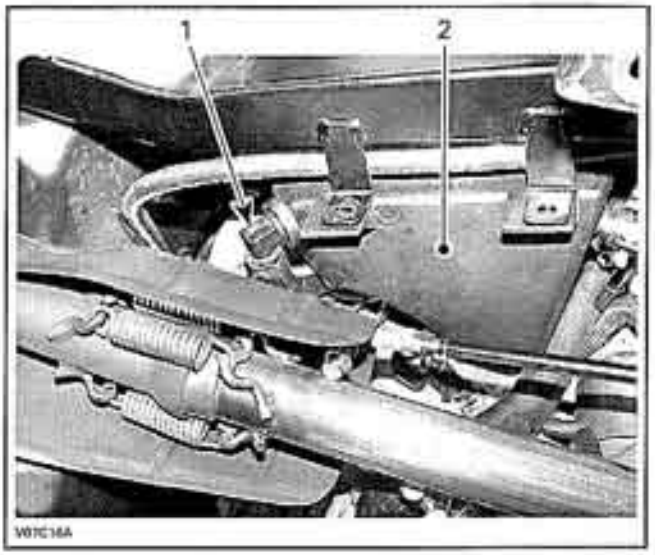
1. Impulse line

– carburetor clamp (air box side)
– carburetor vent hose
– air box screws



1. Carburetor vent hose
2. Air box screws

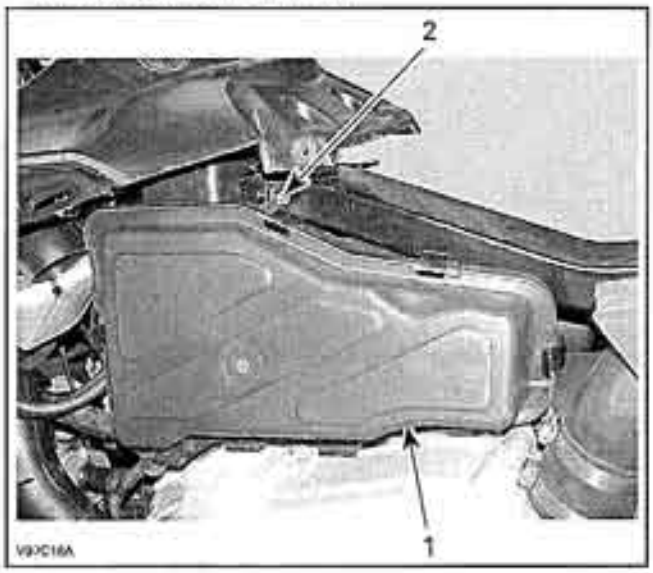
– engine blow-by hose from air box



1. Engine blow-by hose
2. Air box

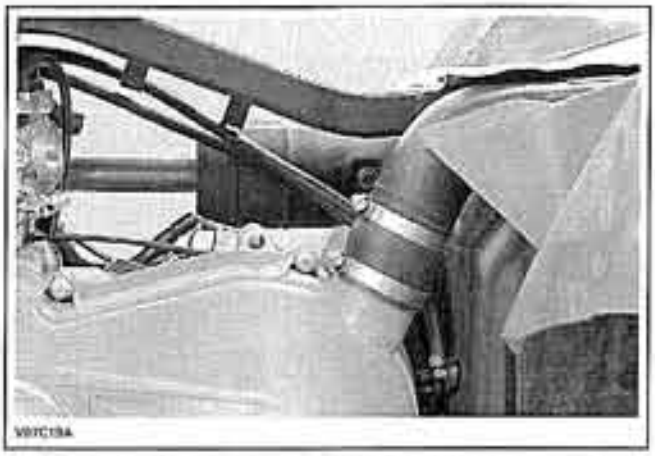
– rear propeller shaft bolt
– disconnect unit bolts from engine.

On left side of vehicle, remove the following:
– inner fender (refer to *BODY*)
– air box bolt then air box

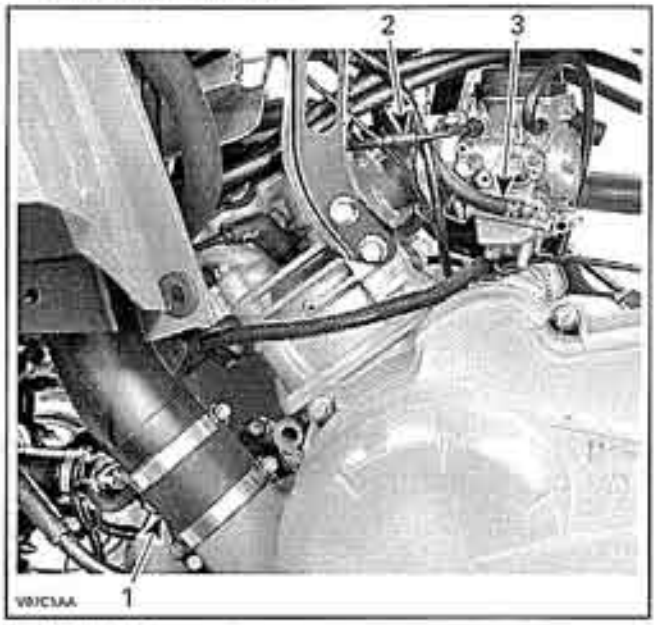


1. Air box
2. Air box bolt

– CVT outlet hose no. 1

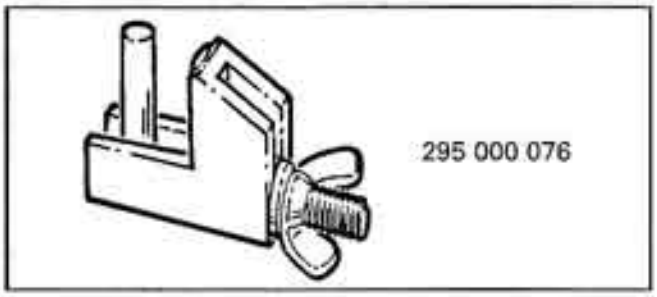


- CVT inlet hose no. 2 with its deflector no. 3
- choke cable from carburetor
- carburetor fuel line



1. CVT inlet hose
2. Choke cable
3. Carburetor fuel line

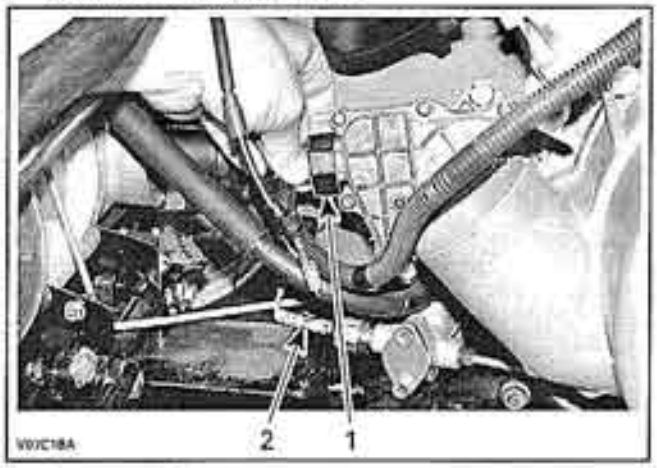
NOTE: Pinch fuel line with a small hose pincher (P/N 295 000 076) before removing it from carburetor.



- carburetor
- exhaust pipe nuts
- upper engine support no. 4.

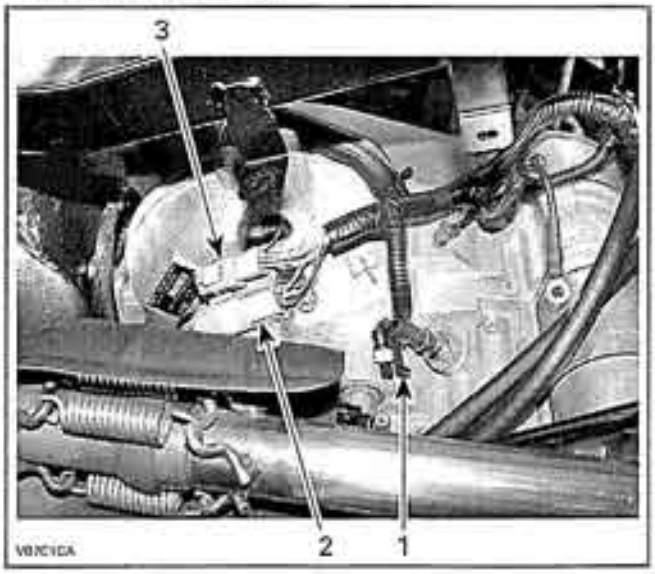
From top side, disconnect the following:
- magneto
- crankshaft position sensor (CPS)

NOTE: The magneto and CPS connectors are located under the console, on top of the frame.
- coupling unit and 2WD/4WD switch connectors
- brake switch connectors



1. Disconnect unit connector
2. Brake switch connectors

- spark plug cable
- engine pressure switch
- vehicle speed sensor (VSS)
- indicator switches.

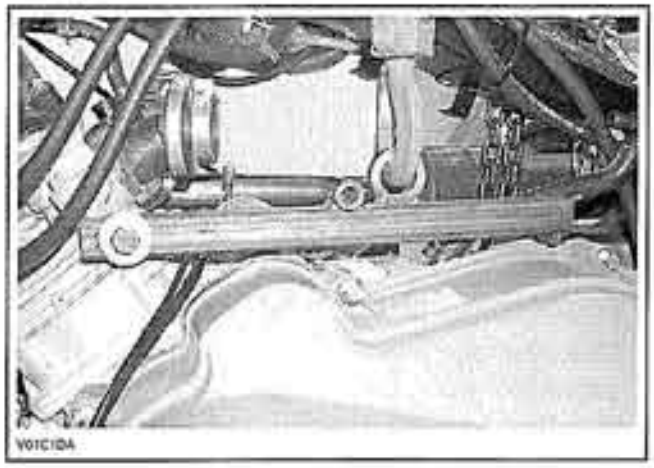


1. Engine pressure switch
2. VSS connector
3. Indicator switches connector

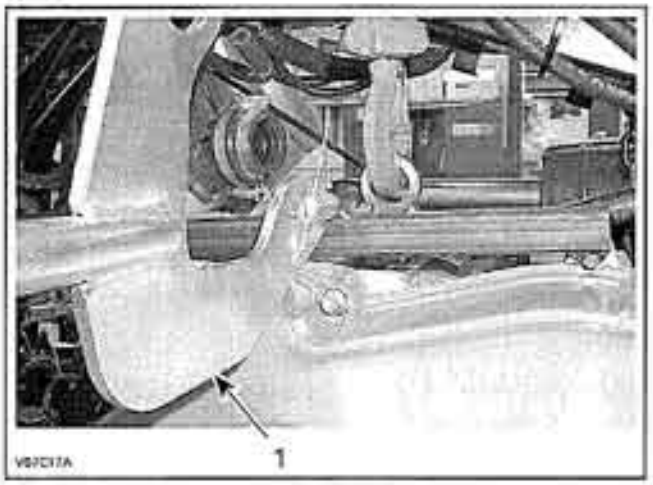
Temporarily, attach all cables, wires and hoses on the frame.

Lifting Engine

Install the engine lifting tool (P/N 529 035 898) in lifting location.



Install the lifting tool (P/N 529 035 619) to tilt engine.

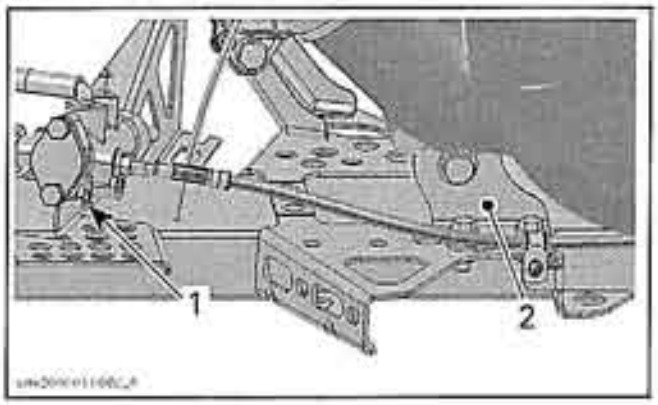


1. Lifting tool

From bottom side, do the following:

Remove front and rear engine mounting bolts no. 5 and no. 6.

Remove front engine mounting bracket no. 7.



1. Front engine mounting bracket
2. Master cylinder

Lift engine approximately 25.4 to 38 mm (1 to 1-1/2 in).

Disconnect the rear propeller shaft from engine.

Lift engine a little more to clear rear mounting bracket from frame.

Turn the rear of engine toward left side to disengage the front propeller shaft from the coupling unit.

⚠ WARNING

Do not hit the fuel tank or fuel tank fittings.

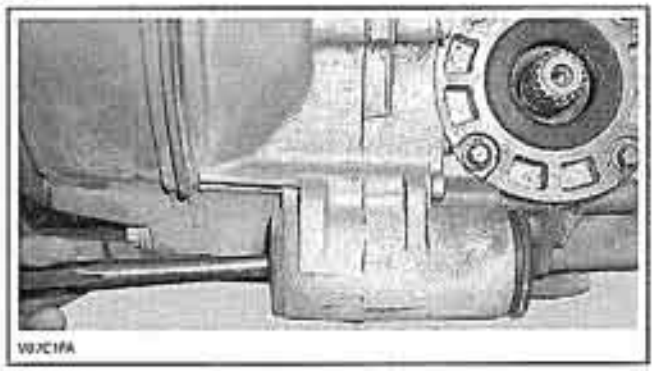
Take the engine out of the frame.

ENGINE MOUNT REPLACEMENT

NOTE: Use the same procedure for the front and rear engine mounts.

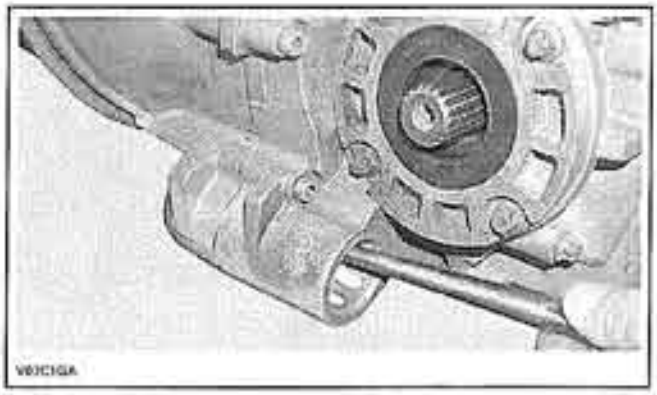
Removal

Insert a punch in hole of engine mount bushing no. 8 and push the other bushing out of the housing.



TYPICAL

Use punch to remove the other bushing.



TYPICAL

Installation

The installation is the reverse of the removal procedure.

ENGINE INSTALLATION

NOTE: Prior to install engine, inspect condition of engine mounts.

Lift engine and move it into the frame (cylinder head first).

Insert the front output shaft end into the coupling unit.

Move the rear side of engine into the frame and install the rear propeller shaft.

Install the front engine mounting bracket no. 7.

Lower engine into place.

Install front engine mounting bolt no. 5. Do not torque yet.

Install rear engine mounting bolt no. 6 and torque both bolts.

Remove the engine lifting tool.

From the top side, connect the following:
- indicator switches
- VSS
- engine pressure switch
- brake switch
- coupling unit
- CPS
- magneto.

On left side of vehicle, install the following:
- upper engine support
- exhaust pipe nut

NOTE: Install a new gasket before screwing the exhaust pipe.
- carburetor
- carburetor fuel line
- choke cable
- CVT inlet and outlet hoses
- radiator outlet hose
- air box
- inner fender
- footrest.

On right side of vehicle, install or connect the following:
- rear propeller shaft bolt
- air box screw
- blow-by hose
- carburetor clamps
- carburetor vent hose
- impulse line
- radiator inlet hose
- throttle cable
- temperature switch connector
- RED starter cable
- engine ground cables

NOTE: Do not forget the star washer between ground cable connectors and frame.
- link rod

NOTE: The transmission lever must be on PARK.
- exhaust pipe support
- engine cover.

Final Assembly Procedure

Install console, LH and RH side panels then seat.

Make sure coolant and oil drain plugs are reinstalled and tight.

Fill cooling system. Refer to *COOLING SYSTEM.*

Fill engine with the right amount of oil. Put oil of appropriate viscosity.

Reconnect battery.

⚠ WARNING

Connect RED (+) cable then BLACK (-) cable. Always connect RED (+) cable in first.

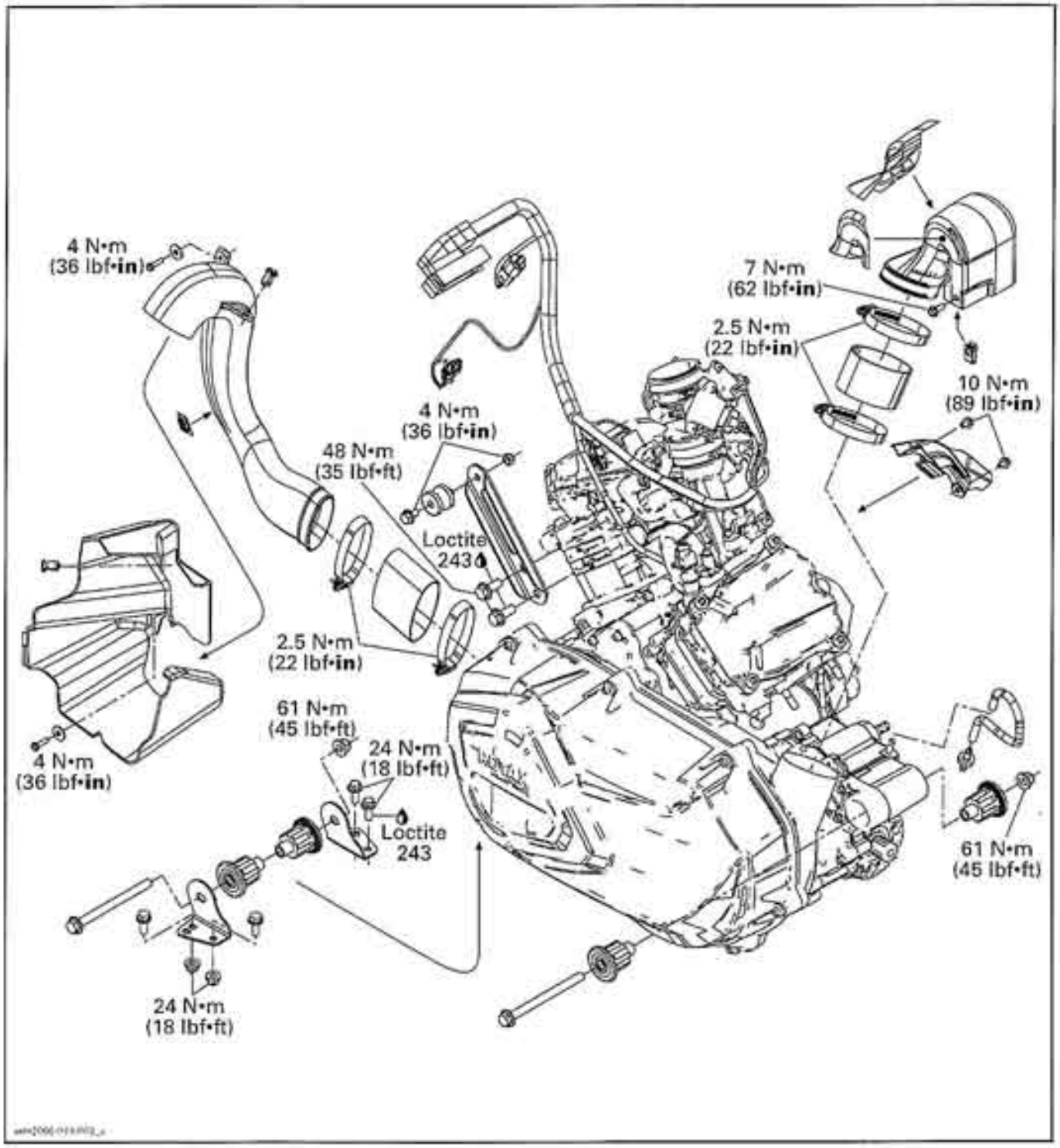
Start vehicle.

Set carburetor.

Stop engine and check if coolant and oil levels are correct.

Test drive vehicle to confirm proper operation.

OUTLANDER 800 SERIES



GENERAL

⚠ WARNING

To avoid potential burns, let engine and exhaust system cool down before performing any servicing.

During assembly/installation, use the torque values and service products as in the exploded view.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pin, etc.) must be installed or replaced with new one where specified. If the efficiency of a locking device is impaired, it must be renewed.

PROCEDURE

ENGINE REMOVAL

Vehicle and Engine Preparation

Place vehicle on a work station that will have access to an engine-lifting hoist. Then start with initial preparation of vehicle by doing the following.

Select 4WD position then place transmission lever to PARK.

Using B.U.D.S., remove fuel pressure in the fuel system. Refer to *ENGINE MANAGEMENT*.

Disconnect the BLACK (-) cable from battery, then the RED (+) cable.

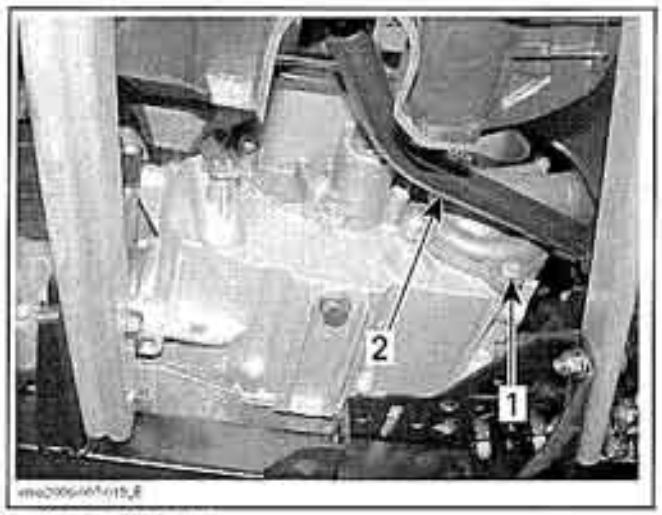
⚠ WARNING

Always disconnect battery cables exactly in the specified order, the BLACK (-) cable first. It is recommended to disconnect electrical connections prior to disconnecting fuel lines.

Drain oil and coolant from engine.

NOTE: Drain engine oil only if engine overhaul is necessary. To work on gearbox the engine removal is necessary but do not drain engine oil.

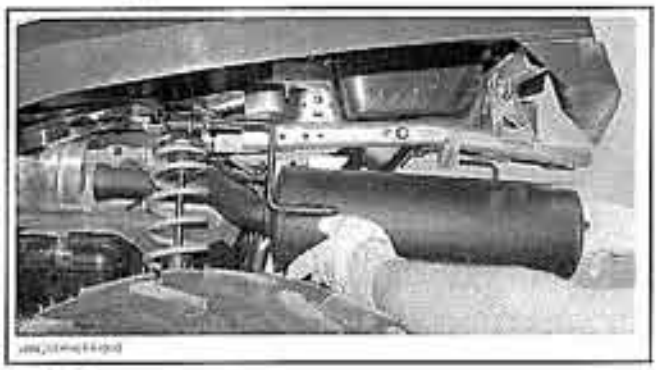
1. Oil drain plug
2. Brake pedal



1. Cooling drain plug
2. Brake pedal

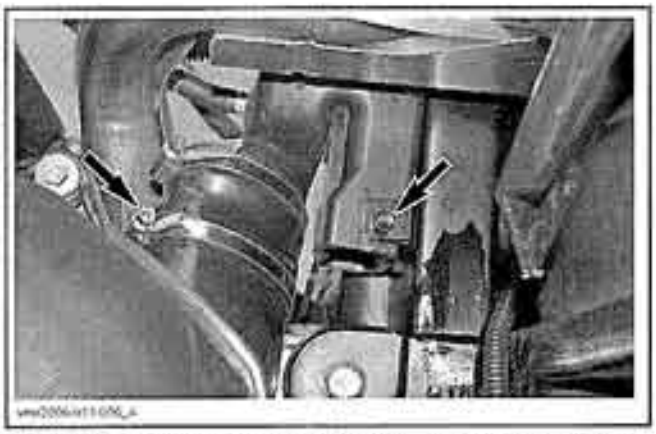
Remove:
- seat
- both side panels
- both footrests
- central panel
- air intake silencer cover.

On left side of vehicle, remove the following parts:

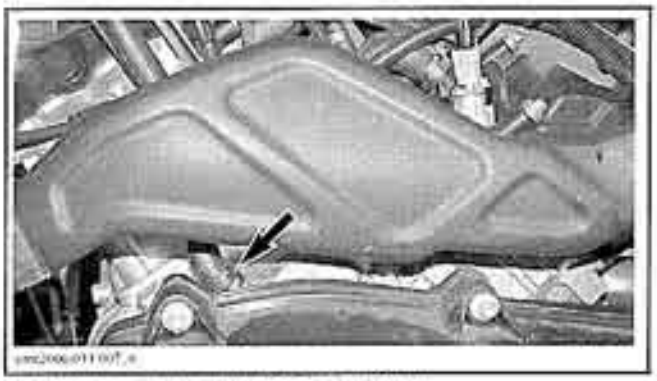


MUFFLER

CVT INLET HOSE CLAMP

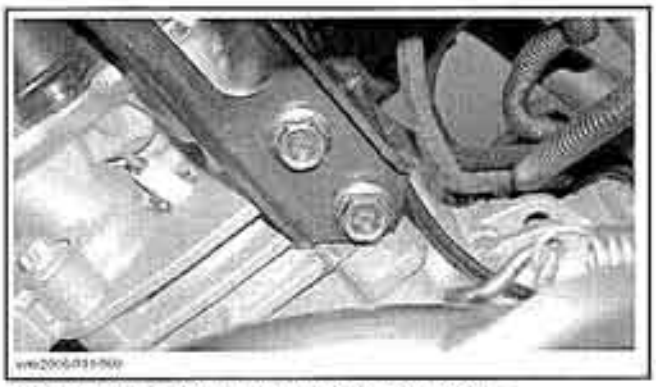


CVT OUTLET HOSE (UNSCREW BOTTOM CLAMP AND BOLT)

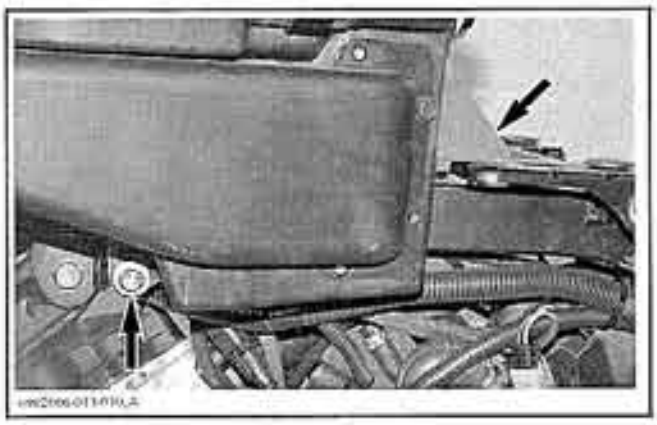


CRANKCASE VENT TUBE FROM ENGINE

FRONT SPARK PLUG CABLE



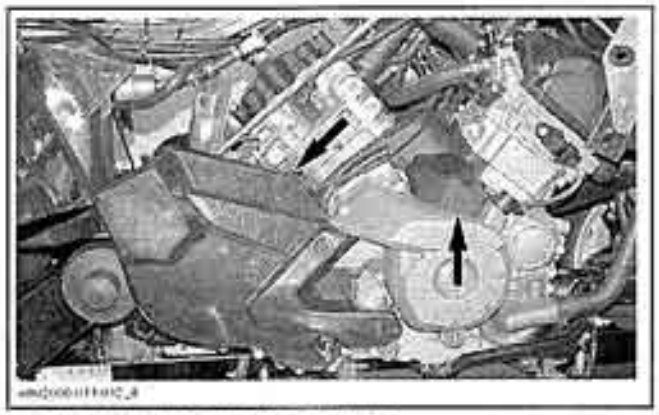
LOWER BOLTS FROM UPPER ENGINE SUPPORT



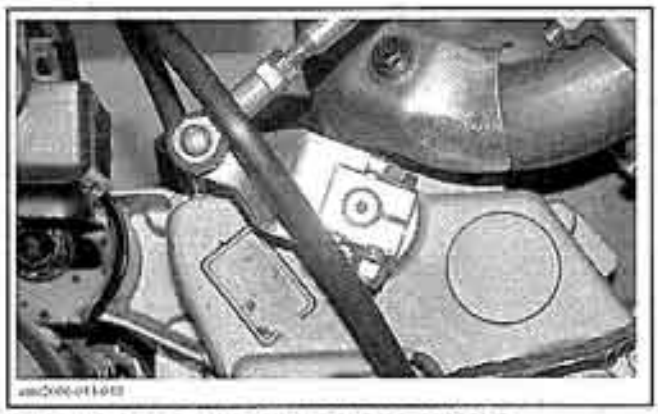
BOLTS RETAINING AIR INTAKE SILENCER

DART HOLDING AIR INTAKE INLET

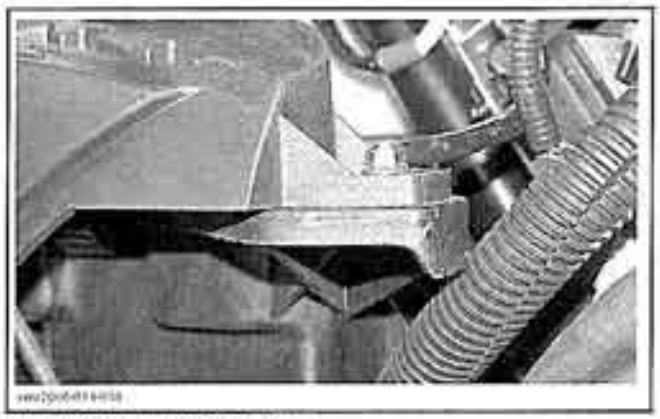
On right side of vehicle, remove or disconnect the following:



FRONT AND REAR ENGINE COVERS



SHIFTING PLATE (UNSCREW BOLT TO REMOVE SHIFTING PLATE)

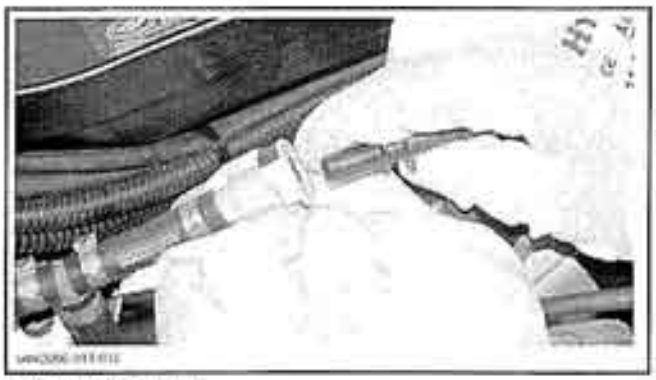


AIR INTAKE SILENCER BOLT

CONNECTORS FROM THROTTLE BODY AND INTAKE MANIFOLD

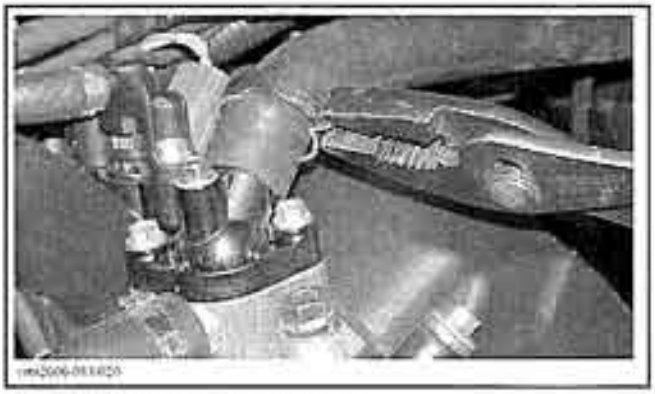
UPPER THROTTLE BODY CLAMP

THE AIR INTAKE SILENCER AND PLACE IT ON FRONT RACK



FUEL SUPPLY LINE

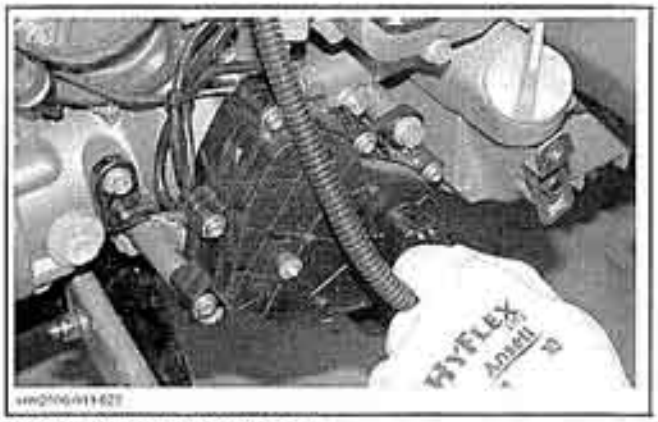
THE OTHER SPARK PLUG CABLE



OUTLET ENGINE COOLANT HOSE

FUEL INJECTOR CONNECTORS

INTAKE MANIFOLD

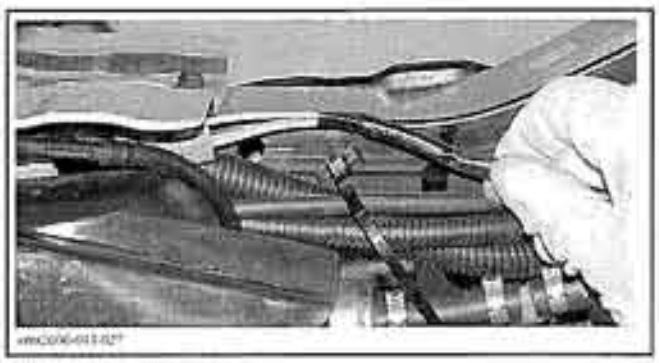


COUPLING UNIT CONNECTOR

2WD/4WD SWITCH CONNECTOR THEN REMOVE HOUSING FROM BRACKET

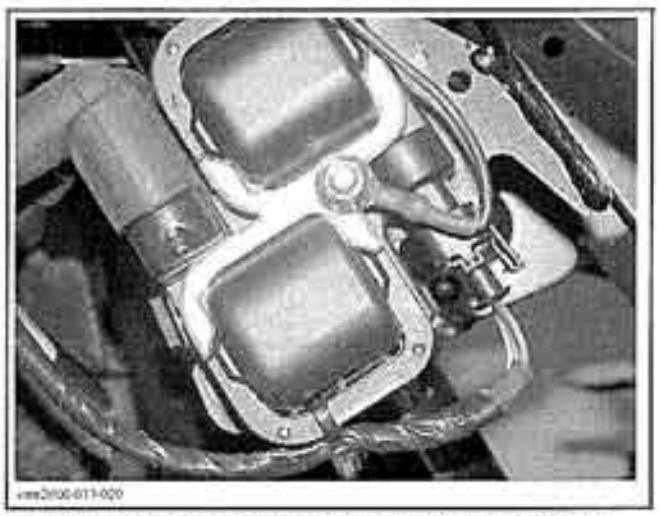
ENGINE GROUND

STARTER CABLE

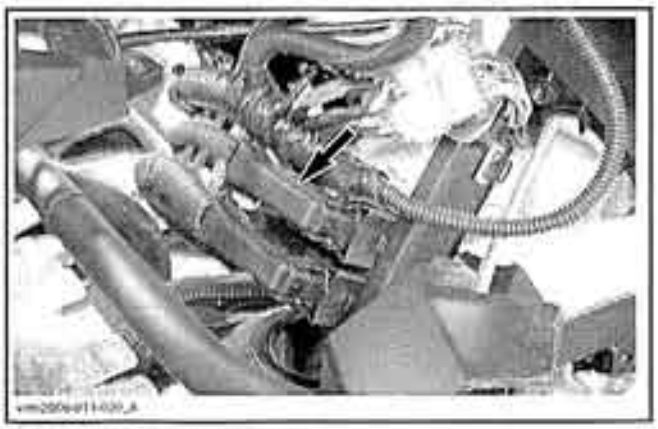


MAGNETO CONNECTOR

B.U.D.S. CONNECTOR THEN REMOVE HOUSING FROM BRACKET



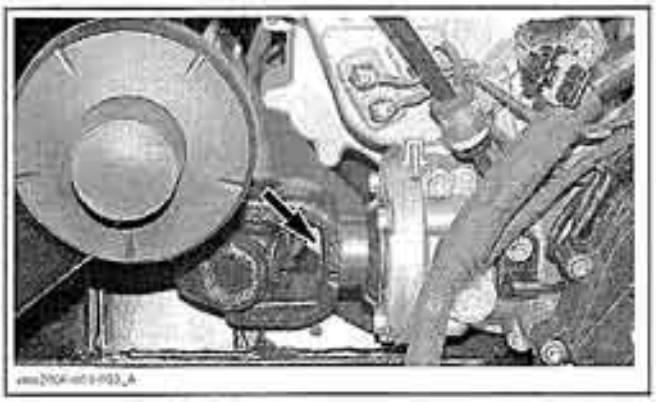
IGNITION COIL CONNECTOR THEN CUT THE LOCKING TIE



CONNECTOR A FROM ECM

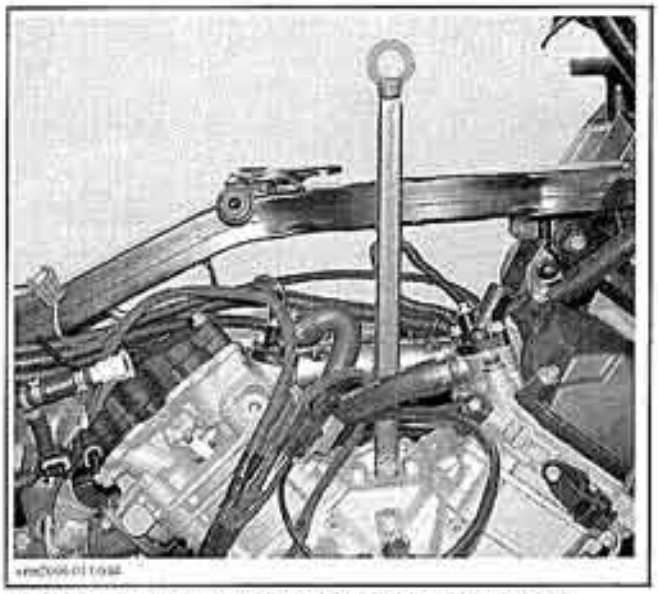
INLET ENGINE COOLANT HOSE

FRONT PROPELLER BOLT

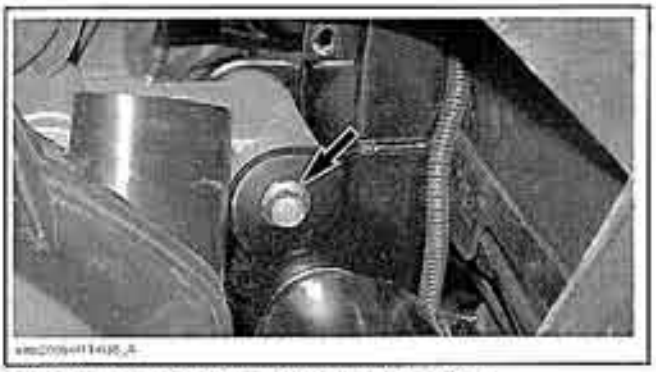


REAR PROPELLER BOLT

Lifting Engine



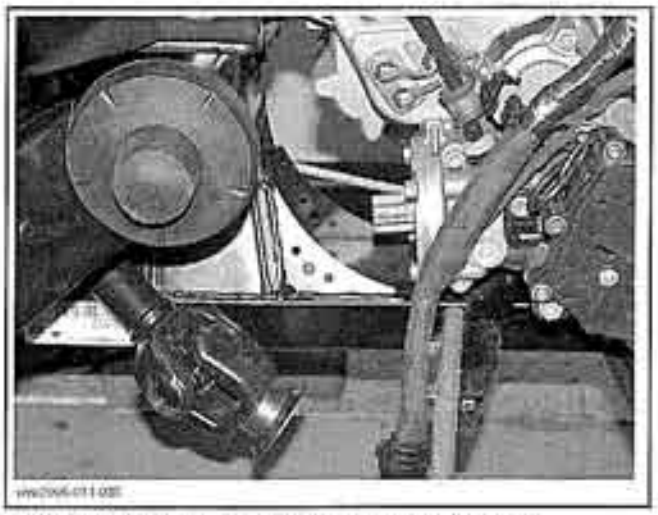
INSTALL THE ENGINE LIFTING TOOL (P/N 529 036 022)



REMOVE THE REAR ENGINE MOUNTING BOLT

THEN THE FRONT ENGINE MOUNTING BOLT

LIFT ENGINE AND DISCONNECT THE FRONT PROPELLER SHAFT FROM ENGINE



MOVE ENGINE FORWARD AND DISCONNECT REAR PROPELLER SHAFT

Lift engine to clear mounting brackets.

Turn engine 90°, cylinder head towards right side of vehicle.

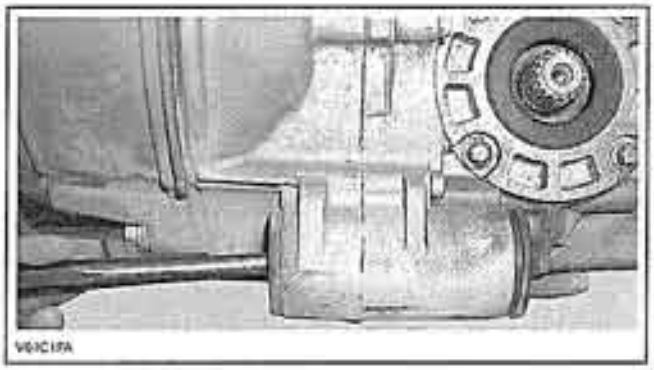
Remove engine from vehicle.

ENGINE MOUNT REPLACEMENT

NOTE: Use the same procedure for the front and rear engine mounts.

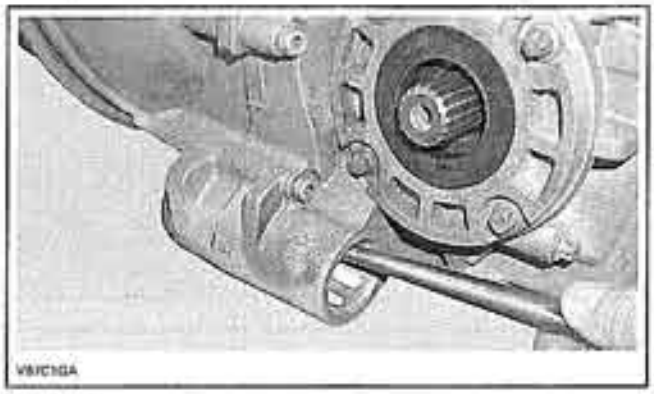
Removal

Insert a punch in hole of engine mount bushing and push the other bushing out of the housing.



TYPICAL

Use punch to remove the other bushing.



TYPICAL

Installation

The installation is the reverse of the removal procedure.

ENGINE INSTALLATION

The installation is the reverse of the removal procedure. However, pay attention to the following.

NOTE: Prior to install engine, inspect condition of engine mounts.

Install the rear engine mounting bolt. Do not torque yet.

Install the rear propeller shaft onto engine output shaft.

Connect the front propeller shaft to engine output shaft while lowering engine.

Install front engine mounting bolt then torque all mounting bolts.

Final Assembly Procedure

Make sure coolant and oil drain plugs are reinstalled and tight.

Fill cooling system. Refer to *COOLING SYSTEM*.

Fill engine with the right amount of oil. Put oil of appropriate viscosity.

Reconnect battery.

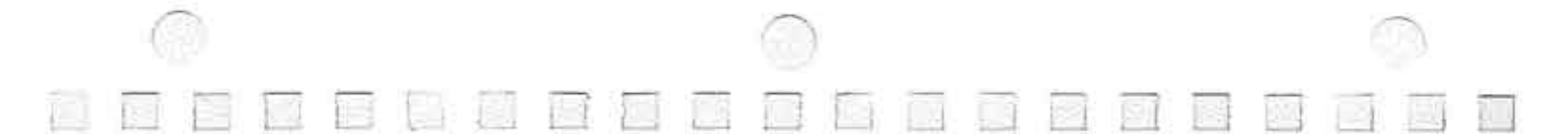
⚠ WARNING

Connect RED (+) cable then BLACK (-) cable. Always connect RED (+) cable in first.

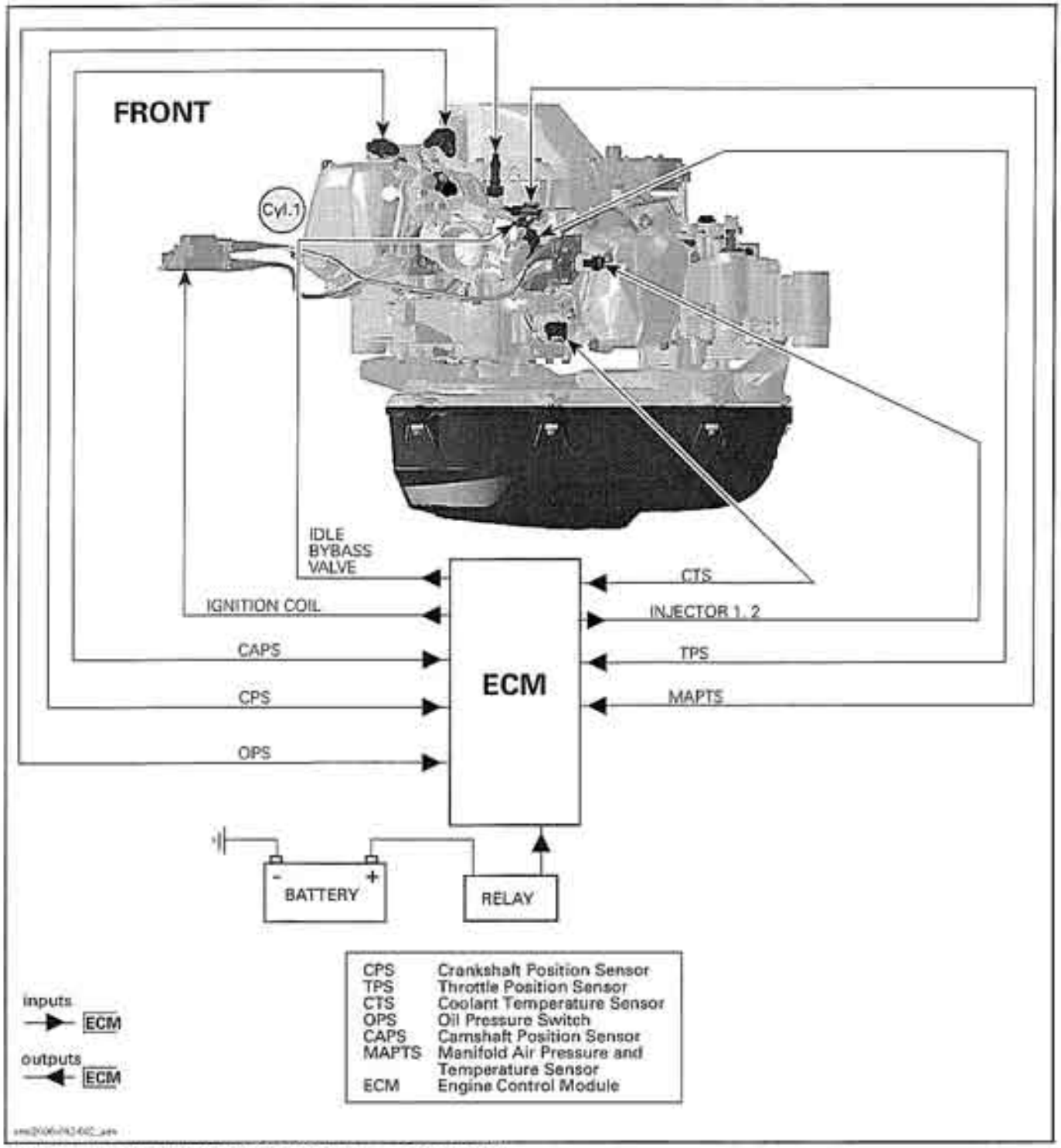
Start vehicle. Let engine reaches the operating temperature.

Stop engine and check if coolant and oil levels are correct. Refill as necessary.

Test drive vehicle to confirm proper operation.



OVERVIEW



ENGINE MANAGEMENT SYSTEM OVERVIEW — V-810 ENGINE

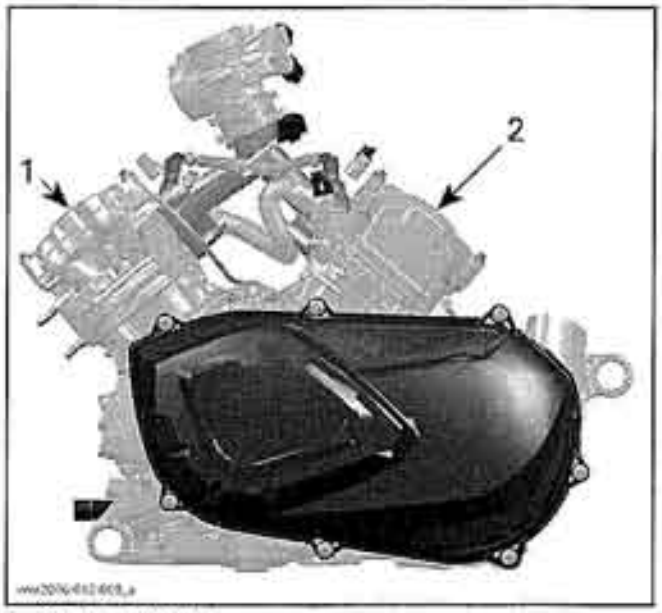
OPERATING PRINCIPLE

A highly advanced engine management system (EMS) has been used to ensure a high power output with cleaner combustion.

There are 3 main systems in interaction with the engine management system (EMS):

1. air induction
2. fuel system
3. electrical system.

NOTE: On the V-810 engine, the cylinders are referenced as 1 (front) and 2 (rear).



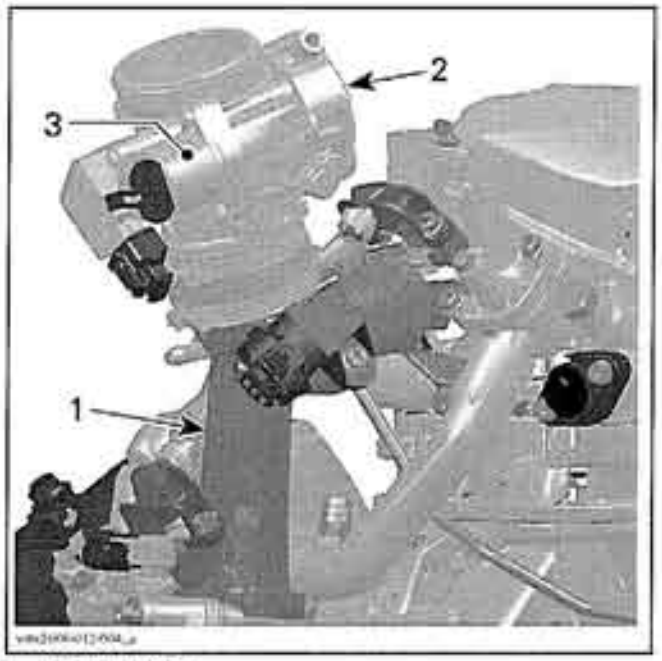
1. Cylinder 1 (front)
2. Cylinder 2

AIR INDUCTION

Air flows through air silencer, air filter, throttle body, intake manifold and then goes into combustion chamber.

Throttle Body

The 46 mm throttle body is mounted on top of intake manifold. Fitted on the throttle body, there is the TPS and the idle bypass valve which allows the ECM to control the idle speed while the throttle plate is closed.



1. Intake manifold
2. Throttle body
3. Idle bypass valve

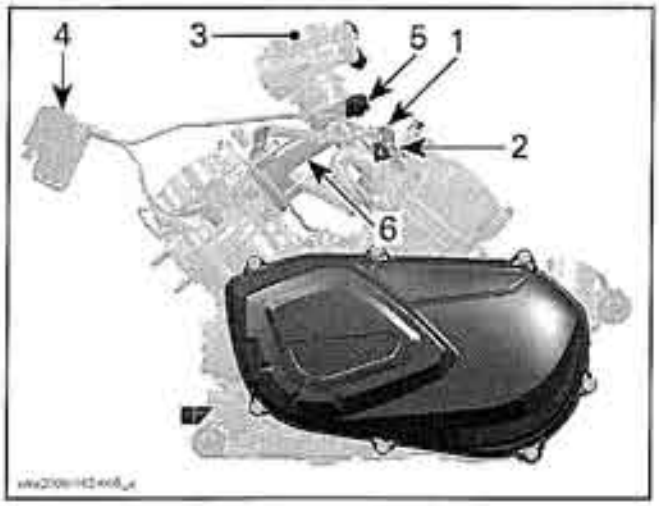
Intake Manifold

The intake manifold is mounted on the top of the engine on both cylinder heads. It provides support for the throttle body, fuel injectors, the fuel rails and the MAPTS (manifold air pressure and temperature sensor).

The air intake manifold is a resonator between the throttle body and the air intake at the cylinder heads.

FUEL SYSTEM

When the intake valve reaches the correct position, the ECM (engine control module) opens the fuel injector and fuel is discharged into the intake port at the air intake manifold by the high fuel pressure inside the fuel rail. The air/fuel mixture enters then the combustion chamber through the open intake valve. This mixture is then ignited by the spark plug.



1. *Fuel rail (2)*
2. *Injector (2)*
3. *Throttle body*
4. *Ignition coil*
5. *Manifold air pressure and temperature sensor (MAPTS)*
6. *Intake manifold*

Fuel Rail

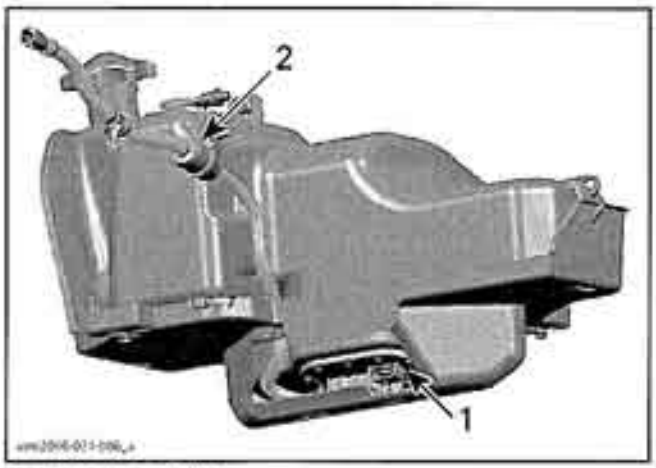
Two fuel rails, one for each injector, are mounted on the intake manifold. The fuel rails ensure all the time, that enough fuel can be delivered to the fuel injectors. The fuel rails are fed by the fuel pump with the properly regulated fuel pressure.

Fuel Injector

Two fuel injectors (one per cylinder) are used to inject fuel into the intake port of the cylinder head.

Fuel Pump Module

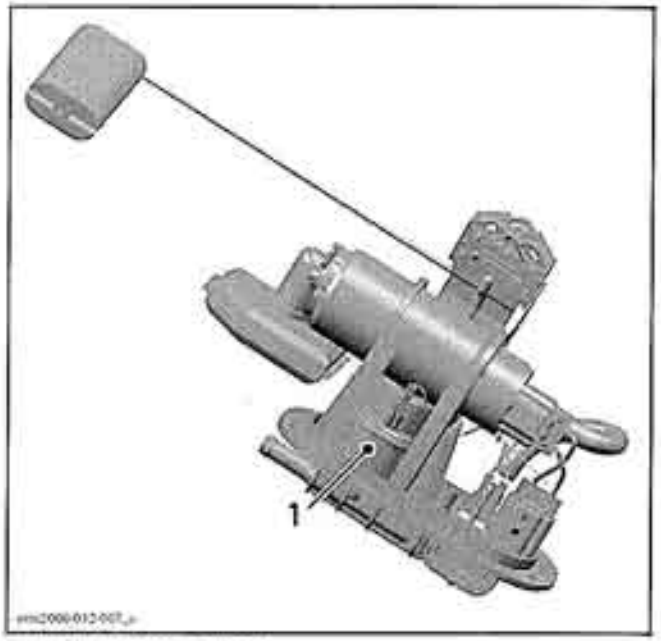
The fuel pump module is underneath fuel tank. The module includes fuel pump, fuel pressure regulator and fuel level sensor. Refer to *FUEL SYSTEM*.



1. *Fuel pump module*
2. *In-line fuel filter*

FUEL PRESSURE REGULATOR

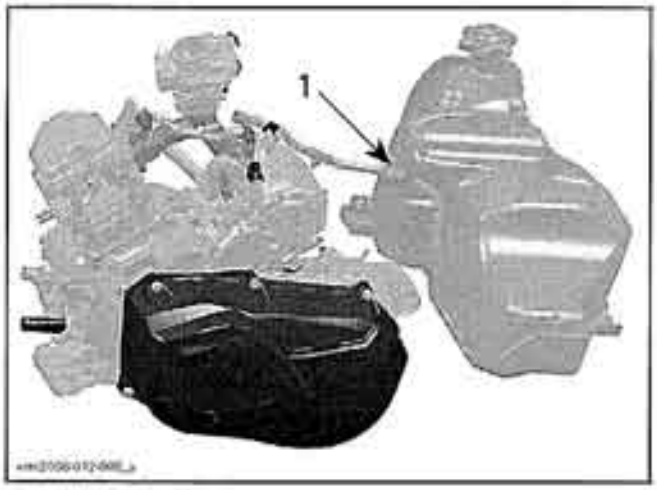
A fuel pressure regulator controls the pressure in the system and allows excess fuel to return to the fuel tank. Refer to *FUEL SYSTEM*.



1. *Fuel pressure regulator*

In-Line Fuel Filter

The in-line fuel filter is located between engine and fuel tank. Refer to *FUEL SYSTEM*.



