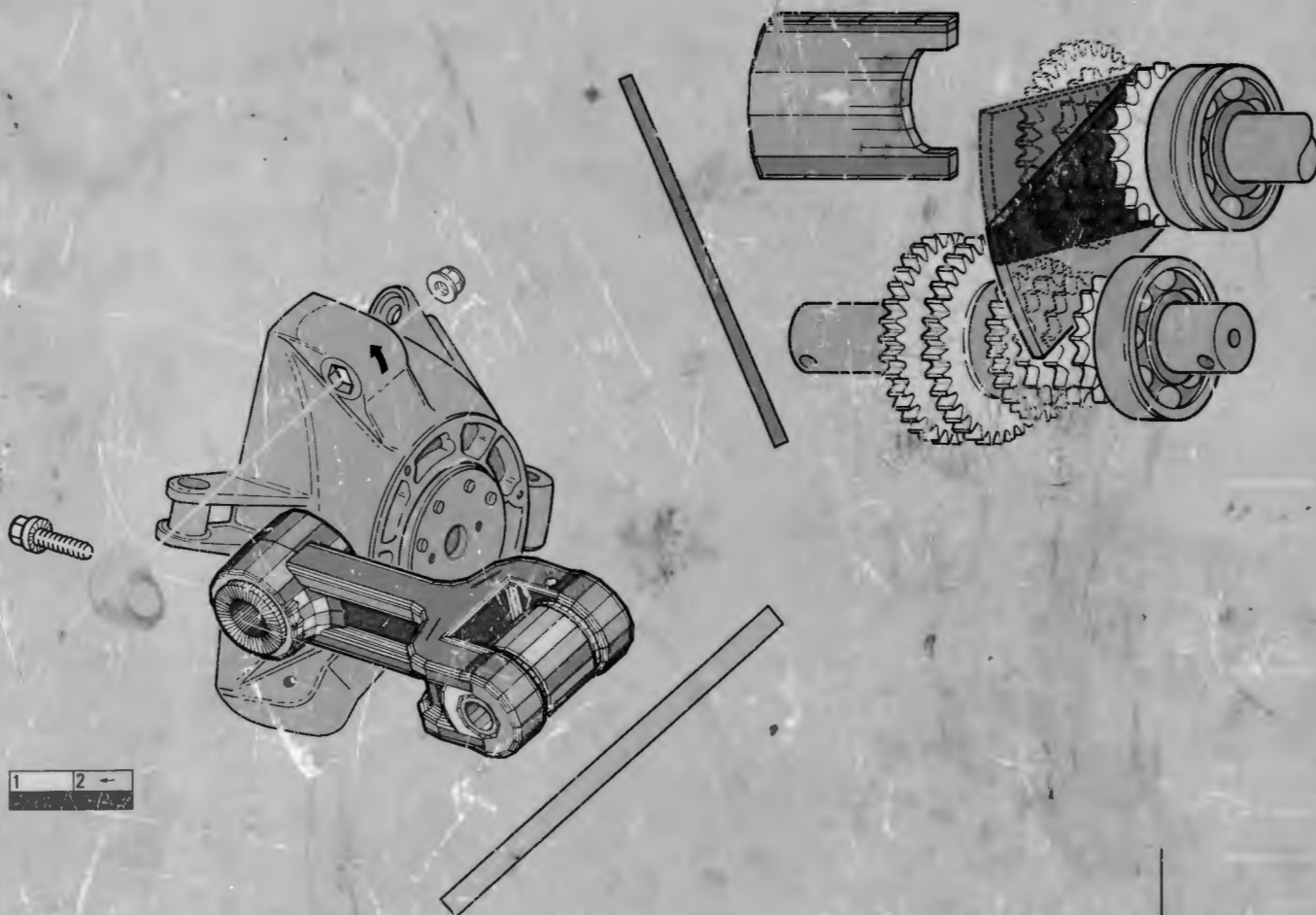


SHOP manual



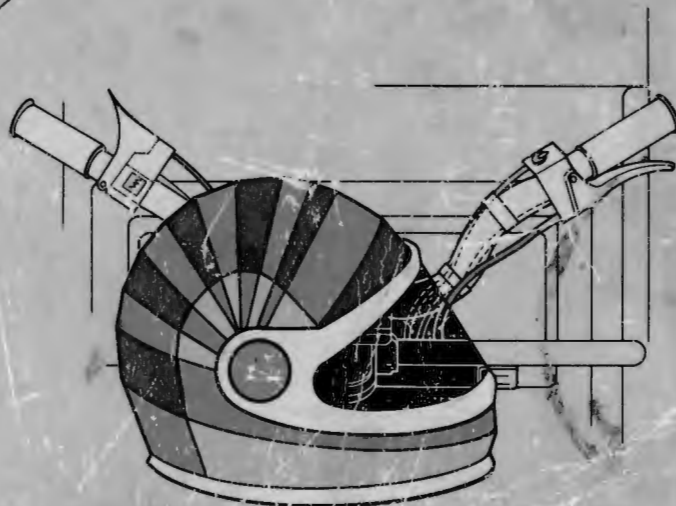
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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair 1989 Ski-Doo snowmobiles.

This edition was primarily published to be used by snowmobile mechanics who are already familiar with all service procedures relating to Bombardier made snowmobiles.

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

This shop manual uses technical terms which may be slightly different from the ones used in parts catalog.

The content depicts parts and/or procedures applicable to the particular product at its time of manufacture. It does not include dealer modifications, whether authorized or not by Bombardier, after manufacturing the product.

In addition, the sole purpose of the illustrations/photographs 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 Bombardier parts is most strongly recommended when considering replacement of any component. Dealer and/or distributor assistance should be sought in case of doubt.

Torque wrench tightening specifications must be strictly adhered to. Locking devices (ex. : lock tab, elastic stop nut) must be installed or replaced with new ones, where specified. If the efficiency of a locking device is impaired, it must be renewed.

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.

This information relates to the preparation and use of Bombardier snowmobiles and has been utilized safely and effectively by Bombardier Inc.. However, Bombardier Inc. 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.

1989 BOMBARDIER SNOWMOBILES SHOP MANUAL

INTRODUCTION

This Shop Manual covers the following Bombardier made 1989 snowmobiles.

MODELS

MODEL NUMBER

| | |
|--------------------|------|
| ELAN® | 3046 |
| ALPINE® II 503 | 3348 |
| SAFARI CITATION® | 3233 |
| SAFARI CITATION® E | 3234 |
| TUNDRA* | 3235 |
| TUNDRA* LT | 3236 |
| SAFARI SCOUT* | 3638 |
| SAFARI SCOUT* E | 3639 |
| SAFARI SAGA* | 3632 |
| SAFARI CHEYENNE* | 3234 |
| SAFARI VOYAGEUR* | 3637 |
| SAFARI ESCAPADE* | 3635 |
| FORMULA* MX | 3735 |
| FORMULA* MX LT | 3736 |
| FORMULA* PLUS | 3737 |
| FORMULA* PLUS LT | 3738 |
| FORMULA* MACH I | 3739 |

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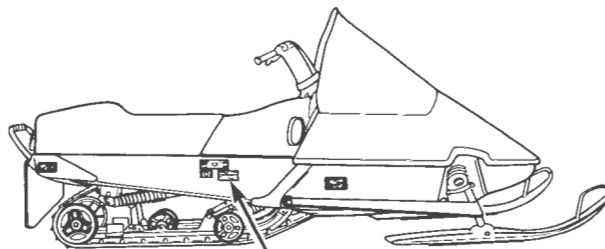
Furthermore, each vehicle has its particular vehicle serial number.

Serial number meaning :

0000 00000
Model no Vehicle no

A000 000 013

(TYPICAL)

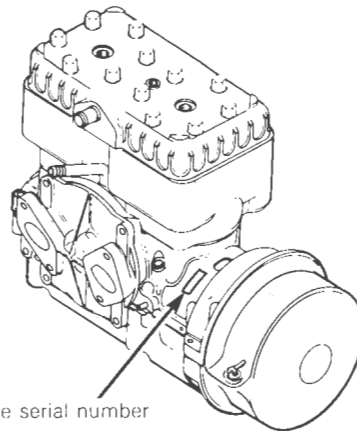


Vehicle serial number

A015 007 023

The engine also has a serial number.

Liquid-cooled engines

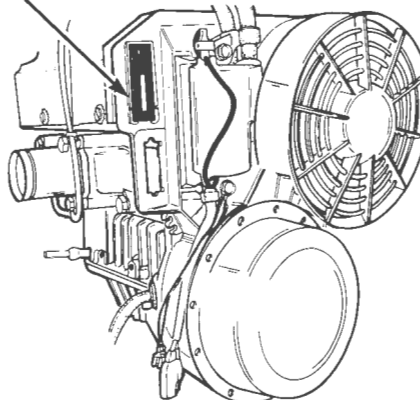


Engine serial number

A000 002 062

Fan-cooled engines

Engine serial number



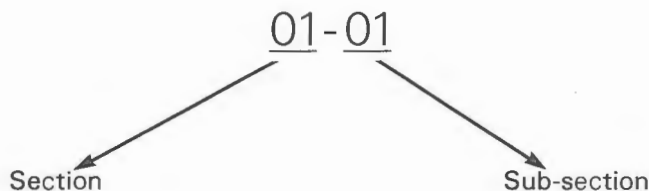
A007 002 001

1989 BOMBARDIER SNOWMOBILES SHOP MANUAL

DEFINITION OF NUMBERING SYSTEMS

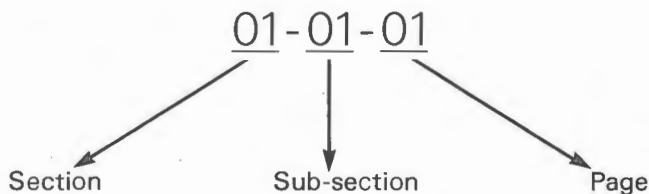
Sections and sub-sections system

The manual makes use of a 2-part digital numbering system (i.e. 01-01), in which the first digit represents the section, the second digit the sub-section.



Pages system

The numerotation at the bottom of each page assists the user in page location.



ARRANGEMENT OF THE MANUAL

The manual is divided into 8 major sections :

- 01 Tools
- 02 Engine
- 03 Transmission
- 04 Electrical
- 05 Suspension
- 06 Steering and skis
- 07 Body/frame
- 08 Technical data

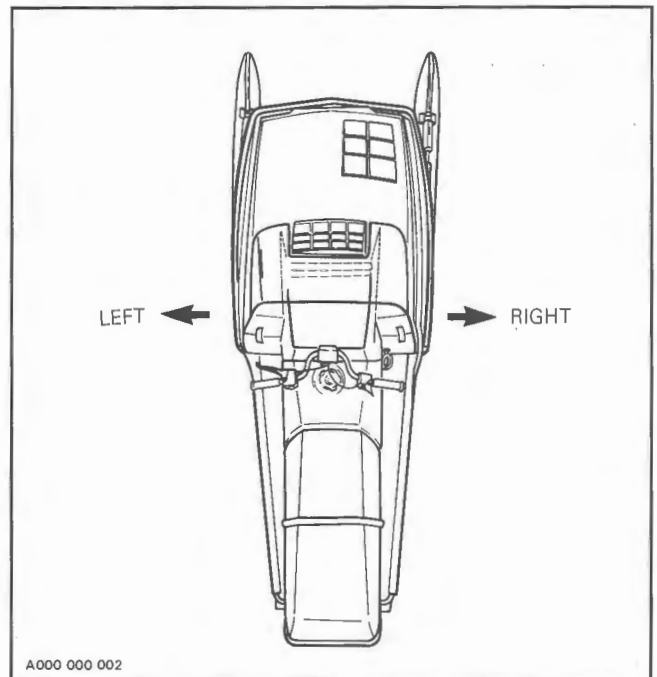
Each section is divided in various sub-sections, and again, each sub-section has one or more division.

EX. : 02 ENGINE

04 Engine type 467

- Cooling system
- Magneto
- Etc.

The use of "Right" and "Left" indications in the text, always refers to driving position (when sitting on vehicle).



GENERAL

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

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

ILLUSTRATIONS & PROCEDURES

An exploded view is conveniently located at the beginning of each section and is meant to assist the user in identifying parts and components.

This Shop Manual uses technical terms which may be slightly different from the ones of the parts catalog.

1989 BOMBARDIER SNOWMOBILES SHOP MANUAL

When ordering parts always refer to the parts catalog.

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.

When something special applies (such as adjustment, inspection, etc.), boldface numbers in exploded views are used for specific parts and referred to in the text.

▼ **CAUTION :** Pay attention to torque specifications. Some of these are in **lbf•in** instead of **lbf•ft**. Use appropriate torque wrench.

▼ **CAUTION :** Most components of those 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.

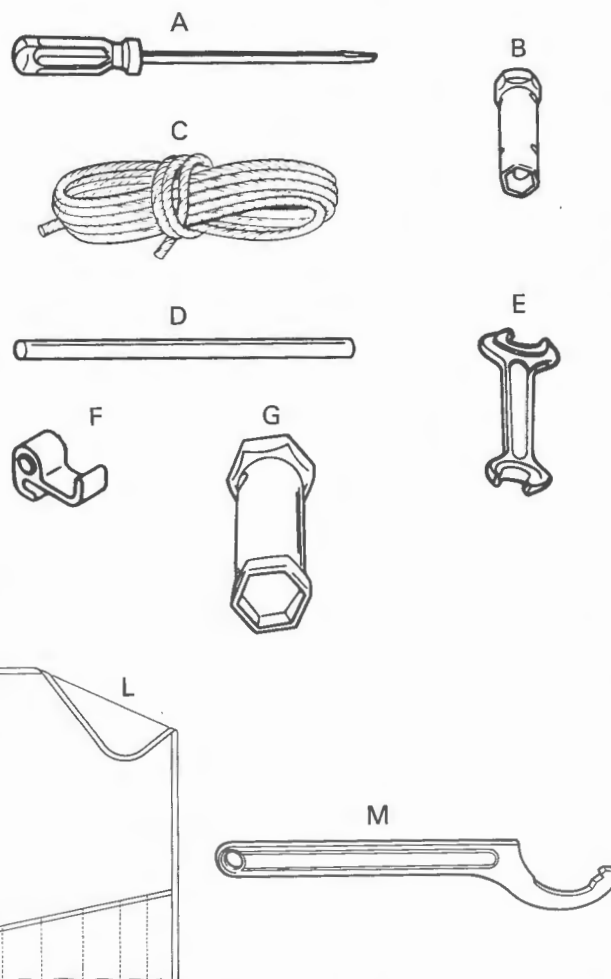
As many of the procedures in this manual are interrelated, we suggest, that before undertaking any task, you read and thoroughly understand the entire section or sub-section in which the procedure is contained.

A number of procedures throughout the book require the use of special tools. Where a special tool is indicated, refer to section 01. Before commencing any procedure, be sure that you have on hand all the tools required, or approved equivalents.

Technical Publications
Bombardier Inc.
Valcourt (Quebec) Canada

BASIC TOOLS

- A. Screwdriver
- B. Socket 10/13 mm
- C. Starter rope
- D. Socket wrench handle
- E. Open end wrench 10/13 mm
- F. Emergency starting clip
- G. Socket 21/26 mm
- H. Suspension adjustment wrench (cam)
- I. Suspension adjustment wrench (shock absorber)
- J. Spring collar adjustment wrench (PRS suspension)
- K. Carry boose adapter
- L. Tool bag
- M. Spring collar adjustment wrench (monoshock suspension)

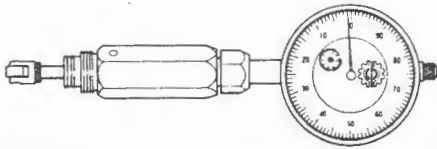
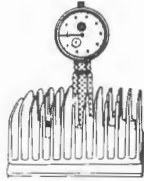

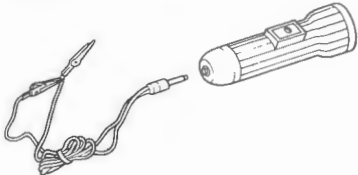
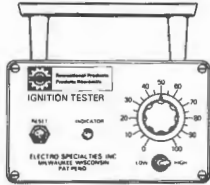



A001 001 083

| 1989 MODELS | APPLICABLE TOOLS |
|-------------------------------|-------------------------------|
| Elan | A, B, C, D, E, F, G, L. |
| Safari Citation/E | A, B, C, D, E, F, G, L. |
| Tundra, Tundra LT | A, B, C, D, E, F, G, H, L. |
| Safari Scout/E | A, B, C, D, E, F, G, H, L. |
| Safari Saga | A, B, C, D, E, F, G, H, I, L. |
| Safari Cheyenne | A, B, C, D, E, F, G, H, K, L. |
| Stratos Voyageur/Escapade | A, B, C, D, E, F, G, H, I, L. |
| Formula MX/MX LT/Plus/Plus LT | A, B, C, D, E, F, G, J, L. |
| Formula Mach I | A, B, C, D, E, F, G, J, L, M. |
| Alpine II 503 | A, B, C, D, E, F, G, L. |

1989 SERVICE TOOLS

TUNE UP

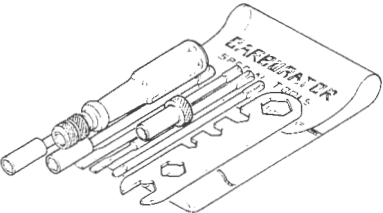
| SERVICE TOOL | PURPOSE | APPLICATION |
|---|---|--|
| <p>Dial indicator (TDC gauge) 414 1047 00</p>  <p>A000 001 086</p> | <p>Engine timing, to determine TDC</p>  <p>A000 002 066</p> | <p>All engine types</p> |
| <p>Degree wheel 414 3529 00</p>  <p>A000 001 111</p> | <p>To mark timing position of rotary valve</p> | <p>467, 536 & 583 engines</p> |
| <p>Circuit tester (continuity light) 414 0122 00</p>  <p>A000 002 073</p> | <p>Engine timing Continuity tests</p> | <p>247 engine type All engine types</p> |
| <p>Bombardier ignition tester 419 0033 00</p>  <p>A000 002 056</p> | <p>Engine electrical components tests</p> | <p>All engine types</p> |
| <p>Nippondenso electronic ignition tester 419 0084 00</p>  <p>A000 004 020</p> | <p>Engine ignition system components tests</p> | <p>- All Nippondenso electronic ignition systems (All engine types except 247)</p> |

Section 01

TOOLS


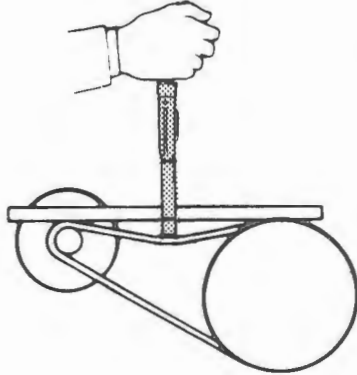

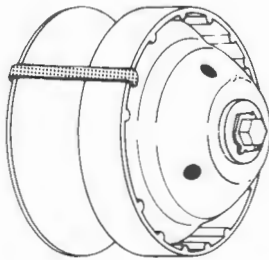
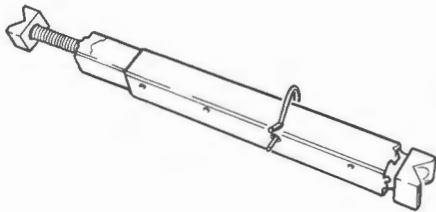
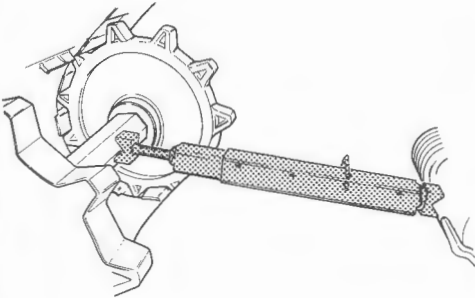
Sub-section 02 (SERVICE TOOLS)

TUNE UP

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|---|-----------------------|
| <div>Carburetor tool kit 404 1120 00</div> <div></div> <div>A000 001 087</div> | <div>To ease disassembly and assembly of carburetor</div> | <div>All models</div> |


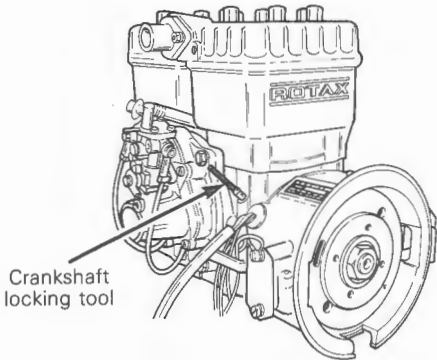

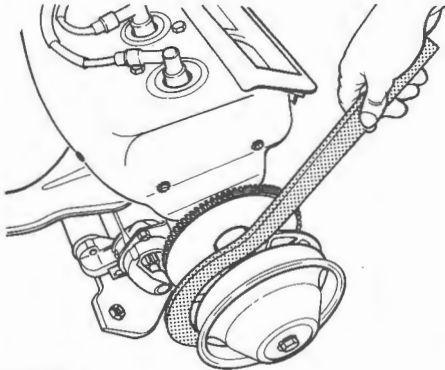
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|---|---------------------------------|
| <p>Belt tension tester 414 3482 00</p>  <p>A000 002 007</p> | <p>To adjust belt deflection and tension</p>  <p>A000 003 008</p> | <p>All models</p> |
| <p>Drive pulley retainer 529 0017 00</p>  <p>A000 002 074</p> | <p>For retaining of governor cup</p>  <p>A000 002 057</p> | <p>Round shaft drive pulley</p> |
| <p>Drive axle holder 529 0072 00</p>  <p>A001 001 050</p> | <p>To hold drive axle during installation or removal of chaincase and/or end bearing housing</p>  <p>A001 001 051</p> | <p>All models</p> |


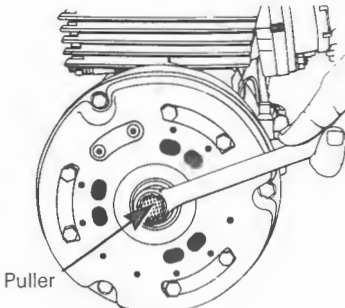


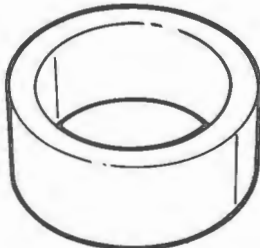
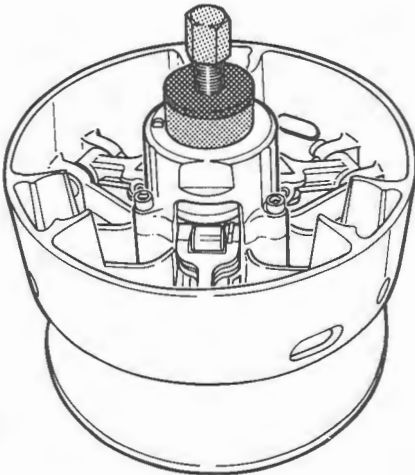
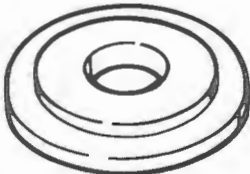
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|---|---------------------------------------|
| <p>Crankshaft locking tool 420 8766 40</p>  <p>A000 002 039</p> | <p>To lock crankshaft when removing and installing drive pulley or flywheel</p>  <p>Crankshaft locking tool</p> <p>A013 002 007</p> | <p>All engine types</p> |
| <p>Clutch holder 529 0064 00</p>  <p>A001 001 041</p> | <p>To hold drive pulley when removing and installing drive pulley retaining screw</p>  <p>A008 003 028</p> | <p>Square shaft & TRA pulleys</p> |

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

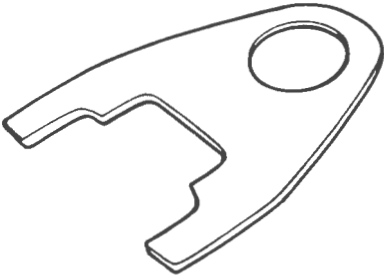
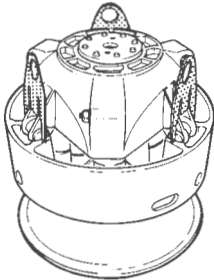
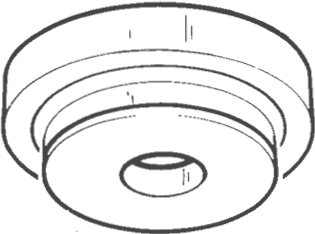
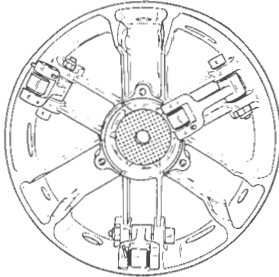
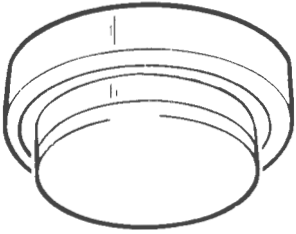
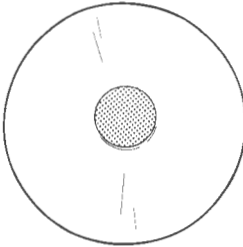
| SERVICE TOOL | PURPOSE | APPLICATION |
|---|---|--|
| <p>Drive pulley puller</p> <p>Standard threads 529 0021 00</p>  <p>A000 002 008</p> | <p>To remove drive pulley from crankshaft</p>  | <p>Engines with tapered crankshaft end</p> |
| <p>529 0030 00 Metric threads 529 0048 00 529 0028 00</p>  <p>A000 002 009</p> | | |
| <p>Metric threads 529 0079 00</p>  <p>A016 001 007</p> | | <p>TRA clutch</p> |
| <p>Spacer 529 0054 00</p>  <p>A016 001 004</p> | <p>Use with drive pulley puller (P/N 529 0079 00) to remove spring cover</p>  | <p>TRA clutch</p> |
| <p>Cover 529 0056 00</p>  <p>A016 001 005</p> | | |

Section 01

TOOLS

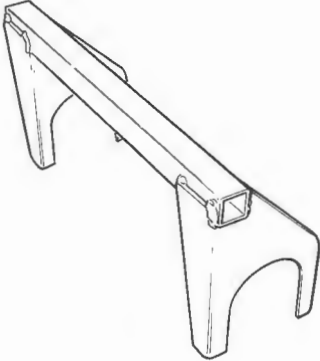
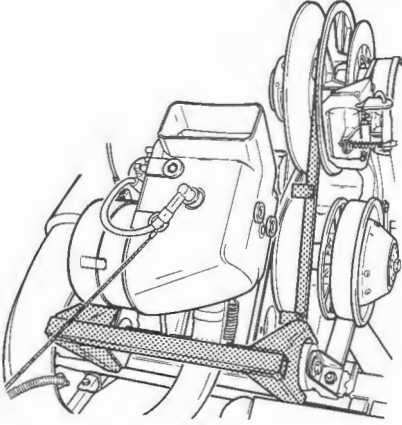
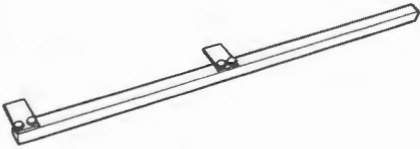
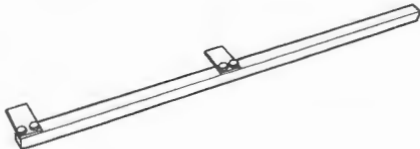
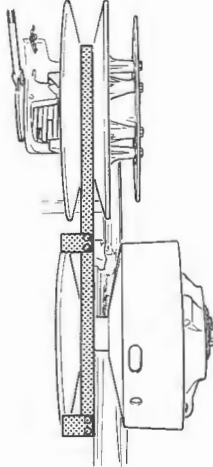
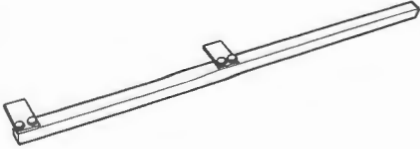
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|-------------|
| <div>Fork 529 0055 00</div> <div></div> <div>A016 001 001</div> | <div>To maintain slider shoes during removal and assembly</div> <div></div> <div>A016 001 002</div> | TRA clutch |
| <div>Outer flare tool 529 0060 00</div> <div></div> <div>A016 001 008</div> | <div>To flare kahrln bushing in inner half</div> <div></div> <div>A016 001 011</div> | TRA clutch |
| <div>Inner flare tool 529 0061 00</div> <div></div> <div>A016 001 009</div> | <div></div> <div>A016 001 010</div> | |

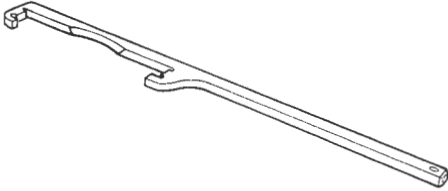
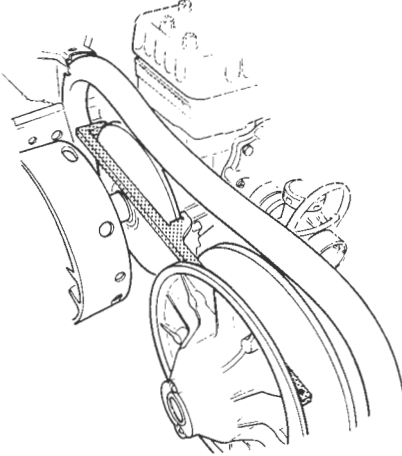
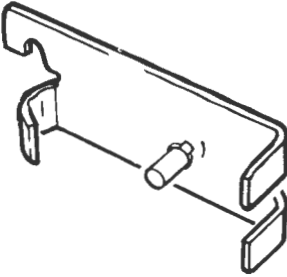
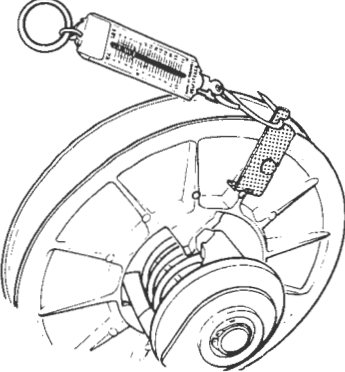
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|---|
| <p>Engine support positioner 529 0081 00</p>  <p>A003 001 001</p> |  <p>A003 001 002</p> | <p>Safari Citation / E Tundra / LT</p> |
| <p>Pulley alignment gauge 529 0080 00</p>  <p>A003 001 003</p> | | <p>Elan Safari Citation / E Tundra / LT</p> |
| <p>A) Alignment gauge 529 0084 00</p>  <p>A003 001 003</p> | <p>To ease pulley alignment</p>  <p>A019 001 006</p> | <p>A) All Safari Voyageur, Safari Escapade, Safari Cheyenne</p> |
| <p>B) 529 0083 00</p>  <p>A003 001 003</p> | | <p>B) Safari Scout / E Safari Saga</p> |

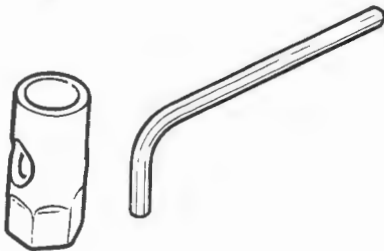
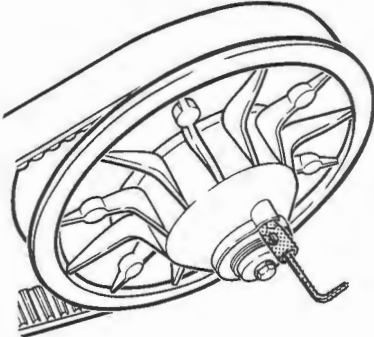
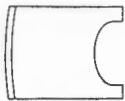
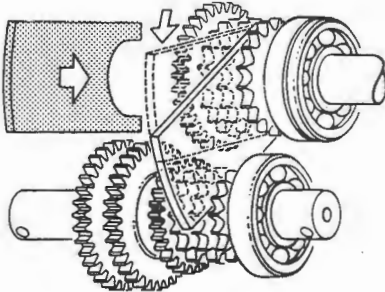
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|---|
| <p>Alignment bar 529 0071 00</p>  <p>A001 001 049</p> | <p>Used as go/no go gauges to check pulley alignment</p>  <p>A001 001 048</p> | <p>TRA clutch</p> <p>Formula MX Formula MX LT Formula PLUS Formula PLUS LT Formula MACH I Alpine II</p> |
| <p>Spring scale hook 529 0065 00</p>  <p>A001 001 043</p> | <p>To hook the spring scale to driven pulley when checking pre-load</p>  <p>A001 001 044</p> | <p>All models except Elan</p> |

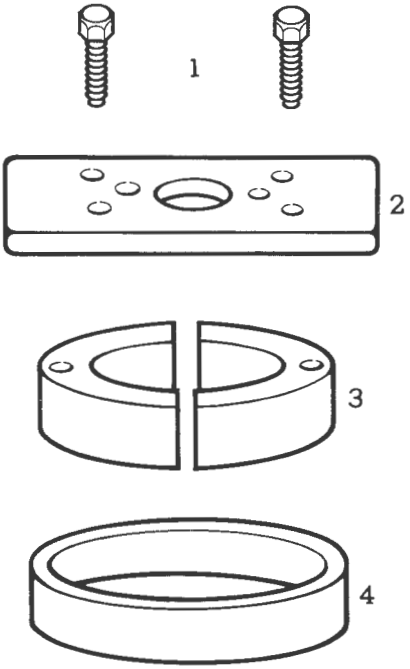
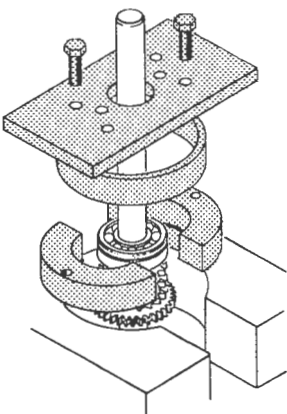
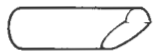
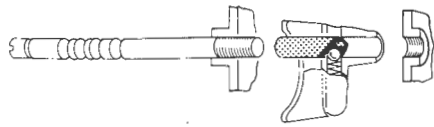
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|---|---|
| <p>Drive belt tension adjuster 529 0087 00</p>  <p>A015 001 004</p> | <p>to adjust drive belt tension</p>  <p>NOTE : Can be used with the socket handle provided in the tool box.</p> <p>A015 001 005</p> | <p>Formula MX/MX LT Formula PLUS/PLUS LT Formula MACH I Alpine II</p> |
| <p>Alignment tool 420 4760 10</p>  <p>A000 002 049</p> | <p>Drive shaft and layshaft sprocket alignment</p>  <p>A017 003 009</p> | <p>Alpine 3-speed transmission</p> |

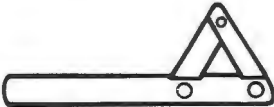
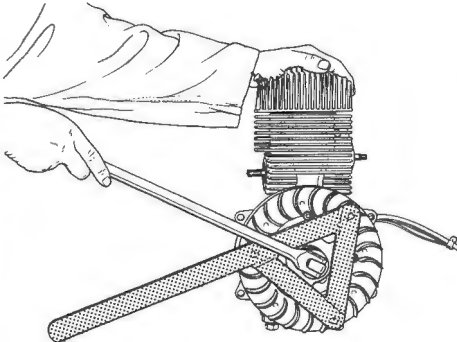

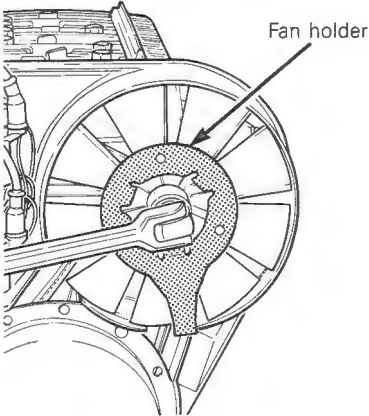
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

TRANSMISSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|--|------------------|
| <p>3-speed transmission bearing extractor</p>  <p>A000 002 047</p> | <p>To remove the bearings from the drive shaft and the lay shaft</p> <p>1- screw M8 x 25 (2) 420 2402 75</p> <p>2- plate 420 9777 00</p> <p>3- half ring (2) 420 8763 30</p> <p>4- ring 420 9774 80</p>  <p>A017 003 006</p> | <p>Alpine II</p> |
| <p>Transmission ball mounting pin 420 4760 20</p>  <p>A000 002 048</p> | <p>Transmission cover index rod ball installation</p>  <p>A017 003 011</p> | <p>Alpine II</p> |

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)


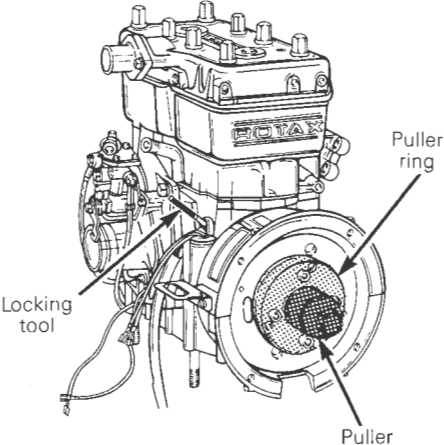
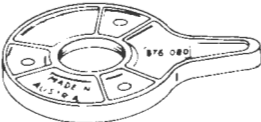
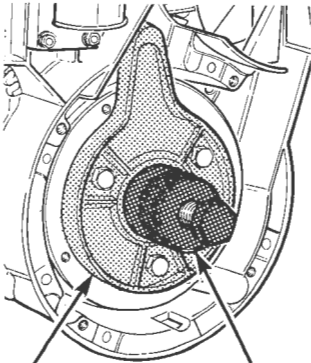

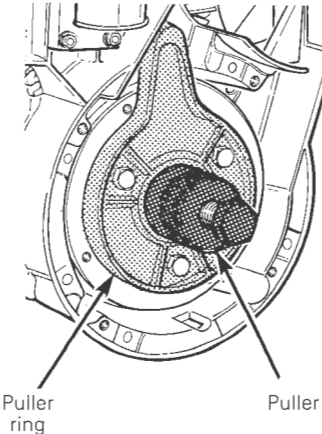
ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|-------------------------------------|
| <p>Magneto housing holder 420 9765 50</p>  <p>A000 002 067</p> |  <p>A000 002 068</p> | <p>247 engine type</p> |
| <p>Fan holder 503 engine 420 8763 55 253 & 377 420 8763 57 engines</p>  <p>A000 002 026</p> |  <p>A009 002 013</p> | <p>Axial fan cooled engines</p> |

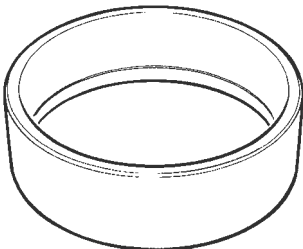
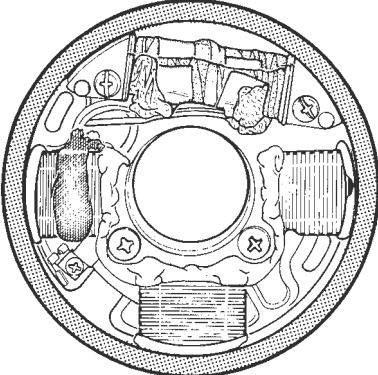
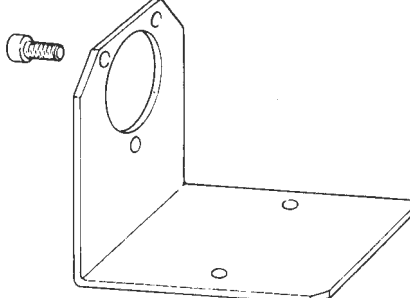
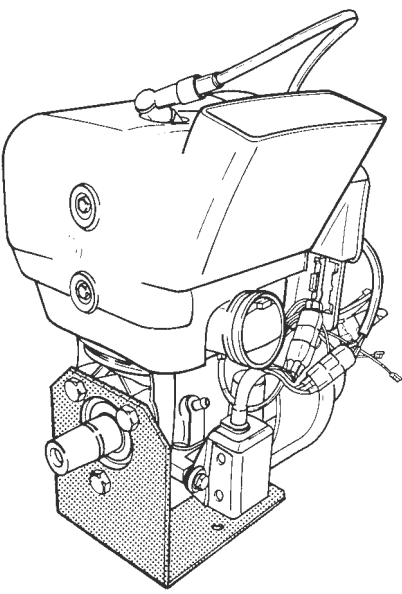
Section 01 TOOLS

Sub-section 02 (SERVICE TOOLS)

ENGINE

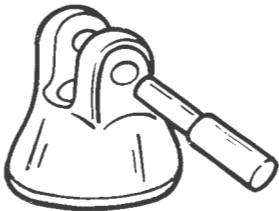
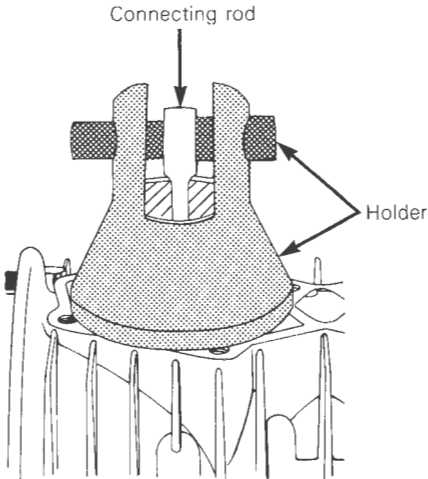
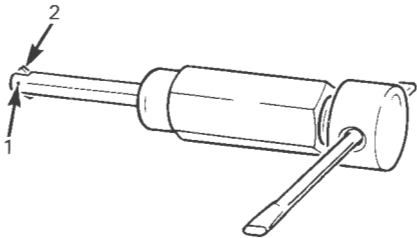
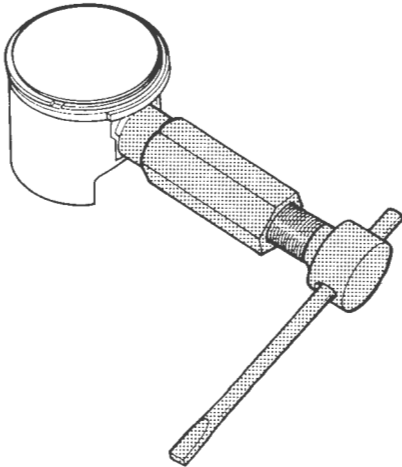
| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|------------------------------------|
| <p>Magneto puller ring 420 8766 55</p>  | <p>Used with crankshaft locking tool (P/N 420 8766 40) & magneto puller to remove flywheel</p>  | <p>All engine types except 247</p> |
| <p>Magneto puller ring 420 8760 80</p>  | <p>Used with magneto puller to remove flywheel</p>  | |
| <p>Magneto puller</p> <p>247 engine 420 9762 35 253,377, 420 8760 65 467,503,537 engines</p>  |  | <p>All engine types</p> |

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|---|----------------------------|
| <p>Magneto coil centering tool 420 8769 22</p>  <p>A001 001 067</p> | <p>To adjust the gap between coils and flywheel</p>  <p>A001 004 003</p> | <p>All Nippondenso CDI</p> |
| <p>Mounting support 420 8768 30 Screw M10 x 16 mm 420 8416 60</p>  <p>A002 001 002</p> | <p>To hold engine</p>  <p>A003 002 001</p> | <p>253 engine type</p> |

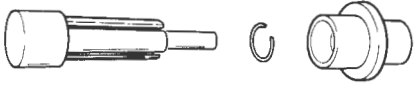
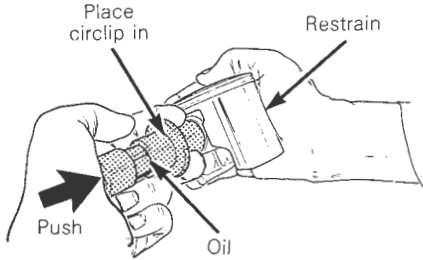
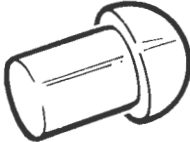
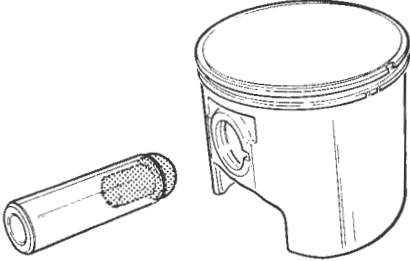
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|--|-------------------------|
| <p>Connecting rod holder 420 9779 00</p>  |  <p>Connecting rod Holder</p> | <p>247 engine type</p> |
| <p>A000 002 023</p> <p>Piston pin puller 529 0068 00</p>  <p>1. Spring pin 372 1010 00 2. Stop notch 529 0068 01</p> | <p>To remove piston pin</p>  | <p>All engine types</p> |
| <p>A001 001 045</p> | <p>A001 001 046</p> | |

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

ENGINE

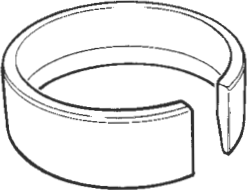
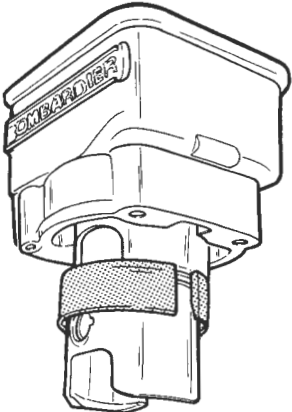
| SERVICE TOOL | PURPOSE | APPLICATION |
|---|--|-------------------------|
| <p>Piston circlip installer 529 0086 00</p>  <p>A001 001 061</p> | <p>To install circlips on piston</p>  <p>▼ CAUTION: Ensure that the circlip is well seated and correctly positioned in the piston groove.</p> <p>A001 001 062</p> | <p>All engine types</p> |
| <p>Piston pin/connecting rod bearing centering tool 529 0091 00</p>  <p>A001 001 063</p> | <p>To center the piston pin with the connecting rod bearing during installation</p>  <p>○ NOTE: The circlip on the opposite side can be installed before pin installation, the tool will easily go out.</p> <p>A001 001 064</p> | <p>All engine types</p> |

Section 01

TOOLS

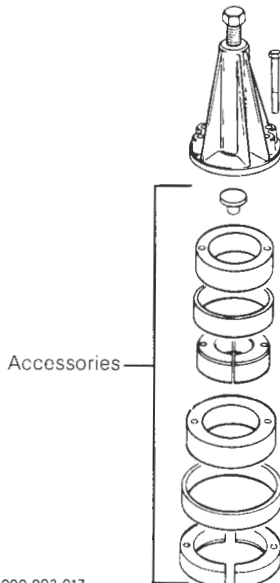
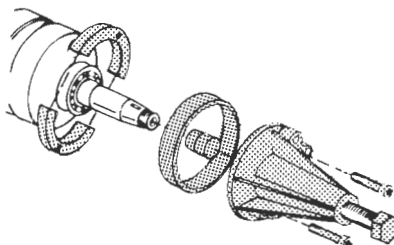
Sub-section 02 (SERVICE TOOLS)

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|---|--|
| <div>Ring compressor</div> <div></div> <div>A) 420 8760 90</div> <div>B) 420 8769 74</div> <div>C) 420 8769 70</div> | <div>To compress piston rings when inserting piston in cylinder</div> <div></div> <div>A001 001 066</div> | <div></div> <div>A) 377 engine type</div> <div>B) 467 engine type</div> <div>C) 253, 503, 536 engine types</div> |

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

ENGINE


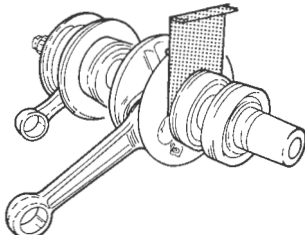

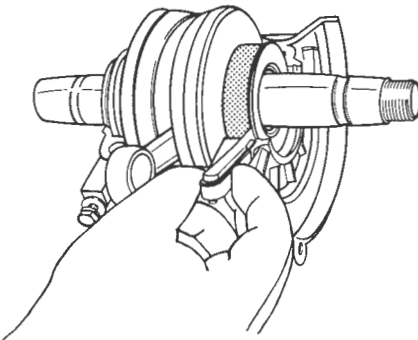


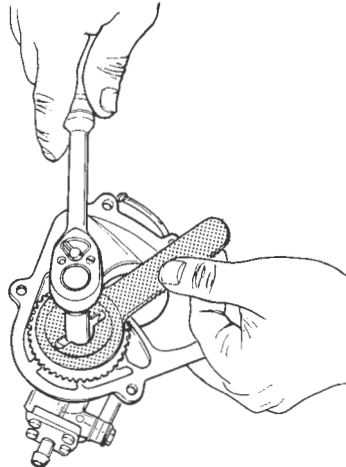
| SERVICE TOOL | | PURPOSE | | APPLICATION | |
|--|--|--|--|------------------|--|
| <div>Puller assembly 420 8762 96 With 145 mm screw</div> <div></div> <div>A000 002 017</div> | | <div>To remove crankshaft bearings</div> <div></div> <div>A000 002 018</div> | | All engine types | |

| PULLER ASSEMBLY COMPONENT | P / N | APPLICABLE TO ENGINE TYPES | | | | | | |
|-----------------------------|-------------|----------------------------|-----|-----|-----|-----|-----|-----|
| | | 247 | 253 | 377 | 467 | 503 | 536 | 583 |
| Screw M16 x 145 | 420 9407 55 | | | | | | | |
| PULLER ASSEMBLY ACCESSORIES | P / N | | | | | | | |
| Screw M8 x 70 (2) | 420 8412 00 | | | | | | | |
| Screw M8 x 40 (2) | 420 8406 80 | | | | | | | |
| Crankshaft protector PTO | 420 8765 50 | | | | | | | |
| Crankshaft protector PTO | 420 8765 52 | | | | | | | |
| Crankshaft protector MAG | 420 8765 57 | | | | | | | |
| Crankshaft protector MAG | 420 8765 55 | | | | | | | |
| Protection cap 18 mm MAG | 420 9768 90 | | | | | | | |
| Protection cap 22 mm MAG | 420 8764 02 | | | | | | | |
| Distance ring | 420 8765 60 | | | | | | | |
| Distance ring | 420 8765 65 | | | | | | | |
| Distance ring | 420 8765 67 | | | | | | | |
| Puller ring | 420 9774 80 | | | | | | | |
| Puller ring | 420 9774 90 | | | | | | | |
| Half ring ass'y | 420 2760 20 | | | | | | | |
| Half ring ass'y | 420 9774 70 | | | | | | | |

Section 01 TOOLS


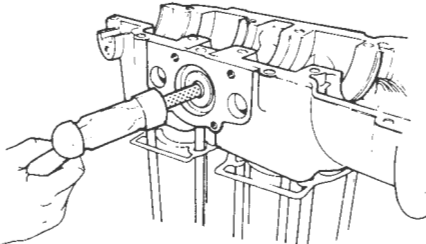

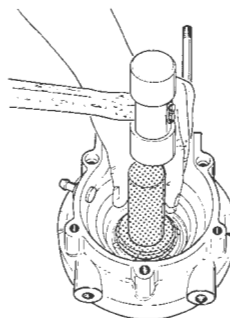
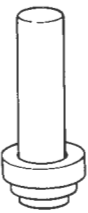
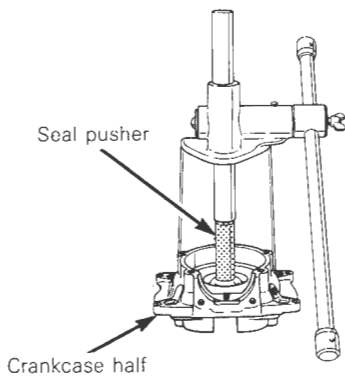
Sub-section 02 (SERVICE TOOL)

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|--|------------------------------------|
| <p>Crankshaft feeler gauge 420 8766 20</p>  <p>A000 002 037</p> | <p>On PTO side</p>  <p>A000 002 038</p> | <p>PTO : 377 & 503 engines</p> |
| <p>Bearing simulator 420 8761 55</p>  <p>A000 002 053</p> | <p>To adjust crankshaft end-play</p>  <p>A001 002 036</p> | <p>253 engine type</p> |
| <p>Injection pump gear holder 253 & 377 engines 420 8766 95</p>  <p>A000 001 109</p> <p>467, 536 & 583 engines 420 2779 00</p>  <p>A000 002 042</p> |  <p>A000 002 043</p> | <p>All oil injection engines</p> |

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|--|
| <p>Rotary valve shaft pusher 420 8766 12 (for 10 mm shaft)</p>  <p>A000 002 015</p> |  <p>A000 002 016</p> | <p>467, 536 & 583 engine types</p> |
| <p>Polyamid ring pusher 420 2769 30</p>  <p>A000 002 035</p> | <p>To install polyamid ring in crankcase</p>  <p>A000 002 036</p> | <p>247 engine type</p> |
| <p>Engine seal pusher 420 9779 20</p>  <p>A000 002 031</p> |  <p>A000 002 032</p> | <p>247 engine type</p> |

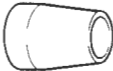
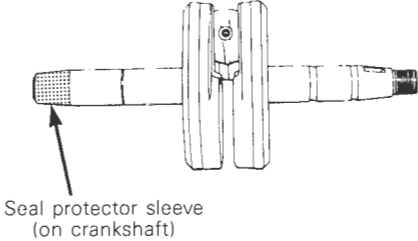
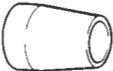
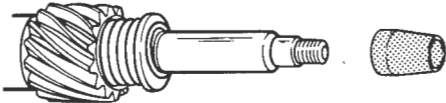

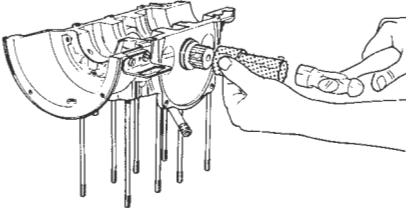
Section 01

TOOLS

Sub-section 02


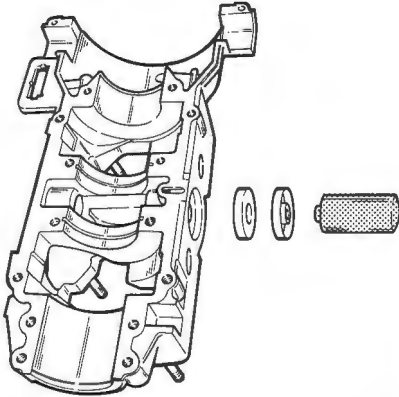

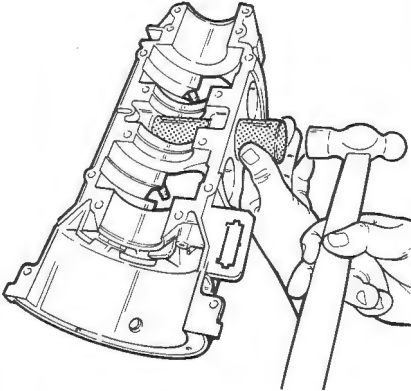
(SERVICE TOOLS)

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|--|--|
| <div>Seal protector sleeve</div> <div>PTO 420 9779 10</div> <div>MAG 420 2769 00</div> <div></div> <div>A000 002 013</div> | <div>To avoid seal damage during crankshaft installation</div> <div></div> <div>A000 002 014</div> | <div>247 engine type</div> |
| <div>Seal protector sleeve</div> <div>420 8769 80 (for 10 mm shaft)</div> <div></div> <div>A000 002 013</div> | <div>To avoid seal damage during rotary valve shaft installation</div> <div></div> <div>A013 002 012</div> <div>A000 002 013</div> | <div>467, 536 & 583 engine types</div> |
| <div>Rotary valve seal pusher</div> <div>420 8766 05</div> <div></div> <div>A000 002 034</div> | <div>To install seal and rotary valve shaft</div> <div></div> <div>A013 002 020</div> | <div>467, 536 & 583 engine types</div> |

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|---|--|
| <p>Seal pusher 420 8765 12 (for 10 mm shaft)</p>  <p>A000 002 033</p> | <p>To install water pump seals</p>  <p>A015 002 014</p> | <p>467, 536 & 583 engine types</p> |
| <p>Bearing pusher 420 8765 00</p>  <p>A000 001 091</p> | <p>To install water pump bearing</p>  <p>A015 002 028</p> | <p>467, 536 & 583 engine types</p> |




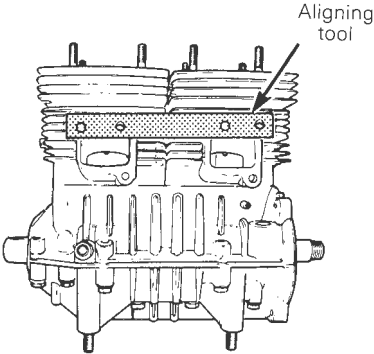
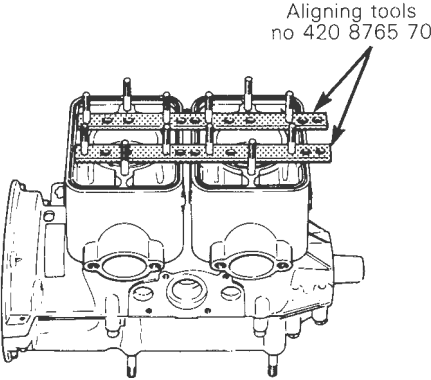

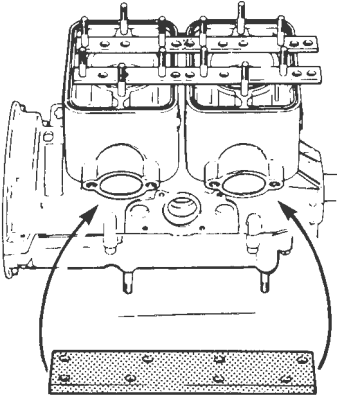
Section 01

TOOLS

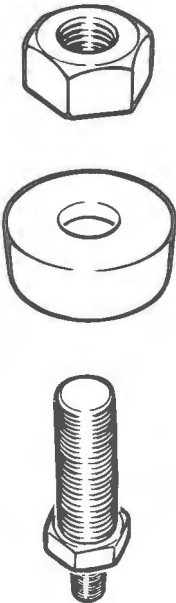
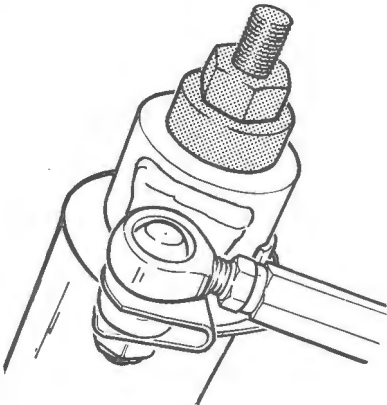
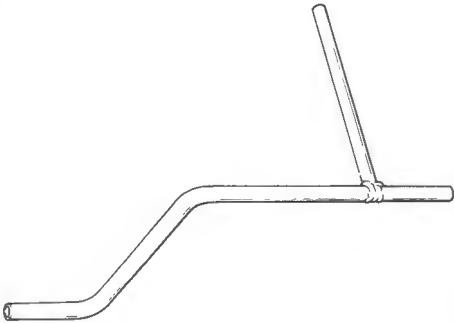
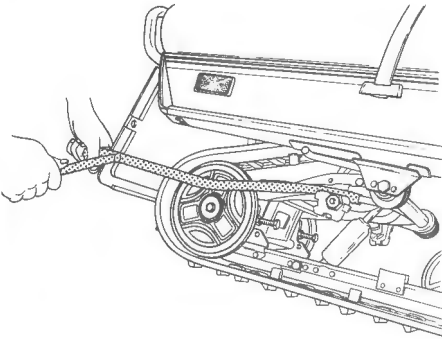
Sub-section 02

(SERVICE TOOLS)