1. *In-line fuel filter*

ELECTRICAL SYSTEM

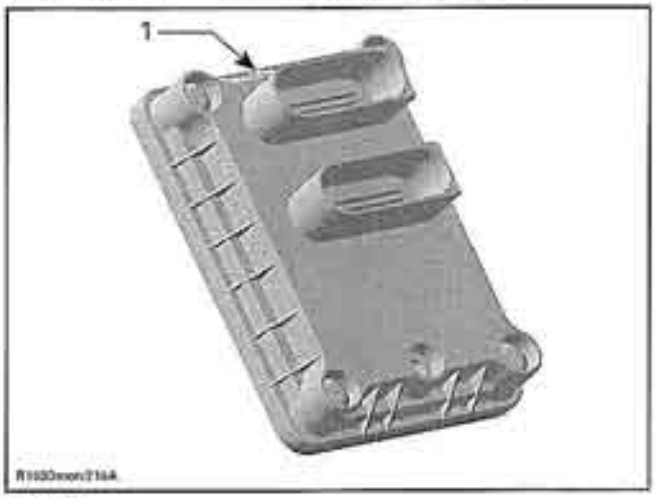
A communication link (CAN lines) is used to communicate between the ECM and the multi-function speedometer. CAN lines consist of a pair of wires (WHITE/TAN and TAN/GREEN).

The speedometer multi-function display can show fault codes. Refer to *DIAGNOSTIC PROCEDURE*.

The communication link is also used to communicate with the VCK (vehicle communication kit) or MPI-2 interface card. Refer to *DIAGNOSTIC PROCEDURES*.

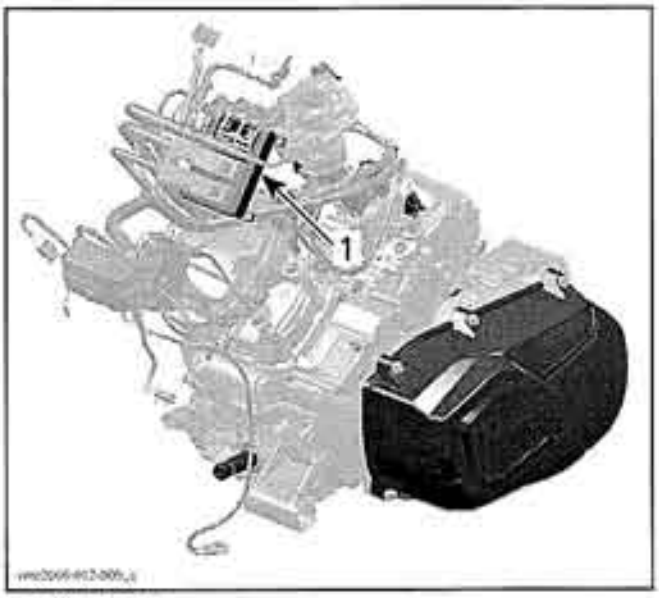
Engine Control Module (ECM)

The ECM controls the electrical system.



TYPICAL
1. ECM

The ECM is located in front of steering column.



1. ECM location

The ECM features a permanent memory that will keep the programmed ignition key(s) active, fault codes, customer information and other engine information, even when the battery is removed from the vehicle.

The ECM features a self-diagnostic mode when ignition key is turned on. However, some components need the engine to be running so that they can be monitored. Some problems will turn on a warning lamp or will set the engine in limp home mode. Refer to *DIAGNOSTIC PROCEDURES* section for more information.

The ECM is powered by the battery through a relay.

⚠ WARNING

Some components are continuously powered by the VFB when ignition key is turned on and engine stop switch is in RUN position. The ECM switches the circuit to the ground to complete the electrical circuits it controls. Take this into account when troubleshooting. Always disconnect the battery prior to disconnecting any electric or electronic parts.

The ECM is responsible for the following electrical functions:

Digitally Encoded Security System (DESS)

This anti-start system allows engine starting only with a programmed key. Refer to *DIGITALLY ENCODED SECURITY SYSTEM (DESS)* subsection.

Engine Starting

If the ECM recognizes a valid key, it allows engine to start. Other conditions are also required to allow engine starting. Refer to *STARTING SYSTEM* subsection.

Engine RPM Limiter

The ECM will limit the maximum engine speed when vehicle shifter is in:

- forward position (Hi and LO individually)
- neutral position
- park position
- reverse position.

The ECM uses the CPS and the GBPS (gearbox position sensor) for this function.

An override switch, on the handlebar, allows the engine speed to run higher than the RPM limiter when more power is needed in reverse operation. Refer to *INSTRUMENTS AND ACCESSORIES*.

Vehicle Speed Limiter

The ECM will limit the maximum vehicle speed both in 2WD and in 4WD. For this purpose, the ECM uses the VSS (vehicle speed sensor) and the GBPS (gearbox position sensor).

Cooling Fan

The ECM controls the cooling fan. Whenever coolant temperature reaches a certain treshold, the ECM triggers the fan relay to start the fan. When temperature cools down to a certain treshold, the ECM stops the fan.

Brake Monitoring

The ECM monitors the brakes through the brake switch. If parking brake is activated or the driver inadvertently keeps the brake depressed for more than 15 seconds (either when vehicle moves or not), the ECM sends out a signal to the multi-function speedometer.

NOTE: PARK BRAKE will be displayed in the multifunction speedometer.

Shutdown Mode

When engine stop switch is turned OFF or ignition key is turned OFF position, speedometer will turn off within 15 seconds. All the electrical system is cut-off.

Engine not running: When engine stop switch if ON and ignition key is left in the ON position, the accessories are powered. After 15 minutes, the ECM shuts down all functions except multi-function speedometer. ECM and mutlifunction speedometer will draw power.

NOTE: If engine starting is desired at this point, it is required to turn ignition key OFF, wait until speedometer turns OFF then, turn key back ON.

To prevent battery drain, always turn OFF either ignition key or engine stop switch.

Drowned Mode (Flooded Engine)

If engine is fuel-flooded and does not start, this special mode can be activated to prevent fuel injection and ignition while cranking. Proceed as follows to activate it.

With ignition key in ignition switch while engine is stopped, press and HOLD throttle lever at WOT position.

Press the start button. The mode is now on.

Releasing throttle lever will bring back the normal mode.

If engine does not start, it may be necessary to remove spark plugs and crank engine with rags over spark plug holes. Refer to *COMPONENT INSPECTION AND ADJUSTMENT* subsection.

⚠ WARNING

When disconnecting coil from spark plug, always disconnect coil from main harness first. Never check for engine ignition spark from an open coil and/or spark plug in the engine compartment as spark may cause fuel vapor to ignite.

Diagnostic Mode

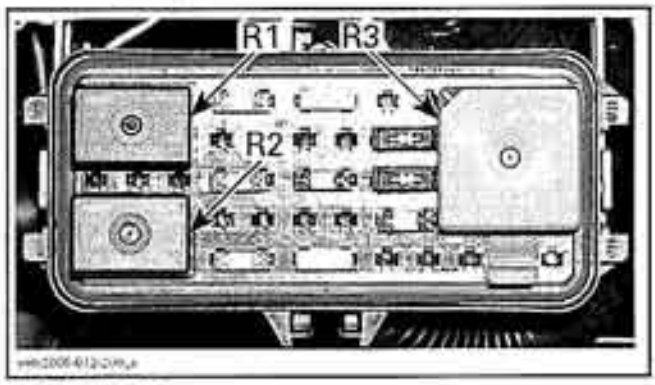
The fault codes are recorded in the memory of the ECM. They can be checked by using the software B.U.D.S. with the VCK (Vehicle Communication Kit) or the MPI-2 interface card.

Refer to the *DIAGNOSTIC PROCEDURES* subsection.

Relays

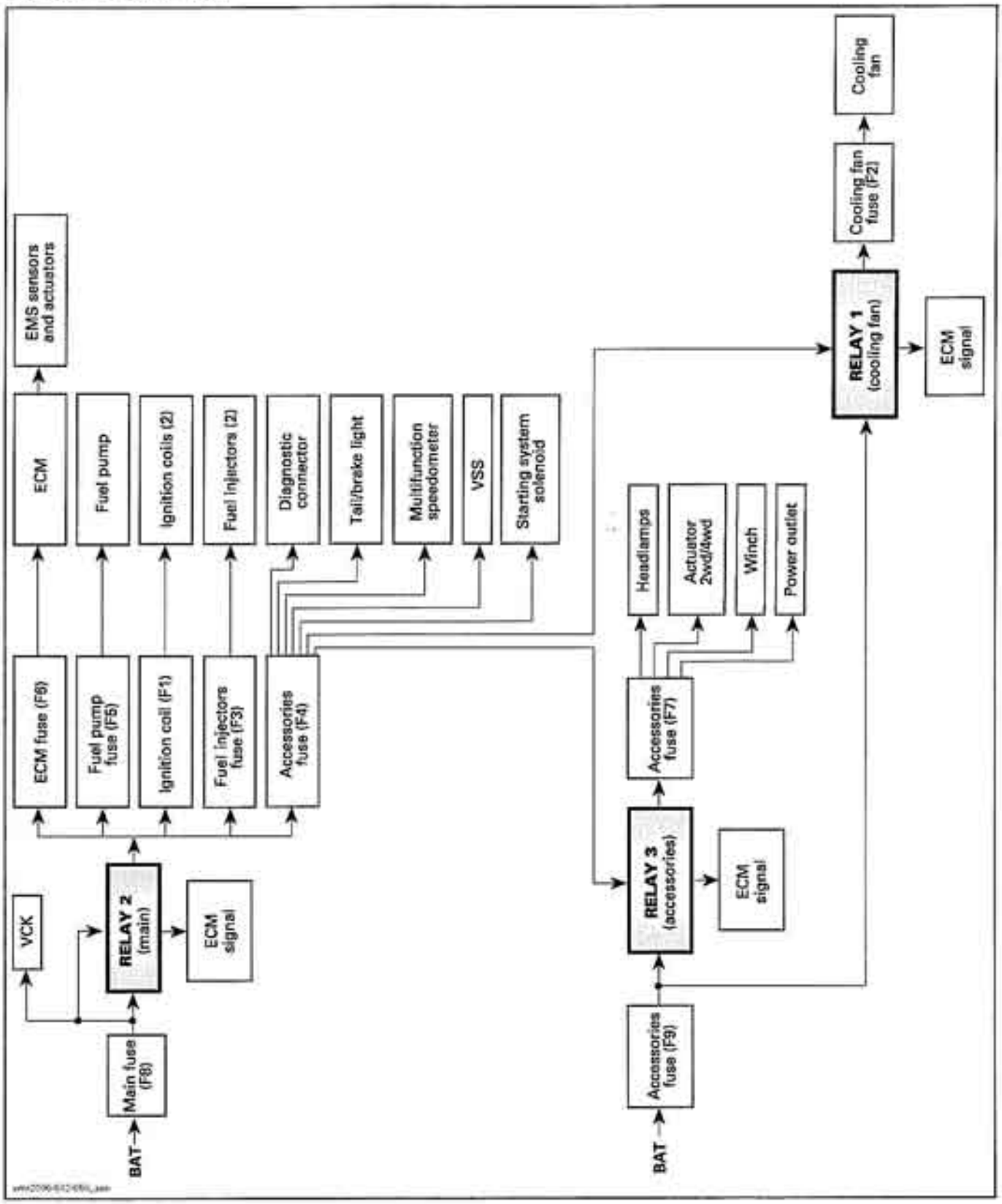
Three relays are used to distribute power to different components. When ignition key is turned ON and engine stop switch is in RUN position, relay 2 is energized and in turn, it supplies the windings of relay 1 and relay 3. The ECM provides the trigger signal to activate each relay individually. Refer to the following diagram.

When starting engine, relay 1 and 3 are temporary disabled to make all power available for the starter, the fuel pump and the EMS.

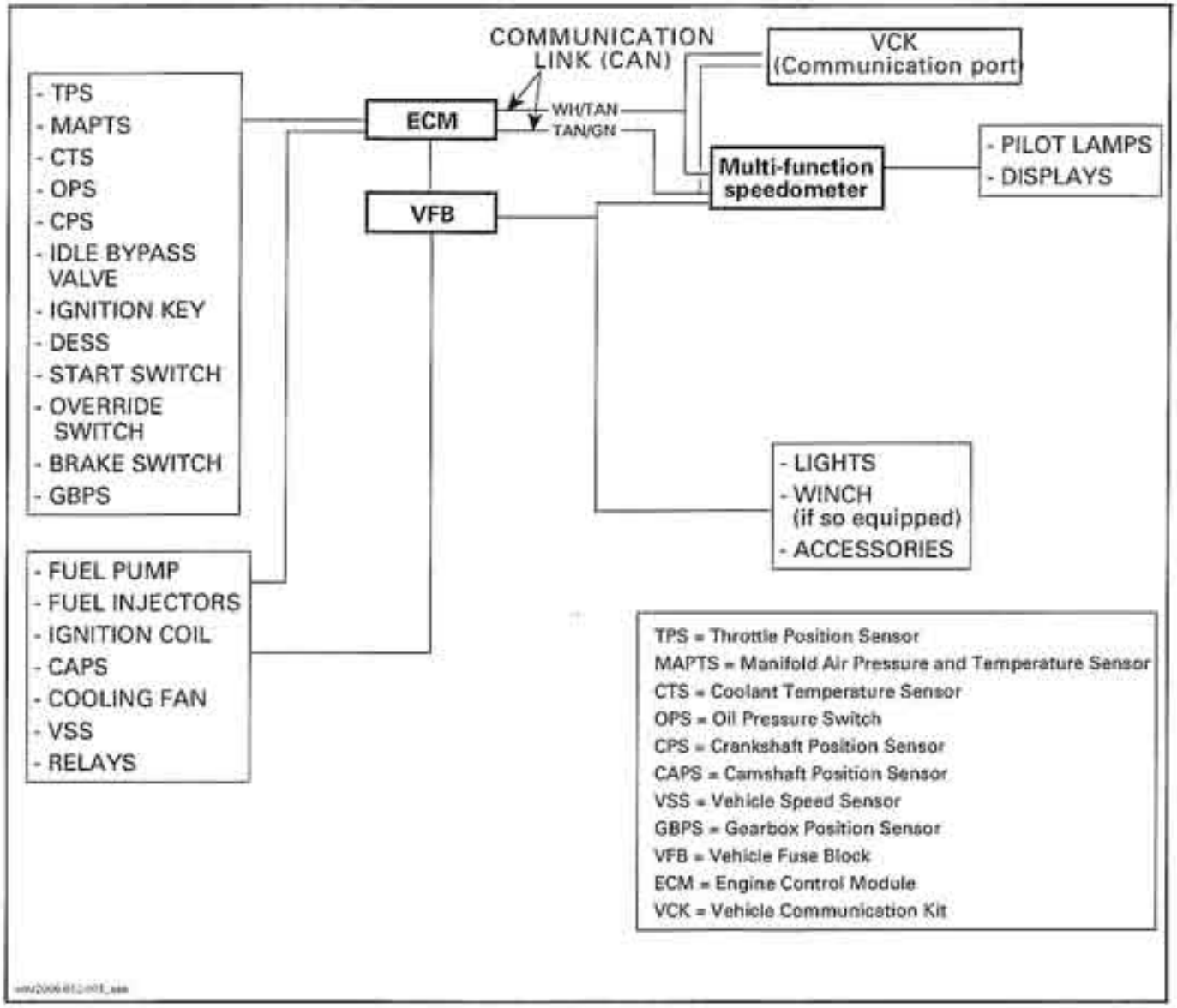


R1: Cooling fan
R2: Main
R3: Accessories

Power Distribution



ECM and VFB Interaction with the Electrical System



NOTE: For VFB and fuses identification, refer to *ELECTRICAL CONNECTORS*.

NOTE: 2 diodes are used in the electrical system. Reversed installation or failure will prevent engine starting or may bring problem to VSS (vehicle speed sensor) or 2/4WD actuator. They are located in VFB. Refer to *STARTING SYSTEM* and *INSTRUMENTS AND ACCESSORIES*.

ENGINE MANAGEMENT SYSTEM

The EMS calculates the proper air/fuel mixture and ignition timing for each cylinder separately.

The ECM is the central point of the engine management system. It reads the inputs, makes computations, uses pre-determined parameters and sends the proper signals to the outputs for proper engine management.

ELECTRONIC FUEL INJECTION

The ECM reads the signals from different sensors which indicate engine operating conditions at millisecond intervals.

Signals from sensors are used by the ECM to determine the injection parameters (fuel maps) required for optimum air-fuel ratio.

The CPS, the MAPTS and the TPS are the primary sensors used to control the injection and ignition timing. Other sensors (like temperature sensors, etc.) are used for secondary input.

IGNITION

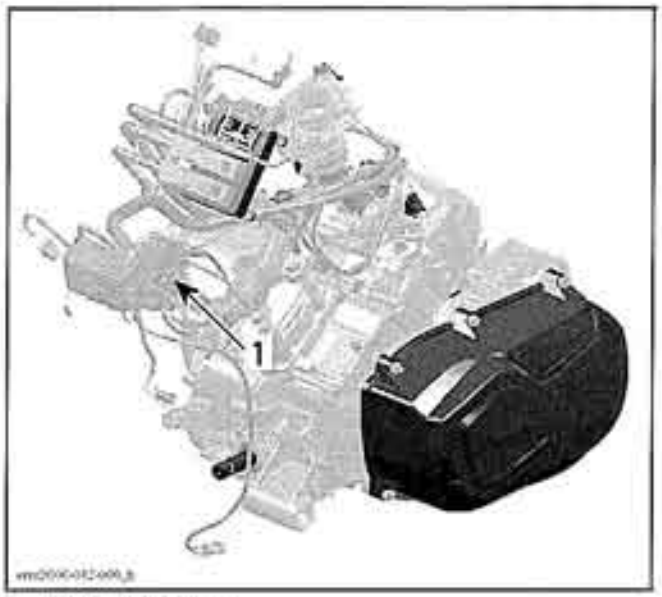
The ignition system is fully managed by the ECM which controls the ignition system parameters, such as spark timing, duration and firing order to achieve the proper engine requirements.

Ignition Coil

A double ignition coil induces voltage to a high level in the secondary winding to produce a spark at each spark plug independently.

The ignition coil receives input from the ECM.

Ignition coil is located in front of engine.



1. Ignition coil location

Ignition Timing

The ECM is programmed with data (it contains ignition mappings) for optimum ignition timing under all operating conditions. Using engine operating conditions provided by the sensors, the ECM controls the ignition timing for optimum engine operation. There is no adjustment to perform.

OTHER ENGINE MANAGEMENT FUNCTIONS

Limp Home Mode

Besides the signals seen above, the ECM may automatically set default parameters to the engine management to ensure the adequate operation of the engine if a component of the fuel injection system is not operating properly. The engine will operate with reduced performance to protect the engine. In more severe cases, the engine RPM will be limited, also to protect the engine.

These performance-reduced modes allow the rider to go back home which would not be otherwise possible without this advanced system. Refer to the *DIAGNOSTIC PROCEDURES* for a complete chart.

When a sensor failure occurs,the ECM will send out a signal to the multi-function speedometer to warn the operator.

NOTE: LIMP MODE will be displayed in the multifucntion speedometer and check engine light will flash. Refer to *INSTRUMENTS AND ACCESSORIES*.

When minor fault occurs, the fault and message in the multi-function speedometer may disappear automatically when the ignition key is turned off and kept off until lights turn off in multi-function speedometer, then turned back on.

Monitoring System

The ECM monitors the electronic components of the fuel injection system and also parts of the electrical system. When a fault occurs, the ECM sends out signals to the multi-function speedometer to inform you of a particular condition. Refer to the *DIAGNOSTIC PROCEDURES* for the fault codes chart.

Battery Voltage Warning Device

When the battery voltage is either too low or too high, the ECM sends out a signal to the multi-function speedometer.

NOTE: Either LO BATT or HI BATT will be displayed in the multifucntion speedometer and check engine light will flash. Limp home will be set.

Low Oil Pressure Warning Device

When the engine oil pressure falls under a certain level, the ECM sends out a signal to the multi-function speedometer.

NOTE: LOW OIL will be displayed in the multi-fucntion speedometer and check engine light will flash. Limp home will be set.

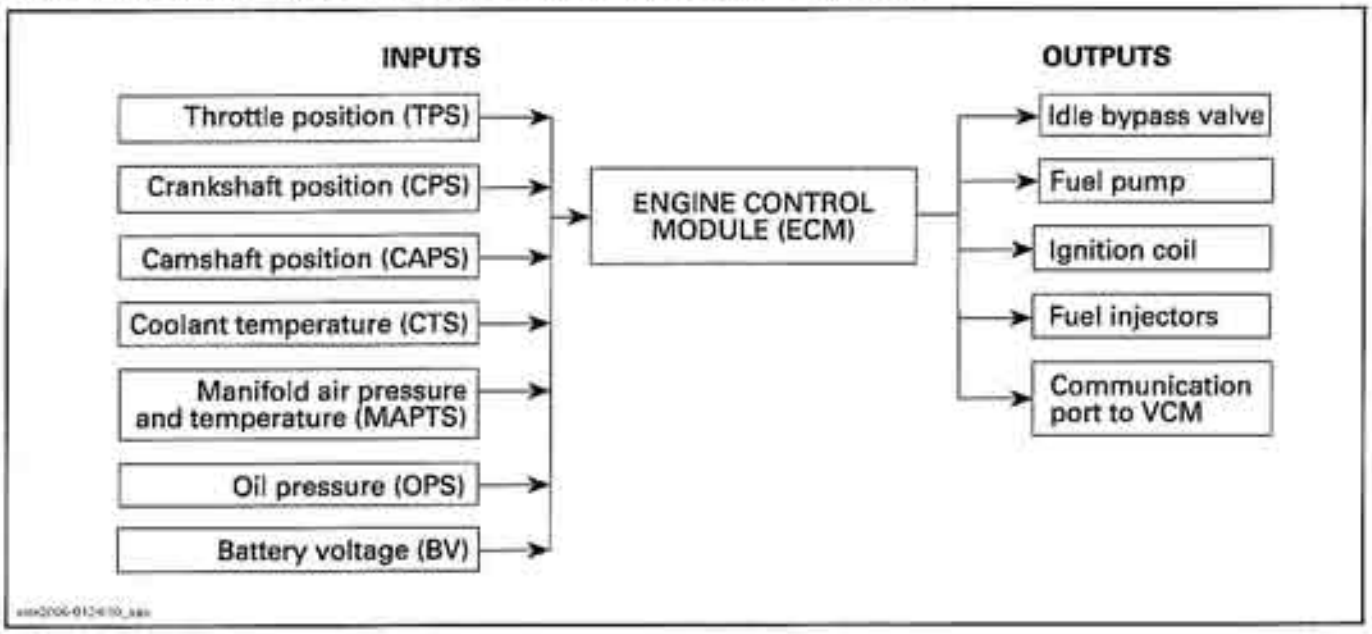
High Coolant Temperature Warning Device

When the engine coolant temperature is getting to high, the ECM sends out a signal to the multi-function speedometer.

NOTE: HI TEMP will be displayed in the multifucntion speedometer and check engine light will flash. Limp home will be set.

In overheat condition, the ECM starts the cooling fan and enriches the fuel mixture. If overheat keeps on, the ECM will set the limp home mode.

ENGINE MANAGEMENT SYSTEM FLOW CHART



DIAGNOSTIC PROCEDURE

GENERAL

Here is the basic order suggested to diagnose a suspected engine management or fuel injection related problem:

- Check the chart in the *TROUBLESHOOTING* section to have an overview of problems and suggested solutions.
- Check if the engine management system (EMS) pilot lamp is ON or blinks. If so, use the B.U.D.S. software and look for fault codes to diagnose the trouble.

NOTE: When a fault code is present, the EMS pilot lamp will turn on. When EMS is in limp home mode, the lamp will blink.

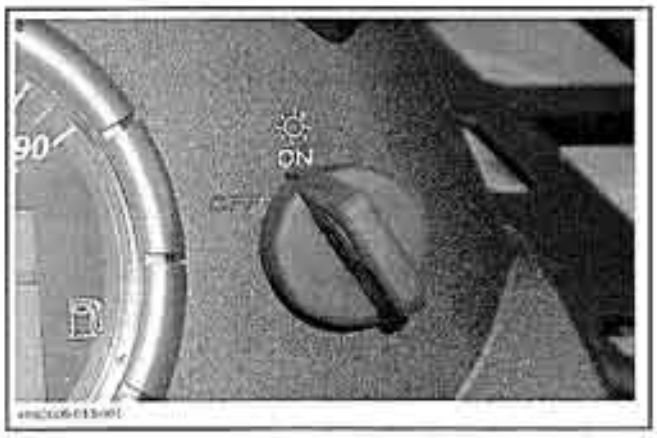
- Check all fuses.
- Check relay(s).
- Check fuel pressure.
- Check spark plugs condition.
- Check all connections of the wiring harness.
- Refer to *COMPONENT INSPECTION AND ADJUSTMENT* section for procedures.

On-Board Diagnostic

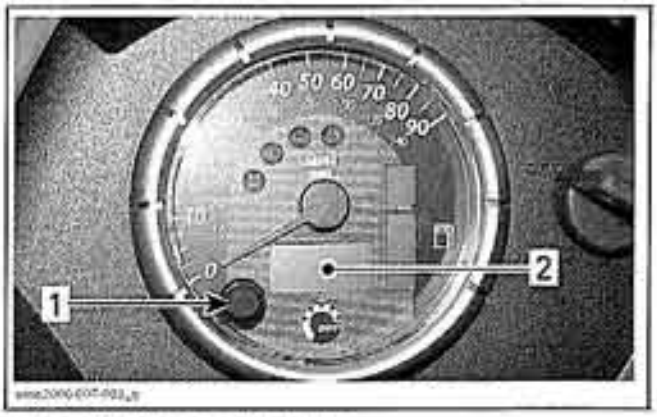
Fault codes starting with the letter P followed by 4 digits (P-1234) can be displayed in the multi-function speedometer for troubleshooting.

Proceed as follows:

- Turn ignition key ON with lights ON.

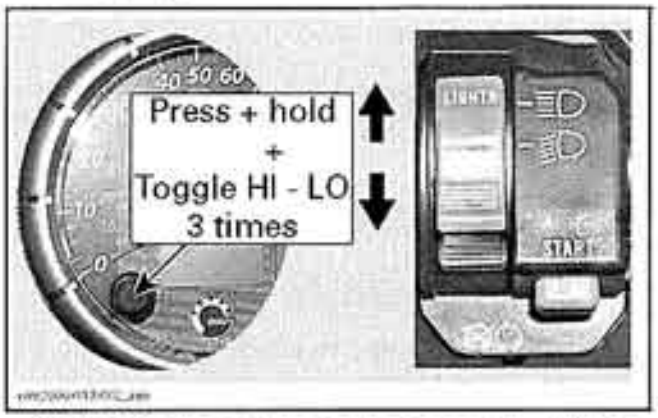


- Set multi-function speedometer in "Engine hour".



1. Repeatedly press selector button
2. Engine hour

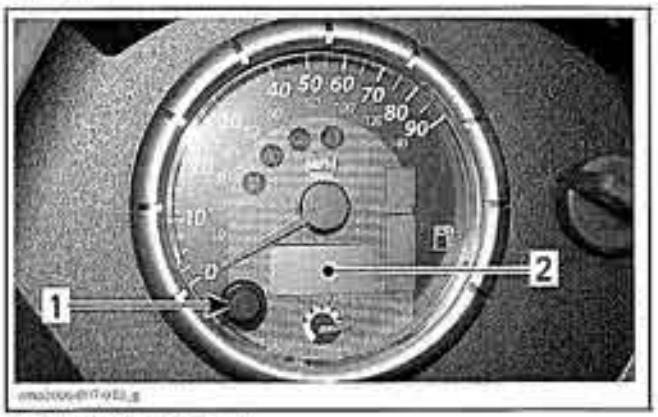
- Press and HOLD selector button while QUICKLY toggling HI - LO beam 3 times in a row



- On-board diagnostic mode is now on. "Active P-code" will show up on display.

NOTE: If it does not work, start over the procedure and toggle light switch faster. Toggling must be done within 2 seconds.

Press selector button to scroll fault codes (if more than one).

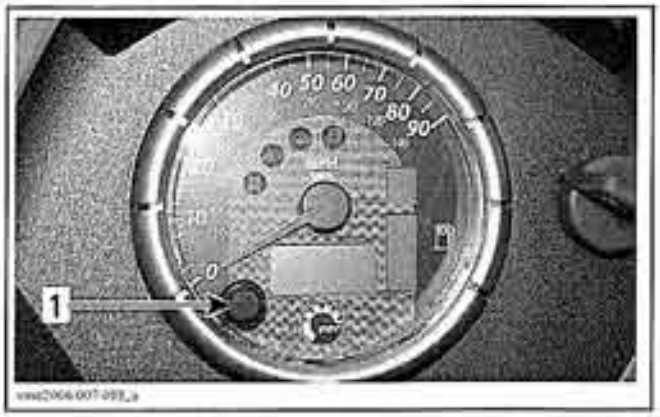


1. Press selector button
2. Scroll fault codes

END will appear when all fault codes have been displayed.

NOTE: If no button is depressed, the fault codes will automatically scroll down (if more than one) until END is reached.

To exit on-board diagnostic mode, press selector button and HOLD 2 seconds.



1. Press and hold 2 seconds to exit

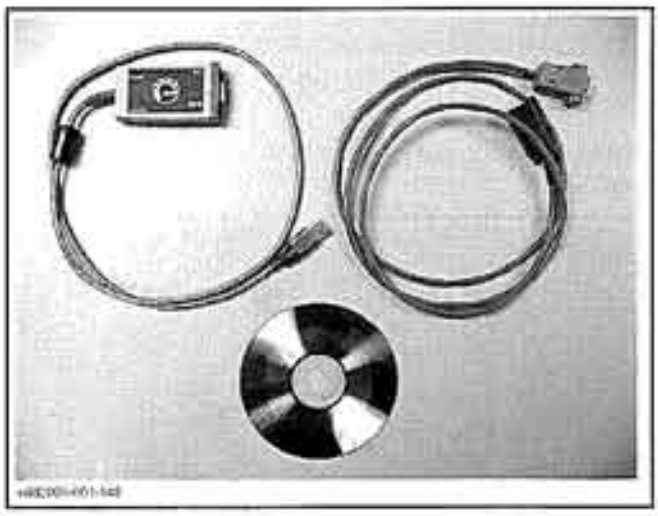
NOTE: If the on-board diagnostic mode is not exited, it will remain in function even if ignition key is turned off.

PROCEDURES

COMMUNICATION TOOLS

Two tools can be used to communicate with the memory of the ECM.

MPI-2 Interface Card



- 529 036 018: MPI-2 interface card
- 710 000 851: diagnostic cable
- 529 035 886: B.U.D.S. – 2 software CD

VCK (Vehicle Communication Kit)

The VCK (Vehicle Communication Kit) (P/N 529 035 981).

- 529 035 677: Multi Protocol Interface (MPI) with four AA-1.5 VDC alkaline batteries
- 529 035 807: Diagnostic cable
- 529 035 679: 6-pin adapter
- 529 035 697: DB9 female to DB9 male serial cable.

SOFTWARE

Ensure to use the latest B.U.D.S. version 2.3.2 or above available on BOSSWeb.

B.U.D.S. (Bombardier Utility and Diagnostic Software) is designed to allow actuators, sensors and electronic equipments inspection, diagnostic options and reset such as the closed throttle and idle actuator.

For more information pertaining to the use of the B.U.D.S. software, use its help which contains detailed information on its functions.

⚠ WARNING

If the computer you are using is connected to the power outlet, there is a potential risk of electrocution when working in contact with water. Be careful not to touch water while working with the VCK.

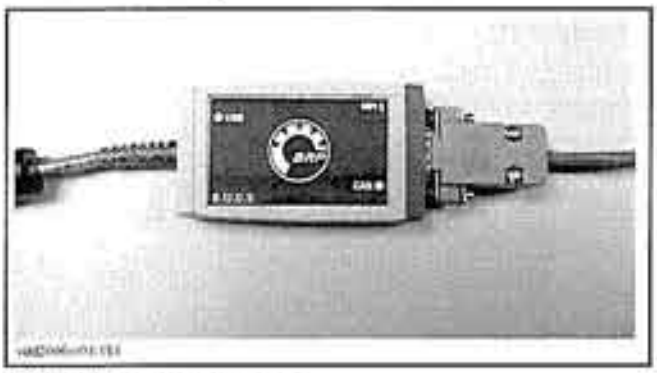
ELECTRICAL CONNECTIONS

MPI-2 Interface Card

Connect the USB connector of the MPI-2 card to the USB port of your computer.

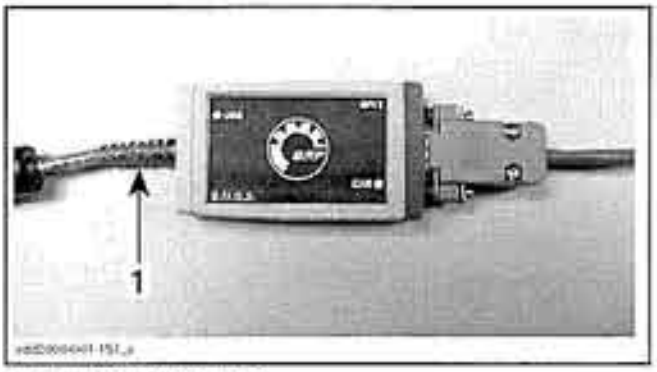
TYPICAL

Connect the diagnostic cable to the MPI-2 card.



MPI-2 Power Supply

The MPI-2 card uses the computer power through the USB port for its supply.



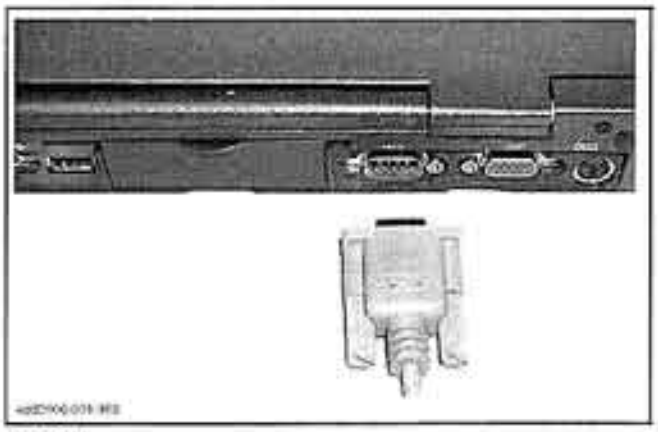
1. Power from USB cable

VCK (Vehicle Communication Kit)

Connect the DB9 serial cable to the MPI serial port.

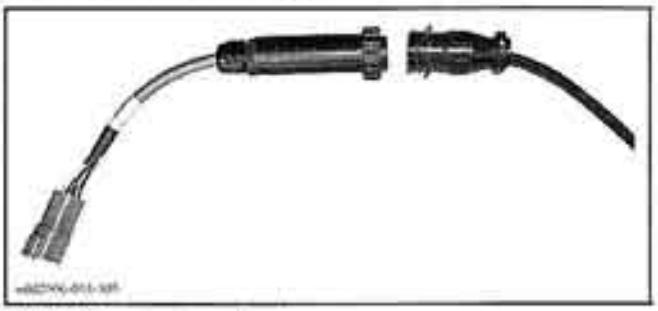
Connect the HDDB-15 male connector of the diagnostic cable to the MPI diagnostic port (engine icon).

Connect the other end of the serial cable to your computer serial port. You may use the DB9 to DB25 serial adapter in the eventuality that your computer has only a 25-pin serial connector.



TYPICAL

Connect the other end of the diagnostic cable to the 6-pin adapter. You can optionally use a diagnostic extension cable between the diagnostic cable and the 6-pin adapter.



MPI Power Supply

The MPI box needs power to work. Four AA batteries or an AC/DC power supply need to be used. Make sure to respect MPI specification if a power supply is used.

1. *DC supply jack*

Vehicle Communication Connector

Open service compartment cover and locate communication connector.

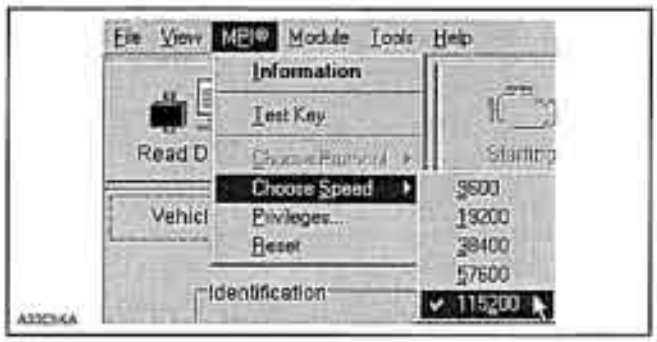
1. *Open*

Unplug communication connector and plug the VCK or MPI-2 connector.

COMMUNICATION PROCEDURES

Turn ignition switch ON and set engine stop switch to RUN to activate the communication.

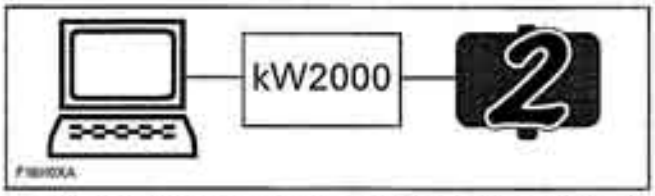
In B.U.D.S., ensure that the speed "115200" is properly selected.



Ensure that the protocol "kW2000" is properly selected.

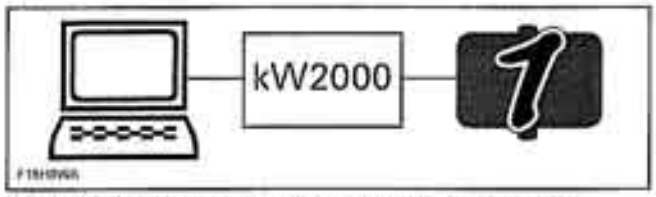
Ensure the status bar shows KW2000 and number 2 to the right.

Number 2 means that 2 "ECUs" are connected.



ECM AND MULTI-FUNCTION SPEEDOMETER ARE CONNECTED

Number 1 means that only one "ECU" is connected (either ECM or multi-function speedometer). Therefore, there is a problem. Check fuses and connections.



ONLY ONE "ECU" IS WORKING. THERE IS A PROBLEM

If an "X" is shown, this means that no communication between MPI and ECM/multi-function speedometer takes place. Possible causes are:

- multi-function speedometer is not powered-up
- ECM is not powered-up
- wrong protocol is used
- bad connection between MPI and ECM.

Changes in ECM

Anytime a change is brought in ECM through B.U.D.S., there will be a message that will say "Remove key from vehicle". When this occurs, remove ignition key from switch then wait until the message disappears (approximately 15 seconds after).

FAULT CODES

General

The faults saved in the ECM (Engine Control Module) are kept even if the battery is disconnected.

IMPORTANT: After a problem has been solved, ensure to clear the fault(s) in the ECM using the VCK. This will properly reset the appropriate counter(s) and will also record that the problem has been fixed in the ECM memory.

Many fault codes at the same time is likely to be burnt fuse(s) or a faulty relay.

For more information pertaining to the fault codes (state, count, first, etc.) and report, refer to B.U.D.S. online help.

TPS (Throttle Position Sensor) Faults

Faults which are reported in B.U.D.S. fall into two groups: TPS faults and adaptation faults. These are displayed on the B.U.D.S. system as TPS OUT OF RANGE and TPS ADAPTATION FAILURE.

TPS "OUT OF RANGE" Fault

It is caused by the sensor reading going out of its allowable range. This fault can occur during the whole range of movement of the throttle.

To diagnose this fully, it is recommended to operate the throttle through its full range. It is also recommended to release the throttle quickly as this may also reveal a fault that is intermittent.

POSSIBLE CAUSES	ACTION
Check if connector is disconnected from TPS	Fix.
Check if sensor is loose	Tighten and reset **Closed Throttle and Idle Actuator.**
Inspect sensor for damage or corrosion	Replace and reset **Closed Throttle and Idle Actuator.**
Inspect wiring (voltage test)	Repair.
Inspect wiring and sensor (resistance test)	If bad wiring, repair. If bad TPS, replace and reset **Closed Throttle and Idle Actuator.**
Test sensor operation (wear test)	Replace and reset **Closed Throttle and Idle Actuator.**

TPS "ADAPTATION FAILURE" Fault

It is caused by the idle position moving out of an acceptable range.

Following problems can be caused by a TPS "Adaptation Failure":

- Idle speed is out of range.
- Engine stops when throttle is released quickly.
- Engine runs inconsistent in low partload or low RPM.

POSSIBLE CAUSES	ACTION
Sensor has been replaced and TPS closed position not reset	Reset **Closed Throttle and Idle Actuator.**
Throttle body has been replaced and TPS closed position not reset	Reset **Closed Throttle and Idle Actuator.**
ECM has been replaced and TPS closed position not reset	Reset **Closed Throttle and Idle Actuator.**
Throttle cable too tight	Tighten and reset **Closed Throttle and Idle Actuator.**
Sensor is loose	Tighten and reset **Closed Throttle and Idle Actuator.**
Throttle bracket is loose	Tighten and reset **Closed Throttle and Idle Actuator.**
Idle speed screw (tamper proof) worn or loose	Change throttle body.
Idle bypass valve replaced but not reset	Reset **Closed Throttle and Idle Actuator** using B.U.D.S.

Supplemental Information

When using the service action suggested in the Fault section of B.U.D.S., the system circuits are referred to as 2-A-41, which means connector "A" on the ECM and pin 41. The first digit (2) indicates connector location in vehicle such as shown in the wiring diagram.

FAULT CODE TABLE

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P0106	Air pressure sensor voltage out of range	Sensing port dirty or blocked. Sensor failure or unexpected reading at idle. Sensor fallen out of intake manifold.	Make sure sensor's connector is fully inserted. Check for approximately 5 volts between sensor connector pins 1 and 3. Check system circuits 2-A-12, 2-A-28 and 2-A-40.	Engine pilot lamp/check engine and limp home	Limp home	No rev limit but air pressure is set to a default value
P0107	Air pressure sensor voltage too low	Damaged circuit wires, damaged or disconnected sensor, sensor shorted to ground.	Make sure sensor's connector is fully inserted. Check for approximately 5 volts between sensor connector pins 1 and 3. Check system circuits 2-A-12, 2-A-28 and 2-A-40.	Engine pilot lamp/check engine and limp home after a few seconds	Limp home	No rev limit but air pressure is set to a default value
P0108	Air pressure sensor voltage too high	Damaged circuit wires, damaged or disconnected sensor, sensor shorted to a supply.	Make sure sensor's connector is fully inserted. Check for approximately 5 volts between sensor connector pins 1 and 3. Check system circuits 2-A-12, 2-A-28 and 2-A-40.	Engine pilot lamp/check engine and limp home	Limp home	No rev limit but air pressure is set to a default value
P0111	Air temperature sensor functional problem	Intermittent air temperature sensor reading or circuit wires shorted to ground.	Check system circuits 2-A-7 and 2-A-21. Replace the sensor if necessary.	Engine pilot lamp/check engine and limp home	Limp home	No rev limit but air temperature is set to a default value
P0112	Air temperature sensor voltage too low	Air temperature sensor or circuit wires shorted to ground.	Disconnect the sensor and check for a change in the fault code. If the fault code stays the same, look for a short circuit on the harness. If the fault code is different, replace the sensor. Check system circuits 2-A-7 and 2-A-21.	Engine pilot lamp/check engine and limp home	Limp home	No rev limit but air temperature is set to a default value
P0113	Air temperature sensor voltage too high	Disconnected sensor or sensor's resistance too high.	Check for disconnected air temperature sensor on the intake. Check the air temperature sensor for approximately 2000 to 4200 ohms at 10 to 25°C (50 to 77°F). Replace the sensor if necessary. Check system circuits 2-A-7 and 2-A-21.	Engine pilot lamp/check engine and limp home	Limp home	No rev limit but air temperature is set to a default value
P0116	Engine temperature sensor functional problem	Intermittent engine temperature sensor reading or circuit wires shorted to ground.	Check system circuits 2-A-11 and 2-A-27. Replace the sensor if necessary.	Engine pilot lamp/check engine and limp home	No effect	No rev limit but engine temperature is set to a default value

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P0117	Engine temperature sensor voltage too low	Engine temperature sensor or circuit wires shorted to ground.	Disconnect the sensor and check for a change in the fault code. If the fault code stays the same, look for a short circuit on the harness. If the fault code is different, replace the sensor. Check for leakage between sensor's connection and ground. Check system circuits 2-A-11 and 2-A-27.	Engine pilot lamp/check engine and limp home	No effect	No rev limit but engine temperature is set to a default value
P0118	Engine temperature sensor voltage too high	Disconnected sensor or sensor's resistance too high.	Check for disconnected engine temperature sensor. Check the engine temperature sensor for approximately 2280 to 2736 ohms at 19 to 21°C (68 to 70°F). Replace the sensor if necessary. Check system circuits 2-A-11 and 2-A-27.	Engine pilot lamp/check engine and limp home	No effect	No rev limit but engine temperature is set to a default value
P0122	Throttle position sensor voltage too low	Damaged circuit wires, damaged throttle position sensor or damaged ECM pins.	Check system circuits 2-A-24, 2-A-25 and 2-A-39. Refer to the *SERVICE MANUAL* for complete throttle position sensor testing procedure.	Engine pilot lamp and check engine	Engine will not start	
P0123	Throttle position sensor voltage too high	Damaged circuit wires, damaged throttle position sensor or damaged ECM pins.	Check system circuits 2-A-24, 2-A-25 and 2-A-40. Refer to the *SERVICE MANUAL* for complete throttle position sensor testing procedure.	Engine pilot lamp and check engine	Engine will not start	
P0231	Fuel pump open circuit or shorted to ground	Damaged or disconnected fuel pump, damaged circuit wires, damaged connectors or damaged ECM output pins.	Check for damaged or disconnected connector on fuel pump. Check for approximately 1 ohm between pins 5-FP-3 and 5-FP-4 of the fuel pump connector. Check for approximately 1 ohm between pins F5 and 2-B-29.	Engine pilot lamp and check engine	Will not run	
P0232	Fuel pump shorted to battery	Damaged fuel pump, damaged circuit wires, damaged connectors or damaged ECM output pins.	Check for approximately 1 ohm between pins 5-FP-3 and 5-FP-4 of the fuel pump connector. Check for approximately 1 ohm between pins F5 and 2-B-29. Check if system circuit 2-B-29 is shorted to 12 V.	Engine pilot lamp and check engine	Will not run long	

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P0261	Cylinder #1 injector open circuit or shorted to ground	Blown fuse, damaged or disconnected injector, damaged or disconnected circuit wires, damaged ECM output pins.	Check fuse F1. Check connections on injector. Check for approximately 14.5 ohms on injector. Check system circuit 2-A-15. Check connector CJ connecting the two harnesses together.	Engine pilot lamp/check engine and limp home	Engine pilot lamp/check engine and limp home	No rev but cylinder 1 will not work properly
P0262	Cylinder #1 injector shorted to battery	Damaged injector, damaged circuit wires, damaged connector or damaged ECM output pins.	Check for approximately 14.5 ohms on injector. Check if system circuit 2-A-15 is shorted to 12 V.	Engine pilot lamp/check engine and limp home	Engine pilot lamp/check engine and limp home	No rev but cylinder 1 will not work properly
P0264	Cylinder #2 injector open circuit or shorted to ground	Blown fuse, damaged or disconnected injector, damaged or disconnected circuit wires, damaged ECM output pins.	Check fuse F1. Check connections on injector. Check for approximately 14.5 ohms on injector. Check system circuit 2-A-33. Check connector CJ connecting the two harnesses together.	Engine pilot lamp/check engine and limp home	Engine pilot lamp/check engine and limp home	No rev but cylinder 2 will not work properly
P0265	Cylinder #2 injector shorted to battery	Damaged injector, damaged circuit wires, damaged connector or damaged ECM output pins.	Check for approximately 14.5 ohms on injector. Check if system circuit 2-A-33 is shorted to 12 V.	Engine pilot lamp/check engine and limp home	Engine pilot lamp/check engine and limp home	No rev but cylinder 2 will not work properly
P0336	High engine RPM detected	CPS signal not plausible, damaged circuit wires, damaged connector or damaged tooth wheel.	Check for metal deposit on sensor. Check circuit between 2-A-5, 2-A-19 and 4-CPS-1, 4-CPS-2. Replace sensor if necessary.	Engine pilot lamp and check engine	Erratic engine behavior	
P0337	No crankshaft signal detected	Damaged circuit wires, damaged CPS or damaged tooth wheel.	Check for metal deposit on sensor. Check circuit between 2-A-5, 2-A-19 and 4-CPS-1, 4-CPS-2. Replace sensor if necessary.	Engine pilot lamp and check engine	No start	
P0339	Crankshaft signal fault	CPS signal not plausible, damaged circuit wires, damaged connector or damaged tooth wheel.	Check for metal deposit on sensor. Check circuit between 2-A-5, 2-A-19 and 4-CPS-1, 4-CPS-2. Replace sensor if necessary.	Engine pilot lamp and check engine	Will not run	
P0344	Cam phase sensor signal missing	Blown fuse, damaged circuit wires or damaged sensor.	Check fuse F4. Check for 12 volts between sensor's connector pins 1 and 3. Check system circuits 2-A-20, 2-A-34 and F4.	Engine pilot lamp and check engine	Limp home	No rev but calculation of RPM will be less precise. Cold start will take more time.

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P0351	No ignition output stage cylinder #1	Blown fuse, damaged circuit wires, damaged connector or damaged ignition coil.	Check fuse F3. Check for 2.2 ± 0.3 ohm between ignition coil pins. Check connector HIC connecting the two harnesses together. Check system circuit 2-A-1.	Engine pilot lamp/check engine and limp home	Limp home	No rev but cylinder 1 will not work properly
P0352	No ignition output stage cylinder #2	Blown fuse, damaged circuit wires, damaged connector or damaged ignition coil.	Check fuse F3. Check for 2.2 ± 0.3 ohm between ignition coil pins. Check connector HIC connecting the two harnesses together. Check system circuit 2-A-1.	Engine pilot lamp/check engine and limp home	Limp home	No rev but cylinder 2 will not work properly
P0480	Engine fan short-circuit to battery	Blown fuse, damaged fan relay, damaged circuit wires, damaged pins or damaged ECM output pin.	Check fuse F4. Check for approximately 12 volts between 3-PF-1D and engine ground. Check system circuit 2-B-3.	Engine pilot lamp and check engine	No effect	
P0480	Engine fan short-circuit to ground or open	Blown fuse, damaged fan relay, damaged circuit wires, damaged or disconnected pins or damaged ECM output pin.	Check fuse F4. Check for disconnected relay or pin 3-PF-1 D and 3-PF-1E. Check for approximately 12 volts between 3-PF-1D and engine ground. Check system circuit 2-B-3.	Engine pilot lamp and check engine	No effect	
P0505	Idle air control valve output stage cutoff memory difference	Damaged actuator, damaged circuit wires, damaged connector or damaged ECM output pins.	Check for approximately 50 ohms between pins A and D and also between pins B and C of the idle air control valve. Check for damaged circuit wires. Check system circuits 2-A-35, 2-A-36, 2-A-37 and 2-A-38. Check for damaged connector or damaged ECM output pins.	Engine pilot lamp and check engine	Erratic engine behavior	
P0505	Idle air control valve output stage fault	Damaged actuator, damaged circuit wires, damaged connector or damaged ECM output pins.	Check for approximately 50 ohms between pins A and D and also between pins B and C of the idle air control valve. Check for damaged circuit wires. Check system circuits 2-A-35, 2-A-36, 2-A-37 and 2-A-38. Check for damaged connector or damaged ECM output pins.	Engine pilot lamp and check engine	Erratic engine behavior	
P0513	Incorrect DESS® key	DESS key not programmed. Wrong DESS key used. Bad contact on the DESS key. DESS key failure.	Clean DESS key. Program the DESS key.	Check engine/ incorrect DESS	Will not start	

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P0520	Oil pressure switch functional problem	Low oil level, engine leak, oil pump failure, damaged sensor, damaged or shorted circuit wires.	Check oil level. Check oil pressure switch resistance. With engine stopped, the resistance should be less than 1 ohm. With engine running, the resistance of oil switch should be infinitely high (O.L.). Check system circuit 2-A-10 to engine ground.	Engine pilot lamp and check engine	No effect	
P0562	Battery voltage too low	Battery failure, damaged circuit wires, damaged or disconnected magneto and regulator.	Check battery voltage for 12 to 13 volts with engine stopped. Check battery voltage for 13.8 to 15.0 volts with engine idling. Check connections on magneto and regulator.	Engine pilot lamp/check engine/low batt and limp home	Limp home	Rev at 5000
P0563	Battery voltage too high	Bad battery, damaged circuit wires or damaged regulator. An external battery charger may have been used.	Check battery voltage for 13.8 to 15.0 volts with engine idling. Check connections on battery. Replace regulator if necessary.	Engine pilot lamp/check engine/hi batt and limp home	Limp home	Rev at 7000
P0600	CAN Bus Off	Communication error between cluster and ECM and/or B.U.D.S.	Check for damaged circuit between 1-CI-23, 4-B-29 and 2-DB-1. Check for damaged circuit between 1-CI-24, 4-B-27 and 2-DB-2. Replace cluster if necessary.	No ECU communi-cation	No effect	
P0600	CAN ID 514 missing	Communication error between cluster and ECM and/or B.U.D.S.	Check system circuits 2-B-27 and 2-A-28 with 1-CI-23 and 1-CI-24. Refer to the *SERVICE MANUAL* for more details.	No ECU communi-cation	No effect	
P0601	Throttle position sensor adaptation failure	Wrong throttle body mechanical position during reset of closed TPS or no initialization after ECM replacement.	Check cable adjustment. Check idle stop for wear. Make sure throttle plate is against throttle stop. Reset closed TPS.	Engine pilot lamp/check engine		
P0601	Module call monitoring	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine		
P0602	ECM not coded	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine	Will not start	
P0604	RAM fault	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine		

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P0605	EEPROM fault	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine		
P0605	EEPROM checksum fault	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine		
P0605	Coding ID checksum fault	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine		
P0605	Coding checksum fault	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine		
P0605	Programming checksum fault	Damaged ECM or faulty programming.	Try updating the ECM. If the problem persists, replace the ECM.	Engine pilot lamp/check engine		
P0608	Sensor's power supply voltage too low	Inverted connectors between air pressure sensor and TPS. Damaged circuit wires, shorted air pressure sensor or shorted TPS.	Check system circuits 2-A-12, 2-A-28, 2-A-40, 2-A-24, 2-A-25 and 2-A-39.	Engine pilot lamp/check engine	Limp home	No rev but all associated sensors will be set to a default value
P0608	Sensor's power supply voltage too high	Damaged circuit wires, TPS or air pressure sensor shorted to a supply.	Check system circuits 2-A-12, 2-A-28, 2-A-40, 2-A-24, 2-A-25 and 2-A-39.	Engine pilot lamp/check engine	Limp home	No rev but all associated sensors will be set to a default value
P0616	Starter relay open circuit or shorted to ground	Blown fuse, damaged or disconnected starter relay, damaged circuit wires, damaged connectors or damaged ECM output pins.	Check fuse F4. Disconnect the starter relay and check for approximately 7.3 ohms between the small starter relay terminals. Check for approximately 12 volts between starter relay OR/GN wire and ground. Check system circuit 2-B-31.	Engine pilot lamp/check engine	Will not start	
P0617	Starter relay shorted to battery	Damaged solenoid, damaged circuit wires, damaged connector or damaged ECM output pins.	Disconnect the starter relay and check for approximately 7.3 ohms between the small starter relay terminals. Check if system circuit 2-B-31 is shorted to 12 V.	Engine pilot lamp/check engine	Will not start	
P0705	Transmission range sensor circuit malfunction (PRNHL)	Improbable combination of transmission switches.	Check for disconnected or damaged transmission contact. Check circuit 2-A-2, 2-A-6 and 2-A-31. Refer to B.U.D.S. transmission switch diagnostic. Refer to *SERVICE MANUAL* for transmission service.	Check engine/"E" is displayed	Limp home	No rev but engine will react as if the gear were in high

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P1102	Throttle position sensor adaptation failure	Wrong throttle body mechanical position during reset of closed TPS or no initialization after ECM replacement.	Check cable adjustment. Check idle stop for wear. Make sure throttle plate is against throttle stop. Reset closed TPS.	Engine pilot lamp/check engine		
P1104	Throttle position sensor adaptation failure	Wrong throttle body mechanical position during reset of closed TPS or no initialization after ECM replacement.	Check cable adjustment. Check idle stop for wear. Make sure throttle plate is against throttle stop. Reset closed TPS.	Engine pilot lamp/check engine		
P1116	High temp	High temperature of the cooling liquid.	Refer to *SERVICE MANUAL* for high engine temperature.	Check engine/hi temp	Limp home	Rev at 4050
P1148	Safety fuel cut off detected	TPS adaptation failure, TPS failure, damaged ECM memory or battery voltage out of range.	Check cable adjustment. Check idle stop for wear. Make sure throttle plate is against throttle stop. Reset closed TPS.	Engine pilot lamp/check engine	Limp home	Rev at 5000
P1202	Oil pressure switch still closed	Low oil level, engine leak, oil pump failure, damaged sensor, damaged or shorted circuit wires.	Check oil level. Check oil pressure switch resistance. With engine stopped, the resistance should be less than 1 ohm. With engine running, the resistance of oil switch should be infinitely high (O.L.). Check system circuit 2-A-10 to engine ground.	Engine pilot lamp/check engine	No effect	
P1203	Oil pressure switch leakage	Low oil level, engine leak, oil pump failure, damaged sensor, damaged or shorted circuit wires.	Check oil level. Check oil pressure switch resistance. With engine stopped, the resistance should be less than 1 ohm. With engine running, the resistance of oil switch should be infinitely high (O.L.). Check system circuit 2-A-10 to engine ground.	Engine pilot lamp/check engine	No effect	
P1520	Low oil	Low oil detected in engine	Refer to *SERVICE MANUAL* for low oil service.	Check engine/low oil	Limp home	Rev at 4000
P1655	DESS® line shorted to battery	Damaged circuit wires or mixed up connection pins.	Check system circuits 2-B-38, and 2-B-39 with 1-CC-C and 1-CC-D.	Check engine/ incorrect DESS	Will not start	
P1656	DESS® line shorted to ground	Damaged circuit wires or mixed up connection pins.	Check system circuits 2-B-38, and 2-B-39 with 1-CC-C and 1-CC-D.	Check engine/ incorrect DESS	Will not start	

P-CODE	DESCRIPTION	CAUSE	ACTION	GAUGE	ENGINE REACTION	DESCRIPTION OF LIMP HOME EFFECT
P1675	Relay 2 shorted to battery	Damaged relay, damaged circuit wires, damaged connector or damaged ECM output pins.	Check for approximately 100 ohms between relay pins 85 and 86. Check if system circuit 2-B-14 is shorted to 12 V.	Engine pilot lamp/check engine	ECM will not do memory tracking sequence	
P1676	Relay 2 open circuit or shorted to ground	Blown fuse, damaged or disconnected relay, damaged or disconnected circuit wires, damaged ECM output pins.	Check fuse F4. Check for approximately 100 ohms between relay pins 85 and 86. Check system circuit 2-B-14.	Engine pilot lamp/check engine	ECM will not do memory tracking sequence	
P1683	CAN RAM Fault	Communication error between cluster and ECM and/or B.U.D.S.	Check for damaged circuit between 1-CI-23, 4-B-29 and 2-DB-1. Check for damaged circuit between 1-CI-24, 4-B-27 and 2-DB-2. Replace cluster if necessary.	Engine pilot lamp/check engine	No effect	
P2119	ECU wrong	Incorrect ECU or cluster for engine.	Install proper recommended ECU or gauge for vehicle.	Engine pilot lamp/check engine	Will not start	

COMPONENT INSPECTION, REPLACEMENT AND ADJUSTMENT

SERVICE TOOLS

Description	Part Number	Page
ECM adapter	420 277 010	140
Fluke 111	529 035 868	138
pliers	295 000 070	146
tachometer	529 014 500	141

SERVICE PRODUCTS

Description	Part Number	Page
Loctite 243	293 800 060	154, 158, 160

GENERAL

Engine problems are not necessarily related to the electronic fuel injection system.