ENGINE

| SERVICE TOOL | PURPOSE | APPLICATION |
|---|---|----------------------------------|
| <div>Cylinder aligning tools</div> <div>377, 503 engines420 8761 71</div> <div></div> <div>A000 001 106</div> <div>Screw M8 x 25 mm</div> <div>377, 503 engines420 2402 75</div> <div></div> <div>A000 002 020</div> <div>467 engine420 8765 75</div> <div>536 & 583 engines420 8765 70</div> <div></div> <div>A000 001 007</div> | <div>To align cylinders</div> <div></div> <div>A017 002 001</div> <div></div> <div>A015 002 052</div> | <div>Twin cylinder engines</div> |
| <div>Exhaust flange aligning tool</div> <div>467,536 engines420 8769 00</div> <div></div> <div>A000 001 008</div> | <div></div> <div>Exhaust flange aligning tool P/N 420 8769 00</div> <div>A015 002 052</div> <div>A000 001 008</div> | |


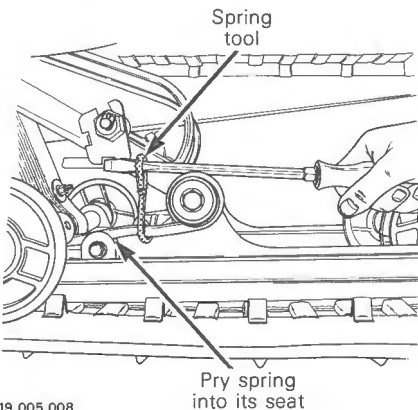
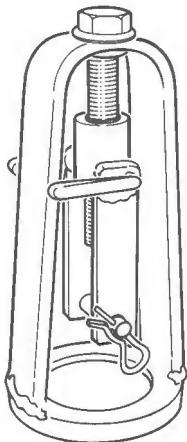

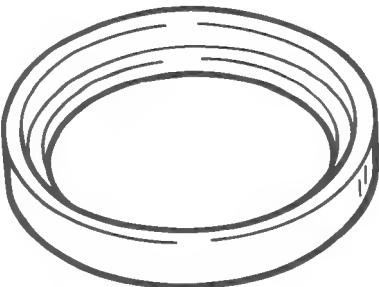

SUSPENSION

| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|---|
| <p>Steering arm installer 529 0088 00</p>  <p>A017 001 003</p> | <p>To install steering arm</p>  <p>▼ CAUTION : Key and keyway must align perfectly before tightening nut.</p> <p>A017 001 004</p> | <p>Alpine II</p> |
| <p>Spring installer 529 0050 00</p>  <p>A000 002 054</p> | <p>To install suspension springs</p>  <p>A009 005 007</p> | <p>Tundra/LT, Safari Scout/E, Safari Saga</p> |

Section 01 TOOLS

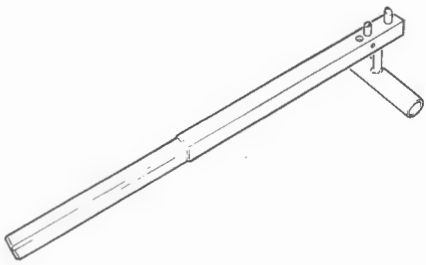

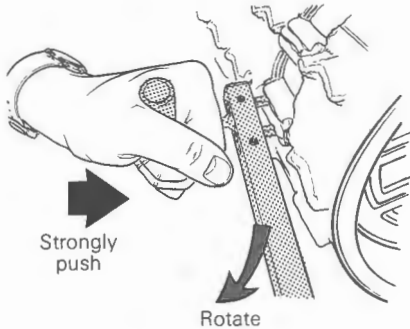
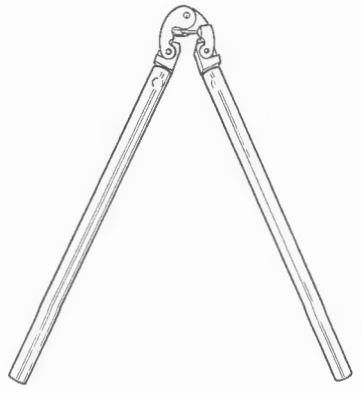
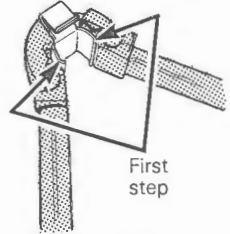
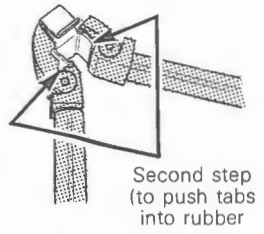
Sub-section 02 (SERVICE TOOLS)

SUSPENSION








| SERVICE TOOL | PURPOSE | APPLICATION |
|--|---|--|
| <p>Suspension spring installer 529 0066 00</p>  <p>A019 001 003</p> | <p>To install suspension springs</p>  <p>Spring tool Pry spring into its seat</p> <p>A019 005 008</p> | <p>Safari Voyageur, Safari Escapade, Safari Cheyenne</p> |
| <p>Spring remover 414 5796 00</p>  <p>A015 001 001</p> | <p>To remove spring from shock absorber</p>  <p>A014 005 025</p> | <p>SP & PRS suspension types</p> |
| <p>Spring adaptor 529 0057 00</p>  <p>A014 001 003</p> | <p>Used with spring remover to remove spring from shock absorber</p>  <p>A014 005 024</p> | <p>SP suspension type</p> |

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

SUSPENSION



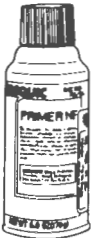



| SERVICE TOOL | PURPOSE | APPLICATION |
|--|--|---|
| <p>Track cleat remover 529 0082 00</p>  <p>A001 001 055</p> <hr/> <p>Position 1-3 : large cleats Position 1-2 : small cleats</p> <p>Spare pins 529 0082 04</p>  <p>NOTE : Pins can be rotated of 180° depending on whether the tool is used by a left-hander or right-hander.</p> <p>A001 001 057</p> | <p>To remove track cleats</p>  <p>A001 001 056</p> | <p>All track cleats</p> |
| <p>A) Track cleat installer 529 0077 00</p> <hr/> <p>B) 529 0085 00</p>  <p>A001 001 058</p> | <p>To install track cleats</p>  <p>A001 001 059</p>  <p>A001 001 060</p> | <p>A) Large track cleats</p> <hr/> <p>B) Small track cleats</p> |

SERVICE PRODUCTS


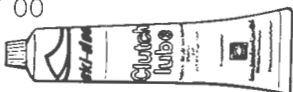



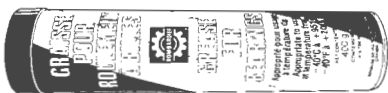
| SERVICE PRODUCT | PURPOSE | APPLICATION |
|---|---|--|
| <p>Silastic 732 RTV 747 0020 00</p>  <p>A000 001 117</p> | To seal joints. | Flat washers on cylinders of 536 engine type. |
| <p>PST Pipe Sealant with Teflon (50 ml) 413 7023 00</p>  <p>A000 001 104</p> | To seal pipe fittings. Prevents leakage and vibrational loosening. | Engine pipe plugs. |
| <p>Retaining Compound RC/609 (10 ml) 413 7031 00</p>  <p>A000 001 100</p> | A bonding compound for use on unthreaded metal cylindrical parts to prevent vibrational loosening and wear. | Drive and driven pulley bushings. |
| <p>Gasket Eliminator 515 (50 ml) 413 7027 00</p>  <p>A000 001 101</p> | Makes, dresses and repairs gaskets of sizes and shapes. | Crankcase halves. Transmission and gearbox mating surfaces. |
| <p>Super Bonder Adhesive 495 (3 ml) 413 7032 00</p>  <p>A000 001 103</p> | Bonds nonporous materials in seconds. For use on metal, vinyl, plastic, rubber and ceramic. | "L"-plates in posi-steer suspension. |
| <p>Lock'n seal (242) blue medium strength (10 ml) 413 7030 00</p>  <p>A000 001 110</p> | A medium-strength adhesive for threadlocking and threadsealing. Vibration-proof nuts, bolts and screws. | General purpose, nuts, bolts screws. Magneto ring nut, crankcase studs, etc. |
| <p>Lock'n seal (271) red high strength (10 ml) 413 7029 00</p>  <p>A000 001 102</p> | Hi-strength threadlocking threadsealing adhesive for large parts. | Fasteners and studs under 1" dia. |

Section 01 TOOLS

Sub-section 03 (SERVICE PRODUCTS)




| SERVICE PRODUCT | PURPOSE | APPLICATION |
|---|---|---|
| Molykote G-n paste (2.8 oz) 413 7037 00  A000 001 064 | A balanced blend of molybdenum disulfide and other lubricating solids to handle extreme pressure. Reduces frictional force and surface damage. Provides excellent protection against fretting wear temperature range from -100°F to 750°F (-73°C to 399°C). | For rewind starter locking spring. (Not to be used on rewind springs as is does not stay on when dried). |
| G.E. Versilube G341 M 8 oz 413 7040 00  A000 001 065 | This General Electric silicone lubricant is highly resistant to oxidation, shear and heat decomposition - and will provide excellent lubrication over long intervals of no maintenance under temperatures from -73°C to 240°C such conditions. Lubricates under (-100°F to 400°F) | Used to lubricate manual starter rewinding spring. (not to be used on rewind starter locking makes it run out). |
| Primer crankcase sealant spray (6 oz) 413 7024 00  A000 001 066 | Very fast cure primer. Primer NF provides fixturing in only 15-30 seconds with full cure in 4 hours or less. On part life is 30 minutes and parts should be assembled as soon as possible after adhesive is applied. | Mainly used when assembling engine crankcases. |
| STRIPPER NO 157 413 7021 00  A000 001 092 | For cleaning mating surfaces before assembly. | Used to clean mating surfaces. |
| Antiseize lubricant (12 oz) 413 7010 00  A000 001 068 | Protects moving and stationary parts against high temperature seizing. Prevents rust and corrosion on parts exposed to high heat. | Unpainted surfaces of drive pulley countershaft. |
| Silicone dielectric grease (3 oz) 413 7017 00  A000 001 069 | Special dielectric grease that prevents moisture and corrosion build-up in electric connections. | On all electric connections. High tension coil. Spark plug connections. Connector housings, etc. |

Section 01 TOOLS
Sub-section 03 (SERVICE PRODUCTS)

| SERVICE PRODUCT | PURPOSE | APPLICATION |
|---|--|--|
| Grease tube LMZ no 1 (400 g) 413 7064 00  A000 001 070 | Multi purpose Lithium based grease containing zinc monoxide which makes it a good conductor for heat & electricity. | Mainly used between regulators or rectifiers and upper column to transfer the heat build-up and to assure a good ground. |
| Clutch lube (4 oz) 413 8007 00  A000 001 071 | Special low temperature metallic lubricant for clutch shafts only. | For roller round shaft drive pulleys. |
| Chaincase oil (250 ml) 413 8019 00  A000 001 099 | Specially formulated oil for chain and roller lubrication. Assures proper lubrication at low temperatures. | Chaincase lubricant on all models. |
| Blizzard oil 496 0135 00 (500 ml)  A000 001 074 | Specially formulated oil that meets lubrication requirements of the Bombardier-Rotax engine. | All models. |
| Injection oil 496 0133 00 (1 litre) 496 0140 00 (4 litres)  A000 001 075 | This oil will flow at -40°C (-40°F). Compounded of base oils and additives, specially selected to provide outstanding lubrication, engine cleanliness and minimum spark plug fouling. Fully efficient for : INJECTION, PRE-MIX, ROTARY VALVE. | All engine types. |
| Bearing grease (400g) 413 7061 00  A000 001 093 | Multi-purpose lithium based grease. It is an antifriction, anticorrosion and water resistant bearing grease for use through temperatures between -40° to 95°C (-40° to 200°F). | For idler bearings, ski legs, leaf spring cushion pads, seal interior lips, rear hub bearings, bogie wheels, countershaft bearings, etc... |

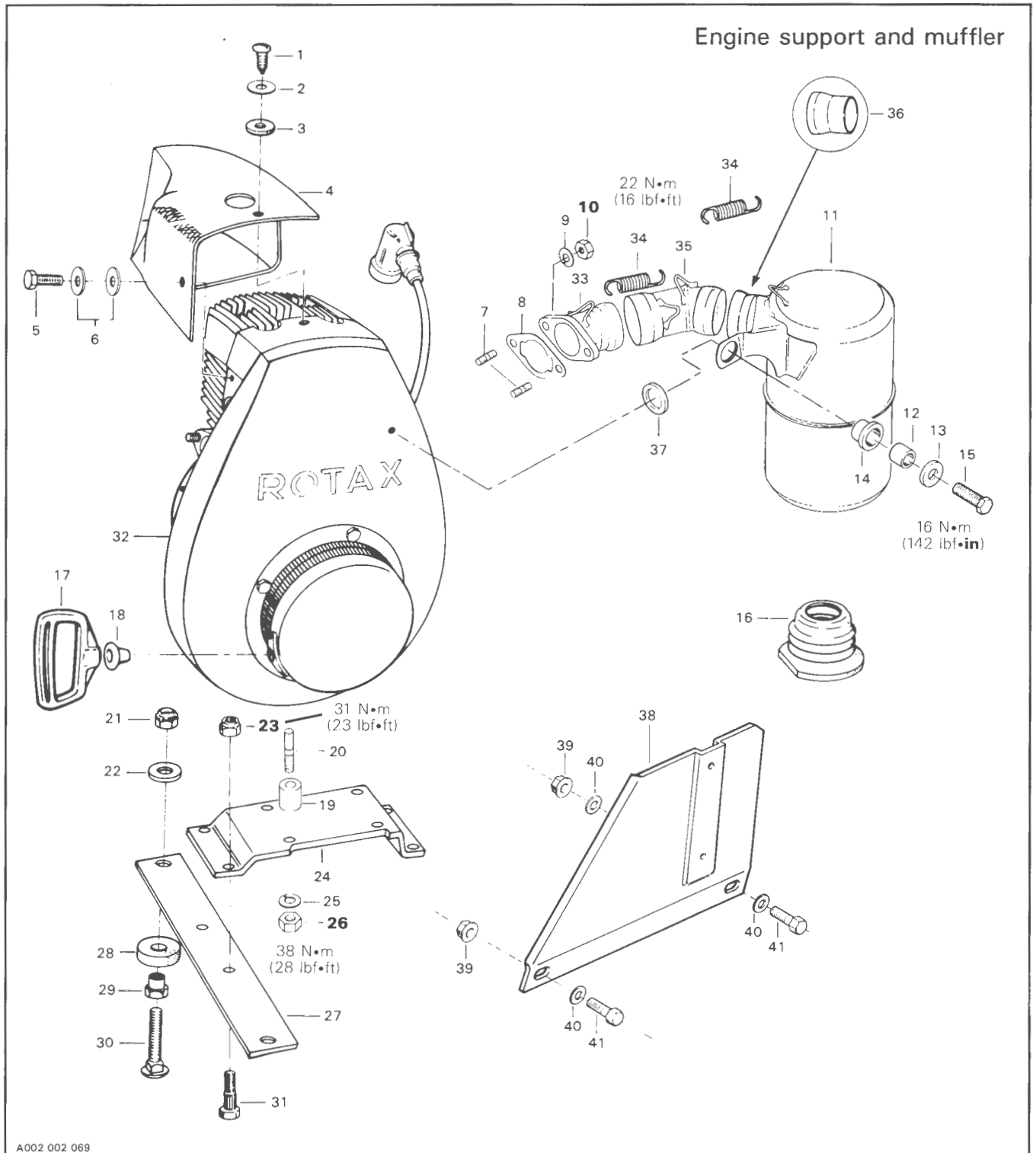
Section 01 TOOLS

Sub-section 03 (SERVICE PRODUCTS)

| SERVICE PRODUCT | PURPOSE | APPLICATION |
|--|---|--|
| <p>Primer for gasket eliminator 413 7053 00</p>  | <p>General purpose primer. Primer N assures fixturing of parts in 15-30 minutes and full cure in 12 hours or less. On part life is 30 days, but it is recommended that parts be joined within 10 minutes after adhesive is applied over primer.</p> | <p>Mainly used when assembling engine crankcases and transmission cases.</p> |
| <p>A000 001 077</p> | | |
| <p>Paint 413 4010 00 Black semi-gloss (Spray can)</p> | <p>For frame touch-up.</p> | <p>Elan, Alpine II</p> |
| <p>413 4031 00 Ice orange (Spray can)</p>  | <p>For hood touch-up.</p> | <p>Alpine II</p> |
| <p>A000 001 094</p> | | |
| <p>496 0141 00 Storage oil (350 g spray can)</p>  | <p>To protect engine from rust during storage period.</p> | <p>All models.</p> |
| <p>A000 001 116</p> | | |

247 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION



Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

- | | |
|---------------------------------|--|
| 1. Metal screw 8 x 5/8 (2) | 22. Washer (4) |
| 2. Washer (2) | 23. Elastic stop nut 5/16-24 (4) |
| 3. Rubber spacer (2) | 24. Engine support |
| 4. Air duct | 25. Lock washer 10 mm (4) |
| 5. Hexagonal screw 1/4 x 20 | 26. Hexagonal nut 10 mm (4) |
| 6. Washer | 27. Cross support (2) |
| 7. Stud M8 x 19 (2) | 28. Vibration damper (4) |
| 8. Muffler gasket | 29. Threaded spacer (4) |
| 9. Lock washer 8 mm (2) | 30. Carriage bolt 3/8-24 (4) |
| 10. Hexagonal nut 8 mm (2) | 31. Knurled screw 5/16-24 (4) |
| 11. Muffler | 32. Rotax engine 247 |
| 12. Bushing | 33. Exhaust socket |
| 13. Washer | 34. Spring (4) |
| 14. Rubber washer | 35. Connecting tube |
| 15. Hexagonal screw M8 x 25 | 36. Muffler female ball joint |
| 16. Exhaust grommet | 37. O-ring |
| 17. Starter grip | 38. Heat shield |
| 18. Rubber buffer | 39. Elastic stop nut 1/4-20 (2) |
| 19. Distance sleeve 22 mm (4) | 40. Washer (3) |
| 20. Stud M10 x 42 (4) | 41. Hex. cap screw 1/4-20 x 3/4 in (2) |
| 21. Elastic stop nut 3/8-24 (4) | |
-

REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle :

- console
- pulley guards
- drive belt
- muffler
- primer hose
- decompressor cable
- throttle cable
- fuel lines
- impulse line
- electrical connectors
- separate steering column support at upper column
- engine mount nuts

ENGINE SUPPORT AND MUFFLER DISASSEMBLY & ASSEMBLY

10,23,26, Manifold nut, engine support nut & engine mount nut

Torque the manifold nuts to 22 N•m (16 lbf•ft).

Torque the engine support nuts to 31 N•m (23 lbf•ft).

Torque the engine mount nuts to 38 N•m (28 lbf•ft).

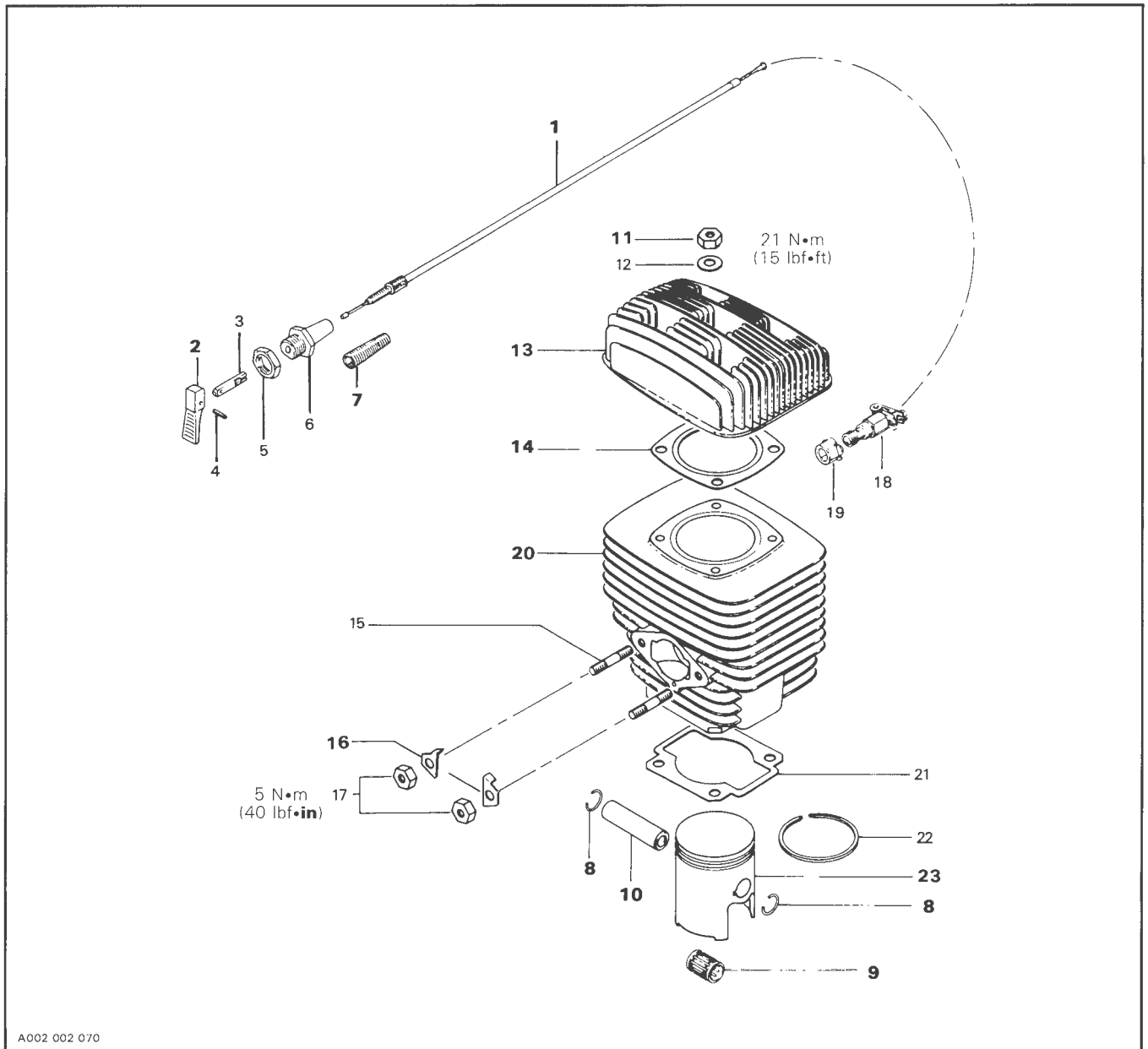
INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following :

- Check tightness of engine mount nuts, and drive pulley screw.
- After throttle cable installation, check maximum throttle slide opening.
- Check pulley alignment and drive belt tension.
- Should a light exhaust leak is experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits accumulation should seal joint.

Section 02 ENGINE
Sub-section 01 (247 ENGINE TYPE)

TOP END



1. Decompressor cable
2. Decompressor lever
3. Switch rod
4. Dowel tube
5. Cap nut M18 x 1.5
6. Switch housing
7. Spring
8. Circlip (2)
9. Needle bearing
10. Gudgeon pin
11. Nut 8 mm (4)
12. Washer 8,4 mm (4)

13. Cylinder head
14. Head gasket
15. Stud M8 x 19,5 (2)
16. Tab lock (2)
17. Nut 8 mm (2)
18. Decompressor
19. Locking sleeve
20. Cylinder
21. Flange gasket
22. Rectangular ring (2)
23. Piston

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

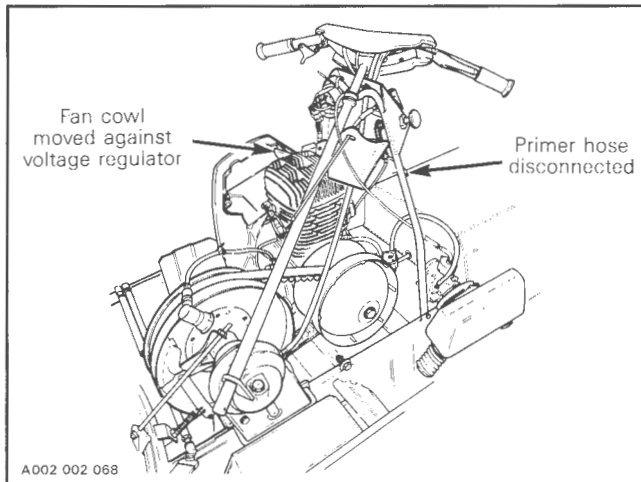
○ **NOTE:** The following procedures can be done without removing the engine from chassis.

REMOVAL

(Without removing engine from chassis)

Remove the following then lift cylinder and cylinder head :

- console
- pulley guards
- spark plug
- air duct
- muffler, connecting tube and exhaust socket
- spark plug cable clamp from fan cowl
- primer hose from carburetor
- untighten rubber flange collar then move carburetor
- steering column U bolt at upper column and spirol pin, washer and short tie rod from bottom end
- air deflector and decompressor cable at cylinder head
- four nuts retaining fan cowl and move it sideways until it is against the voltage regulator
- move steering column toward left to clear engine top end



CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ **NOTE:** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

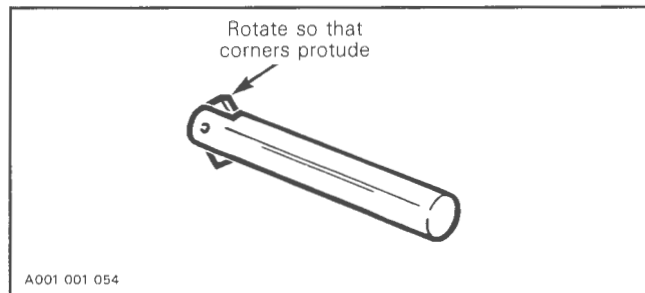
DISASSEMBLY

8,10,23, Circlip, gudgeon pin & piston

Place a clean cloth over crankcase, then with a pointed tool inserted in piston notch, remove circlip from piston.

To remove piston pin, use piston pin puller (P/N 529 0068 00) as follows :

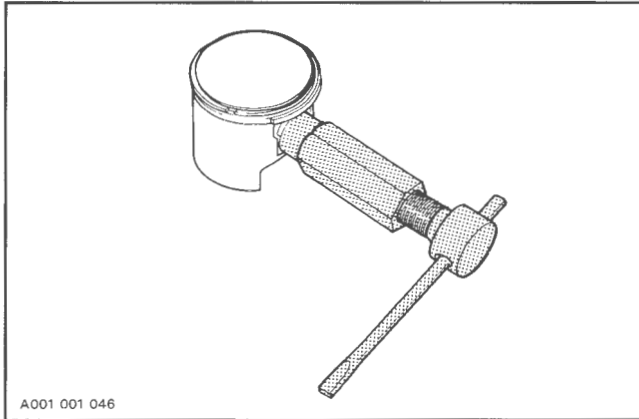
- Fully screw puller handle.
- Place stop notch of puller in line with the puller axis.
- Insert puller end into piston pin.
- Rotate stop notch of puller so that corners protrude the puller end.



- Hold puller firmly and rotate puller handle counter-clockwise to pull piston pin.

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)



○ **NOTE :** 0.5 mm oversize piston and rings are available if necessary.

INSPECTION

The inspection of the engine top end must include the following measurements :

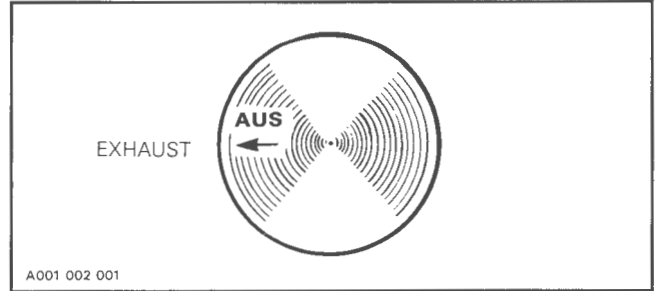
| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|------------------------------|--------------------------|-------------------|-------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Cylinder taper | N.A. | N.A. | 0.08 mm (.0031'') |
| Cylinder out of round | N.A. | N.A. | 0.05 mm (.0020'') |
| Cylinder/piston clearance | 0.08 mm (.0031'') | 0.10 mm (.0039'') | 0.20 mm (.008'') |
| Ring/piston groove clearance | 0.04 mm (.002'') | 0.11 mm (.004'') | 0.20 mm (.008'') |
| Ring end gap | 0.20 mm (.008'') | 0.35 mm (.014'') | 1.0 mm (.039'') |

○ **NOTE :** For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

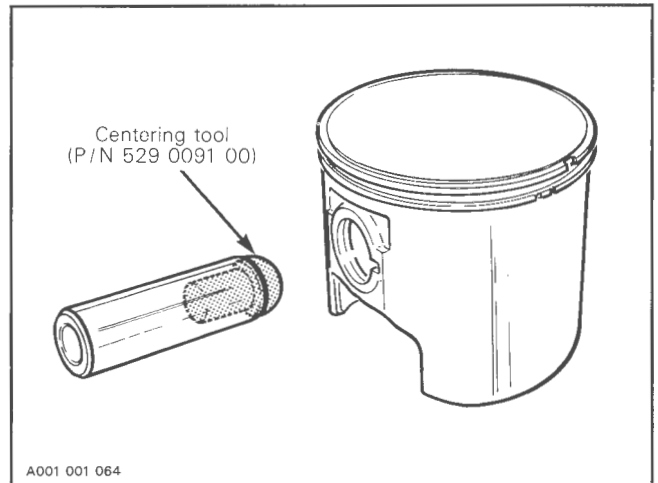
ASSEMBLY

8,10,23, Circlip, piston pin & piston

At assembly, place the piston over the connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.

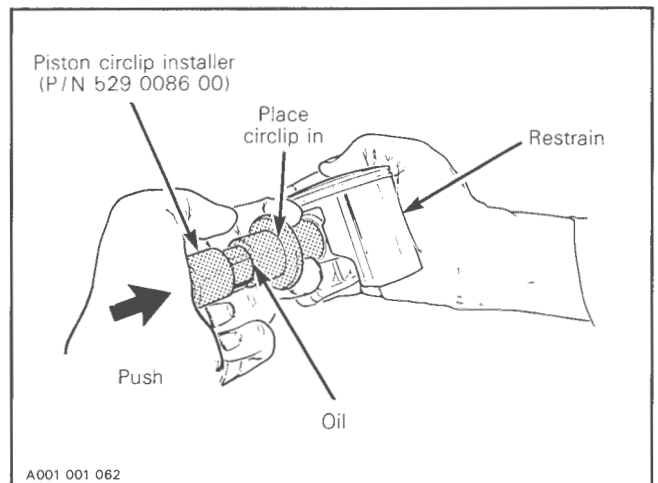


To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00).



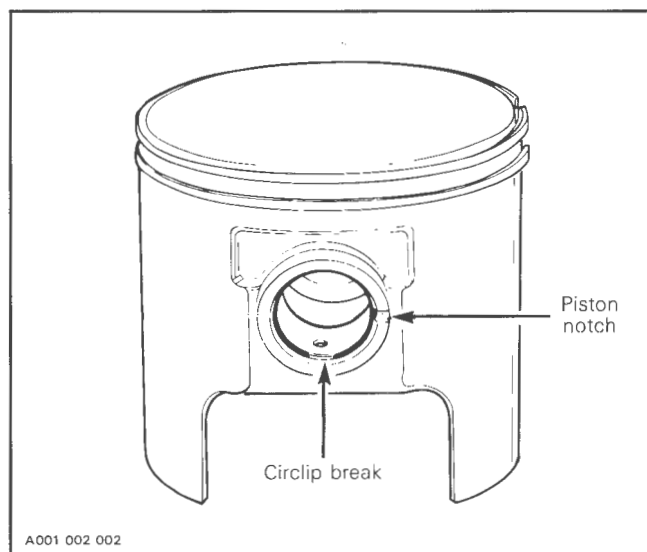
○ **NOTE :** The circlip on the opposite side can be installed before pin installation, the fool will easily go out.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0086 00).



Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)



▼ **CAUTION :** Circlips must not move freely in the groove after installation. If so, replace them.

20, Cylinder

Before inserting piston in the cylinder, lubricate the cylinder with new injection oil or equivalent.

Spare parts pistons and cylinders are identified with a green or red dot, it is important to match piston and cylinder with the same color.

1,13, Nut & cylinder head

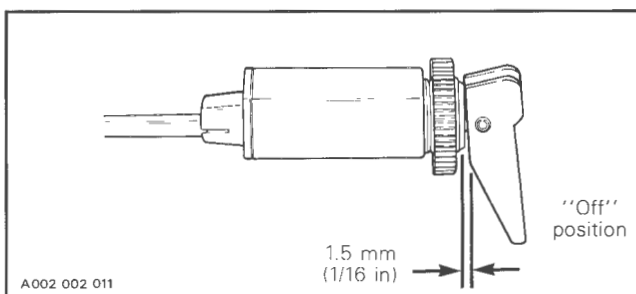
Position cylinder head on cylinder with fins in line with crankshaft center line. Cross torque retaining nuts to 21 N•m (15 lbf•ft).

16, Tab lock

Tab lock should be replaced if bent more than three times. If in doubt replace.

1,2, Decompressor cable & lever

To adjust : From "Off" position, pull lever to feel a light resistance. A gap of 1.5 mm (1/16 in) is required.

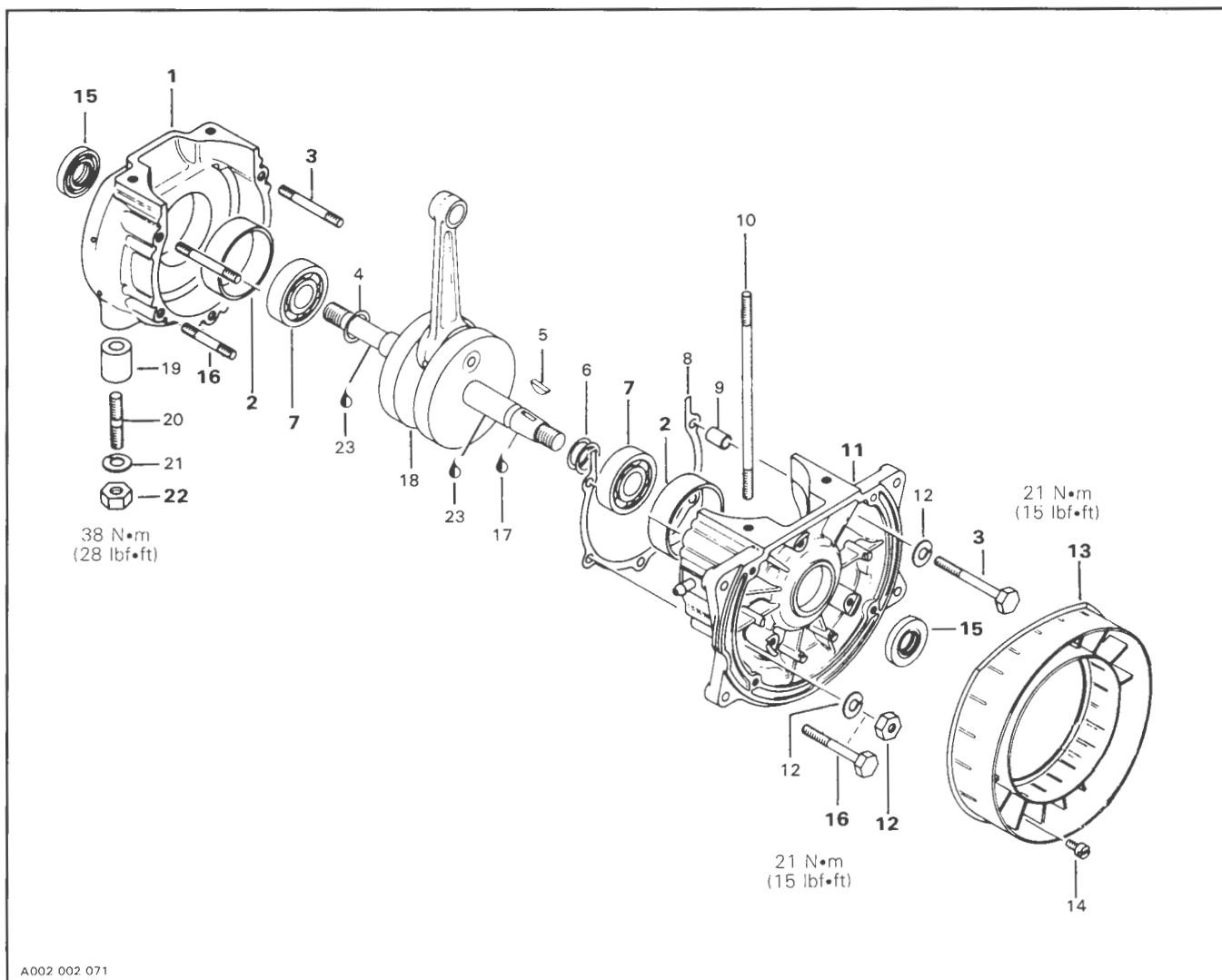


7, Spring

Remove spring then turn adjustment sleeve clockwise to increase free-play or counterclockwise to reduce. Reinstall spring.

Section 02 ENGINE
Sub-section 01 (247 ENGINE TYPE)

BOTTOM END



- | | |
|---|---|
| 1. Crankcase half (PTO side) | 13. Labyrinth ring |
| 2. Polyamid ring (2) | 14. Slotted head screw M6 x 10 (4) |
| 3. Stud M8 x 56 (crankcase with studs) (2) | 15. Seal (2) |
| Hexagonal cap screw M8 x 64 (crankcase with screws) (2) | 16. Stud M8 x 46 (crankcase with studs) (3) |
| 4. Shim 1.0 mm | Hexagonal cap screw M8 x 55 (crankcase with screws) (3) |
| 5. Woodruff key 5 x 6,5 | 17. Loctite 242 |
| 6. Shim 0,1, 0,2, 0,3, 0,5, 1,0 mm | 18. Crankshaft |
| 7. Ball bearing 6305 (2) | 19. Distance sleeve 22 mm (4) |
| 8. Crankcase gasket | 20. Stud M10 x 42 (4) |
| 9. Dowel tube 10 mm x 15 (2) | 21. Lock washer 10 mm (4) |
| 10. Stud M8 x 171 (4) | 22. Hexagonal nut 10 mm (4) |
| 11. Crankcase half (mag side) | 23. Anti-seize lubricant |
| 12. Lockwasher 8 mm (5) | |
| Hexagonal nut 8 mm (crankcase with studs) (5) | |

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

○ NOTE : Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals and gaskets.

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

General

To remove drive pulley, refer to "Drive Pulley", section 03-03.

To remove magneto, refer to "Magneto" in this section.

1,1,1, Crankcase half

When disassembling crankcase halves, do not heat the crankcase. If heat is necessary, temperature must not exceed 55° C (130° F).

2, Polyamid ring

Do not remove polyamid rings unless necessary.

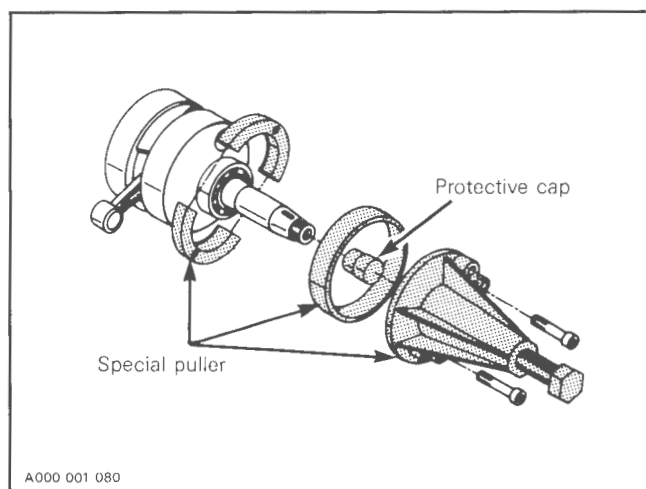
To remove, heat slightly with a butane torch then pry out using a screwdriver.

15, Seal

To remove seals, push from outside the crankcase towards the inside.

7, Ball bearing

To remove bearing from crankshaft use a protective cap and special puller as illustrated. (See Tools Section).



INSPECTION

The inspection of the engine bottom end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|-----------------------------------|--------------------------|------------------|-------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Crankshaft deflection | N.A. | N.A. | 0.10 mm (.0039'') |
| Connecting rod big end axial play | 0.20 mm (.008'') | 0.53 mm (.021'') | 1.0 mm (.039'') |
| Crankshaft end play | 0.10 mm (.004'') | 0.30 mm (.012'') | N.A. |

○ NOTE : For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

ASSEMBLY

7, Bearing

Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container and heat the oil to 75°C (167°F) for 5 to 10 min. This will expand bearings and ease installation.

Install bearings with groove outward.

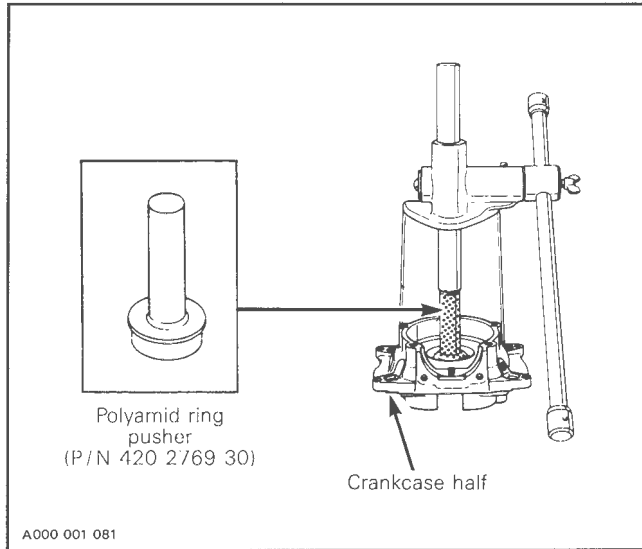
○ NOTE : Crankshaft end-play requires adjustment only when crankshaft and/or crankcase is replaced. Prior to magneto side bearing installation, determine crankshaft end-play and install required shim(s) on crankshaft extension. For the crankshaft end-play adjustment procedure, refer to "Engine dimensions measurement", section 02-09.

2, Polyamid ring

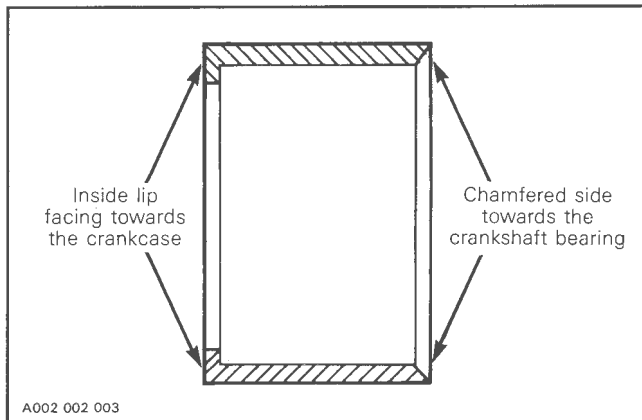
To install polyamid ring, apply oil on outside diameter then use polyamid ring pusher (P/N 420 2769 30).

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

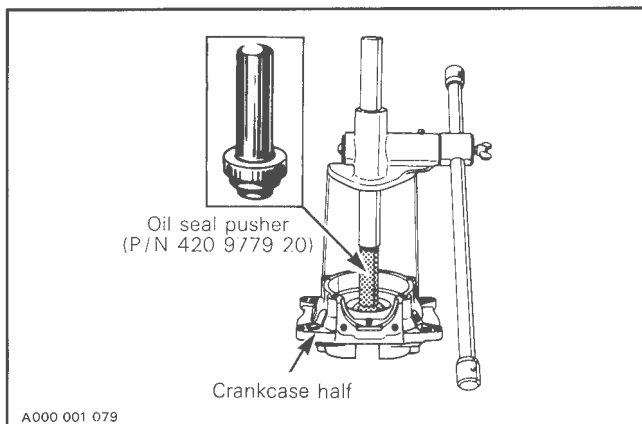


Install as illustrated.



15, Seal

To install new seal into crankcase use oil seal pusher (P/N 420 9779 20).

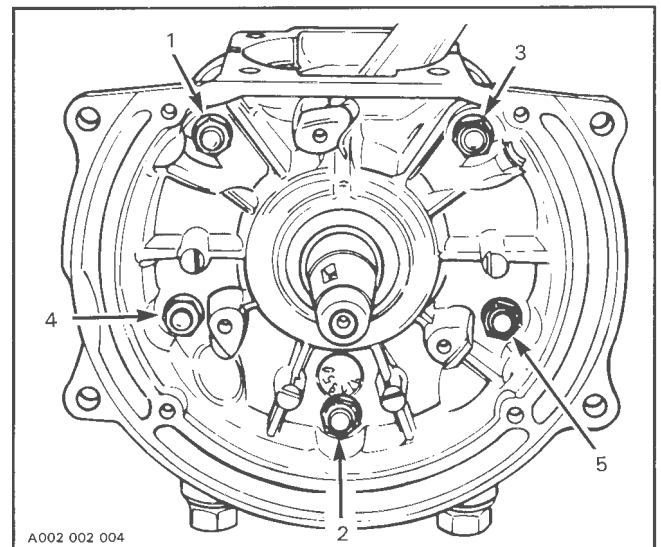


Also, prior to crankcase adjoining, install a protector sleeve on each crankshaft extension to prevent oil seal damage (See Tool Section). Apply a light coat of lithium grease on seal lip. Spray some new injection oil on all moving parts of the crankshaft.

CAUTION: To ensure appropriate crankshaft bearing lubrication, seal outer surface must be pressed on seal crankcase shoulder.

3,12,16, Stud or bolt & nut

Torque the nuts or bolts to 21 N•m (15 lbf•ft) following illustrated sequence.



22, Engine mount nut

Torque the engine mount nuts to 38 N•m (28 lbf•ft).

13, Labyrinth ring

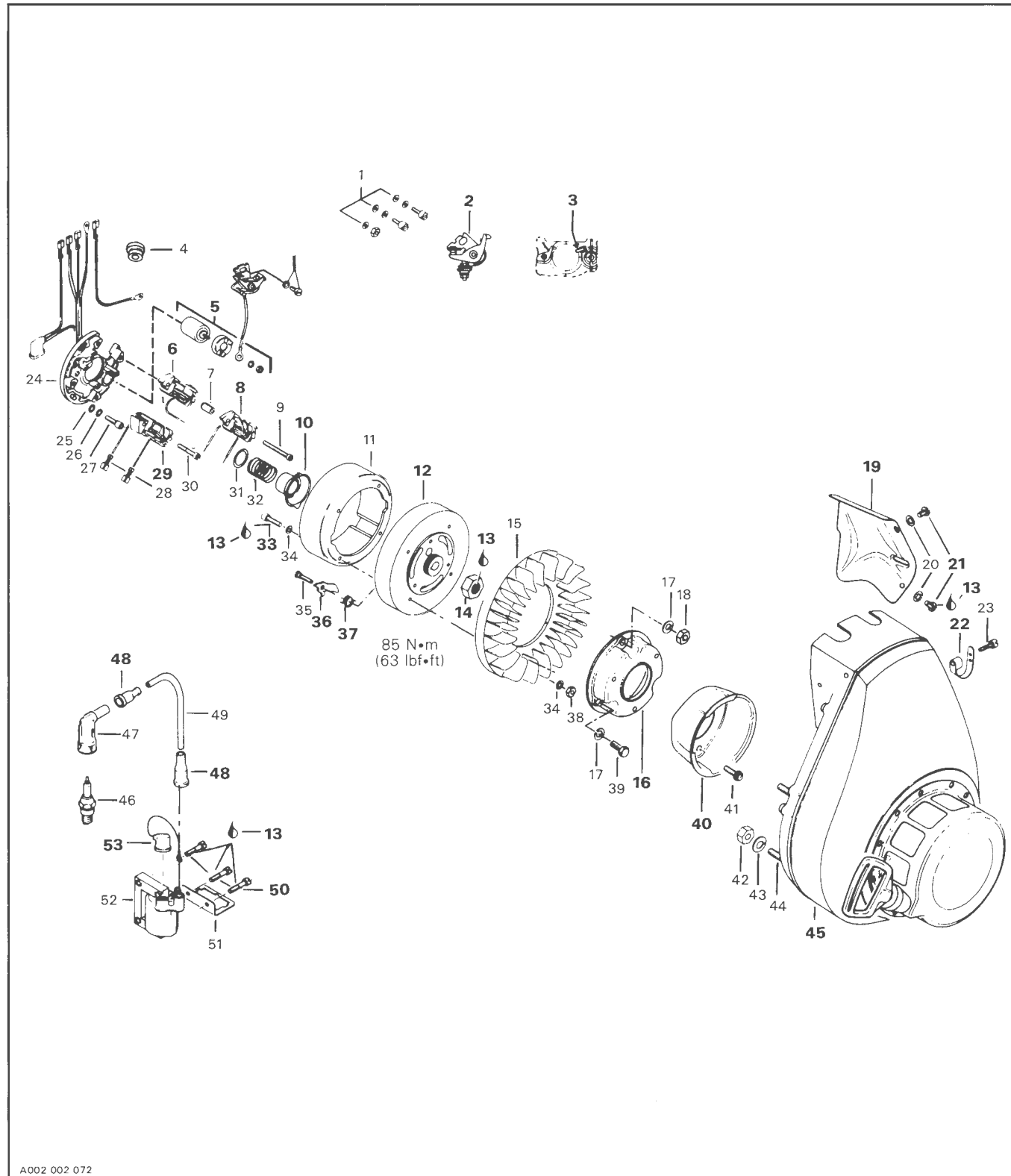
Position labyrinth ring with bevelled side on top.

To install magneto, refer to "Magneto" in this section.

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

MAGNETO AND COOLING SYSTEM



Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

1. Magneto parts set
2. Contact breaker set
3. Lubricating wick
4. Grommet
5. Condenser assembly
6. Generating coil with cable
7. Distance sleeve 11 mm (2)
8. Brake lighting coil with cable
9. Phillips head screw M5 x 32 (2)
10. Breaker cam
11. Magneto ring
12. Magneto housing
13. Loctite 242
14. Hexagonal nut 18 mm x 1.5
15. Fan
16. Pulley spacer
17. Lock washer 6 mm (3)
18. Hexagonal nut M6
19. Air deflector
20. Spring washer B5 (2)
21. Slotted head screw M5 x 8 (2)
22. Cable clamp
23. Slotted head screw M3 x 16
24. Armature plate
25. Washer 5.5 mm (3)
26. Lock washer 5 mm (3)
27. Hexagonal cap screw M5 x 18 (3)
28. Female connector 6.3 (5)

29. Lighting coil with 2 cables
30. Phillips head screw M5 x 28 (2)
31. Cam spring washer
32. Breaker cam spring
33. Hexagonal cap screw M6 x 22 (4)
34. Lockwasher 6 mm (8)
35. Bearing screw M6
36. Centrifugal lever
37. Centrifugal lever spring
38. Hexagonal nut M6 (4)
39. Hexagonal screw M6 x 20 (2)
40. Starting pulley
41. Hexagonal self-tapping screw (3)
42. Hexagonal nut 8 mm (4)
43. Lock washer 8 mm (4)
44. Stud M8 x 23 (3)
Stud M8 x 34
45. Fan cowl
46. Spark plug
47. Spark plug protector
48. Protection cap (2)
49. Ignition cable 360 mm
50. Slotted head screw M5 x 22 (3)
51. Junction box bracket
52. Ignition coil
53. Mass cable
54. Protector cap

○ **NOTE:** The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature using only a clean cloth.

DISASSEMBLY

To gain access to magneto assembly, remove :

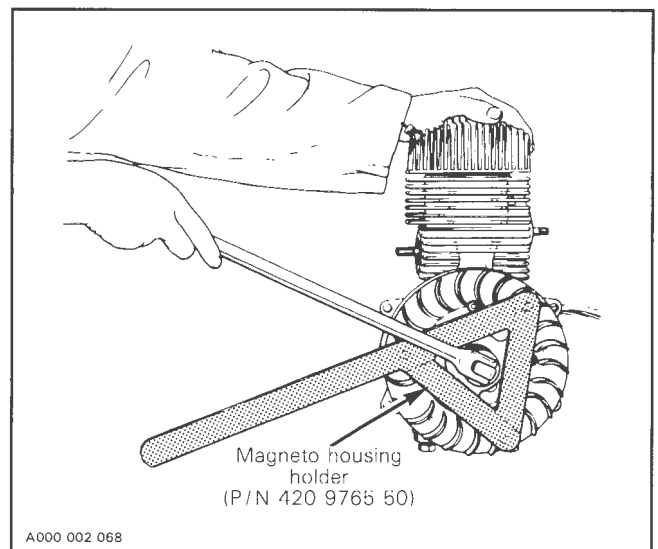
- muffler
- upper column
- air duct
- air deflector
- spark plug cable clamp
- fan cowl
- starting pulley
- pulley spacer

○ **NOTE:** Before disassembling magneto, indexing marks should be located to facilitate reassembly.

14, Magneto retaining nut

To remove magneto retaining nut :

- Lock crankshaft with magneto housing holder (P/N 420 9765 50) as illustrated.
- Remove magneto retaining nut.



○ **NOTE:** It should be noted that to correctly remove a Loctite locked fastener it is first necessary to tap on the fastener to break Loctite bond. This will eliminate the possibility of thread breakage.

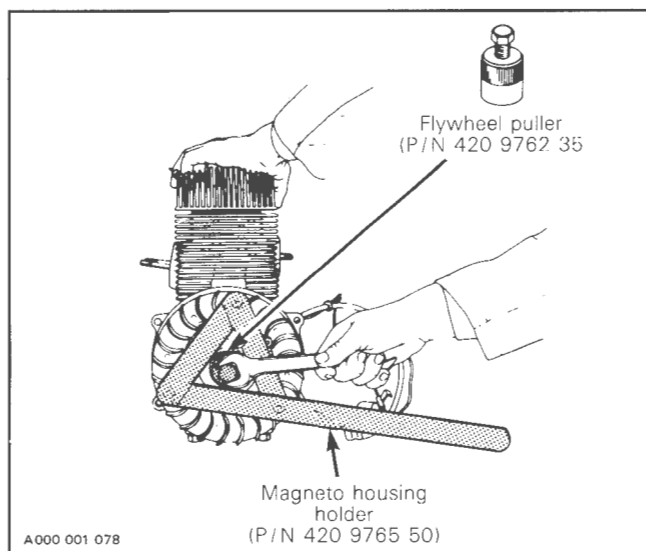
Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

○ **NOTE :** Crankshaft can be locked with crankshaft locking tool (P/N 420 8766 40) inserted in pulsation line fitting.

12, Magneto housing

To remove magneto housing (flywheel) : use flywheel puller (P/N 420 9762 35) and magneto housing holder (P/N 420 9765 50) as illustrated (or crankshaft locking tool (P/N 420 8766 40)).



Tighten puller nut and, at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

5, Condenser

To replace a condenser :

- Unscrew condenser nut and remove both black leads.
- Drive the condenser out of the armature plate using a suitable pusher.
- To reinstall, reverse procedure.

2,3, Contact breaker & lubricating wick

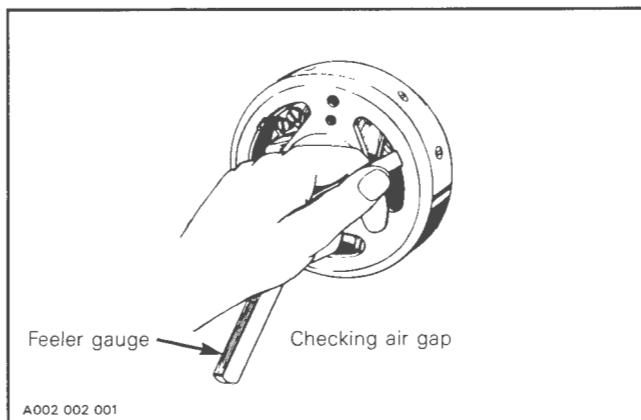
When replacing contact breaker :

- Apply a light coat of grease on lubricating wick.
- Clean breaker points with acetone, alcohol or ether.

6,8,29, Generating coil, brake lighting coil & lighting coil

Whenever a coil is replaced, the air gap (distance between magnet and coil end) must be adjusted.

To check air gap, insert a feeler gauge of 0.25-0.38 mm (.010 in - .015 in) between magnet and coil ends. If necessary to adjust, slacken retaining screws and relocate coil.

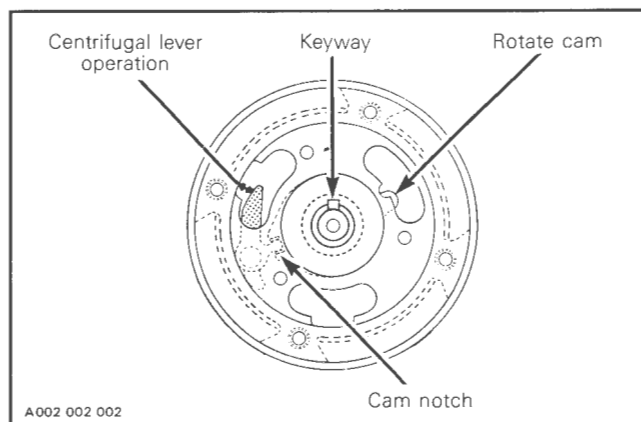


ASSEMBLY

Clean crankshaft extension (taper).

Apply Loctite 242 (blue, medium strength).

Position magneto on crankshaft with the keyway and the cam notch indexed as illustrated :



10,36, Breaker cam & centrifugal lever

Rotate breaker cam to check centrifugal lever operation.

37, Centrifugal lever spring

At assembly, apply a small amount of low temperature grease (P/N 413 7061 00) into spring seating.

13,21,33,50, Loctite 242, air deflector screw, magneto ring screw & junction box screw.


At assembly of air deflector, magneto and junction box, apply Loctite 242 on screw threads.

13,14, Loctite 242 & magneto housing nut

At assembly, thoroughly clean threads and apply Loctite 242, then torque retaining nut to 85 N•m (63 lbf•ft).

48,53, Protection cap & mass cable

At reassembly coat all electric connections with silicone dielectric grease to prevent corrosion or moisture from penetrating. (P/N 413 7017 00).

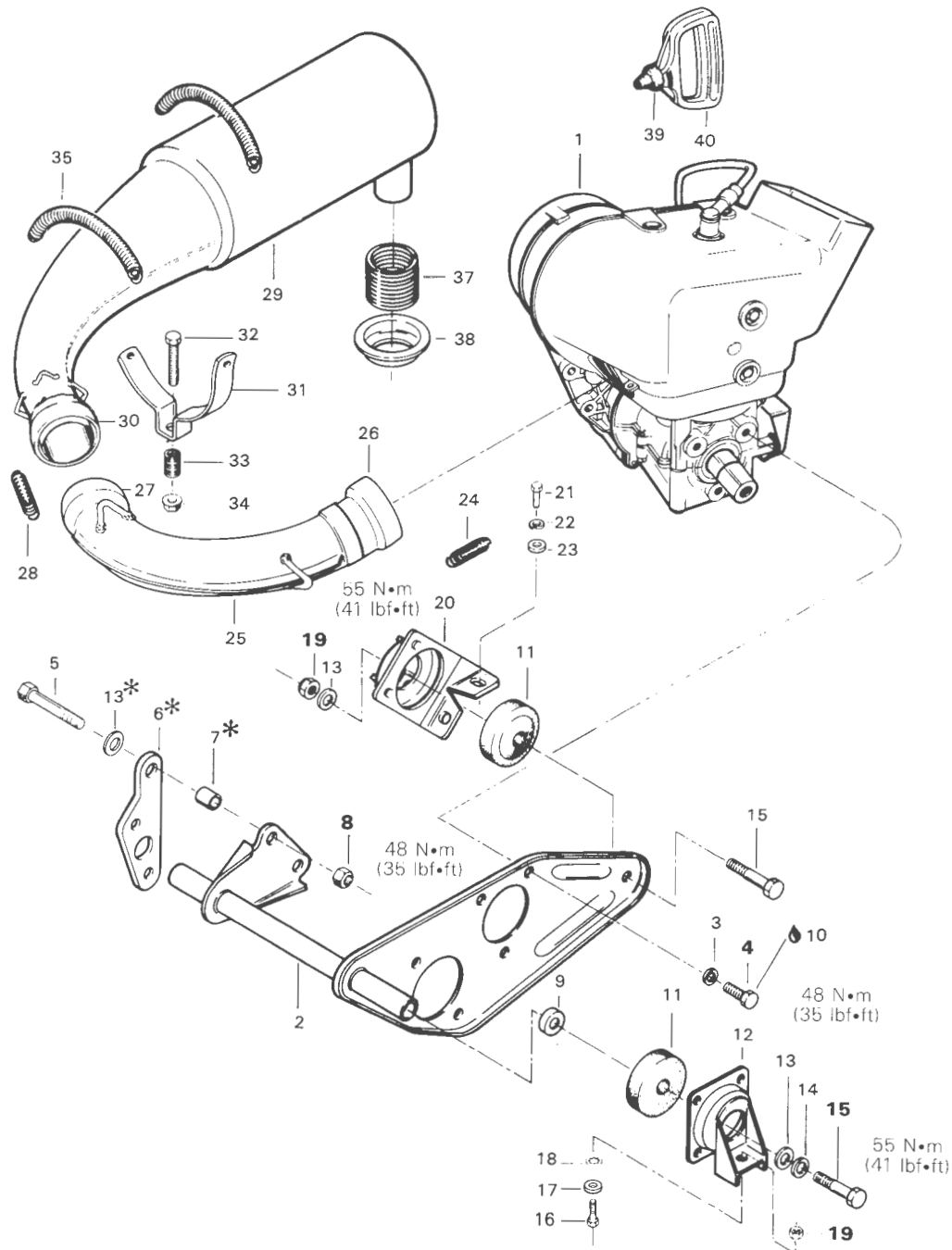
 **CAUTION :** Do not use silicone "sealant", this product will corrode contacts.

For ignition timing refer to section 04-02.

253 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION

Safari Citation/E, Tundra/LT



*For electric starting only.

Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)


- | | |
|---|---|
| 1. Rotax engine 253 | 21. Hexagonal head cap screw M8 x 20 (3) |
| 2. Engine bracket | 22. Lock washer 8 mm (3) |
| 3. Lock washer 10 mm (3) | 23. Flat washer 8.4 mm (3) |
| 4. Hexagonal head cap screw M10 x 20 (3) | 24. Spring |
| 5. Hexagonal head cap screw M10 x 35 (2) | 25. Front shell |
| * Hexagonal head cap screw M10 x 45 (2) | 26. Female ball joint |
| *6. Electric starter support | 27. Male ball joint |
| *7. Spacer | 28. Spring (2) |
| 8. Hexagonal elastic stop nut 10 mm (2) | 29. Muffler |
| 9. Cup (2) | 30. Female ball joint |
| 10. Loctite 242 (blue) | 31. Muffler support |
| 11. Mounting rubber (3) | 32. Hexagonal head cap screw M6 x 45 |
| 12. Front support (2) | 33. Spring |
| 13. Washer (3) *(4) | 34. Hexagonal flanged elastic stop nut 6 mm |
| 14. Lock washer 10 mm (2) | 35. Spring |
| 15. Hexagonal head cap screw M10 x 40 (3) | 36. Spring |
| 16. Hexagonal head cap screw M10 x 25 (2) | 37. Spring |
| 17. Washer (2) | 38. Exhaust grommet |
| 18. Internal tooth lock washer (2) | 39. Rubber stopper |
| 19. Hexagonal elastic stop nut 10 mm (3) | 40. Starter grip |
| 20. Rear support | |

*For electric starting only

REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle :

- battery ground cable, (if applicable)
- pulley guard, chaincase support, drive belt and drive pulley (refer to section 03-03)
- impulse line
- starter cable (if applicable)

 **WARNING : Before disconnecting any electrical wire in starter system always first disconnect the negative black battery cable.**

- muffler
- hood retaining cable
- oil injection pump cable
- electrical connectors
- clamp retaining carburetor on engine
- rewind starter cable
- engine mount screws (3)

INSTALLATION ON VEHICLE

To install engine on vehicle, inverse removal procedure. However, pay attention to the following :

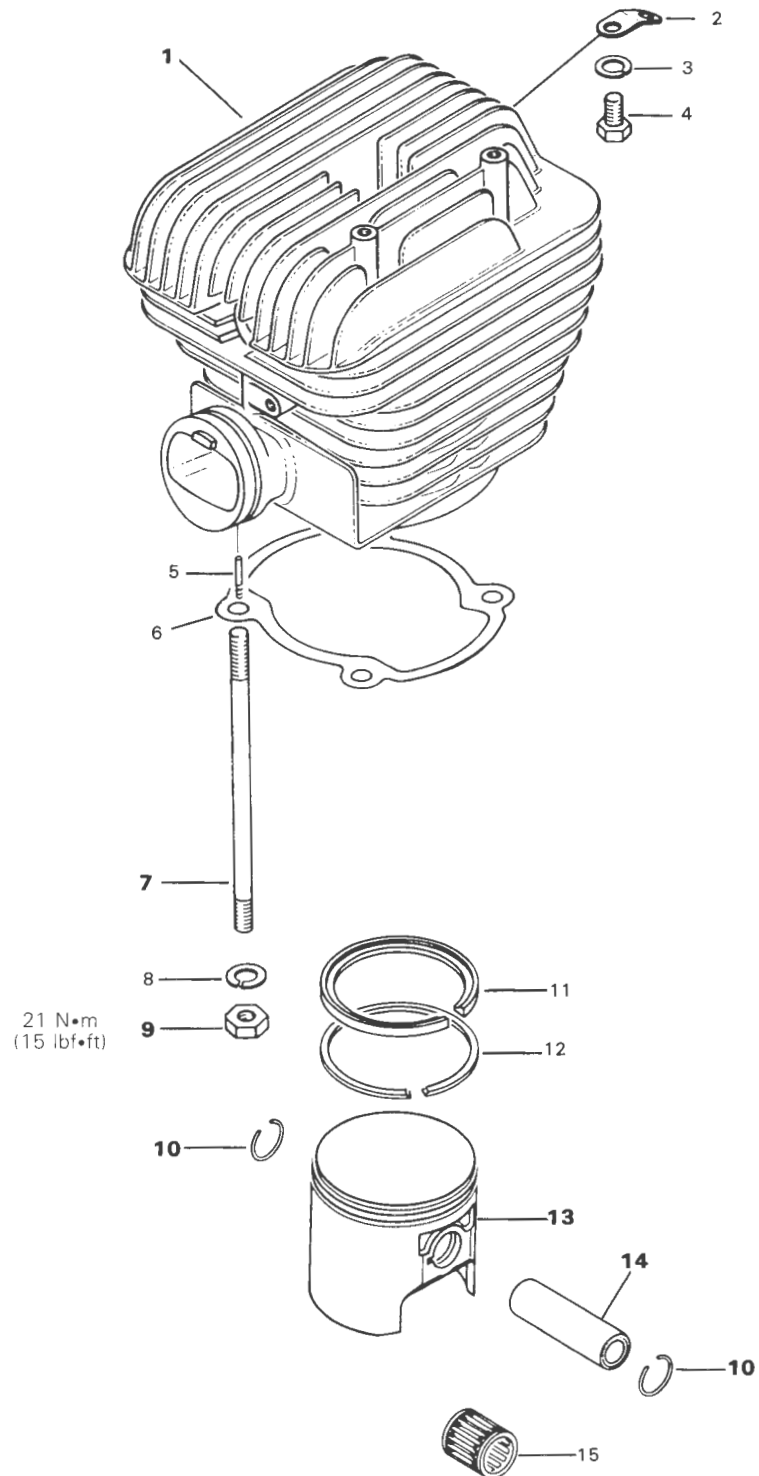
- Check tightness of engine mounting supports screws.

4,8,15,19, Engine mount screw & nut

- Torque both screws **#15** of front engine bracket and nut **#19** of rear support to 55 N•m (41 lbf•ft).
- Torque screws **#4** and nuts **#8** to 48 N•m (35 lbf•ft).
- Check pulley alignment and drive belt tension.
- Check throttle cable condition.
- Should a light exhaust leak is experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits accumulation should seal joint.

Section 02 ENGINE
Sub-section 02 (253 ENGINE TYPE)

TOP END




Section 02 ENGINE

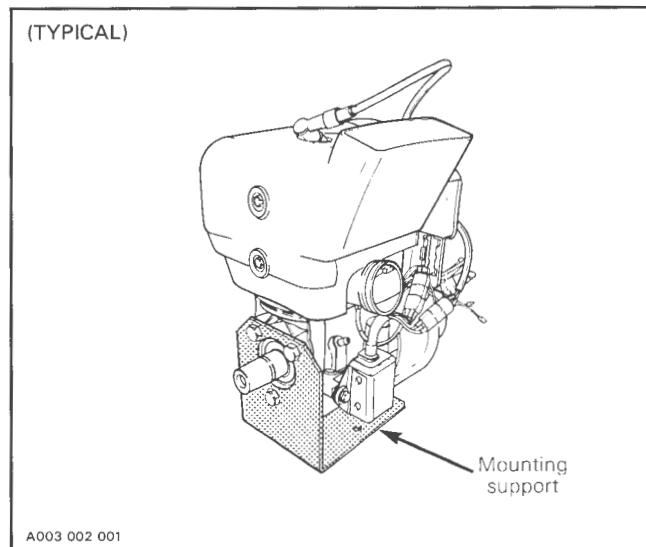
Sub-section 02 (253 ENGINE TYPE)


1. Integral cylinder head
2. Spring bracket
3. Lock washer 6 mm
4. Screw M6 x 12
5. Injection fitting
6. Head cylinder gasket
7. Stud M8 x 158.5 (4)
8. Lock washer 8.4 mm (4)

9. Nut M8 (4)
10. Circlip (2)
11. Semi-trapez ring
12. Rectangular ring
13. Piston
14. Gudgeon pin
15. Needle bearing

 **NOTE :** Engine must be removed from chassis to perform the following procedures.

Use engine mounting support (P/N 420 8768 30) to hold engine while working on it.




 **NOTE :** This engine is designed with an integral cylinder head unit and its mounting nuts are underneath crankcase.

CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

 **NOTE :** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

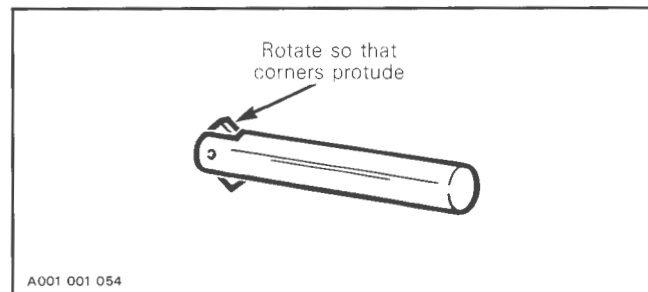
DISASSEMBLY

10,13,14, Circlip, piston & gudgeon pin

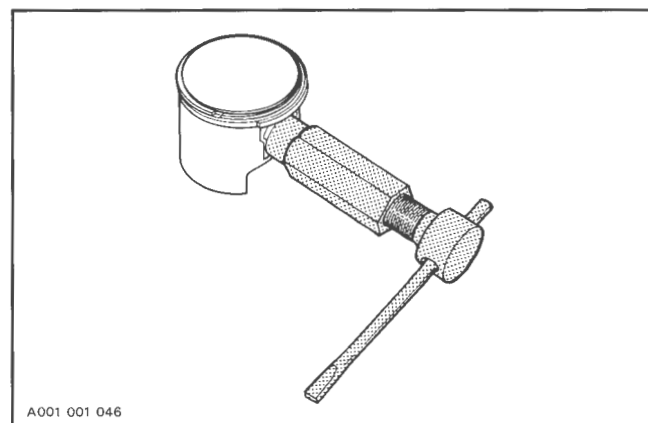
Place a clean cloth over crankcase to prevent circlips from falling into crankcase. With a pointed tool inserted in piston notch, remove circlips from piston.

To remove piston pin, use piston pin puller (P/N 529 0068 00) as follows :

- Fully screw puller handle.
- Place stop notch of puller in line with the puller axis.
- Insert puller end into piston pin.
- Rotate stop notch of puller so that corners protude the puller end.



- Hold puller firmly and rotate puller handle counter-clockwise to pull piston pin.



Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

○ **NOTE :** 0.25 and 0.5 mm oversize pistons and rings are available if necessary.

INSPECTION

The inspection of the engine top end must include the following measurements :

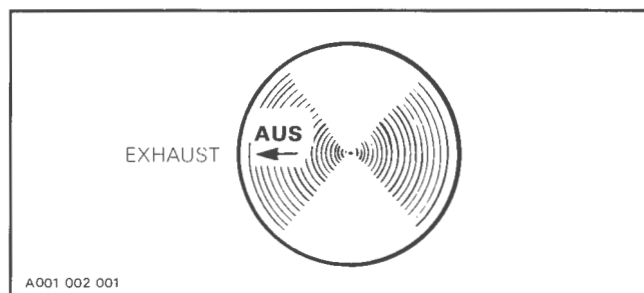
| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|--------------------------------|--------------------------|---------------------|---------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Cylinder taper | 0.03 mm (.0012") | 0.07 mm (.0028") | N.A. |
| Cylinder out of round | N.A. | N.A. | 0.10 mm (.0039") |
| Cylinder / piston clearance | 0.08 mm (.0031") | 0.10 mm (.0039") | 0.20 mm (.008") |
| Ring / piston groove clearance | 0.04 mm (.002") | 0.11 mm (.004") | 0.20 mm (.008") |
| Ring end gap | 0.20 mm (.008") | 0.35 mm (.014") | 1.0 mm (.039") |

○ **NOTE :** For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

ASSEMBLY

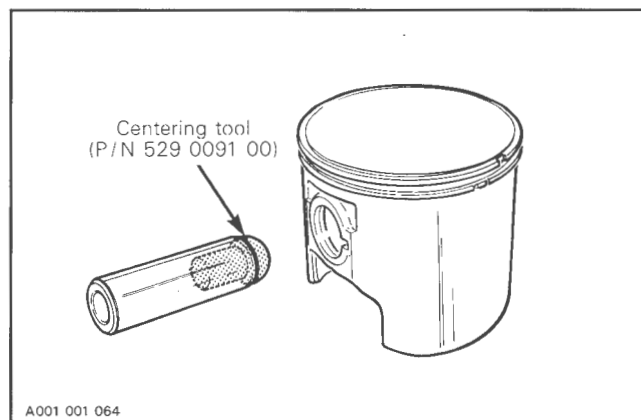
10,13,14, Circlip, piston pin & piston

At assembly, place the piston over the connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.



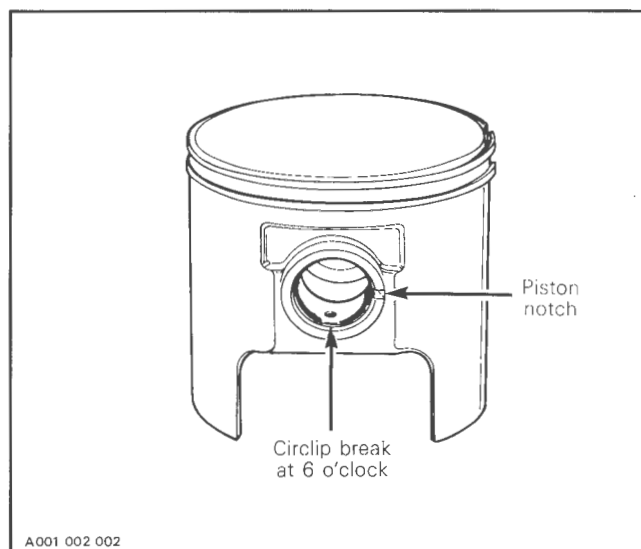
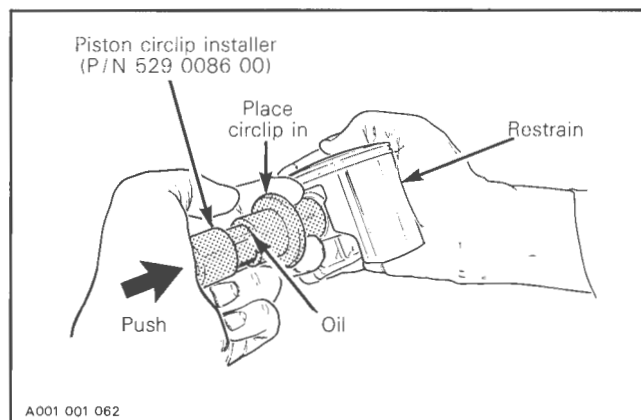
Spare parts pistons and cylinders are identified with a green or red dot, it is important to match the piston with the cylinder of the same color.

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00).



○ **NOTE :** The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0086 00).



Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

▼ **CAUTION :** Circlips must not move freely in the groove after installation. If so, replace them.

1, Integral cylinder head

Before inserting piston in cylinder, lubricate it with new injection oil or equivalent.

Install ring compressor (P/N 420 8769 70) on piston assembly.

○ **NOTE :** The ring compressor will not fit on over-size piston.

Remove spark plug.

Install integral cylinder head, then rotate crankshaft to position.

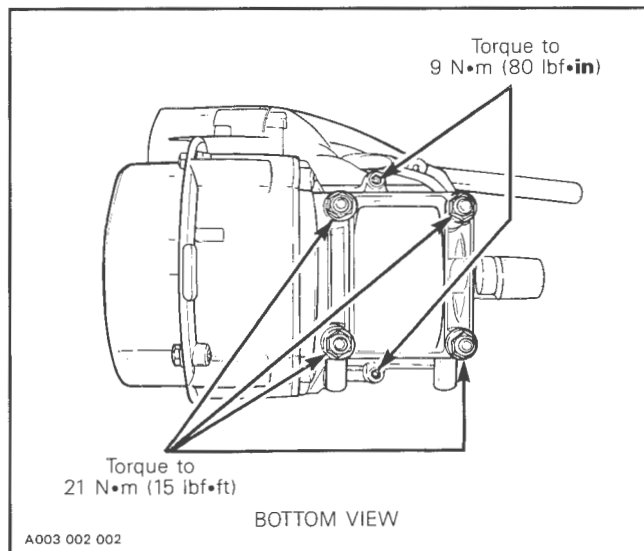
7, Stud

The longer threaded end must be screwed into the integral cylinder head.

9, Nut

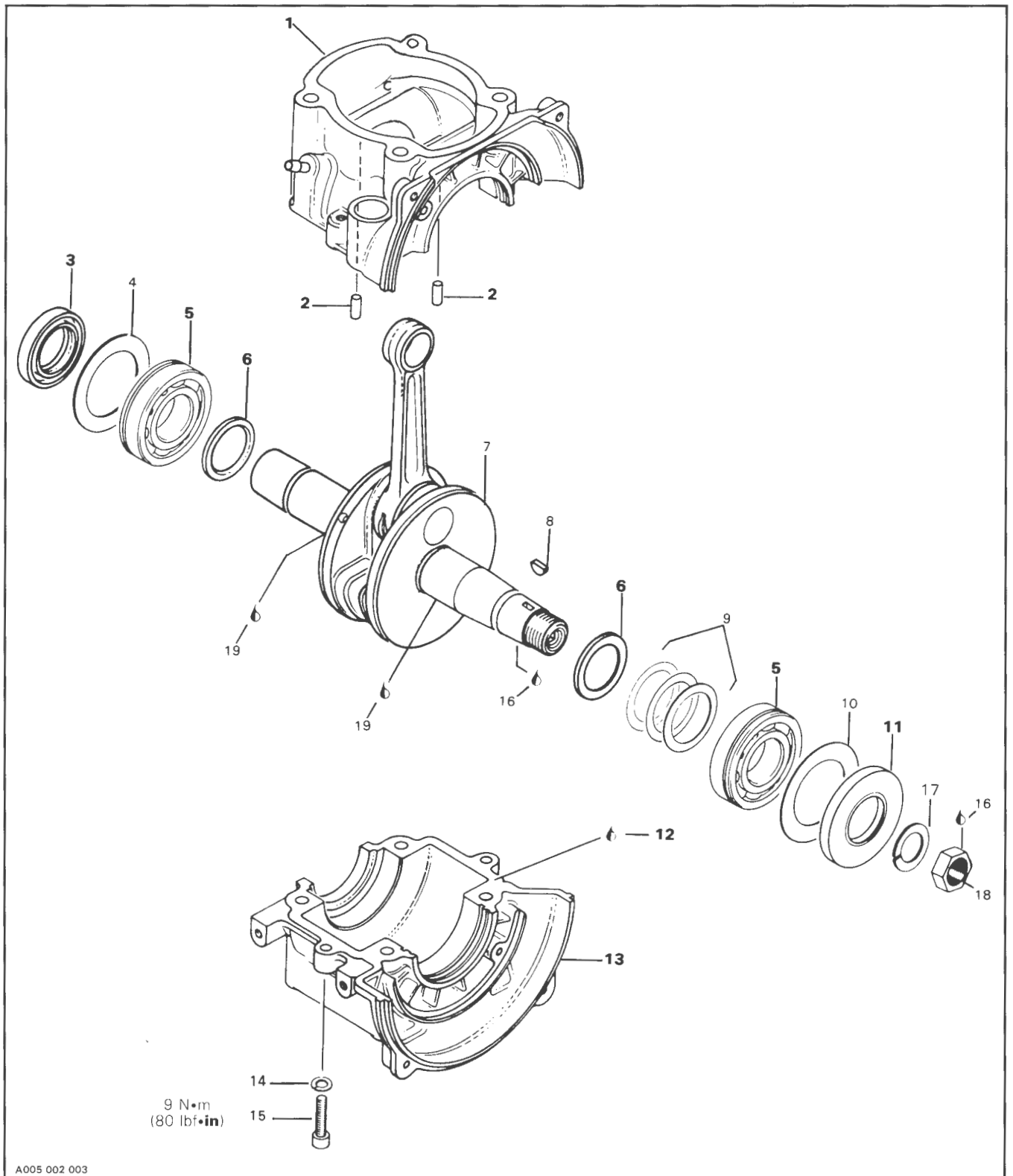
Cross torque integral cylinder head nuts to 21 N•m (15 lbf•ft).

Retorque both crankcase screws to 9 N•m (80 lbf•in).



Section 02 ENGINE
Sub-section 02 (253 ENGINE TYPE)

BOTTOM END




Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

1. Upper crankcase
2. Rubber plug (2)
3. Oil seal PTO side
4. Shim
5. Ball bearing 6206 (2)
6. Distance ring (2)
7. Crankshaft
8. Woodruff key
9. Shim (as required)
10. Bearing retainer


11. Oil seal mag. side
12. Loctite 515
13. Lower crankcase
14. Lock washer M6 (2)
15. Screw M6 x 30 (2)
16. Loctite 242 (blue, medium strength)
17. Lock washer 22 mm
18. Nut M22
19. Anti-seize lubricant

 **NOTE :** Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all seals, gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner. Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper (P/N 413 7021 00).

 **CAUTION :** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

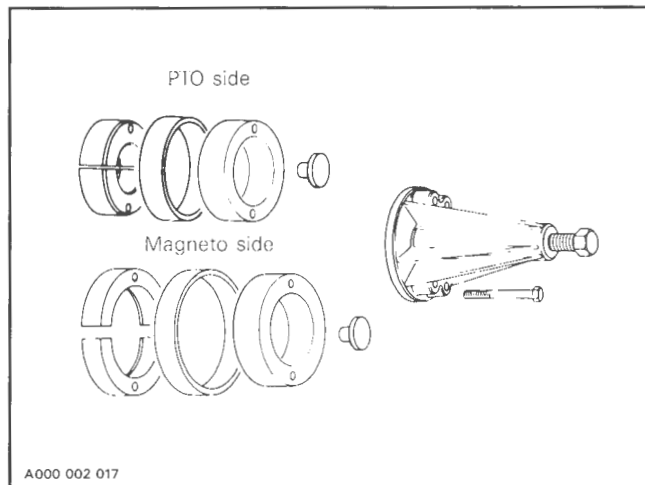
DISASSEMBLY

General

To remove magneto, refer to "Magneto" in this section.

5, PTO side bearing & MAG side bearing

To remove bearings from crankshaft use a protective cap and special puller, as illustrated. (See Tools section).

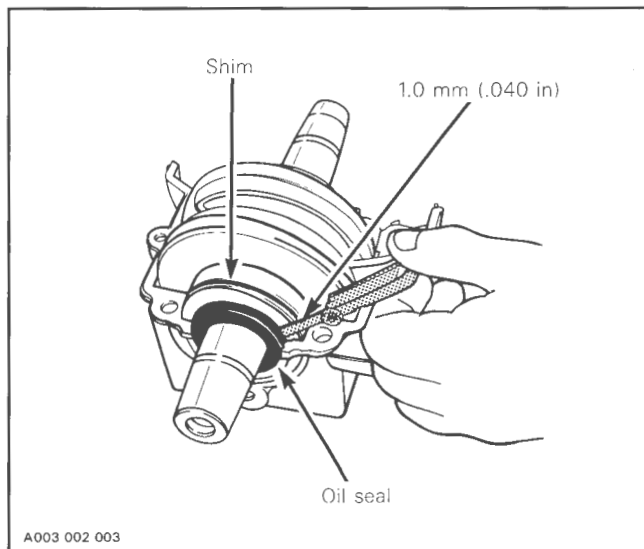


3,11, Oil seal

At seal assembly, apply a light coat of lithium grease on seal lips.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain seals (seal without locating ring or without spacing legs), ensure to maintain the specified gap between shim/bearing retainer and the seal.



2, Rubber plug

Prior to installing the crankshaft, make sure both rubber plugs are into upper holes.

1,12,13, Upper crankcase, Loctite 515 & lower crankcase

Crankcase halves are factory matched and therefore, are not interchangeable as single halves.

Section 02 ENGINE

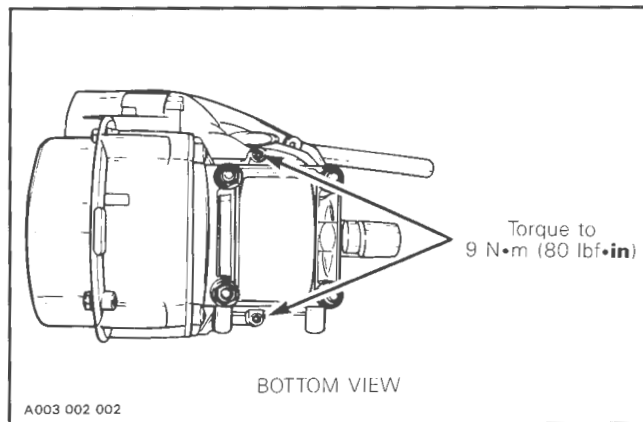
Sub-section 02 (253 ENGINE TYPE)

Prior to joining of crankcase halves, spray new injection oil on all the moving parts of the crankshaft.

Apply Loctite 515 (P/N 413 7027 00) on mating surfaces.

○ **NOTE** : Prior to applying Loctite 515 it is possible to use primer N (P/N 413 7053 00) or primer NF (P/N 413 7024 00). It increases cure speed and gap filling capability. Refer to supplier instructions.

Position the crankcase halves together, rotate crankshaft 2 or 3 turns, then evenly tighten crankcase screws. Torque them to 9 N•m (80 lbf•in).



Refer to "Top end" section to complete the assembly.

INSPECTION

The inspection of the engine bottom end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | |
|-----------------------------------|---------------------------------|--------------------|--------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | WEAR LIMIT |
| Crankshaft deflection | N.A. | N.A. | 0.08 mm (.003") |
| Connecting rod big end axial play | 0.20 mm (.008") | 0.53 mm (.021") | 1.0 mm (.039") |
| Crankshaft end play | 0.1 - 0.3 mm (.004" - .012") | | |

○ **NOTE** : For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

ASSEMBLY

General

▼ **CAUTION** : Before engine reassembly, make sure there is no axial pressure on crankshaft and that the crankshaft end-play is properly adjusted.

Crankshaft end-play adjustment

Refer to "Engine Dimensions and Measurement" section 02-09 for the procedures.

6, Distance ring

At installation, always locate its inner radius against counterweight radius. Make sure it does not slip between the counterweight and the bearing.

5, Crankshaft ball bearing

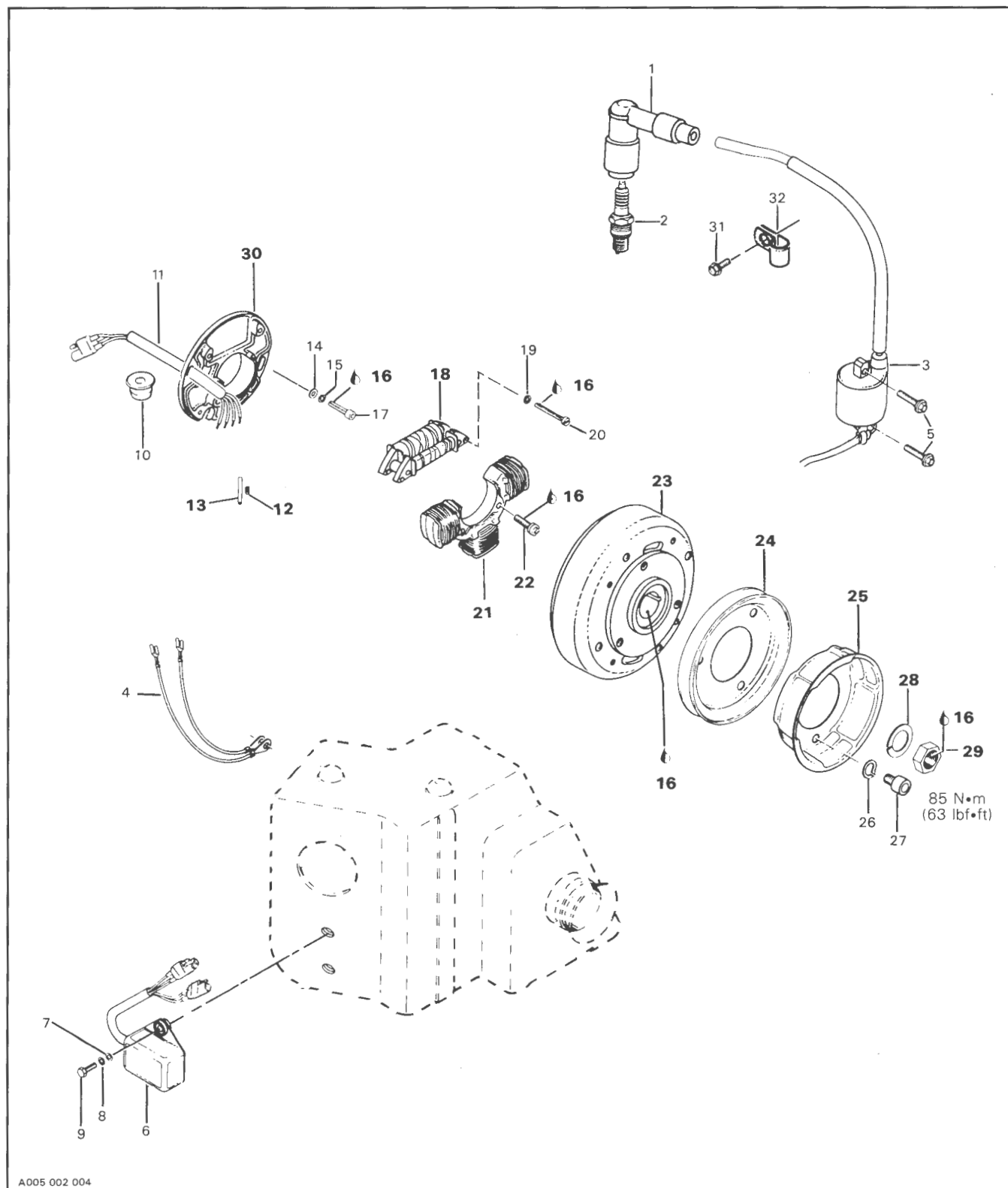
Smear anti-seize compound (P/N 413 7010 00) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container fill with oil heated to 75°C (167°F). This will expand bearings and ease installation. Install outer race groove outward.

Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

MAGNETO



Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

1. Spark plug protector
2. Spark plug
3. Ignition coil
4. Ground wire (2)
5. Taptite screw M5 x 20 (2)
6. Amplifier box
7. Washer 6 mm (2)
8. Lock washer 6 mm (2)
9. Screw M6 x 20 (2)
10. Wiring grommet
11. Wire ass'y
12. Splice connector (6)
13. Protector tube (6)
14. Washer 5.5 mm (2)
15. Lock washer 5 mm (2)
16. Loctite 242 (blue, medium strength)

17. Screw M5 x 18 (2)
18. Generating coil
19. Lock washer 5 mm (2)
20. Screw M5 x 35 (2)
21. Lighting coil
22. Screw M6 x 25 (2)
23. Magneto flywheel
24. V-belt pulley
25. Starting pulley
26. Lock washer 8 mm (3)
27. Screw M8 x 12 (3)
28. Lock washer 22 mm
29. Nut M22
30. Armature plate
31. Screw M5 x 8 mm
32. Clamp

○ **NOTE:** The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

DISASSEMBLY

24,25,29, V-belt pulley, starting pulley & nut

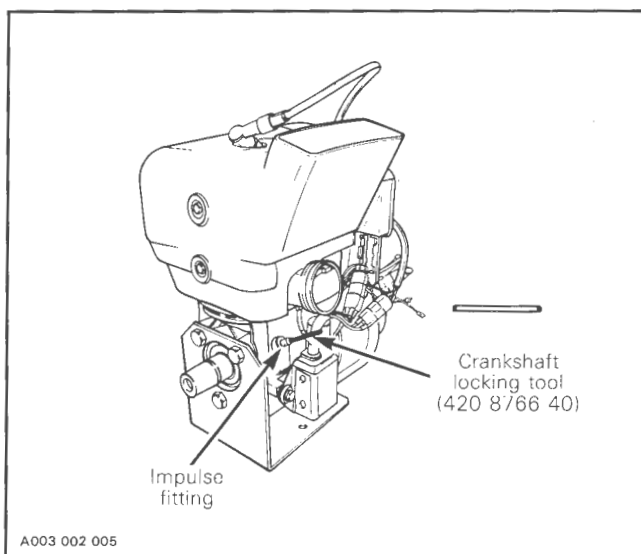
To gain access to magneto assembly, remove :

- injection oil line
- rewind starter
- starting and v-belt pulleys

○ **NOTE:** Before disassembling magneto plate, indexing marks should be scribed to facilitate reassembly.

To remove magneto flywheel retaining nut :

- Lock crankshaft with crankshaft locking tool (P/N 420 8766 40).



○ **NOTE:** It should be noted that to correctly remove a Loctite locked fastener it is first necessary to tap on the fastener to break Loctite bond. This will eliminate the possibility of thread breakage.

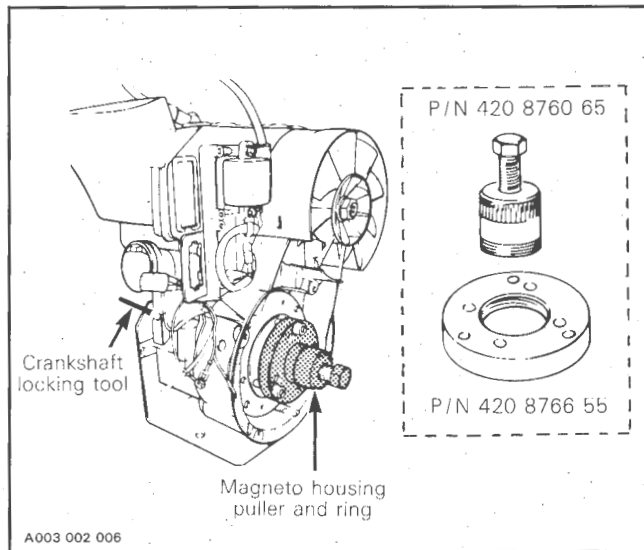
Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

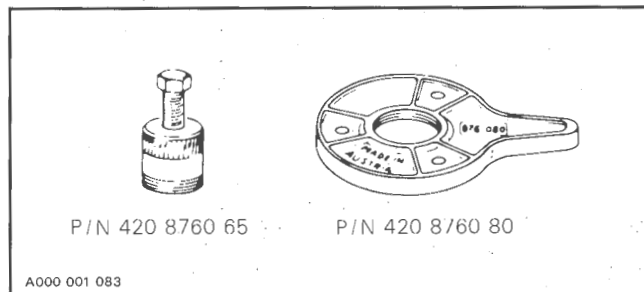
23, Magneto flywheel

To remove :

- Unscrew magneto retaining nut and install the suitable puller as shown.



NOTE : For the above procedure, the locking type puller can be used without crankshaft locking tool.



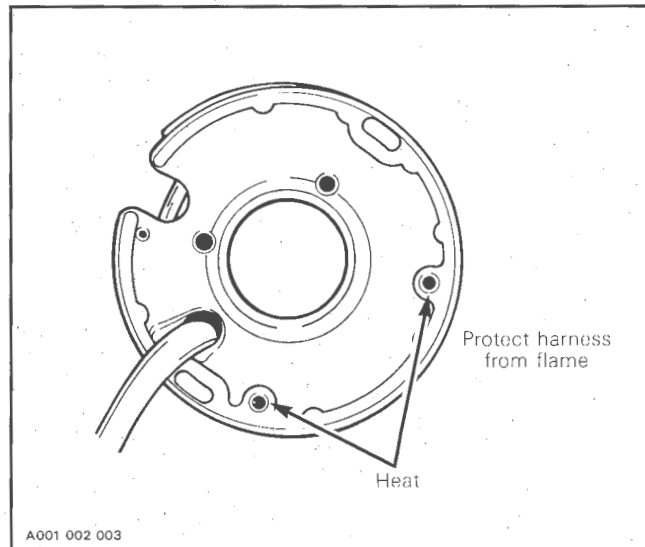
- Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

18, Generating coil

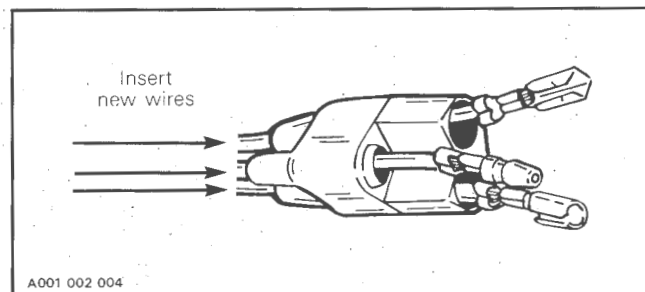
To replace generating coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



CAUTION : Protect harness from flame.

- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector housing and install connectors.

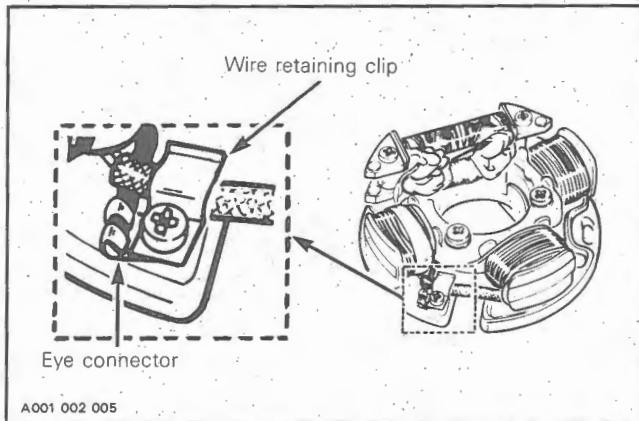


CAUTION : Replace the old wires in the connector with the same color coded new wires.

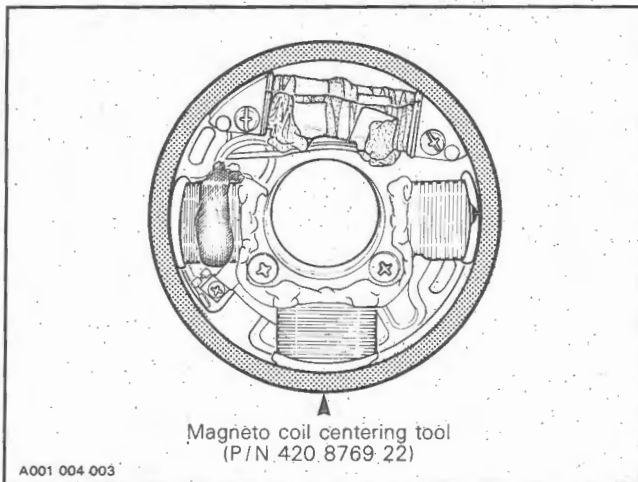
- Install a new receptacle connector to the black / yellow striped wire.
- To install the ground connector of the armature plate, tape the new black lead to the old one and pull it under the lighting coil with the old wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.

Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)



- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws before assembly.
- Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.

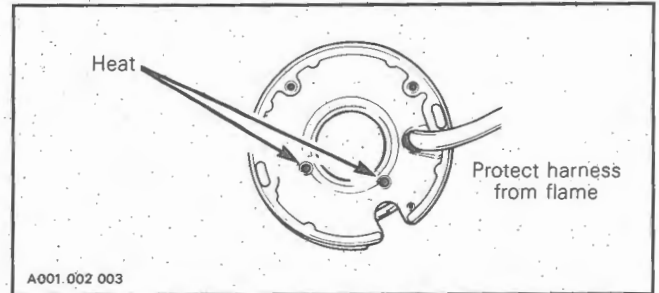


CAUTION : Before reinstalling the magneto, remove the loose epoxy from harness.

12,13,21,22, Splice connectors, protector tubes, lighting coil & screw

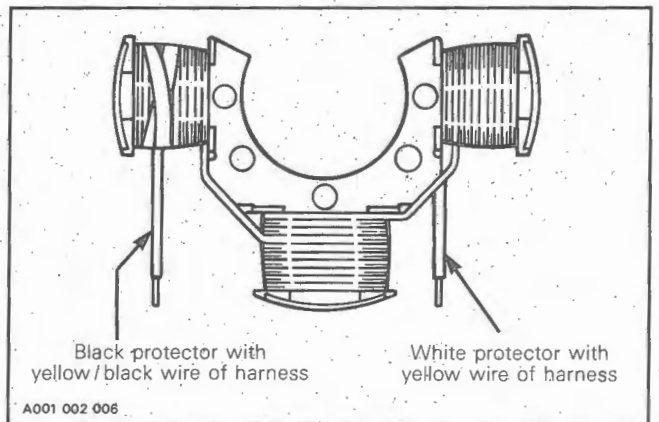
To replace lighting coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



CAUTION : Protect harness from flame.

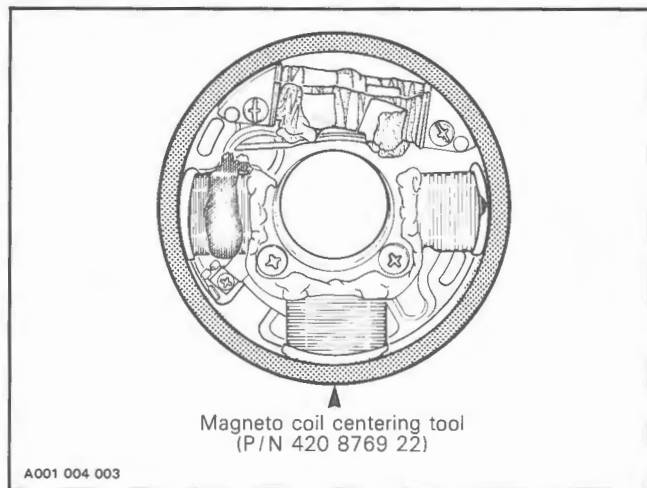
- Remove screws (use Phillips no. 3 screwdriver).
- Remove the wire retaining clip from armature plate.
- Pull out protector tubes and unsolder the splice connectors.
- Solder the yellow wire in the harness to the white tube protected wire of the coil.
- Solder the yellow / black striped wire in the harness to the black tube protected wire of the coil.



- Position protector tubes over connections.
- Prior to assembly, apply Loctite 242 (blue, medium strength) on the lighting coil screws. Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.

Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)



— Fasten retaining clip onto protector tubes.

▼ **CAUTION :** Before reinstalling magneto, remove the loose epoxy from harness.

ASSEMBLY

23,28,29,30, Magneto flywheel, lock washer, armature plate & nut

Position the armature plate on the crankcase aligning the marks on both parts.

Clean crankshaft extension taper.

Apply Loctite 242 (blue, medium strength) on taper.

Position key, magneto flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 85 N•m (63 lbf•ft).

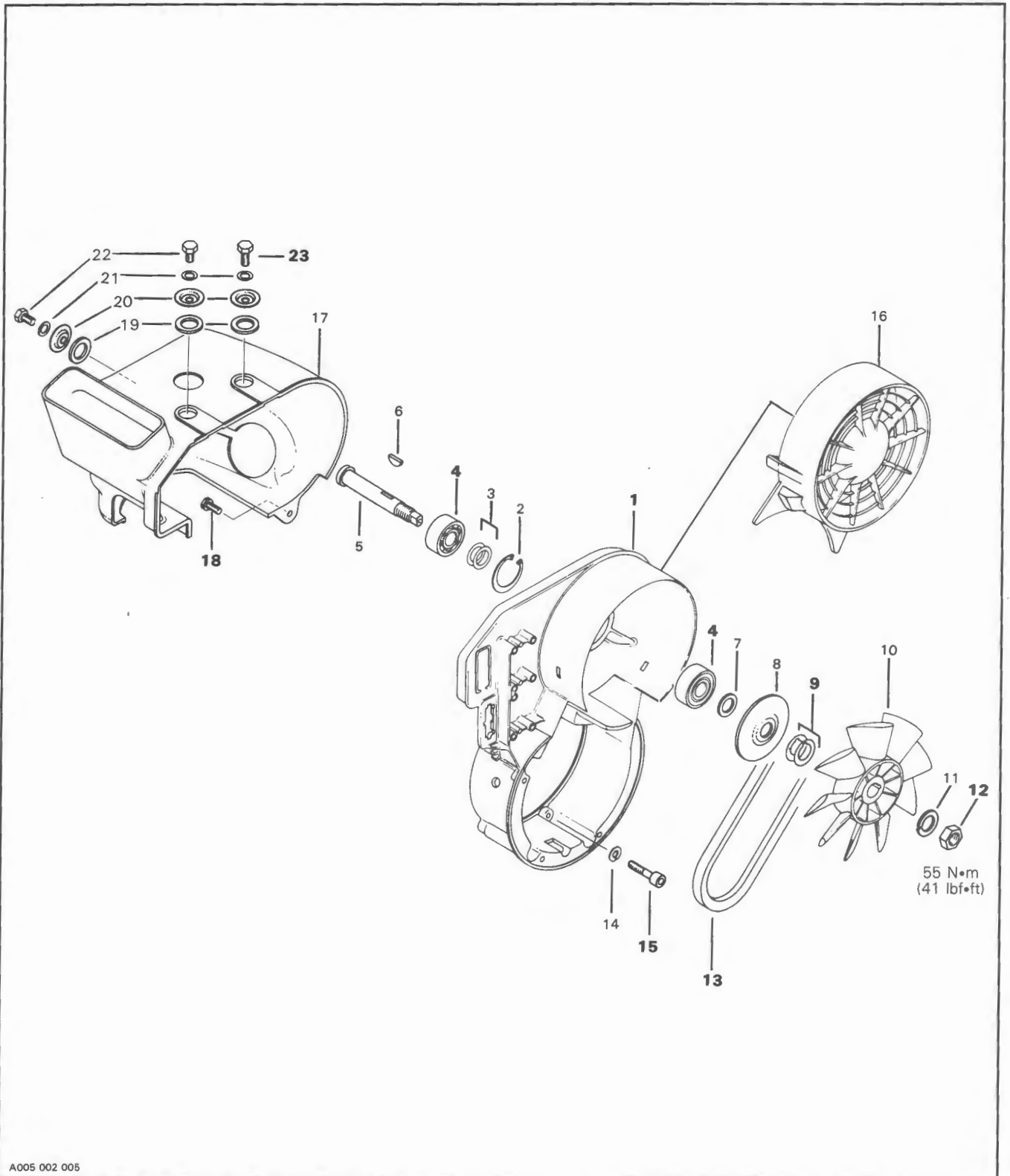
At reassembly coat all electric connections with silicone dielectric grease (P/N 413 7017 00) to prevent corrosion or moisture penetration.

▼ **CAUTION :** Do not use silicone "sealant", this product will corrode contacts.

○ **NOTE :** For ignition timing procedure refer to "Ignition timing" section 04-02.

Section 02 ENGINE
Sub-section 02 (253 ENGINE TYPE)

COOLING SYSTEM



Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

1. Fan housing
2. Snap ring
3. Shim (2)
4. Bearing 6203 (2)
5. Fan shaft
6. Woodruff key
7. Spacer
8. Pulley half
9. Shim 0.5 mm
10. Fan
11. Lock washer 16 mm
12. Nut M16

13. V-belt
14. Lock washer 6 mm (4)
15. Screw M6 x 30 (4)
16. Fan cover
17. Cylinder cowl
18. Taptite screw M16 x 16
19. Rubber washer (4)
20. Cowl cover (4)
21. Lock washer 6 mm (4)
22. Screw M6 x 12 (3)
23. Screw M6 x 16

 **NOTE :** The following procedures can be done without removing the engine from chassis.

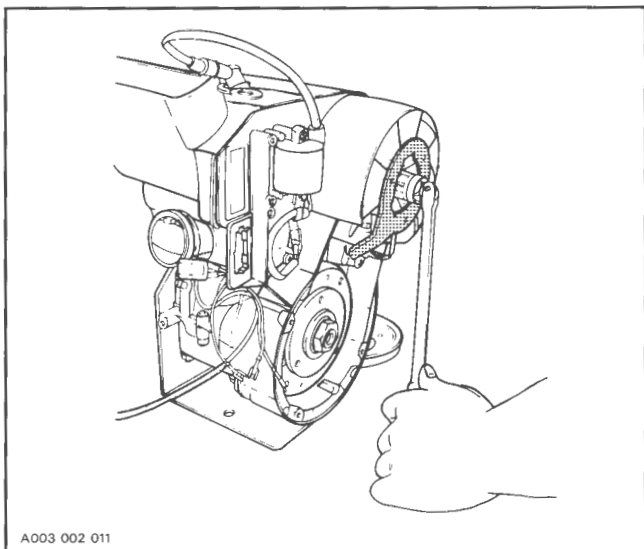
CLEANING

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY & ASSEMBLY

12, Fan nut

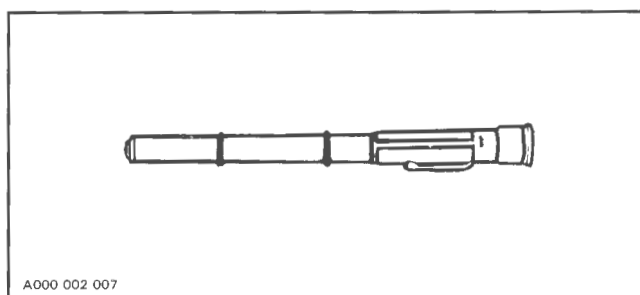
To remove or install fan pulley retaining nut, lock fan pulley with special holder wrench (P/N 420 8763 57). At assembly, torque nut to 55 N•m (41 lbf•ft).



9,13, Shim & V-belt

Fan belt deflection must be 9.5 mm (3/8 in) when applying a force of 5 kg (11 lb). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lock washer.

Use belt tension tester (P/N 414 3482 00) to check deflection.




1,4, Fan housing & ball bearing

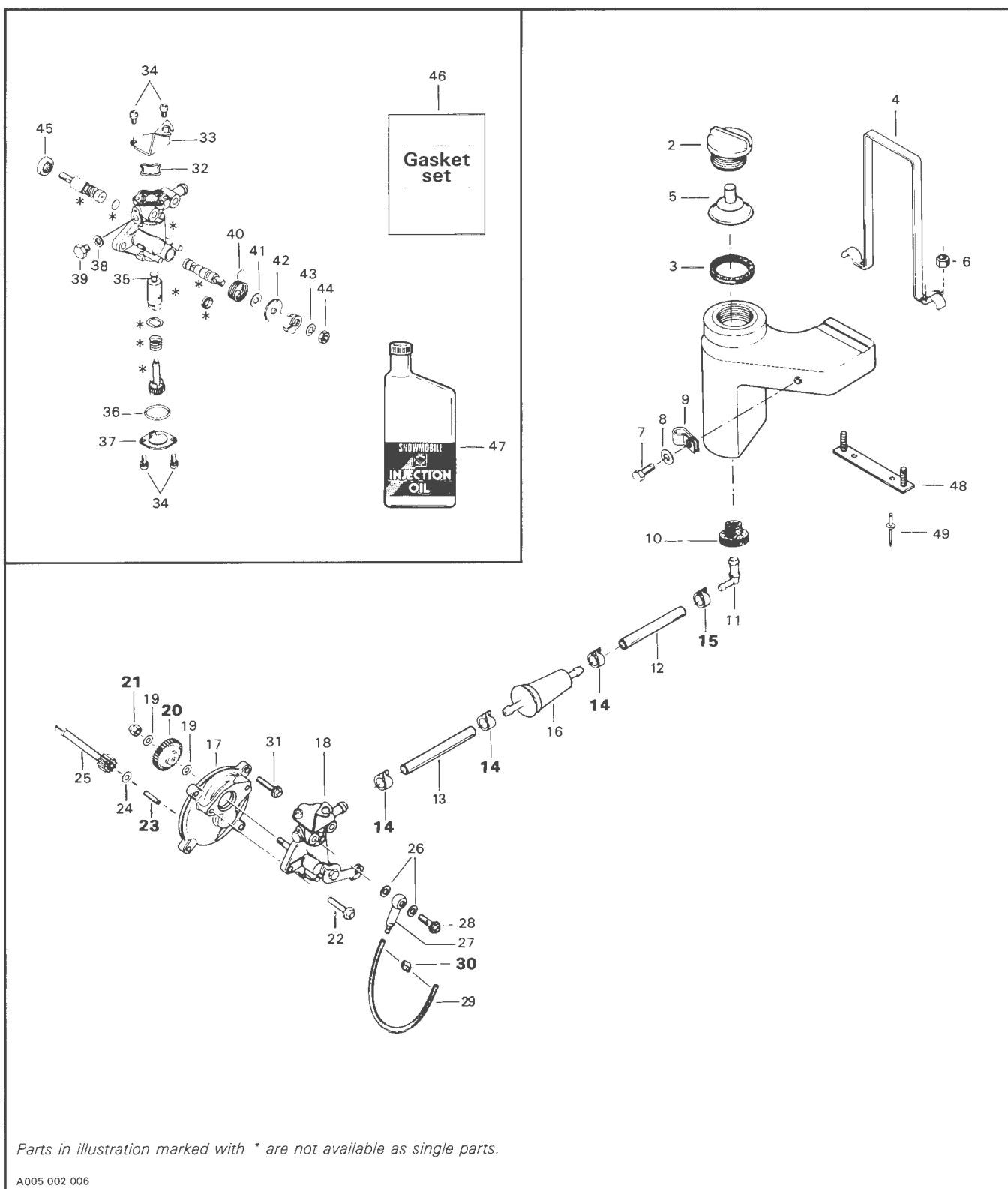
It is first necessary to heat bearing housing to 65°C (150°F) to remove or install bearing.

15,18,22,23, Fan housing screw & upper fan cowl screw

At assembly, apply a light coat of Loctite 242 on threads. It should be noted that to correctly remove a Loctite locked screw, it is first necessary to slightly tap on head screw to break Loctite bond. The screw can then be removed. This will eliminate the possibility of screw breakage.

 **WARNING :** If fan protector is removed, always reinstall after servicing.

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

1. Injection oil tank
2. Oil tank cap
3. O-ring
4. Retainer clip
5. Baffle
6. Hexagonal flanged elastic stop nut 6 mm (2)
7. Screw
8. Washer
9. Clip
10. Grommet
11. Male connector
12. Oil line 2 in (50 mm)
13. Oil line 3 in (75 mm)
14. Spring clip (3)
15. Spring clip
16. Filter
17. Oil pump mounting flange
18. Oil pump
19. Washer 6.2 (2)
20. Oil pump gear 27 teeth
21. Lock nut 6 mm
22. Taptite screw M5 x 16 (2)
23. Needle roller B4 x 17.8
24. Washer 4.3
25. 9 teeth gear
26. Oil banjo gasket (2)
27. Banjo
28. Banjo bolt
29. Oil line 13 in (330 mm)
30. Clamp (2)
31. Taptite screw M5 x 20 (4)
32. O-ring
33. Plate
34. Screw with lock washer (4)
35. Retainer
36. O-ring
37. Cam casing plate
38. Washer
39. Hexagonal head cap screw
40. Spring
41. Washer
42. Lever
43. Lock washer 6 mm
44. Hexagonal nut 6 mm
45. Seal
46. Gasket set
47. Injection oil (1 liter)
48. Retainer plate (underneath frame)
49. Rivet (2)

○ NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

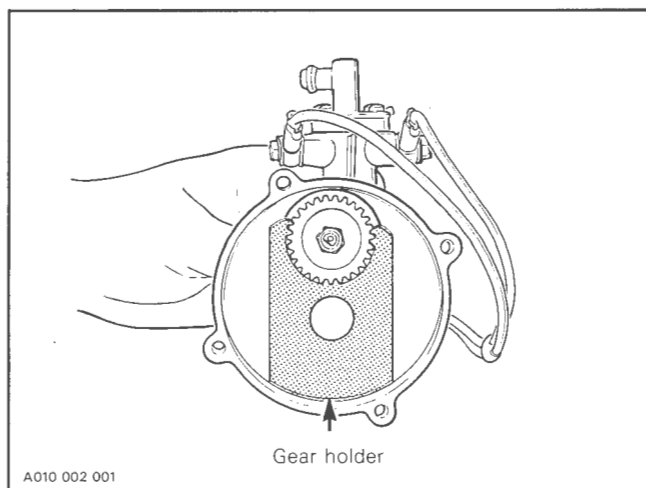
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

○ NOTE: Some oil pump components are not available as spare parts.

20,21, Oil pump gear & gear retaining nut

To remove gear retaining nut, first extract the needle roller with pliers then lock gear in place using gear holder (P/N 420 8766 90).



ASSEMBLY

20, Oil pump gear

At gear assembly, apply a light coat of low temperature grease (P/N 413 7061 00) on gear teeth.

23, Needle roller

The needle roller must be engaged as deep as possible in the pump mounting flange.

14,15,30, Spring clip & clamp

Always check for spring clip and clamp tightness.

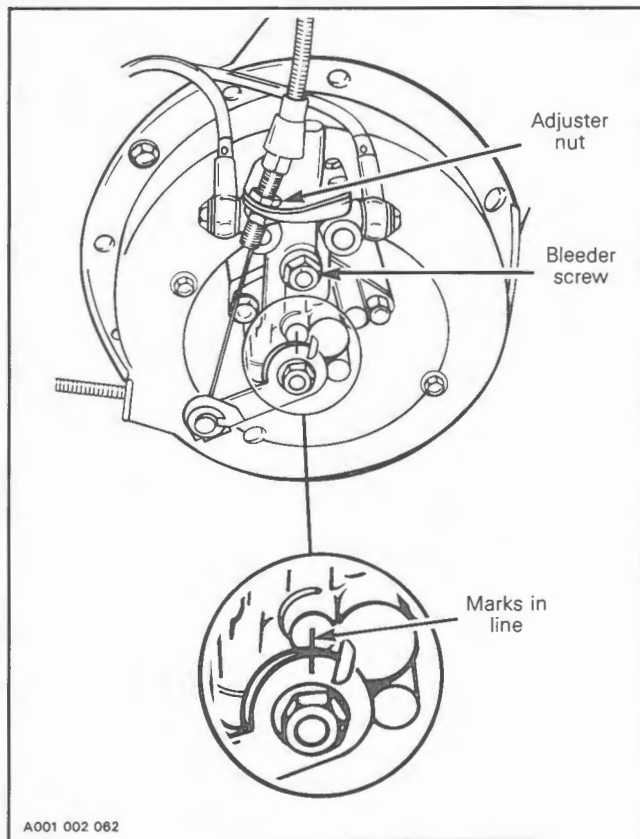
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

To synchronize pump with carburetor :

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



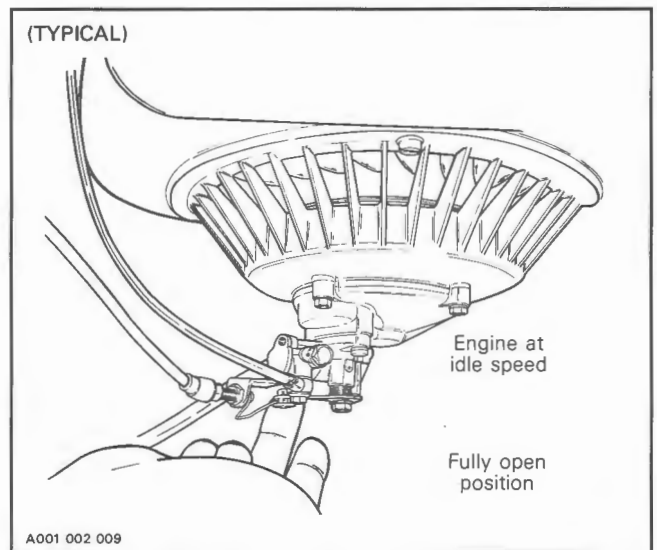
CAUTION : Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To bleed oil lines :

All oil lines should be full of oil. If required, bleed the main oil line (between tank and pump) by loosening the bleeder screw until all air has escaped from the line.