It is important to ensure that the mechanical integrity of the engine/propulsion system is present:

- good transmission system operation
- good engine compression and properly operating mechanical components, no leaks etc.
- fuel pump connection and fuel lines without leaks.

Check the chart in *TROUBLESHOOTING* section to have an overview of problems and suggested solutions.

When replacing a component, always check its operation after installation.

FUEL SYSTEM

⚠ WARNING

The fuel system of a fuel injection system holds much more pressure than on a carbureted ATV. Prior to disconnecting a hose or to removing a component from the fuel system, follow the recommendation described here. Pay attention that some hoses may have more than one clamp at their ends. Ensure to reinstall the same quantity of clamps at assembly.

- Use the VCK (Vehicle Communication Kit) to release the fuel pressure in the system (refer to *DIAGNOSTIC PROCEDURES*). Look in the *ACTIVATION* section of the software B.U.D.S.

⚠ WARNING

Fuel lines remain under pressure at all times. Always proceed with care and use appropriate safety equipment when working on pressurized fuel system. Wear safety glasses and work in a well ventilated area. Do not allow fuel to spill on hot engine parts and/or on electrical connectors. Proceed with care when removing/installing pressure test equipment or disconnecting fuel line connections. Use the VCK (Vehicle Communication Kit) to release fuel pressure prior to removing a hose. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to minimize spilling. Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions. Always work in a well ventilated area. Always disconnect battery prior to working on the fuel system. After performing a pressure test, use the valve on the fuel pressure gauge to release the pressure (if so equipped).

- Always disconnect battery properly prior to working on the fuel system. Refer to *BATTERY* section.

When the job is done, ensure that hoses from fuel rail going to fuel pump are properly secured in their supports. Then, pressurize the fuel system. Perform the pressure test as explained in this section and pressurize the fuel tank and fuel lines as explained in *FUEL SYSTEM* section.

Properly reconnect the battery.

⚠ WARNING

Ensure to verify fuel line connections for damage and that NO fuel line is disconnected prior to turning the ignition key ON and setting engine stop switch to RUN. Always perform the pressure test if any component has been removed. A pressure test must be done before turning the ignition key ON and setting engine stop switch to RUN. The fuel pump is started for a short period each time the ignition key is turned ON and engine stop switch is set to RUN and it builds pressure very quickly.

To check fuel rails for leaks, first pressurize the system then spray soapy water on all hose connections, regulators and injectors. Air bubbles will show the leaking area. Check also for leaking fuel or fuel odor.

⚠ WARNING

Never use a hose pincher on injection system high pressure hoses.

ELECTRICAL SYSTEM

It is important to check that the electrical system is functioning properly:

- battery
- fuses
- relay(s)
- diode
- DESS
- ignition (spark)
- ground connections
- wiring connectors
- multi-function speedometer.

It is possible that a component seems to operate in static condition but in fact, it is defective. In this case, the best way to solve this problem is to remove the original part and replace it with one which is in good condition.

Never use a battery charger to substitute temporarily the battery, as it may cause the ECM (engine control module) to work erratically or not to work at all. Check related-circuit fuse solidity and condition with an ohmmeter. Visual inspection could lead to false results.

⚠ WARNING

Some EMS components are continuously powered by the VFB (Vehicle Fuse Block) when ignition key is turned on and engine stop switch is set in RUN position. The ECM switches the circuit to the ground to complete the electrical circuits it controls. Take this into account when troubleshooting. Always disconnect the battery prior to disconnecting any electric or electronic parts.

To perform verifications, a good quality multimeter such as Fluke 111 (P/N 529 035 868) should be used.

529 035 868

Pay particular attention to ensure that pins are not out of their connectors or out of shape. The troubleshooting procedures cover problems not resulting from one of these causes.

⚠ WARNING

Ensure all terminals are properly crimped on wires and connector housings are properly fastened.

Before replacing an ECM, always check electrical connections. Make sure connectors are properly crimped on wires and fastened in housing, and that they are free of corrosion. Check if wiring harness shows any signs of scoring. Ensure proper electrical connection. Particularly check ECM ground connections. Ensure that contacts are good and clean. A "defective module" could possibly be repaired simply by unplugging and re-plugging the ECM. The voltage and current might be too weak to go through dirty wire pins. Check carefully if pins show signs of moisture, corrosion or if they look dull. Clean pins properly and pay attention to the following. prior to assembling.

- ECM connectors: Do not apply dielectric grease or any other lubricant.
- Other connectors: Apply a silicon-based dielectric grease or other appropriate lubricant.

Ensure that all electronic components are genuine – any modification on the wiring harness may lead to generate fault codes or bad operation.

NOTE: For diagnostics purposes, use Vehicle Communication Kit (VCK). See *DIAGNOSTIC PROCEDURES* subsection.

After a problem has been solved, ensure to clear the fault(s) in the ECM using the VCK. Refer to *DIAGNOSTIC PROCEDURES* subsection.

Resistance Measurement

When measuring the resistance with an ohmmeter, all values are given for a temperature of 20°C (68°F). The resistance value of a resistance varies with the temperature. The resistance value for usual resistor or windings (such as injectors) increases as the temperature increases. However, our temperature sensors are NTC types (Negative Temperature Coefficient) and work the opposite which means that the resistance value decreases as the temperature increases. Take it into account when measuring at temperatures different from 20°C (68°F). Use this table for resistance variation relative to temperature for temperature sensors.

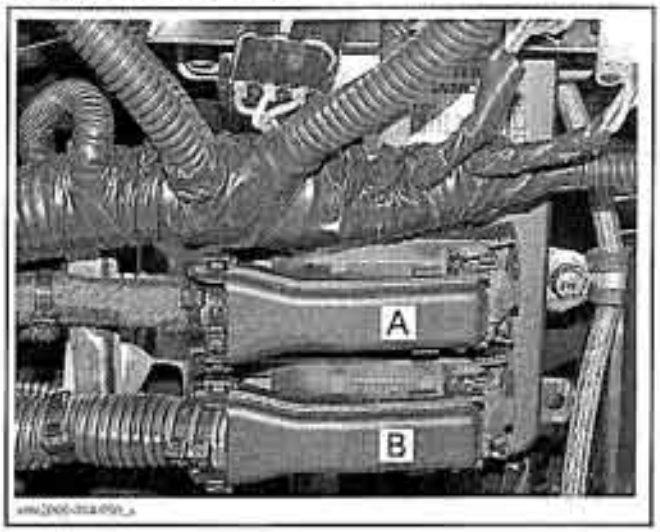
TEMPERATURE SENSOR TABLE			
TEMPERATURE		RESISTANCE (ohms)	
°C	°F	MAPTS	CTS
- 40	- 40	—	45000
- 30	- 22	28000	28000
- 20	- 4	14500	15000
0	32	5500	5750
20	68	2500	2600
40	104	1200	1200
60	140	600	600
80	176	320	320
100	212	180	180
130	266	90	90

CONVERSION CHART FOR TEMPERATURE SENSORS

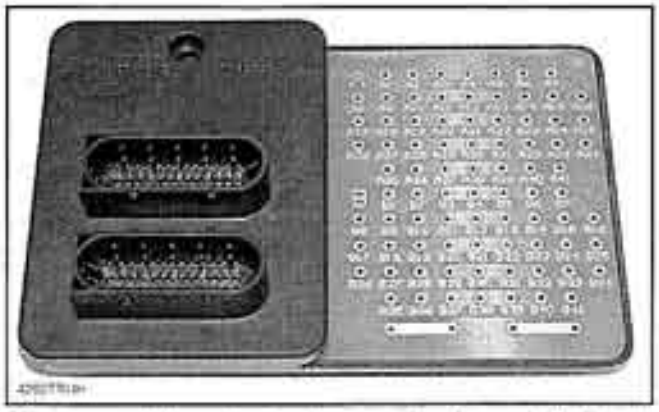
The resistance value of a temperature sensor may test good at a certain temperature but it might be defective at other temperatures. If in doubt, try a new sensor.

Also remember this validates the operation of the sensor at room temperature. It does not validate the over temperature functionality. To test it, the sensor could be removed from the engine and heated with a heat gun while it is still connected to the harness to see if the ECM will detect the high temperature condition and generate a fault code.

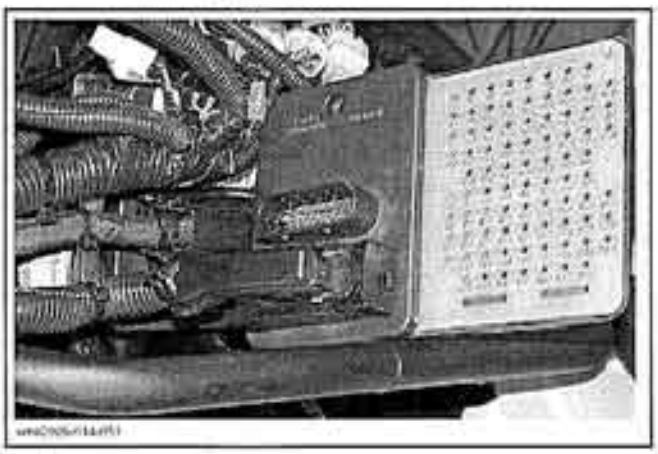
ECM Connectors



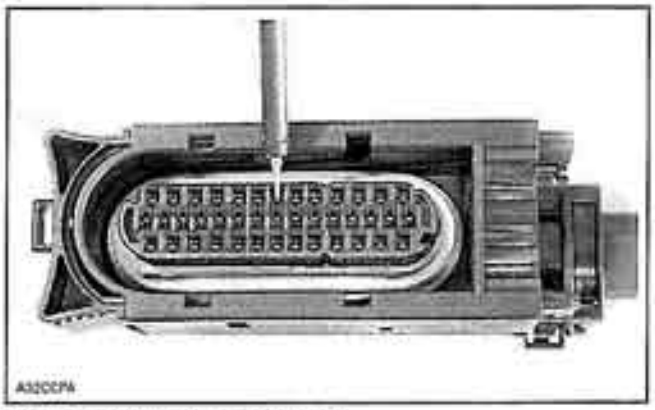
The most recommended and safest method to probe ECM connector terminals is to use the ECM adapter (P/N 420 277 010). This tool will prevent deforming or enlarging terminals which would lead to bad ECM terminal contact creating intermittent or permanent problems.



Disconnect the desired connector from ECM and reconnect on the tool connector. Probe required terminals directly in the tool holes.

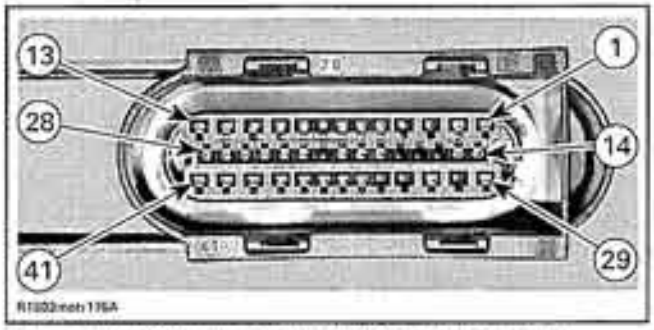


CAUTION: If not using the ECM adapter, probe on top of terminal only. Do not try to probe inside terminal or to use a paper clip to probe inside terminal, it will damage the square-shaped terminal and this could lead to improper function of the engine management system.



PROBE ONLY TOP OF TERMINAL

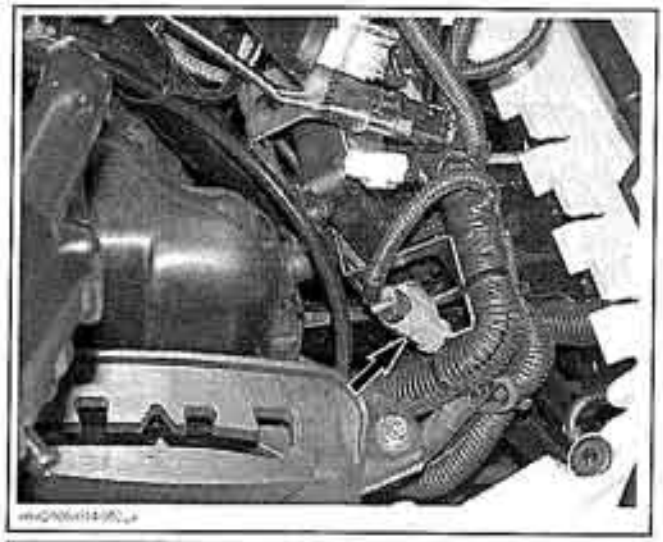
Use this diagram to locate the pin numbers on the ECM connector A of the wiring harness when performing tests.

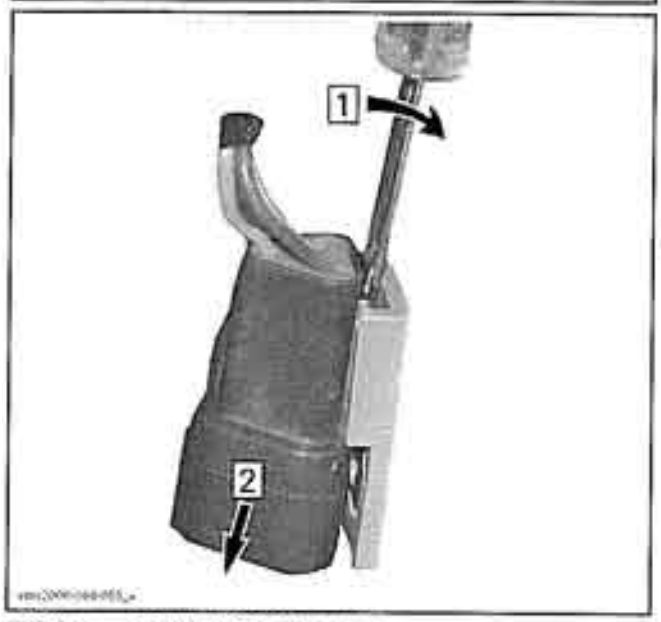


ECM CONNECTOR PIN-OUT (WIRING HARNESS SIDE)

Engine Connector

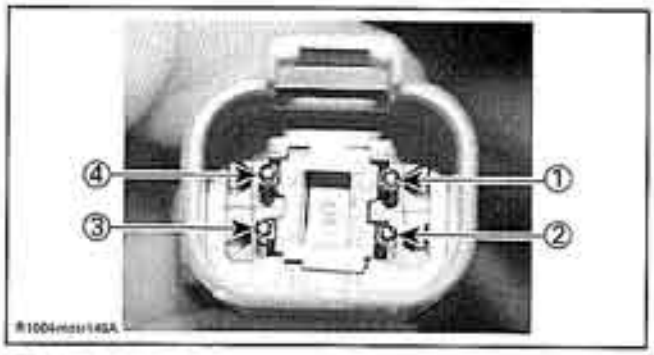
Remove center panel and dashboard. Refer to *BODY*.





TYPICAL — CONNECTOR REMOVAL

Use this diagram to locate the pin numbers on the Engine connector of the wiring harness when performing tests.



ENGINE CONNECTOR PIN-OUT (ENGINE SIDE)

PROCEDURES

IDLE SPEED

The idle speed is not adjustable. The ECM controls the idle speed of the engine.

CAUTION: Never attempt to adjust the sealed idle stop screw. It is calibrated at the factory. If the screw adjustment is changed, the throttle body must be replaced.

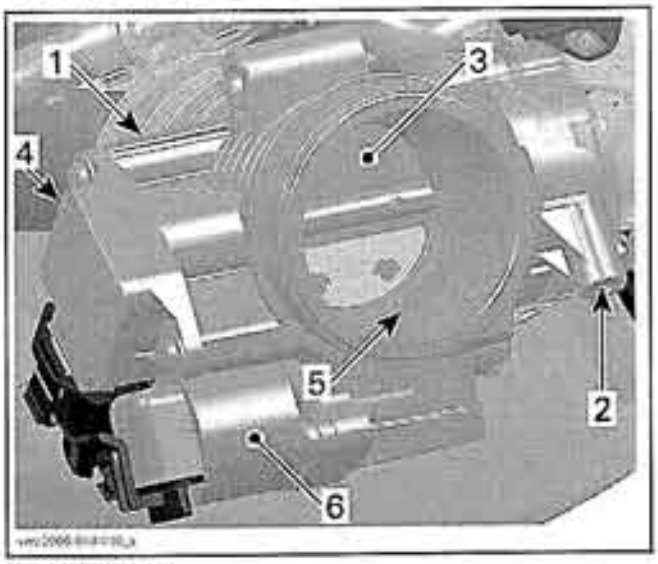
If desired, the engine RPM can be verified with the tachometer (P/N 529 014 500).

Install the tachometer wire on spark plug cable.

IGNITION TIMING

The ignition timing is not adjustable.

THROTTLE BODY

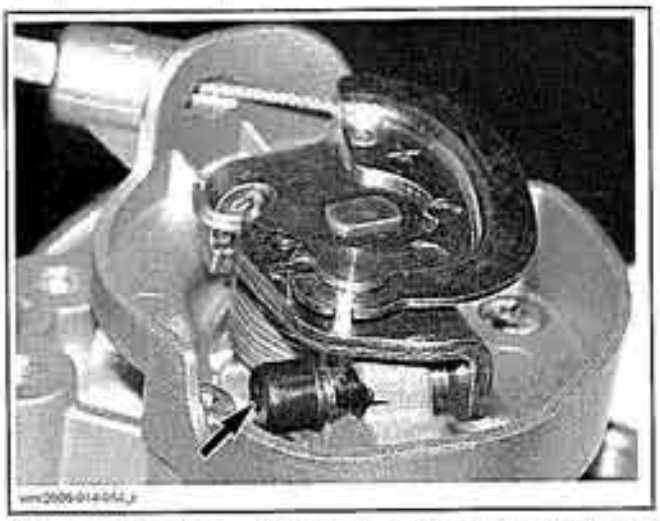


1. *Throttle body*
2. *Throttle cable attachment*
3. *Throttle plate*
4. *TPS*
5. *Idle bypass channel*
6. *Idle bypass valve*

Mechanical Inspection

Check that the throttle plate moves freely and smoothly when depressing throttle lever.

IMPORTANT: Never attempt to adjust the sealed idle stop screw. It is calibrated at the factory. If the screw adjustment is changed, the throttle body must be replaced.



Before replacing any part, check the following as these could be causing the fault. Perform the test while the engine is off.

- Throttle cable adjustment too tight. Not returning fully to idle stop.
- Throttle body idle set screw is loose or worn.
- TPS is loose.
- Idle bypass valve is loose.
- Corroded or damaged wiring or connectors.
- Throttle body has been replaced and the **Closed Throttle and Idle Actuator** reset has not been performed.
- ECM has been replaced and the **Closed Throttle and Idle Actuator** reset has not been performed.

Electrical Inspection

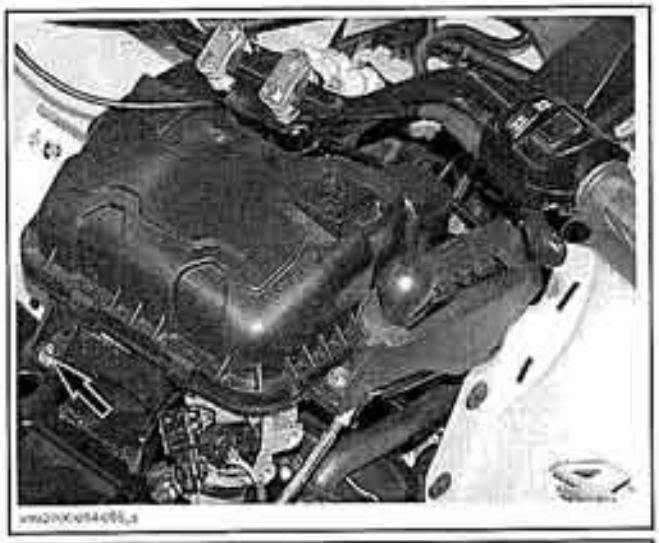
Refer to *THROTTLE POSITION SENSOR (TPS)* and *IDLE BYPASS VALVE* in this section.

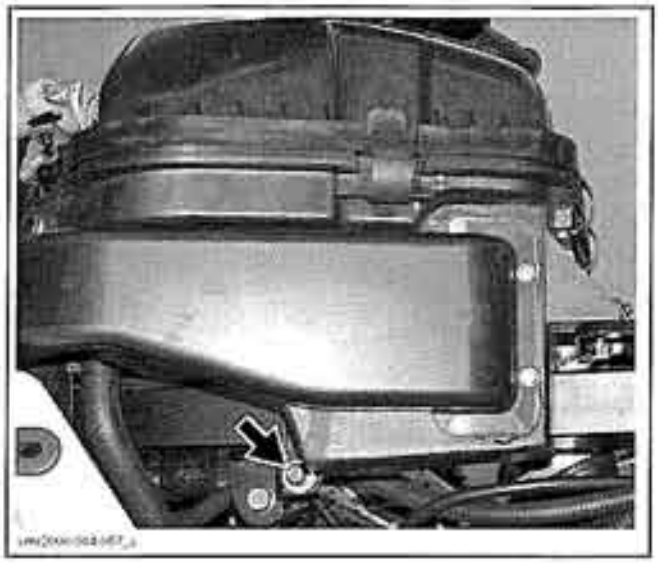
Replacement

Removal

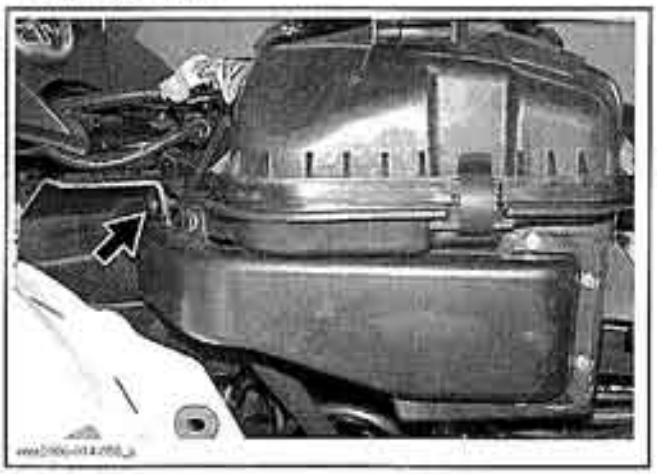
To remove the throttle body from engine, proceed as follows:

- Remove side panels, center panel and dashboard. Refer to *BODY*.
- Remove air box retaining fasteners.

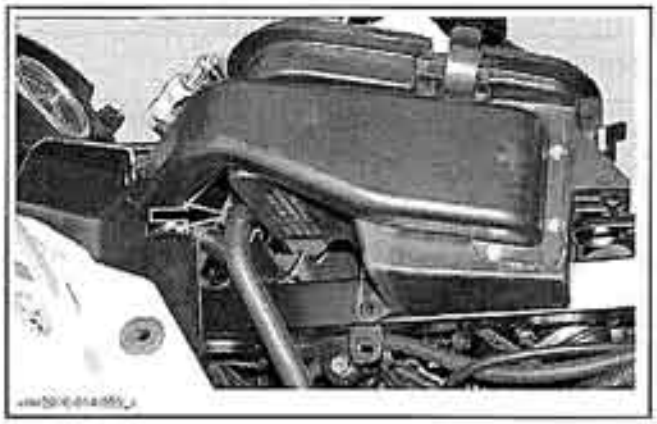




- Remove dart.

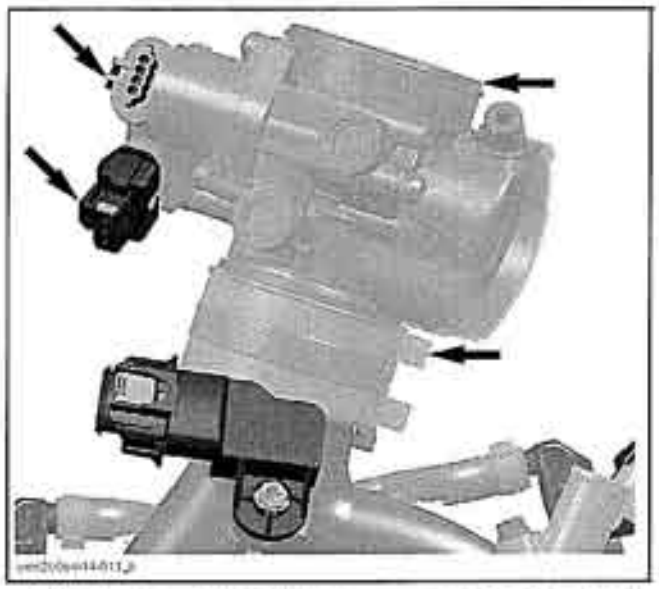


- Disconnect vent hose.

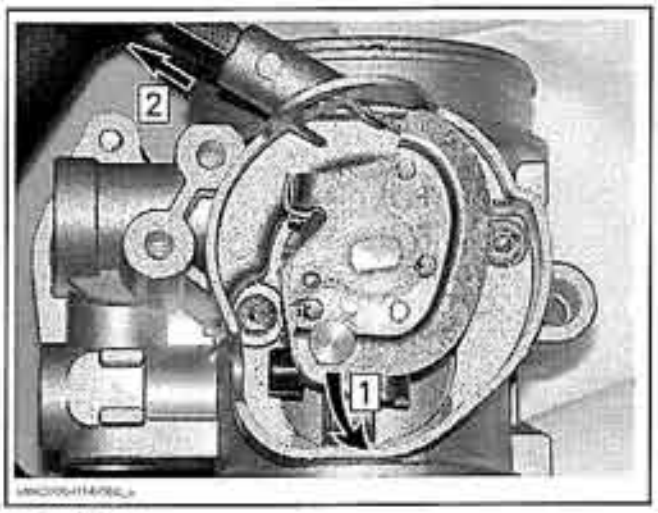


- Detach throttle cable from shifter panel.

- Disconnect TPS and idle bypass valve connectors.
- Detach throttle body from engine/air silencer.



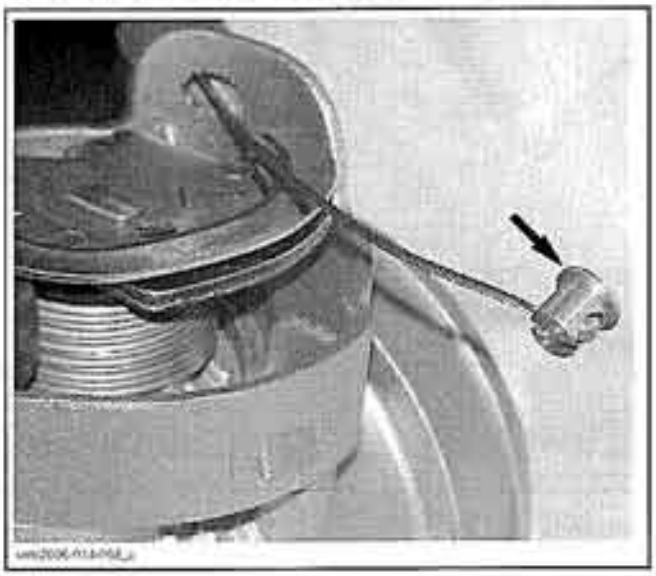
- Gently move throttle body away to detach throttle cable.
- Remove throttle body cover.
- Detach throttle cable.

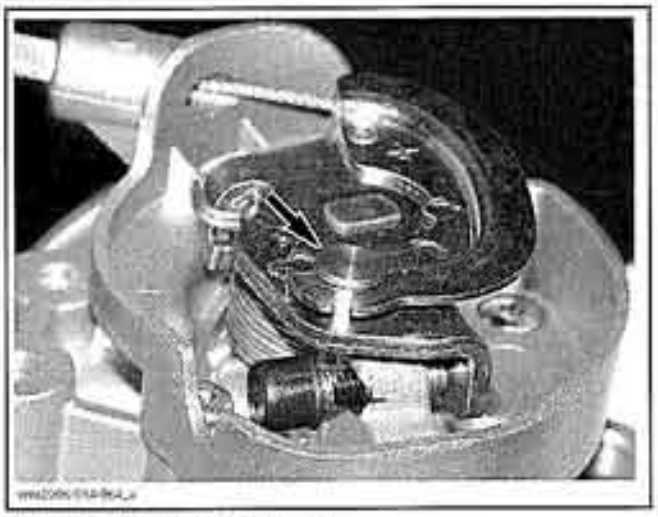


Installation

Installation of the new throttle body is the reverse of the removal procedure. Pay attention for the following details.

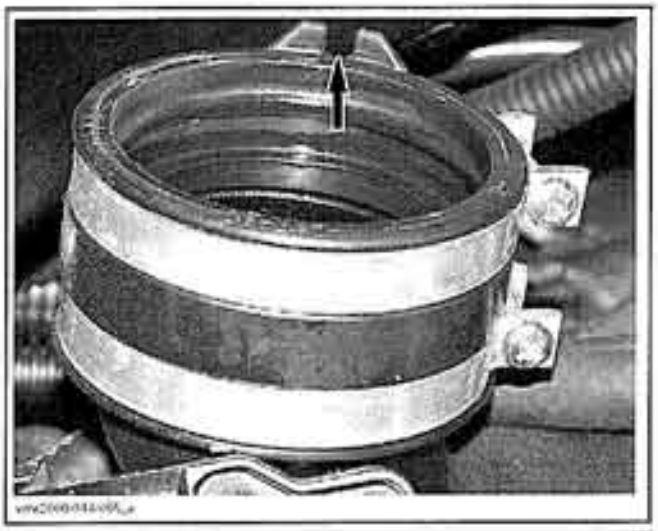
Properly install cable guide to throttle cable end.

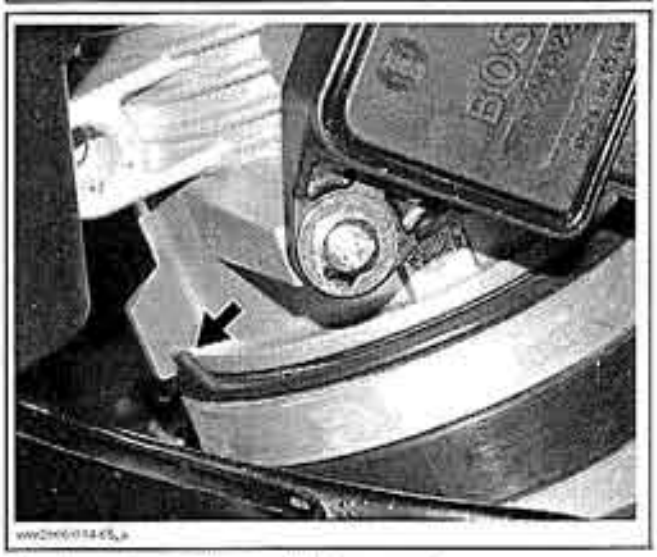




Do not reinstall cover yet.

Install throttle body on intake manifold. Ensure to index throttle body tab with boot notch.





Clip throttle cable to shifter panel.

Gently pull throttle cable toward rear to have a gap between cable and shifter mechanism.

GAP HERE

⚠ WARNING

Ensure shifter mechanism does not touch throttle cable. Depress throttle lever several times to ensure it properly returns.

For TPS and idle bypass valve replacement procedures, refer to the respective paragraph in this section.

Adjustment

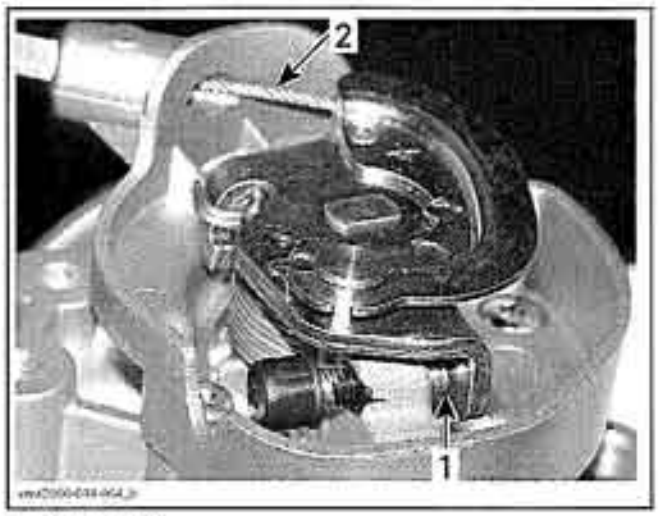
When the throttle body has been replaced, perform throttle cable adjustment (see below) and then the **Closed Throttle and Idle Actuator** reset. Refer to *THROTTLE POSITION SENSOR (TPS)* in this section.

Throttle Cable Adjustment

Mechanically adjust the throttle cable as follows.

Handlebar and throttle cable must be at their normal position. Throttle cable routing must have been performed before adjusting cable.

Activate throttle lever a few times. Make sure throttle cam of throttle body rests against set screw without any tension in the cable.



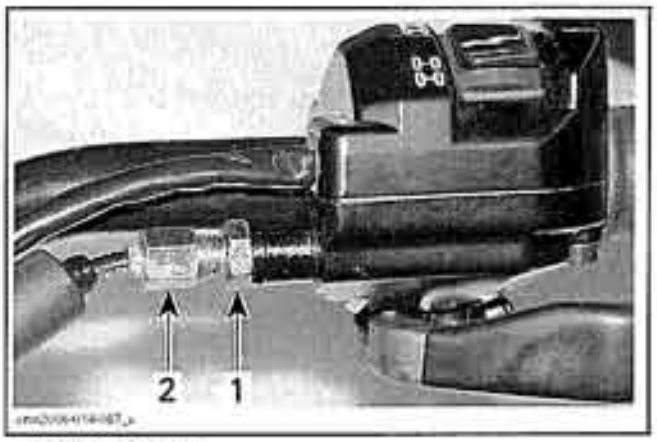
1. Contact here
2. Free-play here

CAUTION: If there is no free-play at idle position, it may cause poor idling and startability problems. Improper cable adjustment will cause strain on cable and/or damage cable bracket or throttle lever at handlebar.

⚠ WARNING

Make sure idle speed stopper contacts throttle cam when throttle lever is fully released at handlebar.

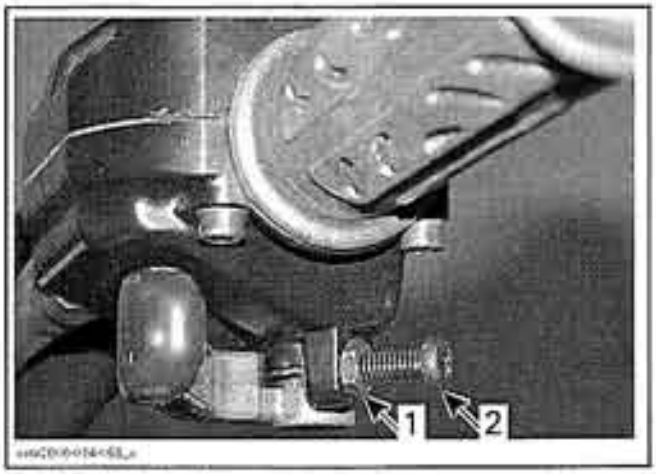
If adjustment is needed, proceed with adjuster at handlebar. Adjust to have 2 mm (.078 in) free-play. When done, slide back cable protector over adjuster.



1. Adjuster lock nut
2. Adjuster

Turn handlebar side to side and ensure there is still free-play in each position.

To ensure there is no strain in the cable at wide open position:



1. Adjuster lock nut
2. Adjuster

– Fully depress throttle lever and hold.

- Slacken adjuster lock nut/adjuster until it just releases lever.
- Turn adjuster clockwise until it touches lever again.
- From there, tighten adjuster 1/2 turn (to remove strain in cable).
- Tighten lock nut.
- Release throttle lever.

Reinstall throttle body cover.

Closed Throttle and Idle Actuator Reset

Perform the **Closed Throttle and Idle Actuator** reset as described in *THROTTLE POSITION SENSOR (TPS)* in this section.

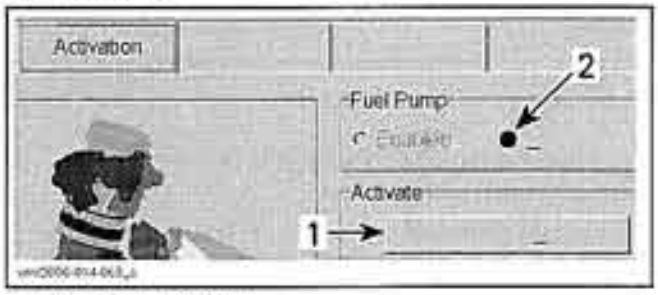
FUEL RAIL

Pressure at fuel rails is supplied and controlled by the fuel pump module. Refer to *FUEL TANK AND FUEL PUMP* for pressure test.

Replacement

Removal

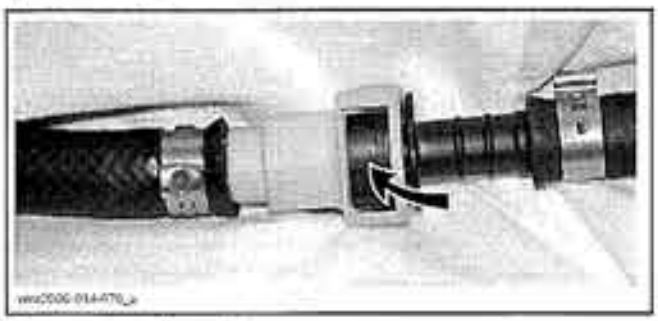
Disable fuel pump using B.U.D.S. Look in the **Activation** tab.



1. Click this button first
2. Ensure Disabled is turned ON

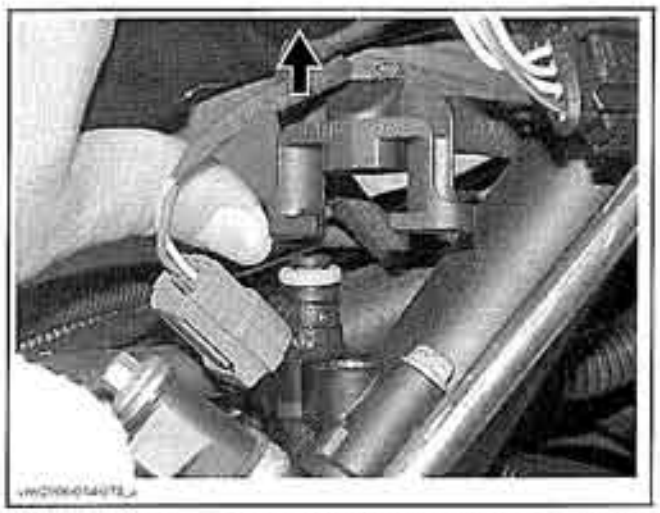
Turn ignition key off.

Wrap a rag around the inlet hose and release the quick fitting.



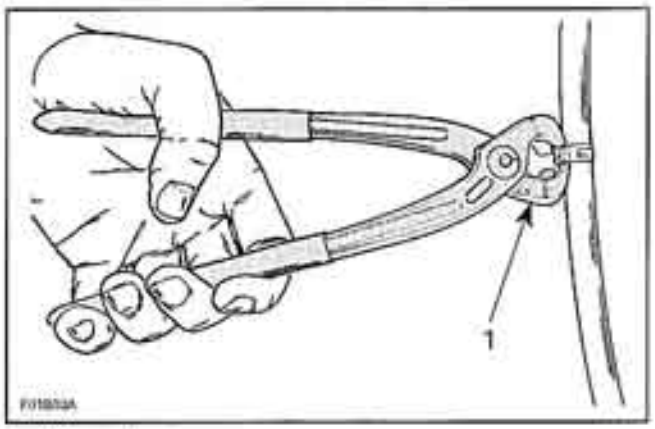
Unscrew rail retaining screws.

Gently pull rail up by hand.



NOTE: If fuel rail is removed purposely to access fuel injector, it is not necessary to cut hose clamp.

To cut clamps on fuel line, use pliers (P/N 295 000 070).



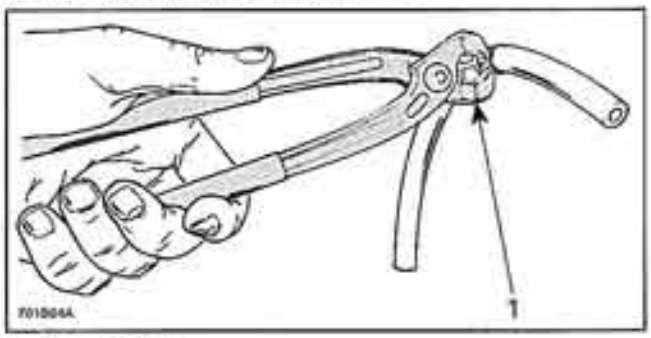
1. Cutting clamp

If necessary remove fuel injector as described below.

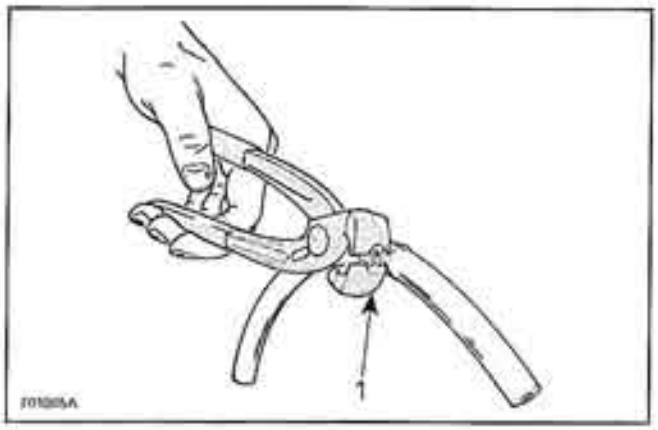
Installation

For installation, reverse the removal process but pay attention to the following.

Install new clamps using pliers.



1. Securing clamp



1. Securing clamp in limited access

A thin film of injection oil should be applied to O-rings of fuel injector to ease installation of fuel rail.

Instal new O-rings.

Install fuel rail and evenly tighten screws a little at a time each side.

Tightening torque of the rail retaining screws is 6 N•m (53 lbf•**in**).

After securing inlet hose at quick fitting, re-enable fuel pump using B.U.D.S.

⚠ WARNING

Perform a fuel pressure test and ensure that there is no leak. Refer to *FUEL TANK AND FUEL PUMP*. Run engine and check for leaks.

FUEL INJECTOR

Leakage Test

The leakage test is validated when performing the "fuel delivery system diagnostic flow chart" in *FUEL TANK AND FUEL PUMP*.

Electrical Test

Voltage Test

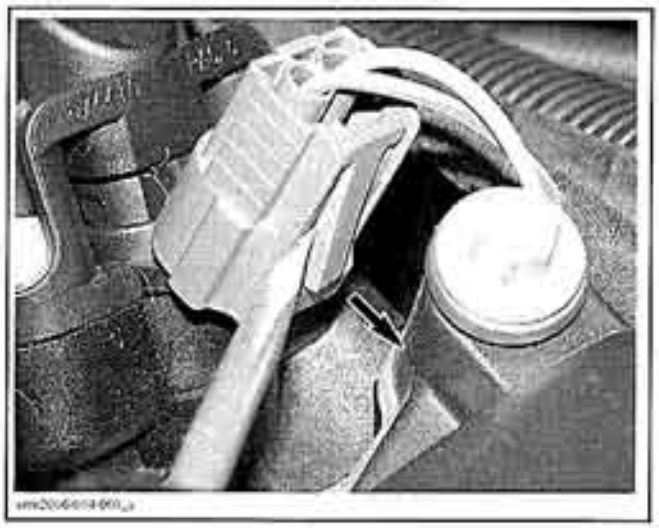
Turn ignition key ON and set engine stop switch to RUN.

Using the Vehicle Communication Kit (VCK) with the B.U.D.S. software, energize the fuel injector from the Activation section.

You should hear the injector working.

If the injector does not work, disconnect the connector from the injector.

NOTE: If connector is hard to unlock, gently use a screwdriver to release connector.



Install a temporary connector to the injector with wires long enough to make the connection outside the engine compartment and apply voltage (12 V) to this test harness.

CAUTION: While doing fuel injector electrical test, do not apply continuous voltage to the connector for more than 10 seconds. This can damage the injector.

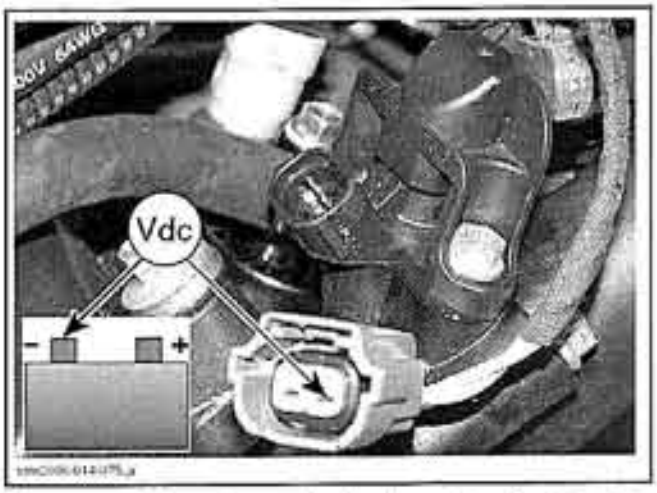
This will validate the injector mechanical and electrical operation.

If it does not work, replace it. If it works, continue procedure.

Using B.U.D.S., probe pins as shown.

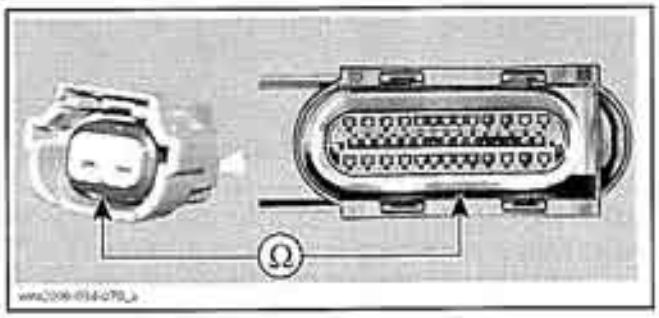
NOTE: It is not necessary to activate the injector since it is continuously powered.

CYLINDER	INJECTOR CONNECTOR WIRE		MEASUREMENT
FRONT	Violet/Blue	Battery ground	12 Vdc
REAR			



If proper voltage is read, check continuity of wires between injector connector and ECM connector A as per table. If it is good, try a new ECM. Otherwise, repair/replace wiring/connector.

INJECTOR	INJECTOR CONNECTOR	ECM CONNECTOR	RESISTANCE @ 20°C (68°F)
FRONT	Brown/Red	A-15	Close to 0 Ω
REAR	Brown/Blue	A-33	



If there is no voltage:

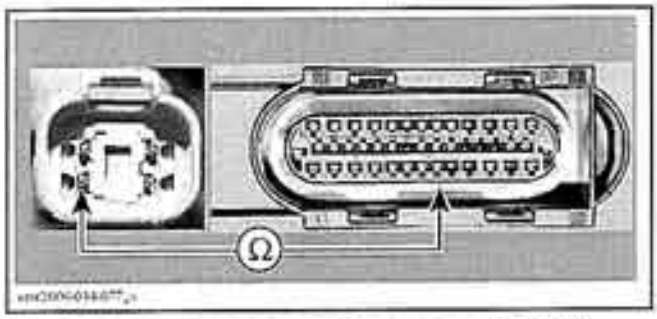
- check fuse F3
- If there is still no voltage to injector, check wiring/connectors from battery to injector. If it is good, try a new ECM.

Resistance Test

Reconnect the injector and disconnect the connector A from the ECM.

Using a multimeter, check resistance value between terminals as follows.

INJECTOR	ENGINE CONNECTOR PIN	ECM CONNECTOR "A"	RESISTANCE @ 20°C (68°F)
FRONT	3	A-15	13.8 - 15.2 Ω
REAR		A-33	



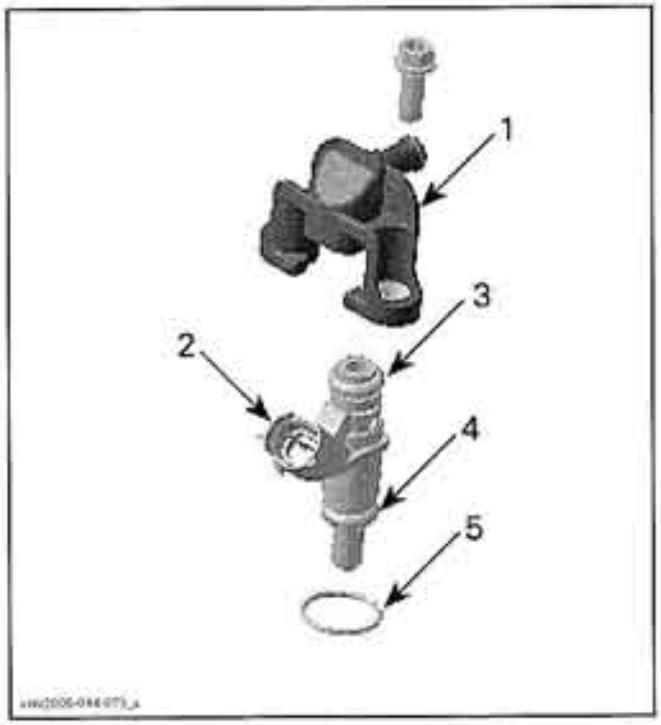
If resistance value is correct, try a new ECM.

If resistance value is incorrect, repair the wiring harness/connectors or replace the wiring harness between ECM plug connector and fuel injector.

Replacement

Removal

Before removing the injector, the fuel rail has to be removed from the engine. Refer to *REMOVAL* in *FUEL RAIL REPLACEMENT* for the procedure.



FUEL RAIL ASS'Y
1. *Fuel rail*
2. *Fuel injector*
3. *Injector top O-ring*
4. *Injector bottom O-ring*
5. *Manifold O-ring*

The fuel injector can be easily pulled out of the fuel rail.

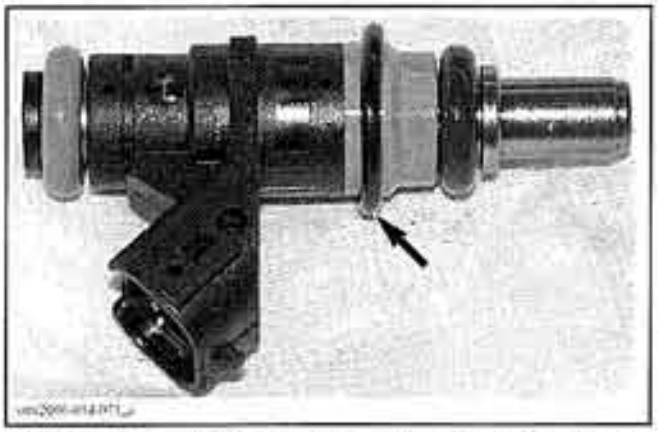
Installation

For the installation, reverse the removal procedure. Pay attention to the following details.

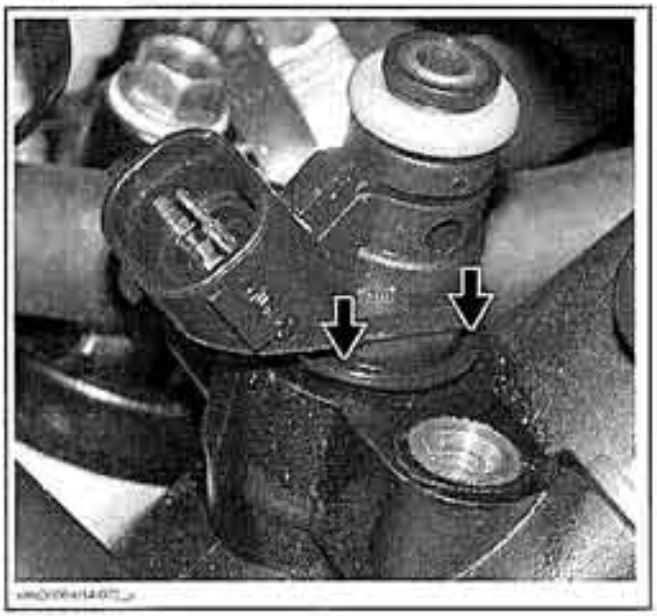
Apply a thin film of engine oil to O-rings to ease insertion in rail.

Install new O-rings, if you reinstall a used injector then insert the fuel injector in place with your hand. Do not use any tool.

Position the manifold O-ring as shown on injector.



Carefully insert injector in fuel rail paying attention to the manifold O-ring. Gently push in evenly all around while inserting injector. O-ring must be completely inserted and not visible, before finishing pushing injector.

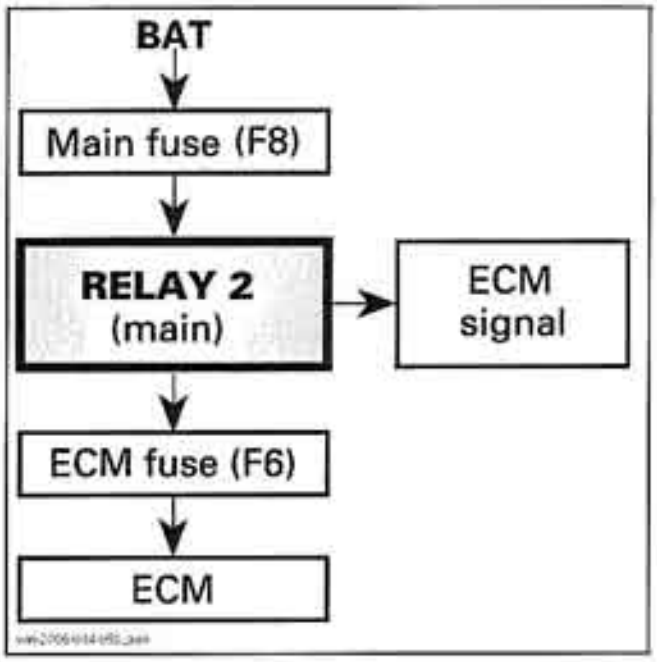


Firmly push injector until it bottoms.

Reinstall fuel rail. See above.

ENGINE CONTROL MODULE (ECM)

Power Supply



Quick indication that ECM is not working (assuming the component itself is working):

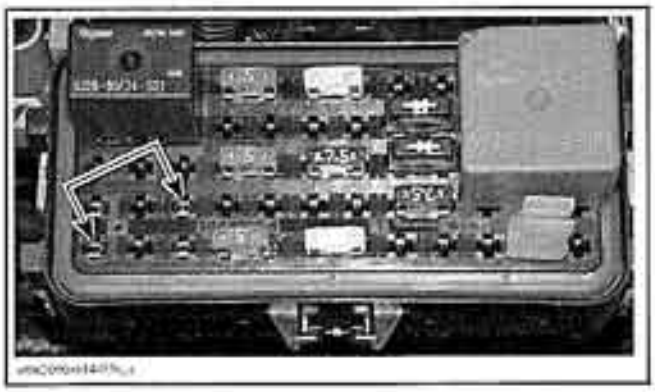
NOTE: Turn ignition key to ON AND set engine stop switch to RUN.

- multi-function speedometer does not turn on.
- Fuel pump does not turn on for approx. 2 seconds (when turning key on and setting engine stop switch RUN).
- Rear light does not turn on.
- Headlamp do not turn on (with ignition key at light position).

If ECM does not turn on, check the following.

Check fuses F8 and F4. If they test good, check relay R2.

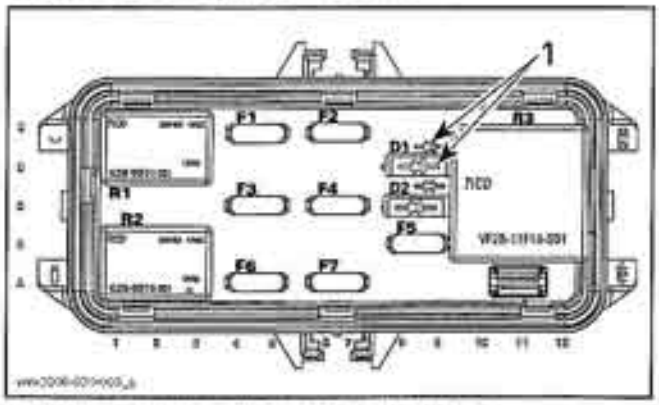
To check relay, remove relay and bypass it with a jumper between terminals as shown.