Make sure the tank is sufficiently filled.

Check the small oil lines (between pump and intake manifold). If required, fill the lines by running the engine at idle speed while holding the pump lever in fully open position.

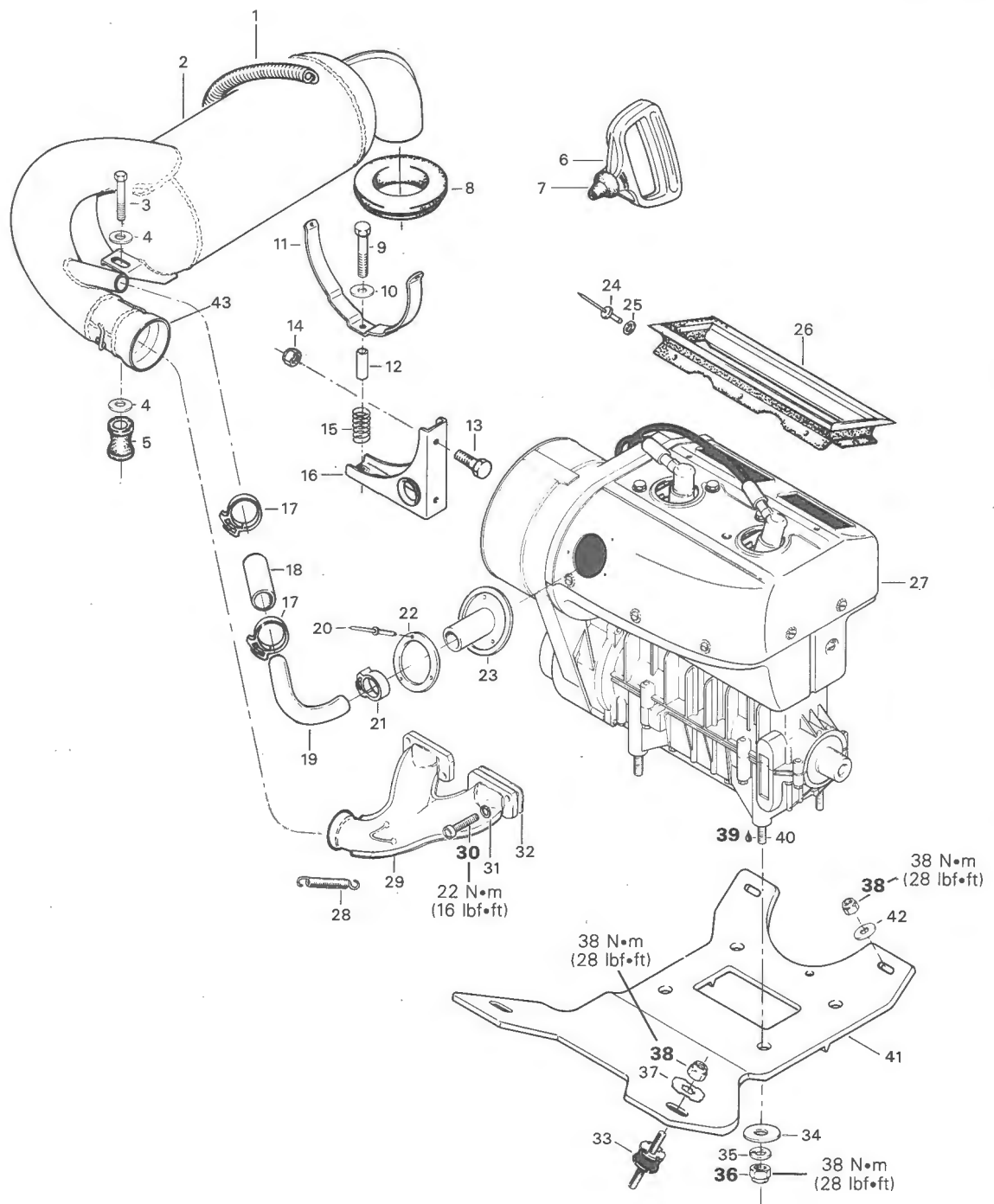


WARNING : Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

377 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION

Engine support & muffler



Section 02 ENGINE


Sub-section 03 (377 ENGINE TYPE)

- | | |
|---------------------------|------------------------------------|
| 1. Spring | 23. Connector |
| 2. Muffler | 24. Rivet (6) |
| 3. Bolt M8 x 1.25 x 12 | 25. Washer (6) |
| 4. Washer 8.4 mm (2) | 26. Air duct |
| 5. Anchor pad | 27. Rotax engine 377 |
| 6. Starter grip | 28. Spring (2) |
| 7. Rubber buffer | 29. Exhaust manifold |
| 8. Exhaust washer | 30. Allen screw M8 x 30 (4) |
| 9. Cap screw M6 x 20 | 31. Lock washer 8 mm (4) |
| 10. Washer 6 mm | 32. Gasket (4) |
| 11. Muffler attachment | 33. Rubber mount (4) |
| 12. Bushing | 34. Washer 10.5 mm (4) |
| 13. Cap screw M6 x 16 (2) | 35. Lock washer 10 mm (4) |
| 14. Elastic stop nut (2) | 36. Hexagonal nut M10 (4) |
| 15. Spring | 37. Internal tooth cup washer (2) |
| 16. Muffler support | 38. Elastic stop nut M10 x 1.5 (4) |
| 17. Plastic clamp (2) | 39. Loctite 242 |
| 18. Hose | 40. Stud M10 x 25 (4) |
| 19. Elbow | 41. Engine support |
| 20. Rivet (3) | 42. Washer (2) |
| 21. Plastic clamp | 43. Female ball joint |
| 22. Connector ring | |
-

REMOVAL FROM VEHICLE

Remove or disconnect the following (if applicable) then lift engine out of vehicle :

- pulley guard, drive belt, drive pulley
- exhaust manifold
- elbow tube on cylinder cowl
- clamp between carburetor and intake manifold
- oil injection pump cable
- oil lines
- pulsation line
- hood retaining cable
- rewind starter cable

 **WARNING :** Before disconnecting any electrical wire in starter system always first disconnect the negative battery cable (black).

- wiring harness
- engine stud nuts (under engine support)

ENGINE SUPPORT & MANIFOLD ASSEMBLY

30,36,38,39, Manifold bolts, engine stud nuts, engine support nuts & Loctite 242

Apply Loctite 242 on the engine stud nuts then torque to 38 N•m (28 lbf•ft).

Torque the engine support to 38 N•m (28 lbf•ft).

Torque the exhaust manifold bolts to 22 N•m (16 lbf•ft).

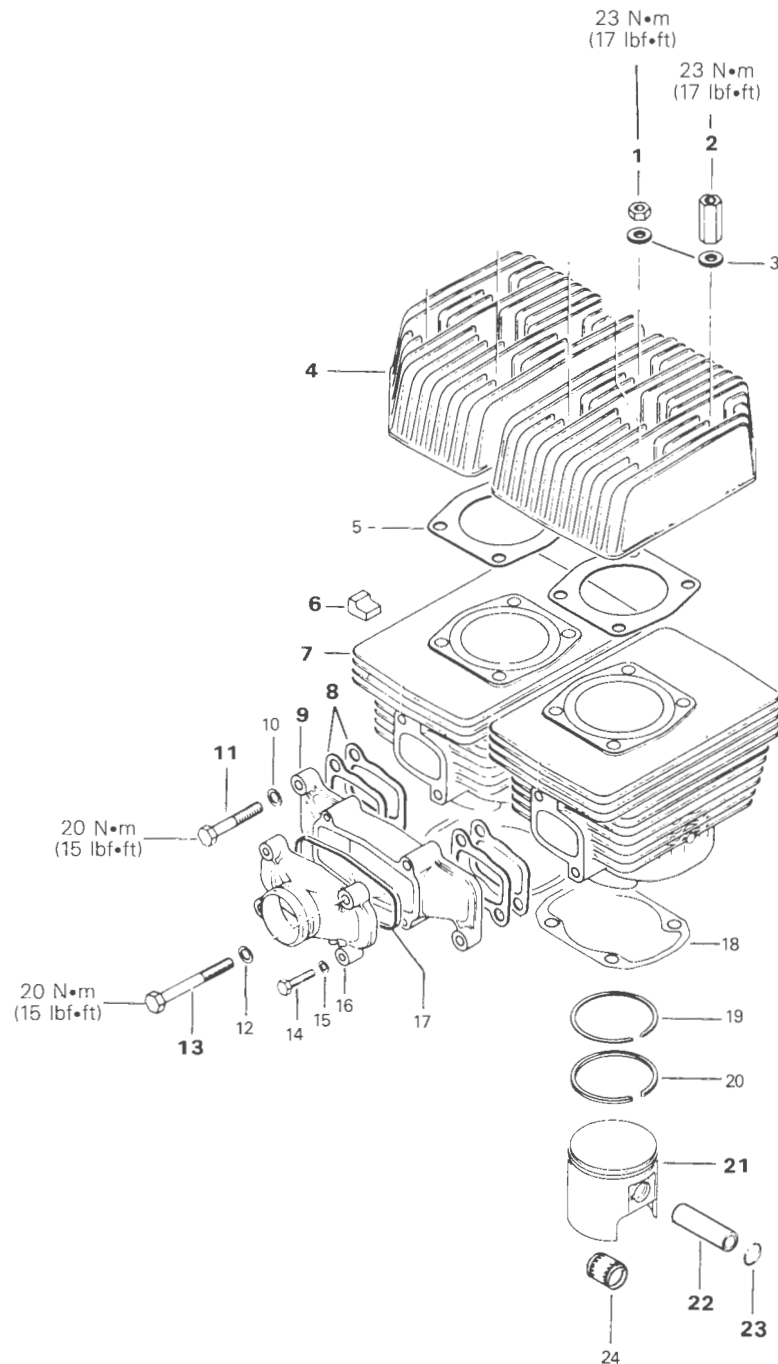
INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following :

- Check tightness of engine mount nuts.
- Verify throttle cable condition then after throttle cable installation, check maximum throttle slide opening.
- Check pulley alignment and drive belt tension.
- Should a light exhaust leak be experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits accumulation should seal joint.

Section 02 ENGINE
Sub-section 03 (377 ENGINE TYPE)

TOP END



Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

1. Hexagonal nut M8 (5)
2. Distance nut M8 x 27,5 (3)
3. Washer (8)
4. Cylinder head (2)
5. Gasket, cylinder head (2)
6. Noise damper (1)
7. Cylinder (2)
8. Gasket, intake manifold (4)
9. Intake manifold (1)
10. Lock washer 8 mm (2)
11. Hexagonal screw M8 x 40 (2)
12. Lock washer 8 mm (2)

13. Hexagonal screw M8 x 74 (2)
14. Hexagonal screw M6 x 25 (2)
15. Lock washer 6 mm (2)
16. Intake cover (1)
17. Rubber ring (1)
18. Gasket, cylinder flange (2)
19. Semi-trapez ring (2)
20. Rectangular ring (2)
21. Piston (2)
22. Piston pin (2)
23. Circlip (4)
24. Needle cage (2)


 **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

 **NOTE :** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

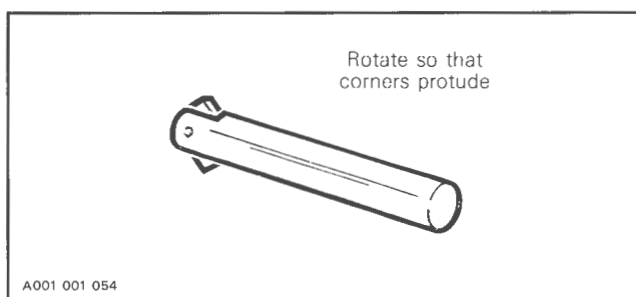
DISASSEMBLY

21,22,23, Piston, piston pin & circlips

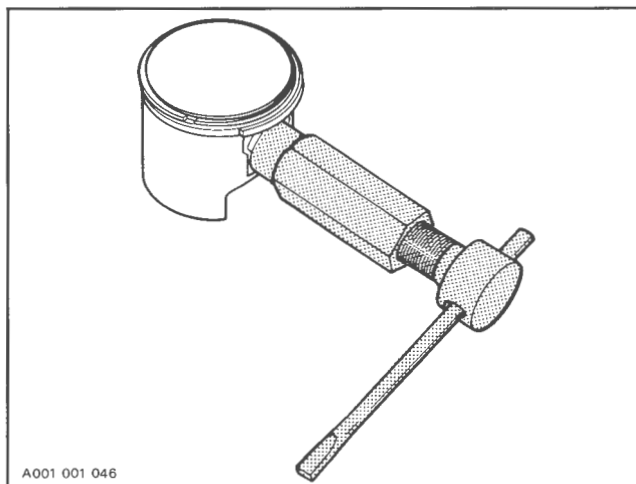
Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Then with a pointed tool inserted in piston notch, remove circlips from piston.


To remove piston pin, use piston pin puller (P/N 529 0068 00) as follows :


- Fully screw puller handle.
- Place stop notch of puller in line with the puller axis.
- Insert puller end into piston pin.
- Rotate stop notch of puller so that corners protude the puller end.



- Hold puller firmly and rotate puller handle counter-clockwise to pull piston pin.



 **NOTE :** On twin cylinder fan cooled engines, the PTO cylinder or fan housing has to be removed to give access to MAG piston pin with the puller.

 **NOTE :** 0.25 and 0.5 mm oversize piston and rings are available if necessary.

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

INSPECTION

The inspection of the engine top end must include the following measurements :

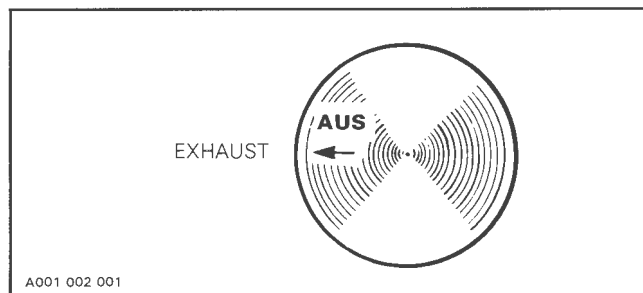
| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|--------------------------------|--------------------------|------------------|------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Cylinder taper | N.A. | N.A. | 0.08 mm (.0031") |
| Cylinder out of round | N.A. | N.A. | 0.05 mm (.0020") |
| Cylinder / piston clearance | 0.08 mm (.0031") | 0.10 mm (.0039") | 0.20 mm (.008") |
| Ring / piston groove clearance | 0.04 mm (.002") | 0.11 mm (.004") | 0.20 mm (.008") |
| Ring end cap | 0.20 mm (.008") | 0.35 mm (.014") | 1.0 mm (.039") |

○ **NOTE :** For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

ASSEMBLY

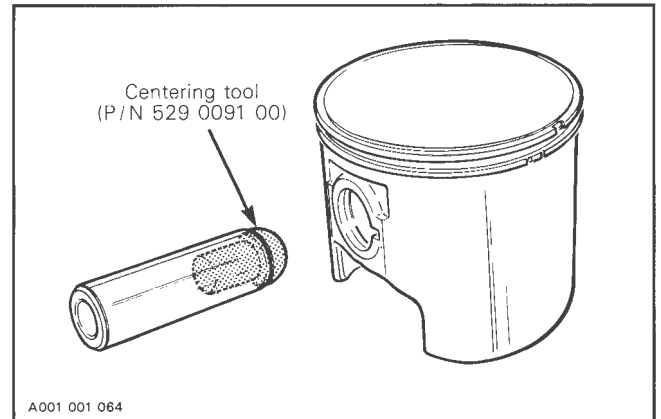
21,23, Piston & circlip

At assembly, place the piston over the connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.



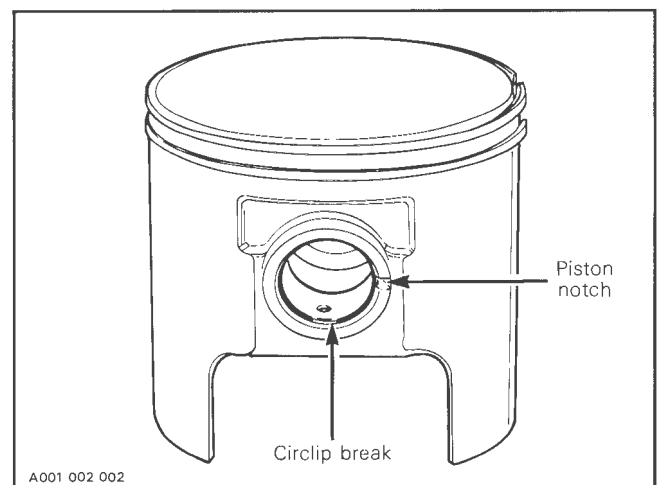
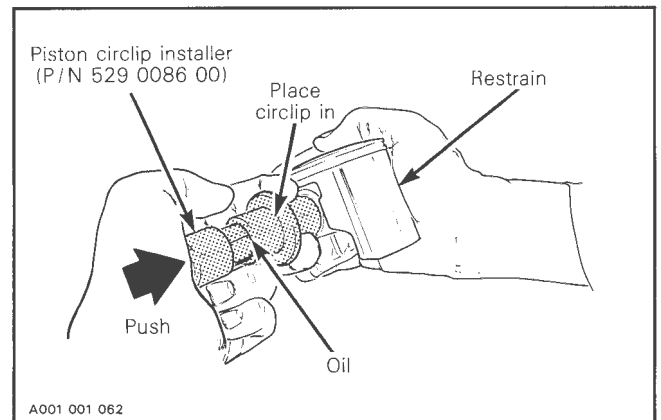
○ **NOTE :** Spare parts pistons and cylinders are identified with a green or red dot, it is important to match the piston with the cylinder of the same color.

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00).



○ **NOTE :** The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0086 00).



Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

▼ **CAUTION :** Circlips must not move freely in the groove after installation. If so, replace them.

7, Cylinder

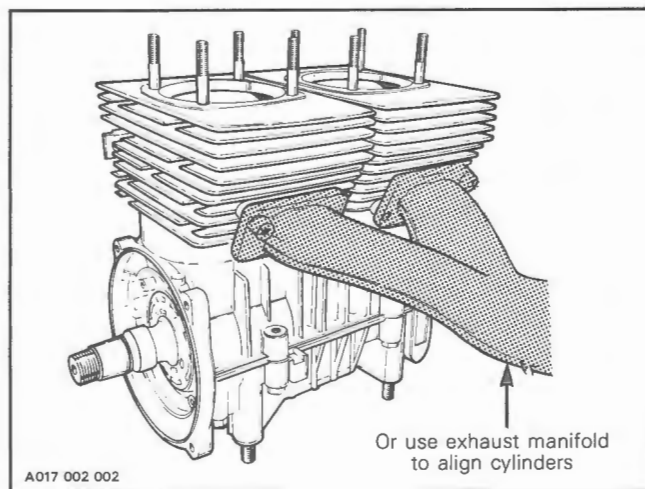
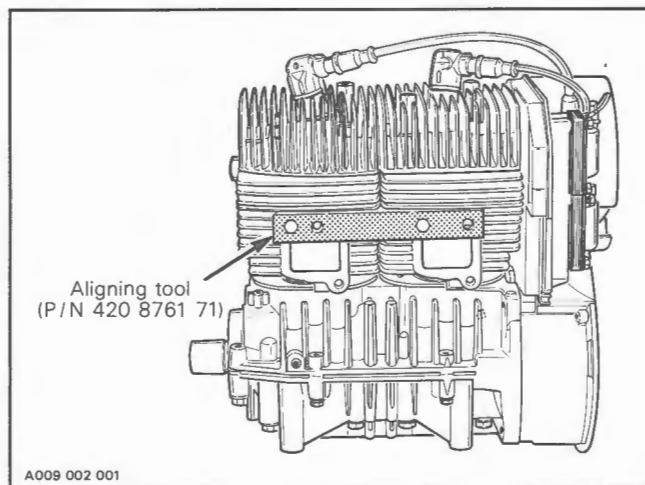
Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

Install ring compressor (P/N 420 8760 90) on piston assembly.

○ **NOTE :** The ring compressor will not fit on oversize pistons.

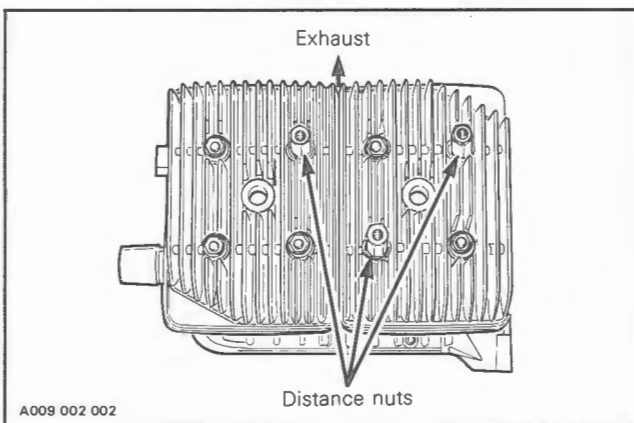
4,7, Cylinder head & cylinder

At cylinder and/or cylinder head installation, use (P/N 420 8761 71) aligning tool to secure sealing of intake manifold and exhaust, before tightening cylinder head nuts.



1,2, Nut & distance nut

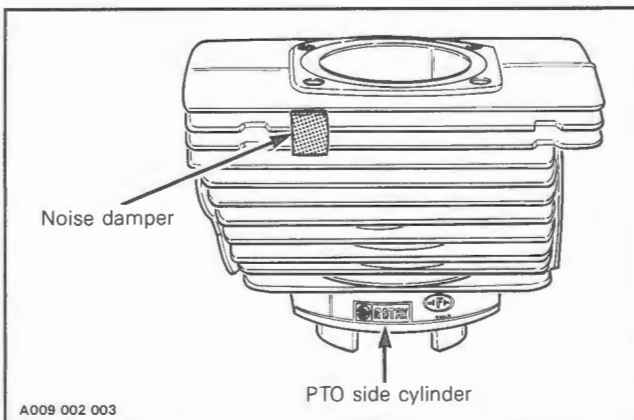
Position distance nuts as illustrated.



Cross torque cylinder head nuts to 23 N•m (17 lbf•ft) torque each cylinder head individually.

6, Damper

Position noise damper as shown below.



Install armature plate, fan housing and then air deflector.

8, Gasket

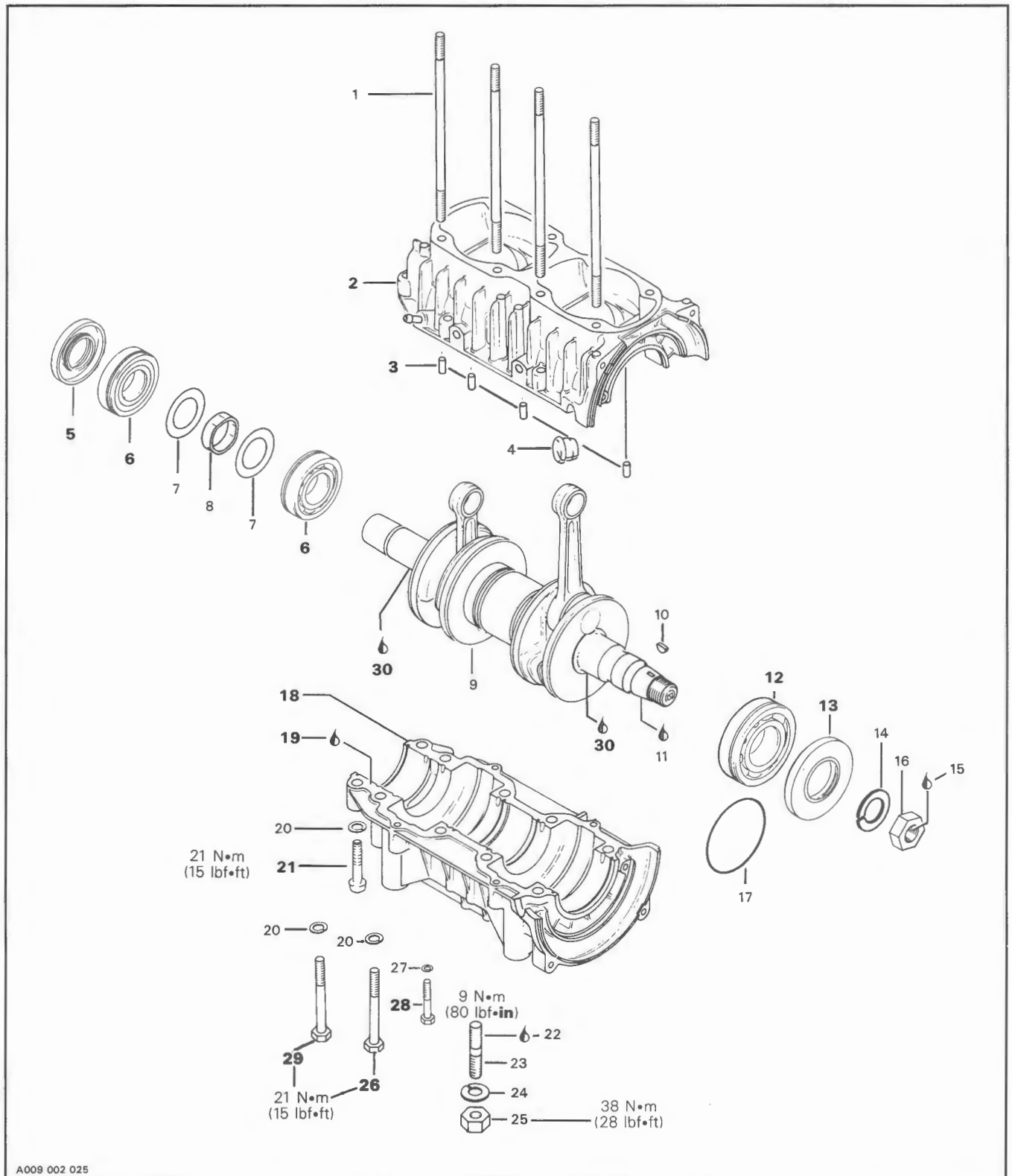
Install a gasket on each side of the air deflector.

9,11,13, Intake manifold & screws

Install intake manifold with identifications marks towards cylinder head and torque the four manifold screws to 22 N•m (16 lbf•ft).

Section 02 ENGINE
Sub-section 03 (377 ENGINE TYPE)

BOTTOM END



Section 02

ENGINE

Sub-section 03 (377 ENGINE TYPE)

1. Stud M8 x 173 (8)

2. Upper crankcase

3. Rubber plug (5)

4. Cable grommet

5. Oil seal PTO side

6. Ball bearing 6206 (2)

7. Shim (2)

8. Spacer

9. Crankshaft

10. Woodruff key 3 x 3,7

11. Loctite 242

12. Ball bearing 6207

13. Oil seal, magneto side

14. Lock washer 22 mm

15. Loctite 242
16. Hexagonal nut 22 x 1,5

17. O-ring

18. Lower crankcase

19. Loctite 515

20. Lock washer 8 mm (10)

21. Cylindrical screw M8 x 45 (2)

22. Loctite 242

23. Stud M10 x 25 (4)

24. Lock washer 10 mm (4)

25. Hexagonal nut M10 (4)


26. Hexagonal screw M8 x 70 (8)

27. Lock washer 6 mm (8)

28. Hexagonal screw M6 x 40 (4)

29. Hexagonal screw M8 x 75 (2)

30. Anti-seize lubricant


 **NOTE :** Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all seals, gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper (P/N 413 7021 00).

 **CAUTION :** Never use a sharp object to scrape away old sealant as score marks are detrimental to crankcase sealing.

DISASSEMBLY

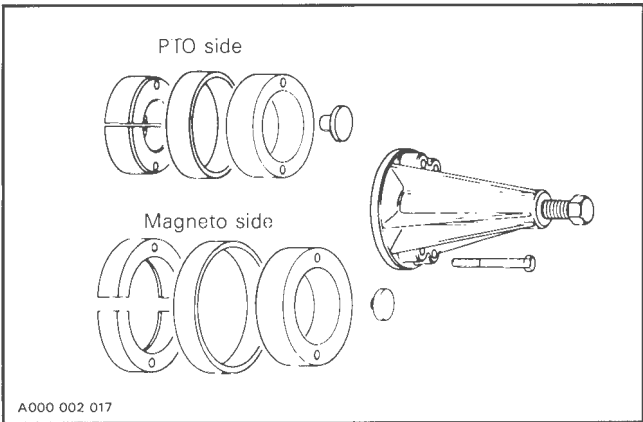
General

To remove drive pulley, refer to “Drive pulley”, section 03-03.

To remove magneto, refer to “Magneto” in this section.

6,12, PTO side bearing & MAG side bearing


To remove bearings from crankshaft, use a protective cap and a special puller, as illustrated. (See Tools section).



INSPECTION

The inspection of the engine bottom end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | |
|-----------------------------------|--------------------------|------------------|------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | WEAR LIMIT |
| Crankshaft deflection | N.A. | N.A. | 0.08 mm (.003'') |
| Connecting rod big end axial play | 0.20 mm (.008'') | 0.53 mm (.021'') | 1.0 mm (.039'') |

 **NOTE :** For the measurement procedures, refer to “Engine Dimensions Measurement”, section 02-09.

ASSEMBLY

6,12,30, PTO side bearing, MAG side bearing & anti-seize lubricant

Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

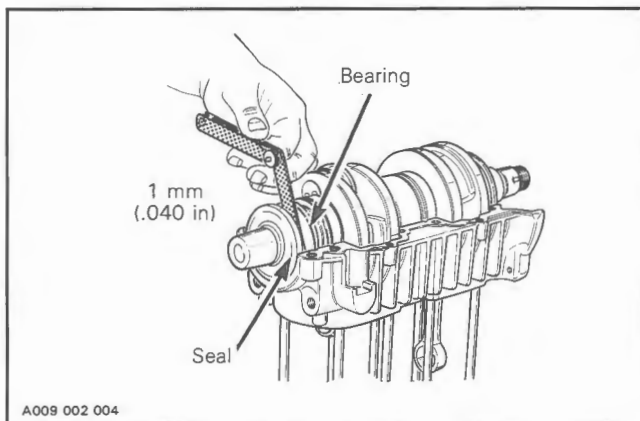
Prior to installing, place bearings into an oil container filled with oil heated to 75°C (167°F). This will expand bearings and ease installation. Install bearings with groove as per exploded view.

Bearings are pressed on crankshaft until they rest against the radius. This radius maintains the gap needed for bearing lubrication.

5,13, Oil seal PTO side & oil seal MAG side

At seal installation, apply a light coat of lithium grease on inside diameter lip of seals.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings. When installing plain seals (without locating ring or without spacing legs), ensure to maintain the specified gap as illustrated.



3, Rubber plug

Prior to installing the crankshaft, make sure both rubber plugs are into upper crankcase holes.

2,18,19, Upper crankcase, lower crankcase & Loctite 515

Crankcase halves are factory matched and therefore, are not interchangeable as single halves.

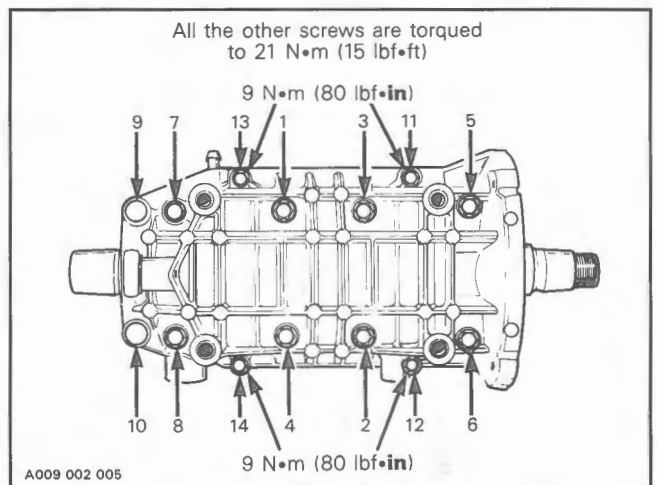
Prior to joining crankcase halves, spray clean injection oil on all crankshaft moving parts, then apply Loctite 515 (P/N 413 7027 00) on mating surfaces.

NOTE: Prior to applying Loctite 515 it is possible to use primer N (P/N 413 7053 00) or primer NF (P/N 413 7024 00). This increases cure speed and gap filling capability. Refer to supplier instructions.

Position crankcase halves together and tighten screws by hand. Then install and tighten armature plate on magneto side to correctly align crankcase halves.

Torque screws to proper torque in the following sequence.

Follow sequence shown.



21,26,29, Screw M8 x 45, M8 x 70, M8 x 75

The bigger screws have to be torqued to 21 N•m (15 lbf•ft). Locate them as per exploded view.

28, Screw M6 x 40

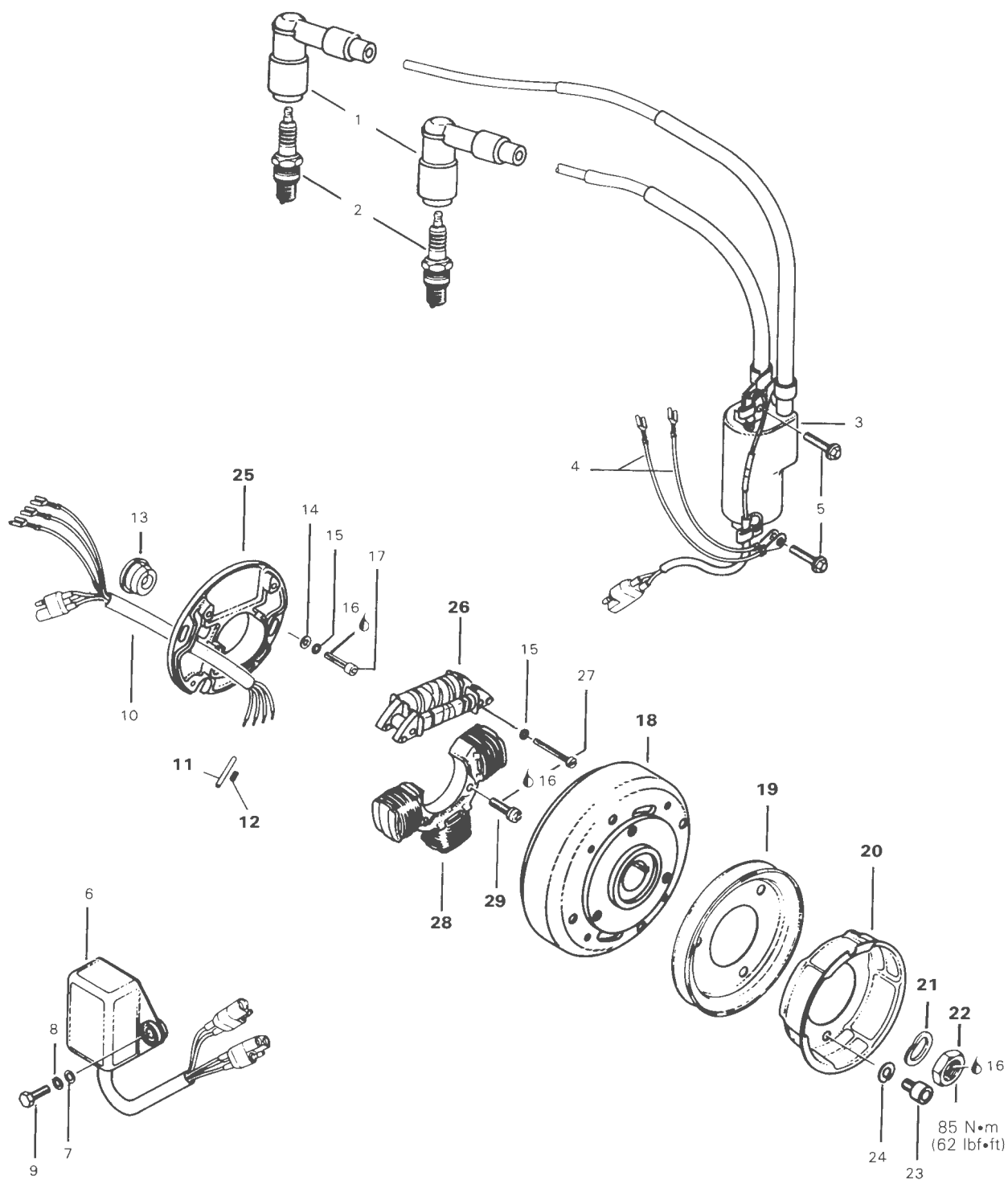
The smaller screws have to be torqued to 9 N•m (80 lbf•in).

To install magneto, refer to "Magneto" in this section.

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

MAGNETO



Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

1. Spark plug protector (2)
2. Spark plug (2)
3. Ignition coil
4. Ground wire (2)
5. Taptite screw M6 x 25 (2)
6. Amplifier box
7. Washer 6,4 mm (2)
8. Lock washer 6 mm (2)
9. Hexagonal screw M6 x 20 (2)
10. Wire ass'y
11. Protection tube (6)
12. Splice connector (6)
13. Cable grommet
14. Washer 5.5 mm (2)
15. Lock washer 5 mm (4)

16. Loctite 242
17. Allen screw M5 x 18 (2)
18. Magneto flywheel
19. V-belt pulley
20. Starting pulley
21. Lock washer 22 mm
22. Hexagonal nut 22 x 1,5
23. Screw M8 x 12 (3)
24. Lock washer 8 mm (3)
25. Armature plate
26. Generating coil
27. Combined screw M5 x 35 (2)
28. Lighting coil
29. Phillips screw M6 x 25 (2)

○ **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION :** Clean armature and magneto using only a clean cloth.

DISASSEMBLY

19,20,22, V-belt pulley, starting pulley, nut

To gain access to magneto assembly, remove :

- injection oil line
- rewind starter
- starting and V-belt pulleys

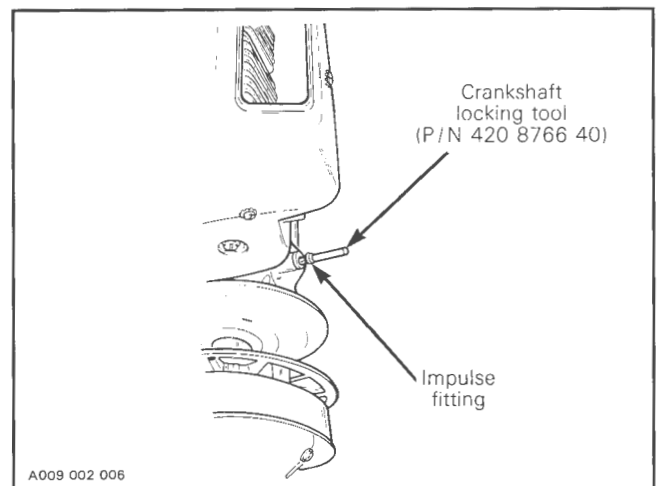
○ **NOTE :** Before disassembling magneto plate, indexing marks should be scribed to facilitate reassembly.

To remove magneto flywheel retaining nut :

- Lock crankshaft with crankshaft locking tool (P/N 420 8766 40) as illustrated (magneto side piston must be at top dead center).

○ **NOTE :** It should be noted that to correctly remove a "Loctite" locked fastener it is first necessary to tap on the fastener to break "Loctite" bond. This will eliminate the possibility of thread breakage.

— Remove magneto retaining nut.



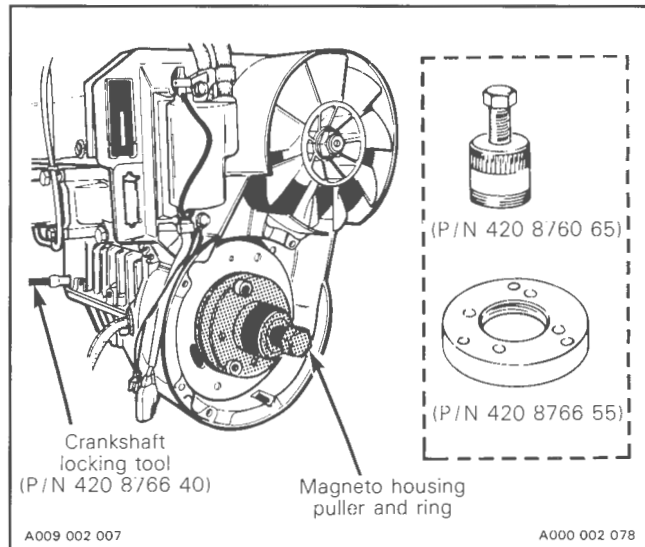
18, Magneto flywheel

To remove magneto housing (flywheel) :

- Lock crankshaft with crankshaft locking tool and install magneto housing puller (P/N 420 8760 65) and puller ring (P/N 420 8766 55) as illustrated.

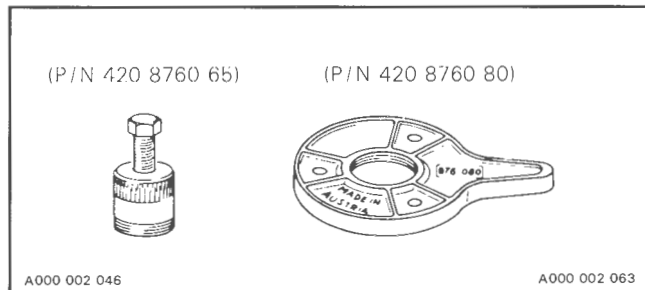
Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)



- Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

NOTE : For the above procedure, the locking type puller (P/N 420 8760 80) can be used without crankshaft locking tool.

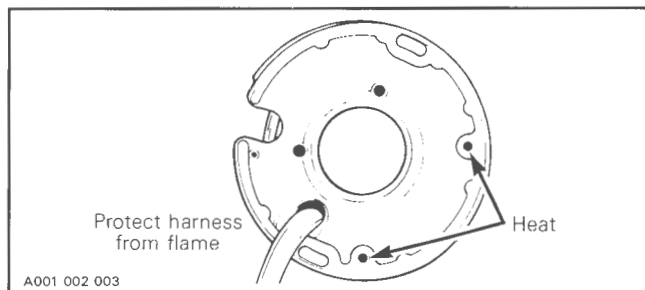


REPAIR

26, Generating coil

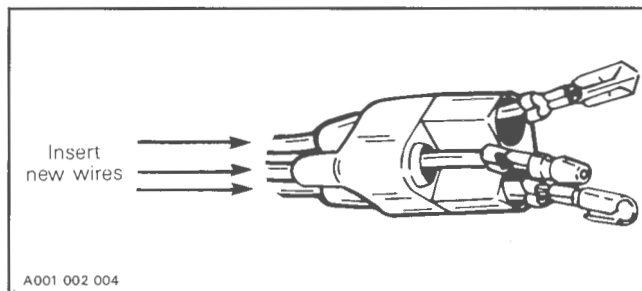
To replace generating coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



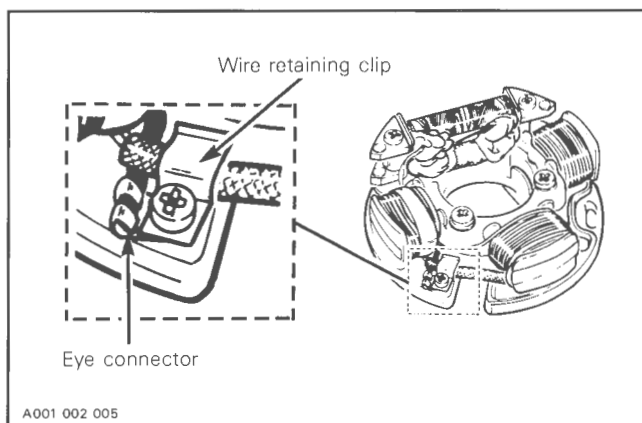
CAUTION : Protect harness from flame.

- Remove screws (use Phillips no 2 or suitable flat screw-driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector housing and install connectors.



CAUTION : Replace the old wires in the connector with the same color coded new wires.

- Install a new receptacle connector to the black/yellow striped wire.
- To install the ground connector of the armature plate, tape the new black lead to the old one and pull it under the lighting coil with the old wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.

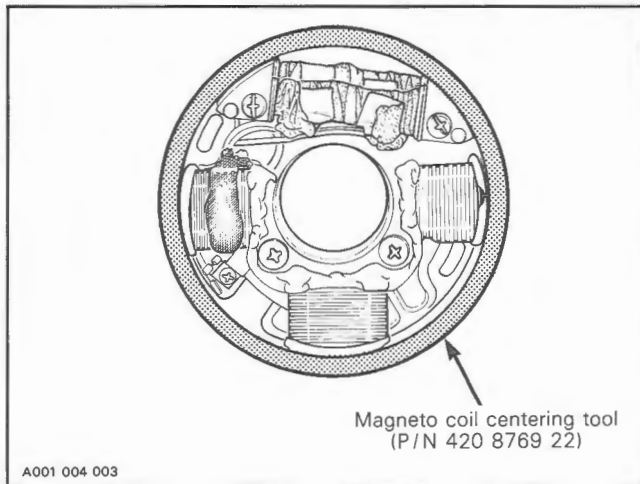


- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.

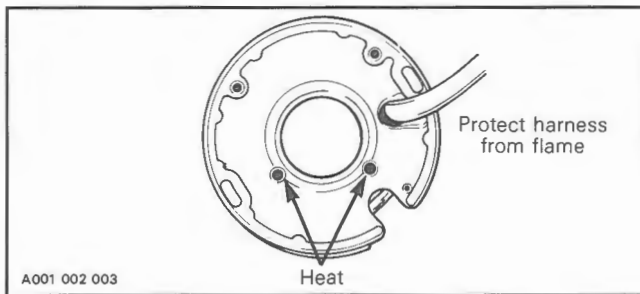


▼ **CAUTION :** Before reinstalling the magneto, remove the loose epoxy from harness.

11,12,28,29, Protector tube, splice connector, lighting coil & screw

To replace lighting coil :

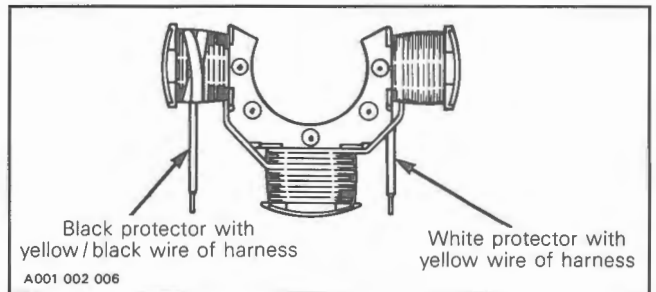
- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



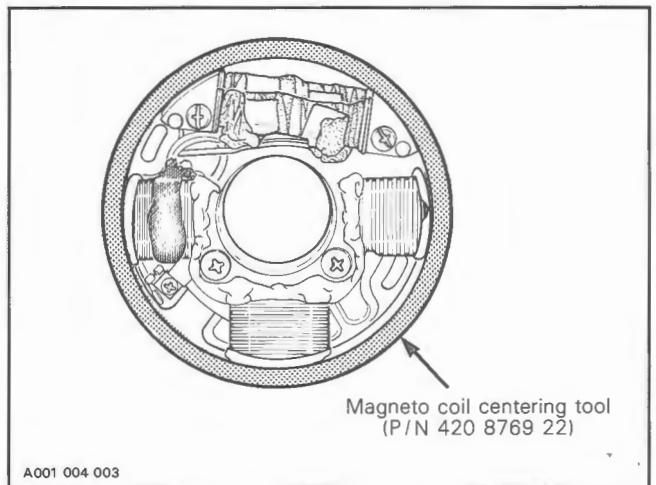
▼ **CAUTION :** Protect harness from flame.

- Remove screws (use Phillips no 3 screwdriver).
- Remove the wire retaining clip from armature plate.
- Pull out protector tubes and unsolder the splice connectors.
- Solder the yellow wire in the harness to the white tube protected wire of the coil.

- Solder the yellow / black striped wire in the harness to the black tube protected wire of the coil.



- Position protector tubes over connections.
 - Prior to assembly, apply Loctite 242 (blue, medium strength) on the lighting coil screws.
- Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



- Fasten retaining clip onto protector tubes.

▼ **CAUTION :** Before reinstalling magneto, remove the loose epoxy from harness.

ASSEMBLY

18,21,22,25, Magneto flywheel, lock washer, nut & armature plate

Position the armature plate on the crankcase aligning the marks on both parts.

Clean crankshaft extension taper.

Apply Loctite 242 (blue, medium strength) on taper.

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

Position key, magneto flywheel and lock washer on crankshaft.

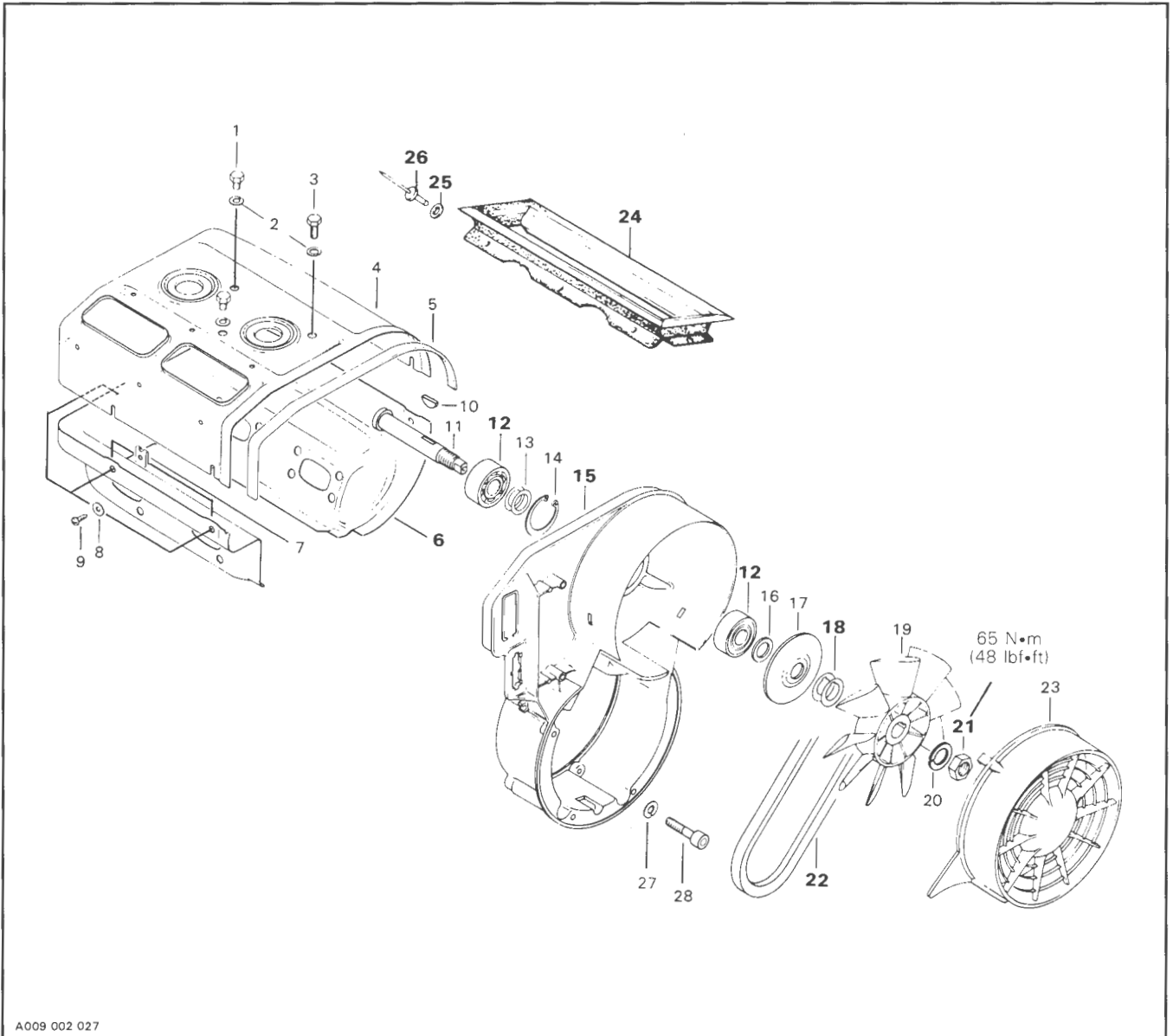
Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 85 N•m (63 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 7017 00) to prevent corrosion or moisture penetration.

▼ **CAUTION :** Do not use silicone “sealant”, this product will corrode contacts.

○ **NOTE :** For ignition timing procedure refer to “Ignition timing” section 04-02.

COOLING SYSTEM



A009 002 027

1. Hexagonal screw M8 x 9 (2)
2. Lock washer 8 mm (3)
3. Hexagonal screw M8 x 16
4. Cylinder head cowl
5. Sealing strip
6. Cylinder cowl
7. Spring nut 4,8 (6)
8. Washer (6)
9. Screw 4,8 x 16 (6)
10. Woodruff key 3 x 5
11. Fan shaft
12. Ball bearing 6203 (2)
13. Shim (2)
14. Circlip

15. Fan housing
16. Distance sleeve
17. Pulley half
18. Shim 0,5 mm
19. Fan
20. Lock washer 16 mm
21. Hexagonal nut M16 x 1,5
22. V-belt
23. Fan cover
24. Air duct
25. Washer
26. Rivet (closed end)
27. Lock washer 6 mm (4)
28. Allen screw M6 x 30 (4)

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

○ **NOTE :** The following procedures can be done without removing the engine from chassis.

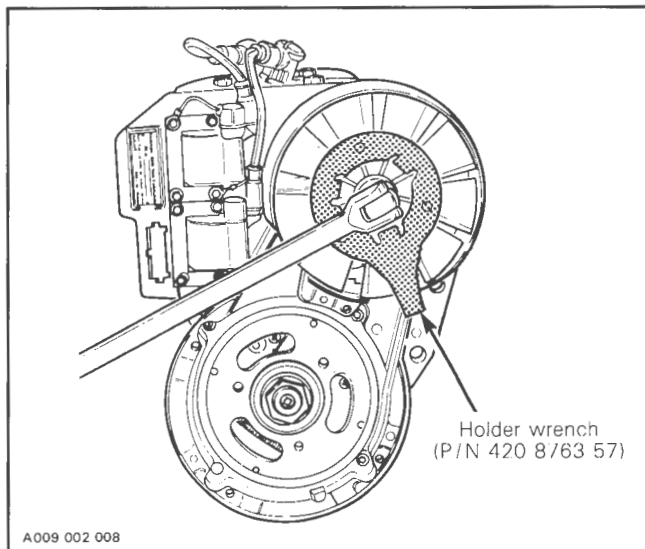
CLEANING

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY & ASSEMBLY

21, Fan nut

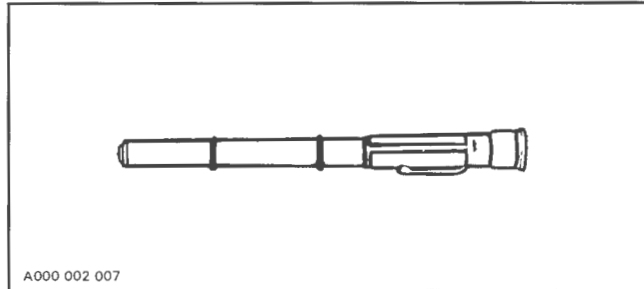
To remove or install fan pulley retaining nut, lock fan pulley with special holder wrench (P/N 420 8763 57). At assembly, torque nut to 65 N•m (48 lbf•ft).



18,22, Shim & V-belt

Fan belt deflection must be 9.5 mm (3/8 po) when applying a force of 5 kg (11 lb) midway between pulleys. To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lock washer.

Use belt tension tester (P/N 414 3482 00) to check deflection.



12,15, Ball bearing & fan housing

It is first necessary to heat bearing housing to 65°C (150°F) to remove or install bearing.

24,25,26, Air duct, washer & rivet (closed end)

Air duct can be removed by drilling out rivets.

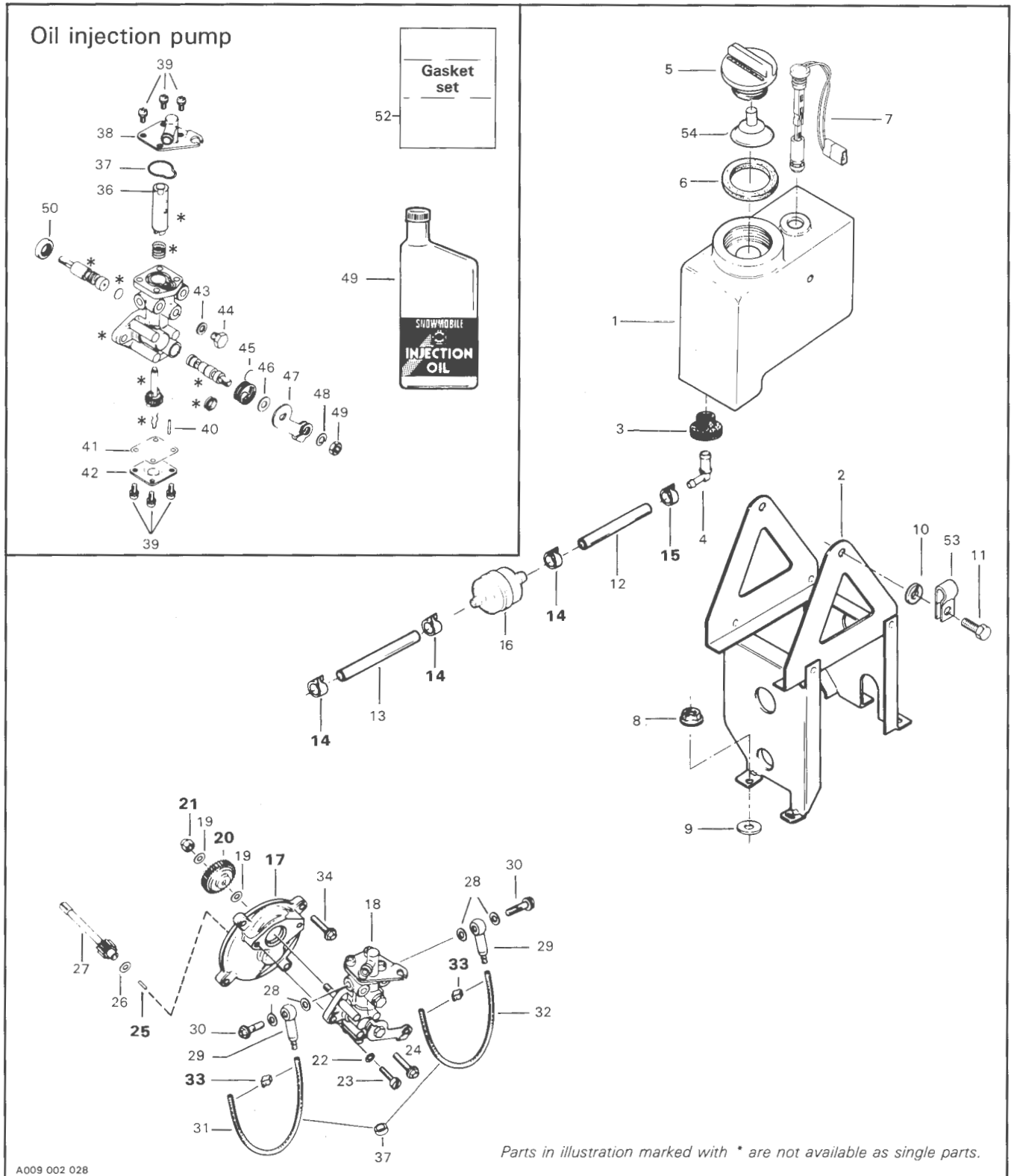
▼ **CAUTION :** At reassembly, use only closed end rivets to avoid rivet ends from falling into magneto.

6, Cylinder cowl

A gasket must be placed on both sides (inner and outer) of intake and exhaust holes on cylinder cowl.

◆ **WARNING :** If fan protector is removed, always reinstall after servicing.

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

1. Injection oil reservoir
2. Oil reservoir support
3. Grommet
4. Male connector
5. Oil tank cap
6. Gasket
7. Oil level sensor
8. Elastic stop nut M5 x 0.8 (4)
9. Rubber washer (4)
10. Lock washer 6 mm (2)
11. Screw M6 x 16 (2)
12. Oil line 38 mm
13. Oil line 102 mm
14. Spring clip (3)
15. Spring clip (1)
16. Filter
17. Oil pump mounting flange
18. Oil pump
19. Washer 6,2 mm (2)
20. Oil pump gear 27 teeth
21. Lock nut M6
22. Lock washer 5 mm (2)
23. Screw M5 x 16 (2)
24. Taptite screw M5 x 16 (2)
25. Needle roll
26. Washer 4,3
27. Gear 9 teeth
28. Banjo oil gasket (4)
29. Banjo (2)
30. Banjo bolt (2)
31. Oil line 325 mm
32. Oil line 325 mm
33. Clamp (4)
34. Taptite screw M5 x 16 (4)
35. Rubber ring
36. Retainer
37. O-ring
38. Plate
39. Screw with lock washer (8)
40. Stop pin
41. Gasket
42. Plate
43. Washer
44. Hexagonal screw M6 x 7
45. Spring
46. Washer
47. Lever
48. Lock washer 6 mm
49. Nut M6
50. Seal
51. Gasket set
52. Injection oil
53. Clip
54. Baffle

○ **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

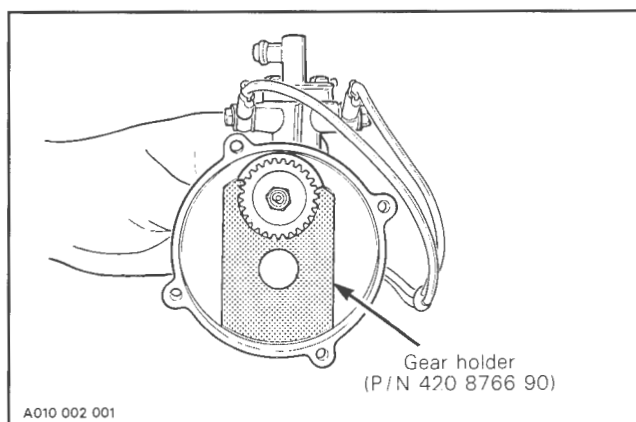
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

○ **NOTE :** Some oil pump components are not available as single parts.

20,21,25, Oil pump gear, lock nut 6 mm & needle roll

To remove retaining nut, first extract the needle roll with pliers then lock gear in place using gear holder (P/N 420 8766 90).



ASSEMBLY

20, Oil pump gear

At gear assembly, apply a light coat of low temperature grease (P/N 413 7061 00) on gear teeth.

25, Needle roll

The needle roll must be engaged as deep as possible in the pump mounting flange.

14,15,33, Spring clip & clamp

Always check for spring clips and clamps tightness.

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

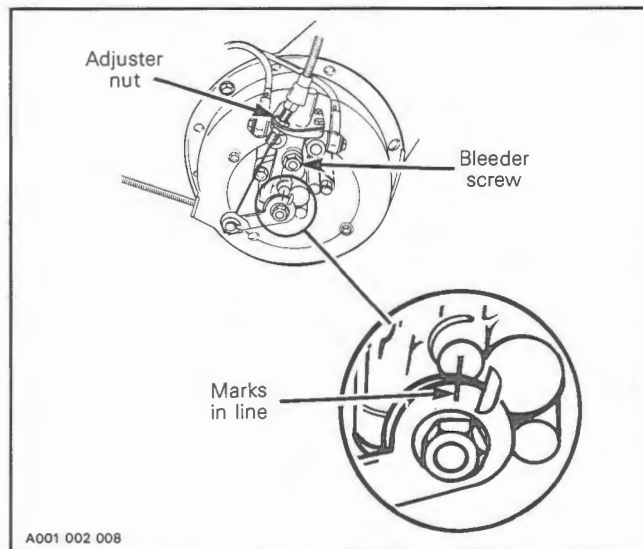
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

To synchronize pump with carburetor :

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.

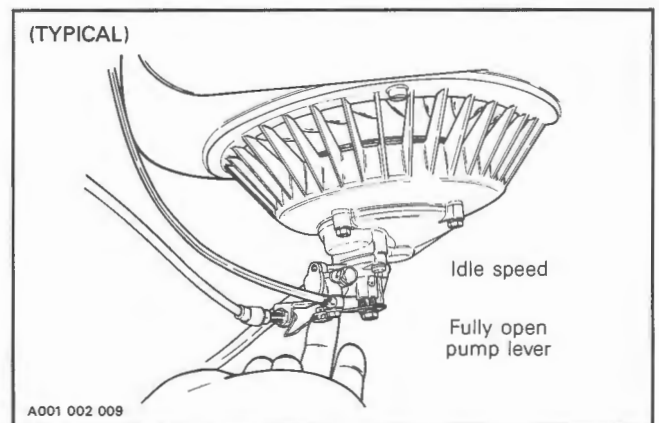


To bleed oil lines :

All oil lines should be full of oil. If required, bleed the main oil line (between tank and pump) by loosening the bleeder screw until all air has escaped from the line.

Make sure the reservoir is sufficiently filled.

Check the small oil lines (between pump and intake manifold). If required, fill the lines by running the engine at idle speed while holding the pump lever in fully open position.

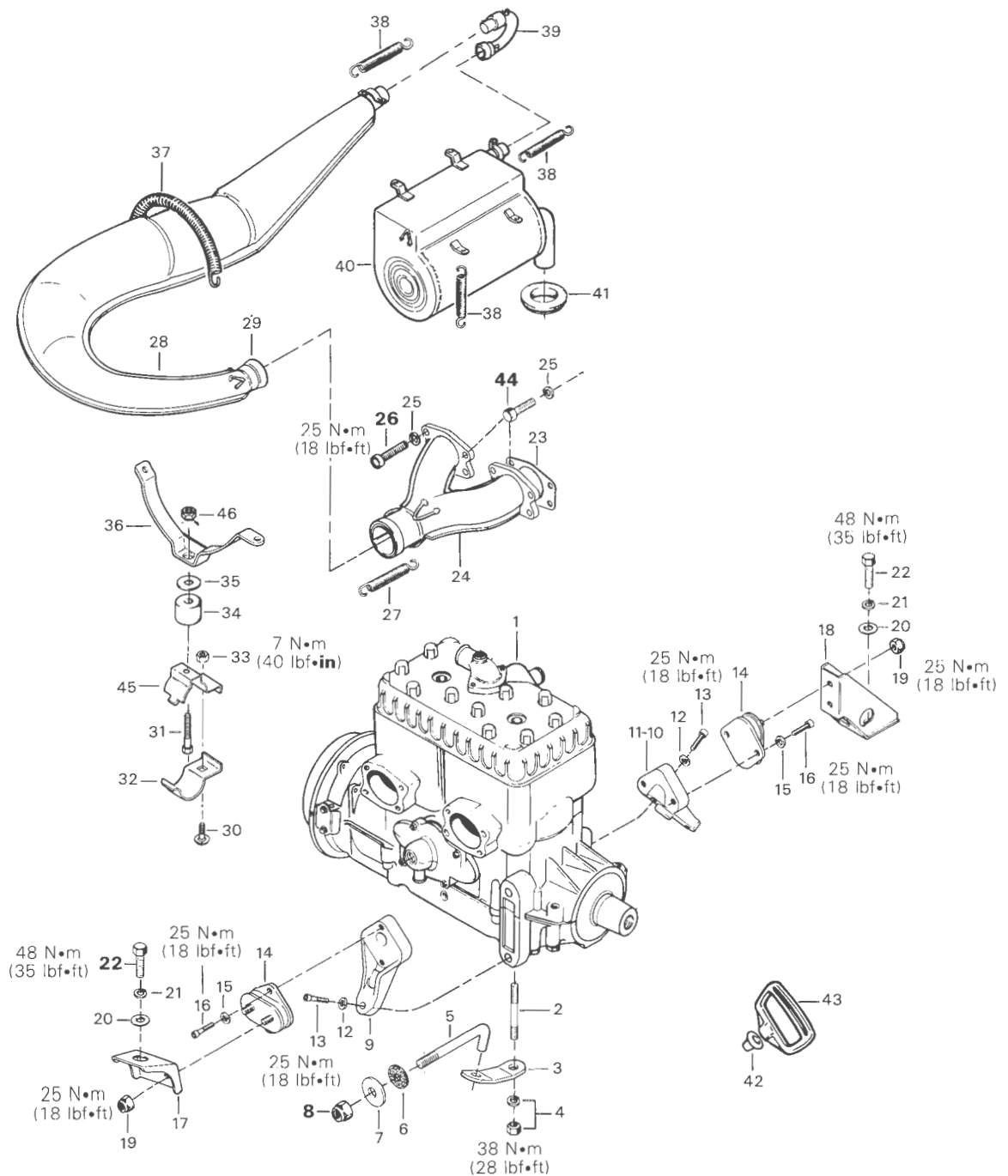


◆ **WARNING :** Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

467 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION

Engine supports & muffler



Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

- | | |
|---|---|
| 1. "467" engine | 24. Exhaust manifold |
| 2. Stud M10 x 18/18 mm | 25. Lock washer 8 mm |
| 3. Clamp | 26. Cylindrical screw M8 x 30 (6) |
| 4. Hexagonal elastic stop nut M10 | 27. Spring |
| 5. Support | 28. Single exhaust pipe |
| 6. Rubber washer | 29. Female ball joint |
| 7. Washer | 30. Hexagonal head capscrew M6 x 30 |
| 8. Hexagonal elastic stop nut M10 | 31. Carriage bolt M6 x 20 |
| 9. Front support (2) | 32. Lower bracket |
| 10. Right rear support | 33. Flanged elastic hexagonal stop nut M6 |
| 11. Left rear support | 34. Rubber spacer |
| 12. Lock washer 8 mm (8) | 35. Asbestos washer |
| 13. Allen Screw M8 x 25 (8) | 36. Exhaust pipe support |
| 14. Bounding rubber mount (4) | 37. Spring |
| 15. Lock washer 8 mm (8) | 38. Spring (6) |
| 16. Allen screw M8 x 20 (8) | 39. Tail pipe |
| 17. Front support (2) | 40. Muffler |
| 18. Rear support (2) | 41. Exhaust grommet |
| 19. Flanged hexagonal elastic stop nut M8 (8) | 42. Rubber buffer |
| 20. Lock washer (4) | 43. Starter grip |
| 21. Spring lock washer 10 mm (4) | 44. Cap screw M8 x 30 (2) |
| 22. Hexagonal head cap screw M10 x 20 (4) | 45. Upper bracket |
| 23. Gasket (2) | 46. Nut M8 |
-

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle :

- air silencer
- pulley guard and drive belt
- throttle cable from carburetors and oil injection pump
- fuel lines, impulse line and primer tubes
- ignition coil
- electrical connectors and wires
- single tuned pipe
- rewind starter
- engine torque rod nut (item #8)
- drain the cooling system and disconnect hoses from the engine (see "Cooling system" in this section)
- four screws retaining engine supports to frame

ENGINE SUPPORTS & MUFFLER DISASSEMBLY & ASSEMBLY

22,26,44, Engine support screw & manifold screw


Torque the engine supports screws to 48 N•m (35 lbf•ft).

Torque the manifold screws to 25 N•m (18 lbf•ft).

INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following :

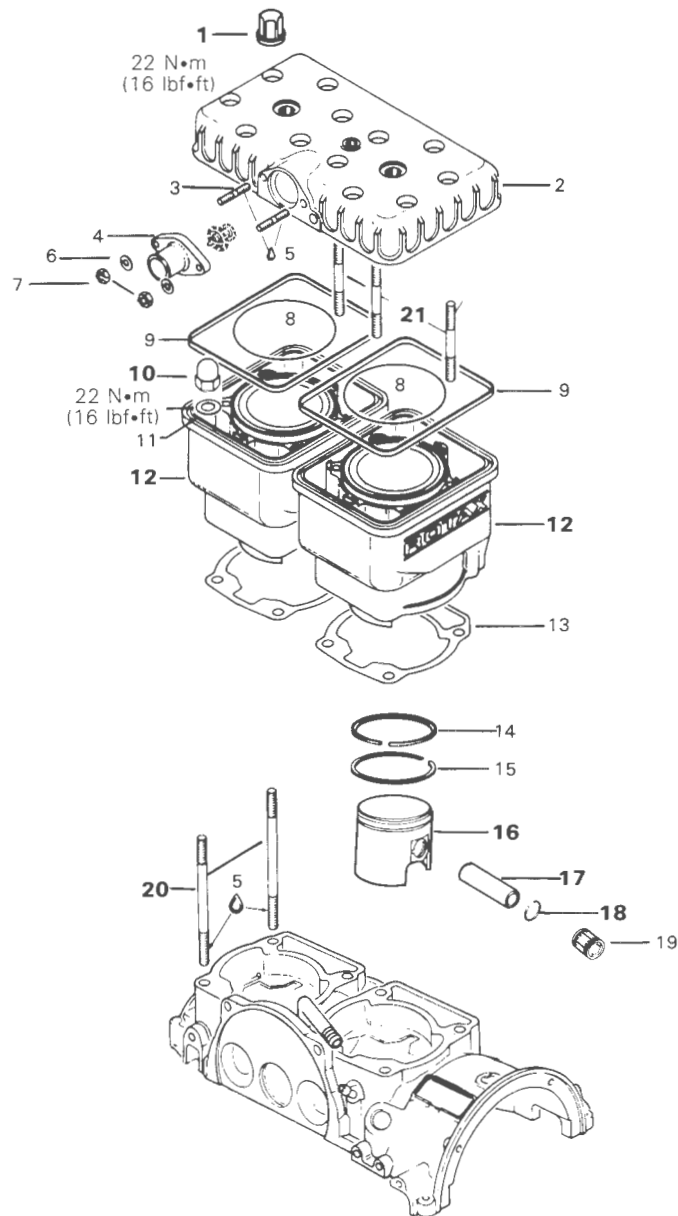
- Check tightness of engine rubber mounts screws and supports nuts. Torque to 25 N•m (18 lbf•ft).
- After throttle cable installation, check carburetor maximum throttle opening and oil injection pump adjustment.
- Check pulley alignment and drive belt tension.

 **CAUTION :** A red dot is printed on one carburetor and on oil pump mounting flange. Match the marked carburetor to the side marked on the oil pump mounting flange (magneto side). This is required because of the different jetting.

- Should as light exhaust leak be experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits should seal joint.

Section 02 ENGINE
Sub-section 04 (467 ENGINE TYPE)

TOP END



A015 002 036

- | | |
|---------------------------------------|-----------------------------------|
| 1. Cap nut M8 (12) | 12. Cylinder (2) |
| 2. Cylinder head | 13. Cylinder/crankcase gasket (2) |
| 3. Stud M6 x 15 (2) | 14. L-ring |
| 4. Coolant outlet collar | 15. Rectangular-ring |
| 5. Loctite 242 blue (medium strength) | 16. Piston |
| 6. Lock washer 6 mm (2) | 17. Piston pin |
| 7. Nut M6 (2) | 18. Circlip (4) |
| 8. Gasket (O-ring) (2) | 19. Needle bearing |
| 9. Gasket (2) | 20. Cylinder stud M8 x 79 (8) |
| 10. Cap nut M8 (8) | 21. Stud (head) M8 x 50 (2) |
| 11. Flat washer 8.4 (8) | |

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

○ **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

○ **NOTE :** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

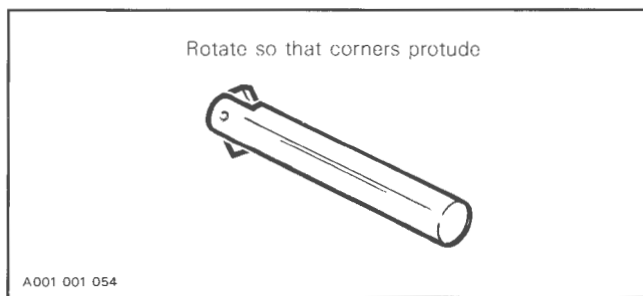
DISASSEMBLY

16,17,18, Piston, piston pin & circlip

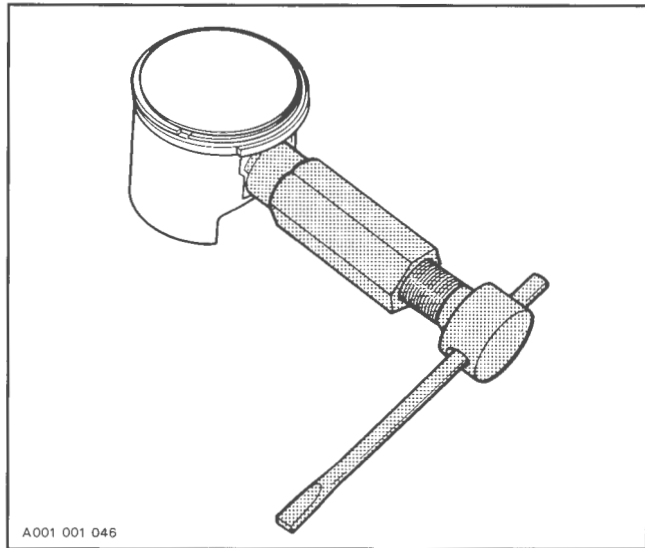
Place a clean cloth over crankcase then with a pointed tool inserted in piston notch, remove circlip from piston.

To remove piston pin, use piston pin puller (P/N 529 0068 00) as follows :

- Fully screw puller handle.
- Place stop notch of puller in line with the puller axis.
- Insert puller end into piston pin.
- Rotate stop notch of puller so that corners protude the puller end.



- Hold puller firmly and rotate puller handle counter-clockwise to pull piston pin.



○ **NOTE :** 0.25 mm oversize piston and rings are available if necessary.

INSPECTION

The inspection of the engine top end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|------------------------------|-----------------------------|----------------------|----------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Cylinder taper | N.A. | N.A. | 0.08 mm (.0031'') |
| Cylinder out of round | N.A. | N.A. | 0.05 mm (.002'') |
| Cylinder/piston clearance | 0.10 mm (.0039'') | 0.12 mm (.0047'') | 0.20 mm (.008'') |
| Ring/piston groove clearance | 0.04 mm (.002'') | 0.11 mm (.004'') | 0.20 mm (.008'') |
| Ring end gap | 0.20 mm (.008'') | 0.35 mm (.014'') | 1.0 mm (.039'') |

○ **NOTE :** For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

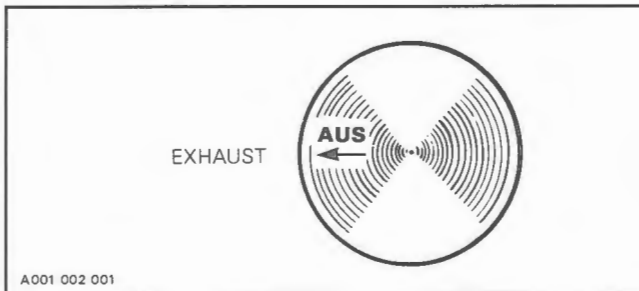
Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

ASSEMBLY

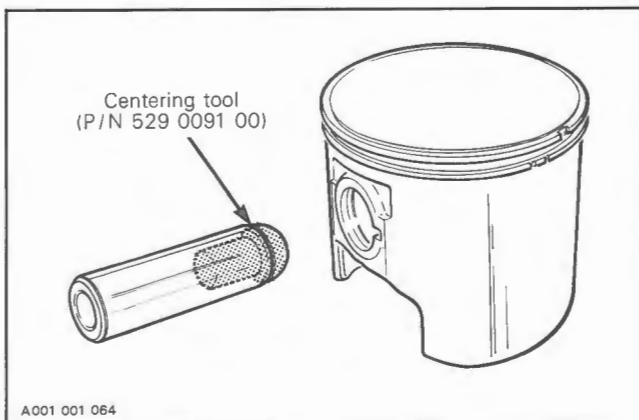
16,17,18, Piston, piston pin & circlip

At assembly, place the pistons over the connecting rods with the letters AUS (over an arrow on the piston dome) facing in direction of the exhaust port.



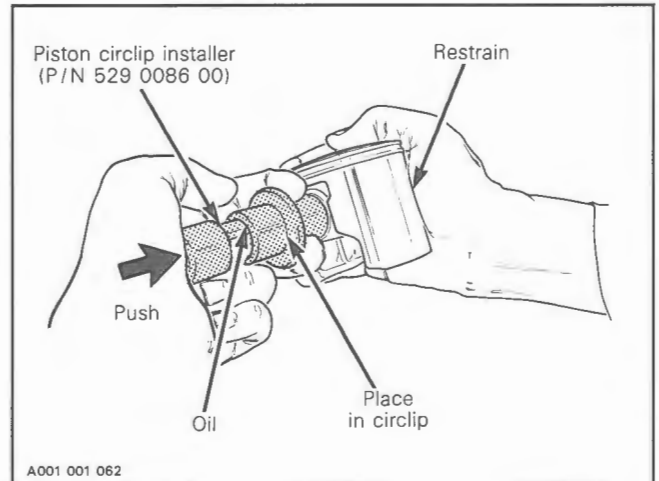
NOTE : Spare parts pistons and cylinders are identified with a green or red dot, it is important to match the piston with the cylinder of the same color.

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00).

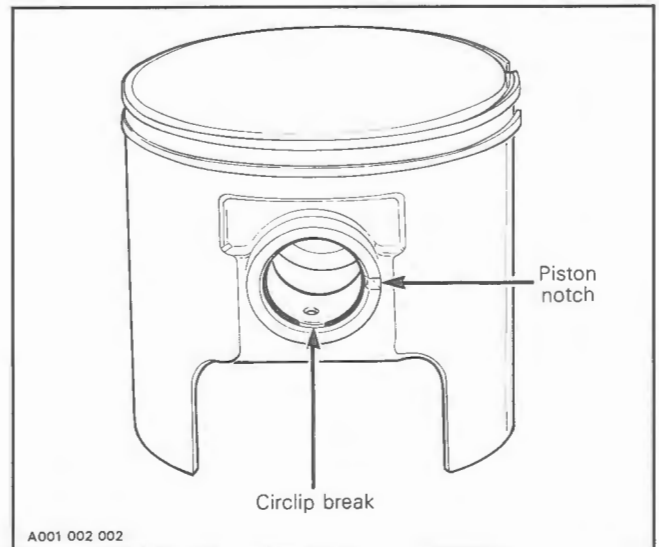


NOTE : The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at six o'clock as illustrated. Use piston circlip installer (P/N 529 0086 00).



CAUTION : Circlips must not move freely after installation if so, replace them.



Install ring compressor (P/N 420 8769 74) on piston assembly.

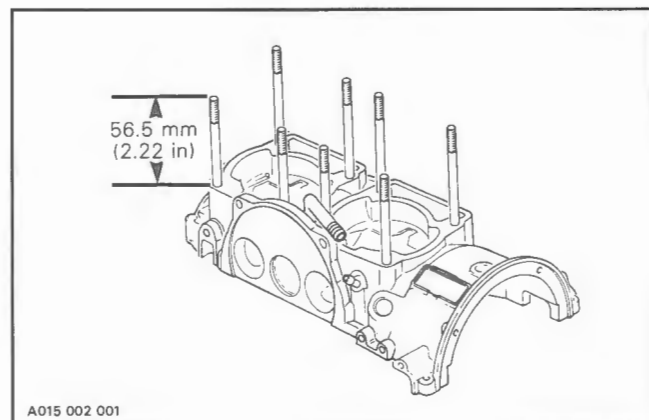
NOTE : The ring compressor will not fit on oversize pistons.

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

20, Crankcase stud

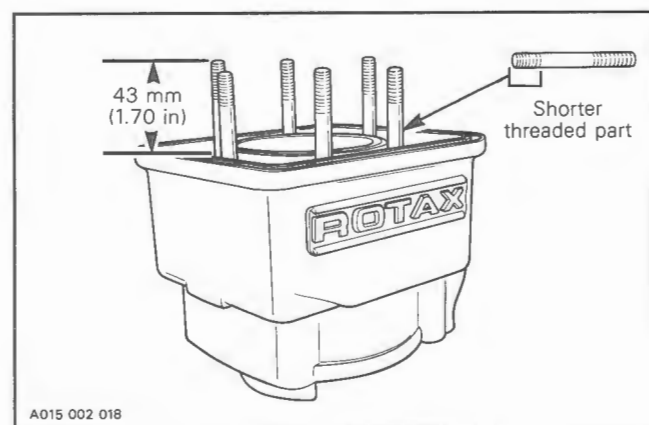
Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not protrude by more than 56.5 mm (2.22 in).



Apply Loctite 242 (blue, medium strength) on the threaded end of the studs going into the crankcase.

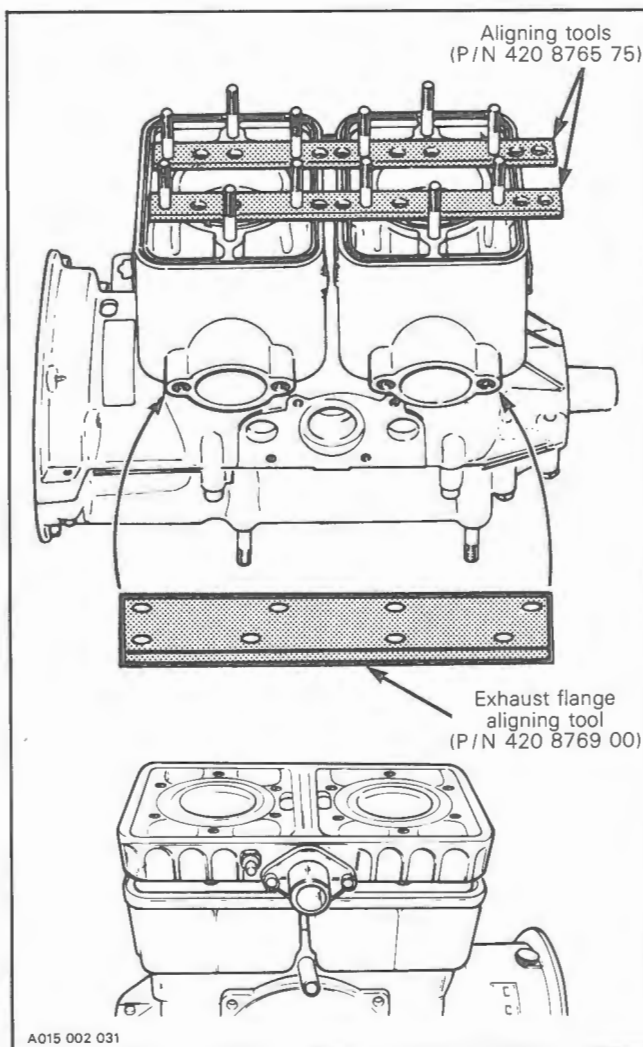
12,21, Cylinder & cylinder head stud

Because of cap nuts, cylinder head studs have to be screwed into the cylinder so that they do not protrude by more than 43 mm (1.70 in). If it is not possible to obtain this length, add a washer between cylinder head and cap nut. Shorter threaded part of stud should be screwed into cylinder.



10,12, Crankcase/cylinder nuts & cylinder

When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. Cylinder aligning tool (P/N 420 8765 75) or cylinder head itself can be used to align the cylinders. Prior to torquing crankcase cylinder nuts, install exhaust flange aligning tool (P/N 420 8769 00) or exhaust manifold itself to properly align exhaust flanges.



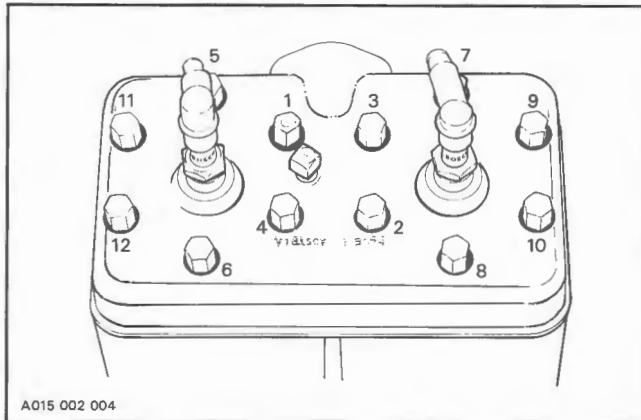
Cross torque cylinder nuts to 22 N•m (16 lbf•ft).

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

1, Cylinder head nut

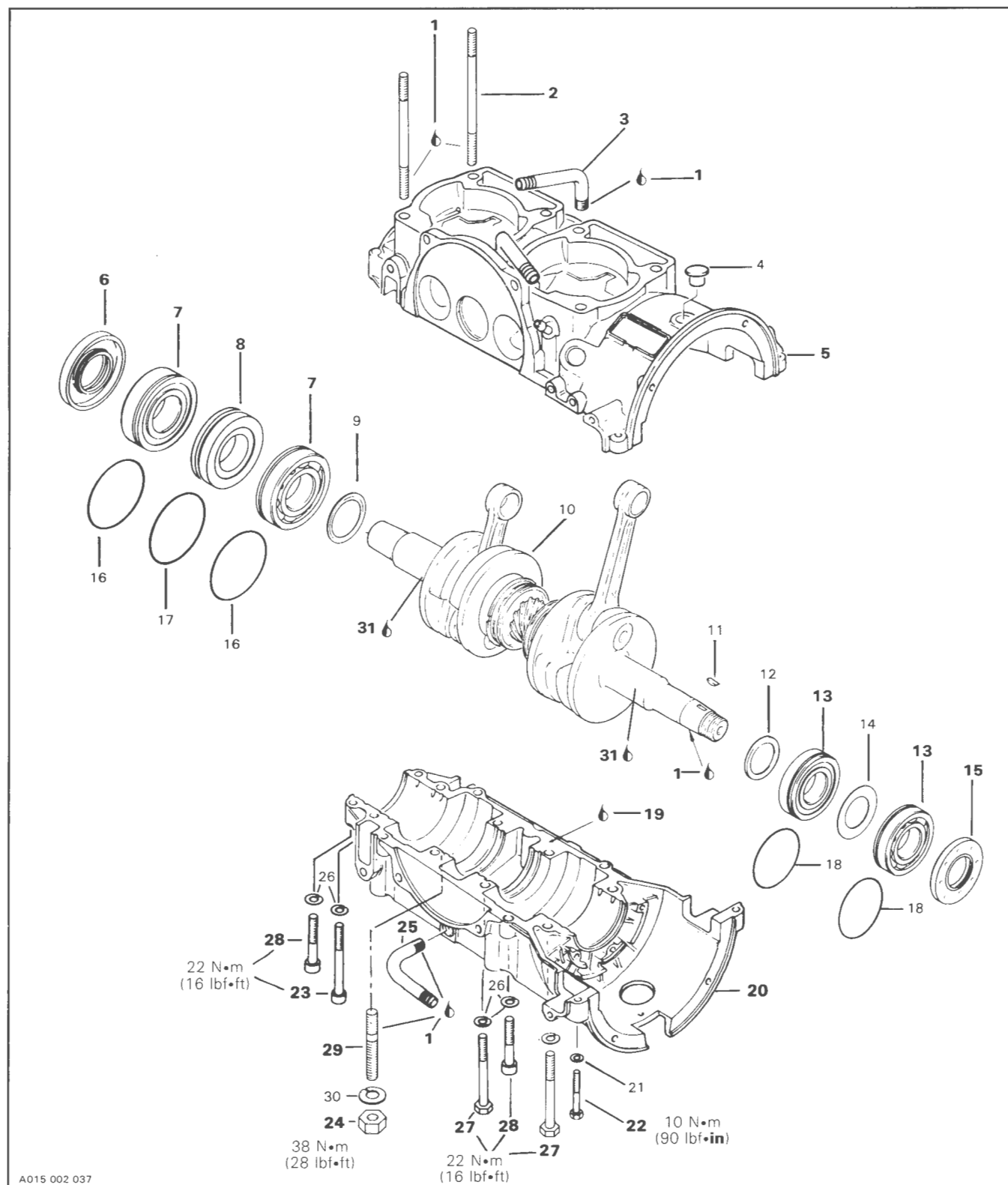
Torque cylinder head nuts to 22 N•m (16 lbf•ft) following illustrated sequence.



Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

BOTTOM END




A015 002 037

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)


1. Loctite 242
2. Stud M8 x 79 (8)
3. Angular tube, oil inlet
4. Plug
5. Crankcase upper half
6. Seal
7. Ball bearing 6207 (2)
8. Labyrinth sleeve
9. Distance ring
10. Crankshaft
11. Woodruff key 3 x 3,7
12. Distance ring
13. Ball bearing 6206 (2)
14. Shim 1 mm
15. Seal
16. O-ring (2)

17. O-ring
18. O-ring (2)
19. Loctite 515
20. Crankcase lower half
21. Lock washer 6 mm (2)
22. Hex. screw M6 x 35 (2)
23. Cylinder screw M8 x 75 (2)
24. Hexagonal nut M10
25. Angular tube, oil outlet
26. Lock washer 8 mm (10)
27. Hex. screw M8 x 65 (6)
28. Cyl. screw M8 x 45 (6)
29. Stud M10 x 42
30. Lock washer 10 mm
31. Anti-seize lubricant

 **NOTE :** Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings. Clean all metal components in a non-ferrous metal cleaner. Remove old Loctite from crankcase mating surfaces with Bombardier sealant stripper (P/N 413 7021 00).

 **CAUTION :** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

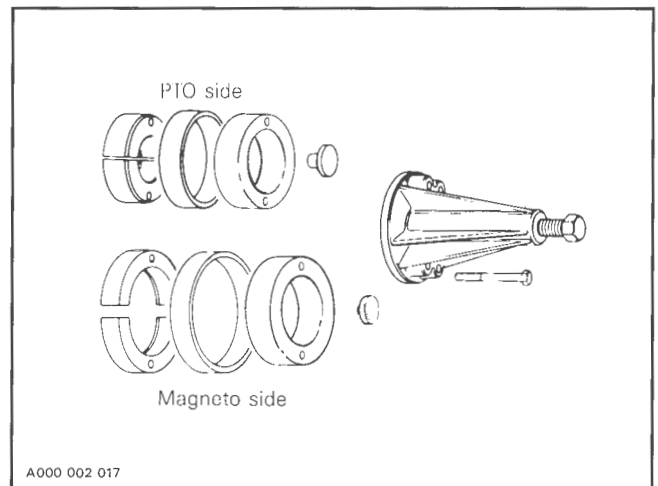
General

To remove drive pulley, refer to "Drive Pulley", section 03-03.

To remove magneto, refer to "Magneto" in this section.

7,13, Crankshaft bearing

To remove bearings from crankshaft use a protective cap and special puller as illustrated (see tools section).



INSPECTION

The inspection of the engine bottom end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | |
|-----------------------------------|--------------------------|--------------------------|-----------------|
| | FITTING NEW PARTS (MIN.) | FITTING NEW PARTS (MAX.) | WEAR LIMIT |
| Crankshaft deflection | N.A. | N.A. | 0.08 mm (.003") |
| Connecting rod big end axial play | 0.40 mm (.016") | 0.73 mm (.029") | 1.2 mm (.047") |

 **NOTE :** For the measurement procedures, refer to "Engine Dimensions Measurement", section 02-09.

Section 02 ENGINE

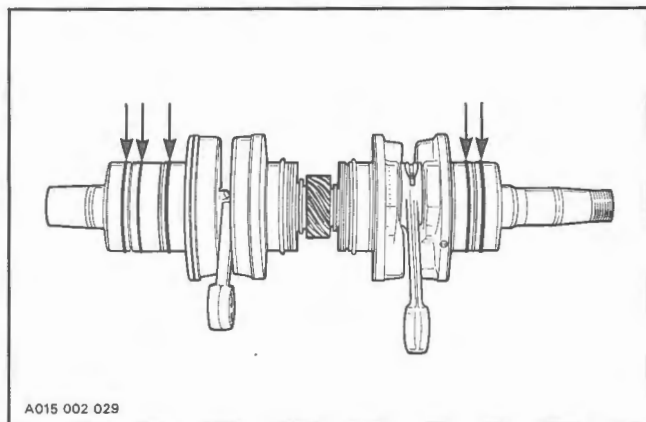
Sub-section 04 (467 ENGINE TYPE)

ASSEMBLY

7,8,13,31, Crankshaft bearing, labyrinth sleeve & anti-seize lubricant

Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with oil previously heated to 75°C (167°F). This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration.

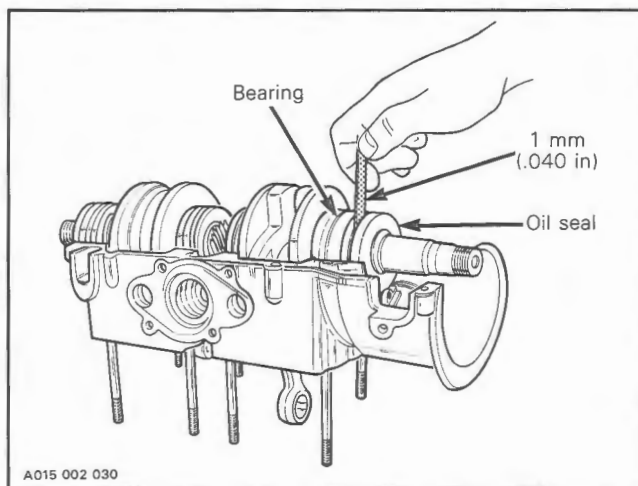


6,15, Seal

At seal assembly, apply a light coat of lithium grease on seal lips.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain seals (seal without locating ring or without spacing legs), ensure to maintain the specified gap as illustrated. For seals with spacing legs, install them against the bearing.



5,19,20, Upper crankcase, Loctite 515 & lower crankcase

Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of Loctite 515 (P/N 413 7027 00) on mating surfaces.

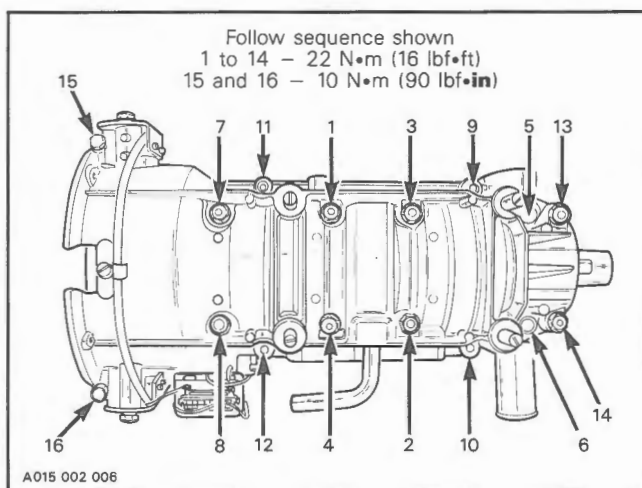
NOTE : Prior to applying Loctite 515 it is possible to use primer N (P/N 413 7053 00) or primer NF (P/N 413 7024 00). It increases cure speed and gap filling capability. Refer to supplier instructions.

CAUTION : Before joining of crankcase halves be sure that crankshaft rotary valve gear is well engaged with rotary valve shaft gear.

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

Position the crankcase halves together and tighten bolts by hand, then install and tighten armature plate on magneto side to correctly align crankcase halves. Torque bolts as specified following illustrated sequence.



NOTE : Torque the two smaller bolts (15 and 16) on magneto side to 10 N•m (90 lbf•in).

1,3,25, Loctite 242, angular tube (oil inlet & oil outlet)

Apply Loctite 242 on threads prior to assembling angular tubes.

23,27,28, Crankcase M8 screws

Torque the crankcase M8 screws to 22 N•m (16 lbf•ft). Install them as per exploded view.

22, Crankcase M6 screws

Torque the crankcase M6 screws to 10 N•m (90 lbf•in).

1,29, Loctite 242 & crankcase stud

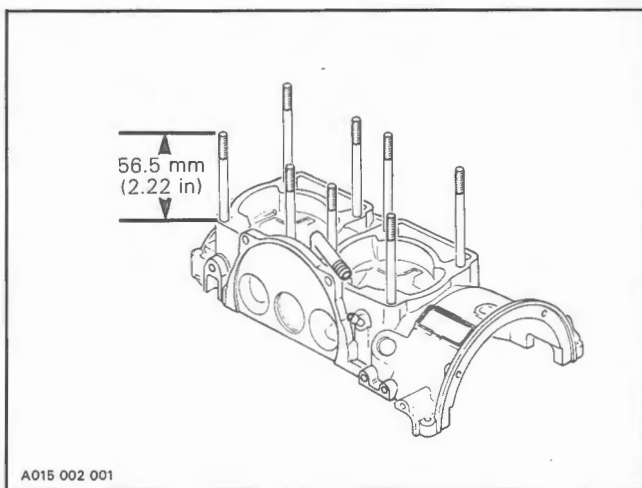
At assembly on crankcase, apply Loctite 242 on stud threads.

24, Crankcase/engine bracket nut

Torque the crankcase/engine bracket nut to 38 N•m (28 lbf•ft).

1,2, Loctite 242 & upper crankcase stud

Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not exceed further than 56.5 mm (2.22 in).



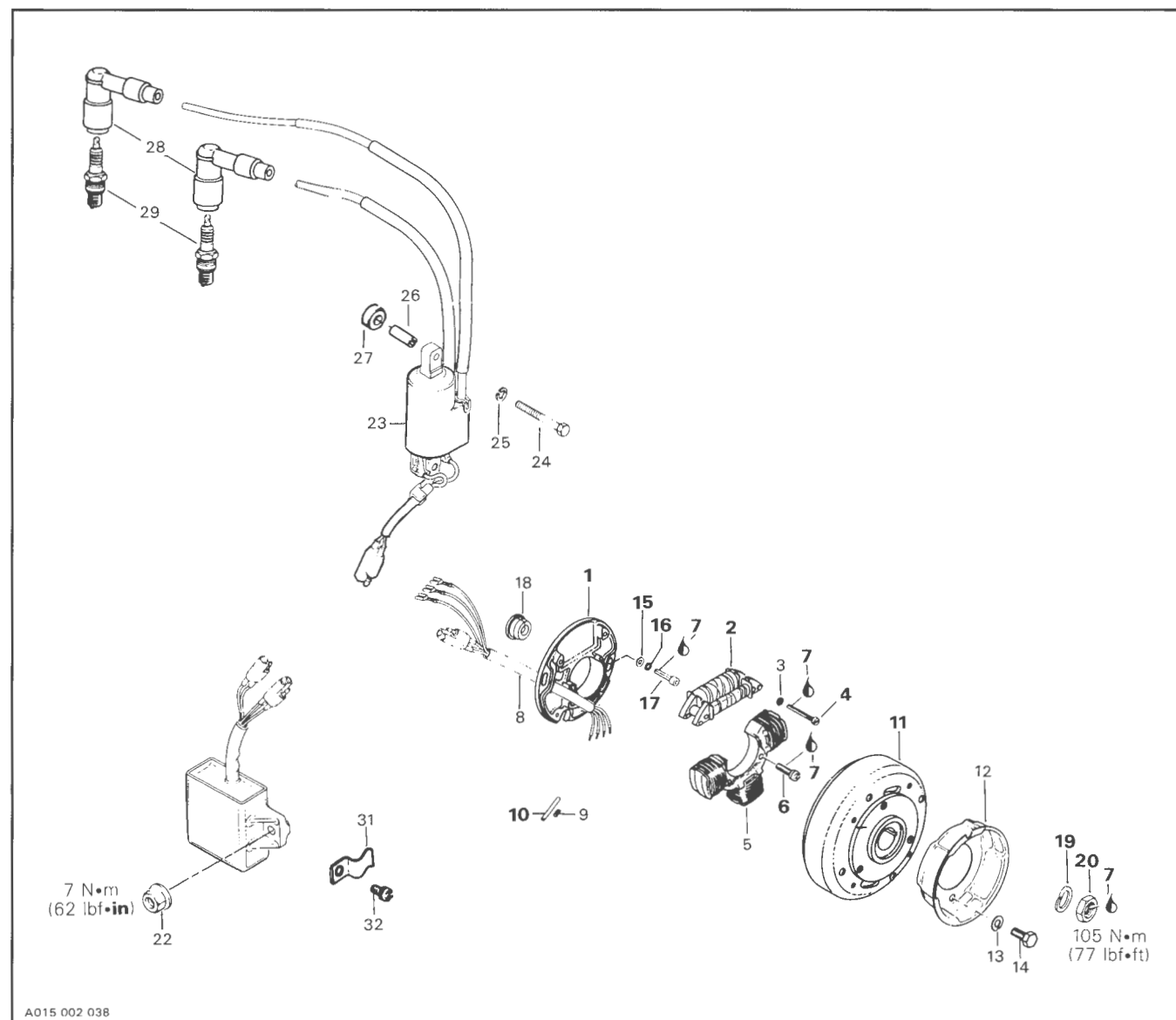
Apply Loctite 242 on the threaded end of the studs going into the crankcase.

To install magneto, refer to "Magneto" in this section.

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

MAGNETO



1. Armature plate
2. Generating coil
3. Lock washer 5 mm (2)
4. Cylindrical slotted head screw M5 x 35 (2)
5. Lighting coil
6. Screw M6 x 25 (2)
7. Loctite 242 (blue, medium strength)
8. Harness
9. Splice connector (2)
10. Protector tube (6)
11. Flywheel
12. Starting pulley
13. Lock washer 8 mm (3)
14. Hexagonal screw M8 x 16 (3)
15. Washer 5.5 mm (2)
16. Lock washer 5 mm (2)

17. Allen screw M5 x 18 (2)
18. Cable grommet
19. Lock washer 22 mm
20. Hexagonal nut 22 x 1.5 mm
21. C.D. box
22. Elastic hexagonal stop nut M6 (2)
23. Ignition coil
24. Hexagonal screw M6 x 85 (2)
25. Lock washer 6 mm (2)
26. Spacer (2)
27. Isolator
28. Spark plug protector (2)
29. Spark plug (2)
30. Clamp
31. Screw M4 x 8 mm

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

○ **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION :** Clean armature and magneto using only a clean cloth.

DISASSEMBLY

To gain access to magneto assembly, remove :

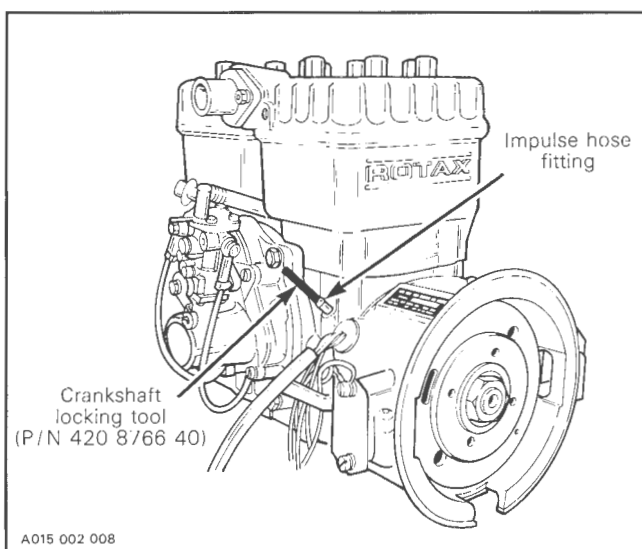
- muffler
- rewind starter
- starting pulley

○ **NOTE :** Before disassembling magneto plate, indexing marks should be scribed to facilitate reassembly.

20, Flywheel retaining nut

To remove magneto flywheel retaining nut :

- Lock crankshaft with crankshaft locking tool (P/N 420 8766 40) as illustrated (magneto side piston must be at top dead center).
- Remove magneto retaining nut.

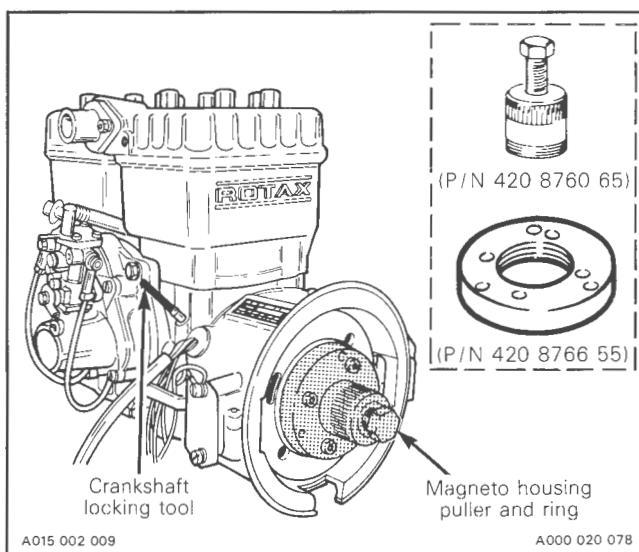


○ **NOTE :** It should be noted that to correctly remove a Loctite locked fastener it is first necessary to tap on the fastener to break "Loctite" bond. This will eliminate the possibility of thread breakage.

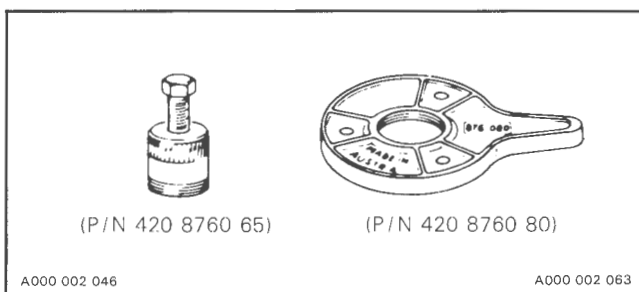
11, Flywheel

To remove magneto housing (flywheel) :

- Lock crankshaft with crankshaft locking tool as illustrated.
- Adjust magneto housing puller (P/N 420 8760 65) and puller ring (P/N 420 8766 55) as illustrated.



○ **NOTE :** For the above procedure, the locking type puller (P/N 420 8760 80) can be used without crankshaft locking tool.



- Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

Section 02 ENGINE

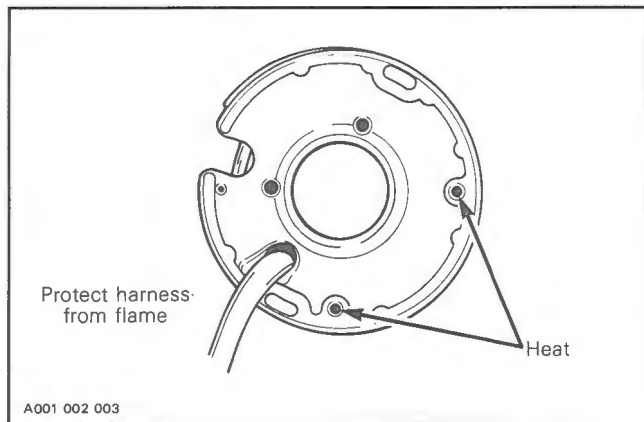
Sub-section 04 (467 ENGINE TYPE)

REPAIR

2, Generating coil

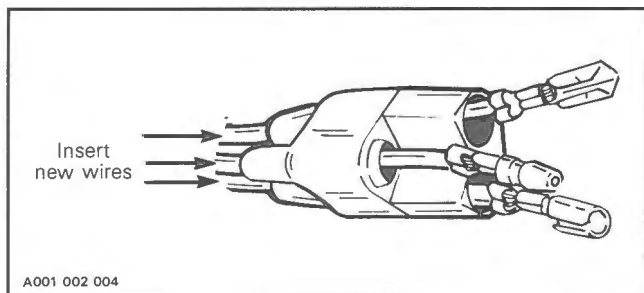
To replace generating coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



CAUTION : Protect harness from flame.

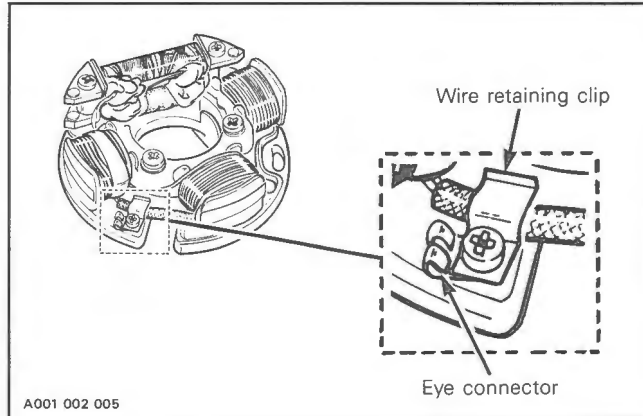
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector housing and install connectors.



CAUTION : Replace the old wires in the connector with the same color coded new wires.

- Install a new receptacle connector to the black / yellow striped wire.

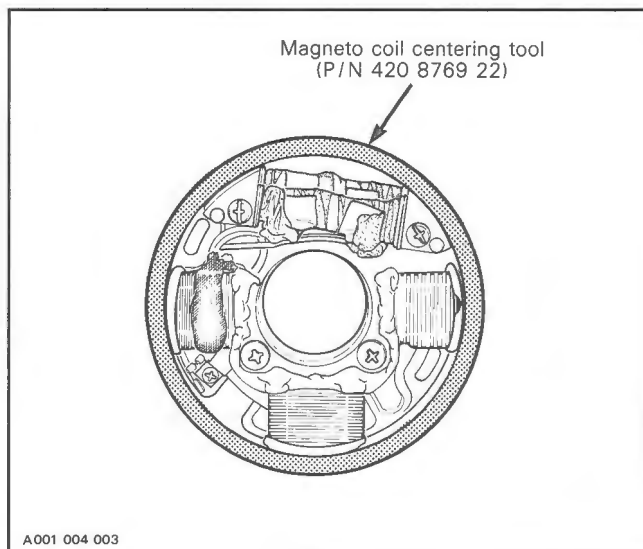
- To install the ground connector to the armature plate, tape the new black lead to the old one and pull it under the lighting coil with the old wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.



4,7, Generating coil screw & Loctite 242

- To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



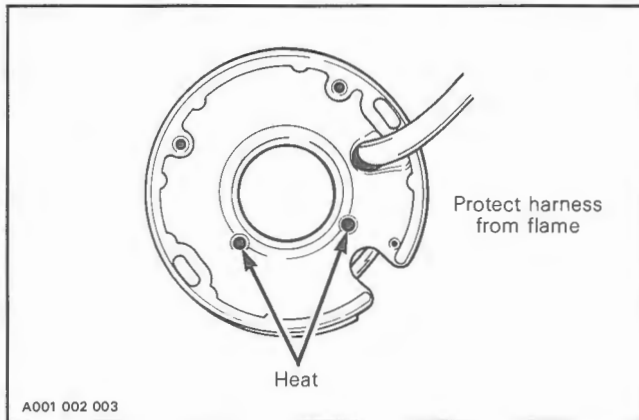
Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

▼ **CAUTION :** Before reinstalling the magneto, remove the loose epoxy from harness.

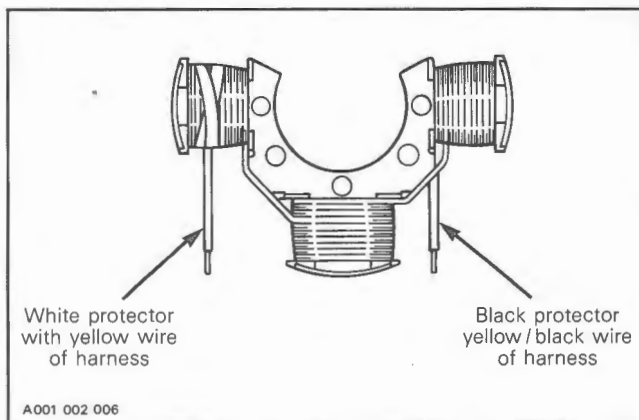
To replace lighting coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



▼ **CAUTION :** Protect harness from flame.

- Remove screws (use Phillips no. 3 screwdriver).
- Remove the wire retaining clip from armature plate.
- Pull out protector tubes and unsolder the splice connectors.
- Solder the yellow wire in the harness to the white tube protected wire of the coil.
- Solder the yellow / black striped wire in the harness to the black tube protected wire of the coil.



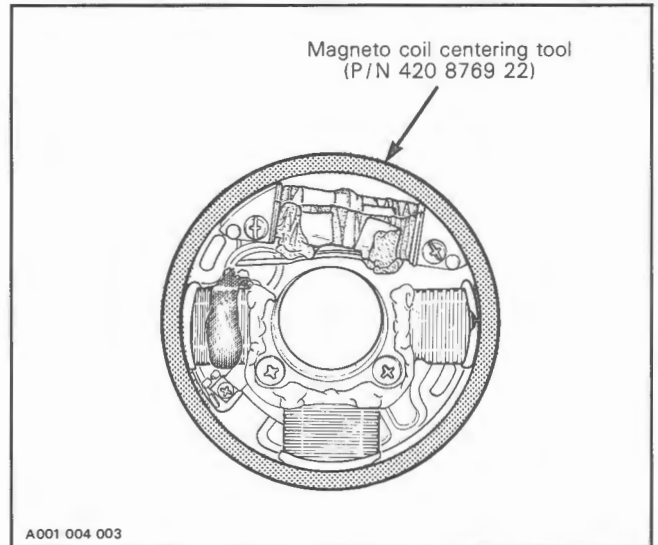
10, Protector tube

- Position protector tubes over connections.

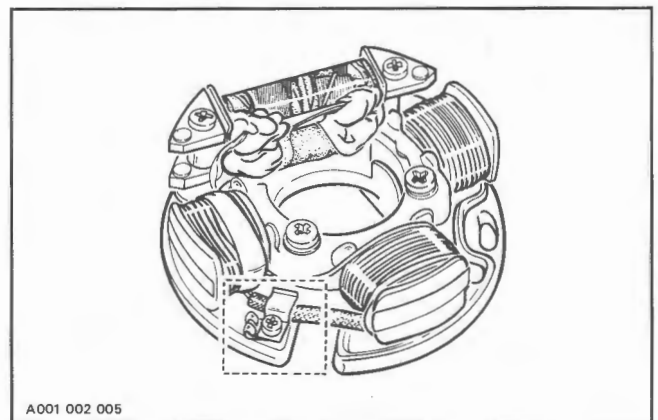
6,7, Lighting coil screw & Loctite 242

- Prior to assembly, apply Loctite 242 (blue, medium strength).

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



- Fasten retaining clip onto protector tubes.
- The ground terminal from generating coil must be fastened under this clip.



▼ **CAUTION :** Before reinstalling magneto, remove the loose epoxy from harness.

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

ASSEMBLY

1,7,15,16,17, Armature plate, Loctite 242, washer, lock washer & screw

Position the armature plate on the crankcase, aligning the marks on both parts.

Put a drop of Loctite 242 on screw threads and tighten.

Clean crankshaft extension (taper).

Apply Loctite 242 on taper.

7,11,19,20, Loctite 242, flywheel, lock washer & nut

Position woodruff key, magneto flywheel and lock washer on crankshaft.