If ECM is now WORKING, replace relay.

If ECM is NOT working, check diode D1 as follows.

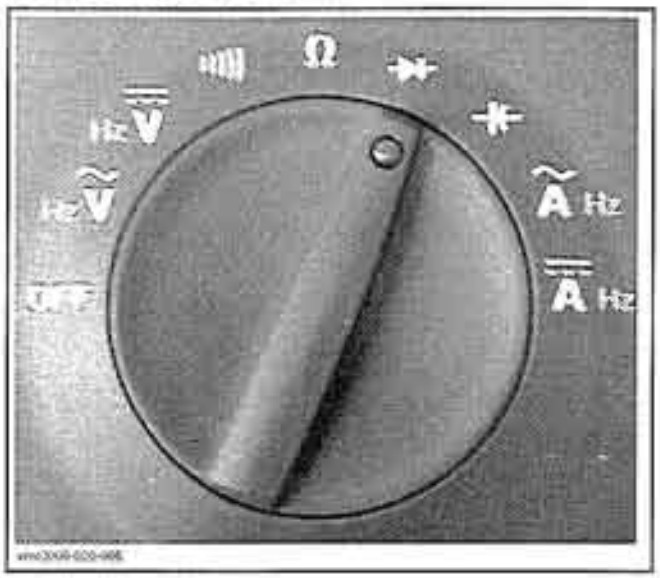
Check diode installation as shown.



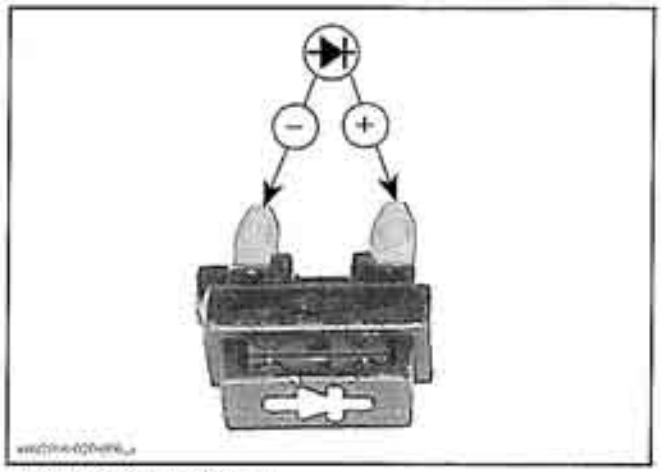
1. Position symbol on diode in same direction as symbol on fuse holder

Remove diode and lay down on a non-metallic table.

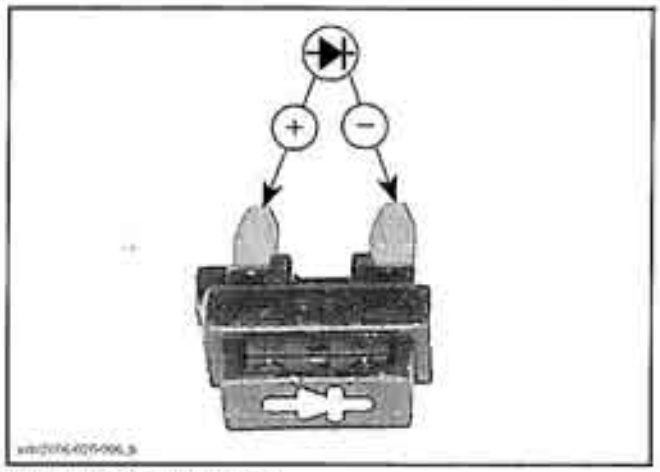
Set multimeter as shown.



Probe diode paying attention to proper polarity.



MUST BE OPEN CIRCUIT



MUST BE AROUND 0.5 V

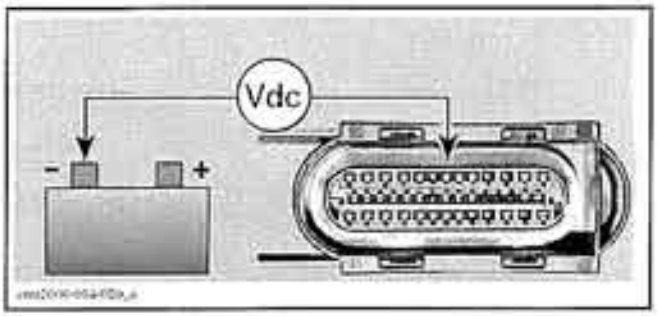
If diode fail any test, replace it.

PROBLEMS RELATED TO DIODE D1	
ECM does not turn on	– Missing diode – Inverted diode installation – Defective diode (open)
ECM does not turn off	– Defective diode (shorted)

Check ignition switch and engine stop switch. Refer to *IGNITION SYSTEM*.

If ECM still does not work, disconnect ECM connector B and measure voltage as follows.

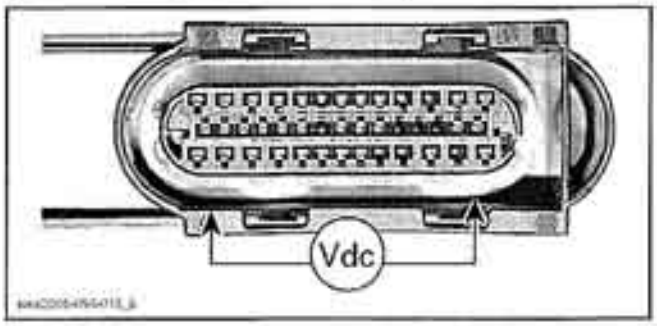
ECM B CONNECTOR		MEASUREMENT
PIN		VOLTAGE
B-11	Battery ground	12 Vdc



If voltage is not appropriate, check wiring/connectors from battery to ECM.

If voltage is adequate, measure voltage as follows.

ECM B CONNECTOR		MEASUREMENT
PIN		VOLTAGE
B-1	B-11	12 Vdc



If voltage is adequate, try a new ECM.

If voltage is not appropriate, check wiring continuity from ECM (B1) to battery ground.

Replacement

Prior to replacing a possibly faulty ECM, ensure that all the recommendations in the general introduction of this section have been carried out.

IMPORTANT: When the ECM is replaced, the ignition key(s) and the **Closed Throttle and Idle Actuator** must be reprogrammed/reset. Refer to their specific section for adjustment.

To allow transferring the previous recorded information from the old ECM to the new one, use the Vehicle Communication Kit (VCK) with the B.U.D.S. software. Use **Replace** ECM in the ECM menu. Follow instructions in its help system.

NOTE: If the old ECM still works, its information must be read by B.U.D.S. before being removed from the vehicle in order to transfer vehicle information and history to the new ECM.

Disconnect battery cables.

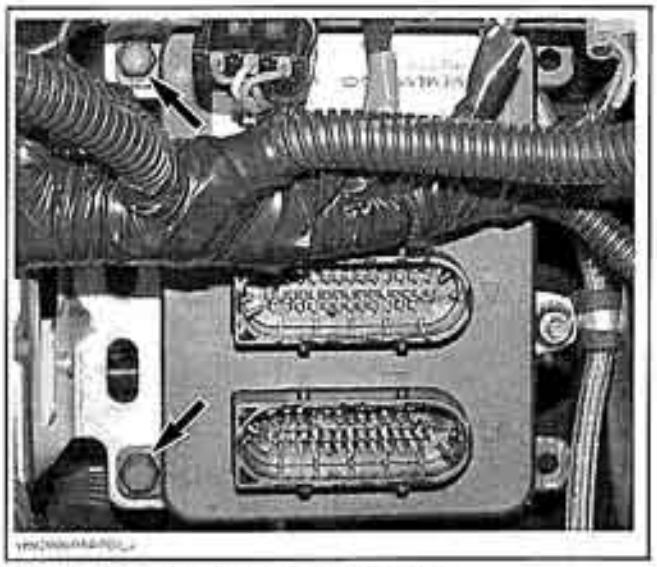
⚠ WARNING

Battery BLACK negative cable must always be disconnected first and connected last.

Remove center panel and dashboard. Refer to *BODY*.

Disconnect both connectors from ECM.

Unscrew retaining screws and remove the ECM from vehicle.

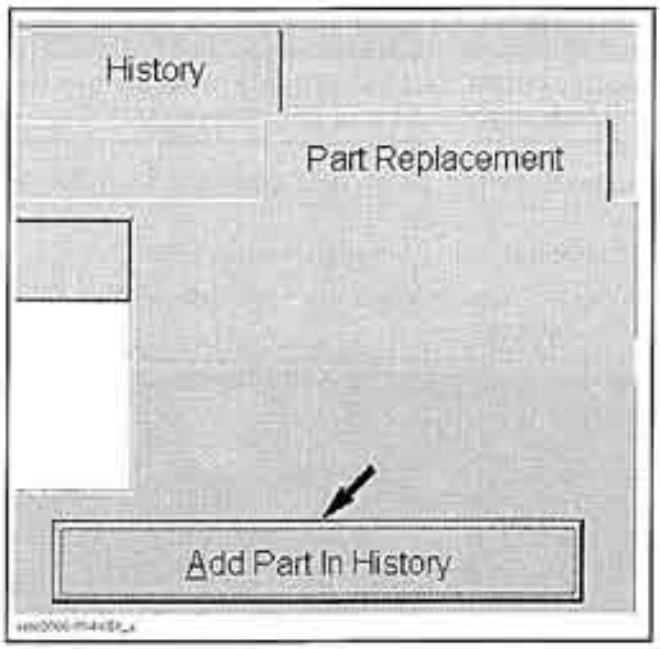


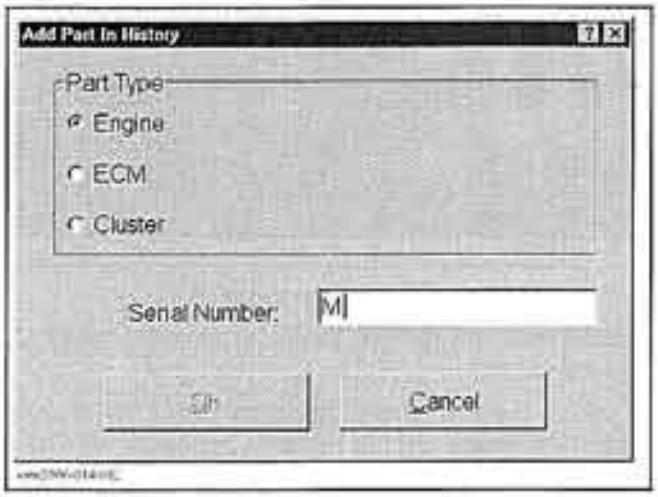
Install the new ECM to the vehicle.

Reconnect connectors to ECM, and then battery cables.

Transfer the data from the previous ECM to the new one using B.U.D.S. then proceed with the required resets and reprogram ignition key(s), if you were unable to transfer the data.

NOTE: If data cannot be transferred, manually enter information in **Vehicle** tab and **Engine serial number** in **History**, **Part replacement**.



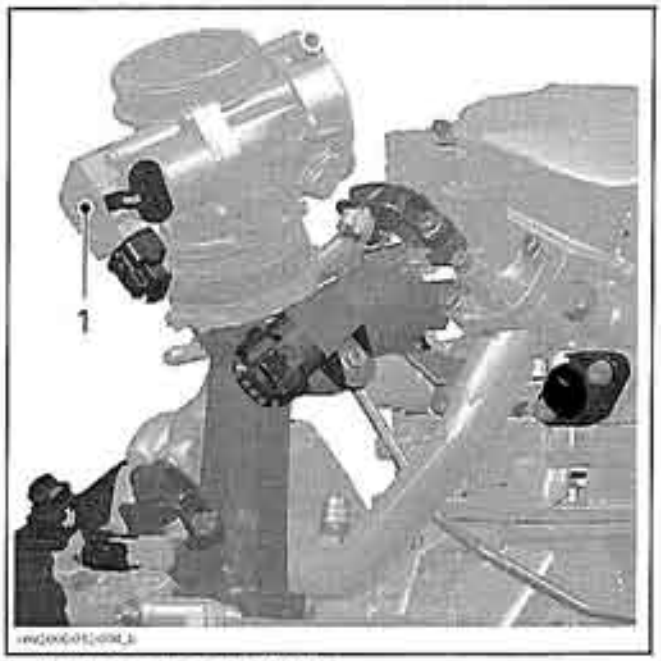


After performing the required resets, ensure to clear all faults from the newly replaced ECM.

THROTTLE POSITION SENSOR (TPS)

General

The throttle position sensor (TPS) is a potentiometer that sends a signal to the ECM which is proportional to the throttle shaft angle.



1. Throttle position sensor (TPS)

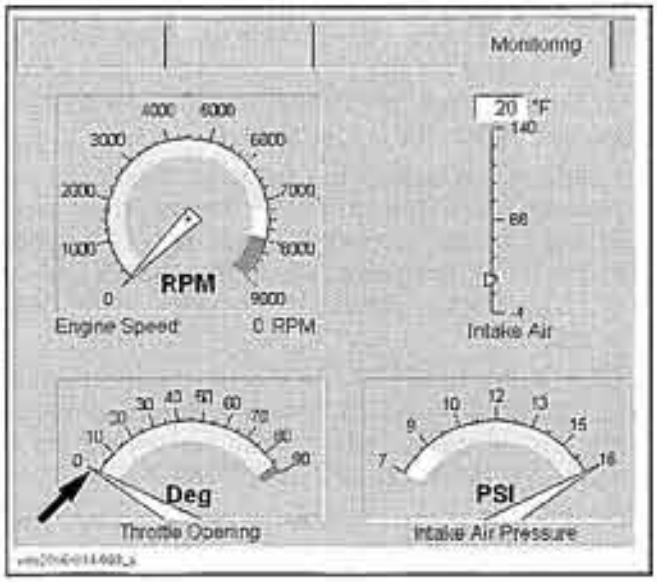
IMPORTANT: Prior to testing the TPS, ensure that mechanical components/adjustments of throttle body are adequate.

The EMS may generate several fault codes pertaining to the TPS. Refer to *DIAGNOSTIC PROCEDURES* section for more information.

Wear Test

While engine is not running, activate throttle and pay attention for smooth operation without physical stops of the cable.

Using the Vehicle Communication Kit (VCK) with the B.U.D.S. software, use the **Throttle Opening** display under **Monitoring**.



Slowly and regularly depress the throttle. Observe the needle movement. It must change gradually and regularly as you move the throttle. If the needle "sticks", bounces, suddenly drops or if any discrepancy between the throttle movement and the needle movement is noticed, it indicates that the TPS needs to be replaced or the computer used may be too slow to transfer data fast enough for real time display.

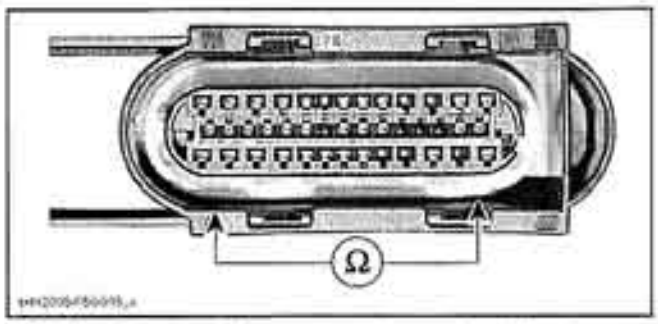
Resistance Test

Ensure TPS is connected to wiring harness.

Disconnect the A connector from the ECM.

Using a multimeter, check resistance values on ECM connector as per the following table.

ECM CONNECTOR		THROTTLE IDLE POSITION	WIDE OPEN THROTTLE POSITION
PIN		RESISTANCE Ω @ 20°C (68°F)	
A-24	A-25	710 - 1300	2600 - 2700
A-25	A-39	1600 - 2400	1600 - 2400
A-24	A-39	2600 - 2700	710 - 1300



NOTE: The resistance value should change smoothly and proportionally to throttle movement. Otherwise, replace TPS.

If resistance values are correct, perform the *VOLTAGE TEST* below.

If resistance values are incorrect, check wiring harness. If wiring is faulty, repair/replace. If wiring is good, replace TPS.

Reconnect ECM connector.

Voltage Test

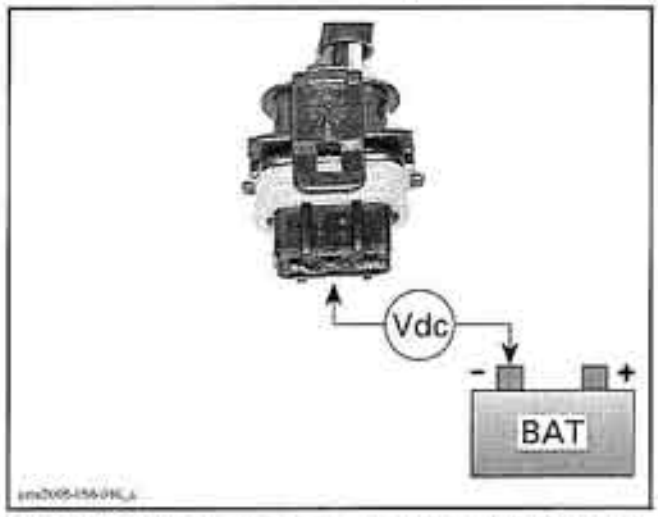
Check the ECM voltage output to the TPS.

Disconnect connector from TPS.

Turn ignition key ON and set engine stop switch to RUN.

Check the voltage readings from harness connector as follows.

CONNECTION	VOLTAGE
Pin 1 with battery ground	5.0 V
Pin 2 with battery ground	0 V
Pin 3 with battery ground	4.75 - 5 V



If voltage test is not good, check/repair wiring harness. If wiring tests good, try a new ECM.

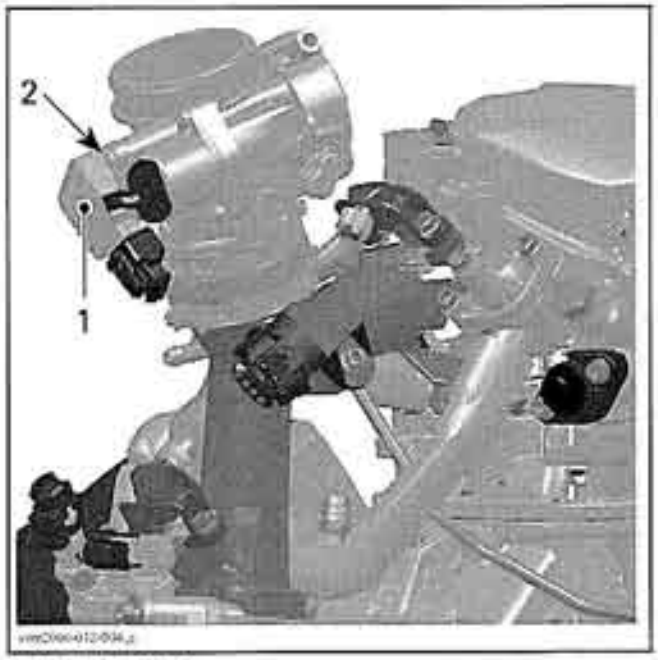
If voltage test is good, everything is in order (assuming resistance test was performed).

Replacement

Remove center panel and dashboard. Refer to *BODY*.

Loosen two screws retaining the TPS.

Remove TPS.



THROTTLE BODY
1. *Throttle position sensor (TPS)*
2. *Screws*

Install the new TPS.

Apply Loctite 243 (P/N 293 800 060) on the TPS retaining screws, then torque to 3 N•m (27 lbf•**in**).

Reinstall remaining removed parts.

Proceed with the *CLOSED THROTTLE AND IDLE ACTUATOR RESET*. See below.

Closed Throttle and Idle Actuator Reset

NOTE: This operation performs a reset of the values in the ECM.

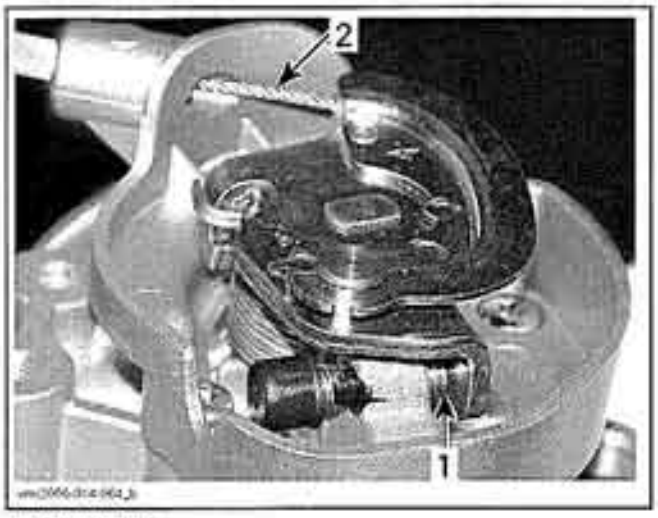
This reset is very important. The setting of the TPS will determine the basic parameters for all fuel mapping and several ECM calculations and the setting of the idle bypass valve will determine the basic parameters for the idle speed control of the engine.

NOTE: Reset must be done each time the throttle position sensor (TPS) is loosened or removed or throttle body is replaced or ECM is replaced.

CAUTION: An improperly set TPS or idle bypass valve may lead to poor engine performance and emission compliance could possibly be affected. In addition, improper idle bypass valve reset may lead to poor engine starting, improper idle (too low or too high) and engine stop on deceleration.

Use the Vehicle Communication Kit (VCK) with the B.U.D.S. software to perform this adjustment.

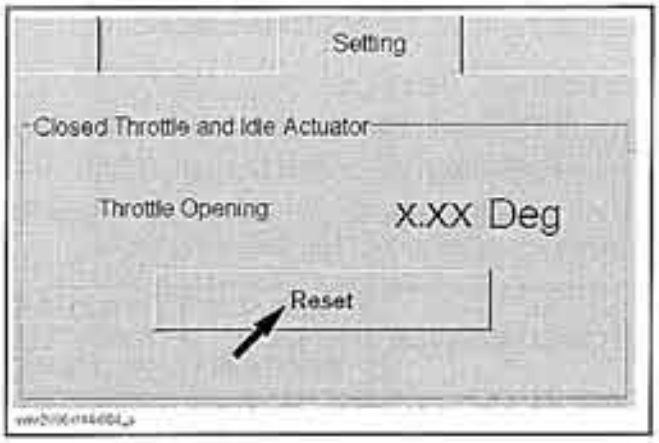
Remove throttle body cap and ensure the throttle cam of throttle body rests against set screw without any tension in the cable.



1. Contact here
2. Free-play here

Open throttle approximately one quarter then quickly release. Repeat 2 - 3 times to settle throttle plate. If stopper does not rest against its stop lever, perform throttle cable adjustment. Refer to *THROTTLE BODY* in this section.

To reset valve and TPS, click on the **Reset** button in the **Setting** section of B.U.D.S.



NOTE: No message will be displayed if operation is successful. If operation is wrong, an error message will be displayed.

NOTE: There is no idle speed adjustment to perform. The ECM takes care of that. If TPS is not within the allowed range while resetting the **Closed Throttle and Idle Actuator**, the ECM will generate a fault code and will not accept the setting.

Start engine and make sure it operates normally through its full engine RPM range. If fault codes appear, refer to *SYSTEM FAULT CODES* in the *DIAGNOSTIC PROCEDURES* section for more information.

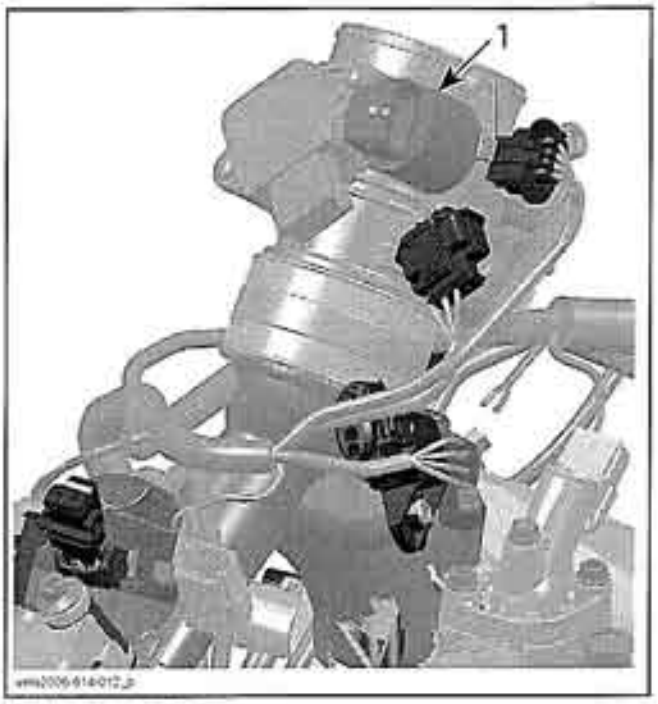
IDLE BYPASS VALVE

An idle bypass valve with good resistance measurement can still be faulty. It is also possible that a mechanical failure occurs which is not detectable without measuring the air flow. Replacing the idle bypass valve may be necessary as a test.

Resistance Test

Disconnect idle bypass valve from the wiring harness.

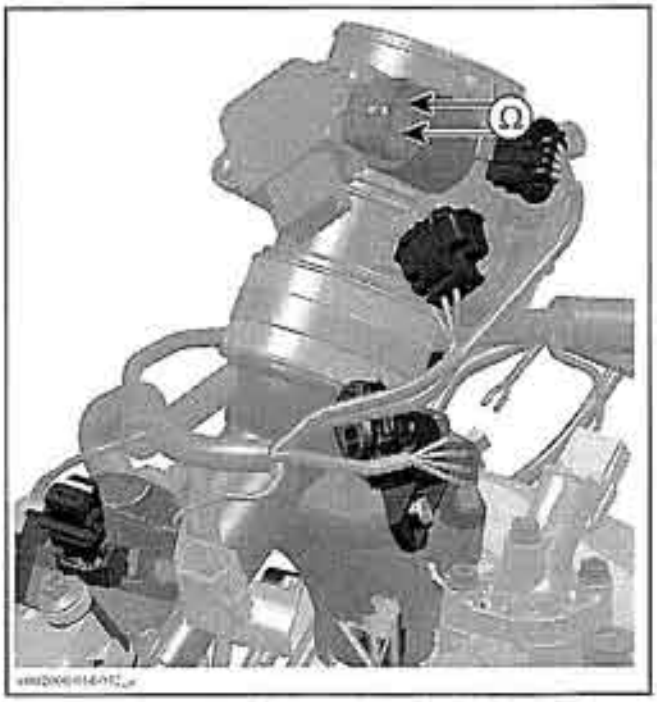
Using a multimeter, check the resistance in both windings.



1. Idle bypass valve

Check the resistance between pins as shown.

IDLE BYPASS VALVE		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
1	4	50
2	3	



If the resistance of one or both windings is not good, replace the idle bypass valve.

If resistance test of valve windings is good, check continuity of circuits A-35, A-36, A-37, A-38. If not good, check/repair wiring/connectors.

Visual Inspection

NOTE: Make sure the ignition key is turned off during the following procedure.

Remove idle bypass valve from throttle body.

Check the piston and bypass channel for dirt/deposits which can cause a sticking piston.

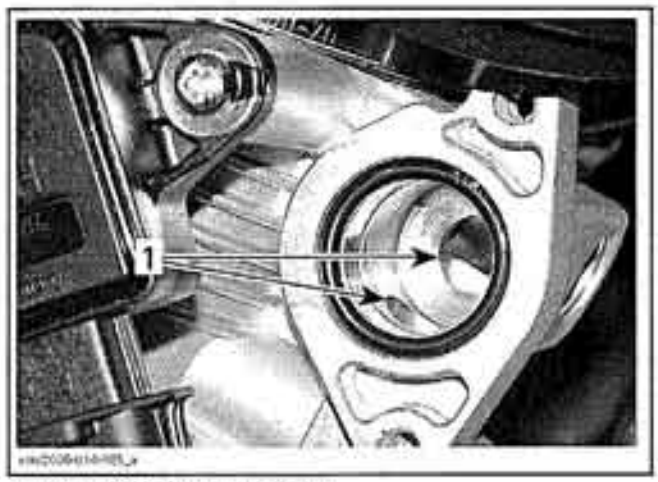
CAUTION: Always keep the ignition key turned OFF, while the idle bypass valve is removed.

CAUTION: Do not try to operate the piston of the idle bypass valve when it is dismounted. Also do not move the piston by hand. The drive screw is very sensitive and may be destroyed.

Using a part cleaner, clean idle bypass in throttle body from contamination then use an air gun to dry it.

⚠ WARNING

Always wear eye protector. Chemicals can cause a rash break out and injure your eyes.

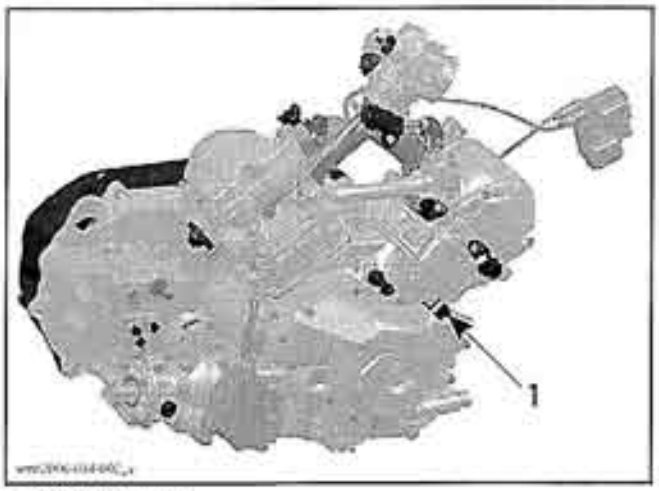


1. Clean bore from contamination

Clean all remaining parts and install the idle bypass valve on the throttle body.

Proceed with the *CLOSED THROTTLE AND IDLE ACTUATOR RESET*. See above.

CRANKSHAFT POSITION SENSOR (CPS)

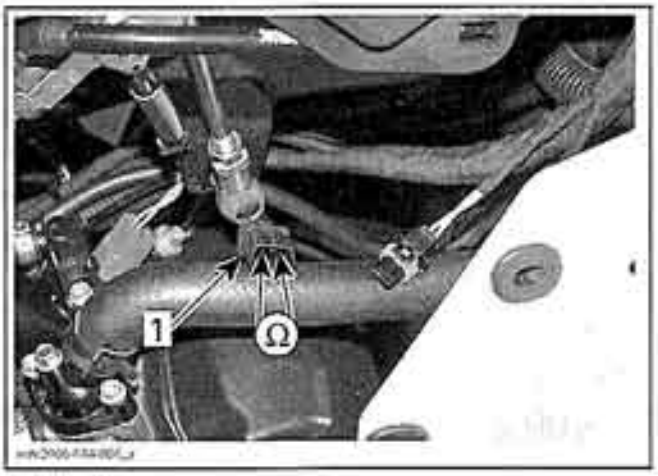


1. CPS connector

NOTE: Take into account that a CPS fault can be triggered by bent or missing encoder wheel teeth. First check fault codes (refer to *DIAGNOSTIC PROCEDURES*) then check the teeth condition if necessary (refer to *MAGNETO SYSTEM*).

Disconnect CPS wiring harness connector. Probe terminals while cranking, as shown.

CPS CONNECTOR		MEASUREMENT
PIN		VOLTAGE
1	2	2.3 Vac



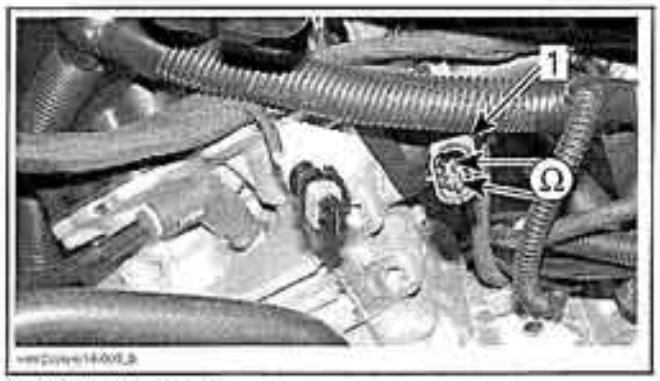
RH SIDE OF VEHICLE
1. CPS connector

If voltage is not within specifications, inspect wiring and replace CPS if wiring is good.

Resistance Test

Disconnect CPS wiring harness connector. Probe terminals as shown.

CPS CONNECTOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
1	2	700 - 900 Ω



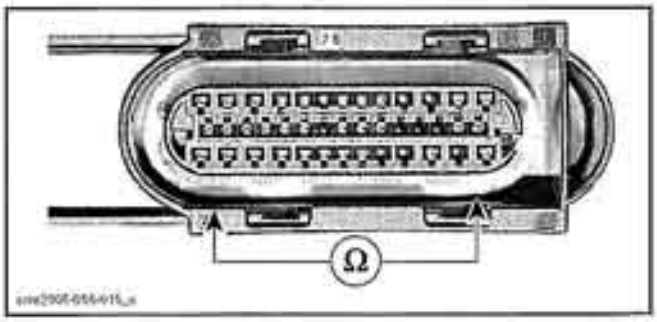
LH SIDE OF VEHICLE
1. CPS connector

If resistance is not within specifications, replace the CPS.

If resistance tests good, reconnect the CPS connector and disconnect the connector A on the ECM.

Using a multimeter, recheck resistance as per table.

ECM CONNECTOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
A-5	A-19	700 - 900 Ω

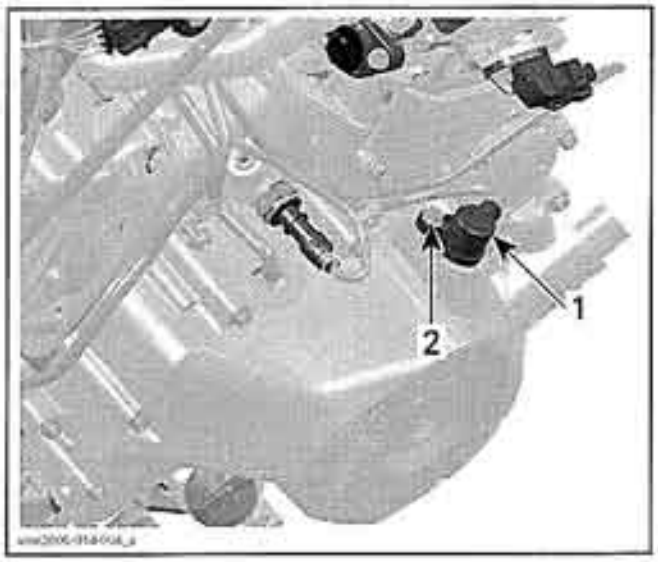


If resistance value is correct, try a new ECM. Refer to *ECM REPLACEMENT* procedures elsewhere in this section.

If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the CPS.

Replacement

Unplug connector and remove CPS.

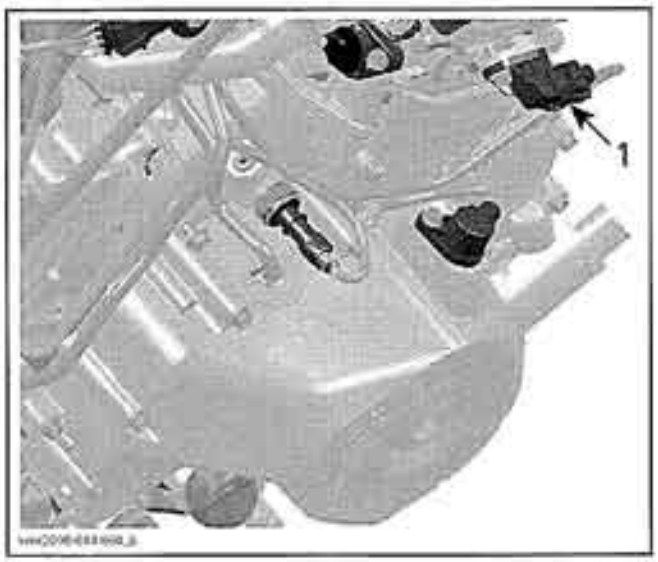


1. CPS
2. Retaining screw

Install new CPS and secure harness with a locking tie.

Tightening torque of the CPS retaining screws is 10 N•m (89 lbf•**in**).

CAMSHAFT POSITION SENSOR (CAPS)



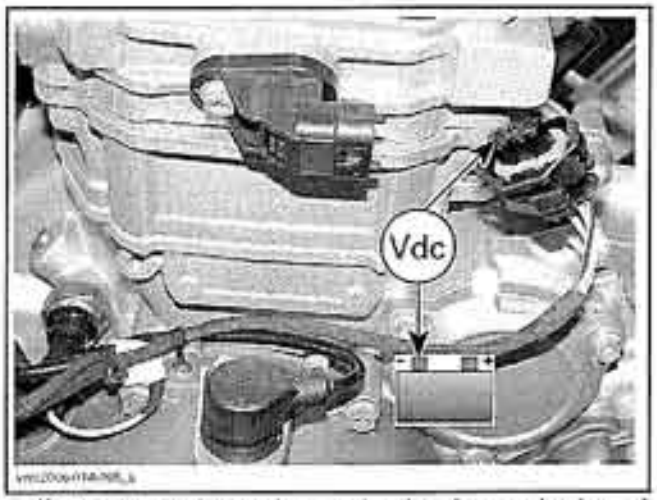
1. CAPS

Voltage Test

Turn ignition key ON and set engine stop switch to RUN.

Disconnect CAPS wiring harness connector. Probe terminals as shown.

CAPS CONNECTOR		MEASUREMENT
PIN		VOLTAGE
3	Battery ground	12 Vdc

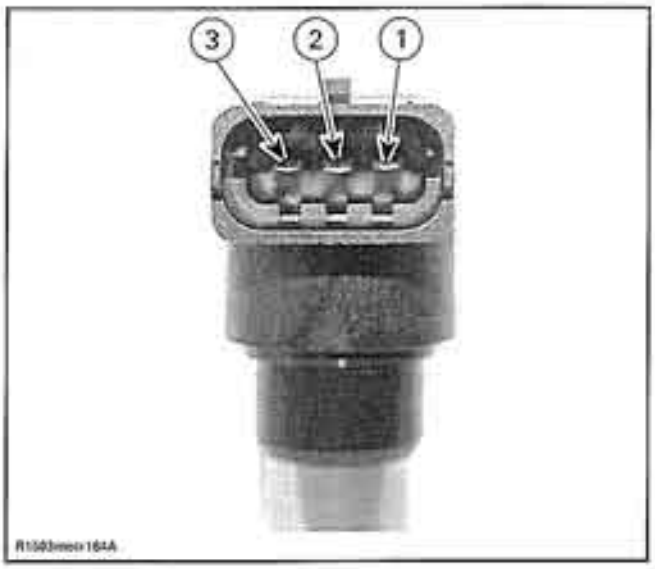


- If proper voltage is read, check continuity of circuits A-20 and A-34.
- If circuits test is good, perform the CAPS voltage test as explained below. If CAPS tests good, try a new ECM.
- If proper voltage is not read, check supply circuit (pin 3 of CAPS connector) fuse (F4), relay and wiring condition. If it still does not work, try a new ECM.

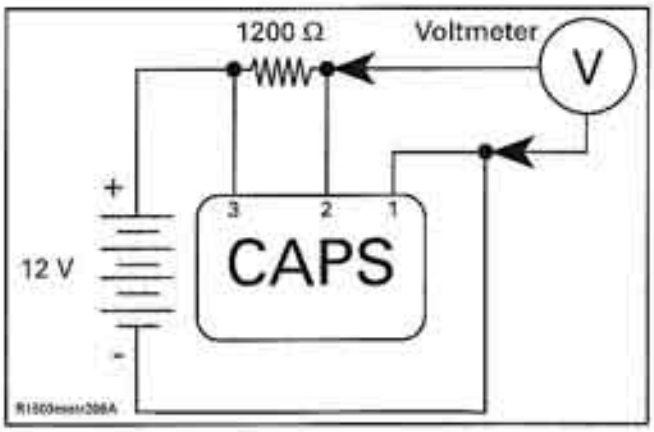
CAPS Test Setup

Remove the CAPS from the cylinder head.

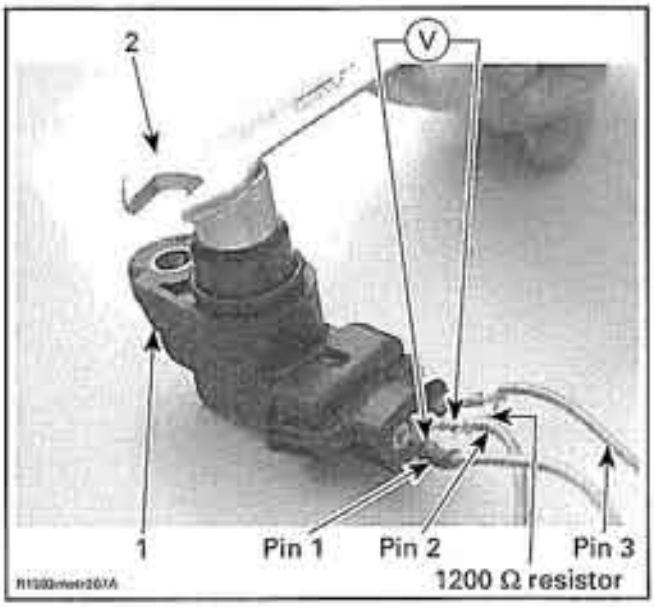
Set up the following electric circuit to perform the voltage test.



CAPS PIN-OUT



Touch the CAPS with a conductor (ex.: screwdriver) and look if the voltage at the multimeter switches from 12 V to less than 1 V.

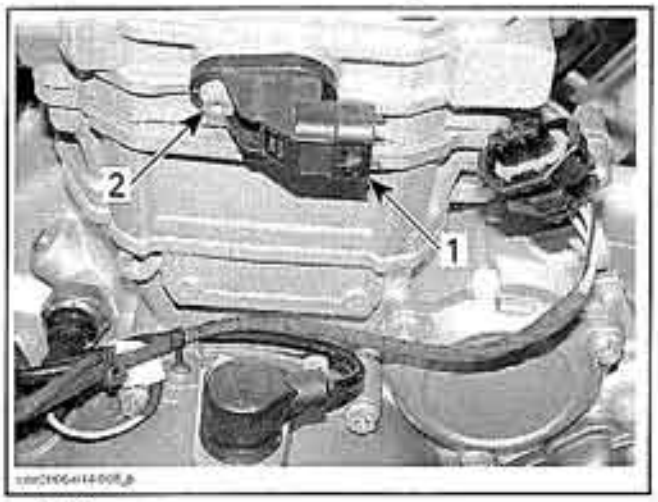


1. CAPS
2. Conductor

If the voltage is not good, replace the CAPS.

Replacement

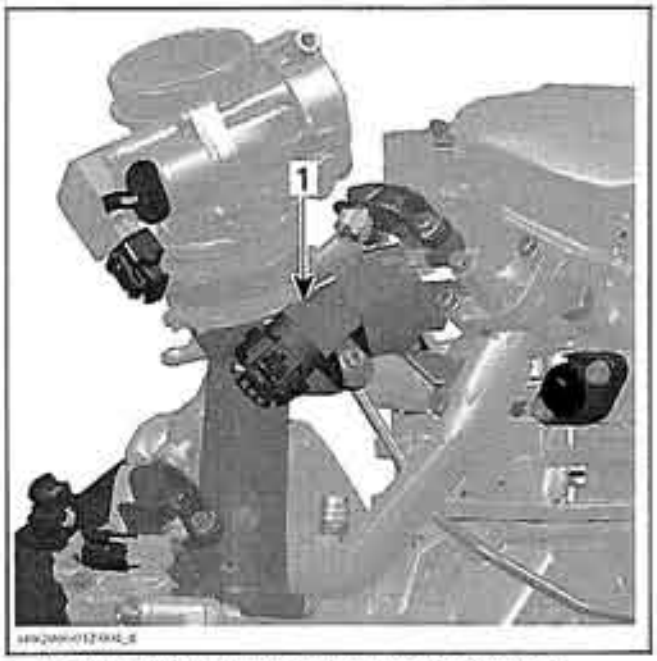
Unscrew the retaining screw and replace the CAPS. Ensure to reinstall O-ring.



1. CAPS
2. Retaining screw

Apply Loctite 243 (P/N 293 800 060) on thread and torque to 10 N•m (89 lbf•**in**).

MANIFOLD AIR PRESSURE AND TEMPERATURE SENSOR (MAPTS)



1. Manifold air pressure and temperature sensor (MAPTS)

NOTE: This sensor is a multi-function device.

Pressure Sensor Function

When engine is started and it runs at idle speed, the sensor takes the atmospheric pressure and stores it in the ECM. Thereafter, it takes the manifold air pressure at operating RPMs.

Ensure sensor is correctly installed on intake manifold. Otherwise, the MAPTS could generate a fault code for an unexpected sensor range at idle when it reads the atmospheric pressure. Remove sensor and check for oil or dirt on its end and if problem persists, check throttle plate condition/position and the wiring harness. Perform the following tests.

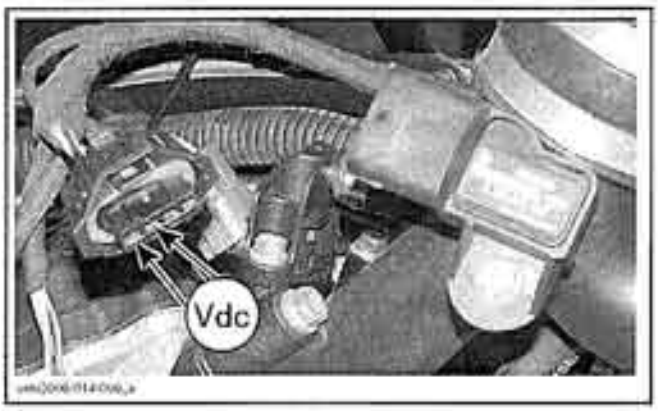
Voltage Test

Check the voltage output from ECM to the pressure sensor.

Turn ignition key ON and set engine stop switch to RUN.

Disconnect plug connector from MAPTS and connect a voltmeter as shown.

MAPTS CONNECTOR		MEASUREMENT
PIN		VOLTAGE
1	3	5 Vdc



If voltage test is good, replace the MAPTS.

If voltage test is not good, check the continuity of the MAPTS circuit. See below.

Resistance Test

Disconnect the connector A from the ECM.

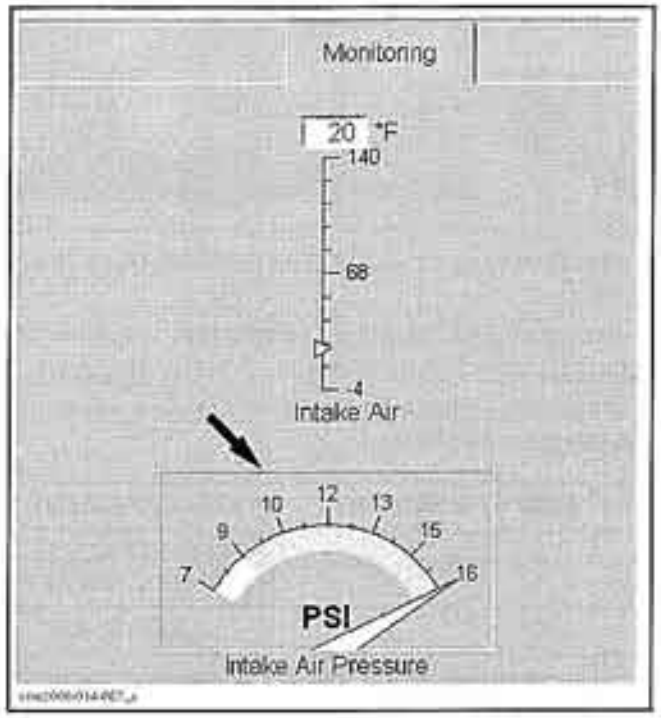
Using a multimeter, check continuity of circuits 12, 28 and 40.

If wiring harness is good, try a new ECM. Refer to *ECM REPLACEMENT* procedures elsewhere in this section.

Otherwise, repair the connectors or replace the wiring harness between ECM connector and the MAPTS.

Quick Test

Using VCK, look the MAPTS from the *MONITORING* section and read out the pressure value while engine is stopped.



Perform the same test with a new MAPTS and compare both readings.

Values have to be within ± 3.4 kPa (0.5 PSI).

If old MAPTS's value is out of this range, replace it.

Temperature Sensor Function

The sensor also monitors the temperature at manifold.

Resistance Test

Disconnect the connector from the MAPTS.

Using a multimeter, check the resistance of the sensor itself as shown.

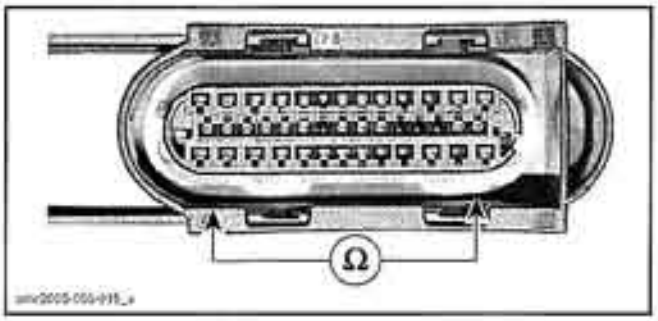
MAPTS		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
1	2	2280 - 2740

If resistance is not within specification, replace the MAPTS.

If resistance tests good, reconnect the MAPTS and disconnect the connector A from the ECM.

Using a multimeter, recheck resistance value between pins as shown.

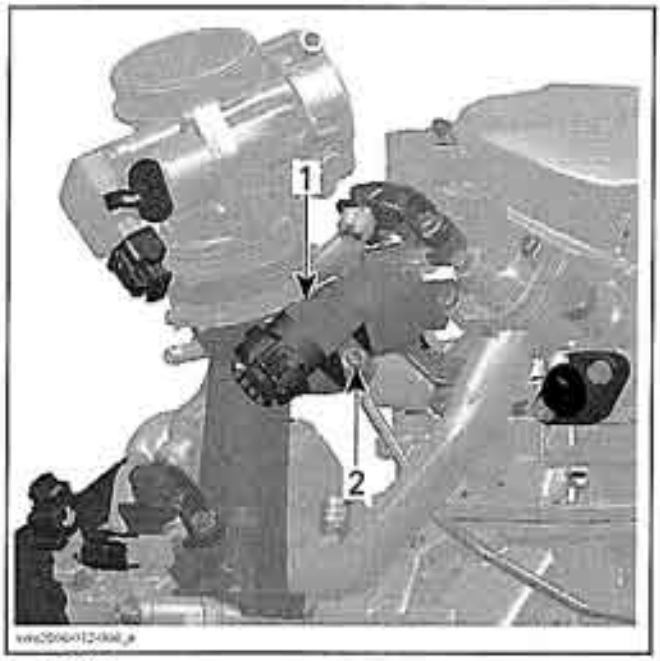
ECM CONNECTOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
A-7	A-28	2280 - 2740



If resistance value is correct, try a new ECM. Refer to *ECM REPLACEMENT* procedures elsewhere in this section.

If resistance value is incorrect, inspect/repair/replace wiring harness between ECM connector and the MAPTS.

Replacement

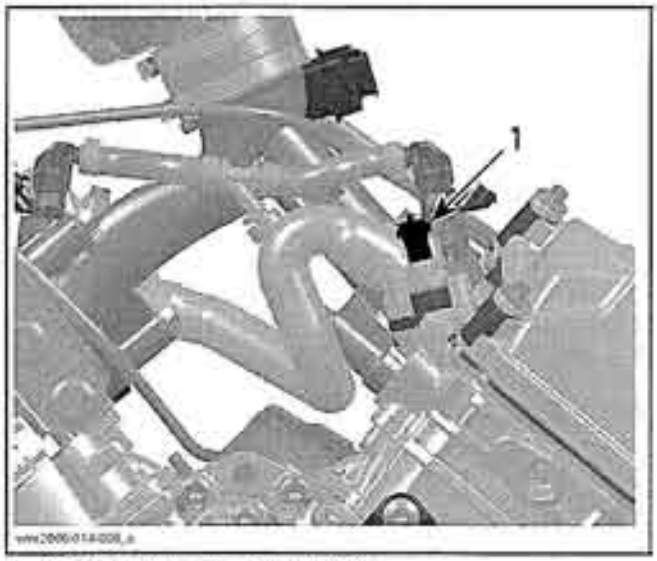


1. MAPTS
2. Retaining screw

Disconnect MAPTS connector and remove the MAPTS.

Apply Loctite 243 (P/N 293 800 060) on screw then torque to 6 N•m (53 lbf•**in**).

COOLANT TEMPERATURE SENSOR (CTS)

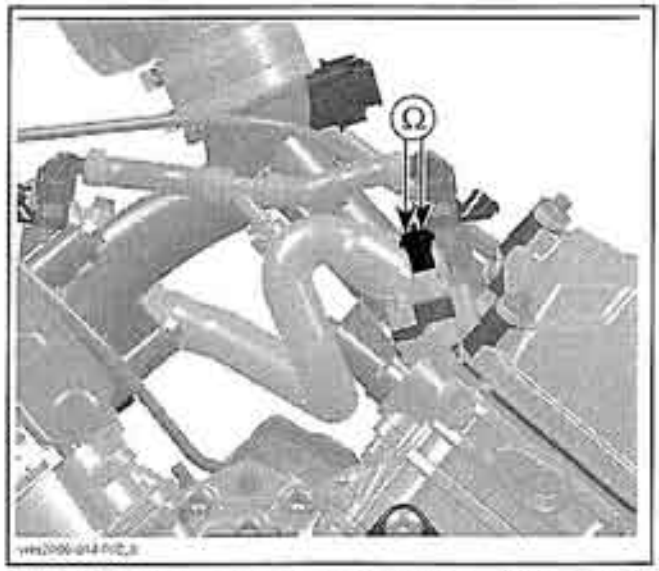


1. Coolant temperature sensor (CTS)

Resistance Test

Disconnect the plug connector from the CTS and check the resistance of the sensor itself.

CTS SENSOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
1	2	2280 - 2740

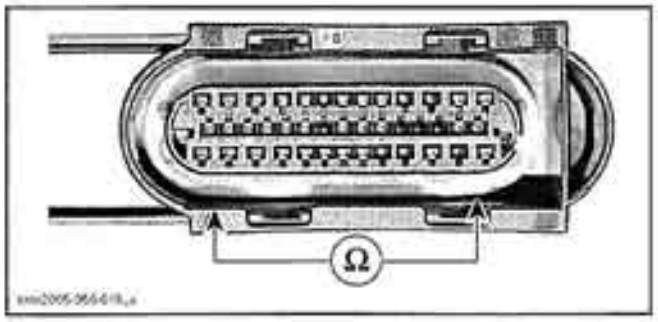


If resistance is out of specification, replace the CTS.

If resistance tests good,reconnect the CTS and disconnect the ECM connector A from the ECM.

Using a multimeter, recheck resistance on the ECM connector as per table.

ECM CONNECTOR		MEASUREMENT
PIN		RESISTANCE Ω @ 20°C (68°F)
A–11	A-27	2280 - 2736



If resistance value is correct, try a new ECM. Refer to *ECM REPLACEMENT* procedures elsewhere in this section.

If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the CTS.

Replacement

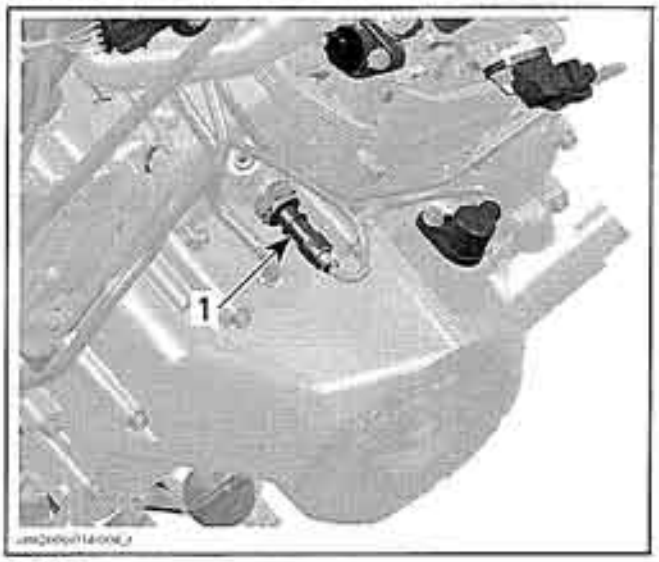
Disconnect CTS connector and remove CTS.

Install the new CTS and torque to 16 N•m (141 lbf•**in**).

Reinstall remaining removed parts.

Refill and bleed the cooling system, refer to *COOLING SYSTEM* subsection.

OIL PRESSURE SWITCH (OPS)



1. OPS

Oil Pressure Test

To check the function of the oil pressure switch, an oil pressure test has to be performed. Refer to *OIL PRESSURE TEST* in *LUBRICATION SYSTEM* section.

If the engine oil pressure is out of specifications, check the points described in *TROUBLESHOOTING* section.

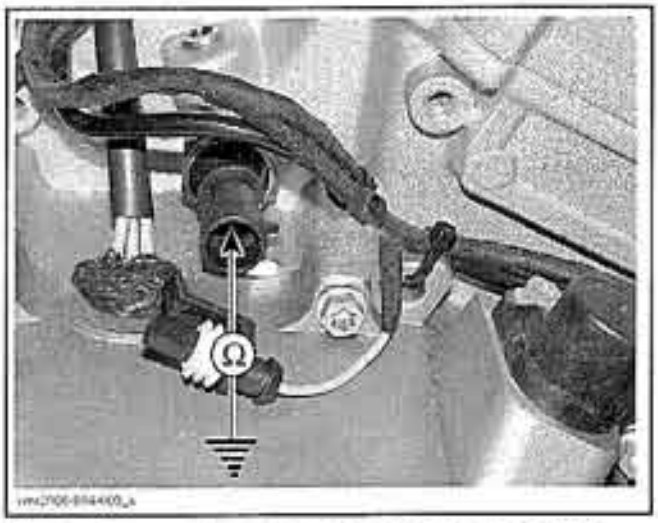
If the engine oil pressure is good, check the resistance of the OPS while engine is off and while engine is running.