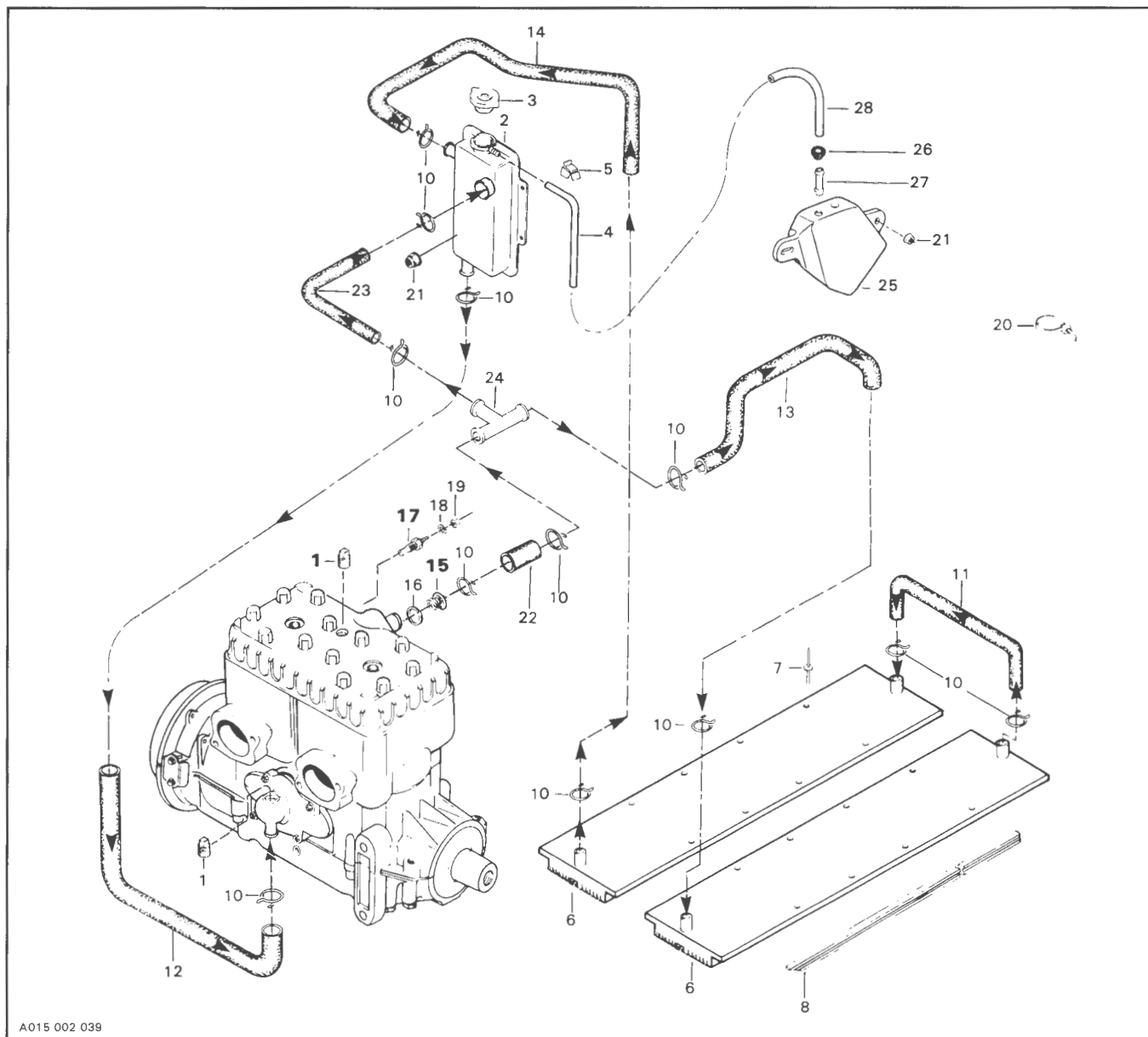
Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 105 N•m (77 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 7017 00) to prevent corrosion or moisture penetration.

▼ **CAUTION :** Do not use silicone "sealant", this product will corrode contacts.

○ **NOTE :** For ignition timing procedure refer to "Ignition Timing" section 04-02.

COOLING SYSTEM



A015 002 039

- | | |
|---|--------------------|
| 1. Plug | 15. Thermostat |
| 2. Coolant tank | 16. Sealing ring |
| 3. Pressure cap | 17. Sender |
| 4. Overflow hose 20 in (510 mm) | 18. Lock washer |
| 5. Clip | 19. Hexagonal nut |
| 6. Radiator (2) | 20. Tie rap |
| 7. Rivet | 21. Nut (2) |
| 8. Radiator protector (2) | 22. Hose |
| 9. Hexagonal tapite washer head screw M5 x 15 (2) | 23. Hose |
| 10. Hose clamp (12) | 24. Tee |
| 11. U-Hose | 25. Overflow tank |
| 12. Engine inlet hose | 26. Grommet |
| 13. Radiator inlet hose | 27. Male connector |
| 14. Radiator outlet hose | 28. Overflow hose |

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

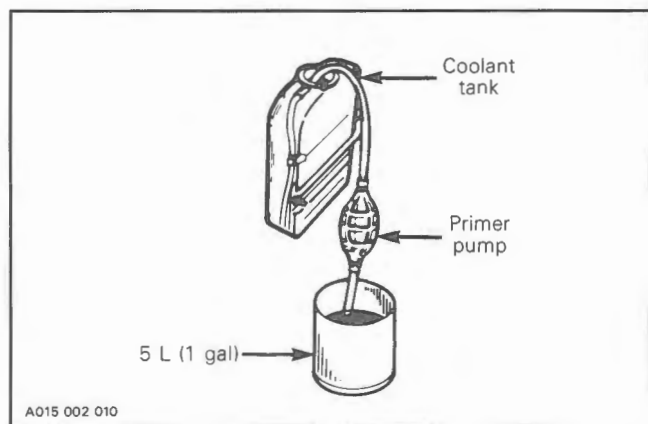
INSPECTION

Check general condition of hoses and clamp tightness.

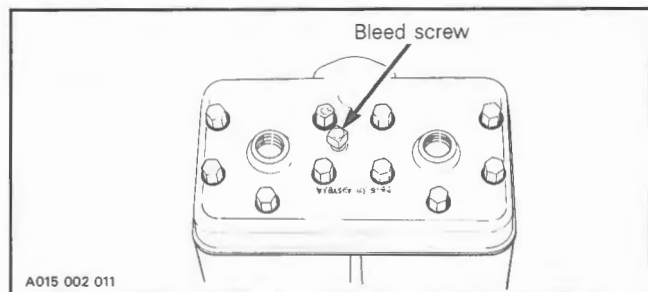
DRAINING THE SYSTEM

◆ **WARNING :** Never drain or refill the cooling system when engine is hot.

To drain the cooling system, siphon the coolant mixture from the coolant tank, using a primer pump and a length of plastic hose and steel tubing inserted as deep as possible into the lower hose of the tank.



When the coolant level is low enough, remove the engine bleed screw and lift the rear of vehicle to drain the heat exchangers.



DISASSEMBLY & ASSEMBLY

1,17, Plug & sender

Apply thread sealant on sender and plug to avoid leaks.

3, Pressure cap

Check if the cap pressurizes the system. If not, install a new 90 kPa (13 PSI) cap, (do not exceed this pressure).

15, Thermostat

To check thermostat, put in water and heat water. Thermostat should open when water temperature reaches 43°C (110°F).

Install the hole in thermostat on top of the housing.

REFILLING THE SYSTEM

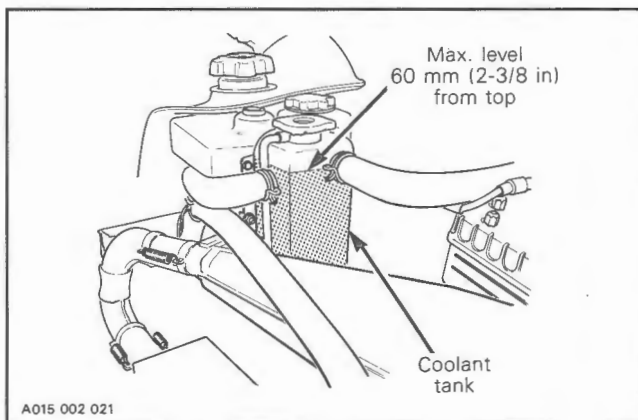
Capacity :

Approximately 4.2 liters (148 imp. oz, 142 U.S. oz)
60% antifreeze + 40% water

▼ **CAUTION :** To prevent rust formation or freezing condition, always replenish the system with 60% antifreeze and 40% water. Pure antifreeze without water produces premature freezing. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

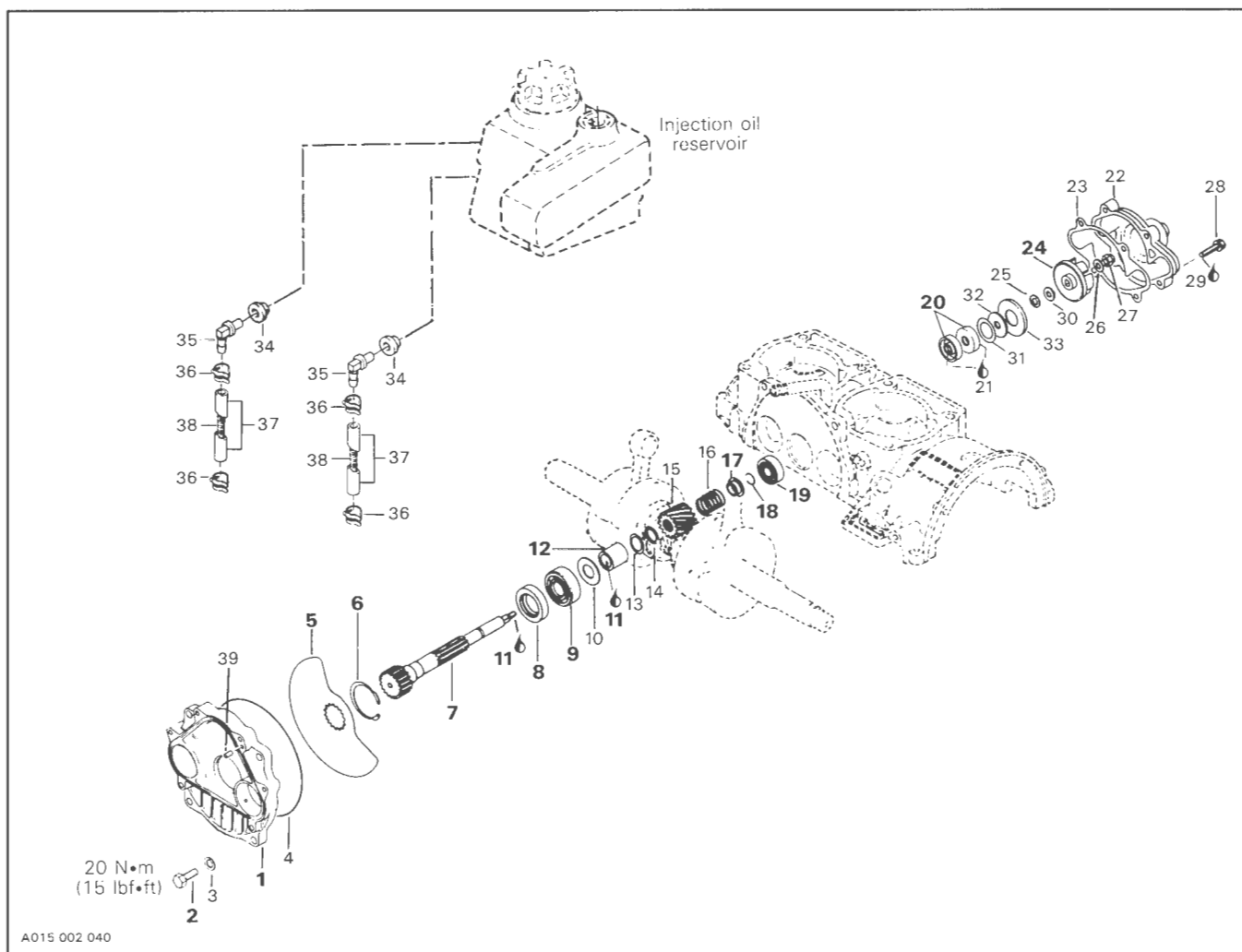
To refill cooling system :

- Put back the rear of vehicle on the ground.
- Refill coolant tank slowly until coolant overfills at bleed hole.
- Reinstall bleed screw.
- Continue to pour coolant in the tank until level reaches 60 mm (2-3/8 in) below top of reservoir (engine cold).



- With the coolant tank cap still removed, start engine and let it warm up to reach its normal operating temperature and thermostat open. Allow it running a few minutes more.
- Stop engine and check coolant freezing point with a suitable tester. Coolant should be strong enough for the temperature in which the vehicle is operated.
- Recheck coolant level and add liquid if required. Put back the tank cap.

ROTARY VALVE, COOLANT PUMP & RESERVOIR



1. Rotary valve cover
2. Bolt M8 x 20 (4)
3. Lock washer 8 mm (4)
4. O-ring
5. Rotary valve
6. Circlip
7. Rotary valve shaft
8. Seal
9. Bearing 6203
10. Shim 0.5 mm
11. Loctite RC 609
12. Distance sleeve 24.5 mm
13. Shim 0.5 mm
14. O-ring
15. Gear
16. Spring
17. Spring retaining cup
18. Circlip
19. Bearing 6201
20. Seal (2)

21. Lithium grease
22. Pump housing
23. Gasket
24. Pump impeller
25. Washer 8.1 mm
26. Washer 6.4 mm
27. Nut M6
28. Bolt M6 x 25 (4)
29. Loctite 242
30. Friction washer
31. Shim 0.5 mm
32. Rubber washer
33. Supporting plate
34. Isolating washer (2)
35. Elbow connector (2)
36. Hose clamp (6)
37. Oil line 7.75 in (196 mm) (2)
38. Spring
39. Pin

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

CLEANING

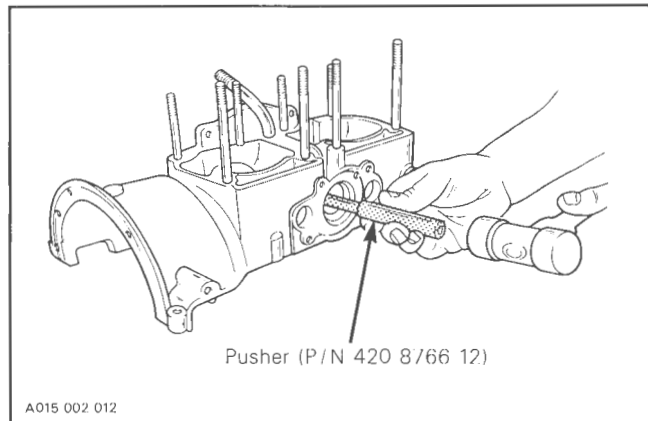
Discard all seals and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY AND ASSEMBLY

6,24, Circlip & pump impeller

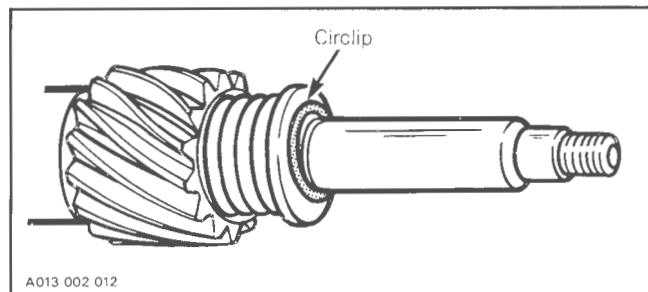
To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip. Using the suitable pusher (P/N 420 8766 12) and a fiber hammer, push shaft assembly.



▼ **CAUTION:** To prevent damage to the end of the rotary valve shaft, use suitable pusher.

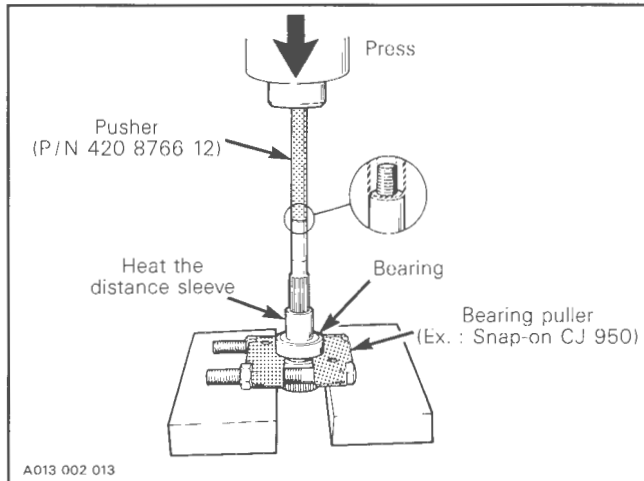
17,18, Spring retaining cup & circlip

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup in order to remove circlip.



11,12, Loctite RC 609 & distance sleeve

To remove the distance sleeve use a bearing puller (Ex. : Snap-on no. CJ 950) and pusher (P/N 420 8766 12) as illustrated. Heat the distance sleeve to 93°C (200°F) to break the Loctite bond and proceed as illustrated.

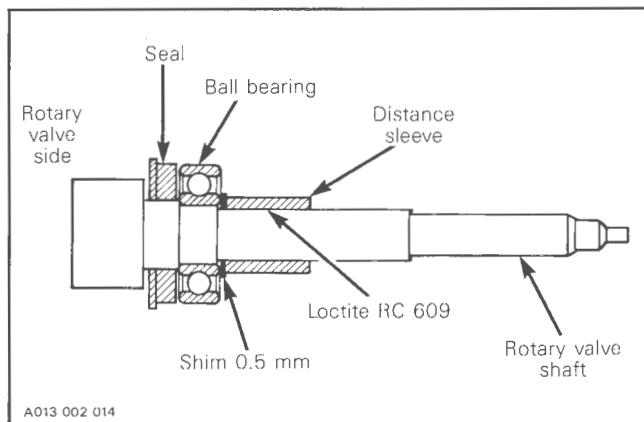


▼ **CAUTION :** Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

Clean rotary valve shaft and inside of distance sleeve. At assembly apply Loctite RC 609 inside of distance sleeve.

7,8, Rotary valve shaft & seal

At assembly apply lithium grease on seal lips. Position the seal with shielded portion towards rotary valve.

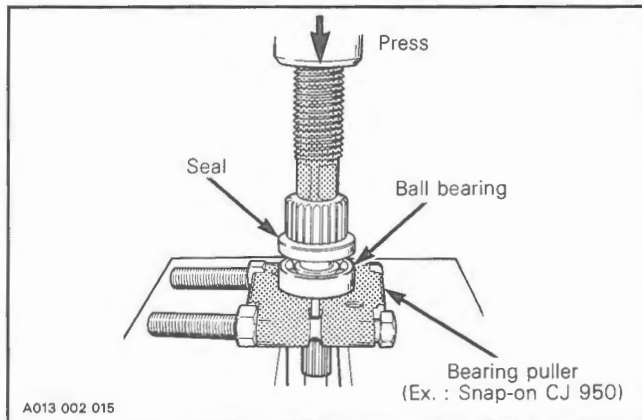


Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

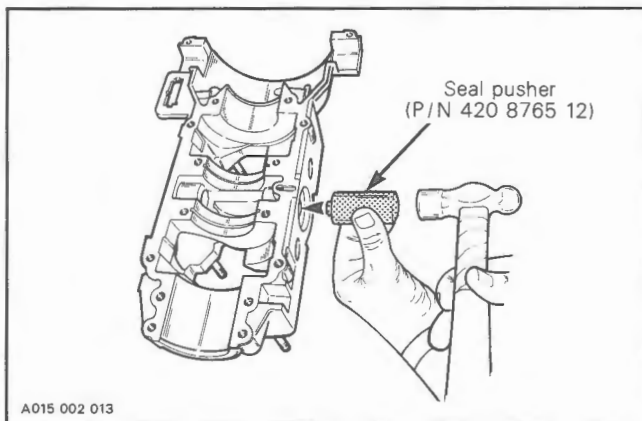
7,9, Rotary valve shaft & bearing 6203

Install ball bearing as illustrated.

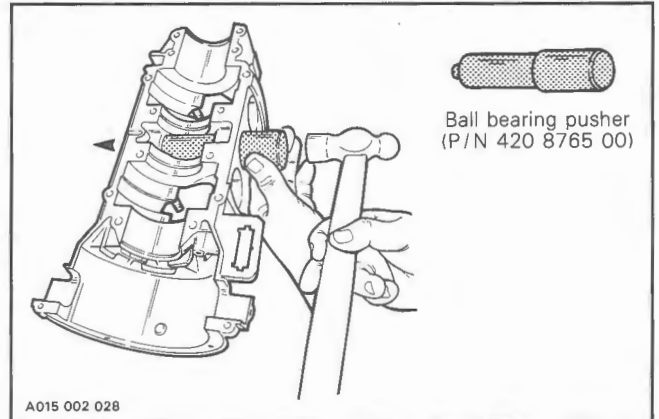


19,20,31,32, Bearing 6201, seals, shim & rubber washer

To remove bearing 6201 (the smallest one), shim and rubber washer, use seal pusher (P/N 420 8765 12).



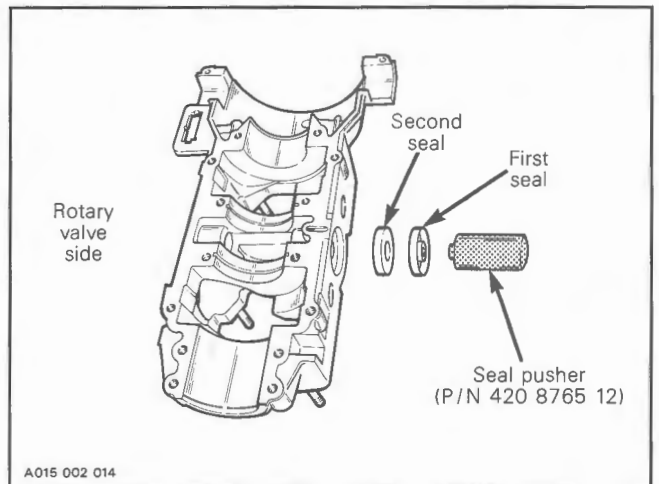
To install ball bearing 6201 use ball bearing pusher (P/N 420 8765 00).



NOTE : Ball bearing shielded side must be facing rotary valve.

20,31,32, Seal, shim & rubber washer

To install seals on water pump side proceed as follows :

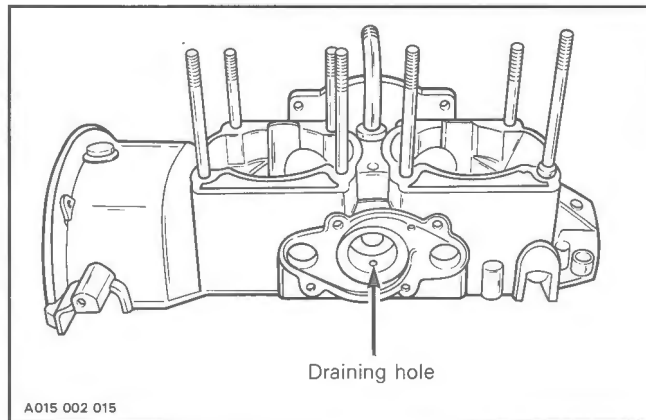


Apply some lithium grease or equivalent on lip of both seals. Position second seal shielded portion towards water pump side. Drive in place with seal pusher (P/N 420 8765 12). Install first seal with its shielded portion towards rotary valve side. Make sure not to obstruct draining hole. Install shim and pack space between seal and rubber washer with lithium grease then install rubber washer.

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

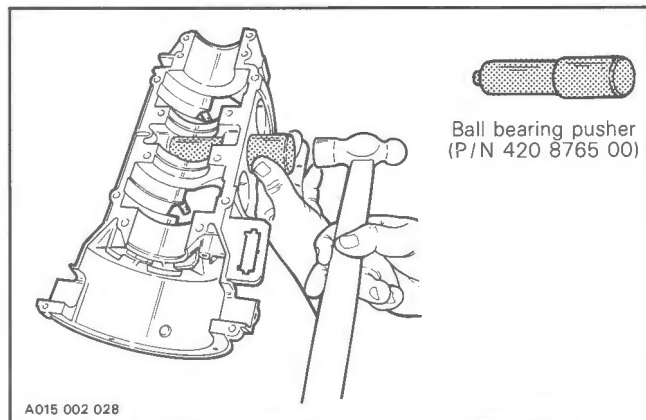
○ **NOTE :** The draining hole is used to detect seal malfunctions. If you notice oil, or coolant at the exit of the draining hole, this mean that oil seal or coolant seal leaks.



▼ **CAUTION :** Failure to position the seals as specified may provoke the seal spring to be corroded by coolant. Severe damages will occur if these notices are disregarded.

19,20,21, Bearing 6201, seal & distance ring

○ **NOTE :** After seals installation, check if the water pump end bearing is correctly positioned with ball bearing pusher (P/N 420 8765 00).

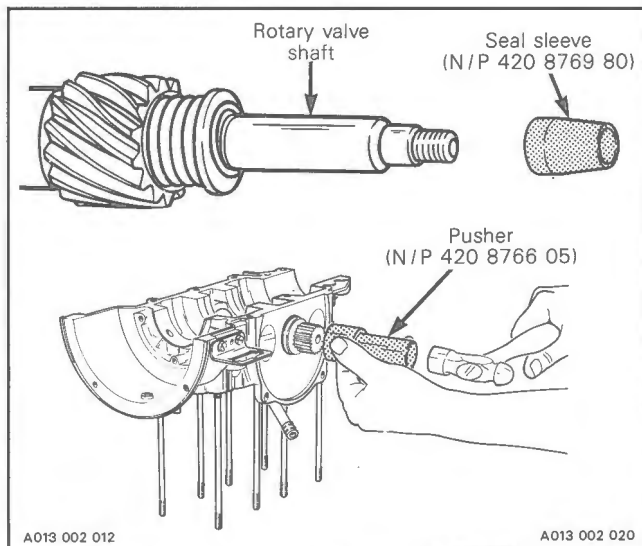


7, Rotary valve shaft

To install rotary valve shaft proceed as follow with the suitable tools :

— pusher (P/N 420 8766 05)

— water pump seal sleeve (P/N 420 8769 80)



28,29, Pump housing bolt & Loctite 242

Apply Loctite 242 on bolt thread.

5, Rotary valve

Installation on genuine crankcase with mark (ridge)



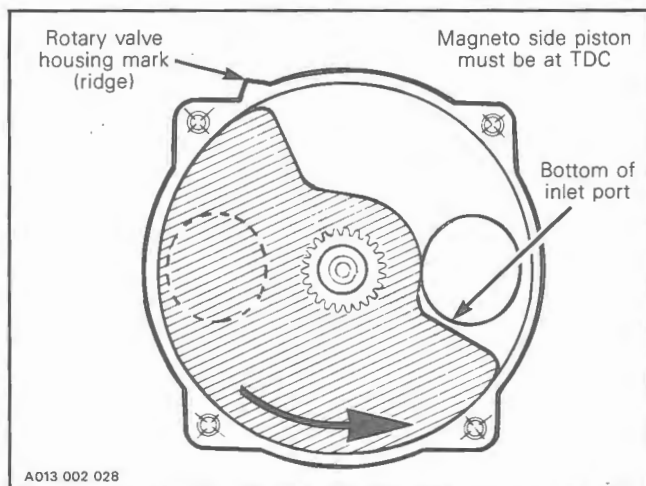
To correctly install the rotary valve, proceed as follows :

- Turning crankshaft counterclockwise, (drive pulley side) bring magneto side piston close to Top Dead Center. Insert crankshaft locking tool while turning crankshaft. When the crankshaft stops it is the right position.
- Position the rotary valve on gear in such a way that its closing edge will be as close as possible to the **bottom** of the magneto side inlet port, and its opening edge in line with the mark (ridge) on the upper left side of the rotary valve housing.

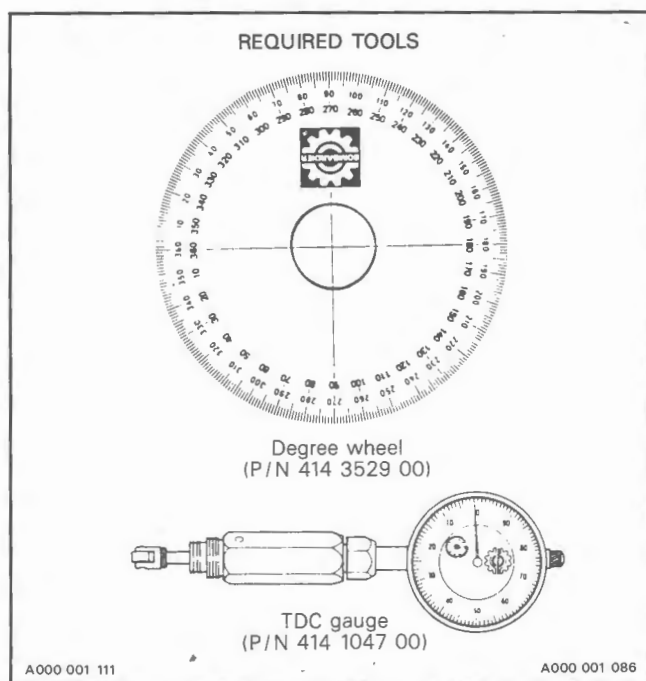
Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

○ **NOTE :** The rotary valve is asymmetrical, therefore, at assembly try positioning each side of it on gear to determine best installation position.



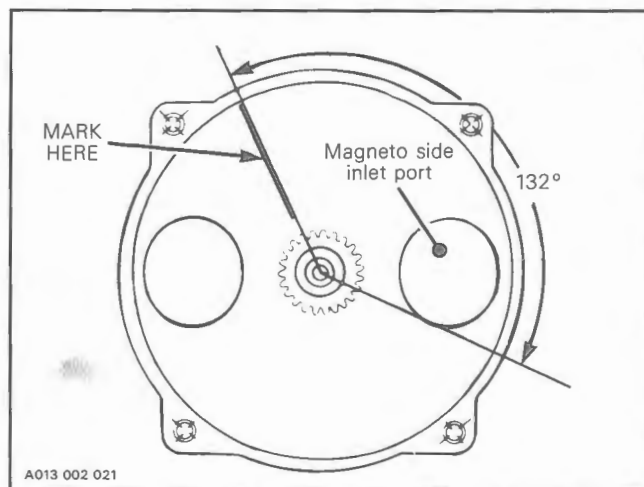
Installation on spare crankcase without mark (ridge)



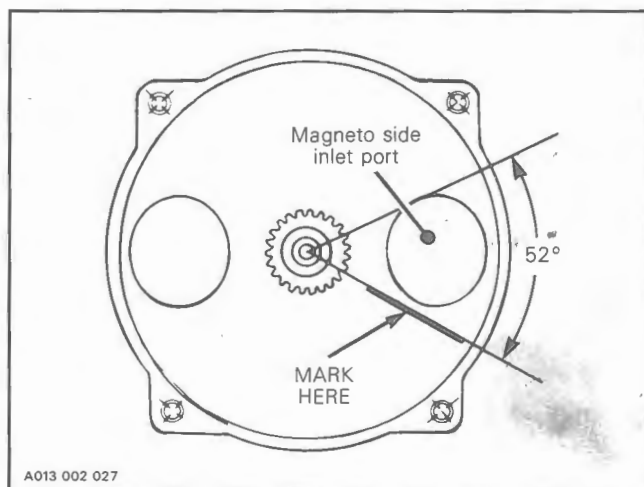
| ENGINE TYPE | TIMING MARKS opening, closing |
|-------------|----------------------------------|
| 467 | 132°, 52° |

For example : 132° opening
52° closing

Using angle finder, mark crankcase at 132° from **bottom** edge of magneto side inlet port.



From **top** edge of magneto side inlet port, mark crankcase at 52°.



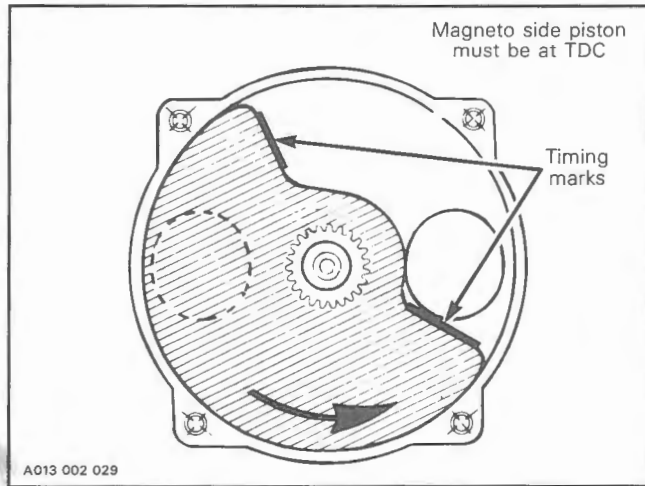
To correctly install the rotary valve disc proceed as follows :

- Turning crankshaft counter-clockwise, (drive pulley side) bring magneto side piston to Top Dead Center using a TDC gauge.
- Position the rotary valve disc on gear to have edges as close as possible to the marks.

○ **NOTE :** The rotary valve disc is asymmetrical, therefore, at assembly, try positioning each side of disc on gear to determine best installation position.

Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)



Spray some injection oil on rotary valve before closing the rotary valve cover.

2, Rotary valve cover bolt

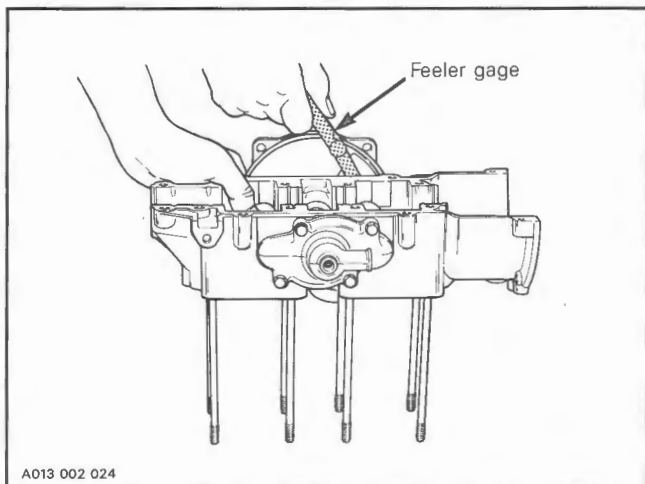
The rotary valve cover bolts must be torqued to 20 N•m (15 lbf•ft).

INSPECTION

1,5, Rotary valve cover & rotary valve

A gap of 0.27 - 0.48 mm (.011 in - .019 in) must be maintained between the rotary valve and the crankcase.

To measure this gap use a feeler gage inserted between rotary valve and upper crankcase with the rotary valve cover in place **without its O-ring**. Check the more surface as possible. Follow the same procedure for the lower crankcase.



7,15 Rotary valve shaft & gear

Backlash check

Engine do not have to be overhauled to check backlash of crankshaft and rotary valve shaft gears. Remove spark plugs, cover and rotary valve.

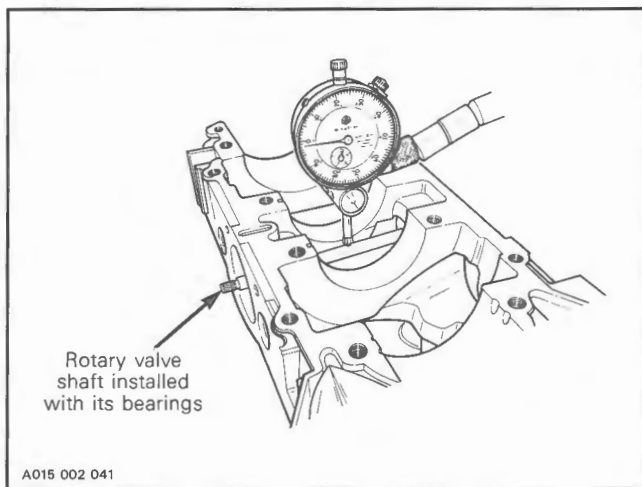
Check backlash at one position then turn crankshaft about 1/8 turn and recheck. Continue this way to complete one revolution.

Backlash must be even at all positions. Otherwise, overhaul engine to find which part is faulty (gear, rotary valve shaft or crankshaft with excessive deflection).

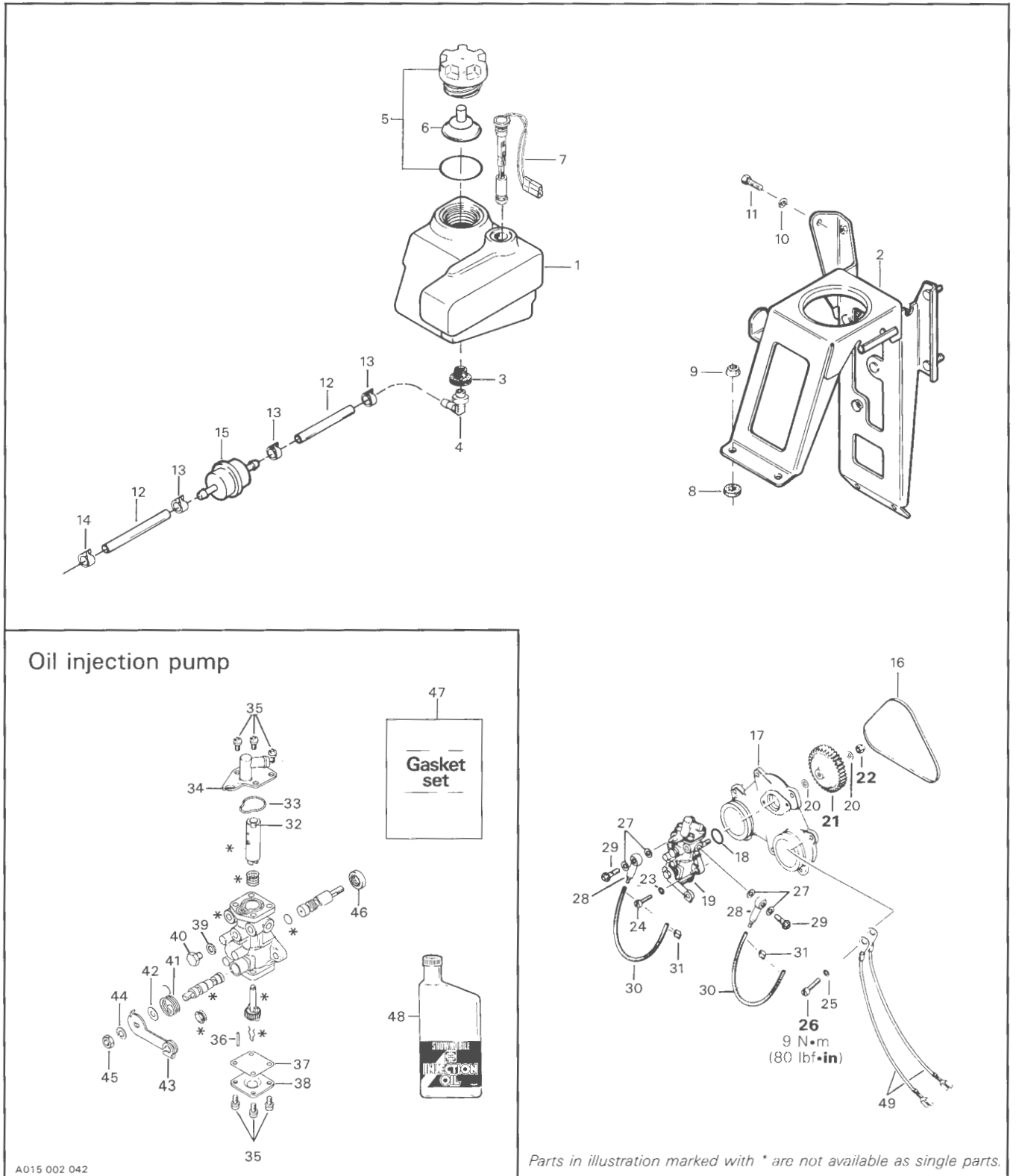
Check for presence of brass filings in gear housing. Replace gear if needed.

Besides, check deflection of rotary valve shaft and crankshaft close to gear. Replace as needed.

| | |
|---|----------------------|
| MAXIMUM ROTARY VALVE SHAFT DEFLECTION | 0.08 mm (0.0031") |
|---|----------------------|



OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 04 (467 ENGINE TYPE)

1. Injection oil reservoir
2. Support
3. Grommet
4. Male connector
5. Oil tank cap
6. Gasket
7. Oil level sensor
8. Rubber spacer (4)
9. Flanged hexagonal elastic stop nut M6 (4)
10. Lock washer 6 mm (2)
11. Hexagonal head cap screw M6 x 12 (2)
12. Oil line 8 in (200 mm)
13. Spring clip (3)
14. Spring clip
15. Filter
16. Rubber ring
17. Oil pump mounting flange
18. O-ring
19. Oil pump
20. Washer 6.2 mm (2)
21. Oil pump gear 44 teeth
22. Lock nut 6 mm
23. Lock washer 5 mm (2)
24. Cylindrical slotted screw M5 x 16 (2)
25. Lock washer 6 mm (7)

26. Cylindrical slotted screw M6 x 20 (7)
27. Oil banjo gasket (4)
28. Banjo (2)
29. Banjo bolt M6 x 16 (2)
30. Oil line 170 mm (2)
31. Clamp (4)
32. Retainer
33. O-ring
34. Plate
35. Screw with lock washer (8)
36. Stop pin
37. Gasket
38. Cam casing plate
39. Washer
40. Hexagonal head screw M6 x 7
41. Spring
42. Washer
43. Lever
44. Lock washer 6 mm
45. Hexagonal nut 6 mm
46. Seal
47. Gasket set
48. Injection oil (1 L)
49. Ground cable ass'y

CLEANING

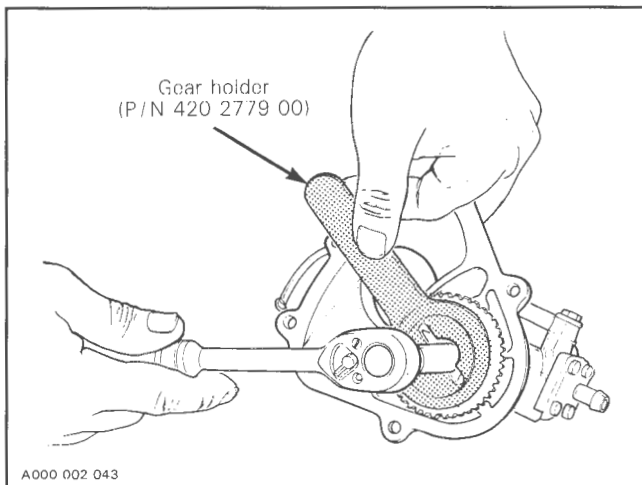
Discard all seals and O-rings. Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

- **NOTE :** Some oil pump parts are not available in single parts.

21,22, Oil pump gear & lock nut

To remove retaining nut, lock gear using gear holder (P/N 420 2779 00).

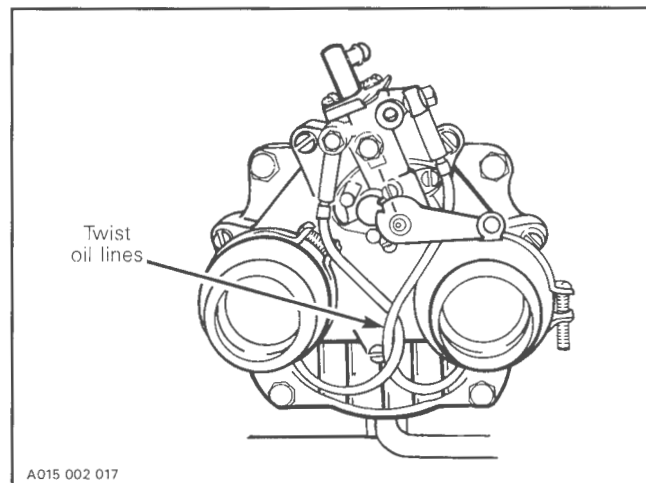


ASSEMBLY

26, Screw

Torque to 9 N•m (80 lbf•in).

▼ **CAUTION :** Whenever oil injection lines are removed, always make the routing as shown. This is important to avoid friction with the steering column.



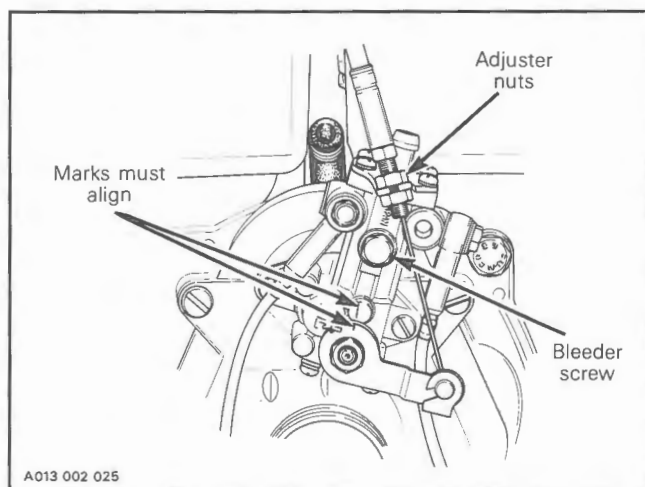
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

To synchronize pump with carburetor :

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



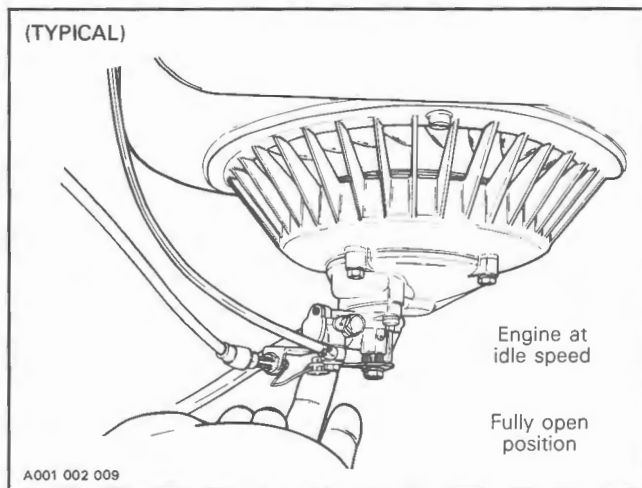
CAUTION : Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To bleed oil lines :

All oil lines should be full of oil. If required, bleed the main oil line (between tank and pump) by loosening the bleeder screw until all air has escaped from the line.

Make sure the tank is sufficiently filled.

Check the small oil lines (between pump and intake manifold). If required, fill the lines by running the engine at idle speed while holding the pump lever in fully open position.



WARNING : Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

On vehicle

NOTE : Main oil line must be full of oil. See bleeding procedure above.

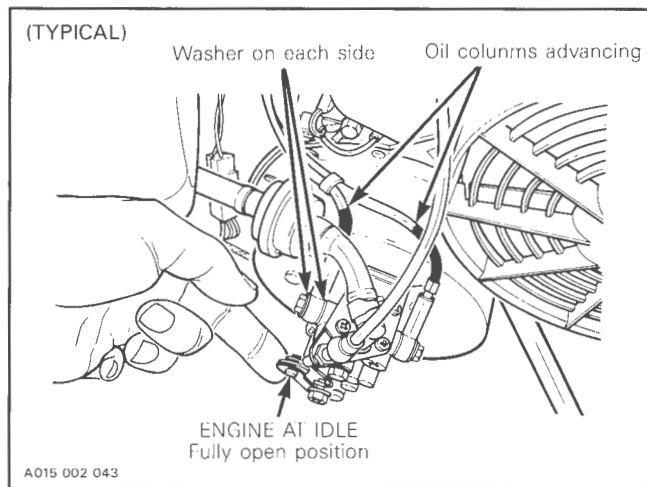
Lift rear of vehicle and support with a mechanical stand. Unbolt banjo fittings from pump. Start engine and stop it as soon as it fires.

Check that oil level in small oil lines is passed banjo fitting end by about 25 mm (1 in) (this will be indicated by a clear section of small oil lines of about 25 mm (1 in)). Repeat the procedure until this condition is attained.

Reconnect banjo fittings with a washer on each side, start engine and run at idle while holding the pump lever in fully open position. Oils columns must advance into small oil lines.

Section 02 ENGINE

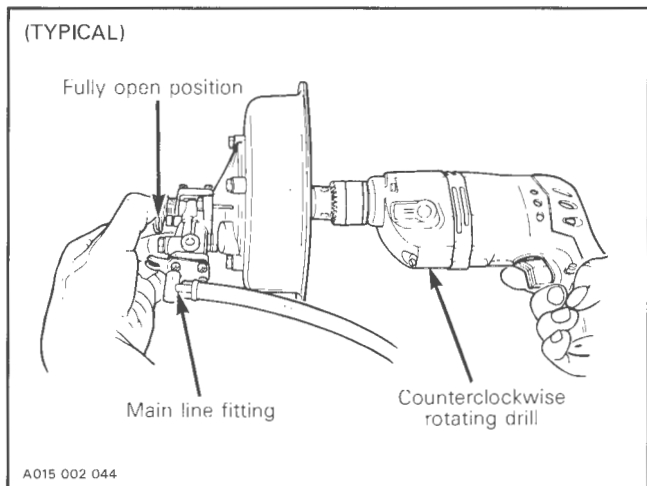
Sub-section 04 (467 ENGINE TYPE)



If not, remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

Test bench

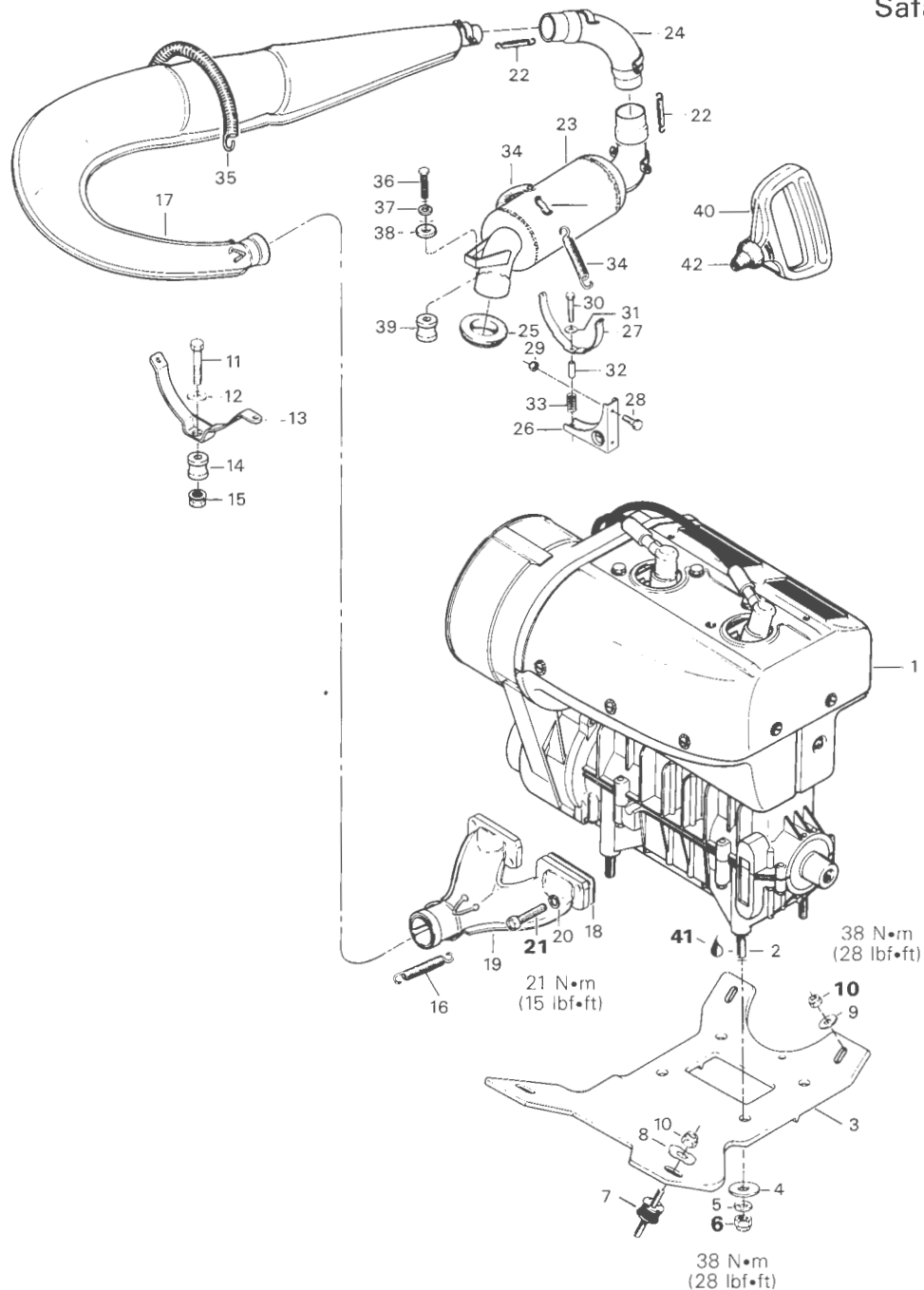
Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using counterclockwise rotating drill, rotate pump shaft. Oil must drip from outer holes while holding lever in a fully open position. If not replace pump.



503 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION

Engine support & muffler
Safari Voyageur
Safari Escapade



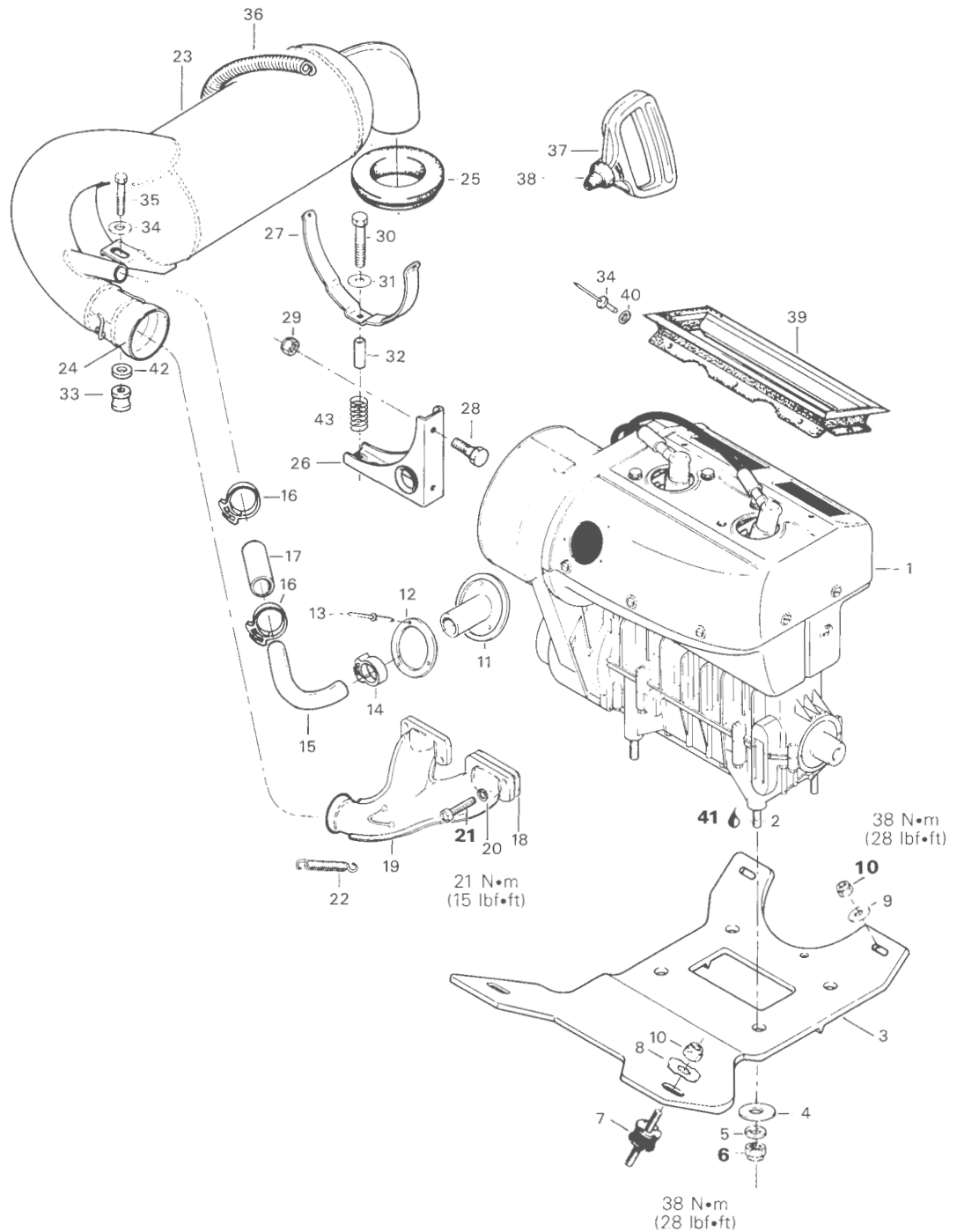
Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

- | | |
|--|---|
| 1. Engine Rotax type 503 | 23. Muffler |
| 2. Stud M10 x 25 (4) | 24. Tail pipe |
| 3. Engine bracket | 25. Exhaust washer |
| 4. Flat washer 10.5 mm x 21 x 2 (4) | 26. Muffler support |
| 5. Lock washer 10 mm (4) | 27. Muffler attachment |
| 6. Hexagonal nut M10 (4) | 28. Hexagonal head cap screw M6 x 16 (2) |
| 7. Rubber mount (4) | 29. Hexagonal elastic flanged stop nut M6 (2) |
| 8. Internal tooth cup washer (2) | 30. Hexagonal head cap screw M6 x 20 |
| 9. Washer (2) | 31. Flat washer 6 mm x 20 |
| 10. Hexagonal elastic stop nut M10 x 1.5 (4) | 32. Bushing |
| 11. Hexagonal head cap screw M8 x 1.25 | 33. Spring |
| 12. Lock washer | 34. Spring (2) |
| 13. Muffler support | 35. Spring |
| 14. Rubber mount | 36. Hexagonal head cap screw M8 x 1.25 |
| 15. Hexagonal elastic flanged stop nut M8 x 1.25 | 37. Lock washer |
| 16. Spring (3) | 38. Washer |
| 17. Tuned pipe | 39. Rubber mount |
| 18. Gasket (4) | 40. Starter grip |
| 19. Exhaust manifold | 41. Loctite 242 (blue, medium strength) |
| 20. Lock washer 8 mm (4) | 42. Rubber buffer |
| 21. Hexagonal socket head cap screw M8 x 30 (4) | 43. Hook |
| 22. Spring (4) | |
-

ENGINE REMOVAL & INSTALLATION

Engine support & muffler
Safari Cheyenne



Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

1. Engine Rotax type 503
2. Stud M10 x 25 (4)
3. Engine bracket
4. Flat washer 10.5 mm x 21 x 2 (4)
5. Lock washer 10 mm (4)
6. Hexagonal nut M10 (4)
7. Rubber mount (4)
8. Internal tooth cup washer (2)
9. Washer (2)
10. Hexagonal nut M10 (4)
11. Connector
12. Connector ring
13. Rivet (3)
14. Gear clamp
15. Elbow
16. Gear clamp (2)
17. Hose
18. Gasket (4)
19. Exhaust manifold
20. Lock washer 8 mm (4)
21. Hexagonal socket head cap screw M8 x 30 (4)
22. Spring (3)

23. Muffler
24. Female ball joint
25. Exhaust washer
26. Muffler support
27. Muffler attachment
28. Hexagonal head cap screw M6 x 16 (2)
29. Hexagonal flanged stop nut M6 (2)
30. Hexagonal head cap screw M6 x 20
31. Flat washer 6 x 20 mm
32. Bushing
33. Anchor pad
34. Rivet (6)
35. Screw M8 x 12
36. Spring
37. Starter grip
38. Rubber buffer
39. Air duct
40. Flat washer 7/32 x 5/8 x .060 in (6)
41. Loctite 242 (blue, medium strength)
42. Flat washer 8.4 mm x 25 x 1.6 (2)
43. Spring

REMOVAL FROM VEHICLE

Disconnect or remove the following :

- pulley guard, drive belt, drive pulley
- exhaust manifold
- elbow tube on cylinder cowl (Safari Cheyenne)
- clamp between carburetor(s) and intake manifold(s)
- oil injection pump cable
- oil lines
- impulse line
- hood retaining cable
- rewind starter cable

◆ **WARNING :** Before disconnecting any electrical wire in starter system always first disconnect the black negative battery cable (on electric starting models).