Resistance Test

Disconnect the connector from the OPS.

Use a multimeter to check the resistance between as shown.

OPS CONNECTOR		ENGINE NOT RUNNING	ENGINE RUNNING
PIN		RESISTANCE (Ω)	
1	Engine ground	Close to 0 Ω (normally closed switch)	Infinitely high when pressure reaches 20 - 40 kPa (2.9 - 5.8 PSI)



If resistance values are incorrect, replace OPS.

If the values are correct, check the continuity of the wiring harness.

Disconnect the connector A from the ECM and check continuity of circuit 10.

If wiring harness is good, try a new ECM. Refer to *ECM REPLACEMENT* procedures elsewhere in this section.

Otherwise, repair the connector or replace the wiring harness between ECM connector and OPS.

FUEL TANK AND FUEL PUMP

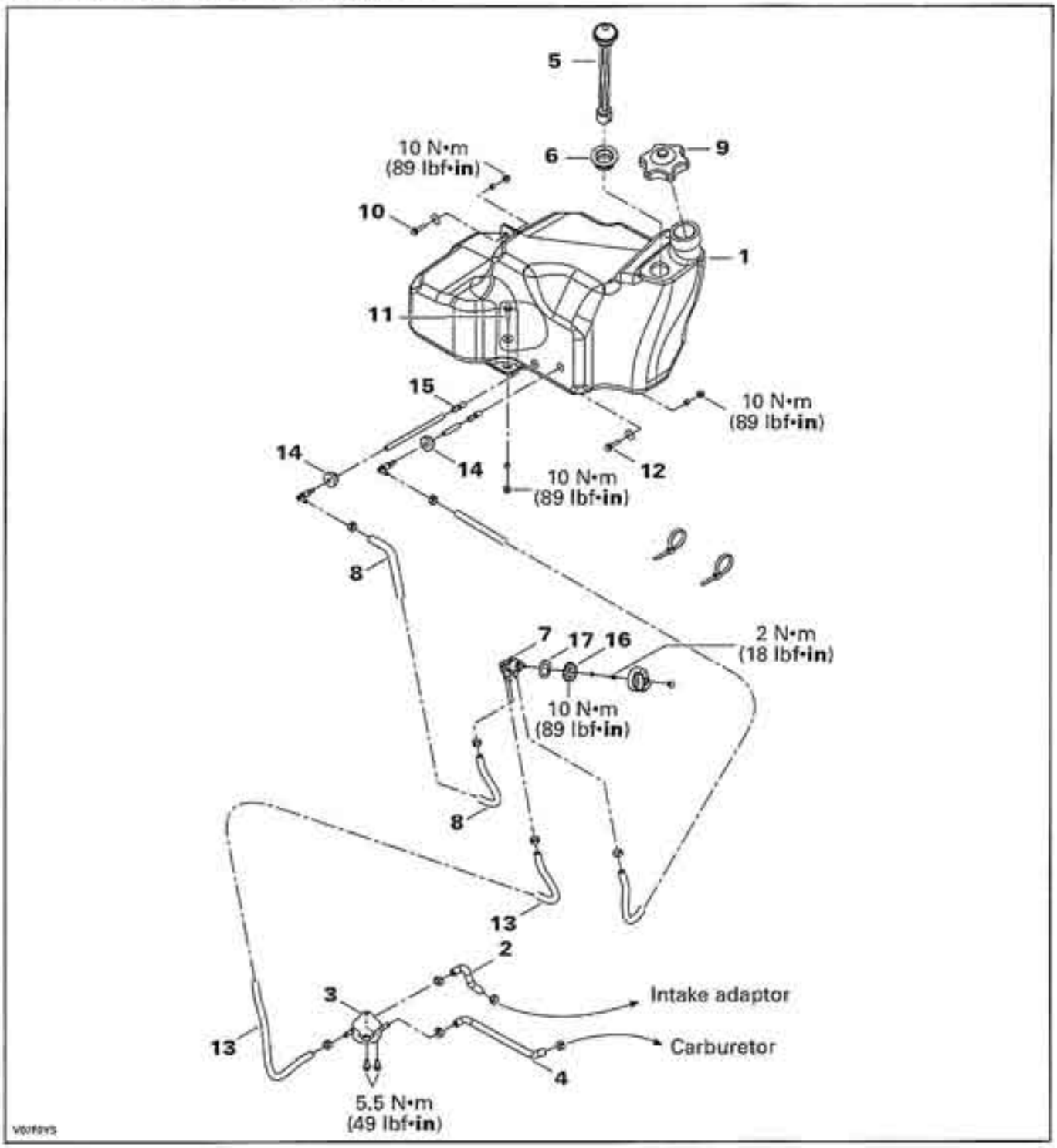
SERVICE TOOLS

Description	Part Number	Page
hose pincher	295 000 076	165
leak testing kit	529 033 100	165
pliers	295 000 070	176
pressure gauge	529 035 591	181
small hose pincher	295 000 076	165, 168, 171, 176
T-fitting	529 036 023	181
vacuum/pressure pump	529 021 800	165, 171, 176
VCK (Vehicle Communication Kit)	529 035 981	182

SERVICE PRODUCTS

Description	Part Number	Page
BOMBARDIER LUBE	293 600 016	169

OUTLANDER 400 SERIES



GENERAL

⚠ WARNING

Always disconnect battery exactly in the specified order, BLACK (-) cable first. It is recommended to disconnect electrical connections prior to disconnecting fuel lines.
When draining a fuel tank or whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pin, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

Fuel Lines

⚠ WARNING

Whenever working on fuel system, always verify for water or dust infiltration in reservoir. Replace any damaged, leaking or deteriorated fuel lines.

When replacing fuel lines, be sure to use hoses as available from Bombardier parts department. This will ensure continued proper and safe operation.

⚠ WARNING

Use of improper fuel lines could compromise fuel system integrity.

PROCEDURES

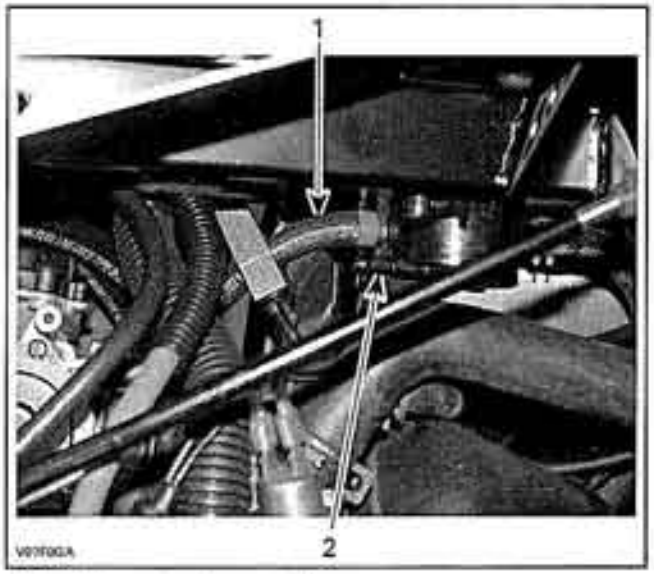
FUEL TANK PRESSURIZATION

Fill up fuel tank no. 1.

Remove the RH side panel.

Unplug the impulse line no. 2 from fuel pump no. 3.

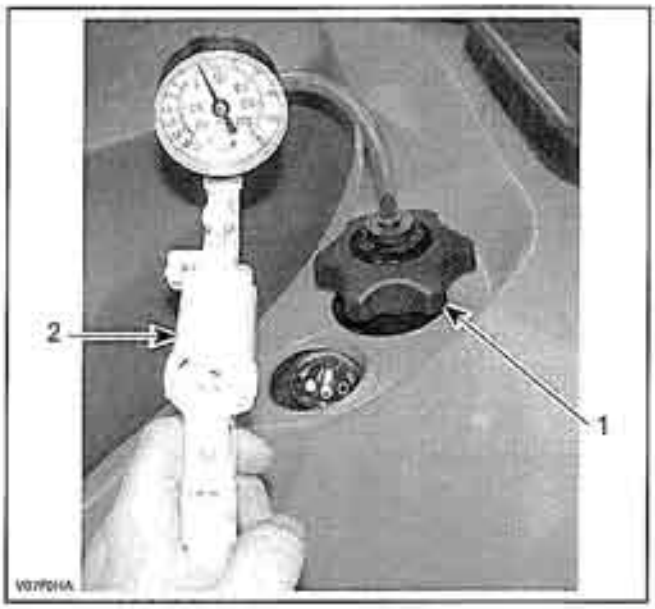
Install a small hose pincher (P/N 295 000 076) on fuel pump outlet hose no. 4 at carburetor, as shown in the following photo.



1. Install hose pincher on this hose
2. Impulse line location

Install on fuel tank, the special cap of leak testing kit (P/N 529 033 100).

Using thevacuum/pressure pump (P/N 529 021 800) inject air into fuel tank. See next photo.



1. Special cap on tank
2. Air pump

Pressurize fuel system to 21 kPa (3 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate fuel leak(s) and repair and/or replace leaking component(s).

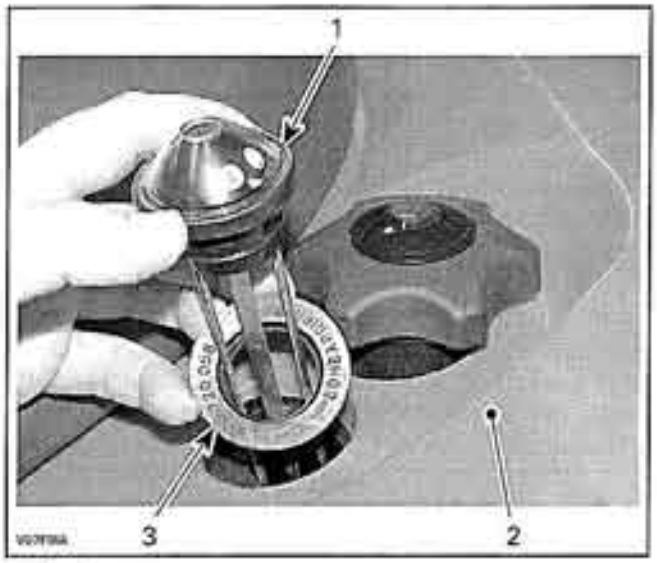
To ease locating leak(s) at fuel tank vent fitting, fuel gauge or fuel cap spray soapy water on components; bubbles will indicate leak location(s).

FUEL GAUGE

NOTE: The fuel gauge no. 5 shows an approximate amount of the fuel in tank.

Removal

Pull out fuel gauge no. 5 from fuel tank. At the same time, remove the fuel gauge gasket no. 6.



1. Fuel gauge
2. Rear fender
3. Fuel gauge gasket

Inspection

Check if fuel gauge gasket is brittle, hard or cracked. Replace if necessary.

Check if the float moves freely between its supports.

Installation

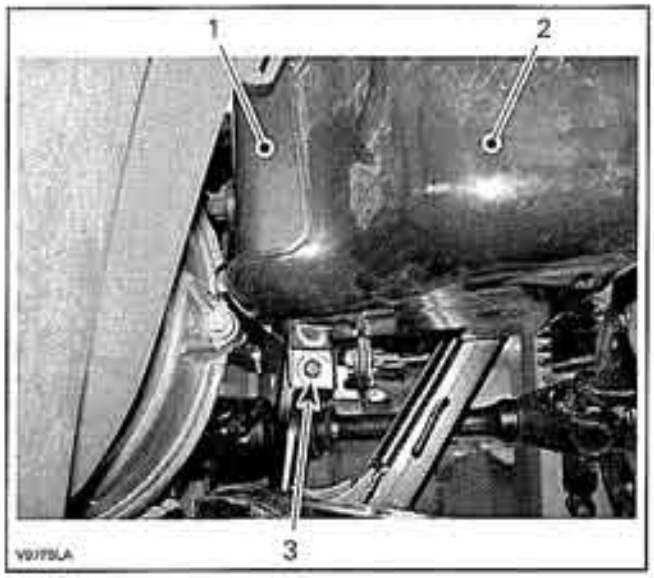
The installation is the reverse of the removal procedure.

FUEL TANK PROTECTORS

Removal

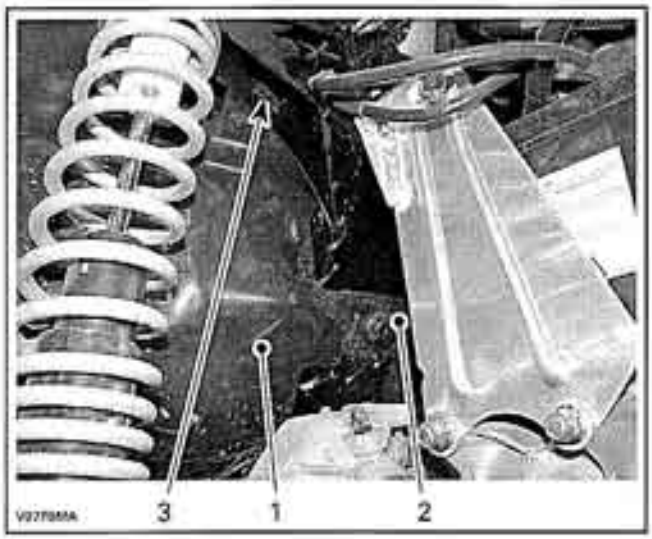
LH Fuel Tank Protector

Remove screw under LH fuel tank protector.



1. Fuel tank
2. Fuel tank protector
3. Remove this screw

Remove screw retaining both protectors then lift up the LH protector to unlatch the upper tab.

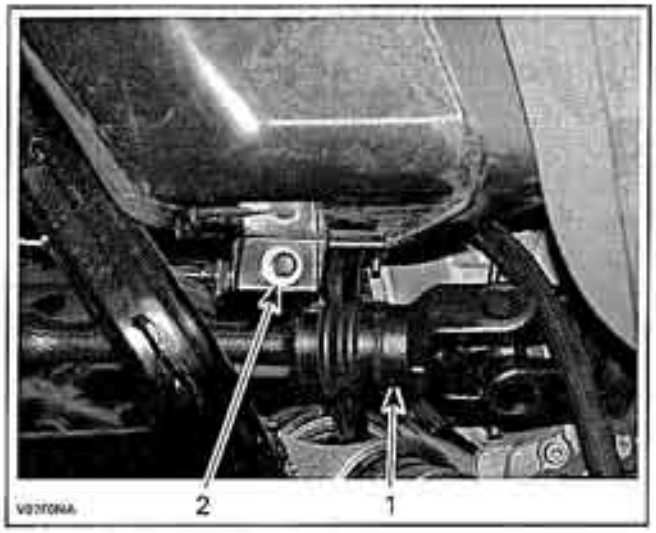


1. LH protector
2. RH protector
3. Tab

Pull the protector out through the left hand side of vehicle.

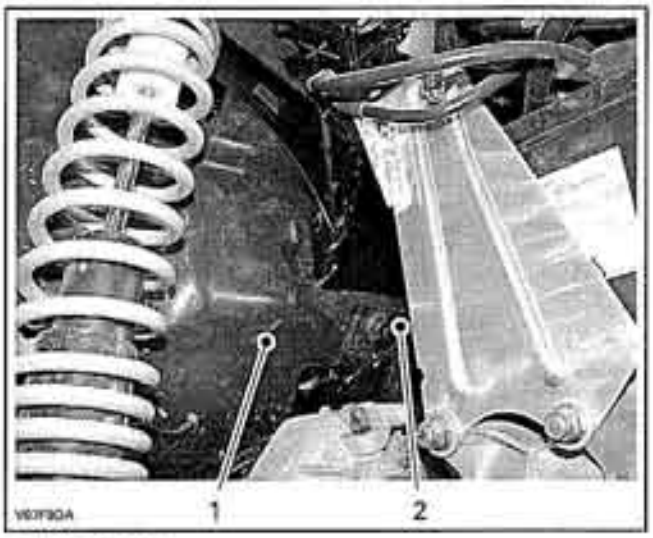
RH Fuel Tank Protector

Remove screw under RH fuel tank protector.



1. Rear propeller shaft
2. Remove this screw

Remove screw retaining both protectors to the frame.



1. LH protector
2. RH protector

Pull the protector out through the right hand side of vehicle.

Installation

To install protectors, reverse the removal procedure.

FUEL TANK

Draining

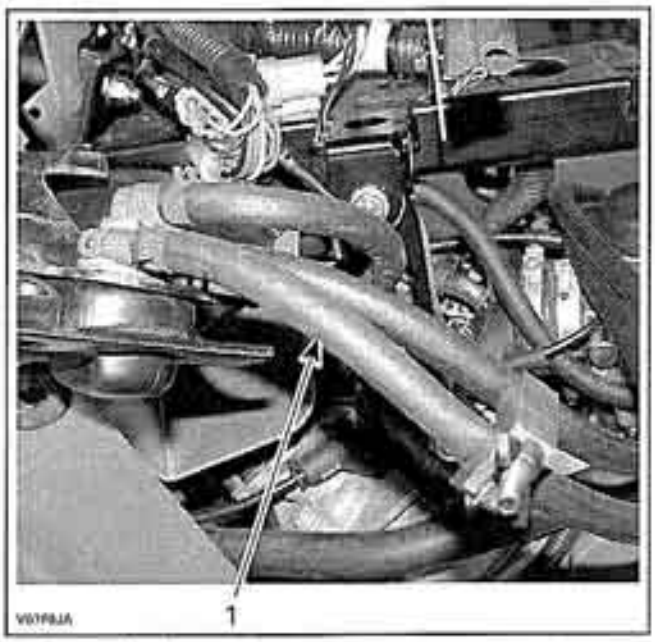
⚠ WARNING

Never perform this operation when the engine and/or the exhaust system is/are hot.

Turn fuel valve no. 7 OFF.

Remove:
- seat, RH side panel and console (refer to *BODY*)
- air box (refer to *AIR INTAKE SILENCER*).

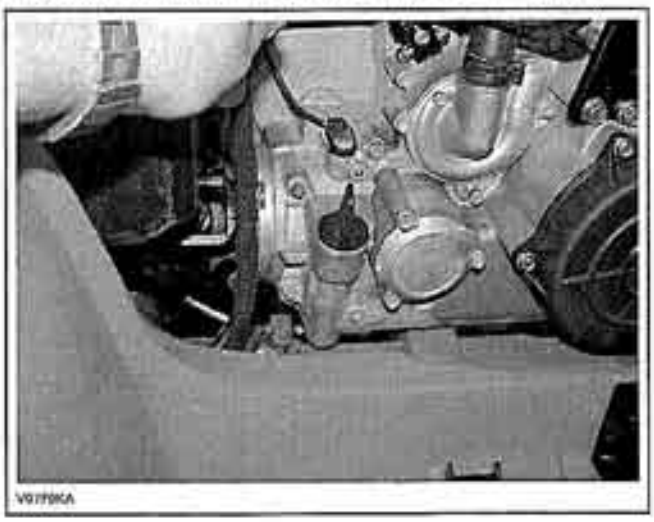
Install a small hose pincher (P/N 295 000 076) on reserve fuel hose no. 8.



1. Reserve fuel hose

Disconnect the reserve fuel hose from fuel valve.

Bring the reserve fuel hose on the right side of engine and put it between footrest and frame.



Place an approved fuel container under engine then bring the reserve fuel hose into the container.

Remove the hose pincher to drain the fuel tank.

NOTE: To accelerate fuel tank draining and ensure complete draining, remove cap no. 9.

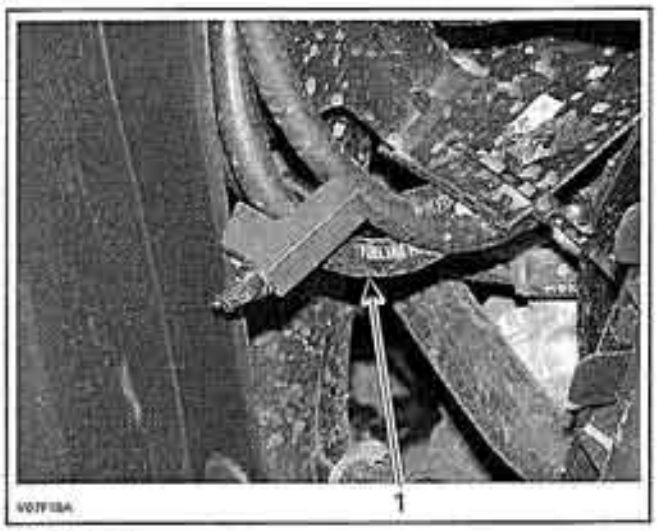
Removal

NOTE: To ease reinstallation, mark all hoses before removing them.

Drain fuel tank no. 1 (see the procedure above).

Remove:
- rear fender (refer to *BODY*)
- CVT outlet deflector (refer to *CVT*)
- LH fuel tank protector
- screws no. 10, no. 11 and no. 12
- LH side panel.

Pinch and unplug the main fuel hose no. 13 from fuel valve no. 7.



1. Fuel hose

Pull out the fuel tank through the LH side of vehicle.

⚠ WARNING

During fuel tank removal, do not pull main and reserve grommets and/or fittings out of fuel tank because a small amount of gas is still contained in the fuel tank.

Inspection

Visual

Inspect fuel tank for any damage or cracks which may result in fuel leaks. If so, replace tank with new one.

Pressure Test

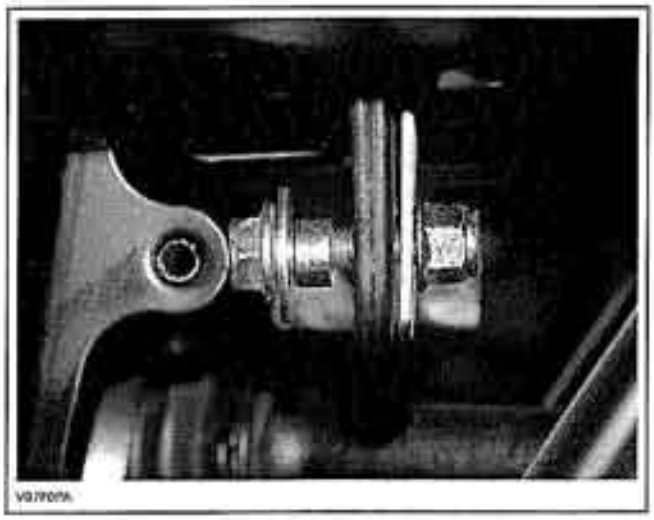
Refer to *FUEL SYSTEM PRESSURIZATION* for complete detailed procedure.

Installation

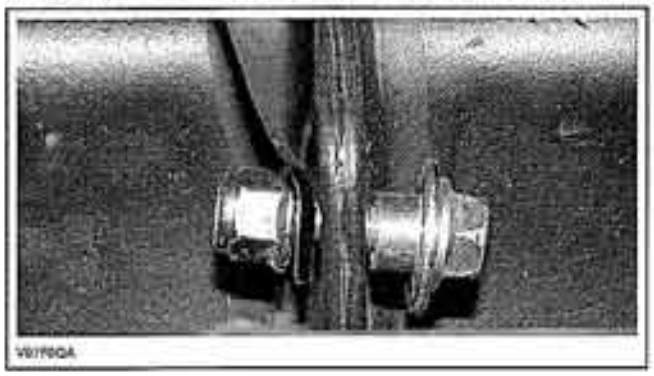
Insert the fuel tank into the frame.

Install screw no. 11 (behind the engine) with a spacer, a washer and an elastic nut. Do not torque yet.

Install the LH bottom screw no. 12 with a spacer, a washer and an elastic lock nut. Do not torque yet.



On right side of vehicle, install the last screw no. 10 with a washer, a spacer and an elastic nut.



Torque all fuel tank screws.

Install all removed parts in accordance with the proper instructions described in each sections.

Refuel tank and ensure there are no leaks by performing fuel system pressurization as described in the *FUEL SYSTEM PRESSURIZATION* section.

FUEL TANK STRAINER

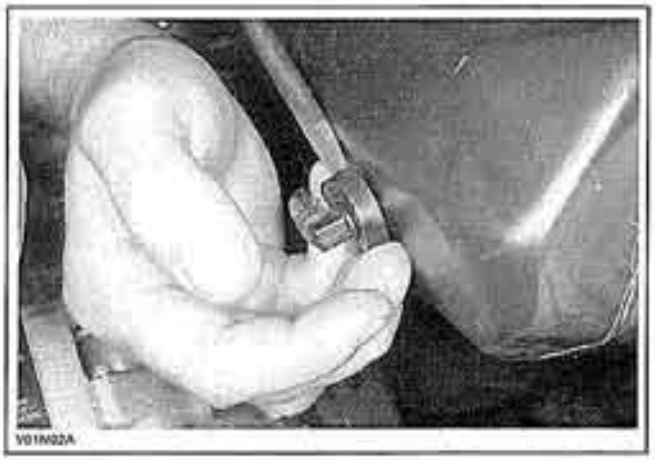
NOTE: The fuel tank has two fuel hose strainers. Use the following procedure for both fuel lines.

Removal

Drain and remove fuel tank; see above for the proper procedures.

Manually pull grommet no. 14 out of fuel tank.

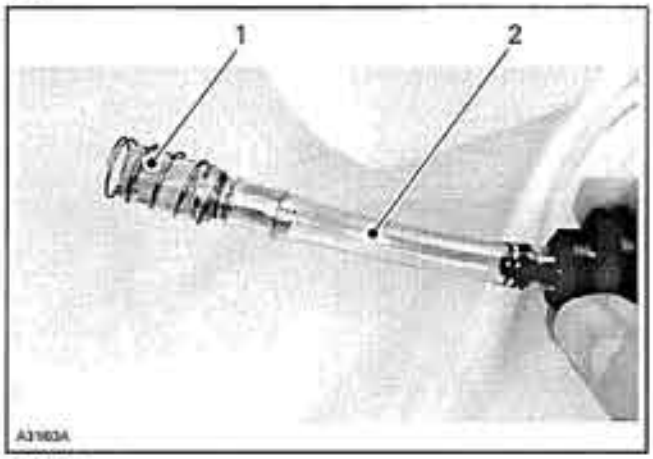
NOTE: In the case that grommet is too tight, use a flat screwdriver and carefully pull out grommet, as shown in the next photo.



TYPICAL — USE SCREWDRIVER ONLY IF GROMMET IS TOO TIGHT

Inspection

Ensure that fuel tank strainer no. 15 and fuel line are clean and not damaged, as per following photo.

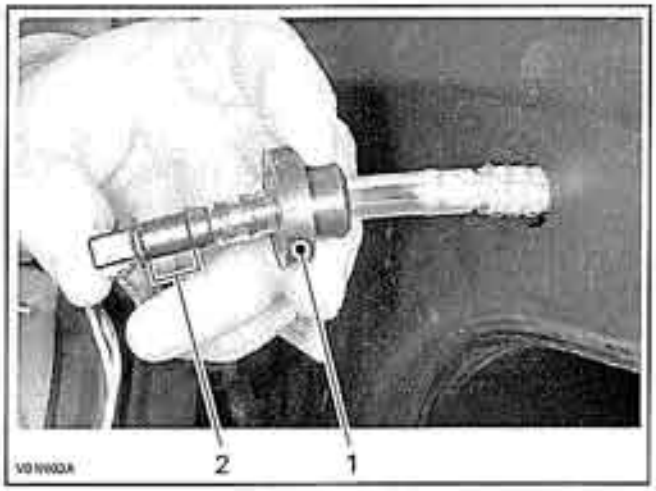


TYPICAL
1. Fuel tank strainer
2. Fuel line

Installation

NOTE: To ease grommet insertion, apply BOMBARDIER LUBE (P/N 293 600 016).

Position grommet on fuel line as shown in the next photo then insert grommet in tank hole.



TYPICAL
1. Grommet properly positioned for tank insertion
2. Fitting recess

Once grommet is inserted in tank hole, push fitting until its recess properly sits in grommet.

Refuel tank and ensure there are no leaks.

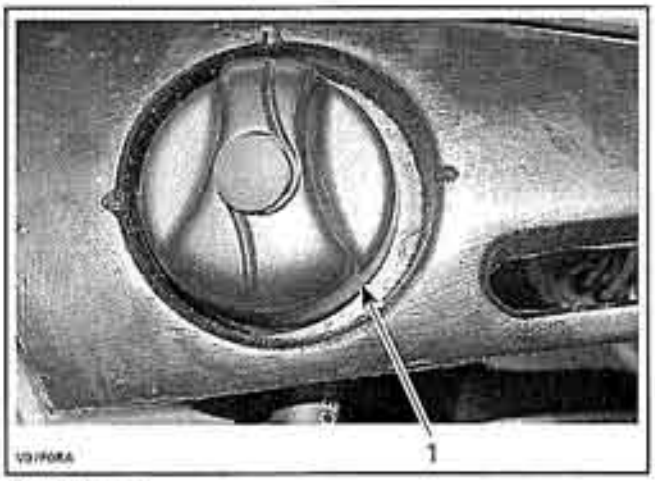
FUEL VALVE

Removal

NOTE: To ease reinstallation, mark all hoses before removing fuel valve no. 7.

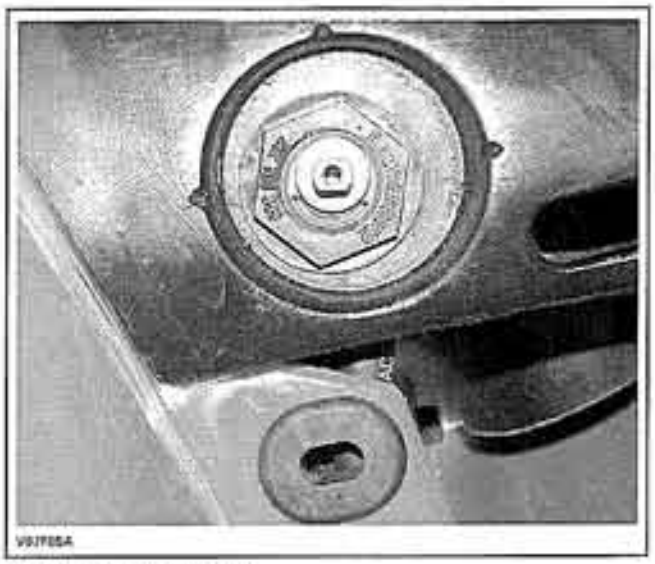
Remove the LH side panel; refer to *BODY*.

Remove plastic cap from fuel valve.



1. Plastic cap

Unscrew valve nut no. 16.



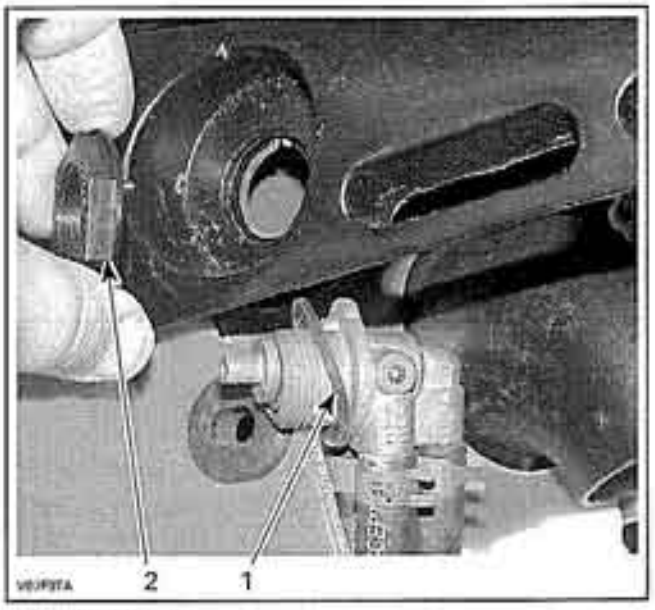
UNSCREW VALVE NUT

Unplug all hoses from fuel valve.

Remove fuel valve.

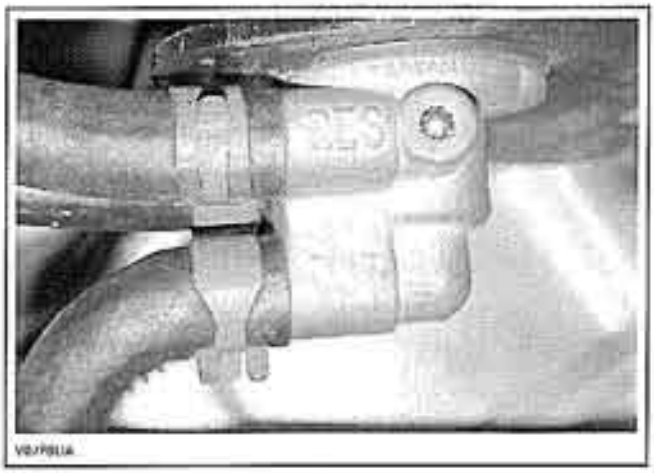
Installation

Reinstall fuel valve by positioning rubber washer no. 17 inside and nut outside vehicle. See next photo.



1. Rubber washer
2. Fuel valve nut

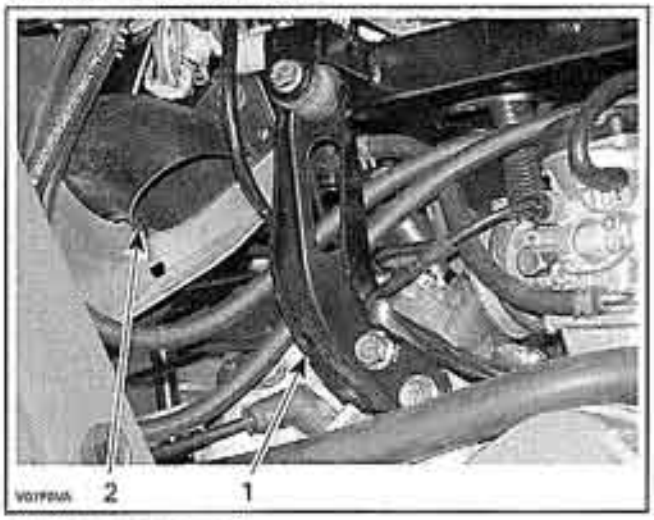
Plug all hoses at the proper position; check on fuel valve for location.



FUEL PUMP

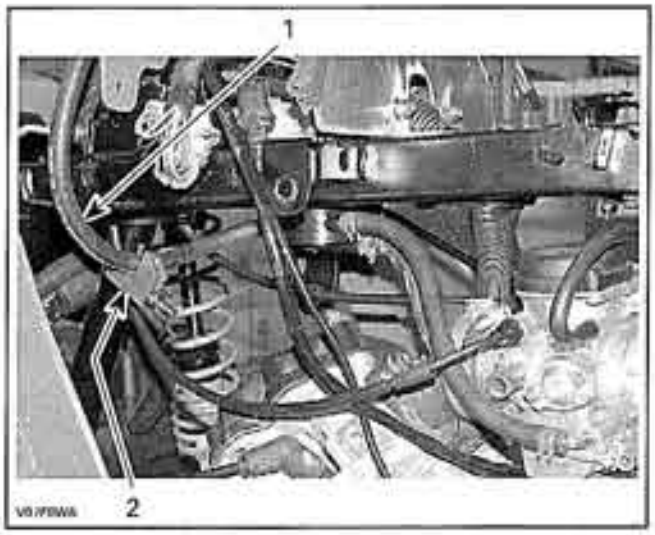
Removal

Remove CVT inlet hose.



1. Upper engine support
2. CVT inlet hose

Install a small hose pincher (P/N 295 000 076) on main fuel line no. 13.



1. Main fuel line from fuel valve
2. Hose pincher

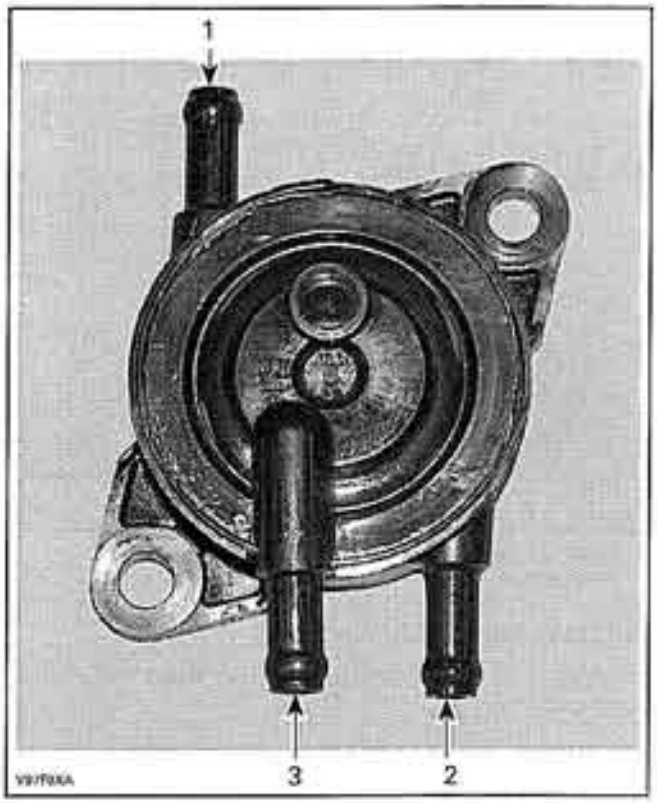
Unscrew fuel pump.

Unplug all hoses from fuel pump then remove it from vehicle.

Inspection

Check fuel pump operation as follows:

- Connect a clean plastic tubing to the fuel inlet nipple. Using the vacuum/pressure pump (P/N 529 021 800), apply pressure and vacuum. The inlet valve should release with pressure and hold under vacuum.
- Repeat the same procedure at the fuel outlet nipple. This time the outlet valve should hold with pressure and release under vacuum.
- Connect a clean plastic tubing to the impulse nipple. Repeat the previous procedure at the impulse nipple. This time the outlet valve should hold pressure and vacuum.

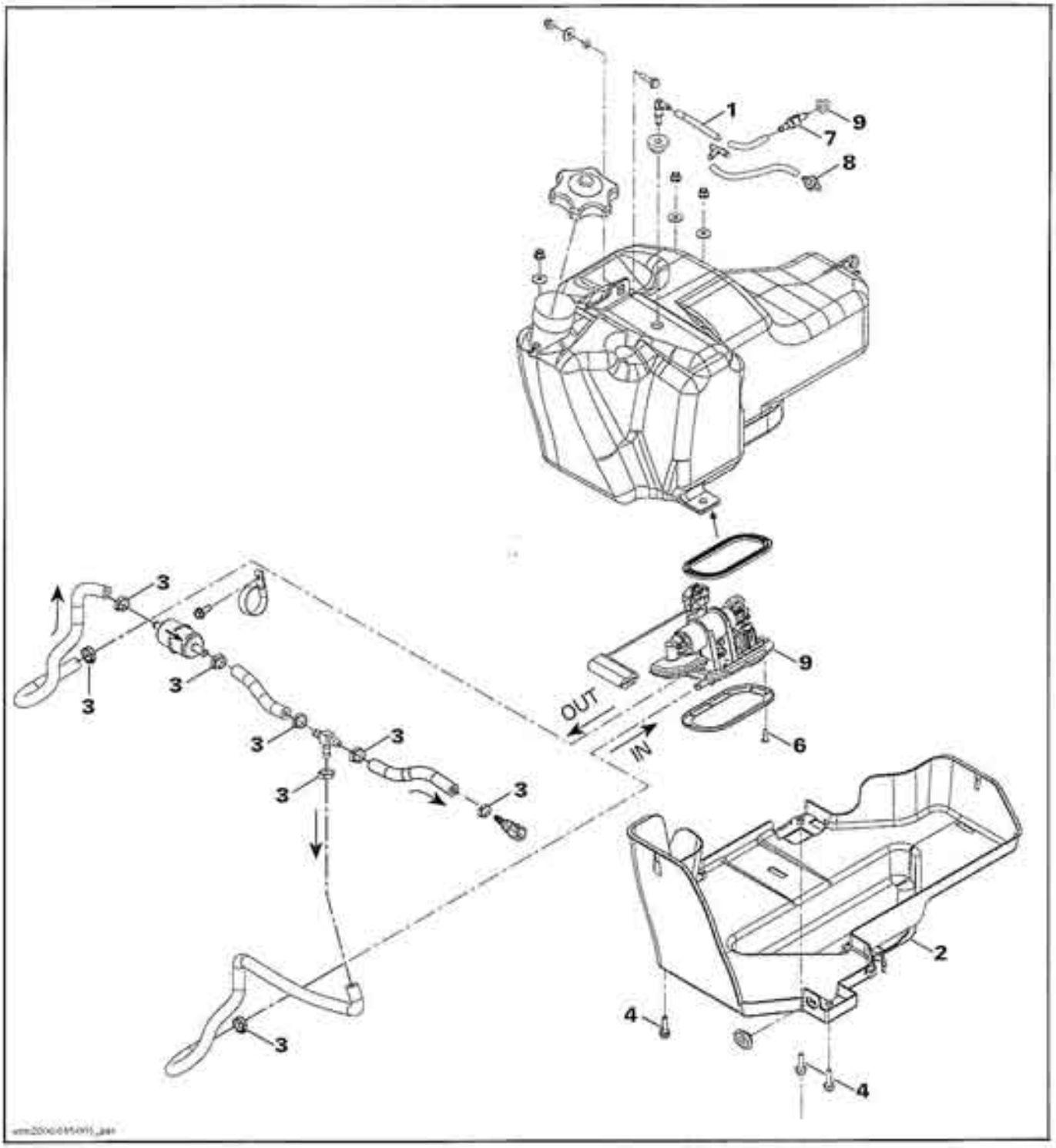


1. Fuel inlet nipple
2. Fuel outlet nipple
3. Impulse line location

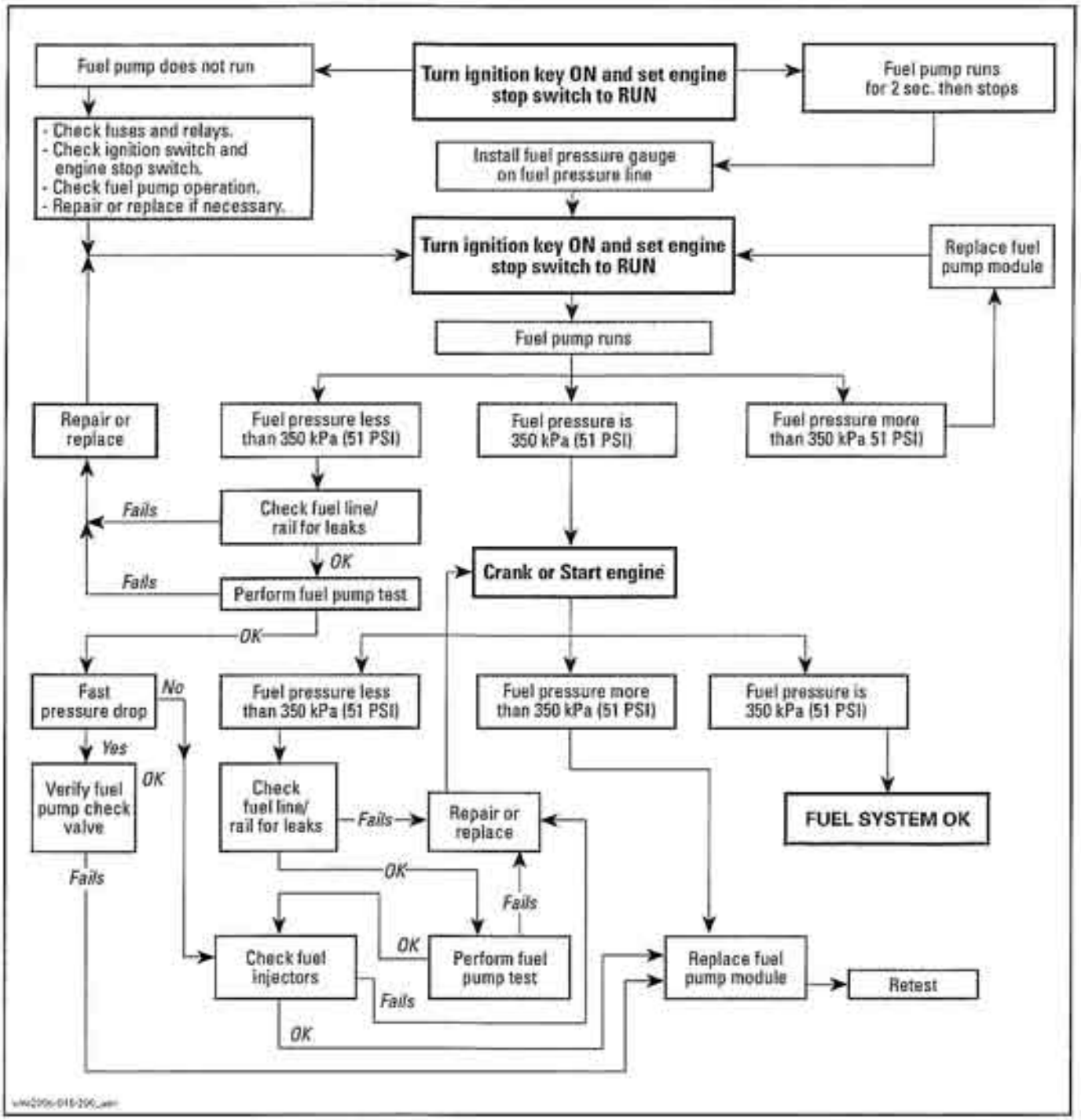
Installation

The installation is the reverse of removal procedure.

OUTLANDER 800 SERIES



FUEL DELIVERY SYSTEM DIAGNOSTIC FLOW CHART



GENERAL

⚠ WARNING

Always disconnect battery exactly in the specified order, BLACK (-) cable first. It is recommended to disconnect electrical connections prior to disconnecting fuel lines.
Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity. Never use a hose pincher on injection system high pressure hoses.

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to *SELF-LOCKING FASTENERS* and *LOCTITE APPLICATION* at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pin, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

⚠ WARNING

The fuel system of a fuel injection system holds much more pressure than on a carbureted ATV. Prior to disconnecting a hose or to removing a component from the fuel system, follow the recommendation described here.

- Use the VCK (Vehicle Communication Kit) to release the fuel pressure in the system. Look in the **Activation** section of the B.U.D.S. software.

⚠ WARNING

Fuel lines remain under pressure at all times. Always proceed with care and use appropriate safety equipment when working on pressurized fuel system. Wear safety glasses and work in a well ventilated area. Do not allow fuel to spill on hot engine parts and/or on electrical connectors. Proceed with care when removing/installing pressure test equipment or disconnecting fuel line connections. Use the VCK (Vehicle Communication Kit) to release fuel pressure prior to removing a hose. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to minimize spilling. Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions. Always work in a well ventilated area. Always disconnect battery prior to working on the fuel system. After performing a pressure test, use the valve on the fuel pressure gauge to release the pressure (if so equipped).

- Always disconnect battery properly prior to working on the fuel system. Refer to *BATTERY* section.

When the job is done, ensure that hoses from fuel rail going to fuel pump are properly secured in their supports. Then, pressurize the fuel system. Perform the pressure test and pressurize the fuel tank and fuel lines as explained in this section.

Properly reconnect the battery.

⚠ WARNING

Ensure to verify fuel line connections for damage and that NO fuel line is disconnected prior to installing the ignition key. Always perform the pressure test if any component has been removed. A pressure test must be done before turning the ignition key ON and setting the engine stop switch to RUN. The fuel pump is started each time the ignition key is turned ON and engine stop switch is set to RUN and it builds pressure very quickly.

To check fuel rails for leaks, first pressurize the system then spray soapy water on all hose connections and injectors. Air bubbles will show the leaking area. Check also for leaking fuel or fuel odor.

Fuel Lines

⚠ WARNING

Whenever working on fuel system, always verify for water or dust infiltration in reservoir. Replace any damaged, leaking or deteriorated fuel lines.

When replacing fuel lines, be sure to use hoses and clamps as available from Bombardier parts department. This will ensure continued proper and safe operation.

⚠ WARNING

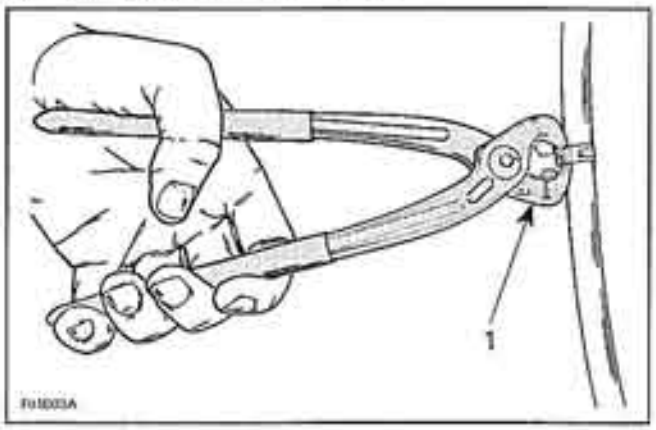
Use of improper fuel lines could compromise fuel system integrity.

⚠ WARNING

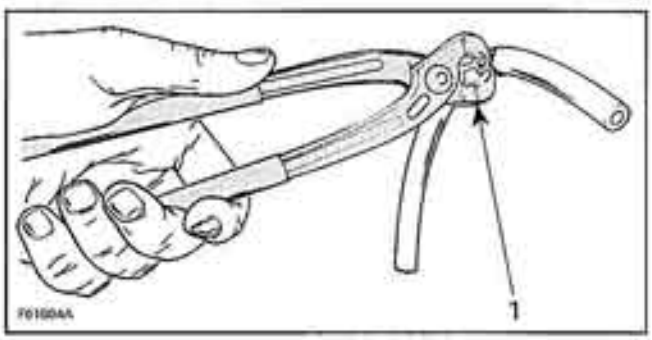
Whenever removing a hose in the fuel system, always use new Oetiker clamps at assembly. Then, validate fuel tightness by performing a pump pressure test as described below.

Oetiker Clamps

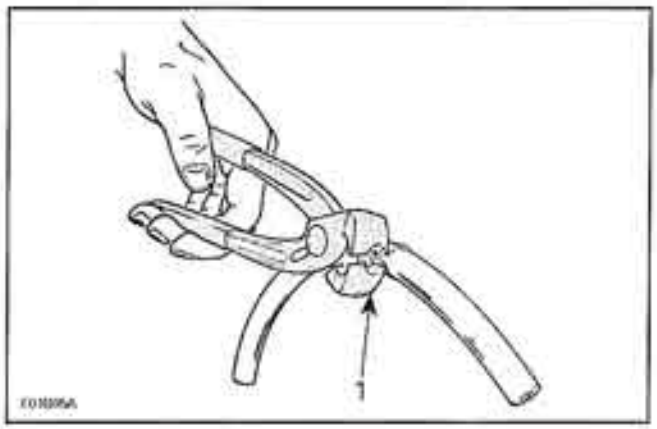
To secure or cut Oetiker clamps no. 3 on fuel lines, use pliers (P/N 295 000 070).



1. Cutting clamp



1. Securing clamp



1. Securing clamp in limited access

PROCEDURES

FUEL TANK PRESSURIZATION

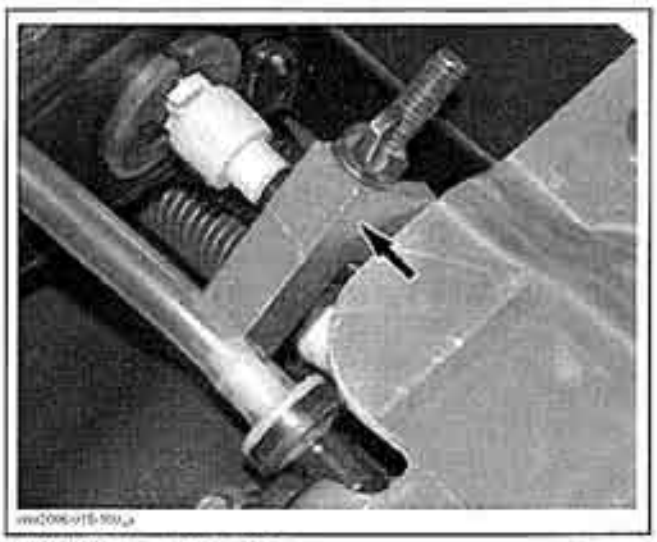
⚠ WARNING

Ensure to also perform the fuel pump pressure test. See elsewhere in this section.

Fill up fuel tank.

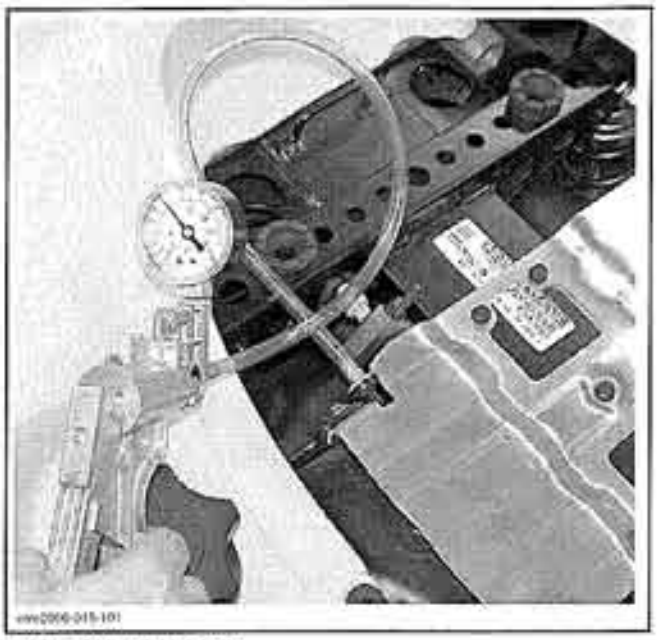
Remove the RH side panel. Refer to *BODY*.

Install a small hose pincher (P/N 295 000 076) on vent line (OUTLET side) no. 1.



PINCHER ON OUTLET SIDE

Using the vacuum/pressure pump (P/N 529 021 800), pressurize fuel tank through vent line (INLET side).



PUMP ON INLET SIDE

Pressurize fuel tank as follows.

PRESSURE	TIME WITHOUT PRESSURE DROP
21 kPa (3 PSI)	3 minutes

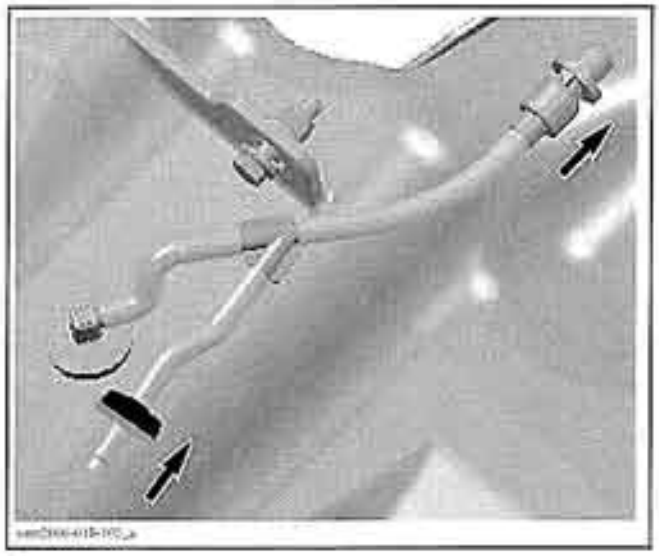
If pressure drops, locate fuel leak(s) and repair/replace leaking component(s).

To ease locating leak(s), spray soapy water on components; bubbles will indicate leak location(s).

Check Valve and Pressure Relief Valve

Air can enter fuel tank at all times through INLET side. The check valve prevents fuel to flow out. Air cannot goes out (unless pressure increases). Always reinstall valve with the black side as shown.

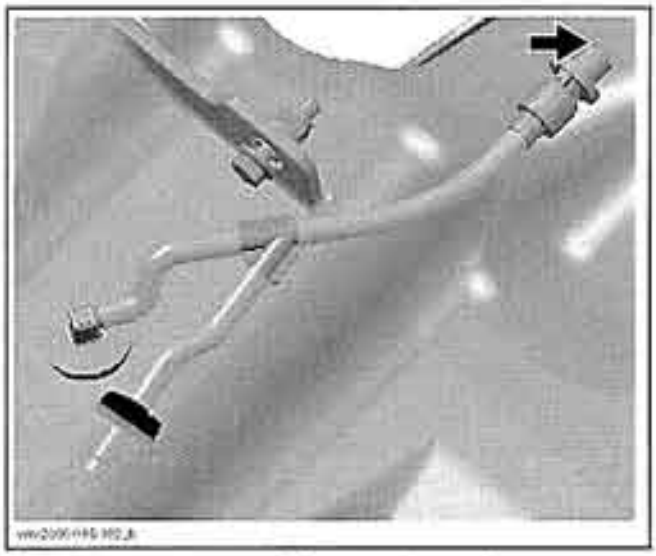
If pressure in fuel tank builds up and exceeds 2.5 - 7.6 kPa (.36 - 1.1 PSI), pressure relief valve opens and let excess pressure evacuate through OUTLET side. Always reinstall valve according to arrow on valve as shown.



Test

While tank is still pressurized in the above test, do the following:

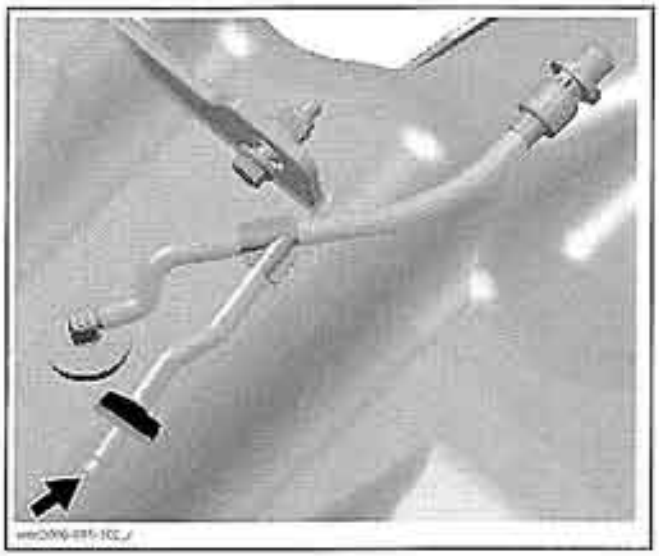
When removing hose pincher, alternately touch and release end of pressure relief valve no. 7. You should feel pressurized air flowing out indicating relief valve is working.



Ensure grommet no. 9 is not plugged.

Remove fuel tank cap.

With your mouth, blow air from outlet nipple. Air must freely flows towards fuel tank neck.



IN-LINE FUEL FILTER

Replace fuel filter as per maintenance chart schedule. Refer to *MAINTENANCE*.

Removal

Detach filter from body.

Remove Oetiker clamps and pull hoses off.

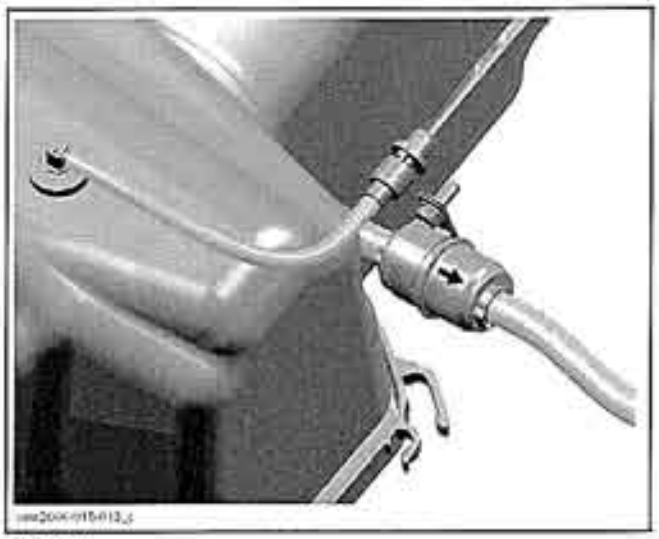
Inspection

If fuel filter is suspected to be clogged, it may be checked as follows.

Using low compressed air, check if fuel filter is clogged. Air should flow easily through filter. In doubt, install a new filter.

Installation

Use arrow on filter to position it according to fuel flow.



TYPICAL

FUEL TANK

Draining

⚠ WARNING

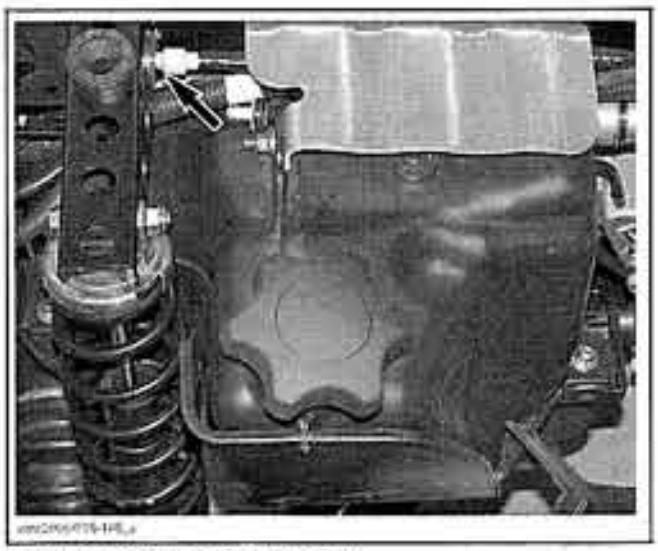
Never perform this operation when the engine and/or the exhaust system is/are hot. Never use a hose pincher on injection system high pressure hoses.

Remove fuel tank cap and siphon gas in an approved fuel container.

Removal

Remove side panels (refer to *BODY*).

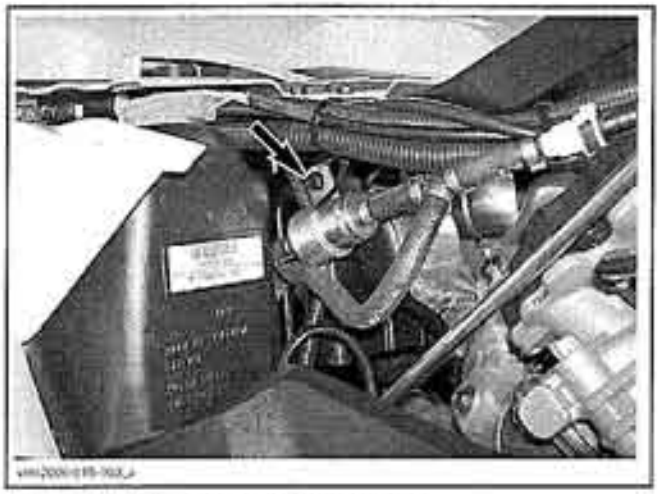
Disconnect vent line (OUTLET side) no. 7 from body.



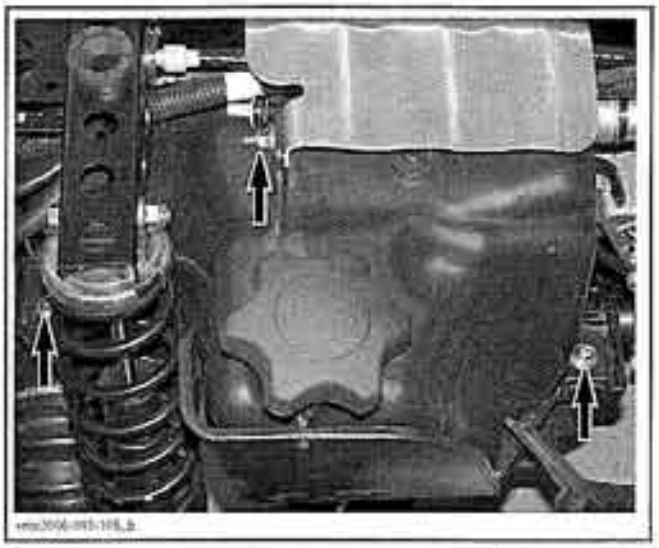
FENDER REMOVED FOR CLARITY

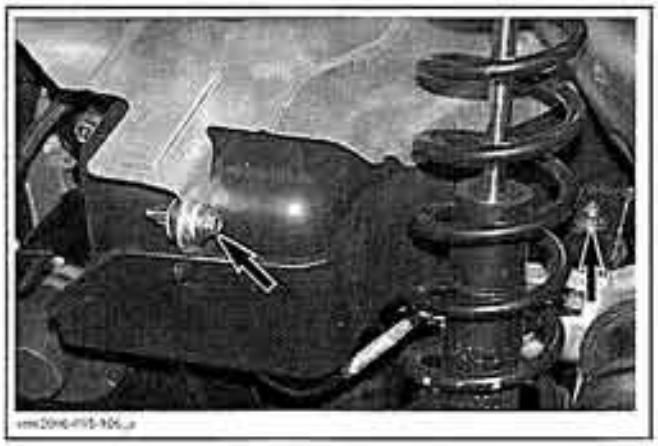
Disconnect fuel line **no. 5** at quick connect. See *FUEL PUMP MODULE* below.

Detach in-line fuel filter from body.

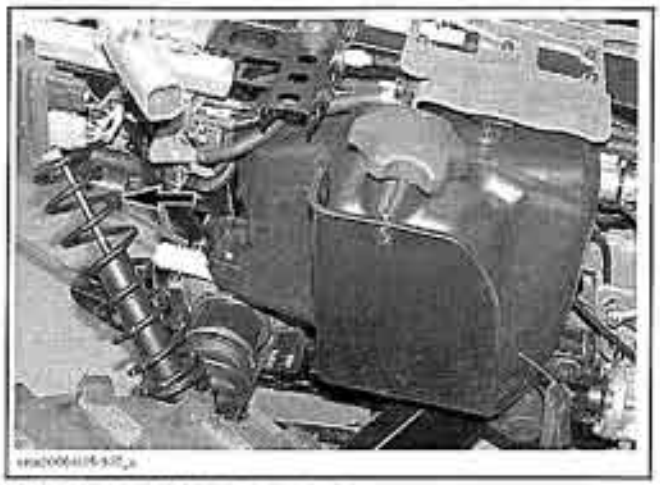


Remove retaining screws **no. 4**.



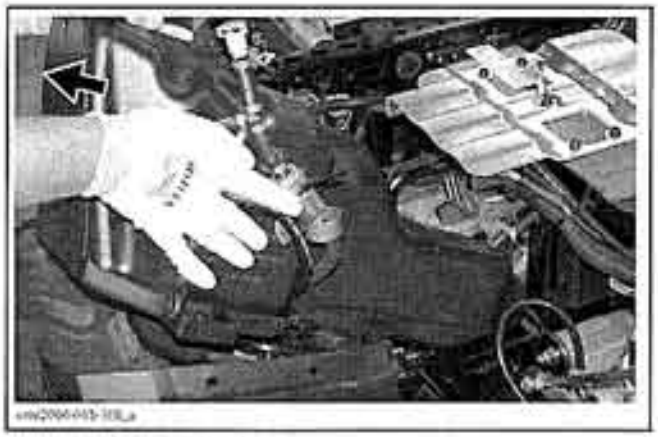


Lift frame just enough to extend RH rear shock absorber. Remove upper screw and move shock absorber away.



FENDER REMOVED FOR CLARITY

Bend fender then pull out the fuel tank through the RH side of vehicle. Pull enough to reach fuel pump connector and unplug it.

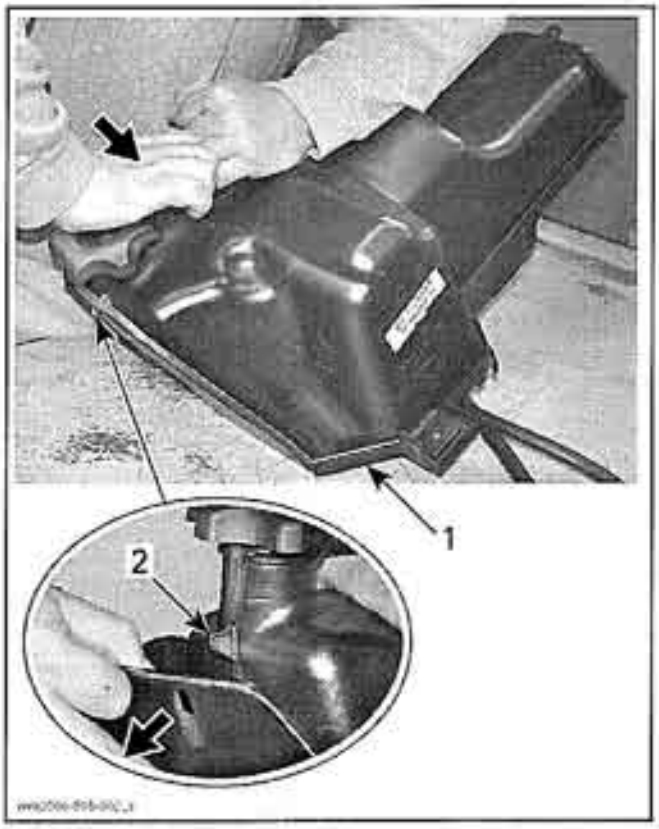


Fuel Tank Protector

To release protector **no. 2** from tank:

NOTE: This procedure should be done with parts at room temperature.

- work on a stable table
- lay down front of fuel tank on table
- firmly push on top of fuel tank and hold
- pull out protector from tank tab



1. *Tank protector*
2. *Tank tab*

– completely remove protector.

Inspection

Visual

Inspect fuel tank for any damage or cracks which may result in fuel leaks. If so, replace tank with a new one. Inspect tank and protector attachment points for damage. Inspect protector for damage.

Pressure Test

Refer to *FUEL TANK PRESSURIZATION* for complete detailed procedure.

Installation

NOTE: Removing top plate from frame to ease routing hoses and wiring.

Secure tank into protector. Reverse removal procedure.

Reconnect fuel pump connector.

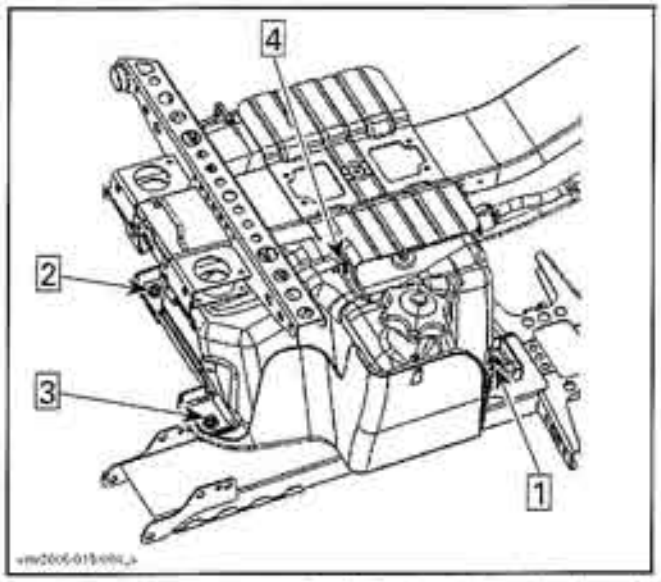
Insert the fuel tank into the frame.

Reconnect hoses.

Tighten retaining screws as per following sequence.

⚠ WARNING

Ensure wiring is on the top of fuel tank.



Install gearbox vent tube in its hook on fuel tank protector.

Refuel tank and ensure there are no leaks by performing fuel tank pressurization and fuel pump pressure test as described in this section.

FUEL PUMP

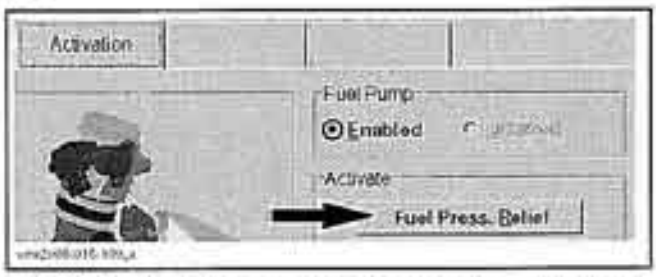
Fuel Pressure Test

⚠ WARNING

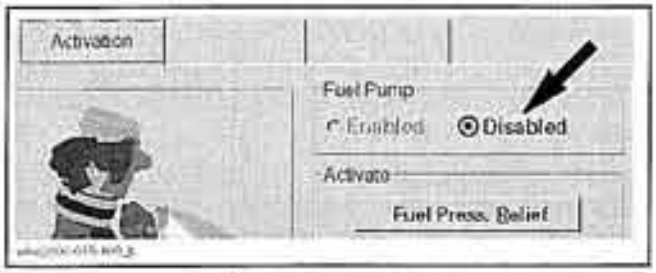
Ensure to also perform the fuel tank pressurization test. See elsewhere in this section.

Before proceeding to the pressure test ensure the battery is fully charged. Battery voltage must be over 12 volts.

Disable the fuel pump using B.U.D.S. Look in the **Activation** tab and click **Fuel Press. Relief** button.



Then, ensure **Disabled** is in function. This validates fuel pump is deactivated.



⚠ WARNING

This does not release fuel pressure. It prevents fuel pump to run until reactivated.

⚠ WARNING

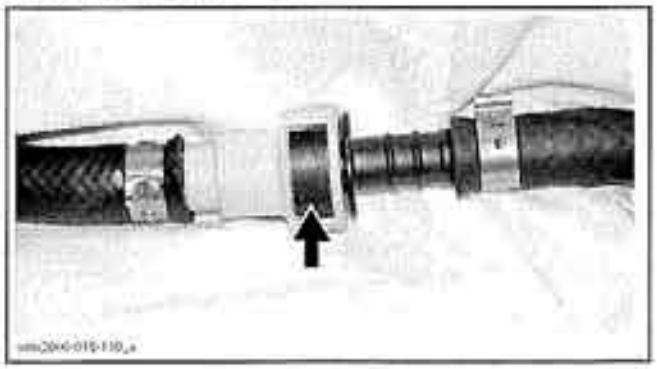
The fuel hose is under pressure. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to release the pressure. Wipe off any fuel spillage inside engine compartment.

The pressure test will show the available pressure at the fuel pump outlet. It validates the pressure regulator, the fuel pump and leaks in the system.

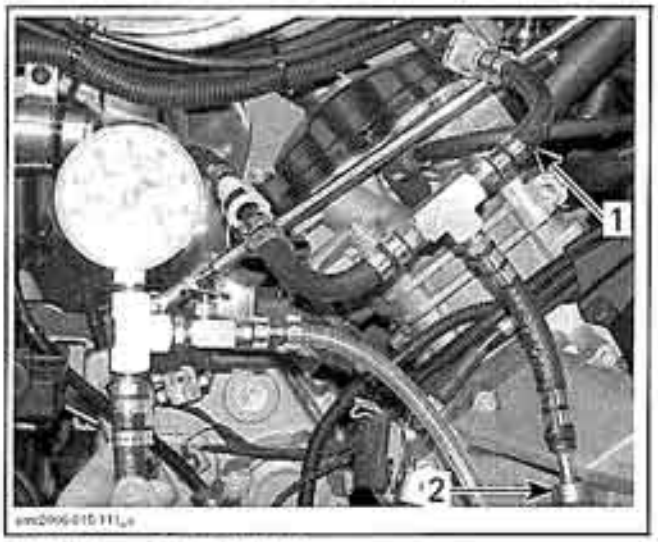
Ensure there is no leak from hoses and fittings. Repair any leak.

Ensure there is enough gas in fuel tank.

Disconnect outlet hose.



Install fuel pressure gauge (P/N 529 035 591) and T-fitting (P/N 529 036 023) between disconnected hoses (in-line installation).



1. T-fitting — In-line installation
2. Fuel pressure gauge connection

Turn ignition key ON and set engine stop switch to RUN and observe fuel pressure. Turn ignition key off then back on. Repeat the test.

FUEL PRESSURE	350 kPa (51 PSI)

Start engine and observe fuel pressure. The fuel pressure should be the same as above.

If pressure is within limits, fuel pump and pressure regulator are working adequately.

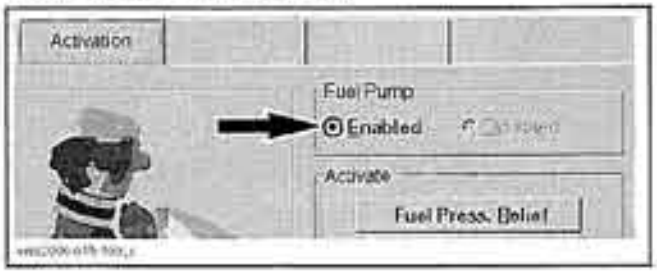
A rapid pressure drop indicates leakage either from the fuel rail or from the fuel pump check valve. Check fuel rail for leaks. If it is not leaking then replace fuel pump.

A slow pressure drop indicates leakage either from the fuel injector or from the fuel pressure regulator. Check fuel injector for leaks (see below). If it is not leaking then replace fuel pump module.

Release fuel pressure in the system using B.U.D.S. Look in the **Activation** tab.

Remove pressure gauge from inlet hose. Reconnect inlet hose.

Using B.U.D.S., reactivate fuel pump by pressing **Fuel Press. Relief** button.



⚠ WARNING

Wipe off any fuel spillage. Fuel is flammable and explosive under certain conditions. Always work in a well ventilated area.

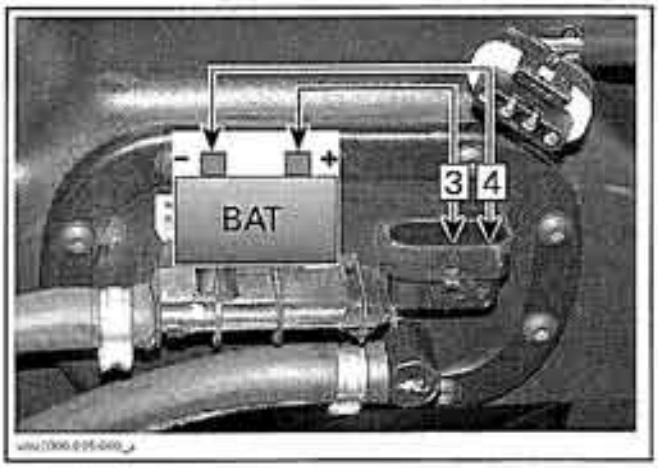
Reinstall removed parts.

Electrical Test

When turning ignition key ON and setting engine stop switch to RUN, the fuel pump should run for 2 seconds to build up the pressure in the system.

If the pump does not work, disconnect the connector from the fuel pump.

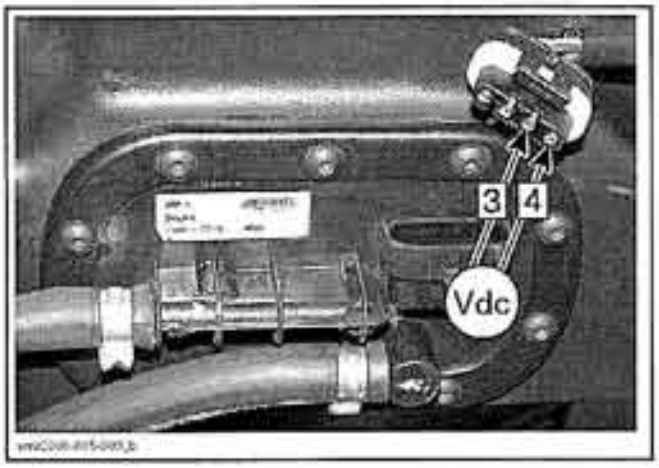
Install a temporary connector to the fuel pump connector. Apply 12 V to this test harness as shown.



CAUTION: Running pump a few minutes with reverse polarity can damage the pump.

If pump does not run, replace the fuel pump module.

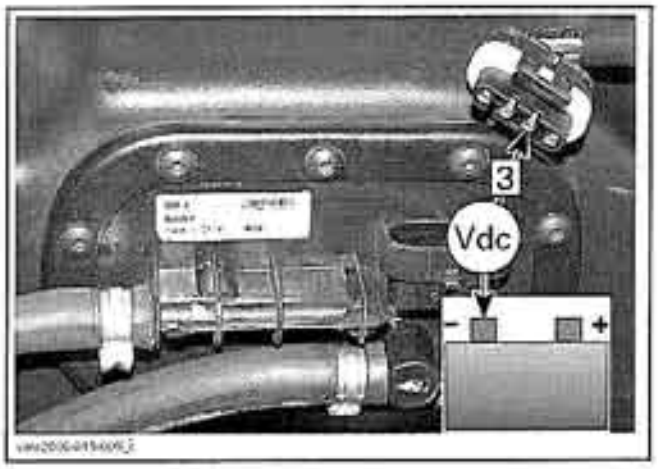
Otherwise, check fuse F5 and if good, probe terminals of fuel pump connector on vehicle harness side as shown.



When turning ignition key ON and setting engine stop switch to RUN, you should read battery voltage for approximately 2 seconds (then voltage will drop to approximately 11 V).

If battery voltage is read, the problem can be in fuel pump harness or its connector. Repair or replace appropriate part.

If battery voltage is not read, probe terminals as shown.



a. If battery voltage is read, check continuity of circuit going towards ECM. If it is good, try a new ECM.
b. If battery voltage is not read, check continuity of circuit 5-FP-3 from fuse F5. If it is good, check relay (R2) and its wirings.

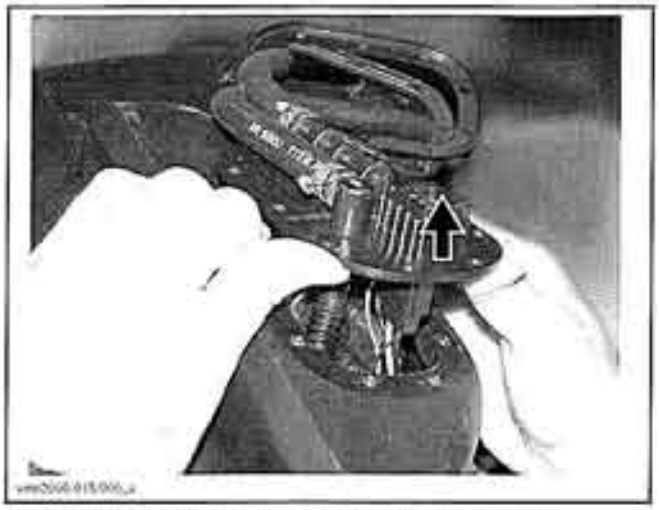
Removal

Connect VCK (Vehicle Communication Kit) (P/N 529 035 981). Use B.U.D.S. to release fuel pressure.

Remove fuel tank.

Remove fuel pump retaining screws no. 6.

Gently push pump up as shown.



GASKET AND FLANGE NOT SHOWN FOR CLARITY PURPOSES ONLY

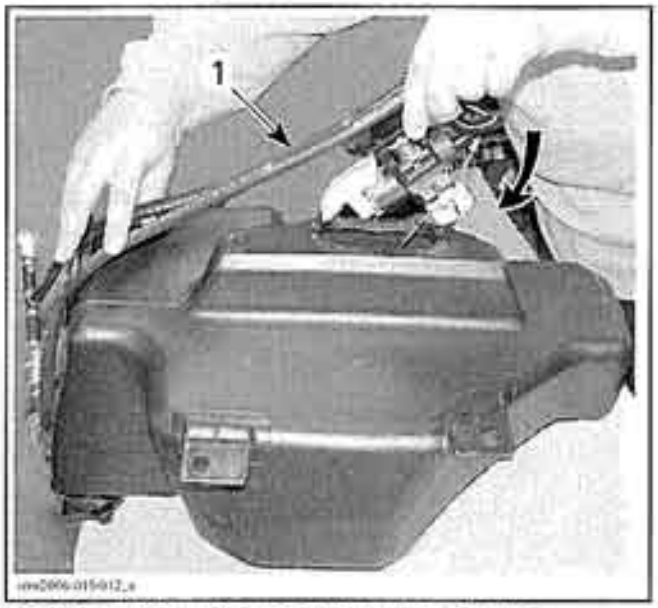
CAUTION: While pulling out the fuel pump, pay attention to fuel sensor float arm. Float arm can get stuck and bend which can reduce the fuel sensor capabilities.

Installation

For installation, reverse the removal process but pay attention to the following.

Install a new gasket.

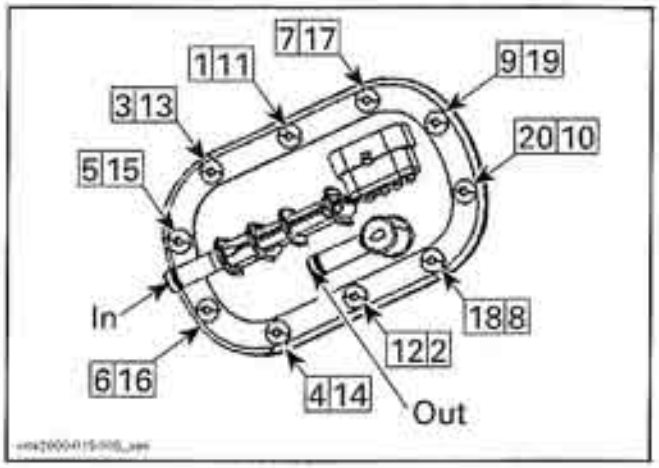
Pay attention to pump orientation as shown.



GASKET AND FLANGE NOT SHOWN FOR CLARITY PURPOSES ONLY
1. Fuel line on this side

Tighten retaining screws as per illustrated sequence. For the first sequence from 1 to 10, turn screws only to make a contact between parts, do not tighten yet. Properly torque for sequence from 11 to 19.

Install hoses properly on IN and OUT nipples.



FUEL LEVEL SENDER

Refer to *ACCESSORIES AND INSTRUMENTS*.

CARBURETOR

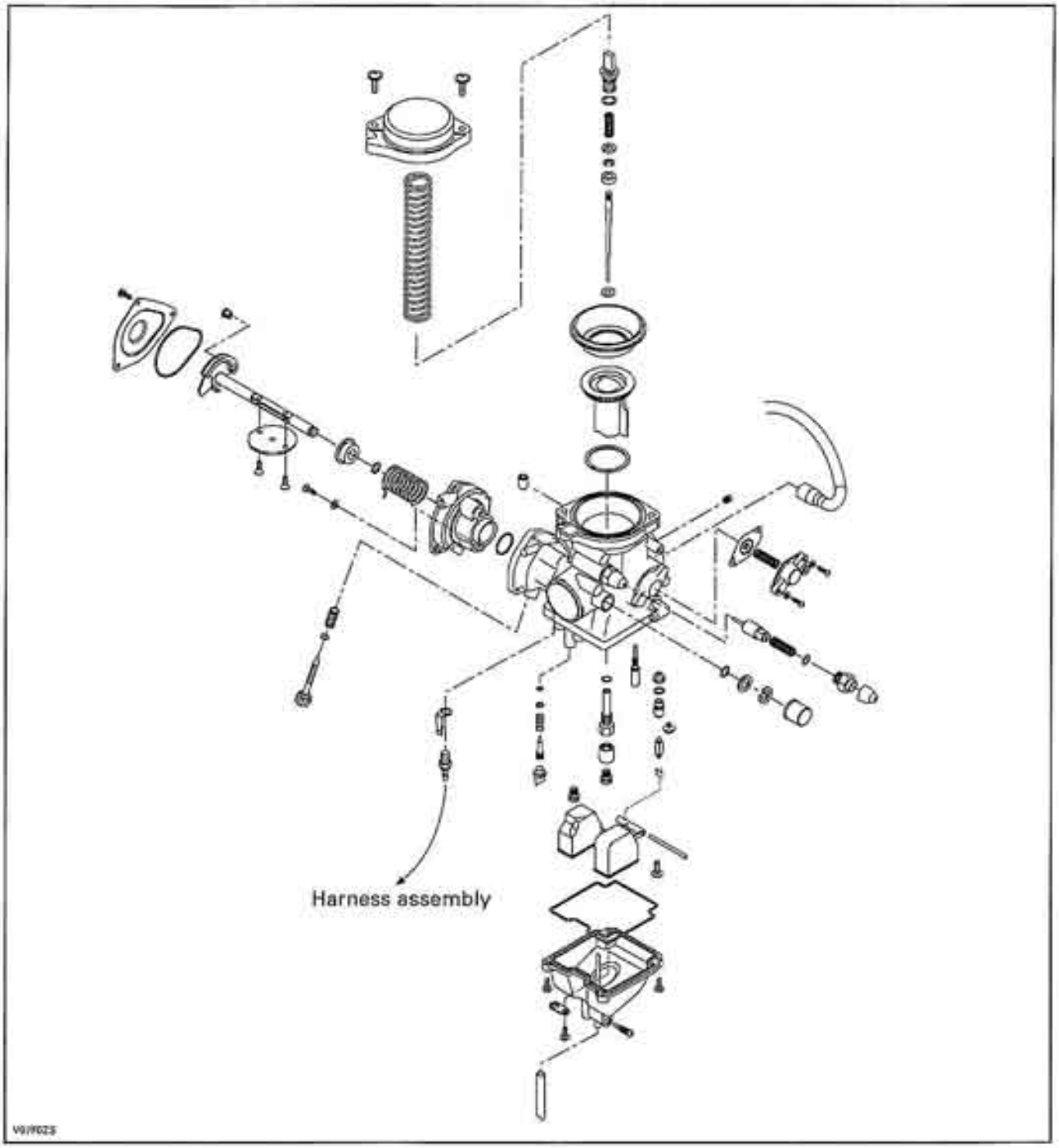
SERVICE TOOLS

Description	Part Number	Page
digital induction tachometer	529 014 500	189
float level gauge	529 035 520	187
small hose pincher	295 000 076	187

SERVICE PRODUCTS

Description	Part Number	Page
cable lubricant	293 600 041	191

OUTLANDER 400 SERIES



GENERAL

Before performing any job on the fuel system, always turn fuel valve to OFF position and disconnect BLACK (-) cable from battery.

⚠ WARNING

Always disconnect battery exactly in the specified order, BLACK (-) cable first. It is recommended to disconnect electrical connections prior to disconnecting fuel lines.

PROCEDURES

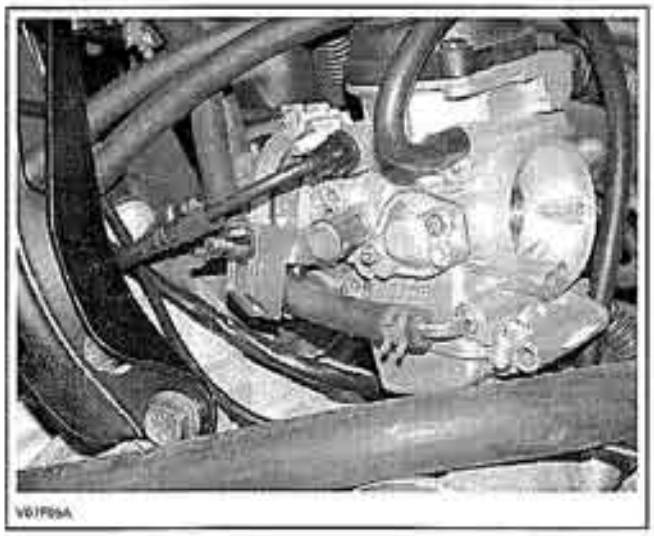
CARBURETOR

CAUTION: Although some jets can be replaced by other jets from other carburetors, such modifications should not be performed. They can greatly affect engine calibration and can cause severe damage to engine. Use only recommended jetting specific for this carburetor.

Removal

Remove air filter box (refer to *AIR INTAKE SILENCER*).

Install a small hose pincher (P/N 295 000 076) on fuel pump outlet hose at carburetor.



V01F09A

Drain carburetor by unscrewing the drain screw underneath.

Unplug all hoses from carburetor.

NOTE: To ease reinstallation, mark all hoses before unplugging.

Unscrew choke cable then remove the choke plunger from the throttle body.

NOTE: Take care not to drop the choke plunger. If so, check plunger for damages and replace if necessary.

On the RH side of vehicle, remove the throttle cable from carburetor. See *THROTTLE CABLE* further in this section.

Unscrew clamp retaining carburetor to the intake adaptor.

Pull out carburetor.

Cleaning and Inspection

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

CAUTION: Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-rings, etc. Therefore, it is recommended to remove those parts prior to cleaning.

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

⚠ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzene, etc., should not be used as they are flammable and explosive.

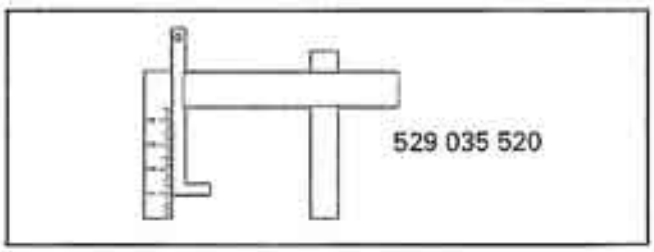
Carburetor Float Level Adjustment

Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows:

- Remove float bowl and gasket from carburetor.
- Make sure that float arm is symmetric, not distorted.

With carburetor chamber upside down:

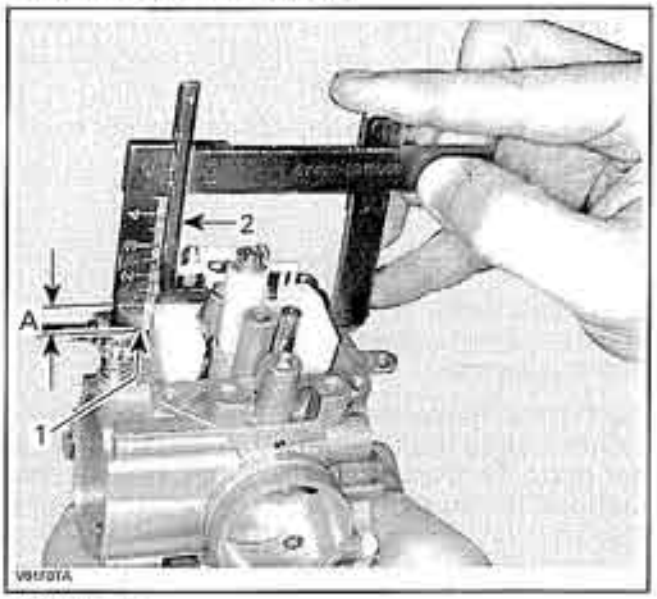
- Measure height between bowl seat and the top edge of float arm. Use the float level gauge (P/N 529 035 520).



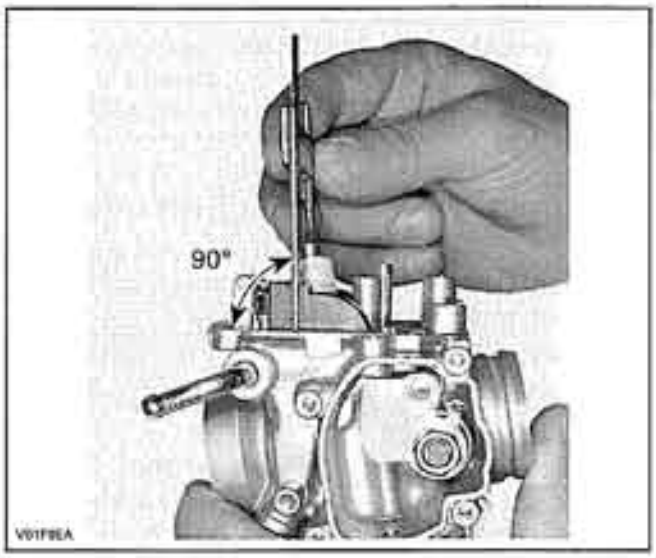
- Keep float level gauge perfectly vertical and in line with main jet hole.

Ensure that both float level gauge tips are properly positioned on carburetor body and that "L" arm is leaning on float while compressing valve spring.

Refer to following photos for proper float level gauge positioning and adjust float level to 10 mm ± 0.5 mm (.39 in ± .02 in).



1. Gauge tips
2. "L" arm
A. Height



GAUGE ALIGNED WITH MAIN JET

To adjust height, bend the contact tab of float arm until the specified height is reached.

CAUTION: When adjusting lever, do not pry it. This will apply pressure on needle and damage valve seat/needle.

Installation

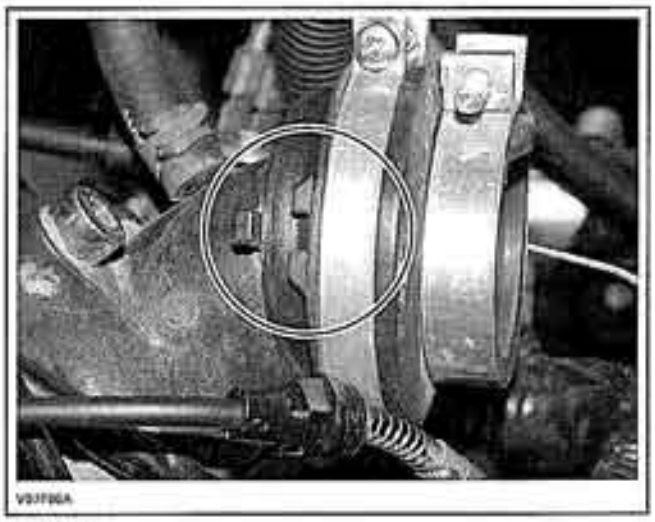
To install carburetor on engine, inverse removal procedure. Pay attention to the following details:

- Inspect throttle and choke cable housing prior to installation.
- Reinstall throttle and choke cables, at the same time adjust the throttle cable, then install the side cover. Refer to *CARBURETOR ADJUSTMENTS* below in this section.
- Reinstall carburetor on vehicle.

When reinstalling carburetor on vehicle, pay attention to the following:

CAUTION: The rubber flanges must be checked for cracks and/or damage. At assembly, the rubber flanges must be perfectly matched with the air box, carburetor and engine or severe engine damage will occur. Do not use screwdriver or other tool to install the rubber flanges.

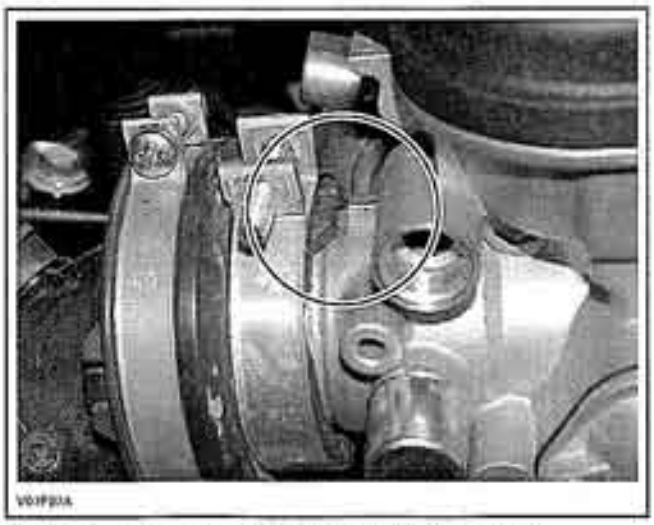
Make sure rubber flange recess is aligned with intake adaptor notch.



TYPICAL

Install clamps so that their tightening bolts are staggered — not aligned.

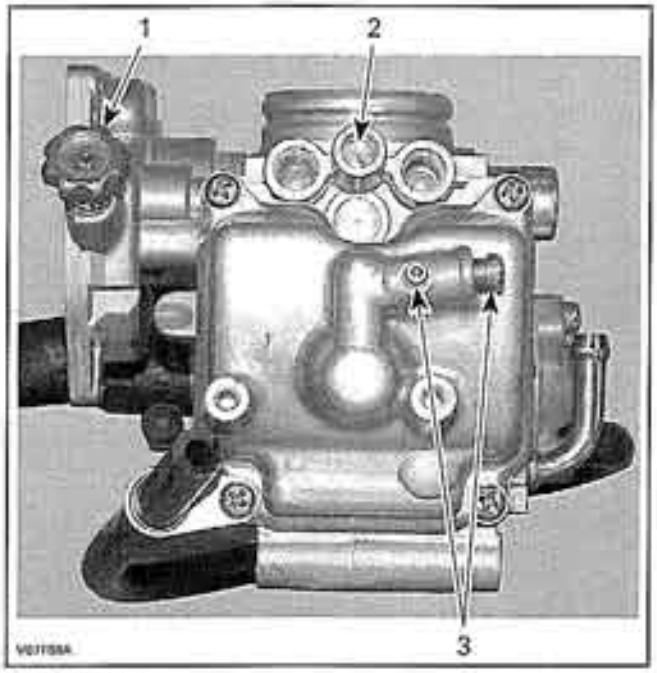
Align carburetor notch with the flange recess.



TYPICAL — CARBURETOR NOTCH ALIGNED WITH THE FLANGE RECESS

Install air filter box.

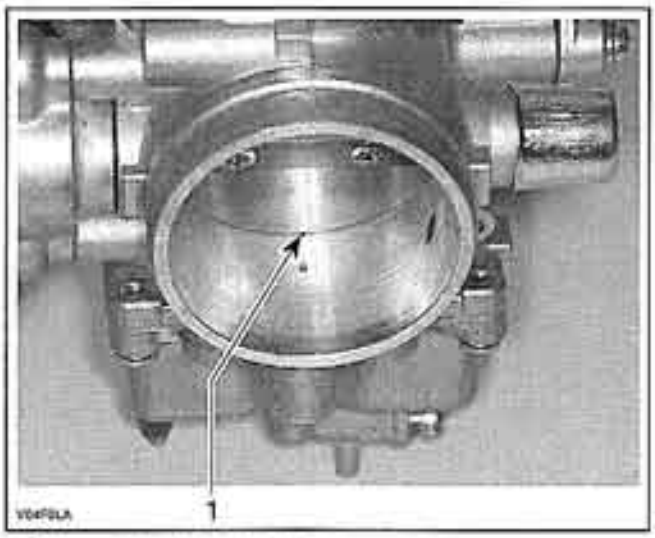
Carburetor Adjustments



BOTTOM VIEW
1. Idle speed screw
2. Pilot screw
3. Drain plug and screw

Idle Speed Preliminary Adjustment

Adjust throttle screw to 1-1/2 turn or so that throttle valve closes bypass hole by half, as shown in the next photo.

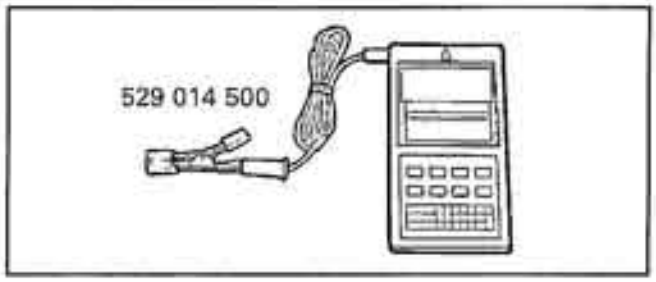


1. Bypass hole closes to halfway

Idle Speed Adjustment

Start engine and allow it to warm then adjust idle speed to specifications by turning idle speed screw clockwise to increase engine speed or counterclockwise to decrease it.

NOTE: Use the digital induction tachometer (P/N 529 014 500). Turn tachometer wire around spark plug wire, about 4 or 5 turns, for the best measure.



CAUTION: Do not attempt to set the idle speed by using the pilot screw.

The idle speed should be adjusted to 1300 ± 50 RPM.

Pilot Screw Adjustment

NOTE: The pilot screw is factory preset. Warm the engine to operating temperature.

Turn the pilot screw clockwise until you hear the engine missing or decreasing idle speed, then turn counterclockwise until the engine again misses or decreases idle speed.

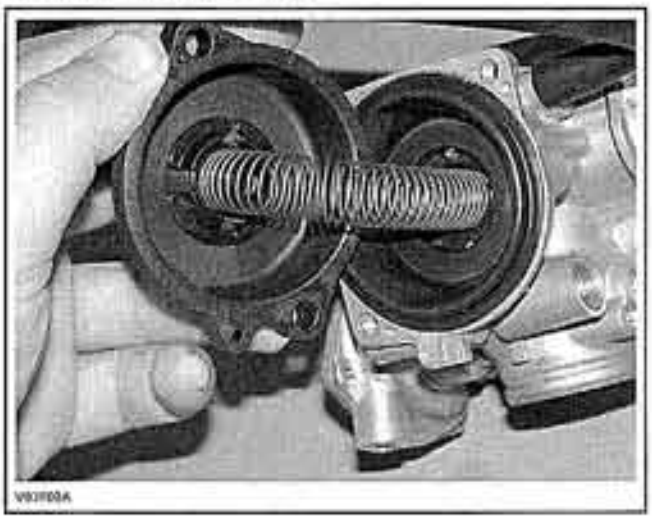
Center the pilot screw exactly between these two extreme positions then unscrew the pilot screw of 3/8 turn.

If idle speed changes after adjustment of the pilot screw, readjust the idle speed screw.

Diaphragm Installation

Carefully replace diaphragm in its original position.

Make sure spring is located properly in carburetor cover before screwing.



THROTTLE CABLE

Removal

Carburetor Side

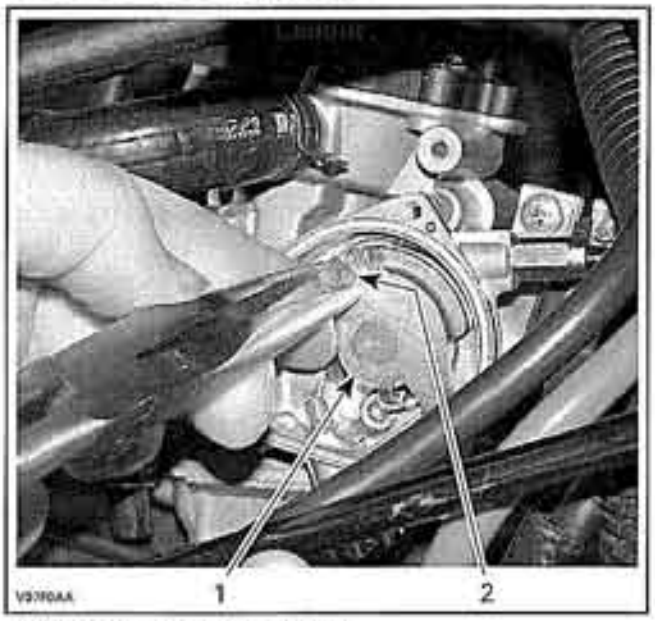
⚠ WARNING

Ensure the key is turned OFF, prior to performing the throttle cable adjustment.

NOTE: To ease reinstallation, take note the cable routing.

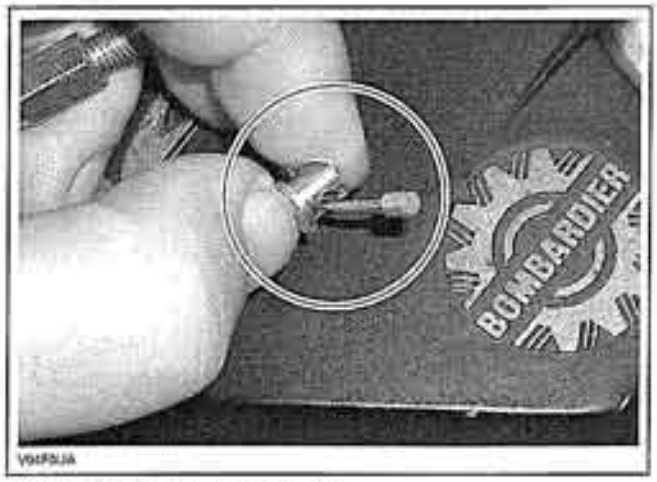
Remove carburetor side cover.

Using thumb, release tension on throttle lever. With long nose pliers, rotate cable end bushing so that cable aligns with throttle lever recess, then lift cable end. See next photo.



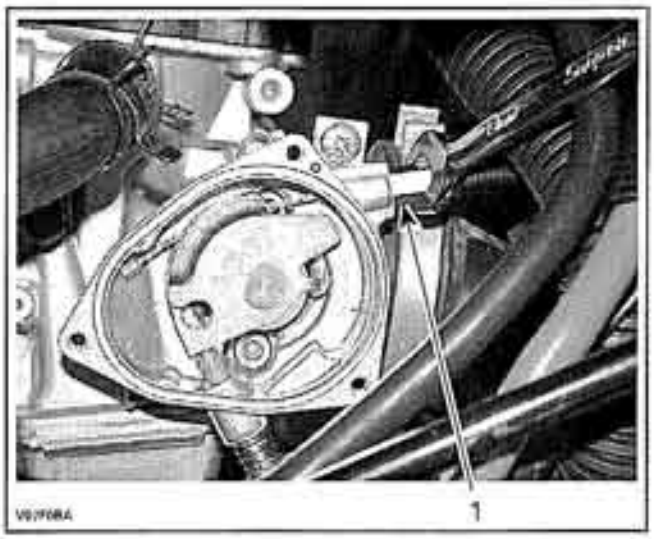
1. Release tension on throttle lever
2. Cable end bushing

Separate cable end bushing from throttle cable end, as shown in the next photo. Keep bushing.



REMOVE CABLE END BUSHING

Loosen throttle cable nut, as shown in the next photo.

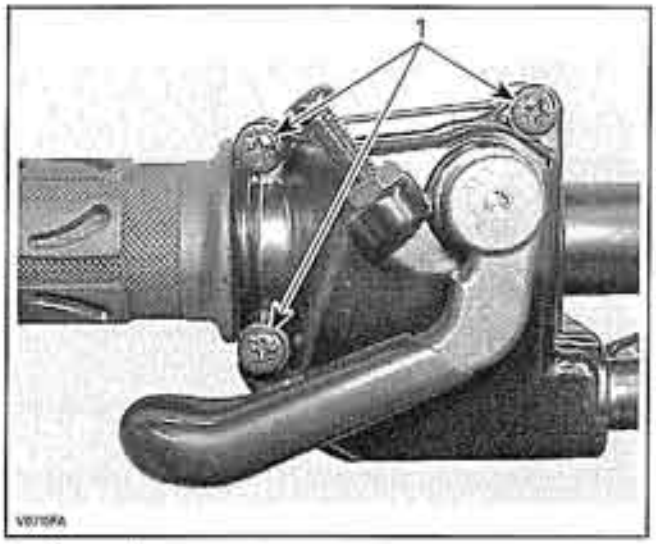


1. Loosen this nut

Pull cable out from carburetor.

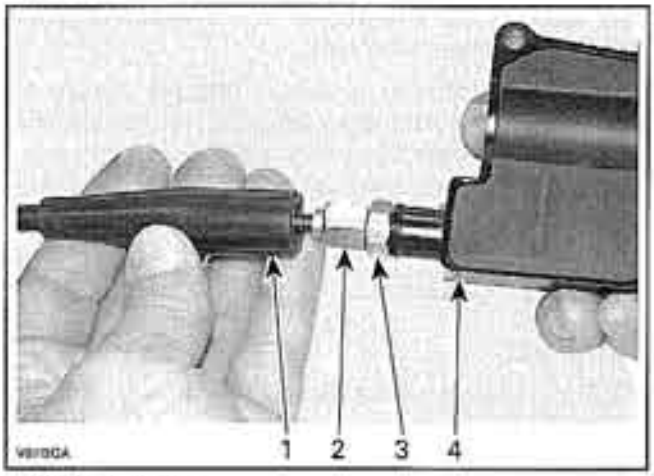
Throttle Lever Side

Remove screws under throttle lever then open it.



1. Remove these screws

Separate housing. Slide rubber protector back to expose throttle cable adjuster.

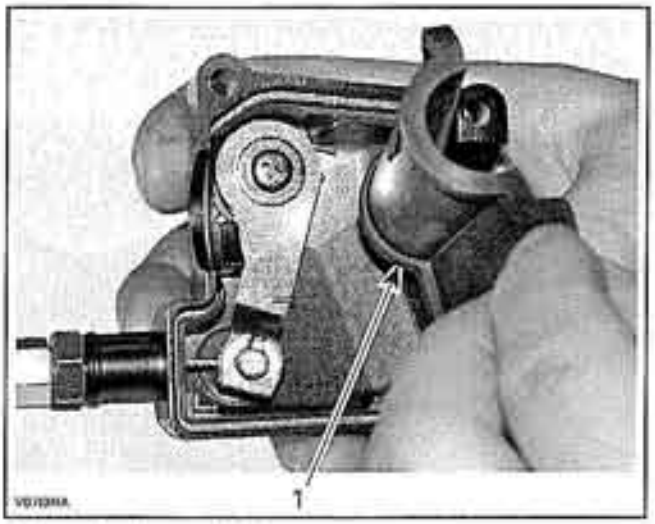


1. Cable protector
2. Throttle cable adjuster
3. Lock nut
4. Throttle lever housing

Screw in the throttle cable adjuster.

Remove:

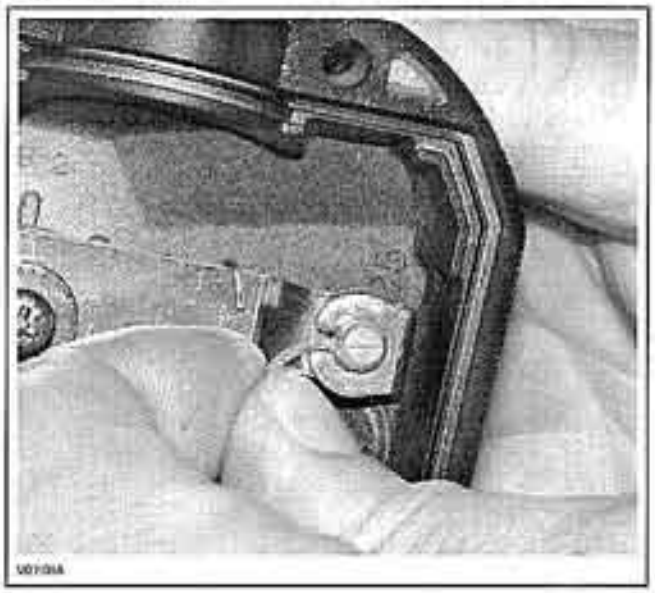
– inner housing protector



1. Inner housing protector

– throttle cable from housing.

Slide cable in clip slot and remove the end of cable from clip.



Lubrication

The throttle cable must be lubricated with the cable lubricant (P/N 293 600 041) or with another silicone cable lubricant.

⚠ WARNING

Always use a silicone-based lubricant. Using another lubricant (like a water-based lubricant) could cause the throttle lever/cable sticking or stiffness.

To lubricate the throttle cable, remove cable from throttle lever side.

Slide rubber protector to expose throttle cable adjuster.

Remove carburetor side cover.

Insert the needle of lubricant can in the end of throttle cable adjuster.

⚠ WARNING

Always wear eye protection and gloves when lubricating cables.

NOTE: Place a rag around cable adjuster to prevent lubricant splash.

TYPICAL

Put lubricant until it passes through the cable.

Clean lubricant surplus in carburetor housing.

Spray lubricant inside throttle housing.

Reinstall carburetor cover and cable in throttle housing.

Adjust cable; see below.

Installation

For installation, reverse the removal procedure.

Adjustment

⚠ WARNING

Ensure the key is turned OFF, prior to perform the throttle cable adjustment.

Slide rubber protector back to expose throttle cable adjuster.

Loosen lock nut then turn the adjuster to obtain correct throttle lever free play.

NOTE: Measure throttle free play at the tip of throttle lever.

Tighten lock nut and reinstall protector.

With the transmission lever on PARK position, start engine. Check if the throttle cable is adjusted correctly by turning handlebar fully right then fully left. If the engine RPM increase, readjust the throttle lever free play.

Turn engine off and unscrew stopper screw located under throttle lever housing. Press throttle lever at wide open throttle position and turn screw until it touches the throttle lever. Turn the stopper screw 1/2 turn again and lock it with the lock nut.

CHOKE CABLE

Removal

NOTE: To ease reinstallation, take note of cable routing.