- wiring harness
- engine stud nuts (under engine support)

ENGINE SUPPORT & MUFFLER ASSEMBLY

6,10,21,41, Engine stud nut, engine support nut, manifold bolt & Loctite 242

Apply Loctite 242 on the engine stud nuts then torque to 38 N•m (28 lbf•ft).

Torque the engine support to 38 N•m (28 lbf•ft).

Torque the exhaust manifold bolts to 22 N•m (16 lbf•ft).

INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following :

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment and drive belt tension.

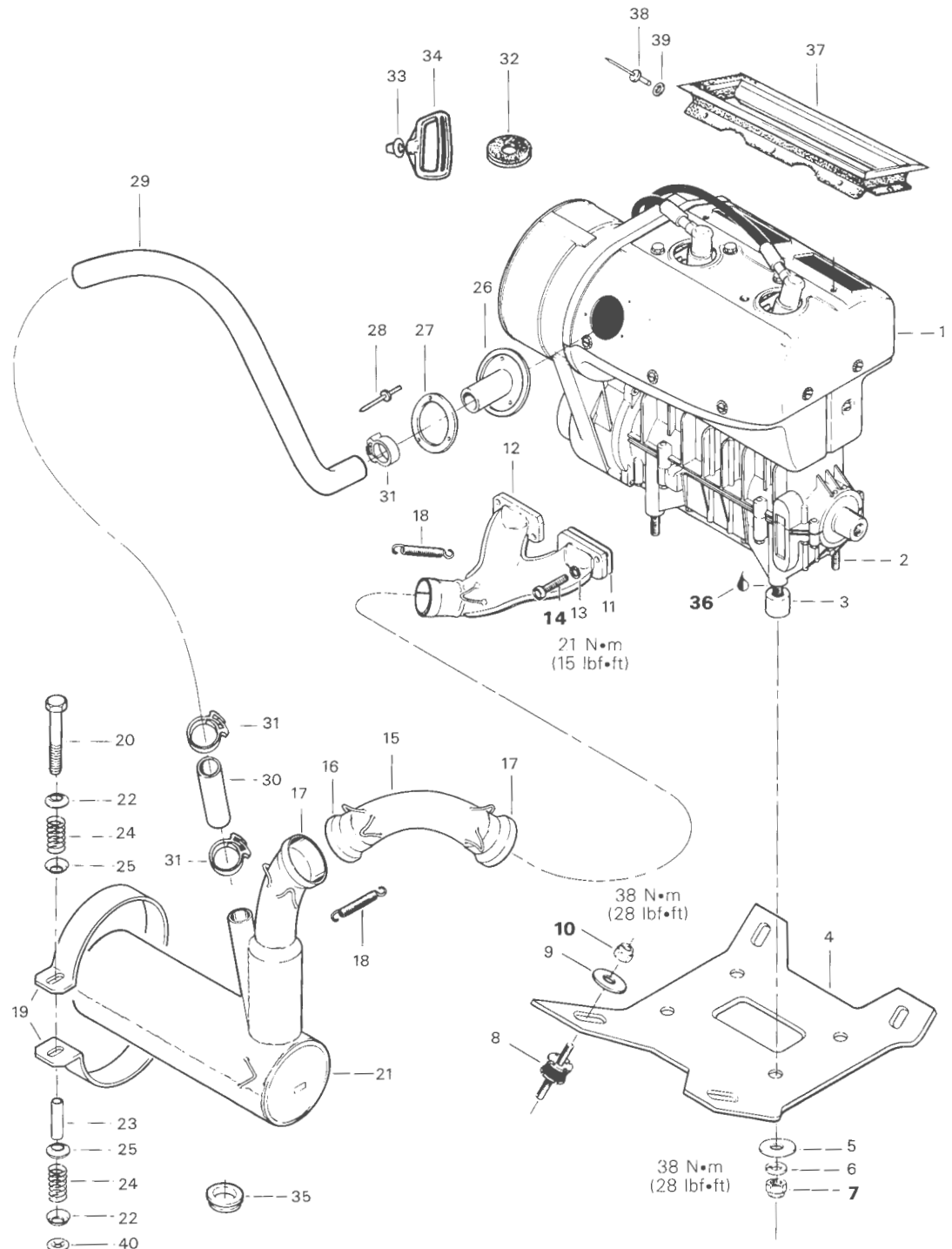
▼ **CAUTION :** A red dot is printed on one carburetor and on engine. Match the marked carburetor to the side marked on the engine. This is required because of the different jettings on carburetors of Safari Voyageur/Escapade.

- Should a slight exhaust leak be experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits should seal joint.

Section 02 ENGINE
Sub-section 05 (503 ENGINE TYPE)

ENGINE REMOVAL & INSTALLATION

Engine support & muffler
Alpine II 503



Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)


- | | |
|---|---|
| <ul style="list-style-type: none">1. Engine Rotax type 5032. Stud M10 x 37 (4)3. Distance sleeve (4)4. Engine bracket5. Flat washer 10.5 mm x 21 x 2 (4)6. Lock washer 10 mm (4)7. Hexagonal nut M10 (4)8. Rubber mount (4)9. Washer (4)10. Hexagonal elastic stop nut M10 x 1.5 (4)11. Gasket (4)12. Exhaust manifold13. Lock washer 8 (4)14. Allen screw M8 x 30 (4)15. Connector pipe16. Male ball joint17. Muffler female ball joint (2)18. Spring (6)19. Muffler clamp (2)20. Hexagonal head cap screw M8 x 1.25 x 80 (2) | <ul style="list-style-type: none">21. Muffler22. Cup (4)23. Bushing (2)24. Spring (4)25. Cup (4)26. Connector27. Connector ring28. Rivet (3)29. Elbow30. Hose 4 in (102 mm)31. Clamp (3)32. Spark plug grommet (2)33. Rubber buffer34. Starter grip35. Exhaust grommet36. Loctite 242 (blue, medium strength)37. Air duct38. Rivet (6)39. Washer (6)40. Push nut (2) |
|---|---|
-

REMOVAL FROM VEHICLE

Remove or disconnect the following (if applicable) then lift engine out of vehicle leftward :

- belt guard, drive belt
- console
- intake silencer panels
- clamp between intake manifold and carburetor
- impulse line

Disconnect **negative** cable (ground) from battery, then disconnect electrical connections leading to engine.

 **WARNING :** Before disconnecting any electrical wire in starter system always first disconnect the black negative battery cable (on electric starting models).

- muffler ball joint, close to engine
- elbow tube on cylinder cowl
- select transmission shifter to reverse

ENGINE SUPPORT AND MANIFOLD ASSEMBLY

7,10,14,36, Engine stud nut, engine support nut, manifold screw & Loctite 242

Install engine support with the fastening hole for battery ground cable toward the rear of vehicle.

Apply Loctite 242 on the engine stud nuts then torque to 38 N•m (28 lbf•ft).

Torque the engine support to 38 N•m (28 lbf•ft).

Torque the exhaust manifold bolts to 22 N•m (16 lbf•ft).

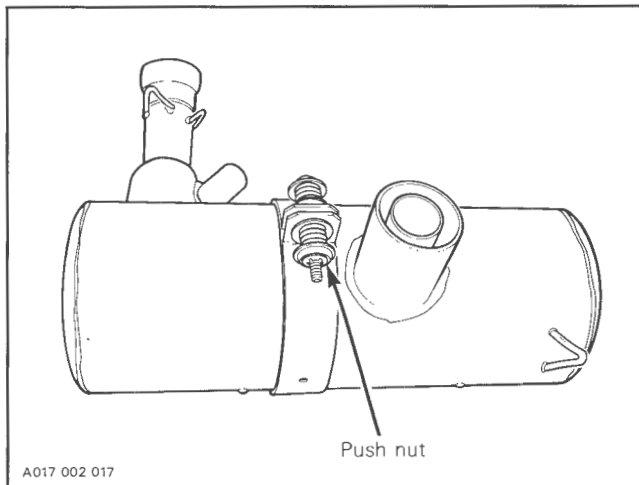
INSTALLATION ON VEHICLE

To install engine on vehicle, reverse removal procedure. However, pay attention to the following :

- Check tightness of engine mount nuts.
- After throttle cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment and drive belt tension.
- Should a slight exhaust leak be experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits should seal joint.

MUFFLER INSTALLATION

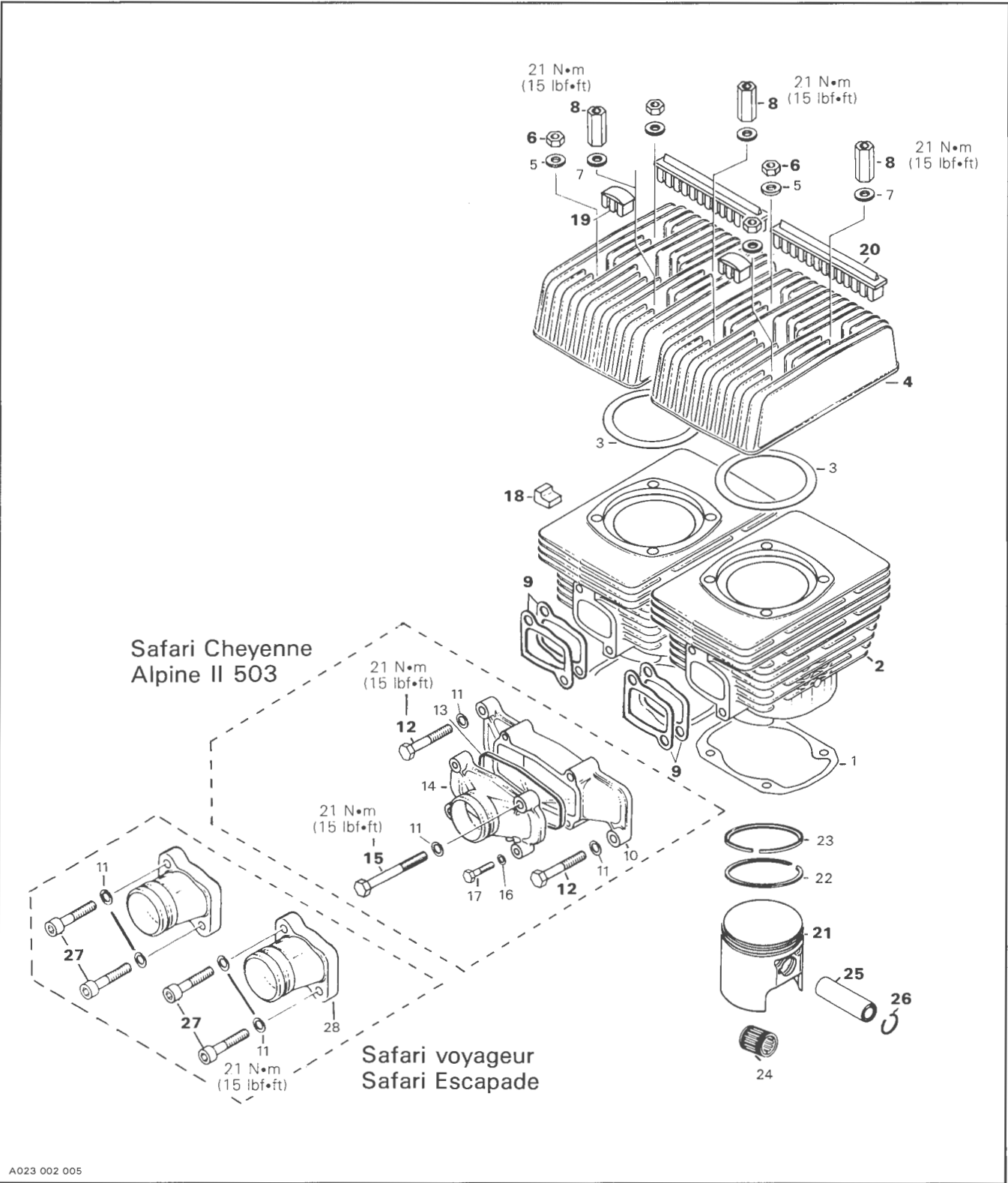
Install brackets and hardware on muffler and secure with push nuts.



Bolt muffler assembly on frame.

Section 02 ENGINE
Sub-section 05 (503 ENGINE TYPE)


TOP END



Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

1. Cylinder flange gasket (2)
2. Cylinder (2)
3. Cylinder head gasket (2)
4. Cylinder head (2)
5. Washer 8.4 mm (4)
6. Hexagonal nut M8 (4)
7. Washer 8.4 mm (4)
8. Distance nut M8 x 37 mm (4)
9. Intake manifold gasket (4)
10. Intake manifold
(Safari Cheyenne & Alpine II 503 only)
11. Lock washer 8 mm (4)
12. Hexagonal bolt M8 x 40 mm (2)
(Safari Cheyenne & Alpine II 503 only)
13. O-ring
(Safari Cheyenne & Alpine II 503 only)
14. Intake manifold cover
(Safari Cheyenne & Alpine II 503 only)
15. Hexagonal bolt M8 x 64 mm (2)
(Safari Cheyenne & Alpine II 503 only)
16. Lock washer 6 mm (2)
(Safari Cheyenne & Alpine II 503 only)
17. Hexagonal bolt M6 x 30 mm (2)
(Safari Cheyenne & Alpine II 503 only)
18. Noise damper
19. Noise damper (short) (4)
20. Noise damper (long) (4)
21. Piston (2)
22. Rectangular ring (2)
23. Semi-trapez ring (2)
24. Needle bearing (2)
25. Piston pin (2)
26. Circlip (4)
27. Cylindrical screw M8 x 30 (4)
(Voyageur & Escapade only)
28. Intake socket (2) (Voyageur & Escapade only)


 **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

 **NOTE :** The letters "AUS" (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

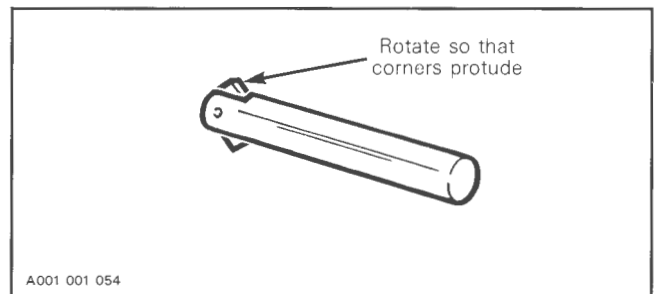
DISASSEMBLY

21,25,26, Piston, piston pin & circlip

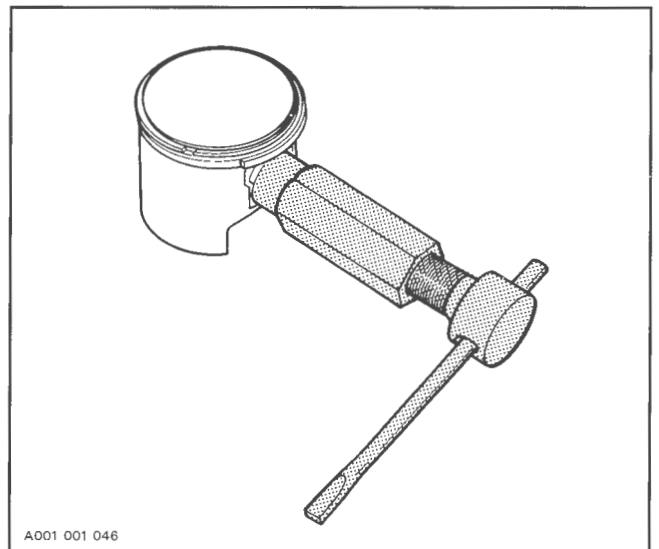
Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Then with a pointed tool inserted in piston notch, remove circlip from piston.

To remove piston pin, use piston pin puller (P/N 529 0068 00) as follows :

- Fully screw puller handle.
- Place stop notch of puller in line with the puller axis.
- Insert puller end into piston pin.
- Rotate stop notch of puller so that corners protude the puller end.



- Hold puller firmly and rotate puller handle counter-clockwise to pull piston pin.



 **NOTE :** On twin cylinder fan cooled engines, the PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

NOTE : 0.25 and 0.5 mm oversize piston and rings are available if necessary.

INSPECTION

The inspection of the engine top end must include the following measurements :

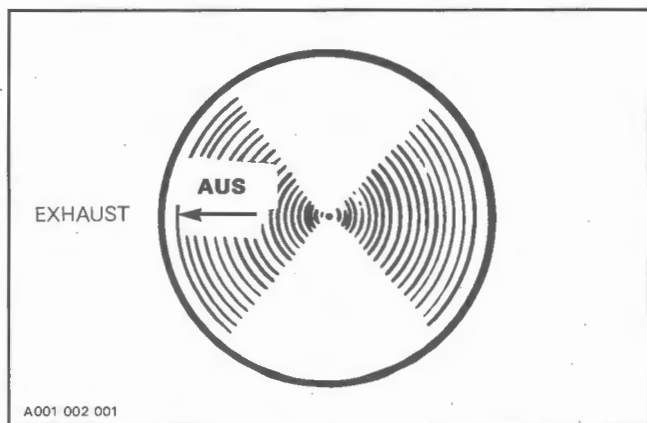
| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|--------------------------------|-----------------------------|---------------------|---------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Cylinder taper | N.A. | N.A. | 0.08 mm (.0031") |
| Cylinder out of round | N.A. | N.A. | 0.05 mm (.0020") |
| Cylinder / piston clearance | 0.07 mm (.0028") | 0.09 mm (.0035") | 0.20 mm (.008") |
| Ring / piston groove clearance | 0.04 mm (.001") | 0.11 mm (.004") | 0.20 mm (.008") |
| Ring end gap | 0.20 mm (.008") | 0.35 mm (.014") | 1.0 mm (.039") |

NOTE : For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

ASSEMBLY

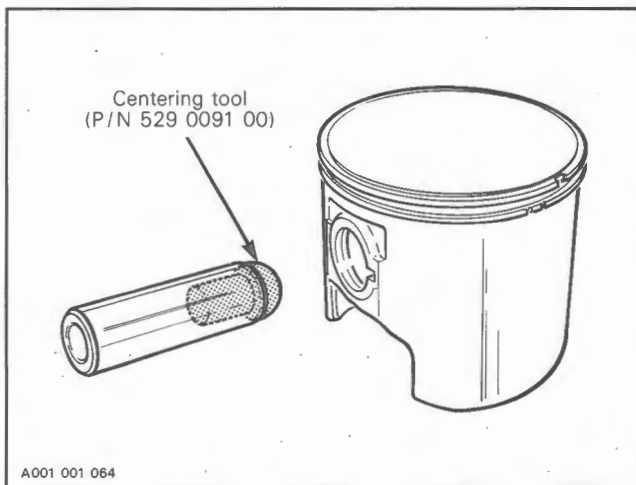
21,26, Piston & circlip

At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing in the direction of the exhaust port.



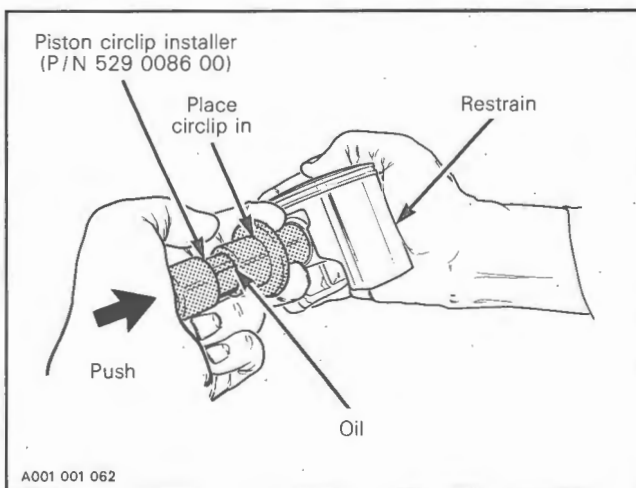
NOTE : Spare parts pistons and cylinders are identified with a green or red dot, it is important to match the piston with the cylinder of the same color.

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00)



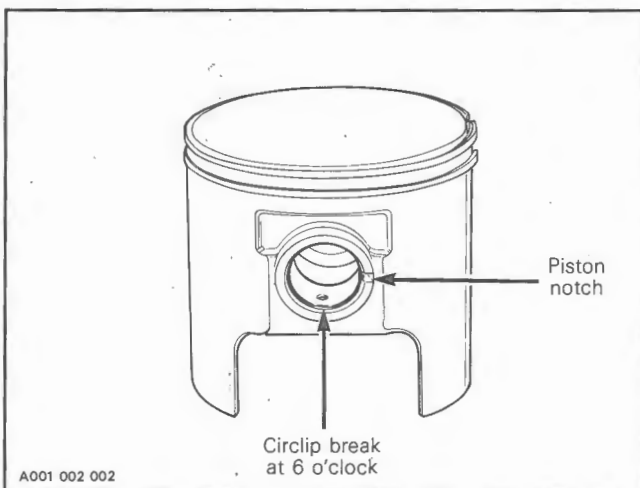
NOTE : The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0068 00).



Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)



▼ **CAUTION :** Circlips must not move freely in the groove after installation. If so, replace them.

2,21, Cylinder & piston

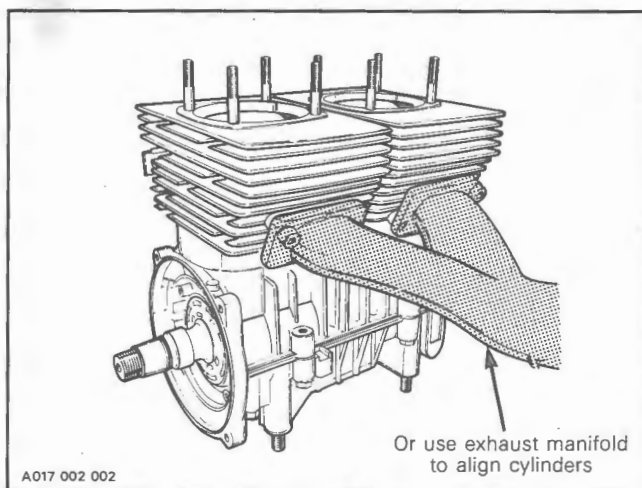
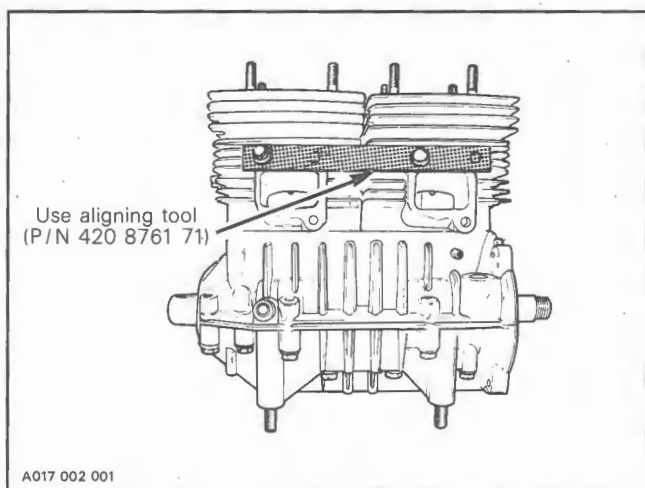
Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

Install ring compressor (P/N 420 8769 70) on piston assembly.

○ **NOTE :** The ring compressor will not fit on oversize pistons.

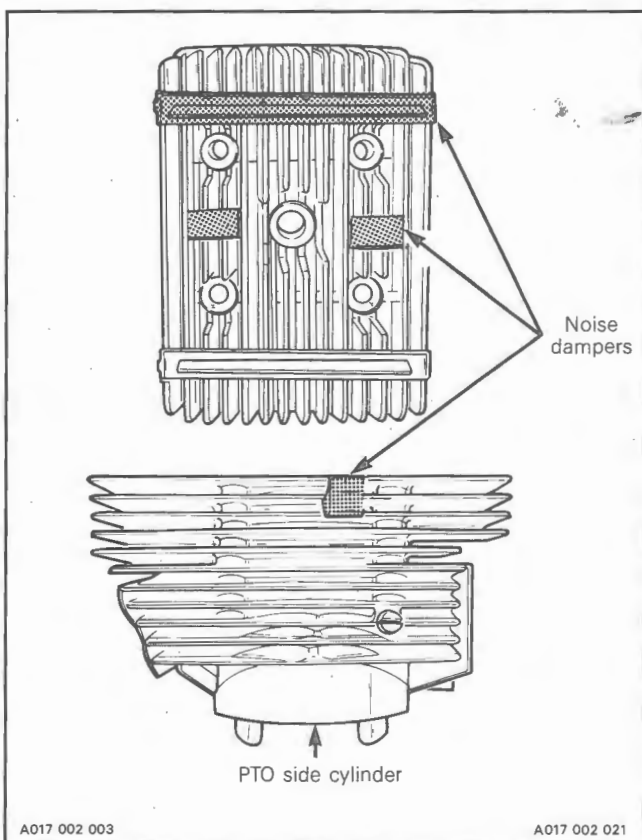
2,4, Cylinder & cylinder head

At cylinder and/or cylinder head installation, use aligning tool (P/N 420 8761 71) or exhaust manifold itself to ensure sealing of intake manifold and exhaust before tightening cylinder head nuts.



18,19,20, Noise damper

For proper position of noise dampers, refer to the following illustrations.

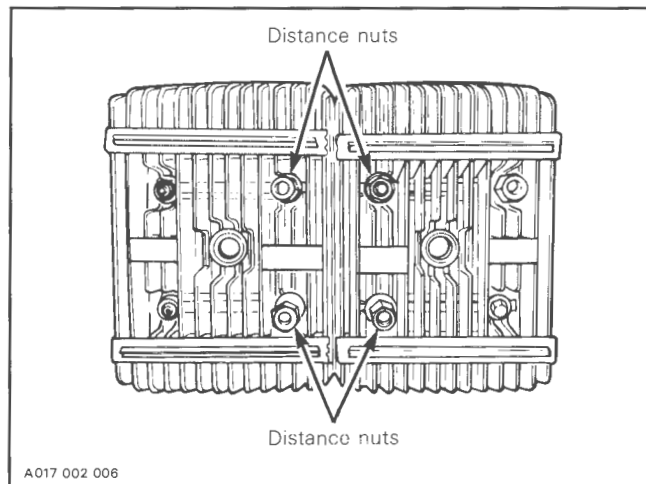


Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

6,8, Nut & distance nut

Position distance nuts as illustrated.



Cross torque cylinder head nuts to 21 N•m (15 lbf•ft) ; torque each cylinder head individually.

Install armature plate, fan housing and then air deflector.

9, Intake manifold gasket

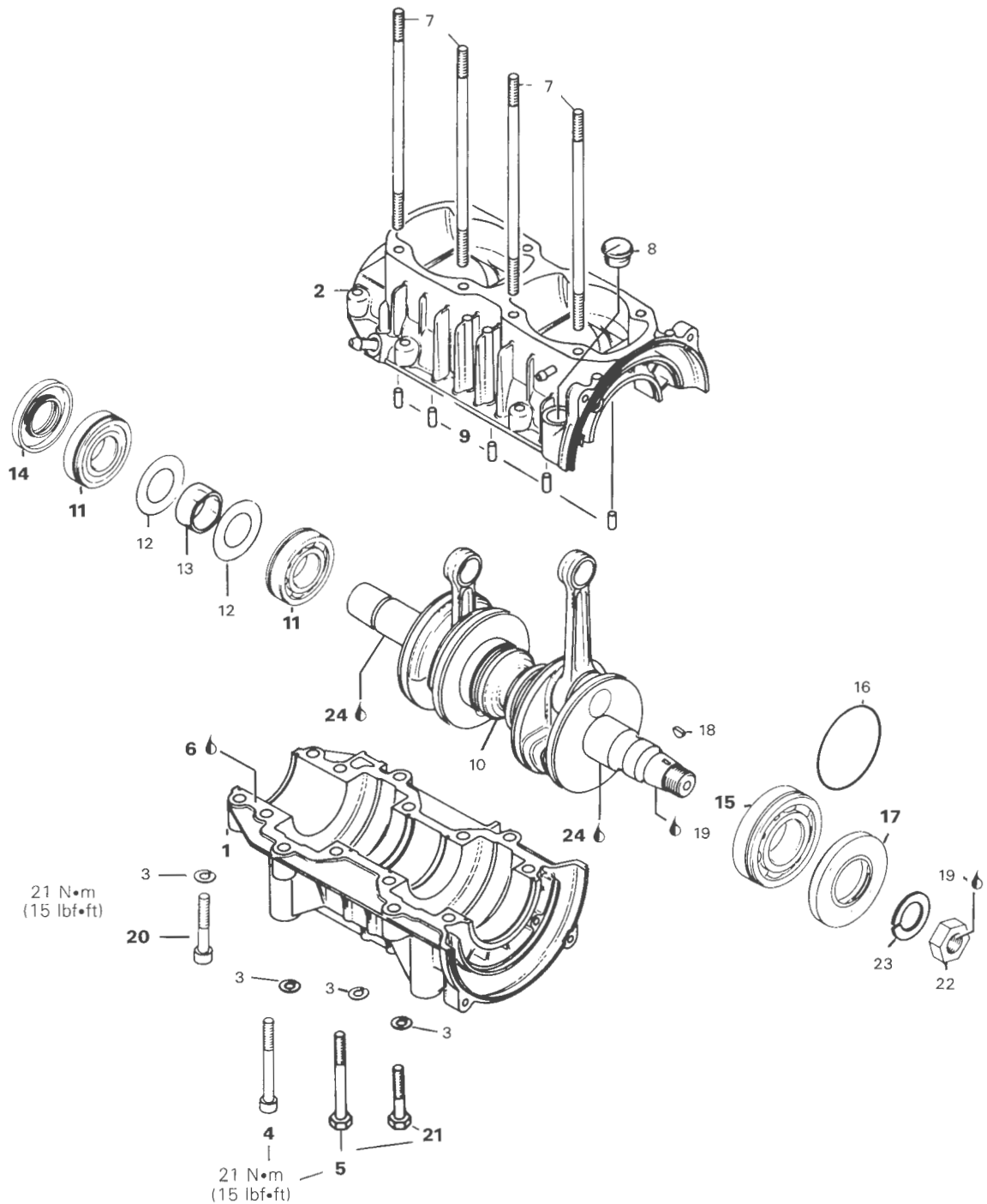
Install a gasket on each side of the air deflector.

12,15,27, Intake manifold bolt

Torque intake manifold bolts to 21 N•m (15 lbf•ft).

Section 02 ENGINE
Sub-section 05 (503 ENGINE TYPE)

BOTTOM END



Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

1. Crankcase lower half
2. Crankcase upper half
3. Lock washer 8 mm (14)
4. Cylindrical screw M8 x 75 (2)
5. Screw M8 x 70 (6)
6. Loctite 515
7. Stud M8 x 173 (8)
8. Cable grommet
9. Rubber plug (5)
10. Crankshaft
11. Ball bearing 6206 (2)
12. Shim 1 mm (2)

13. Spacer
14. Seal PTO side
15. Ball bearing 6207
16. O-ring
17. Seal mag side
18. Woodruff key
19. Loctite 242
20. Cylindrical screw M8 x 45 (2)
21. Screw M8 x 45 (4)
22. Hexagonal nut M22 x 1.5
23. Lock washer 22 mm
24. Anti-seize lubricant

○ **NOTE :** Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all seals, gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

Remove old sealant from crankcase mating surfaces with Bombardier sealant stripper (P/N 413 7021 00).

▼ **CAUTION :** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

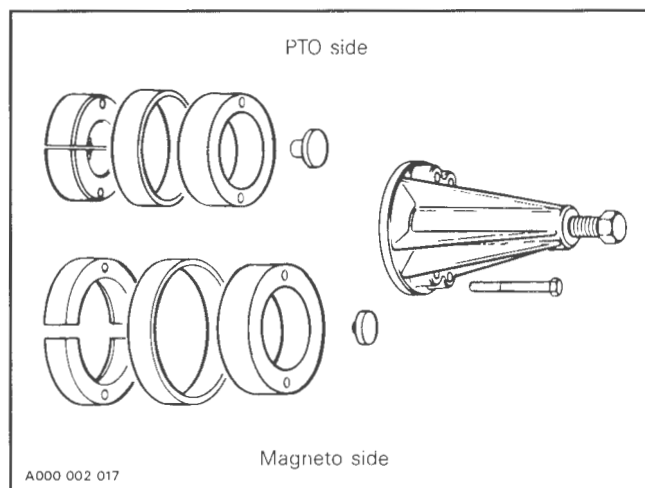
General

To remove drive pulley, refer to "Drive pulley", section 03-03.

To remove magneto, refer to "Magneto" in this section.

11,15, PTO side bearing & MAG side bearing

To remove bearings from crankshaft, use a protective cap and a special puller, as illustrated. (See Tools section).



INSPECTION

The inspection of the engine bottom end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|-----------------------------------|--------------------------|-----------------|-----------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Crankshaft deflection | N.A. | N.A. | 0.08 mm (.003") |
| Connecting rod big end axial play | 0.20 mm (.008") | 0.53 mm (.021") | 1.0 mm (.039") |

○ **NOTE :** For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

ASSEMBLY

11,15, PTO side bearing & MAG side bearing

Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with oil heated to 75°C (167°F).

This will expand bearings and ease installation. Install bearings with groove as per exploded view.

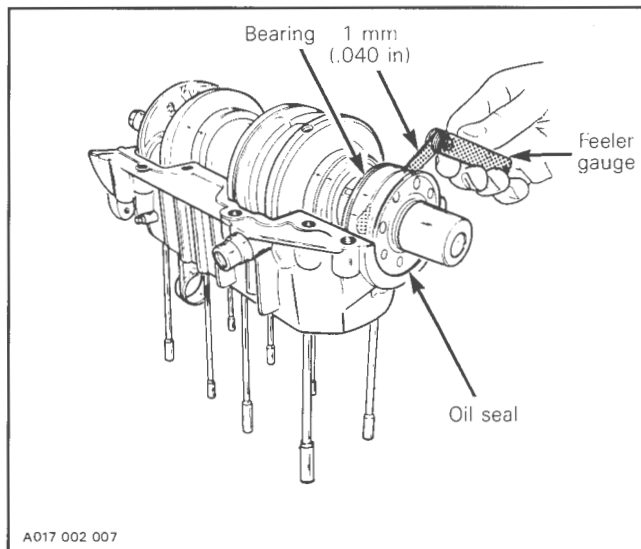
Bearings are pressed on crankshaft until they rest against radius. These radius maintain the gap needed for bearings lubrication.

14,17, Oil seal

At seal assembly, apply a light coat of lithium grease on seal lip.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain seals (seal without locating ring or without spacing legs), ensure to maintain the specified gap as illustrated.



9, Rubber plug

Prior to installing the crankshaft, make sure both rubber plugs are into upper crankcase holes.

1,2, Lower and upper crankcase

Crankcase halves are factory matched and therefore, are not interchangeable as single halves.

6, Loctite 515

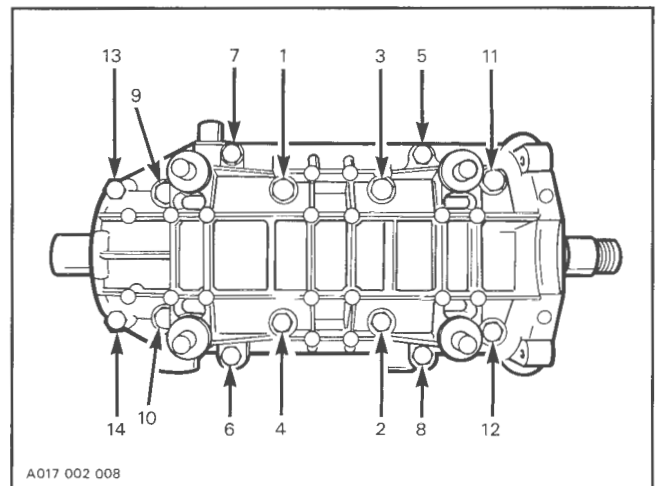
Prior to joining of crankcase halves spray some new injection oil (or equivalent) on all moving parts of the crankshaft. Then apply Loctite 515 (413 7027 00) on crankcases mating surfaces.

NOTE : Prior to apply Loctite 515 it is possible to use primer N (P/N 413 7053 00) or primer NF (P/N 413 7024 00). It increases cure speed and gap filling capability. Refer to supplier instructions.

Position the crankcase halves together and tighten bolts by hand then install and tighten armature plate on magneto side to correctly align the crankcase halves.

4,5,20,21, Crankcase bolt

Torque bolts to 21 N•m (15 lbf•ft) following illustrated sequence.

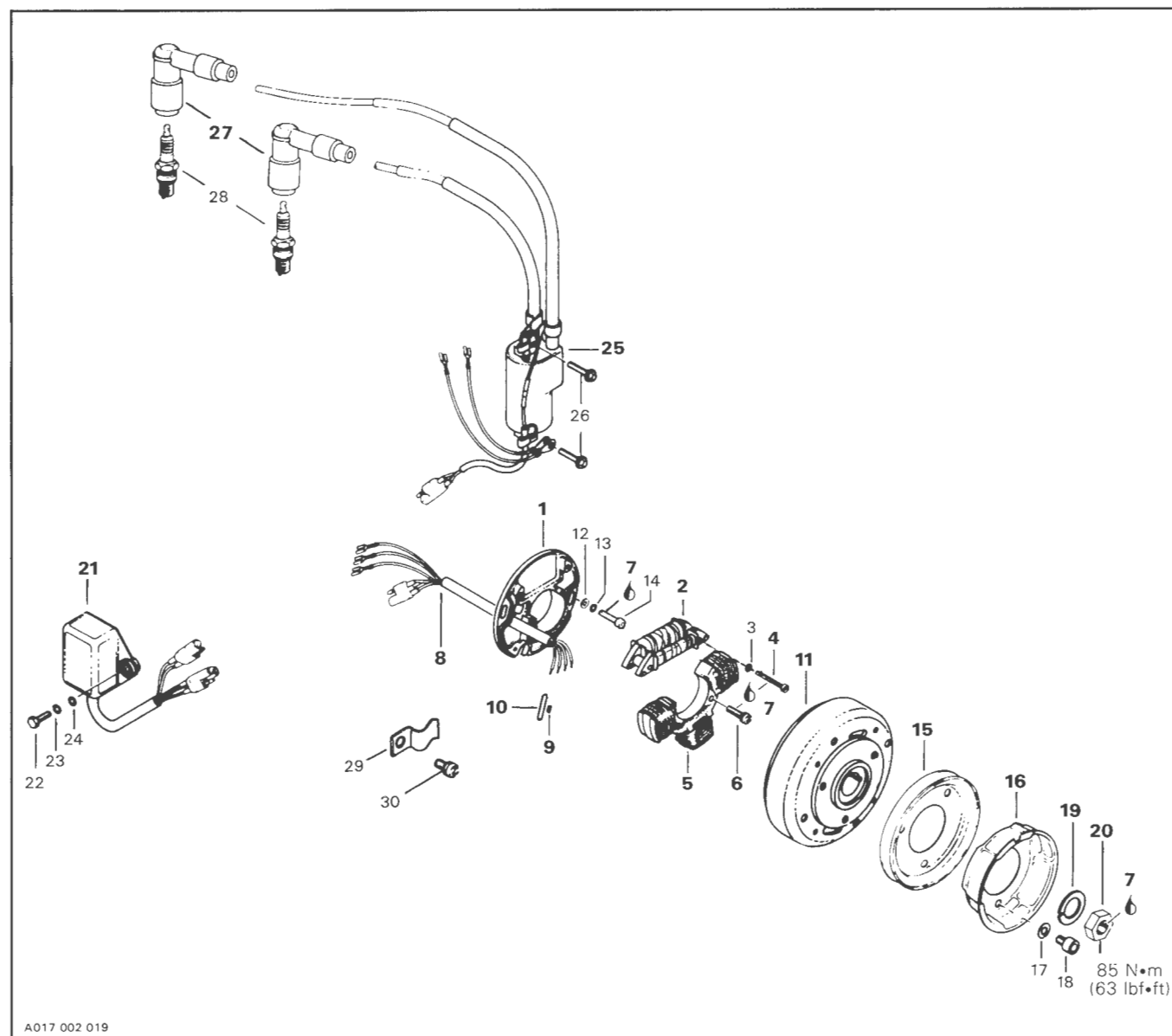


To install magneto, refer to "Magneto" in this section.

Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

MAGNETO



A017 002 019

1. Armature plate
2. Generating coil
3. Lock washer 5 mm (2)
4. Cylindrical slotted head screw M5 x 35 (2)
5. Lighting coil
6. Screw M6 x 25 (2)
7. Loctite 242 (blue, medium strength)
8. Harness
9. Splice connector (6)
10. Protector tube
11. Flywheel
12. Washer 5.5 mm (2)
13. Lock washer 5 mm (2)
14. Allen screw M5 x 18 (2)
15. V-belt pulley

16. Starting pulley
17. Lock washer 8 mm (3)
18. Allen screw M8 x 12 (3)
19. Lock washer 22 mm
20. Hexagonal nut 22 x 1.5 mm
21. C.D. box
22. Hexagonal screw M6 x 20 mm (2)
23. Lock washer 6 mm (2)
24. Washer 6.4 mm (2)
25. Ignition coil
26. Hexagonal head taptite screw M5 x 25 (2)
27. Spark plug protector (2)
28. Spark plug (2)
29. Clamp
30. Screw M4 x 8

Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

○ **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION :** Clean armature and magneto using only a clean cloth.

DISASSEMBLY

15,16, V-belt pulley and starting pulley

To gain access to magneto assembly, remove :

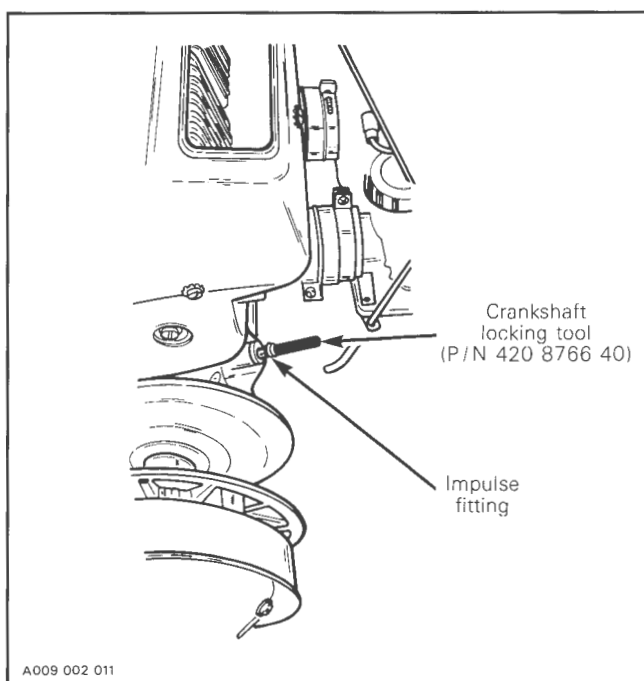
- - rewind starter
- starting and V-belt pulleys

○ **NOTE :** Before disassembling magneto plate, indexing marks should be scribed to facilitate reassembly.

20, Flywheel retaining nut

To remove magneto flywheel retaining nut :

- - Lock crankshaft with crankshaft locking tool (P/N 420 8766 40) as illustrated (magneto side piston must be at top dead center).
- - Remove magneto retaining nut.

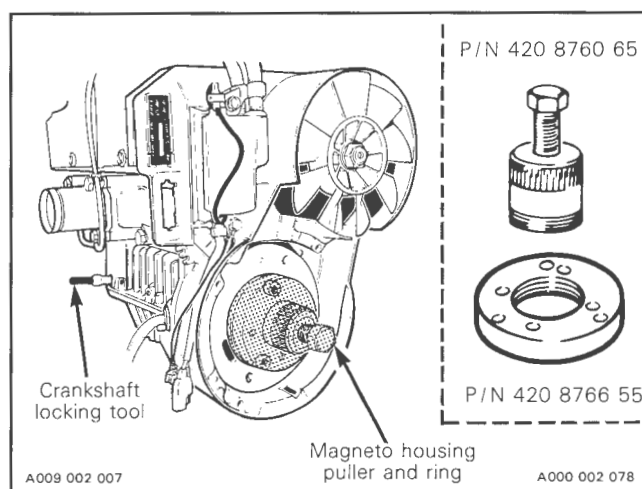


○ **NOTE :** It should be noted that to correctly remove a Loctite locked fastener it is first necessary to tap on the fastener to break Loctite bond. This will eliminate the possibility of thread breakage.

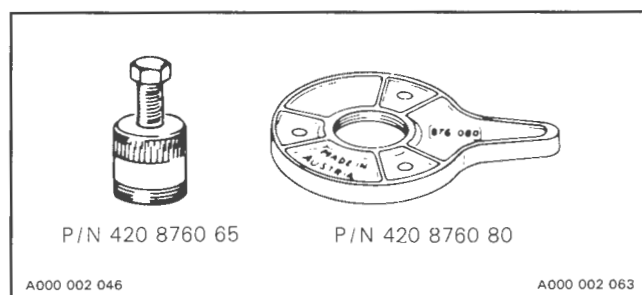
11, Magneto housing flywheel

To remove magneto housing (flywheel) :

- Lock crankshaft with crankshaft locking tool and install magneto housing puller (P/N 420 8760 65) and puller ring (P/N 420 8766 55) as illustrated.



○ **NOTE :** For the above procedure, the locking type puller (P/N 420 8760 80) can be used without crankshaft locking tool.



- - Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

Section 02 ENGINE

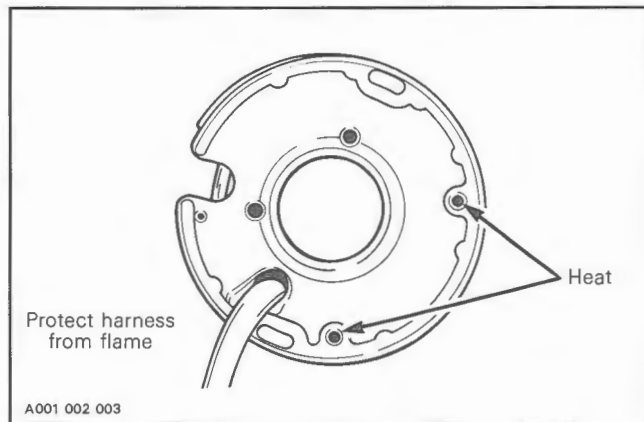
Sub-section 05 (503 ENGINE TYPE)

REPAIR

2, Generating coil

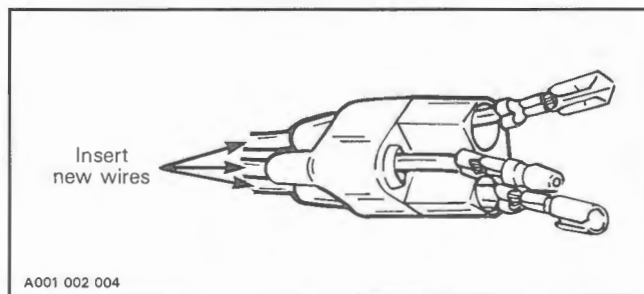
To replace generating coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



CAUTION : Protect harness from flame.

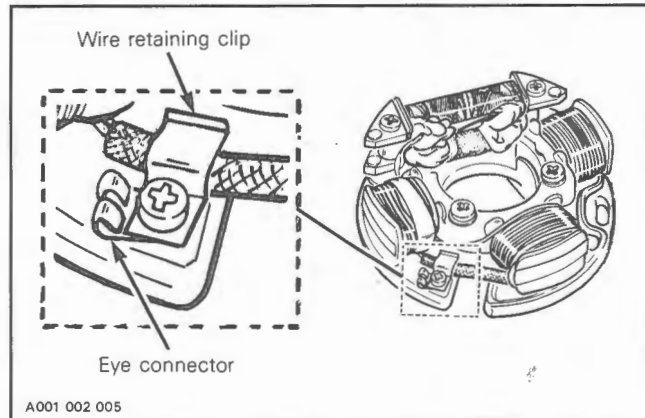
- Remove screws (use Phillips no 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector housing and install connectors.



CAUTION : Replace the old wires in the connector with the same color coded new wires.

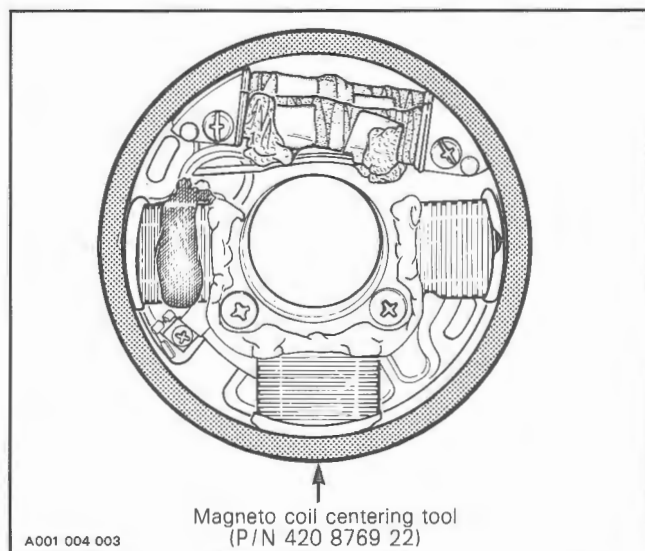
- Install a new receptacle connector to the black / yellow striped wire.

- To install the ground connector of the armature plate, tape the new black lead to the old one and pull it under the lighting coil with the old wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.



4,7, Generating coil screw & Loctite 242

- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws before assembly. Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



CAUTION : Before reinstalling the magneto, remove the loose epoxy from harness.

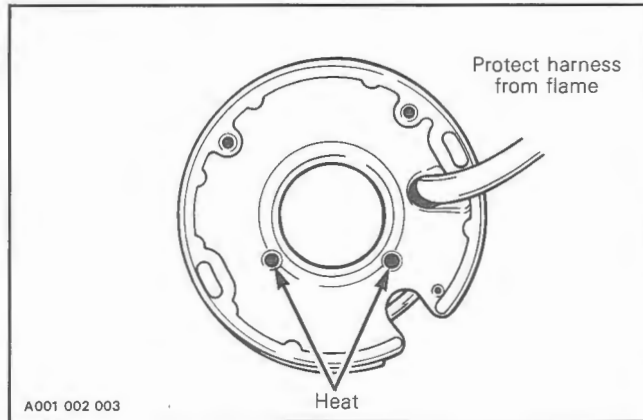
Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

5, Lighting coil

To replace lighting coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.

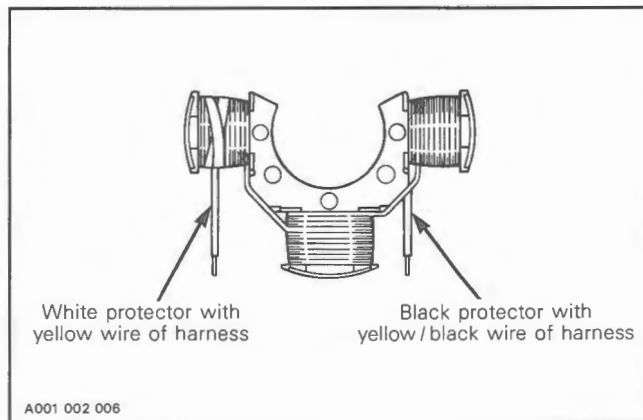


CAUTION : Protect harness from flame.

- Remove screws (use Phillips no 3 screwdriver).
- Remove the wire retaining clip from armature plate.

9,10, Splice connector and protector tube

- Pull out protector tubes and unsolder the splice connectors.
- Solder the yellow wire in the harness to the white tube protected wire of the coil.
- Solder the yellow / black striped wire in the harness to the black tube protected wire of the coil.

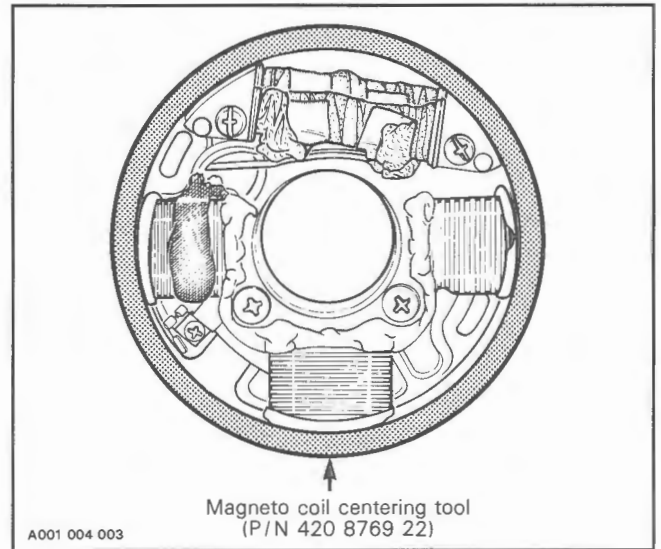


- Position protector tubes over connections.

6,7, Lighting coil screw & Loctite 242

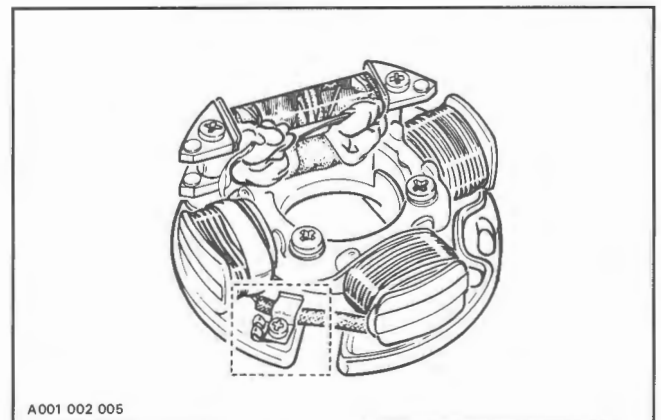
Prior to assembly, apply Loctite 242 (blue, medium strength) on lighting coil screws.

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



- Fasten retaining clip onto protector tubes.

The ground terminal from generating coil must be fastened under this clip.



CAUTION : Before reinstalling magneto, remove the loose epoxy from harness.

Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

ASSEMBLY

1, Armature plate

Position armature plate on crankcase, aligning marks on both parts.

7, Loctite 242

Clean crankshaft extension taper.

Apply Loctite 242 (blue medium strength) on taper.

11,19, Flywheel & 22 mm lock washer

Position woodruff key, magneto flywheel and lock washer on crankshaft.

7,20, Loctite 242 & nut

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 85 N•m (63 lbf•ft).

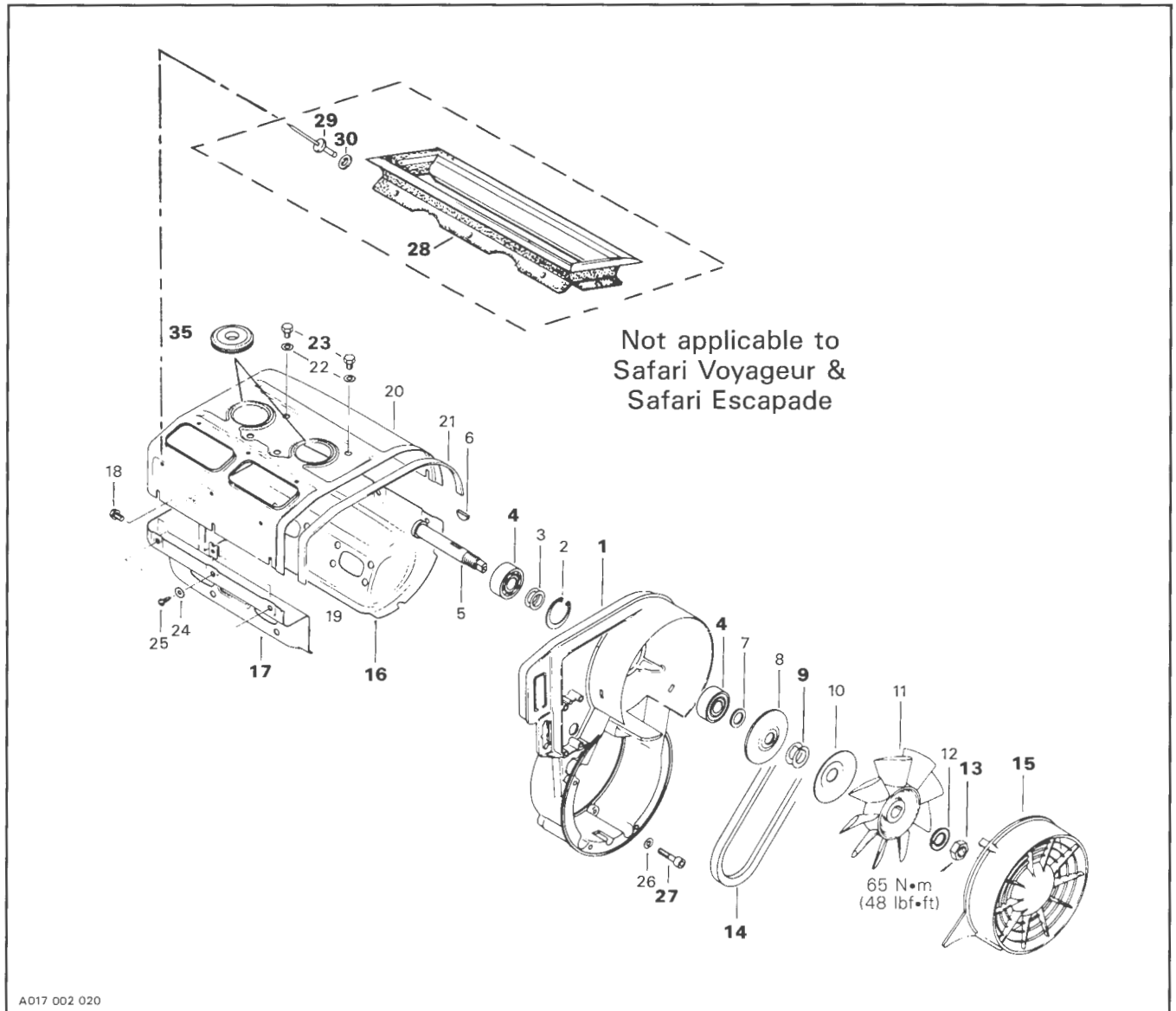
8,21,25,27, Harness, C.D. Box, ignition coil & spark plug protector

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 7017 00) to prevent corrosion or moisture penetration.

▼ **CAUTION:** Do not use silicone "sealant", this product will corrode contacts.

○ **NOTE:** For ignition timing procedure refer to "Ignition timing" section 04-02.

COOLING SYSTEM



1. Fan housing
2. Locking ring
3. Shim 1.0 mm (2)
4. Ball bearing (2)
5. Fan shaft
6. Woodruff key 3 x 5
7. Distance sleeve
8. Pulley half
9. Shim 0.5 mm
10. Pulley half
11. Fan
12. Lock washer 16 mm
13. Hexagonal nut M16 x 1.5
14. V-Belt
15. Fan cover
16. Cylinder cowl, lower half, exhaust side

17. Cylinder cowl, lower half, carburetor side
18. Taptite screw M6 x 12
19. Spring nut M4.8 (8)
20. Cylinder cowl, upper half
21. Sealing strip 440 mm
22. Lock washer 8 mm (4)
23. Hexagonal screw M8 x 16 (4)
24. Washer 4 mm x 15.8 (8)
25. Screw M4.8 x 16 (8)
26. Lock washer 6 mm (4)
27. Cylindrical screw M6 x 30 (4)
28. Air duct (Not applicable to Voyageur & Escapade)
29. Rivet (6) (Not applicable to Voyageur & Escapade)
30. Washer (6) (Not applicable to Voyageur & Escapade)
31. Spark plug cover (2)

Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

○ NOTE: The following procedures can be done without removing the engine from chassis.