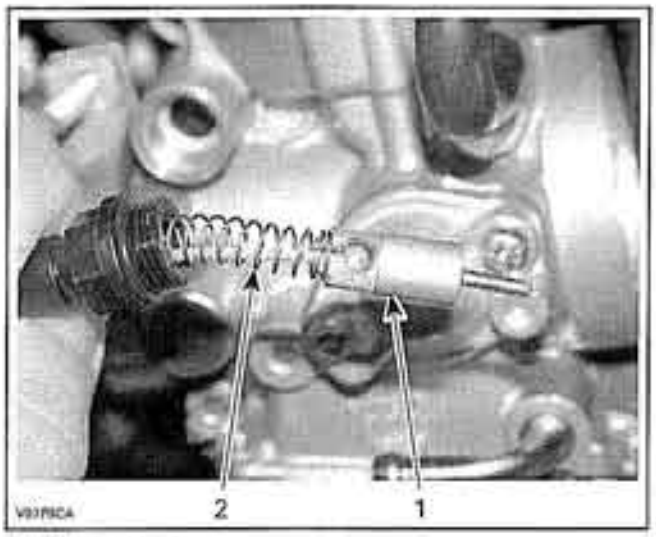
Carburetor Side

Remove the LH side panel and the air filter box.

Unscrew choke plastic nut from carburetor.

Pull choke cable to remove choke plunger from carburetor.

Remove the choke plunger and its spring.



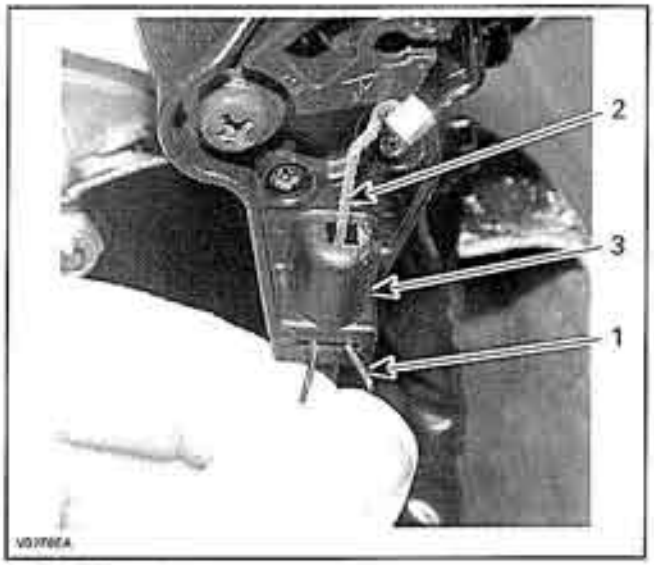
1. Choke plunger
2. Choke plunger spring

Handlebar Side

Push the choke lever on FULL position.

Underneath multi-function switch, align the choke cable end with the lever slot then remove the cable.

Remove the retaining spring to remove the choke cable from housing.



1. Retaining spring
2. Choke cable
3. Choke cable housing

Installation

The installation is the reverse of removal procedure.

CHARGING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
4-pin magneto harness adapter	529 036 021	198-201
multimeter Fluke 111	529 035 868	196

SERVICE PRODUCTS

Description	Part Number	Page
dielectric grease	293 550 004	203

GENERAL

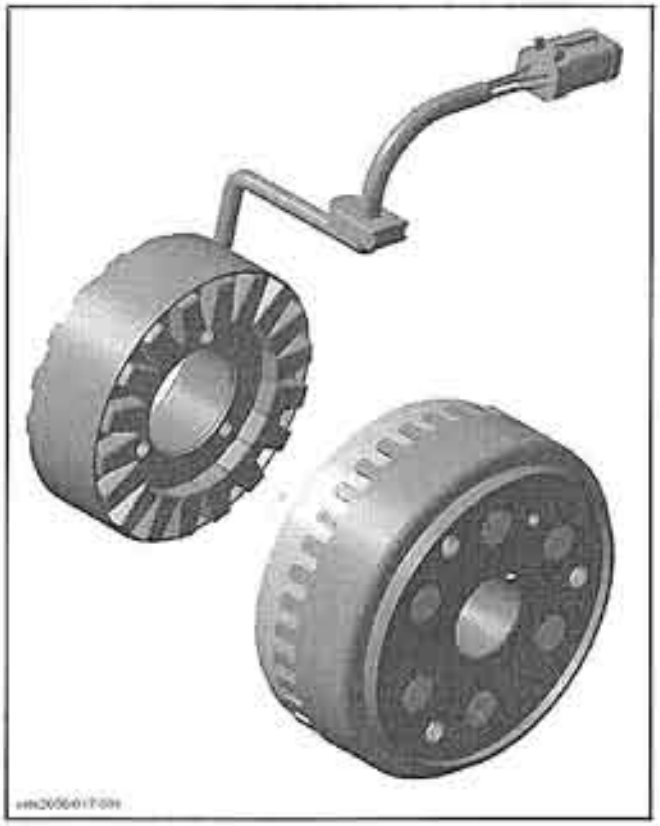
The purpose of the charging system is to keep the battery at a full state of charge.

NOTE: For an overview of the vehicle electrical system, refer to *ENGINE MANAGEMENT*.

Magneto

The magneto is the primary source of electrical energy. It transforms magnetic field into electric current (AC).

The magneto has a 3 phase series stator.



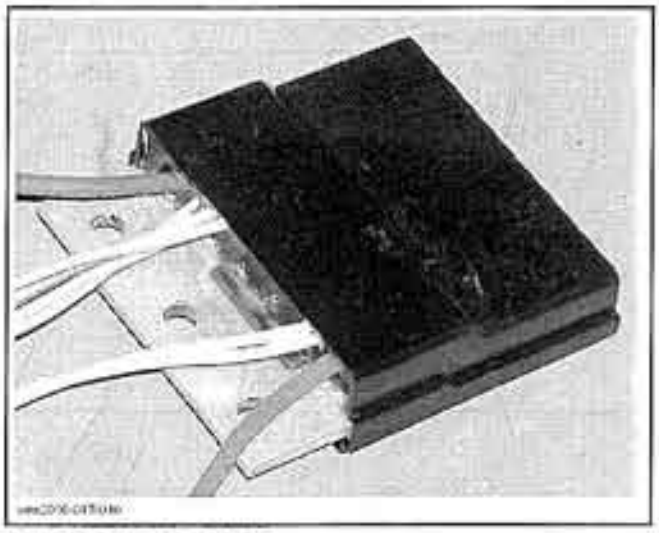
TYPICAL

Voltage Regulator/Rectifier

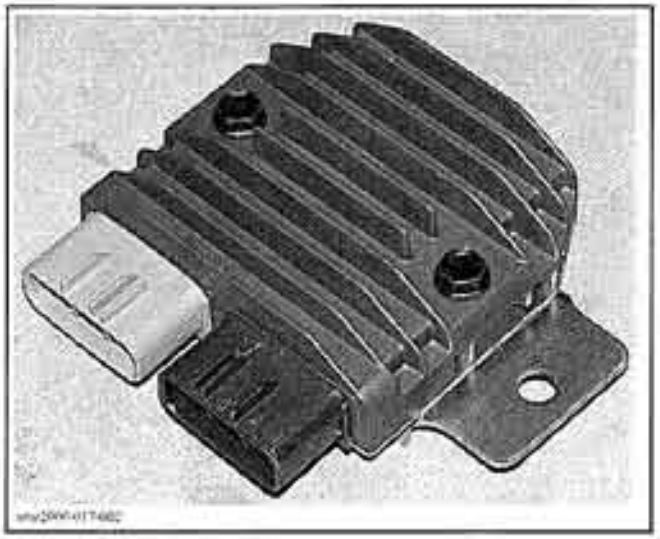
The rectifier receives AC current from the magneto and transforms it into direct current (DC).

The voltage regulator, included in the same unit, limits voltage as follows to prevent any damage to electrical components.

MODEL	VOLTAGE, Vdc
Outlander 400 series	15.1
Outlander 800 series	14.8



OUTLANDER 400 SERIES



OUTLANDER 800 SERIES

Battery

The battery is the DC source for the electric starter, the ECM and all accessories.

Parts Replacement

Before replacing any part, always ensure wiring/connectors are in good condition. Check for continuity or short circuits.

PROCEDURES

NOTE: First, ensure that battery is in good condition prior to performing the following test using a current inductive ammeter such as Snap-on MT 110.

For best results, use the multimeter Fluke 111 (P/N 529 035 868).

529 035 868

If the battery is regularly discharged, check battery and solenoid terminals.

VOLTAGE REGULATOR/RECTIFIER

Outlander 400 Series

Static Test: Continuity

Due to internal circuitry, there is no static test available.

Dynamic Test: DC Current

Proceed as follows:

- Start engine.
- Lay an inductive ammeter on positive cable of battery.
- Bring engine to approximately 4000 RPM.

Depending on battery charge, current reading should be approximately 3 - 7 amperes. If not, check magneto output prior to concluding that voltage regulator/rectifier is faulty.

Dynamic Test: Voltage

Proceed as follows:

- Start engine.
- Connect a multimeter to battery posts. Set multimeter to Vdc scale.
- Bring engine to approximately 4000 RPM.

If multimeter reads over 15.1 ± 0.5 volts, voltage regulator/rectifier is defective. Replace it.

NOTE: Whatever the voltmeter type used (peak voltage or RMS), the voltage must not exceed 15 V. A faulty voltage regulator/rectifier will allow voltage to exceed 15 V as engine speed is increased.

NOTE: If voltage exceeds 19 Vdc, speedometer will display "FAIL". Replace voltage regulator/rectifier by a new one.

NOTE: If the battery will not stay charged, the problem can be any of the charging circuit components. If these all check good, you would be accurate in assuming the problem to be in the voltage regulator/rectifier.

If there is no charging at the battery with the preceding voltage test, the following test can also be performed.

NOTE: If the voltage regulator/rectifier is within the specification, the wiring harness between the voltage regulator/rectifier and battery is defective. If the voltage regulator/rectifier is out of specification and the stator tests good, the voltage regulator/rectifier is defective.

Outlander 800 Series

⚠ WARNING

In the following tests:
- **Pay attention not to touch chassis with any tool when disconnecting/connecting wires.**
- **Pay attention so that battery positive post does not touch chassis when moving battery.**

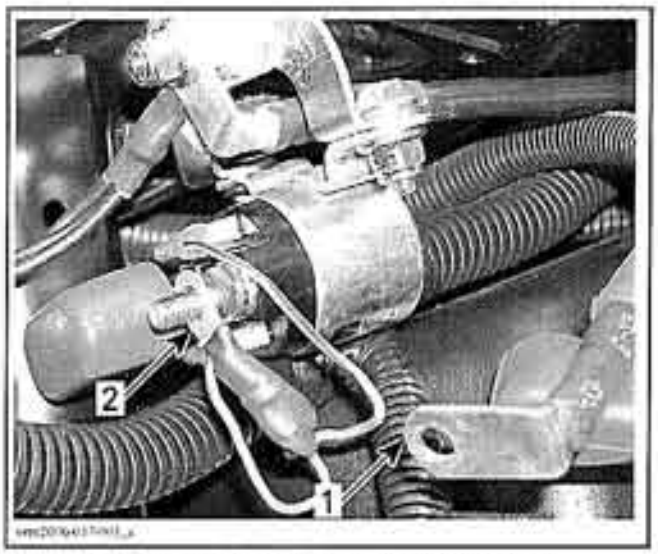
Static Test: Continuity

Due to internal circuitry, there is no static test available to check continuity.

Dynamic Test: DC Current

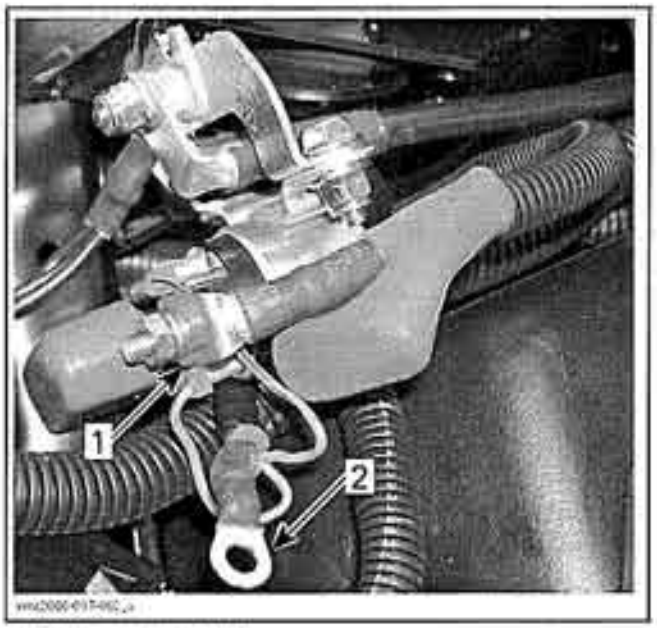
Proceed as follows:

- Disconnect voltage regulator/rectifier wire from solenoid.



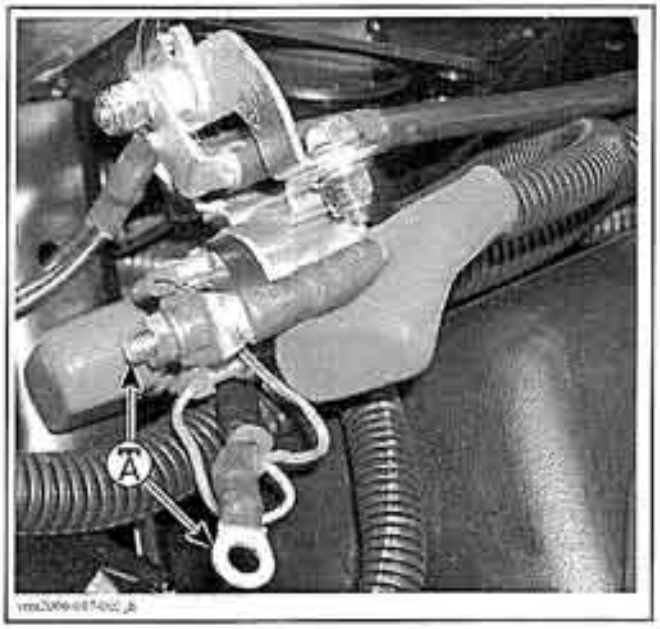
1. Move battery cable away to remove wire underneath
2. Remove this wire

- Reconnect battery cable.



1. Battery cable installed
2. Voltage regulator/rectifier wire disconnected

- Set multimeter to Adc.
- Start engine.
- Connect multimeter probes between voltage regulator/rectifier wire and solenoid post.



TEST ENGINE SPEED	CURRENT
4000 RPM	approx. 3 - 7 A

- Read current.
- If current is below specification, check magneto (stator) output prior to concluding that rectifier is faulty.
- Properly reconnect voltage regulator/rectifier wire.

Dynamic Test: Voltage

Proceed as follows:

- Release battery strap. Pull back battery to reach battery posts.
- Set multimeter to Vdc scale.
- Connect multimeter to battery posts.
- Start engine.

TEST ENGINE SPEED	VOLTAGE
4000 RPM	Max. 14.8 Vdc

- Read voltage.

- If voltage is above specification, replace voltage regulator/rectifier.
- If voltage is below specification, check wiring and connections.
- Properly secure battery.

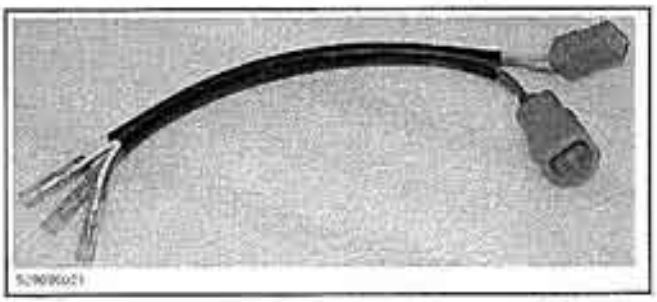
NOTE: If the battery will not stay charged, the problem can be any of the charging system components. If these all check good, try a new voltage regulator/rectifier.

STATOR

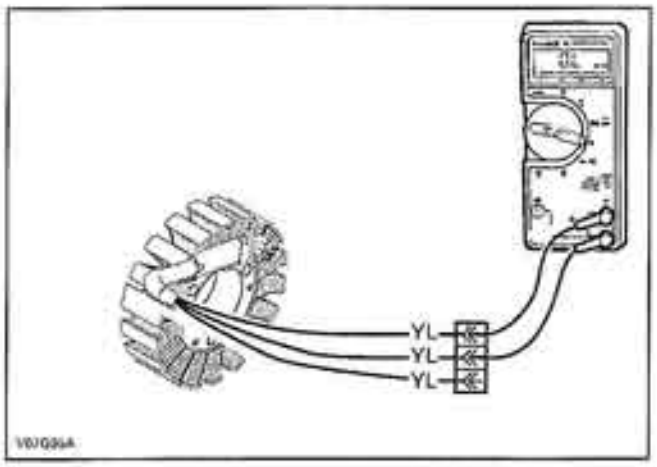
Outlander 400 Series

Static Test: Continuity

- Disconnect the magneto wiring harness connector.
- Install the 4-pin magneto harness adapter (P/N 529 036 021) on magneto connector. Leave the other connector unplugged.

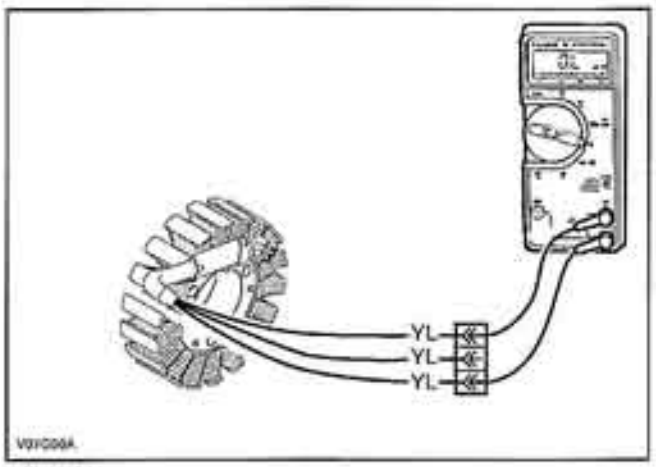


- With the recommended multimeter, place the 2 meter test probes onto the stator wire leads AC-1 and AC-2 of the stator. The resistance should be between 0.1 Ω and 1.0 Ω.



TYPICAL

– Place either meter test probe into the remaining stator lead (AC-3) and note the resistance. If the readings are out of specification, the stator will need to be replaced.

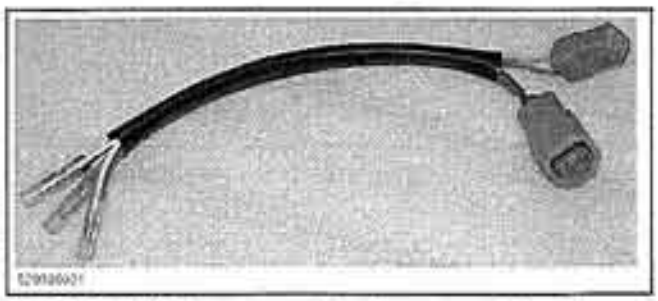


TYPICAL

Static Test: Insulation

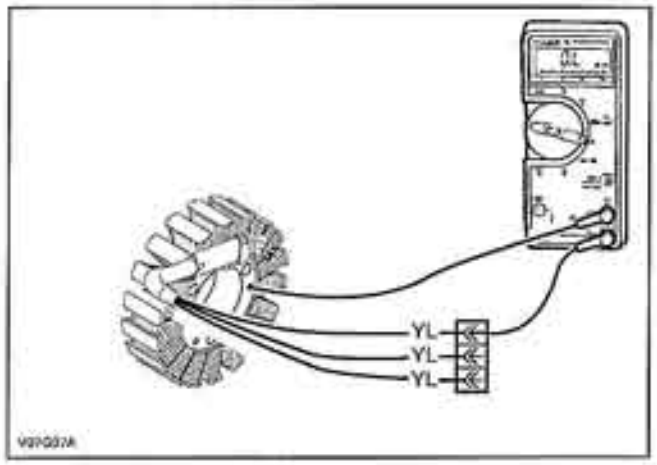
Disconnect the magneto wiring harness connector.

Install the 4-pin magneto harness adapter (P/N 529 036 021) to the magneto wiring harness.



IMPORTANT: Leave wiring harness side disconnected.

Insert either meter test probe onto AC-1 and ground the other meter test probe to the engine or the stator iron core and note the reading. There should be no continuity (infinity) between the stator insulated coils and ground. If there is a reading, the stator coils and/or the wiring from the coils is grounded and needs to be replaced/repaired respectively.



TYPICAL

Dynamic Test: AC Voltage

1. Unplug magneto wiring harness connector.
2. On magneto side, connect test probes of the multimeter to two of the YELLOW wires.
3. Set multimeter to Vac scale.
4. Start engine and bring to 4000 RPM. The obtained value should be between 10 and 13 Vac.
5. Repeat operation 3 times with each wire (to check each phase).
6. If the stator is out of specification, replace it.

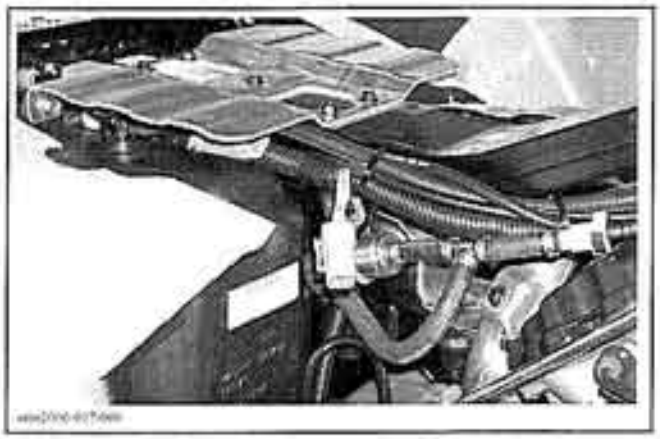
Outlander 800 Series

Remove seat and RH side panel.

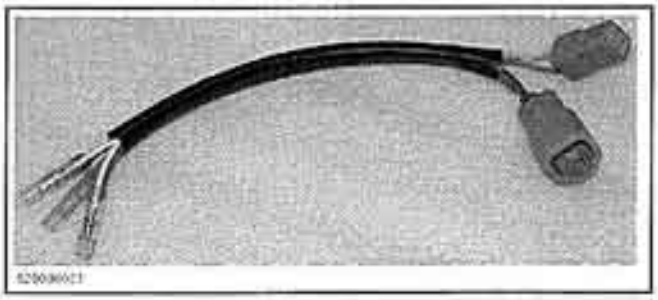
Static Test: Continuity

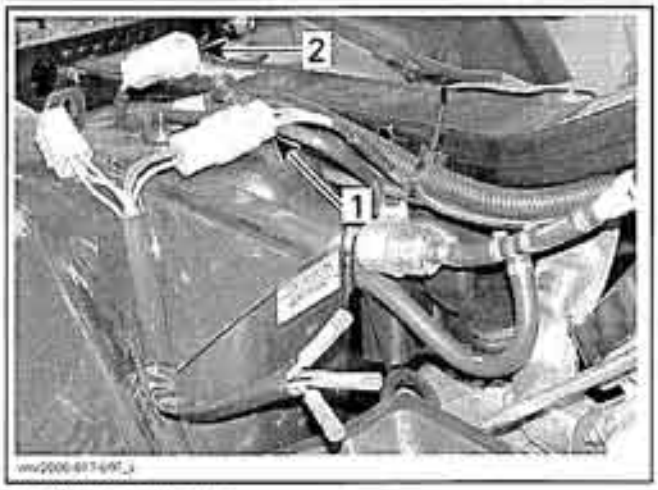
Proceed as follows:

– Remove protective plate as necessary.
– Disconnect the magneto wiring harness connector.



- Install the 4-pin magneto harness adapter (P/N 529 036 021) on magneto connector. Leave the other connector unplugged.



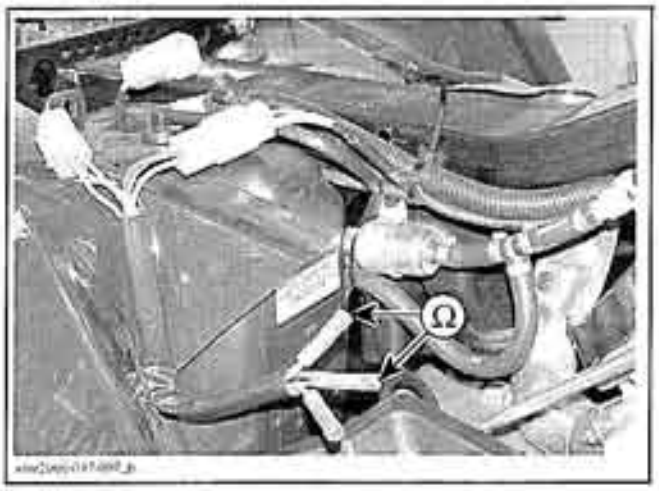


1. Magneto connector
2. Leave unplugged

- Set multimeter to Ω.
- Connect multimeter between YELLOW wires.

TERMINAL	RESISTANCE @ 20°C (69°F)
1 and 2	0.1 - 1 Ω
1 and 3	
2 and 3	

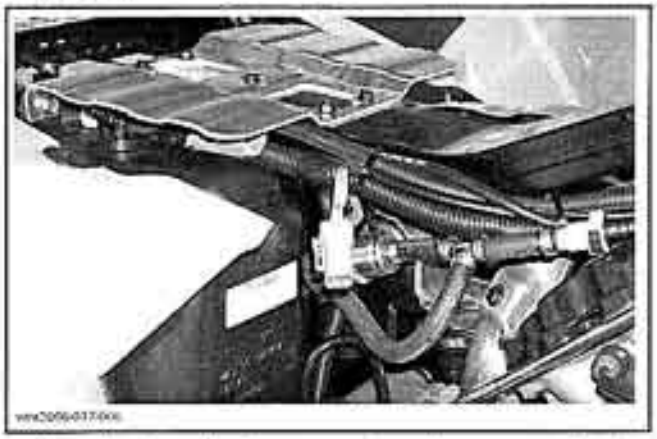
- Read resistance.



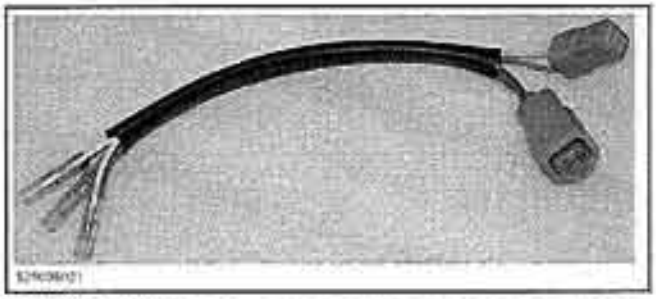
- If any result is out of specification, replace stator.
- Replug connectors properly.

Static Test: Insulation

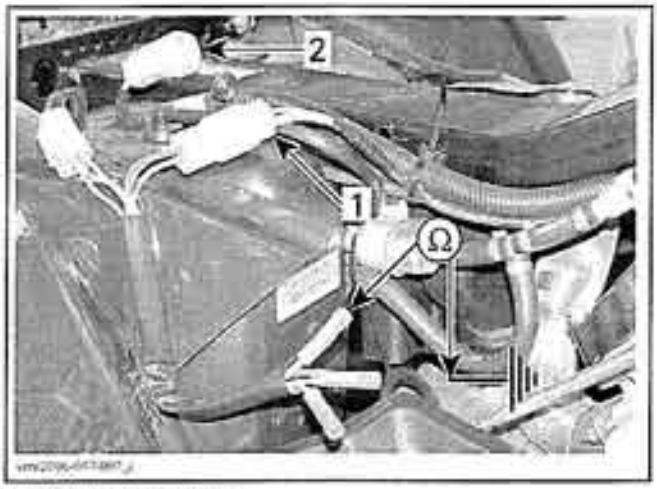
- Disconnect the magneto wiring harness connector.



- Install the 4-pin magneto harness adapter (P/N 529 036 021) to the magneto wiring harness.



IMPORTANT: Leave wiring harness side disconnected.



1. Magneto connector
2. Leave unplugged

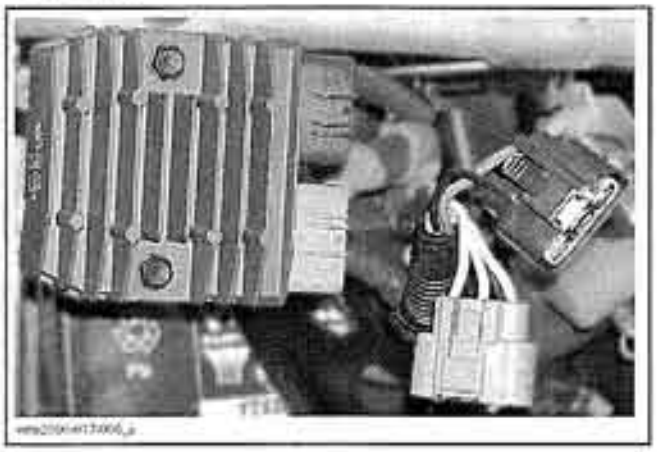
- Set multimeter to Ω.
- Connect multimeter between YELLOW wires.

TERMINAL	RESIGNANCE @ 20°C (69°F)
Any YELLOW wire and engine ground	Infinity (open circuit)

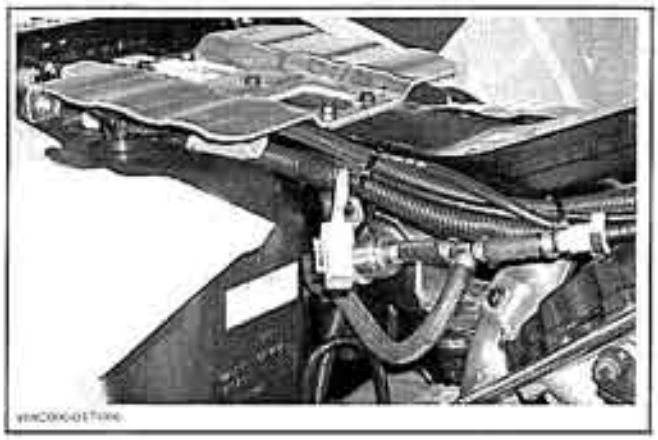
- Read resistance.
- If there is a resistance or continuity, the stator coils and/or the wiring is grounded and needs to be repaired or replaced.
- Replug connectors properly.

Dynamic Test: AC Voltage

- Disconnect the voltage regulator/rectifier connectors.

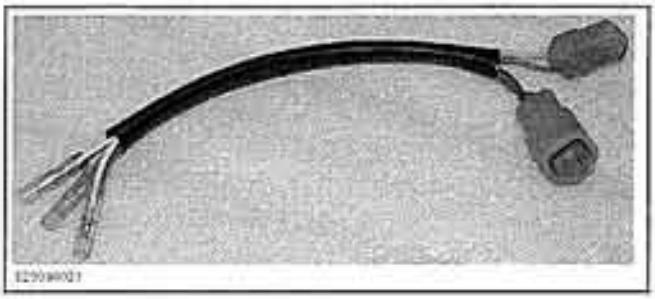


- Disconnect the magneto wiring harness connector.

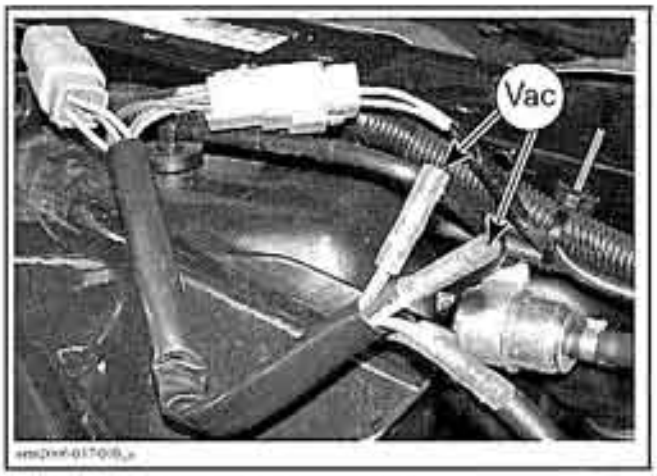


- Install the 4-pin magneto harness adapter (P/N 529 036 021) between unplugged connectors.

NOTE: Both connectors must be plugged.



TYPICAL



- Set multimeter to Vac scale.
- Start engine.
- Connect multimeter between YELLOW wires.

TEST ENGINE SPEED	TERMINAL	VOLTAGE
4000 RPM	1 and 2	Approx. 25 Vac
	1 and 3	
	2 and 3	

- Read voltage.
- If voltage is lower than specification, replace stator.
- Replug connectors properly.

BATTERY

Battery Information

These vehicles are equipped with a VRLA battery (Valve Regulated Lead Acid). It is a maintenance-free type battery.

When filling a new battery, **use only the electrolyte container that comes with the battery.** Sealed VRLA battery electrolyte is a higher concentration of sulfuric acid. All sealed VRLA battery electrolyte containers are not the same. Each contains the proper amount of electrolyte for its specific battery.

NOTE: NEVER REMOVE THE SEALING STRIP AFTER CHARGING IS COMPLETED.

Refer to battery manufacturer's instructions for proper filling, activation and routine charging procedures.

Troubleshooting

DISCHARGED OR WEAK BATTERY

- battery posts and/or cable terminal oxidized
- loose or bad connections
- faulty battery (does not keep a full charge)
- main system fuse burnt, faulty voltage regulator/rectifier or stator.

Unload Test

NOTE: An unloaded test is made on a battery without discharging current. It is the simplest and most commonly used. However, be aware that the voltage test can be good, while the battery does not have enough power to crank the engine. A load test gives a more accurate condition of the battery.

Check the charge condition using a multimeter.

With a multimeter, voltage readings appear instantly to show the state of charge. Always respect polarity. A fully charged battery will have a reading of 12.6 Vdc minimum.

Load Test

This is the best test of the batteries condition. Use a load testing device that has an adjustable load.

Apply a load of 3 times the ampere-hour rating of the battery. At 14 seconds into the test, check battery voltage; if battery is in good condition, it will have at least 10.5 Vdc.

Removal

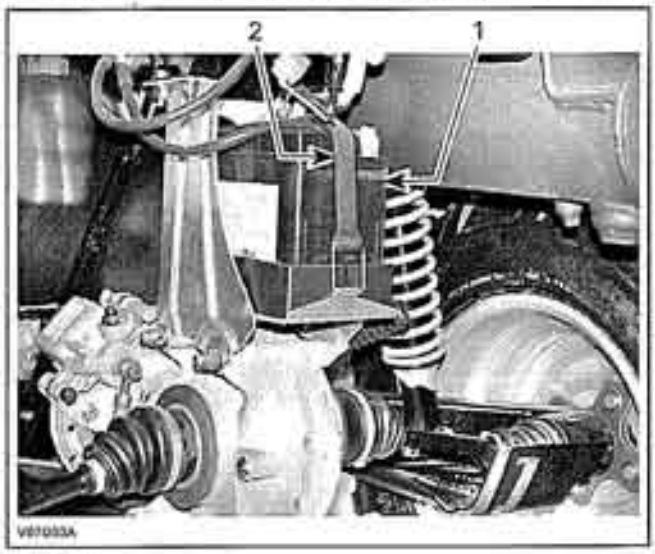
Outlander 400 Series

Disconnect BLACK (-) cable first, then the RED (+) cable.

⚠ WARNING

Always respect this order for disassembly; disconnect BLACK (-) cable first. Electrolyte or fuel vapors can be present and a spark may ignite them and possibly cause personal injuries.

Remove holding strap retaining battery to rack.



TYPICAL
1. Battery
2. Holding strap

Outlander 800 Series

Release battery strap.

1. Strap

Pull back battery to reach battery posts.

Disconnect BLACK (-) cable first, then the RED (+) cable.

⚠ WARNING

Always respect this order for disassembly; disconnect BLACK (-) cable first. Electrolyte or fuel vapors can be present and a spark may ignite them and possibly cause personal injuries.

Remove battery.

Cleaning

Clean the battery rack, cables and battery posts using a solution of baking soda and water.

Remove corrosion (if so) from battery cable terminals and battery posts using a firm wire brush. Rinse with clear water and dry well.

Inspection

Visually inspect battery casing for cracks or other damage. If casing is damaged, replace battery and thoroughly clean battery rack with water and baking soda.

Inspect battery posts condition, battery rack mounting, straps and strap attachment points.

Storage

If the battery is in storage or used infrequently, disconnect the battery cables to eliminate drain from electrical equipment.

For extended storage, remove the battery from vehicle.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 293 550 004) on terminals.

Clean battery casing using a solution of baking soda and water. Rinse battery with clear water and dry well using a clean cloth.

Regularly charge battery as per manufacturer's recommendations.

For other recommendations during storage, refer to battery manufacturer's instructions.

⚠ WARNING

Ensure to store battery in a safe place, out of reach for children.

Installation

Outlander 400 Series

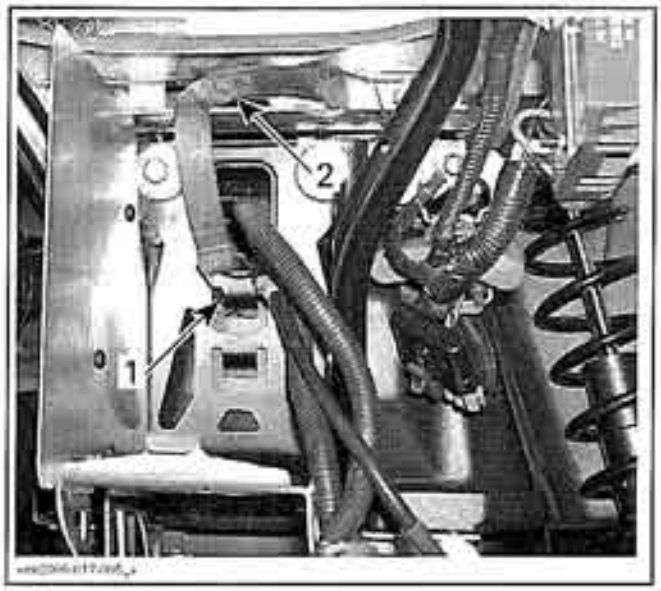
Reinstall battery in vehicle. Install the holding strap.

⚠ WARNING

Always connect RED (+) cable first then BLACK (-) cable.

Outlander 800 Series

Temporary hook battery strap as shown.



1. Hook at bottom
2. Temporary squeeze strap here

Temporary put battery in rack.

Connect battery cables.

⚠ WARNING

Always connect RED (+) cable first then BLACK (-) cable.

Properly position battery with positive post towards front, then secure with strap.

1. Secured strap

IGNITION SYSTEM

SERVICE TOOLS

Description	Part Number	Page
ECM adapter	420 277 010	215
multimeter Fluke 111	529 035 868	212

OUTLANDER 400 SERIES

GENERAL

Ignition Problems

When dealing with ignition problems, the following items should be checked in this order. After one item has been checked and it is found not to be the problem, continue with the next item:

1. main fuse condition
2. spark occurrence
3. battery condition
4. ignition switch
5. CPS (Crankshaft Position Sensor)
6. ignition coil
7. electronic module.

Intermittent Ignition Problems

In dealing with intermittent problems there is no easy diagnosis. For example, problems that occur only at normal engine operating temperature have to be tested under similar conditions.

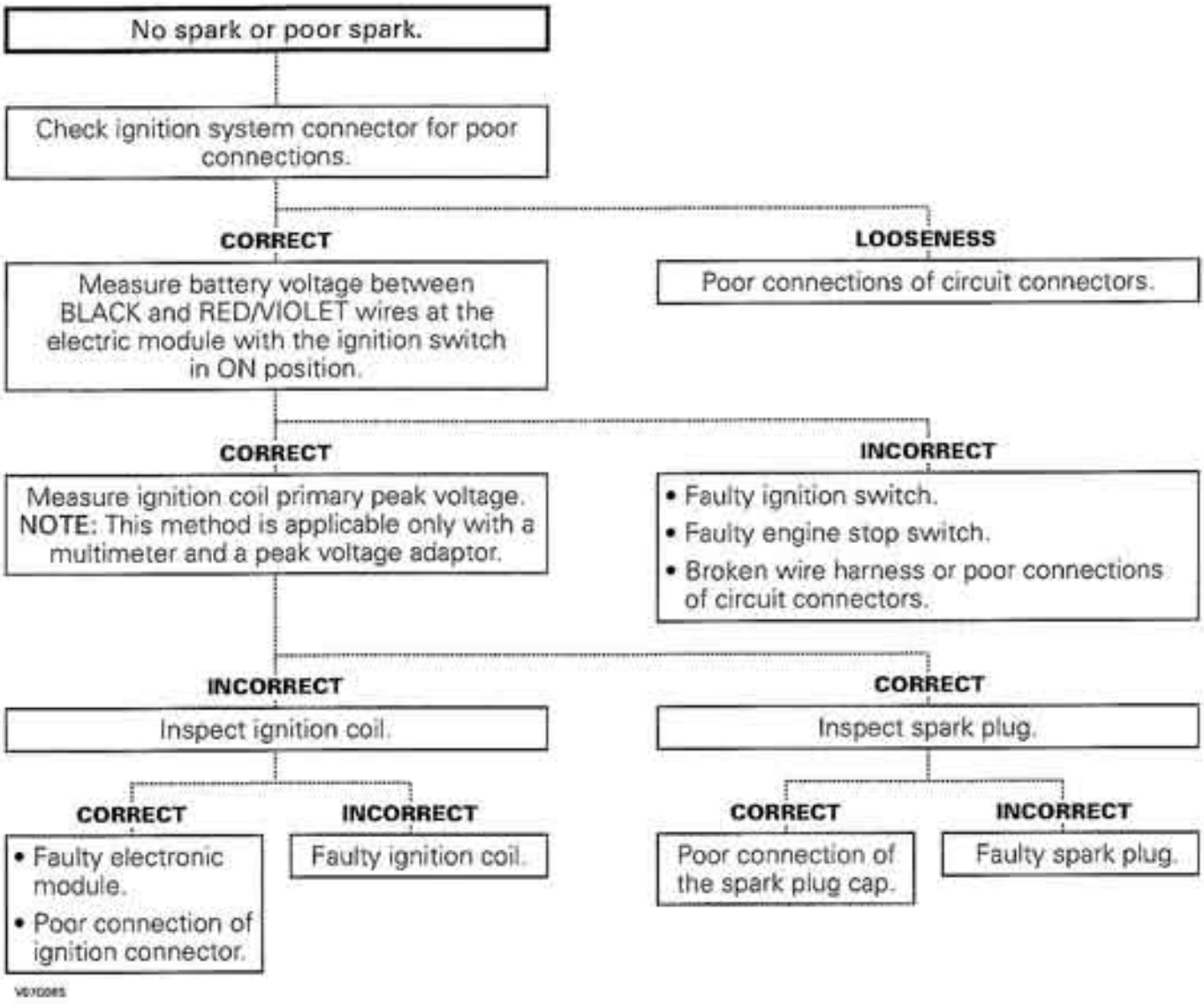
In most cases of temperature and/or vibration failure, only parts replacement might solve the problem as most of these failures return to normal when engine is not running.

Multiple Problems

There is always the possibility of more than one faulty part. If after a component has been replaced, the problem still persists, carefully repeat the complete test procedure to find the other faulty part.

TROUBLESHOOTING

NOTE: Check that the transmission is in PARK or NEUTRAL position and the engine stop switch is in "RUN" position. Check that main fuse is not burned and if battery is fully-charged before diagnosing.



PROCEDURES

Safety Precautions

⚠ WARNING

To prevent powerful electric shocks while cranking engine, neither touch any electronic ignition components (ignition coil, wire harness, etc.) nor tester lead clips. Also make sure that tester leads do not touch any metallic object.

MAIN FUSE CONDITION

Check main fuse (20 A) condition. Replace burnt fuse as necessary.

CAUTION: Do not use higher rated fuse as this can cause severe damage.

SPARK OCCURRENCE

Remove spark plug and connect to the ignition coil. While holding the spark plug against a metallic part of the engine, crank the engine. Look for a spark at the spark plug tip. Replace defective spark plug.

NOTE: Make sure that the engine stop switch is in the run position.

Keep in mind that a spark plug might test good this way while not being able to work properly under combustion chamber mixture and pressure.

If known good spark plug does not work, continue the other tests.

BATTERY CONDITION

A battery must be present in the vehicle to allow the ignition system to work. Also, at least 8 V is required for proper operation. Check battery voltage.

IGNITION SWITCH

A quick test to verify if it is working properly. Turn the ignition switch ON. If the headlamps turn on, the ignition switch is good.

Test

Remove console and disconnect ignition switch.

Measure voltage between RED supply wire and the battery ground. If voltage is lower than battery voltage, test the wiring. If voltage is good, test switch.

Use a multimeter and measure the resistance between the following wires.

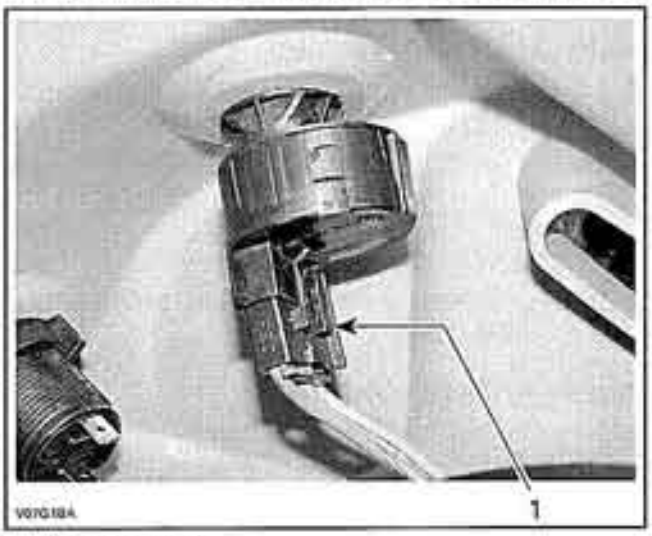
POSITION	WIRE	RESISTANCE
OFF	RED and RED/YELLOW	Infinite (O.L)
OFF	RED and RED/VIOLET	Infinite (O.L)
ON (w/lights)	RED and RED/YELLOW	0.2 ± 0.2 Ω max.
ON (w/lights)	RED and RED/VIOLET	0.2 ± 0.2 Ω max.
ON (w/o lights)	RED and RED/YELLOW	Infinite (O.L)
ON (w/o lights)	RED and RED/VIOLET	0.2 ± 0.2 Ω max.

Replace switch if defective.

If switch is good, continue the other tests.

Removal

Lift the console and unplug the switch connector.



1. Switch connector

Unscrew the ignition switch nut.

Installation

For the installation, reverse the removal procedure.

CRANKSHAFT POSITION SENSOR

NOTE: The CPS is not adjustable.

Static Test: Continuity

Check resistance with a high-sensitivity ohmmeter.

1. Remove console and disconnect the CPS connector.
2. Connect multimeter probes to the BLACK/YELLOW wire and to the BLACK wire.
3. Measure resistance; it should be between 190 - 300 ohms.

Dynamic Test: Voltage

1. Disconnect the CPS connector.
2. Connect multimeter probes to the BLACK/YELLOW wire and to the BLACK wire, then bring selector switch to Vac and scale to 00.0 Vac.
3. Press START button, note result. The obtained value should be between 0.4 and 0.7 Vac. Repeat operation 3 times.
4. If the CPS is out of specification, replace it. If it tests good continue the other tests.

IGNITION COIL

Ignition coil is mounted on frame along steering column, in front of engine.

NOTE: An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter. Replacing the ignition coil may be necessary as a test.

Static Test

Primary Winding

Disconnect the wire connector on the primary side of the ignition coil.

Using a multimeter, check the resistance between the terminal and the ignition coil body ground.

The resistance should be between 0.8 and 1.2 Ω at 20°C (68°F).

If not within specification, replace the ignition coil.

If the ignition coil test good, check the power supply on the electronic module.

There should be 12 Vdc between the RED/VIOLET and WHITE/GREEN wires.

If there is no voltage, either the electronic module or the wiring harness is defective.

Secondary Winding

The output voltage should not be less than 12 kV (12 000 V).

The ignition coil outlet caps and the spark plug caps include a resistance. They should be checked prior to replacing a suspected ignition coil.

Measure resistance between ignition coil terminals and spark plug caps. The obtained value should be between 9 and 14 KΩ. If resistance is good, continue check. If not, change spark plug wires.

Dynamic Test

An ignition coil tester available from aftermarket tool/equipment suppliers can be used.

CAUTION: Do NOT use coil tester on metal work bench. Follow manufacturer instructions.

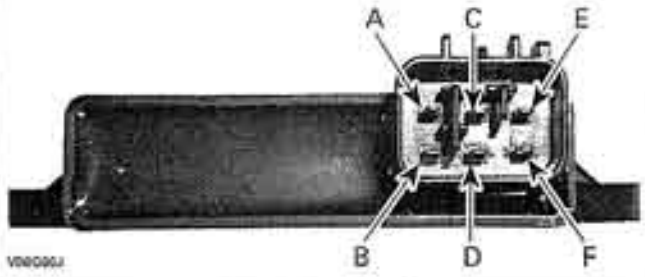
If the ignition coil is out of specification, replace it. If it tests good ensure the wiring and connectors are in good condition then continue the next tests.

ELECTRONIC MODULE (CDI)

Test

NOTE: On the multimeter, set measuring range from 1 MΩ – 10 MΩ. Make sure that positive and negative tester probes are installed on the appropriate wires.

If a fault is detected, the electronic module must be replaced.



		NEGATIVE (-) TESTER LINE					
		A	B	C	D	E	F
POSITIVE (+) TESTER LINE	A		O.L.	2.97 KΩ	2.356 MΩ	2.447 MΩ	UP to ∞
	B	2.460 MΩ		2.464 MΩ	5.92 MΩ	6.07 MΩ	O.L.
	C	2.976 KΩ	O.L.		2.356 MΩ	2.451 KΩ	UP to ∞
	D	O.L.	O.L.	O.L.		O.L.	O.L.
	E	O.L.	O.L.	O.L.	O.L.		O.L.
	F	2.304 MΩ	O.L.	2.304 MΩ	5.65 MΩ	5.79 MΩ	

When every other components above have been tested and are good, the electronic module can be suspected. Ensure wiring and connectors are in good condition prior to replacing the electronic module.

Removal

The electronic module is located under service compartment. Remove the front fender.

To remove, unscrew both bolts retaining electronic module to frame and unplug the connector.

Installation

For the installation, reverse the removal procedure.

NOTE: Do not forget the rubber bushings between electronic module and frame.

IGNITION TIMING

Ignition timing is not adjustable.

SPARK PLUG

Disassembly

Unplug the spark plug cable.

Unscrew the spark plug one turn.

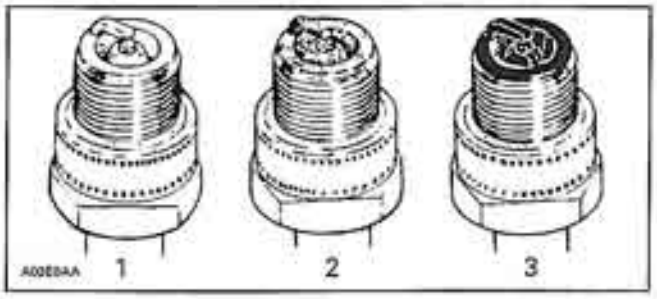
Clean the spark plug and cylinder head with pressurized air.

Unscrew spark plug completely then remove it.

Fouling

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling or low-speed riding, or running on a too rich mixture due to abuse of choke, a clogged air filter, a faulty carburetor adjustment, incorrect fuel, defective ignition system, incorrect ignition timing, incorrect spark plug gap, lubricating oil entering the combustion chamber, or too cold spark plug. The plug face of a fouled spark plug has either a wet black deposit or a black carbon fouling. Such coatings form a conductive connection between the center electrode and ground.

Analysis



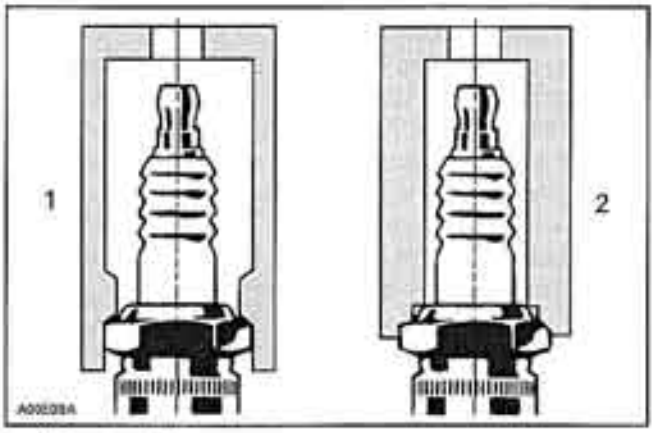
TYPICAL
1. Overheated (light grey, white)
2. Normal (light brown, brown)
3. Fouled (black, wet or dry, dark deposits, grey, melted coating)

The plug face reveals the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at regular intervals, examining the plug face (i.e. the part of the plug projecting into the combustion chamber).

Installation

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

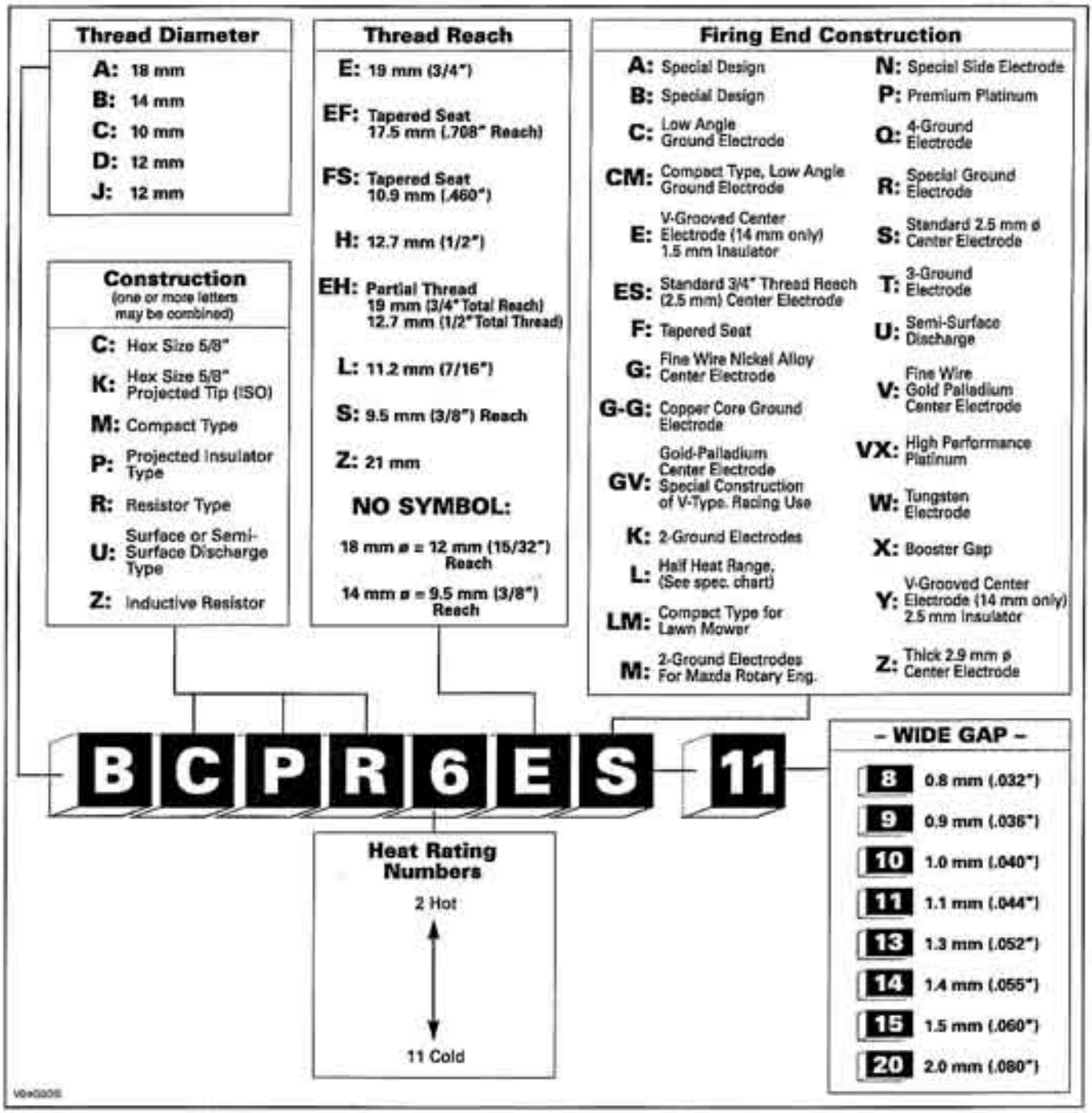
- Using a wire feeler gauge, set electrode gap to 0.65 mm (.026 in).
- Apply antiseize lubricant over the spark plug threads to prevent possible seizure.
- Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



1. Proper socket
2. Improper socket

- Torque spark plug to 20 N•m (15 lbf•ft).

NGK Spark Plug Symbol Explanation



OUTLANDER 800 SERIES

GENERAL

The EMS controls the ignition system. For more information, refer to *ENGINE MANAGEMENT*.

The ECM (Engine Control Module) energizes the primary side of ignition coil individually while the ECM completes the circuit for each cylinder by switching it to the ground at the right moment. The ECM can detect open and short circuit in the primary winding but it does not check the secondary winding.

⚠ WARNING

Never check for engine ignition spark from an open coil and/or spark plug as spark may cause potential fuel vapor to ignite.

For best electrical measurement results, use the multimeter Fluke 111 (P/N 529 035 868).

529 035 868

PROCEDURES

IGNITION SWITCH

Ignition function

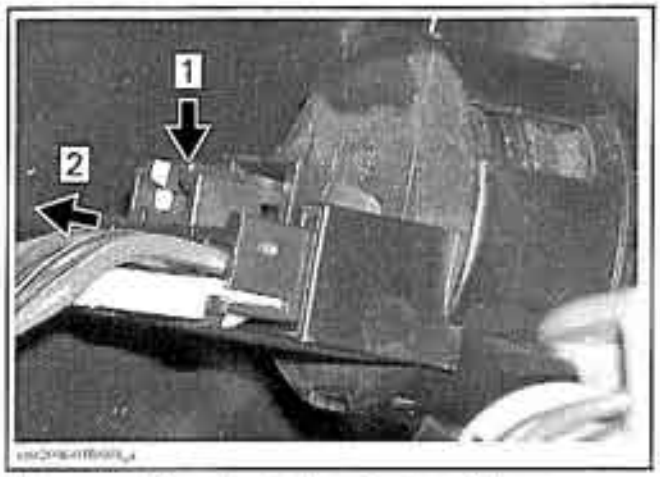
First ensure multi-function switch is in RUN position.

As a quick test to check if ignition key functions properly, turn it to the ON position. If multi-function speedometer turns on (assuming it works), the ignition switch is good. Otherwise, perform the following tests.

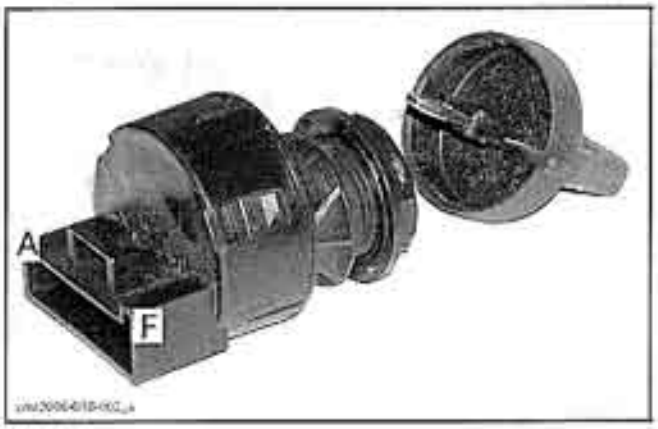
If "INVALID KEY" is seen in speedometer display, ensure key is programmed for the vehicle. Refer to *DESS SYSTEM*.

Remove center panel and dashboard. Refer to *BODY*.

Unplug ignition switch connector.



Using a multimeter, test switch as follows.



PINOUT

IGNITION SWITCH POSITION	PIN		RESISTANCE @ 20°C (68°F)
OFF	B	E	Infinite (O.L)
ON with lights			1 Ω max.
ON without lights			

If switch is out of specification, replace with a new one.

If switch tests good, continue testing.

DESS function

If DESS key is not recognized by the ECM, key is defective or there is a wiring problem, CHECK ENGINE light will turn on and a message will be displayed in the multi-function speedometer.

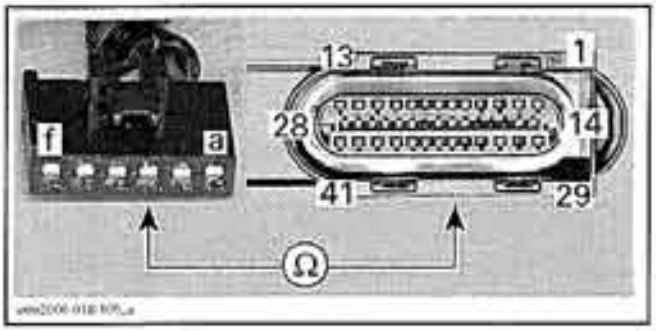
Ensure DESS wiring is not reverted (BLACK/GREEN and ORANGE/RED).

Check wiring and multi-function switch as follows.

Remove ignition key and disconnect connector B from ECM.

Check continuity of wiring between ignition switch and ECM as follows.

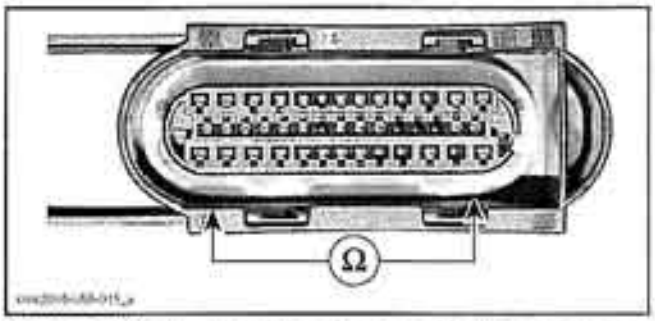
IGNITION SWITCH HARNESS PIN	ECM CONNECTOR PIN	RESISTANCE @ 20°C (68°F)
C	B-39	Close to 0 Ω
D	B-38	



If any test fails, repair wiring/connector.

Check multi-function switch (RUN/STOP) as follows.

MULTI-FUNCTION SWITCH POSITION	ECM CONNECTOR PIN		RESISTANCE @ 20°C (68°F)
STOP	B-38	B-39	Close to 0 Ω
RUN			Infinite (O.L)

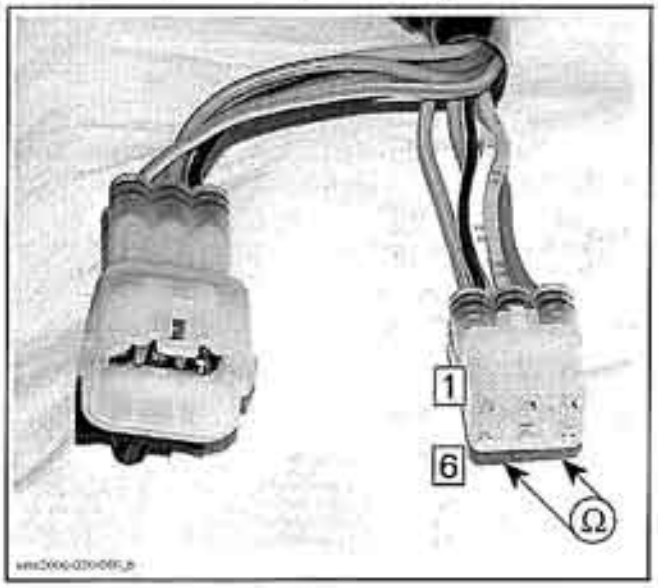


If any test fails, check continuity of wiring/connectors. If they test good, replace switch.

MULTI-FUNCTION SWITCH (RUN/STOP)

Using a multimeter, test switch as follows.

POSITION	MULTI-FUNCTION SWITCH CONNECTOR (MG1) (run/stop)		RESISTANCE @ 20°C (68°F)
RUN	1	2	1 Ω MAX.
STOP			Infinite (O.L)



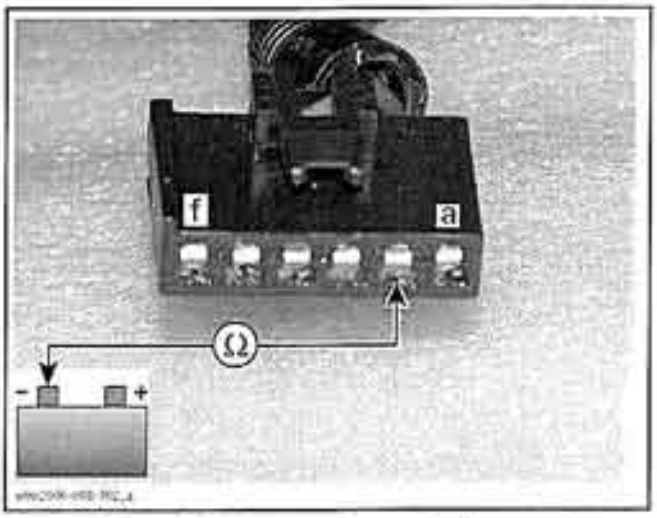
If switch is out of specification, replace with a new one.

If switch tests good, continue testing.

Wiring Tests (wiring related to ignition/multi-function switches)

Wiring Test between Ignition Switch and Battery Ground

IGNITION SWITCH HARNESS PIN		RESISTANCE @ 20°C (68°F)
B	Battery ground	Close to 0 Ω

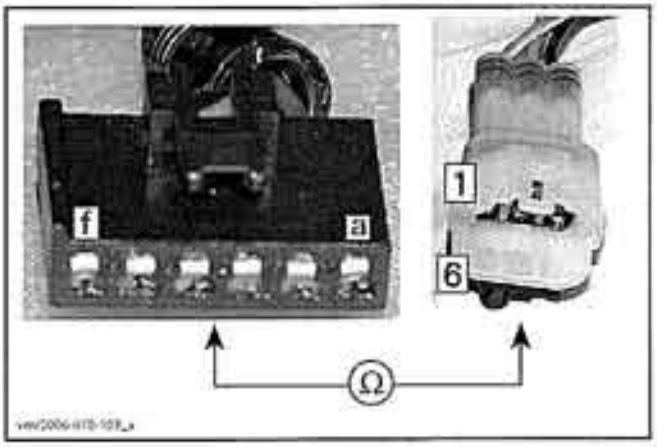


If out of specification, repair wiring/connector.

If as per specification, continue testing.

Wiring Test between Ignition Switch and multi-function Switch (Run/Stop)

IGNITION SWITCH HARNESS PIN	MULTI-FUNCTION SWITCH HARNESS PIN (MG1)	RESISTANCE @ 20°C (68°F)
E	2	Close to 0 Ω

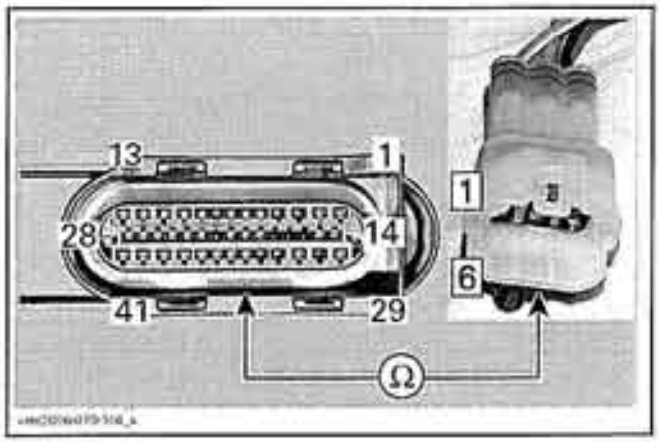


If out of specification, repair wiring/connector.

If as per specification, continue testing.

Wiring Test between multi-function Switch (Run/Stop) and ECM

ECM CONNECTOR PIN	MULTI-FUNCTION SWITCH HARNESS PIN	RESISTANCE @ 20°C (68°F)
B-26	1	Close to 0 Ω



IGNITION COIL

Quick Test with B.U.D.S.

Using the vehicle communication kit (VCK) with the B.U.D.S. software, energize the ignition coil for each spark plug.

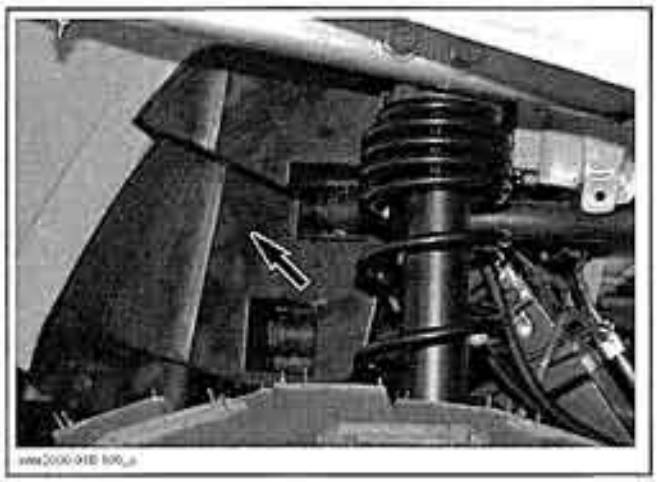
You should hear the spark occurring. In doubt, use an inductive spark tester. If there is no spark, perform the following checks.

NOTE: Keep in mind that even if there is a spark during this static test, voltage requirement is higher to produce a spark in the combustion chamber when engine is running. Ignition coil could be not working in real operation. Replacing ignition coil may be necessary as a test.

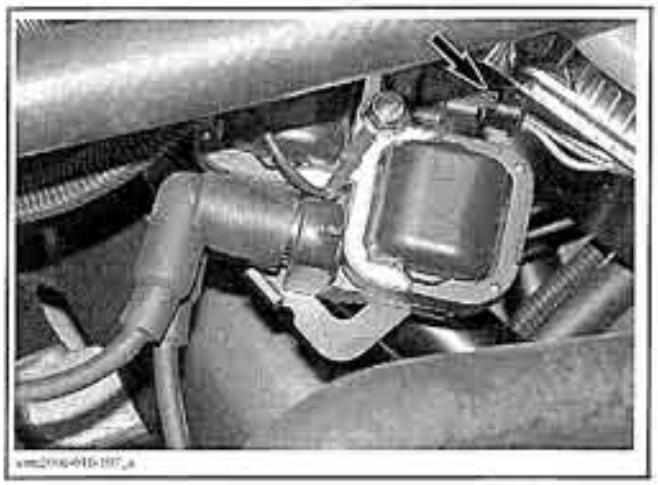
NOTE: Ensure spark plug cable is on the appropriate cylinder.

Voltage Test

Remove RH inner fender. Refer to *BODY*.



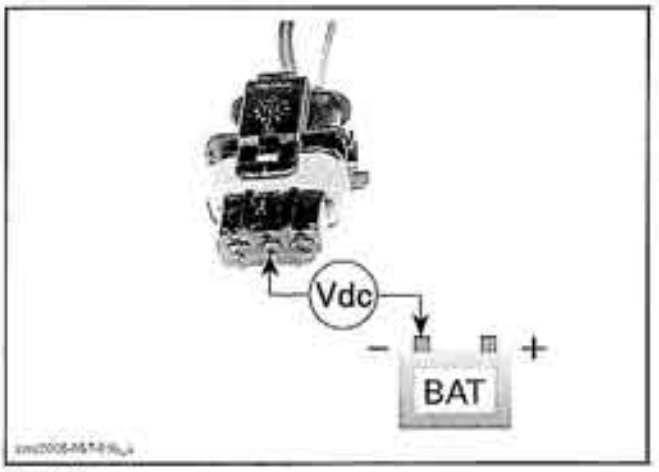
Disconnect the 3-pin connector from the ignition coil and check the voltage supplied by the main relay.



Turn ignition switch to ON and set engine stop switch to RUN.

Using a multimeter, read voltage.

IGNITION COIL CONNECTOR	VOLTAGE
Pin 2 with battery ground	12 V



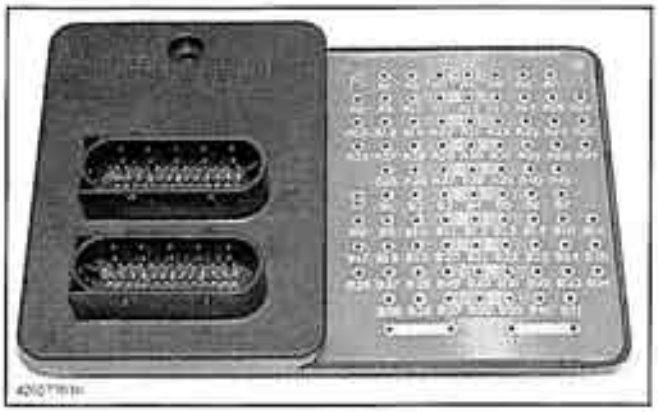
TYPICAL

The voltage should be 12 V.

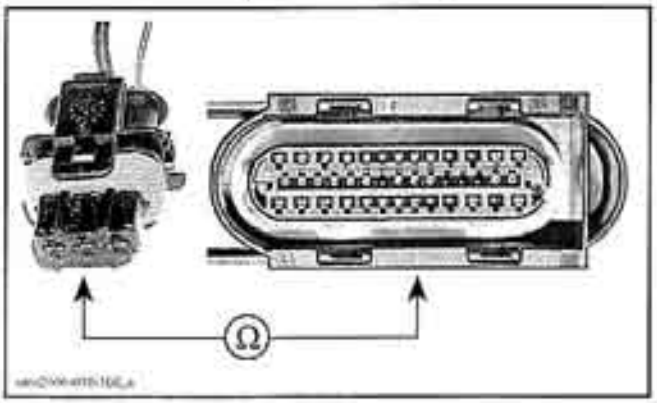
If 12 V is NOT read, check continuity of ignition coil supply circuit.

If 12 V is read, disconnect the ECM connector A and check the continuity of appropriate circuit.

NOTE: For this test, use the ECM adapter (P/N 420 277 010) to probe ECM connector. Refer to *ENGINE MANAGEMENT* for more information.



COMPONENT	CIRCUIT NUMBER (ignition coil connector)	CIRCUIT NUMBER (ECM connector)
Cylinder 1 (front)	1	A-1
Cylinder 2 (rear)	3	A-41



If wiring harness is defective, repair the connector or replace the wiring harness between ECM connector and the ignition coil.

If wiring harness is good, try a new ECM.

Resistance Test

An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter. Replacing the ignition coil may be necessary as a test.

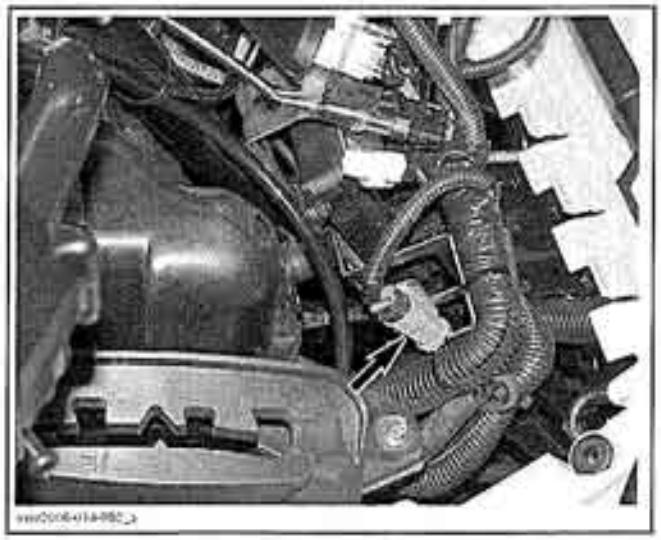
Disconnect ignition cable from spark plug.

Primary Windings

Reconnect connector to ignition coil.

Remove center panel and dashboard. Refer to *BODY*.

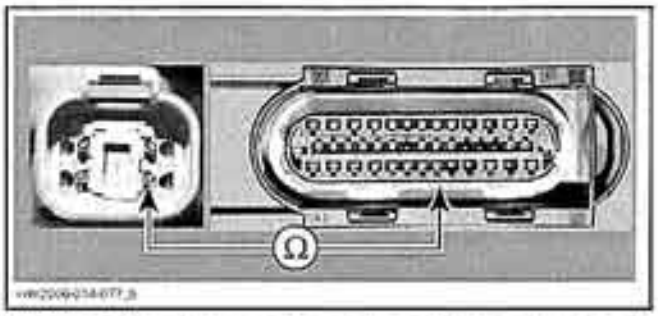
Disconnect engine connector.



Disconnect A connector from ECM.

Using a multimeter, check resistance in primary windings as follows.

PRIMARY CIRCUIT	ENGINE CONNECTOR PIN	ECM CONNECTOR "A"	RESISTANCE @ 20°C (68°F)
Front	2	A-1	.3 - .6 Ω
Rear		A-41	



If any resistance is not good, replace ignition coil.

If the windings test good, check wiring/connectors and if adequate, try a new ECM.

Secondary Windings

Due to the integrated diode, it is not possible to take any resistance measurement of the secondary winding.

IGNITION TIMING

Ignition timing is not adjustable.

SPARK PLUG

Refer to *OUTLANDER 400* in this section.

STARTING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
ECM adapter	420 277 010	223
multimeter Fluke 111	529 035 868	219, 223

SERVICE PRODUCTS

Description	Part Number	Page
dielectric grease	293 550 004	220, 228

OUTLANDER 400 SERIES

STARTING SYSTEM TROUBLESHOOTING

Symptom: **STARTER DOES NOT TURN.**

1. **Ignition switch is in the OFF position.**
   - *Turn switch to the ON position.*
2. **Burnt fuse.**
   - *Check main fuse and wiring condition.*
3. **Transmission is not set to Park or Neutral position.**
   - *Set transmission to PARK or Neutral or squeeze the brake lever or press on brake pedal.*
4. **Poor contact of battery terminal(s) or ground cable connections.**
   - *Clean and tighten terminal(s).*
5. **Weak battery.**
   - *Recharge battery.*
6. **Poor contact or open circuit of: start button, engine stop switch, ignition switch or starting solenoid.**
   - *Check and replace defective part.*
7. **Park and/or Neutral switch(es) is(are) defective.**
   - *Check park and/or neutral switch(es) and wiring condition.*
8. **Engine mechanical problem (ensure that other electric components are good).**
   - *Check and replace defective part.*

Symptom: **STARTER TURNS, BUT DOES NOT CRANK THE ENGINE.**

1. **Poor contact of battery terminal(s).**
   - *Clean and tighten terminal(s).*
2. **Poor battery ground cable connection.**
   - *Clean and tighten.*
3. **Burnt or poor contact of solenoid switch contact disc.**
   - *Replace starting solenoid.*

Symptom: **STARTER TURNS, BUT DOES NOT CRANK THE ENGINE.** (cont'd)

4. **Poor contact of brush.**
   - *Clean, verify or straighten commutator and brush or replace electric starter.*
5. **Burnt commutator.**
   - *Turn commutator in a lathe or replace electric starter.*
6. **Worn commutator segments.**
   - *Undercut mica or replace electric starter.*
7. **Shorted armature.**
   - *Replace electric starter.*
8. **Weak brush spring tension.**
   - *Replace electric starter.*
9. **Weak magnet.**
   - *Replace electric starter.*
10. **Worn bushings.**
    - *Replace electric starter.*
11. **Weak battery.**
    - *Recharge or replace battery.*

Symptom: **STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR.**

1. **Worn clutch pinion gear.**
   - *Replace electric starter.*
2. **Defective clutch.**
   - *Replace electric starter.*
3. **Poor movement of clutch on splines.**
   - *Replace electric starter.*
4. **Worn clutch bushing.**
   - *Replace electric starter.*
5. **Worn ring gear.**
   - *Replace ring gear.*

Symptom: **STARTER MOTOR KEEPS RUNNING.**

1. **Shorted starting solenoid switch winding.**
   - *Replace starter solenoid.*
2. **Melted solenoid contacts.**
   - *Replace starter solenoid.*
3. **Sticking or defective starter clutch.**
   - *Lubricate or replace electric starter.*
4. **Start button stock.**
   - *Fix or remove mud/ice/dirt or replace it.*

GENERAL

First ensure the problem is not related to engine mechanical components. If not, test the starting system.

Causes of problems are not necessarily related to starter but may be due to a burnt fuse, faulty battery, start button, ignition switch, engine stop switch, starting solenoid, electrical cables, connections or the electronic module.

Check these components before removing starter. Consult the *STARTING SYSTEM TROUBLESHOOTING* table above for a general view of possible problems.

⚠ WARNING

To avoid the possibility of a short circuit while working on the starter, always disconnect the battery.

Tool

For best electrical measurement results, use the multimeter Fluke 111 (P/N 529 035 868).

529 035 868

TEST

FUSES

Make sure the main fuse (20 amp) is in good condition. If the fuse tests good, continue with the next tests.

BATTERY

To check battery condition, refer to *BATTERY* above. If it tests good, continue with the next tests.

IGNITION SWITCH

A quick test to check if it is functioning properly. Turn the ignition switch to the ON position. If the headlamps turn on, the ignition switch is good. Otherwise, refer to *IGNITION SYSTEM* for testing procedure. If it tests good, continue the next tests.

ENGINE STOP SWITCH

If engine does not crank when placing engine stop switch to RUN and pressing the start button, test the engine stop switch as follows.

Remove the console (refer to *BODY*) and unplug the multi-function switch connector.

Using a multimeter, measure the resistance between the following wires.

POSITION	WIRE	RESISTANCE
Switch to OFF	BLACK and BLACK/WHITE	1 Ω max.
Switch to RUN		Infinite (O.L)

Replace multi-function switch if defective.

If switch and wiring test is good, continue the next tests.

START SWITCH

If engine does not turn when pressing the start button, test the switch as follows.

Remove the front fascia and unplug the multi-function switch connector.

Using a multimeter, measure the resistance between the following wires.

POSITION	WIRE	RESISTANCE
Switch released	RED/VIOLET and YELLOW/RED	Infinite (O.L)
Switch depressed and held		0.6 Ω max.

Replace multi-function switch if defective.

If switch tests good, check wiring going to electronic module. If the wiring tests good, continue the next tests.

STARTING SOLENOID

NOTE: Solenoid is located on the frame, behind battery rack.

Ensure the solenoid receives electric current as follows. Using a multimeter, measure the voltage between the YELLOW/RED and WHITE/RED wires when pressing the start button with the ignition key turned ON.

NOTE: Disconnect wires from solenoid.

If solenoid does not properly receive current, the electronic module can be suspected. See *ELECTRONIC MODULE* section below.

If solenoid receives current, test the solenoid as follows.

Disconnect large cables from solenoid.

Inspect connections and clean as necessary. Solenoid condition can be checked with an ohmmeter. Install test probes on large connectors of solenoid. Measure resistance when current is applied to small connectors; if it is more than a few ohms, replace solenoid.

If solenoid test good, check the electric starter. If starter test good, the electronic module can be suspected. See *ELECTRONIC MODULE* below.

ELECTRICAL CABLES OR CONNECTIONS

Check all connections, cables and wires. Tighten any loose connections. Replace any chafed wires/cables.

If wiring and connectors are good, check the electric starter. See below.

ELECTRIC STARTER

Using booster cables, carefully supply current from the battery directly to the starter. Connect the BLACK (-) cable first. Then connect the remaining jumper cable from the battery then to the starter.

If starter turns ensure the cables/connections from battery to solenoid and to starter are in good condition. If they test good, the electronic module can be suspected. See *ELECTRONIC MODULE* below.

If starter does not turn, check for mechanical problems in the starter.

ELECTRONIC MODULE

When other components have been tested above and are good, the electronic module can be suspected. Ensure wiring and connectors are in good condition prior to replacing the electronic module.

PART REPLACEMENT

ELECTRIC STARTER

Removal

Turn OFF ignition switch.

Disconnect BLACK (-) cable from battery.

⚠ WARNING

Always disconnect BLACK (-) cable first and reconnect last.

Remove the RH side cover and the engine cover (refer to *BODY*).

Disconnect RED (+) cable from starter.

Clean starter area.

Remove starter mount screws.

Pull starter out.

Installation

Installation is the reverse of removal procedure. However, pay particular attention to the following.

Make sure that starter and engine mating surfaces are free of debris. Serious problem may arise if the starter is not properly aligned.

Torque starter screws to 10 N•m (89 lbf•**in**).

Connect the RED (+) cable to the starter and torque nut to 6 N•m (53 lbf•**in**). Apply dielectric grease (P/N 293 550 004) on terminal and nut.

First connect RED (+) cable to battery then connect the BLACK (-) cable.

⚠ WARNING

Always connect RED (+) cable first then BLACK (-) cable last. Whenever connecting the RED (+) cable to the starter motor, make sure the battery cables are disconnected to prevent electric shock.

Test starter operation.

OUTLANDER 800 SERIES

STARTING SYSTEM TROUBLESHOOTING

Symptom: STARTER DOES NOT TURN.

1. **Ignition switch is in the OFF position.**
   - *Turn switch to the ON position.*
2. **Engine stop switch is in the OFF position.**
   - *Turn switch to the RUN position.*
3. **DESS key not programmed for the vehicle.**
   - *Refer to DESS SYSTEM.*
4. **Defective DESS key or switch.**
   - *Check key and switch.*
5. **Burnt fuse.**
   - *Check main fuse and wiring condition.*
6. **Transmission is not set to Park or Neutral position or brake switch is not activated.**
   - *Set transmission to PARK or NEUTRAL position or squeeze the brake lever or press on brake pedal.*
7. **Poor contact of battery terminal(s) or ground cable connections.**
   - *Clean and tighten terminal(s).*
8. **Weak battery.**
   - *Recharge battery.*
9. **Poor contact or open circuit of: start button, engine stop switch, ignition switch or starting solenoid.**
   - *Check and replace defective part.*
10. **GBPS switch(es) is(are) defective.**
    - *Check GBPS switch(es) and wiring condition. Refer to GEARBOX.*
11. **Diode incorrectly installed or failure.**
    - *Check diode installation and condition.*
12. **Defective ECM.**
    - *Check. Refer to ENGINE MANAGEMENT.*
13. **multi-function speedometer replaced but not updated with proper coding.**
    - *Use B.U.D.S. and update ECM. Refer to INSTRUMENTS AND ACCESSORIES.*
14. **Defective brake switch.**
    - *Check brake switch and its connectors. Replace defective part.*
15. **Engine mechanical problem (ensure that other electric components are good).**
    - *Check and replace defective part.*

Symptom: STARTER TURNS, BUT DOES NOT CRANK THE ENGINE.

1. **Poor contact of battery terminal(s).**
   - *Clean and tighten terminal(s).*
2. **Poor battery ground cable connection.**
   - *Clean and tighten.*

Symptom: **STARTER TURNS, BUT DOES NOT CRANK THE ENGINE.** (cont'd)

3. **Weak battery.**
   - *Recharge or replace battery.*
4. **Burnt or poor contact of solenoid switch contact disc.**
   - *Replace starting solenoid.*
5. **Poor contact of brush.**
   - *Clean, verify or straighten commutator and brush or replace electric starter.*
6. **Burnt commutator.**
   - *Turn commutator in a lathe or replace electric starter.*
7. **Worn commutator segments.**
   - *Undercut mica or replace electric starter.*
8. **Shorted armature.**
   - *Replace electric starter.*
9. **Weak brush spring tension.**
   - *Replace electric starter.*
10. **Weak magnet.**
    - *Replace electric starter.*
11. **Worn bushings.**
    - *Replace electric starter.*

Symptom: **STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR.**

1. **Worn clutch pinion gear.**
   - *Replace electric starter.*
2. **Defective clutch.**
   - *Replace electric starter.*
3. **Poor movement of clutch on splines.**
   - *Replace electric starter.*
4. **Worn clutch bushing.**
   - *Replace electric starter.*
5. **Worn ring gear.**
   - *Replace ring gear.*

Symptom: **STARTER MOTOR KEEPS RUNNING.**

1. **Shorted starting solenoid switch winding.**
   - *Replace starter solenoid.*
2. **Melted solenoid contacts.**
   - *Replace starter solenoid.*
3. **Sticking or defective starter clutch.**
   - *Lubricate or replace electric starter.*
4. **Start button stock.**
   - *Fix or remove mud/ice/dirt or replace it.*

GENERAL

First ensure the problem is not related to engine mechanical components. If not, test the starting system.

Causes of problems are not necessarily related to starter but may be due to a burnt fuse, faulty battery, relay, start button, ignition switch (DESS), engine stop switch, starting solenoid, electrical cables, connections or the ECM.

Check these components before removing starter. Consult the *STARTING SYSTEM TROUBLESHOOTING* table above for a general view of possible problems.

⚠ WARNING

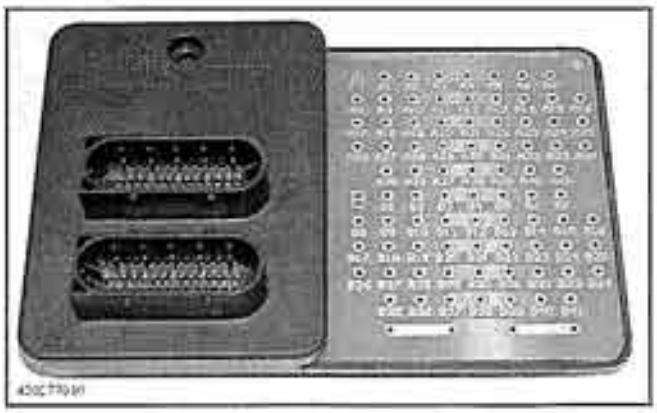
To avoid the possibility of a short circuit while working on the starter, always disconnect the battery.

Tool

For best electrical measurement results, use the multimeter Fluke 111 (P/N 529 035 868).

529 035 868

For ECM pin testing, use the ECM adapter (P/N 420 277 010) to probe ECM connector. Refer to *ENGINE MANAGEMENT* for more information.



TEST

FUSES

Make sure the main fuse (F8) and the accessories fuse (F4) is(are) in good condition. If the fuses test good, continue with the next tests.

NOTE: The solenoid may be the cause of a burnt fuse. If the solenoid test good, one of the accessory may be defective.

BATTERY

To check battery condition, refer to *BATTERY*. If it tests good, continue with the next tests.

ELECTRICAL CABLES OR CONNECTIONS

Check all connections, cables and wires. Tighten any loose connections. Replace any chafed wires/cables.

If wiring and connectors are good, check the electric starter.

ECM INITIALIZATION

To validate ECM initializes (turns on), look speedometer display. It should turn on when ignition key is ON and engine stop switch is at RUN. Otherwise, refer to *ENGINE MANAGEMENT*.

If speedometer turns on, continue the next tests.

ELECTRIC STARTER

Using booster cables, carefully supply current from the battery directly to the starter. Connect the BLACK (-) cable first. Then connect the remaining jumper cable from the battery then to the starter.

If starter turns ensure the cables/connections from solenoid to starter are in good condition.

If starter does not turn, replace starter.

IGNITION SWITCH

First ensure engine stop switch is in RUN position.

As a quick test to check if ignition key functions properly, turn it to the ON position. If multi-function speedometer turns on (assuming it works), the ignition switch is good. Otherwise, refer to *IGNITION SYSTEM* for testing procedure.

If "INVALID KEY" is seen in speedometer display, ensure key is programmed for the vehicle. Refer to *DESS SYSTEM*. If problem persists, check DESS key, ignition switch and stop switch. Refer to *IGNITION SYSTEM*.

ENGINE STOP SWITCH

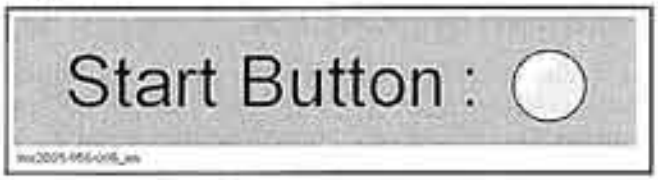
First ensure ignition switch is in ON position and engine stop switch is RUN position.

If engine does not crank when pressing the start button, try starting while using brake. If it is now working, test GBPS switch. Refer to *GEARBOX*. If GBPS switch tests good, check the brake switch. Refer to *IGNITION SYSTEM*.

START SWITCH

If engine does not turn when pressing the start button, test the switch as follows.

A quick operation test can be done using the vehicle communication kit (VCK) with the B.U.D.S. software, using the **Monitoring** tab. Press the vehicle's start button and look at the **Start button** LED.



It should turn on, indicating the starting system is working on the input side of the starting system (start button, ECM and wiring).

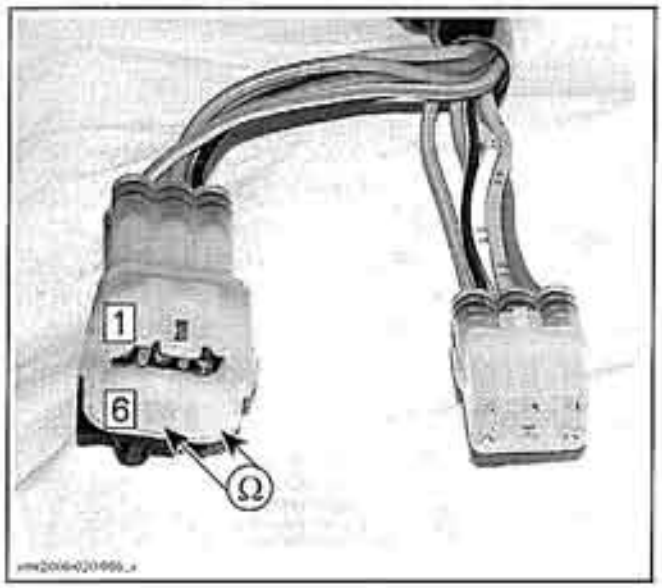
If it turns on, you are knowing now the problem is on the output side of the starting system (ECM output signal to starting solenoid, wiring harness going to the solenoid and starter motor).

If it does not turn on, check the input side (start switch) as follows.

Remove center panel and dashboard. Refer to *BODY*.

Using a multimeter, measure the resistance between the following wires.

POSITION	MULTI-FUNCTION SWITCH CONNECTOR (MG2) PIN (start)		RESISTANCE
Switch released	1	6	Infinite (O.L)
Switch depressed and held			0.6 Ω max.

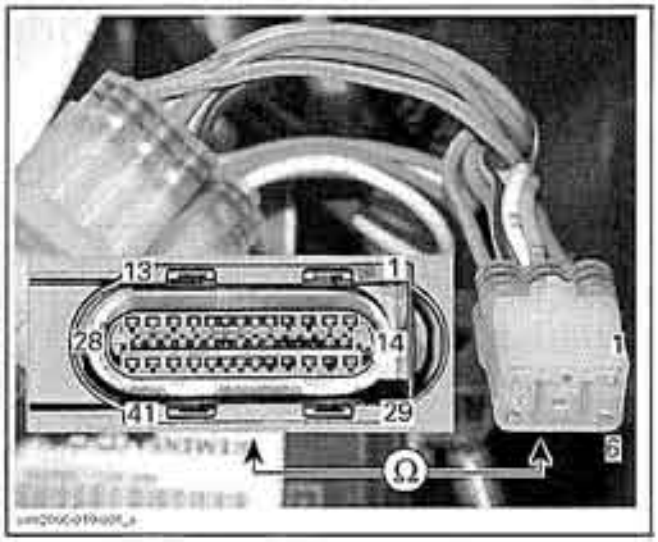


Replace multi-function switch if defective.

If switch tests good, disconnect ECM connector B.

Test continuity of wiring between start switch connector and ECM connector as follows.

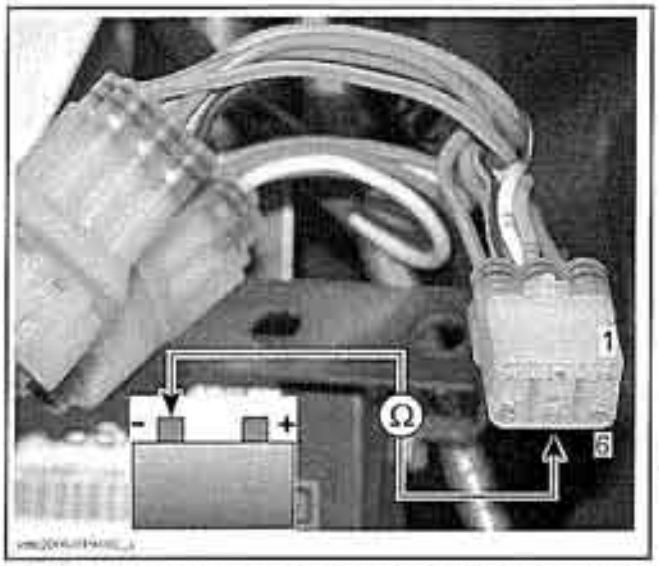
CONNECTOR		RESISTANCE @ 20°C (68°F)
ECM	MULTI-FUNCTION SWITCH (MG2) PIN (harness side) (start)	
PIN		
B-21	1	1 Ω max.



Reconnect ECM connector B.

If switch tests good, test continuity of wiring between start switch connector and battery ground as follows.

CONNECTOR		RESISTANCE @ 20°C (68°F)
MULTI-FUNCTION SWITCH (MG2) (start)	BATTERY	
PIN		
6	Battery ground	1 Ω max.



If wiring is faulty, repair/replace harness and/or connectors. If it tests good, continue the next tests.

STARTING SOLENOID

NOTE: Solenoid is located on the frame, besides battery rack.

Inspect connections and clean as necessary.

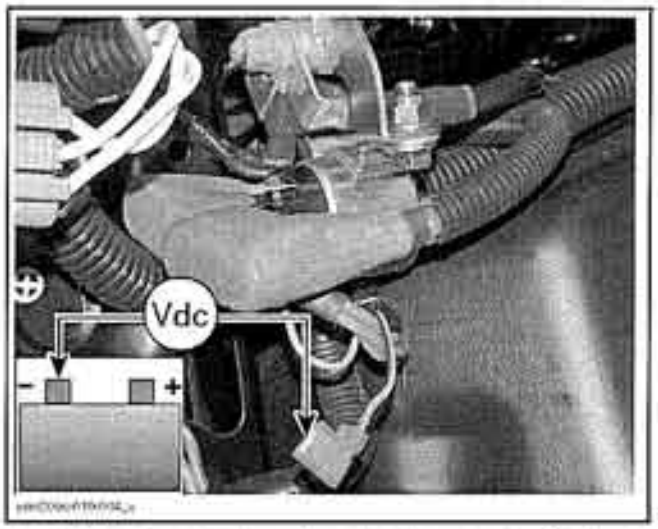
Solenoid Winding Supply

Disconnect connector with ORANGE/GREEN wire from solenoid and check voltage as follows.

Turn ignition key ON and set engine stop switch to RUN.

Read voltage (do not press start switch).

SOLENOID CONNECTOR (harness side)	VOLTAGE
ORANGE/GREEN with battery ground	12 Vdc



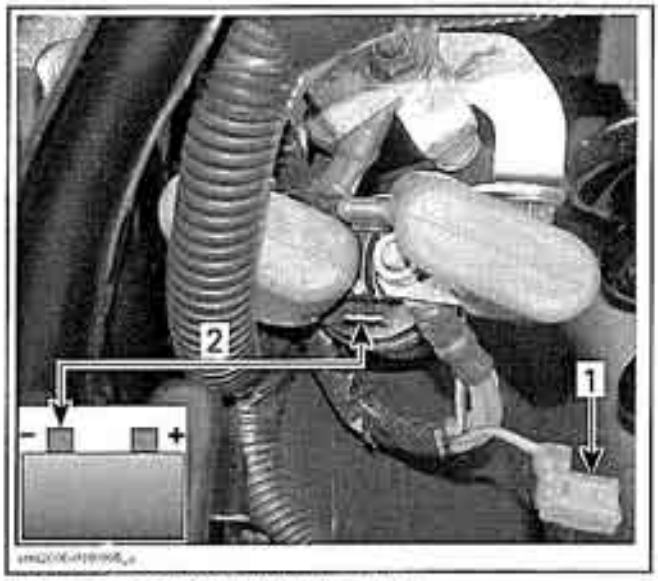
If voltage is not adequate, check accessories fuse (F4). If fuse is good, test continuity of wiring between solenoid and fuse F4.

If voltage is adequate, do the following test.

Reconnect ORANGE/GREEN terminal to solenoid.

Disconnect ORANGE/BROWN terminal from solenoid.

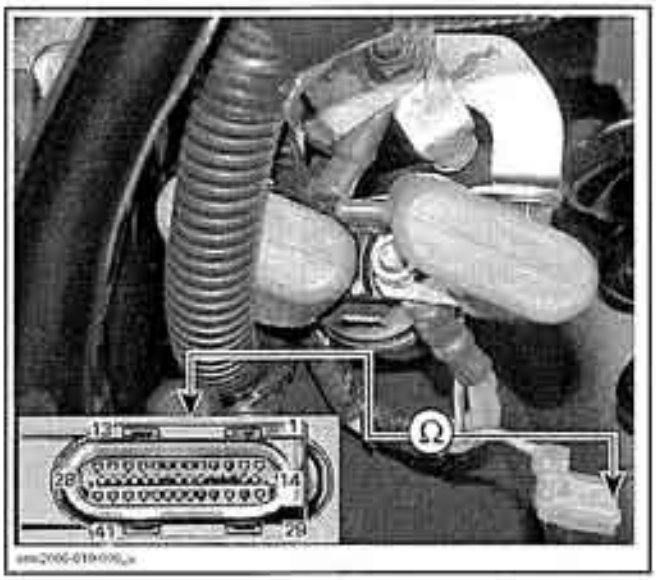
Connect a jumper wire between solenoid terminal and battery ground.



1. Disconnect ORANGE/BROWN terminal
2. Jumper to battery ground

If solenoid works, check wiring/connectors for continuity as follows.

ECM CONNECTOR PIN	SOLENOID TERMINAL (harness side)	RESISTANCE @ 20°C (68°F)
B-31	ORANGE/BROWN	Close to 0 Ω



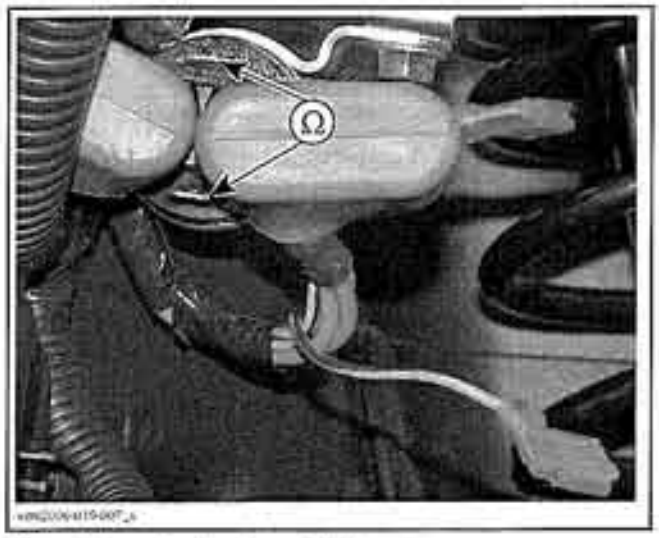
If solenoid does not work, test solenoid.

Static Test: Continuity

Disconnect terminals from solenoid.

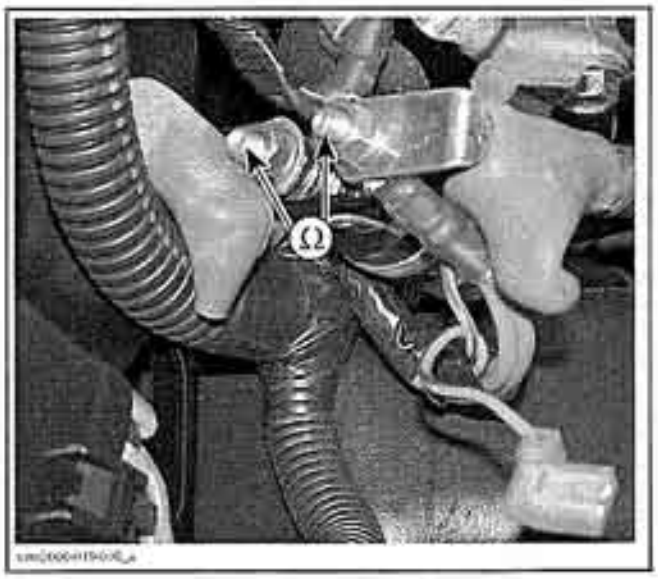
With a multimeter, check primary winding resistance as follows.

SOLENOID CONNECTOR		MEASUREMENT
TERMINAL		RESISTANCE @ 20°C (68°F)
A	B	Approximately 5 Ω



Check for stuck solenoid plunger.

SOLENOID CONNECTOR		MEASUREMENT
PIN		RESISTANCE @ 20°C (68°F)
Battery post	Starter post	Open circuit



If any measurement is out of specification, replace solenoid.

Dynamic Test

Turn ignition key ON and set engine stop switch to RUN.

For the following test, we do not want the engine to run. Set ECM in engine drowned mode as follows:

- Depress and hold throttle lever at full throttle position.
- Install a rubber band or some tape to maintain throttle lever in this position while testing.

Depress start button and while engine is cranking, measure the voltage drop as follows with a multimeter.

SOLENOID CONNECTOR		MEASUREMENT
PIN		VOLTAGE
Post coming from battery	Post going to starter	0.2 Vdc max.

⚠ WARNING

Remove any rubber band or tape from throttle lever to release it.

If voltage is out of specification, replace solenoid.

If solenoid tests good, check the electric starter.

ECM

When other components have been tested above and are good, the ECM can be suspected. Try a new ECM. Refer to *ENGINE MANAGEMENT*.

PART REPLACEMENT

ELECTRIC STARTER

Removal

Turn OFF ignition switch.

Disconnect BLACK (-) cable from battery.

⚠ WARNING

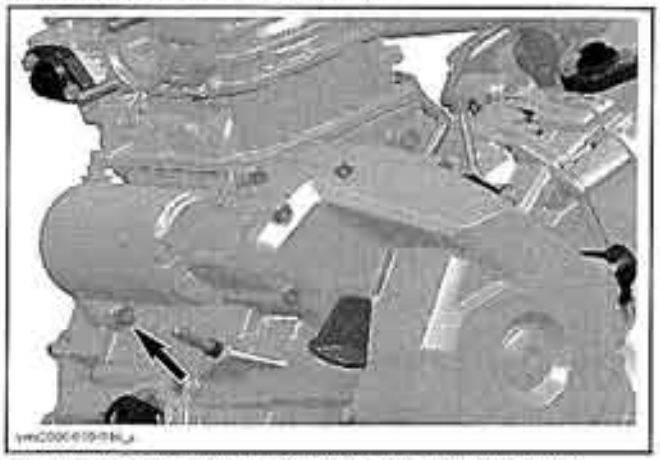
Always disconnect BLACK (-) cable first and reconnect last.

Remove the RH side cover and the engine cover (refer to *BODY*).

Disconnect RED (+) cable from starter.

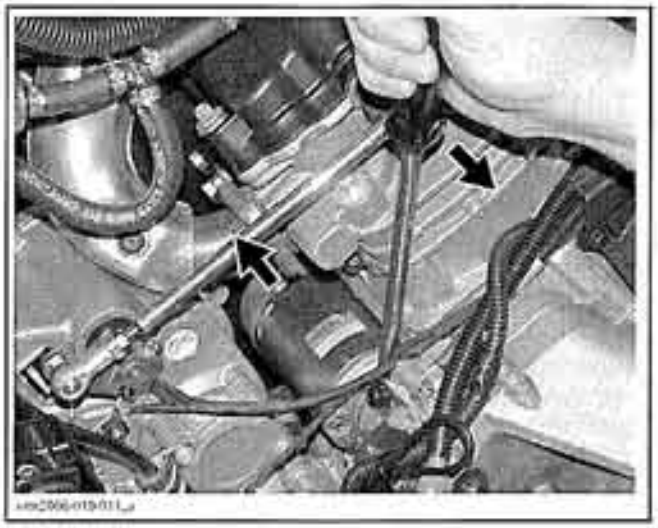
Clean starter area.

Remove starter mount screw.

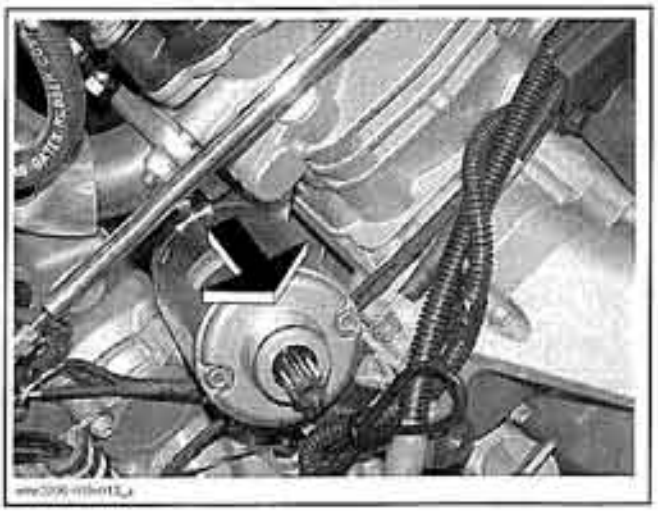


SOME PARTS REMOVED FOR CLARITY PURPOSE ONLY

Carefully pry starter out of its housing.



Pull starter out.



Installation

Installation is the reverse of removal procedure. However, pay particular attention to the following.

Make sure that starter and engine mating surfaces are free of debris. Serious problem may arise if the starter is not properly aligned.

Bring starter close to its location. Rotate it so that its mounting ear allows installation in engine housing. Push in place and align mounting ear to install screw.

Torque starter screw to 25 N•m (18 lbf•ft).

Connect the RED (+) cable to the starter and torque nut to 6 N•m (53 lbf•**in**). Apply dielectric grease (P/N 293 550 004) on terminal and nut.

First connect RED (+) cable to battery then connect the BLACK (-) cable.

⚠ WARNING

Always connect RED (+) cable first then BLACK (-) cable last. Whenever connecting the RED (+) cable to the starter motor, make sure the battery cables are disconnected to prevent electric shock.

Test starter operation.

DIGITALLY ENCODED SECURITY SYSTEM

SERVICE TOOLS

Description	Part Number	Page
B.U.D.S. software	529 036 024	229
diagnostic cable	710 000 851	229
MPI-2 interface card	529 036 018	229
Vehicle Communication Kit (VCK)	529 035 981	229

GENERAL

The ignition key contains a ROM chip with a unique digital code that is the equivalent of a unique teeth pattern on a conventional key.

When the ignition key is turned ON, the ECM is powered up as well as the multi-function speedometer and the accessories. Then, the ECM reads the ignition key and, if it is not recognized, no engine starting will be possible.

NOTE: When a key is not recognized by the ECM, INVALID KEY will be displayed in the multi-function speedometer.

To work on a particular DESS-equipped vehicle, the ignition key must have been programmed first.

NOTE: All ignition keys have the same teeth pattern. Therefore, they can be used and turned in the switch of any DESS-equipped vehicle. However, unless the DESS system recognizes (in the ECM) a valid programmed key, the engine starting will not be allowed.

NOTE: Actually, it is the memory of the ECM that is programmed to recognize the digital code of the ignition key.

The system is quite flexible. Up to 8 ignition keys may be programmed in the memory of the ECM. They can also be erased individually or all at once.

Note that the DESS circuitry is already activated on all new ECM.

KEY PROGRAMMING

Two tools can be used to communicate with the engine control module (ECM) of the vehicle to program a key:

- Vehicle Communication Kit (VCK) (P/N 529 035 981) or,
- MPI-2 interface card (P/N 529 036 018) with diagnostic cable (P/N 710 000 851).

NOTE: For more details on these tools, refer to *DIAGNOSTIC PROCEDURES* in the *ENGINE MANAGEMENT* section.

The B.U.D.S. software (P/N 529 036 024) is designed to allow, among other things, the programming of ignition key(s) and entering customer information.

NOTE: Always use the latest software version available on BRP Sales Exchange.

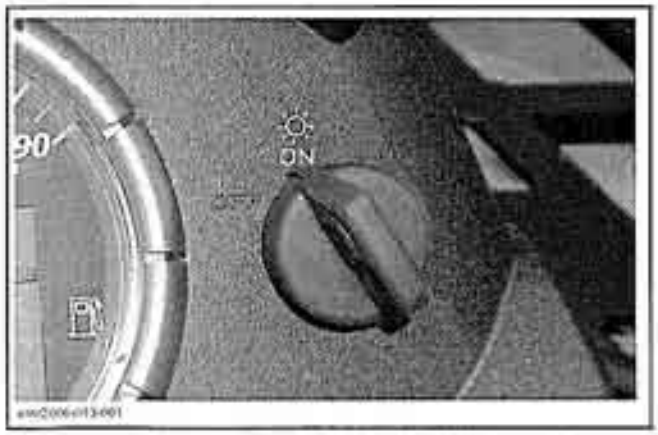
For more information pertaining to the use of the software B.U.D.S., use its help which contains detailed information on its functions.

⚠ WARNING

If the computer you are using is connected to the 110 Vac power outlet, there is a potential risk of electrocution when working in contact with water. Be careful not to touch water while working with the VCK.

Connect the VCK or the MPI-2 interface card as described in *DIAGNOSTIC PROCEDURES*.

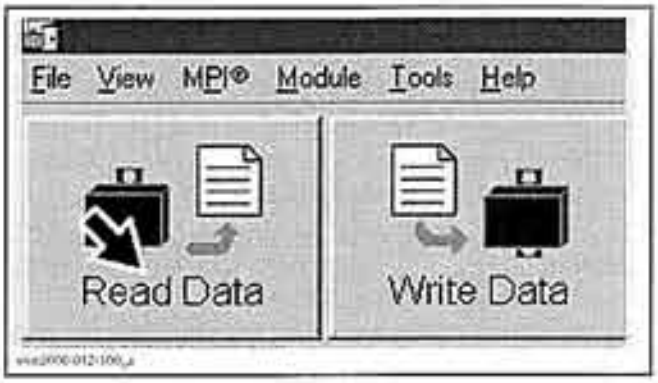
Install key in ignition switch and turn it to ON.



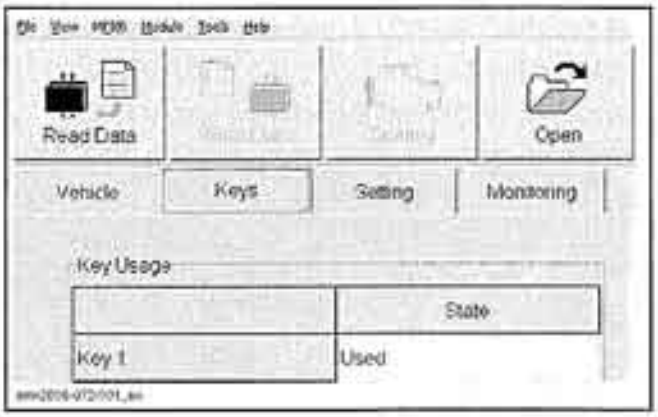
Ensure engine stop switch is in RUN position.

1. Run

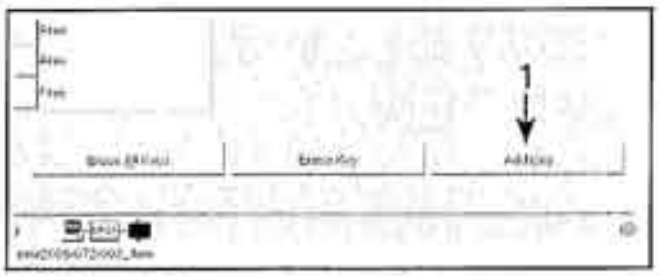
Read ECM using READ DATA button.



Turn ignition key OFF and remove key.
Install the new key to be programmed.
Turn ignition key ON.
Click on KEYS tab.



Click on ADD KEY button on bottom of screen.



1. Click on this tab

A new key is now saved in the computer.

NOTE: To program other key(s), install a new key in ignition switch, turn it ON and click again on ADD KEY tab.

Ensure to save new data in ECM using WRITE DATA button.