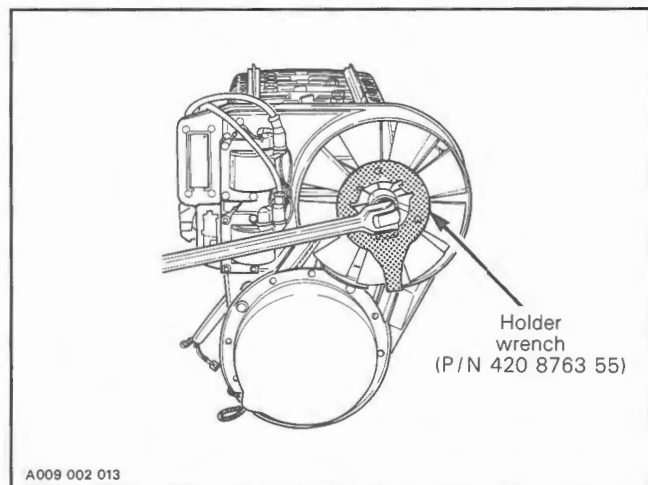
CLEANING

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY & ASSEMBLY

13, Fan retaining nut

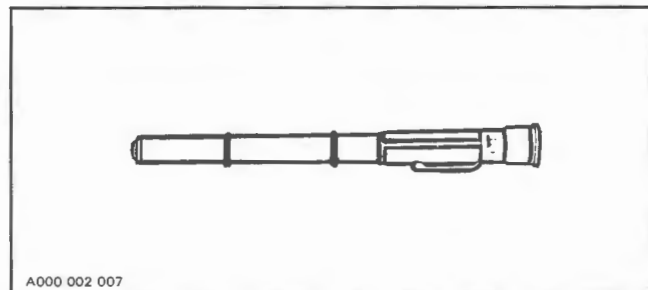
To remove or install fan pulley retaining nut, lock fan pulley with special holder wrench (P/N 420 8763 55). At assembly, torque nut to 65 N•m (48 lbf•ft).



9,14, Shim & V-belt

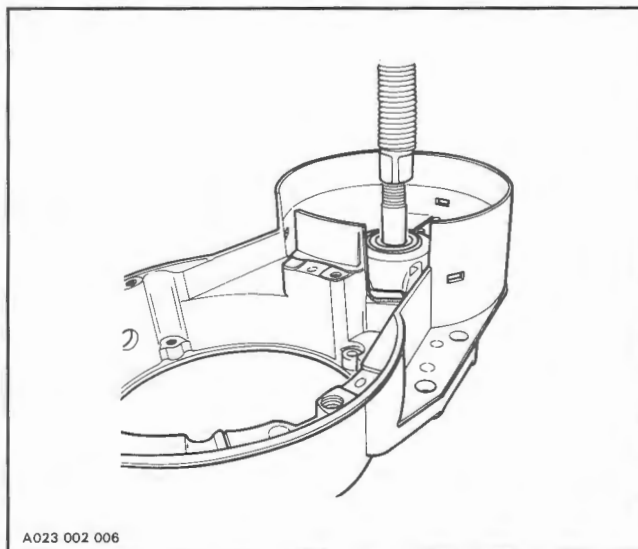
Fan belt deflection must be 9.5 mm (3/8 in) when applying a force of 5 kg (11 lb). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lock washer.

Use belt tension tester (P/N 414 3482 00) to check deflection.



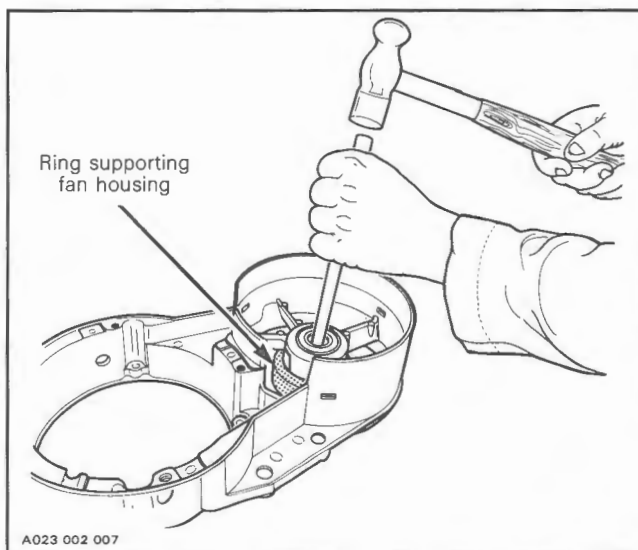
5, Fan shaft

Using a press, drive the fan shaft out.



1,3,4, Fan housing, shim and bearing

Support fan housing with a ring. With a punch, working all around bearing inner race, drive bearing out of fan housing. Keep shims for installation.



2,4, Locking ring & bearing

Remove locking ring then remaining bearing.

To install, press one bearing in place then install locking ring and shims. Press the other bearing from opposite side until it is flush with housing. Press fan shaft from engine side of fan housing. Check for free rolling action.

23,27, Upper fan cowl screw & fan housing screw

At assembly, apply a light coat of Loctite 242 on threads. It should be noted that to correctly remove a Loctite locked screw, it is first necessary to slightly tap on head screw to break Loctite bond. The screw can then be removed. This will eliminate the possibility of screw breakage.

28,29,30, Air duct, washer & rivet (closed end)

Air duct can be removed by drilling out rivets.

▼ **CAUTION :** At reassembly, use only closed end rivets to avoid rivet ends from falling into magneto.

16,17, Cylinder cowl

A gasket must be placed on both sides (inner and outer) of intake and exhaust holes of cylinder cowl.

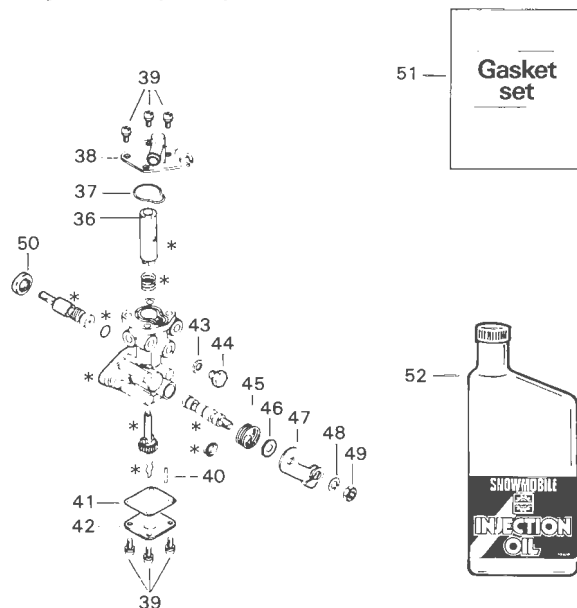
◆ **WARNING :** If fan protector is removed, always reinstall after servicing.

Section 02 ENGINE

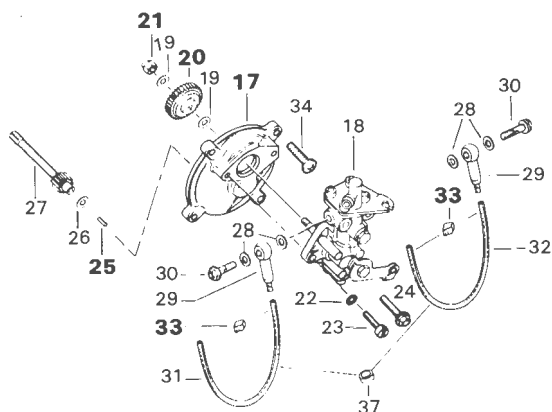
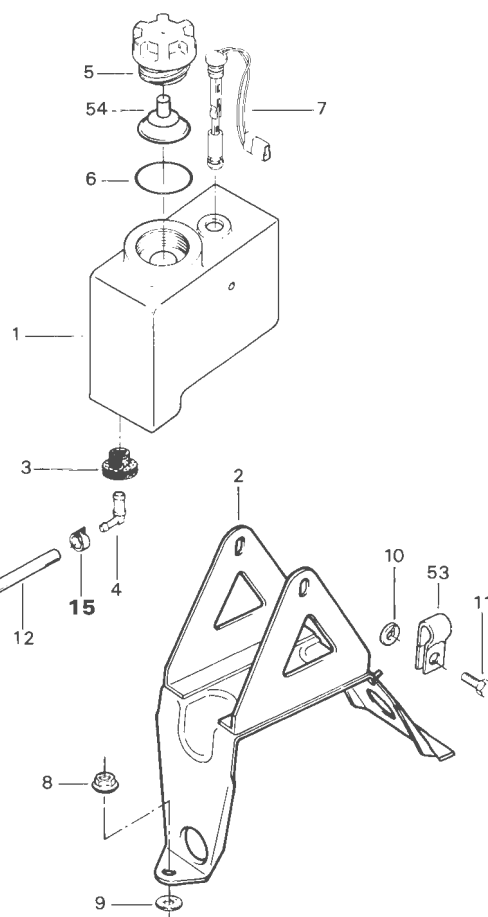
Sub-section 05 (503 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR

Oil injection pump



Not applicable to Alpine II 503



Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

- | | |
|--|--|
| <ul style="list-style-type: none">1. Injection oil reservoir2. Oil reservoir support3. Grommet4. Male connector5. Oil reservoir cap6. Gasket7. Oil level sensor8. Elastic stop nut M5 x 0.8 (4)9. Rubber washer (4)10. Lock washer 6 mm (2)11. Screw M6 x 16 (2)12. Oil line 38 mm13. Oil line 102 mm14. Spring clip (3)15. Spring clip (1)16. Filter17. Oil pump mounting flange18. Oil pump19. Washer 6.2 mm (2)20. Oil pump gear - 27 teeth21. Lock nut M622. Lock washer 5 mm (2)23. Screw M5 x 16 (2)24. Taptite screw M5 x 16 (2)25. Needle roll26. Washer 4,327. Gear 9 teeth | <ul style="list-style-type: none">28. Oil banjo gasket (4)29. Banjo (2)30. Banjo bolt (2)31. Oil line 325 mm32. Oil line 325 mm33. Clamp (4)34. Taptite screw M5 x 16 (4)35. Rubber ring36. Retainer37. O-ring38. Plate39. Screw with lock washer (8)40. Stop pin41. Gasket42. Plate43. Washer44. Hexagonal screw M6 x 745. Spring46. Washer47. Lever48. Lock washer 6 mm49. Nut M650. Seal51. Gasket set52. Injection oil53. Clip54. Baffle |
|--|--|

○ NOTE: The following procedures can be done without removing the engine from chassis.

CLEANING

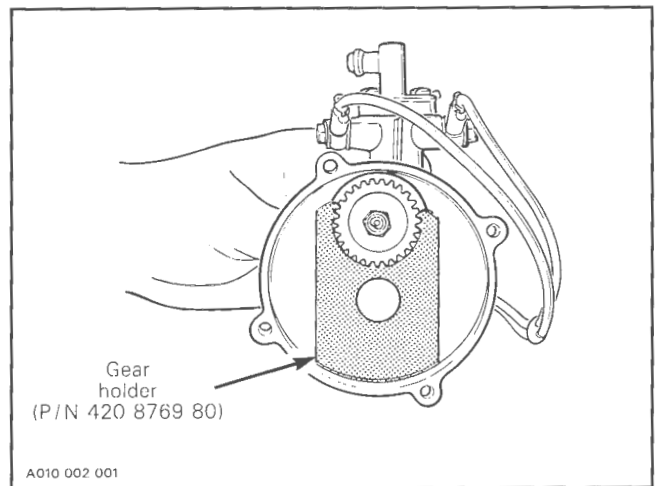
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

○ NOTE: Some oil pump components are not available as single parts.

20,21,25, Oil pump gear, lock nut 6 mm & needle roll

To remove retaining nut, first extract the needle roll with pliers then lock gear in place using tool (P/N 420 8769 80).



ASSEMBLY

20, Oil pump gear

At gear assembly, apply a light coat of low temperature grease (P/N 413 7061 00) on gear teeth.

25, Needle roll

The needle roll must be engaged as deep as possible in the pump mounting flange.

14,15,33, Spring clip & clamp

Always check for spring clips and clamps tightness.

Section 02 ENGINE

Sub-section 05 (503 ENGINE TYPE)

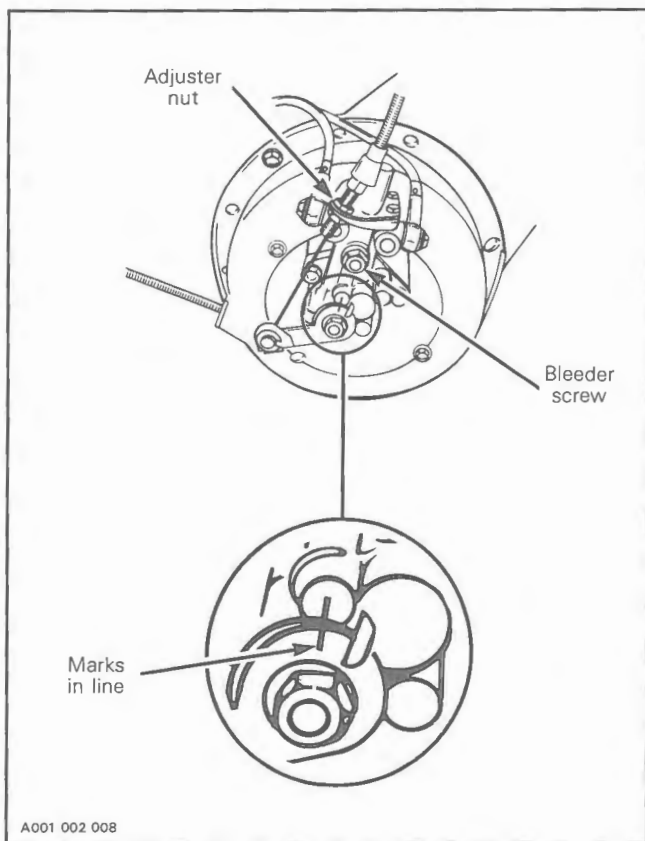
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

To synchronize pump with carburetor :

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



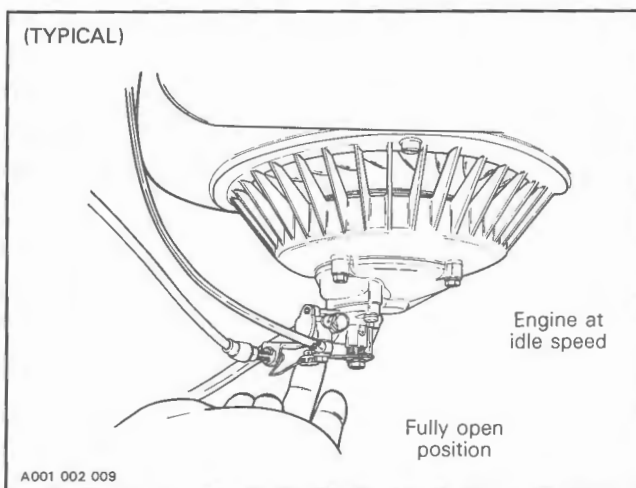
CAUTION : Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To bleed oil lines :

All oil lines should be full of oil. If required, bleed the main oil line (between reservoir and pump) by loosening the bleeder screw until all air has escaped from the line.

Make sure the reservoir is sufficiently filled.

Check the small oil lines (between pump and intake manifold). If required, fill the lines by running the engine at idle speed while holding the pump lever in fully open position.



WARNING : Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

CHECKING OPERATION

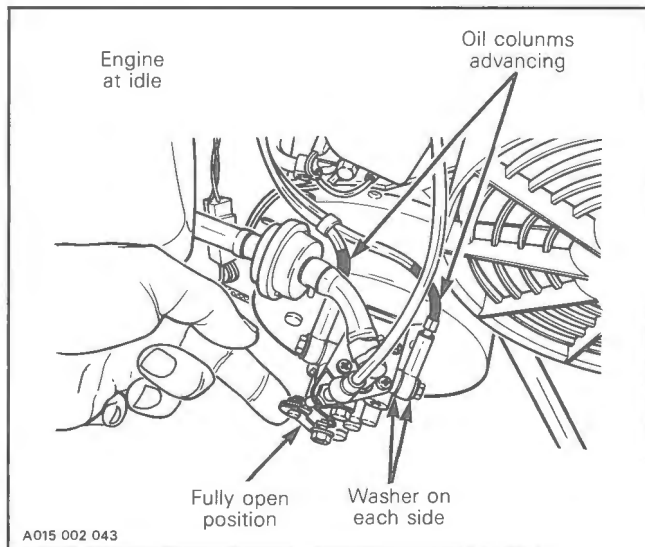
On vehicle

NOTE : Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unbolt banjo fittings from pump. Start engine and stop it as soon as it fires.

Check that oil level in small oil lines is passed banjo fitting end by about 25 mm (1 in) (this will be indicated by a clear section of small oil lines of about 25 mm (1 in)). Repeat the procedure until this condition is attained.

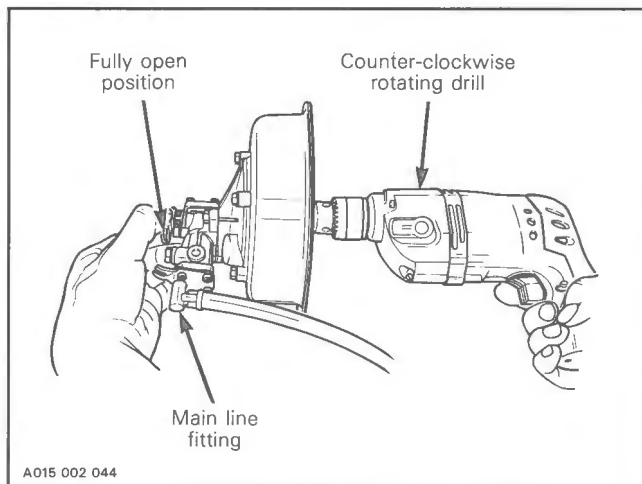
Reconnect banjo fittings with a washer on each side, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.



If not remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

Test bench

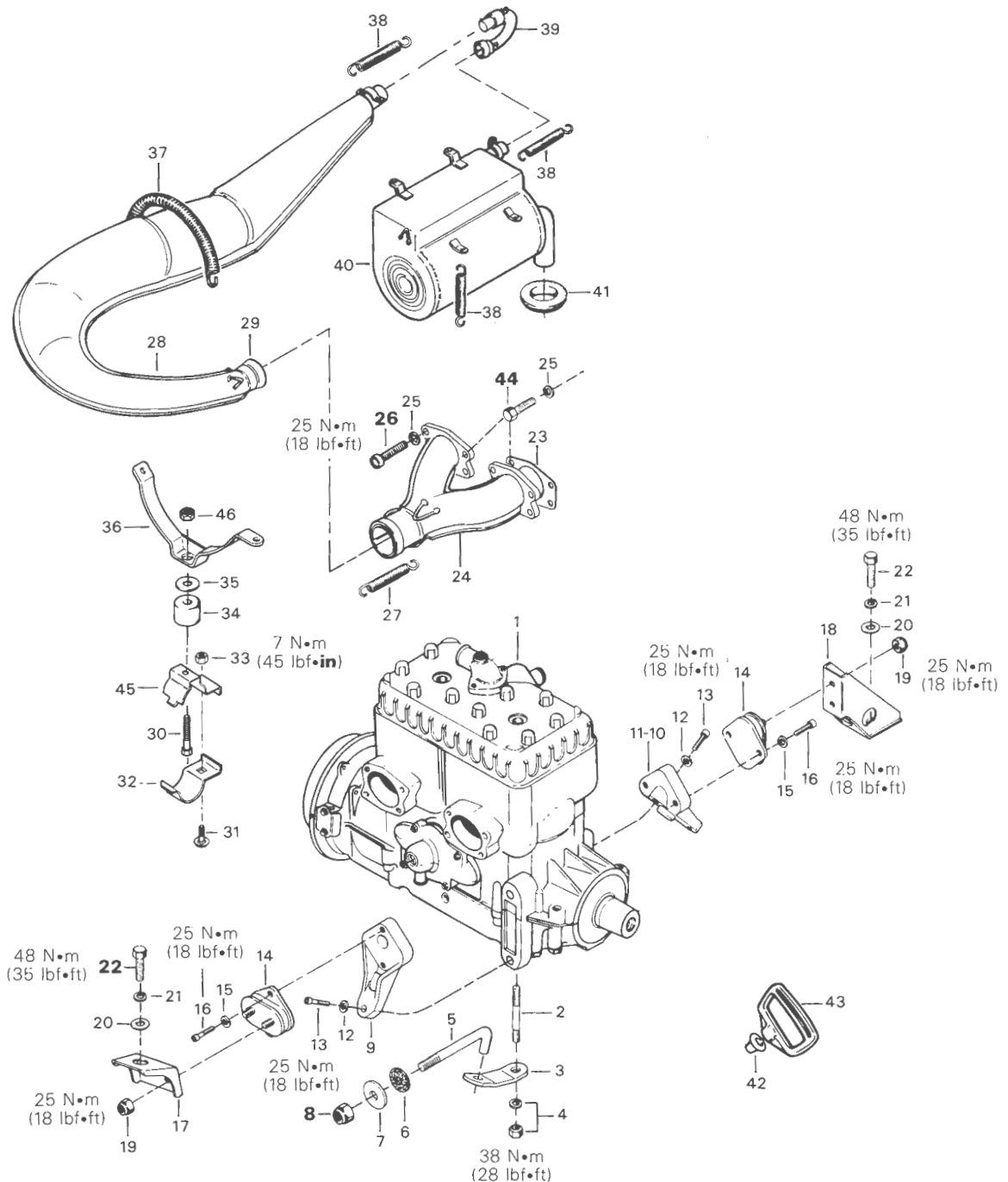
Connect a hose filled with injection to main line fitting. Insert other hose end in an injection oil container. Using a counter-clockwise rotating drill rotate pump shaft. Oil must drip from outer holes while holding lever in a fully open position. If not replace pump.



536 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION

Engine support & muffler



Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

- | | |
|---|---|
| 1. 536 engine | 24. Exhaust manifold |
| 2. Stud M10 x 18/18 | 25. Lock washer 8 mm |
| 3. Clamp | 26. Cylindrical screw M8 x 30 (6) |
| 4. Hexagonal elastic stop nut M10 | 27. Spring |
| 5. Support | 28. Single exhaust pipe |
| 6. Rubber washer | 29. Female ball joint |
| 7. Washer | 30. Hexagonal head cap screw M6 x 30 |
| 8. Hexagonal elastic stop nut M10 | 31. Carriage bolt M6 x 20 |
| 9. Front support (2) | 32. Lower bracket |
| 10. Right rear support | 33. Flanged elastic hexagonal stop nut M6 |
| 11. Left rear support | 34. Rubber spacer |
| 12. Lock washer 8 mm (8) | 35. Asbestos washer |
| 13. Allen screw M8 x 25 (8) | 36. Exhaust pipe support |
| 14. Bounding rubber mount (4) | 37. Spring |
| 15. Lock washer 8 mm (8) | 38. Spring (6) |
| 16. Allen screw M8 x 20 (8) | 39. Tail pipe |
| 17. Front support (2) | 40. Muffler |
| 18. Rear support (2) | 41. Exhaust grommet |
| 19. Flanged hexagonal elastic stop nut M8 (8) | 42. Rubber buffer |
| 20. Lock washer (4) | 43. Starter grip |
| 21. Spring lock washer 10 mm (4) | 44. Cap screw M8 x 30 (2) |
| 22. Hexagonal head cap screw M10 x 20 (4) | 45. Upper bracket |
| 23. Gasket (2) | 46. Nut M8 |
-

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle :

- air silencer
- pulley guard and drive belt
- throttle cable from carburetors, oil injection pump
- fuel lines, impulse line and primer tubes
- ignition coil and rotary valve reservoir
- electrical connectors and wires
- single tuned pipe
- rewind starter
- engine torque rod nut (item #8)

Drain the cooling system and disconnect hoses from the engine (see "Cooling system" in this section).

Remove the four screws retaining engine supports to frame.

ENGINE SUPPORT & MANIFOLD DISASSEMBLY & ASSEMBLY

22,26,44, Engine support screw & manifold screw


Torque the engine support screws to 48 N•m (35 lbf•ft).

Torque manifold screws to 25 N•m (18 lbf•ft).

INSTALLATION ON VEHICLE

To install on vehicle, reverse removal procedure. However, pay attention to the following :

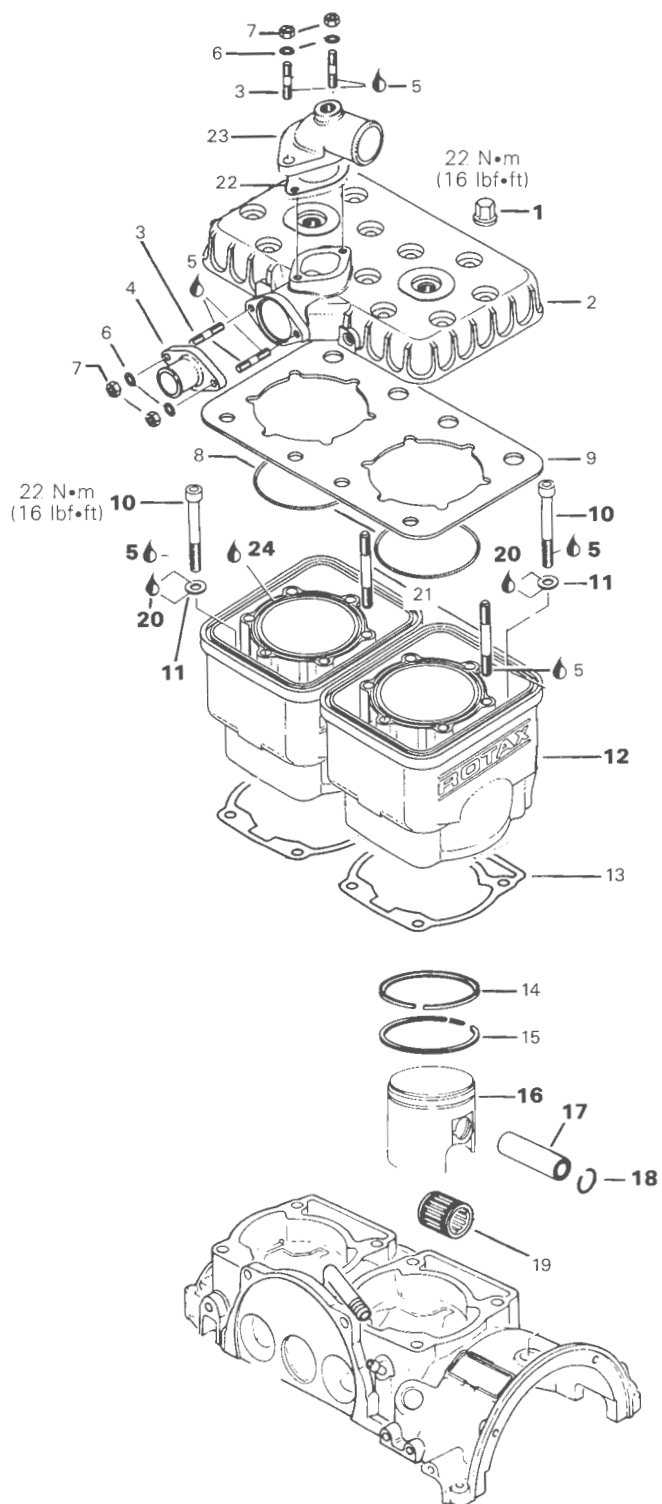
- Check tightness of engine rubber mounts screws and support nuts. Torque to 25 N•m (18 lbf•ft).
- Verify throttle cable condition then after throttle cable installation, check carburetor maximum throttle opening and oil injection pump adjustment.
- Check pulley alignment and drive belt tension.

 **CAUTION :** A red dot is printed on one carburetor and on oil pump mounting flange. Match the marked carburetor to the marked side of the oil pump mounting flange (magneto side). This procedure is required because of the different jettings.

- Should a light exhaust leak be experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits should seal joint.

Section 02 ENGINE
Sub-section 06 (536 ENGINE TYPE)


TOP END



Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

- | | |
|---------------------------------------|-----------------------------------|
| 1. Cap nut M8 (12) | 13. Cylinder/crankcase gasket (2) |
| 2. Cylinder head | 14. I-ring |
| 3. Stud M6 x 15 (4) | 15. Rectangular-ring |
| 4. Coolant outlet collar | 16. Piston |
| 5. Loctite 242 blue (medium strength) | 17. Gudgeon pin |
| 6. Lock washer 6 mm (4) | 18. Circlip (4) |
| 7. Nut M6 (4) | 19. Needle bearing |
| 8. Gasket (O-ring) (2) | 20. Silastic 732 RTV |
| 9. Gasket | 21. Stud M8 x 50 (12) |
| 10. Cylindrical screw M8 x 70 (8) | 22. Gasket |
| 11. Flat washer 8.4 (8) | 23. Water outlet socket |
| 12. Cylinder (2) | 24. Loctite 515 |


 **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, cylinder head and piston dome using a wooden spatula.

 **NOTE :** The letters «AUS» (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

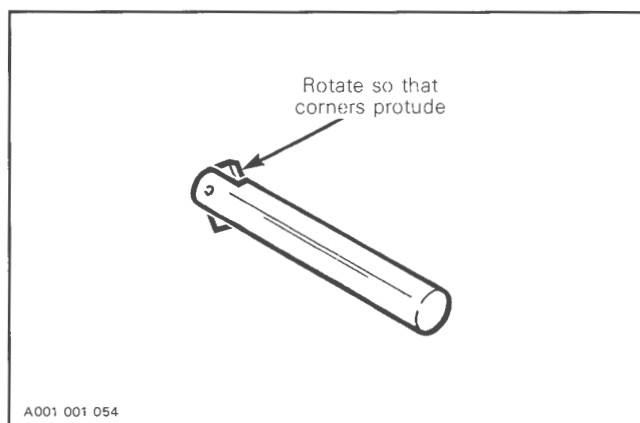
DISASSEMBLY

16,17,18, Piston, piston pin & circlip

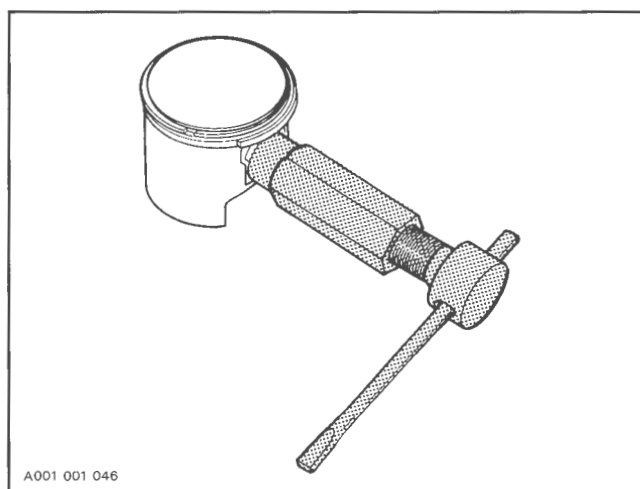
Place a clean cloth over crankcase then with a pointed tool inserted in piston notch, remove circlip from piston.


To remove piston pin, use piston pin puller (P/N 529 0068 00) as follows :

- Fully screw puller handle.
- Place stop notch of puller in line with the puller axis.
- Insert puller end into piston pin.
- Rotate stop notch of puller so that corners protude the puller end.



- Hold puller firmly and rotate puller handle counter-clockwise to pull piston pin.



 **NOTE :** 0.25 and 0.5 mm oversize piston and rings are available if necessary.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

INSPECTION

The inspection of the engine top end must include the following measurements :

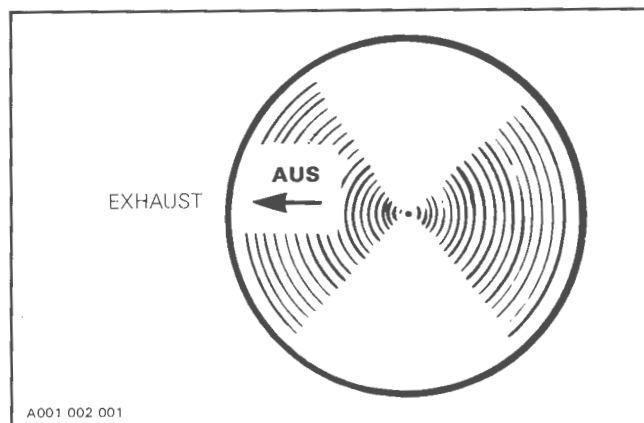
| MEASUREMENTS | TOLERANCES | | WEAR LIMIT |
|--------------------------------|--------------------------|------------------|------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | |
| Cylinder taper | N.A. | N.A. | 0.08 mm (.0031") |
| Cylinder out of round | N.A. | N.A. | 0.05 mm (.0020") |
| Cylinder / piston clearance | 0.09 mm (.0035") | 0.10 mm (.0039") | 0.20 mm (.008") |
| Ring / piston groove clearance | 0.04 mm (.002") | 0.11 mm (.004") | 0.20 mm (.008") |
| Ring end cap | 0.20 mm (.008") | 0.35 mm (.014") | 1.0 mm (.039") |

○ **NOTE :** For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

ASSEMBLY

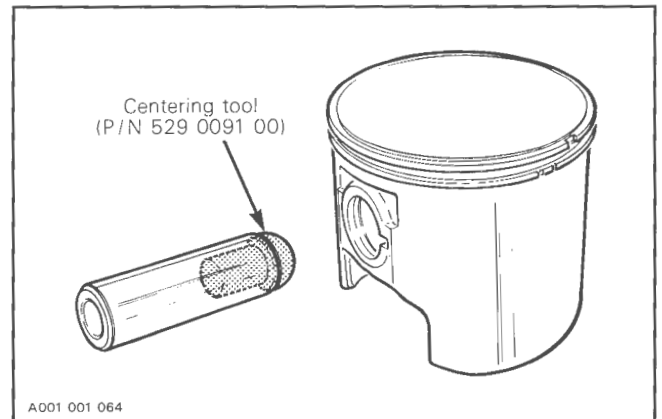
16,17,18 Piston, piston pin & circlip

At assembly, place the pistons over the connecting rods with the letters «AUS» (over an arrow on the piston dome) facing in direction of the exhaust port.



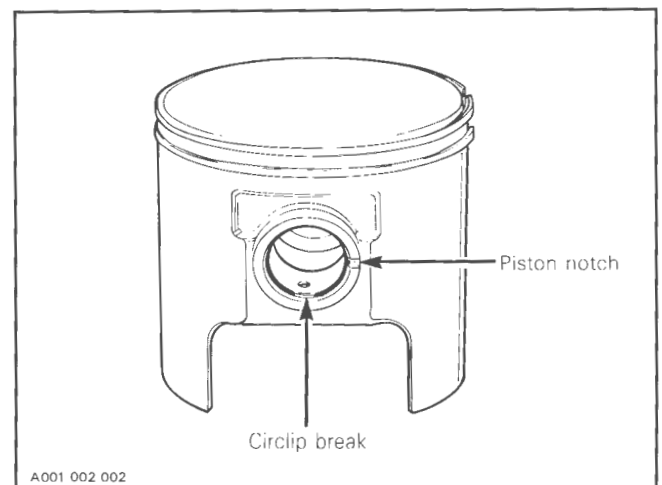
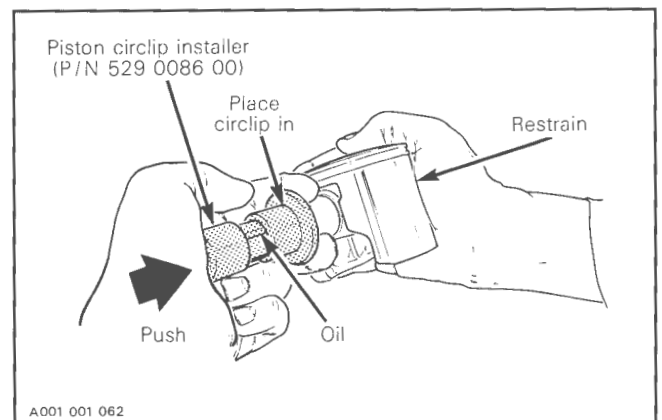
○ **NOTE :** Spare parts pistons and cylinders are identified with a green or red dot, it is important to match the piston with the cylinder of the same color.

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00).



○ **NOTE :** The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0086 00).



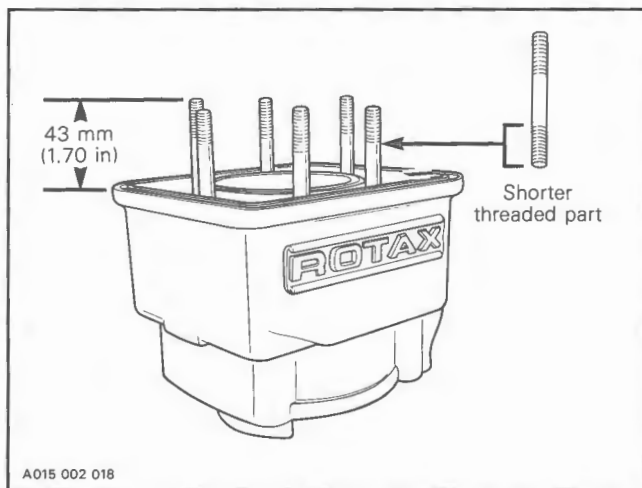
Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

▼ **CAUTION :** Circlips must not move freely after installation if so, replace them.

12,21, Cylinder & cylinder head stud

Because of cap nuts, cylinder head studs have to be screwed into the cylinder so that they do not protrude by more than 43 mm (1.70 in). If it is not possible to obtain this length, add a washer between cylinder head and cap nut. Shorter threaded part of stud should be screwed into cylinder.

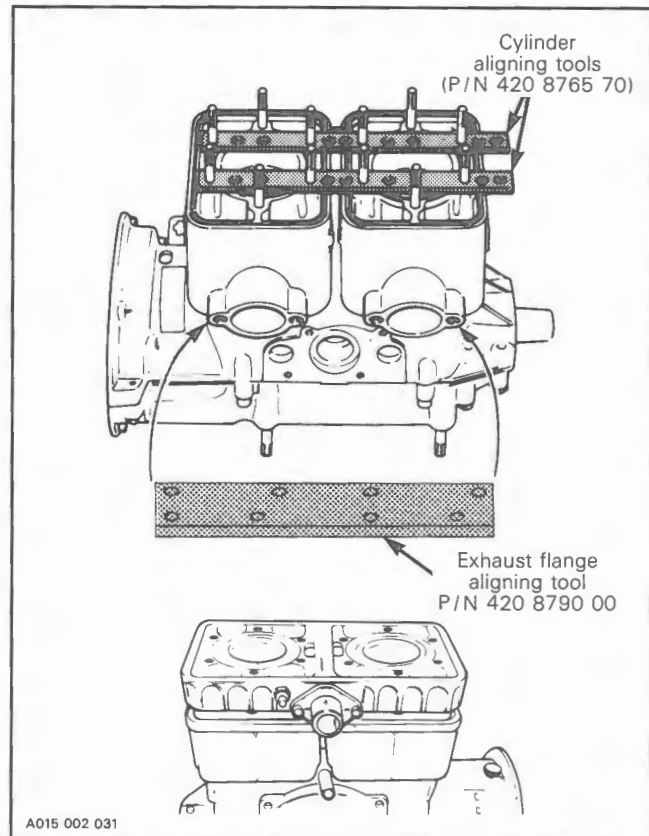


Install ring compressor (P/N 420 8769 70) on piston assembly.

○ **NOTE :** The ring compressor will not fit on oversize piston.

12, Cylinder

When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. Cylinder aligning tool (P/N 420 8765 70) or cylinder head itself can be used to align the cylinders. Prior to torquing cylindrical screws, install exhaust flange aligning tool (P/N 420 8769 00) or exhaust manifold itself to properly align exhaust flanges.

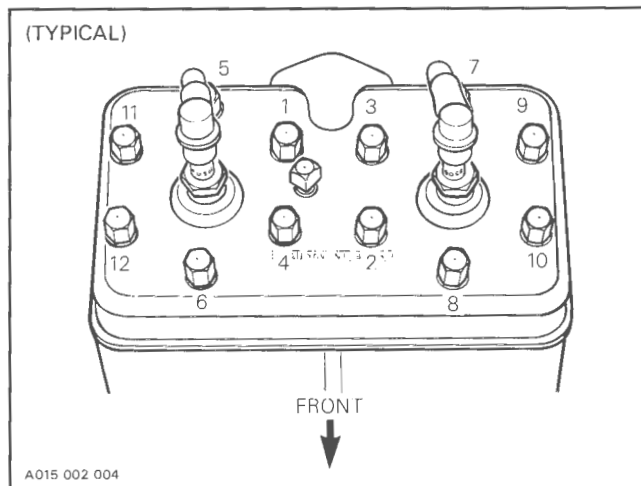


5,10,11,20, Loctite 242, cylindrical screw, flat washer & silastic 732 RTV

Apply silastic 732 RTV (P/N 747 0020 00) on washers and Loctite 242 on screw threads. Torque cylindrical screws in a criss-cross pattern to 22 N•m (16 lbf•ft).

1, Cylinder head nut

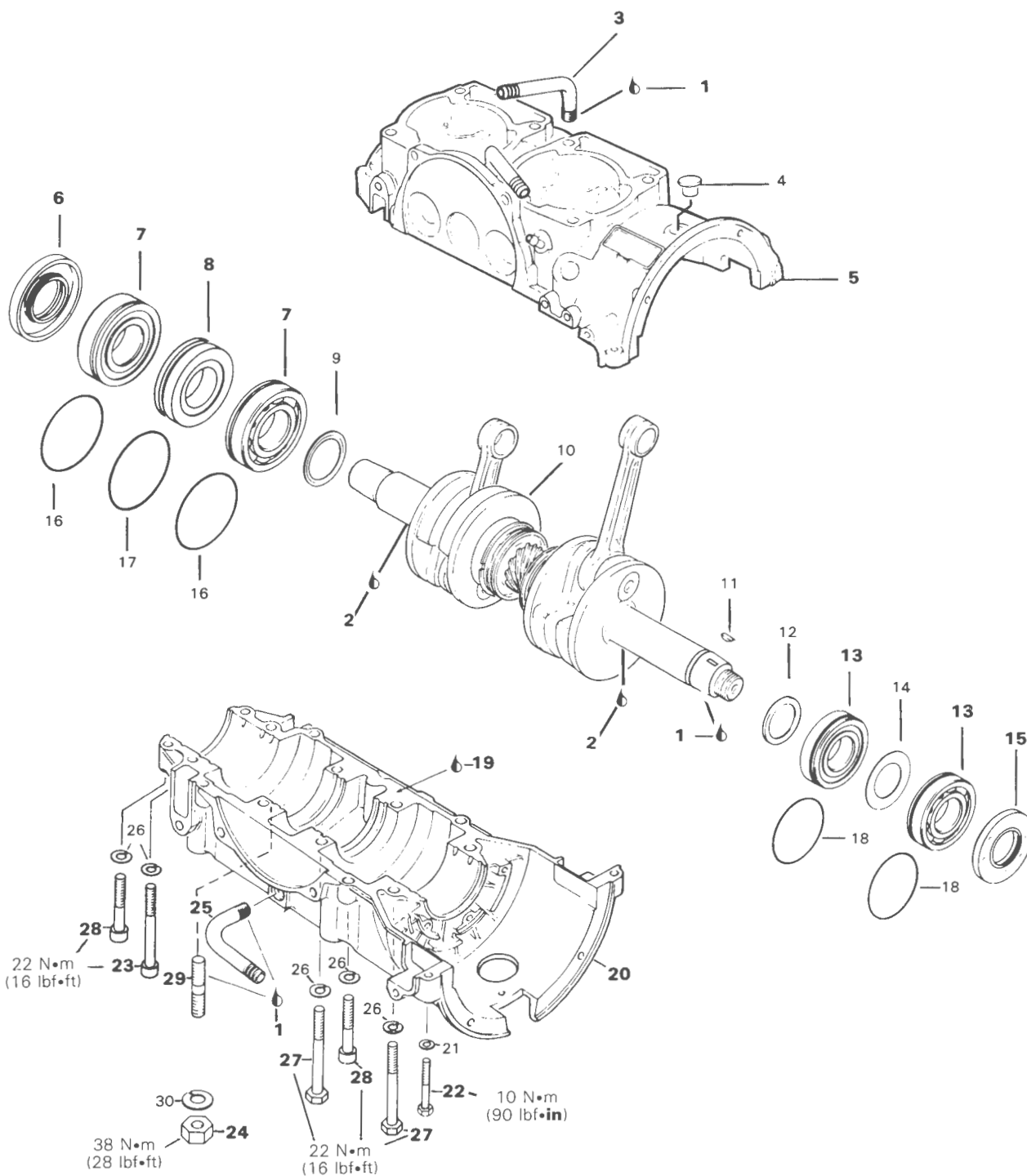
Torque cylinder head nuts to 22 N•m (16 lbf•ft) following illustrated sequence.



Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

BOTTOM END




Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

1. Loctite 242
2. Anti-seize lubricant
3. Angular tube, oil inlet
4. Plug
5. Crankcase upper half
6. Seal
7. Ball bearing 6207 (2)
8. Labyrinth sleeve
9. Distance ring
10. Crankshaft
11. Woodruff key 3 x 3,7
12. Distance ring
13. Ball bearing 6206 (2)
14. Shim 1 mm
15. Seal


16. O-ring (2)
17. O-ring
18. O-ring (2)
19. Loctite 515
20. Crankcase lower half
21. Lock washer 6 mm (2)
22. Hexagonal screw M6 x 35 (2)
23. Cylinder screw M8 x 75 (2)
24. Hexagonal nut M10
25. Angular tube, oil outlet
26. Lock washer 8 mm (14)
27. Hexagonal screw M8 x 65 (6)
28. Cylinder screw M8 x 45 (6)
29. Stud M10 x 42
30. Lock washer 10 mm

 **NOTE :** Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings.
Clean all metal components in a non-ferrous metal cleaner.

Remove old Loctite from crankcase mating surfaces with Bombardier sealant stripper (P/N 413 7021 00).

 **CAUTION :** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

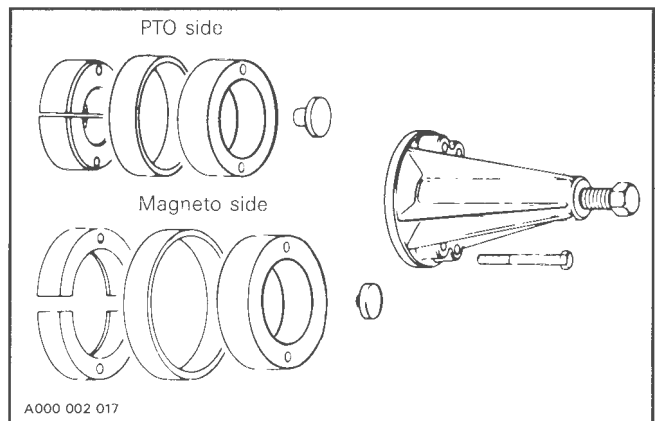
General

To remove drive pulley, refer to "Drive pulley", section 03-03.

To remove magneto, refer to "Magneto" in this section.

7,13, Crankshaft bearing

To remove bearings from crankshaft, use a protective cap and special puller, as illustrated (see "Tools" section).



INSPECTION

The inspection of the engine bottom end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | |
|-----------------------------------|-----------------------------|--------------------|--------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | WEAR LIMIT |
| Crankshaft deflection | N.A. | N.A. | 0.08 mm (.003") |
| Connecting rod big end axial play | 0.40 mm (.016") | 0.73 mm (.029") | 1.2 mm (.047") |

 **NOTE :** For the measurement procedures, refer to "Engine Dimensions Measurement", section 02-09.

Section 02 ENGINE

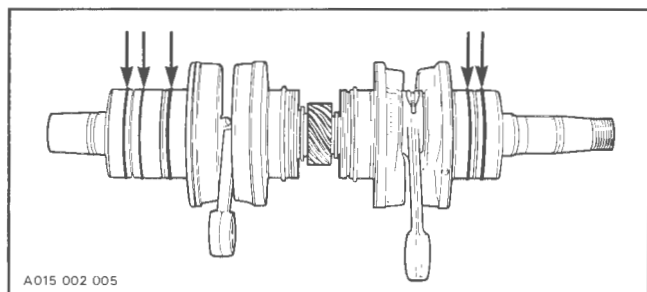
Sub-section 06 (536 ENGINE TYPE)

ASSEMBLY

2,7,8,13, Anti-seize lubricant, crankshaft bearing & labyrinth sleeve

Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with oil previously heated to 75°C (167°F). This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration.

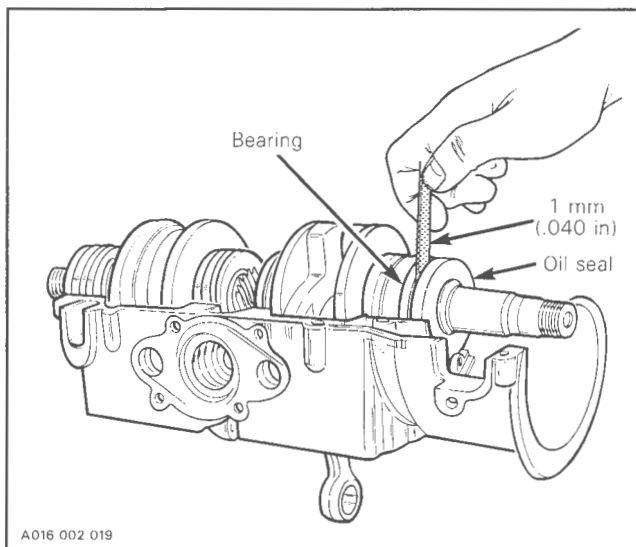


6,15, Seal

At seal assembly, apply a light coat of lithium grease on seal lips.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain seals (seal without locating ring or without spacing legs), ensure to maintain the specified gap as illustrated. For seals with spacing legs, install them against the bearing.



5,19,20, Upper crankcase, Loctite 515 & lower crankcase

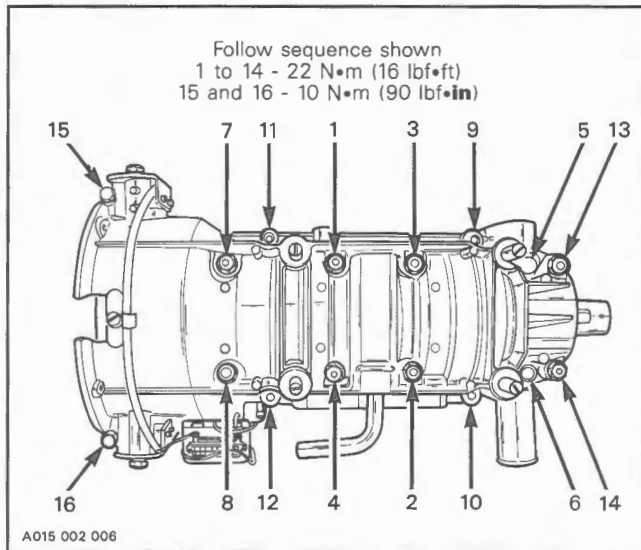
Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of Loctite 515 (P/N 413 7027 00) on mating surfaces.

○ **NOTE :** Prior to applying Loctite 515 it is possible to use primer N (P/N 413 7053 00) or primer NF (P/N 413 7024 00). It increases cure speed and gap filling capability. Refer to supplier instructions.

▼ **CAUTION :** Before joining crankcase halves be sure that crankshaft rotary valve gear is well engaged with rotary valve shaft gear.

Position the crankcase halves together and tighten bolts by hand then install and tighten armature plate on magneto side to correctly align crankcase halves. Torque bolts as specified following illustrated sequence.

Section 02 ENGINE
Sub-section 06 (536 ENGINE TYPE)



○ **NOTE :** Torque the two smaller bolts (15 and 16) on magneto side to 10 N•m (90 lbf•in).

1,3,25, Loctite 242, angular tube (oil inlet & oil outlet) & cover screw

Apply Loctite 242 on threads prior to assembly angular tubes.

23,27,28, Crankcase M8 Screw

Torque the crankcase M8 screws to 22 N•m (16 lbf•ft). Install them as per exploded view.

22, Crankcase M6 screw

Torque the crankcase M6 screws to 10 N•m (90 lbf•in).

1,29, Loctite 242 & crankcase stud

At assembly on crankcase, apply Loctite 242 on stud threads.

24, Crankcase/engine bracket nut

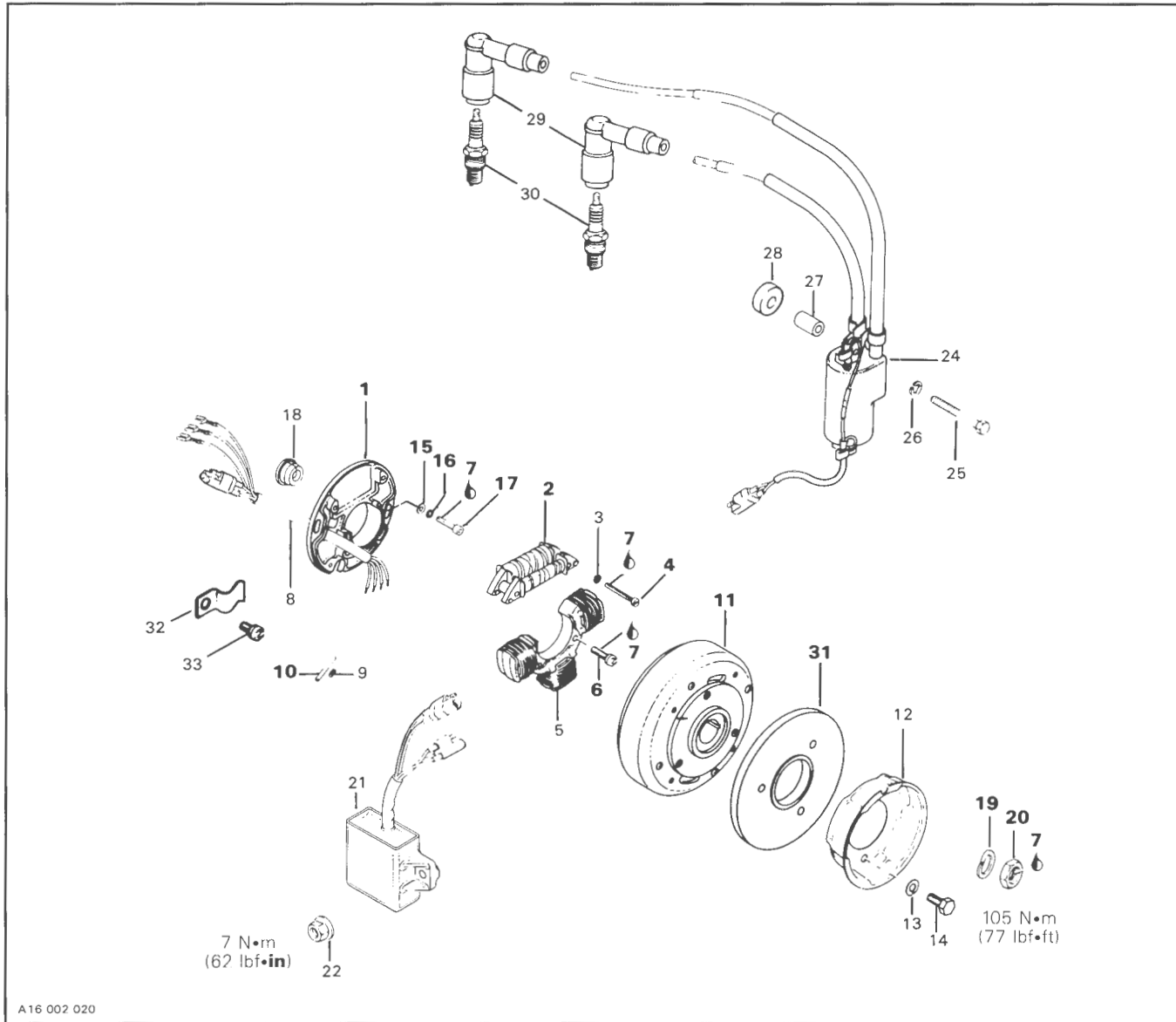
Torque the crankcase/engine bracket nut to 38 N•m (28 lbf•ft).

To install magneto, refer to "Magneto" in this section.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

MAGNETO



A16 002 020

- | | |
|---|---|
| 1. Armature plate | 17. Allen screw M5 x 18 (2) |
| 2. Generating coil | 18. Cable grommet |
| 3. Lock washer 5 mm (2) | 19. Lock washer 22 mm |
| 4. Cylindrical slotted head screw M5 x 35 (2) | 20. Hexagonal nut 22 x 1.5 mm |
| 5. Lighting coil | 21. C.D. box |
| 6. Screw M6 x 25 (2) | 22. Flanged elastic hexagonal stop nut M6 (2) |
| 7. Loctite 242 (blue, medium strength) | 23. Ignition coil |
| 8. Harness | 24. Hexagonal screw M6 x 85 (2) |
| 9. Splice connector (6) | 25. Lock washer 6 mm (2) |
| 10. Protector tube (6) | 26. Spacer (2) |
| 11. Flywheel | 27. Insulator |
| 12. Starting pulley | 28. Spark plug protector (2) |
| 13. Lock washer 8 mm (3) | 29. Spark plug (2) |
| 14. Hexagonal screw M8 x 16 (3) | 30. Flywheel counterweight |
| 15. Washer 5.5 mm (2) | 31. Clamp |
| 16. Lock washer 5 mm (2) | 32. Screw M4 x 8 mm |

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

○ **NOTE :** The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION :** Clean armature and magneto using only a clean cloth.

DISASSEMBLY

To gain access to magneto assembly, remove :

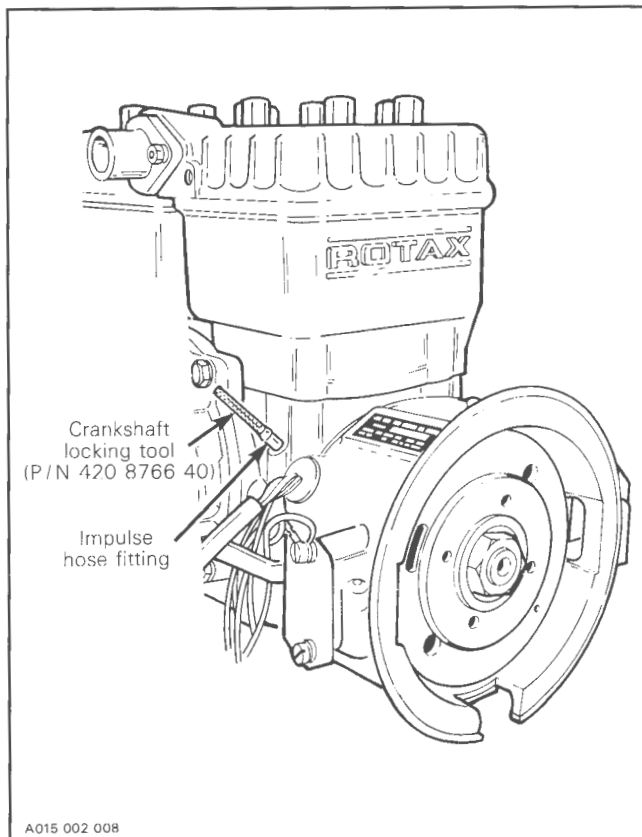
- muffler
- rewind starter
- starting pulley

○ **NOTE :** Before disassembling magneto plate, indexing marks should be scribed to facilitate reassembly.

20, Flywheel retaining nut

To remove magneto flywheel retaining nut :

- Lock crankshaft with crankshaft locking tool as illustrated.
- Remove magneto retaining nut.

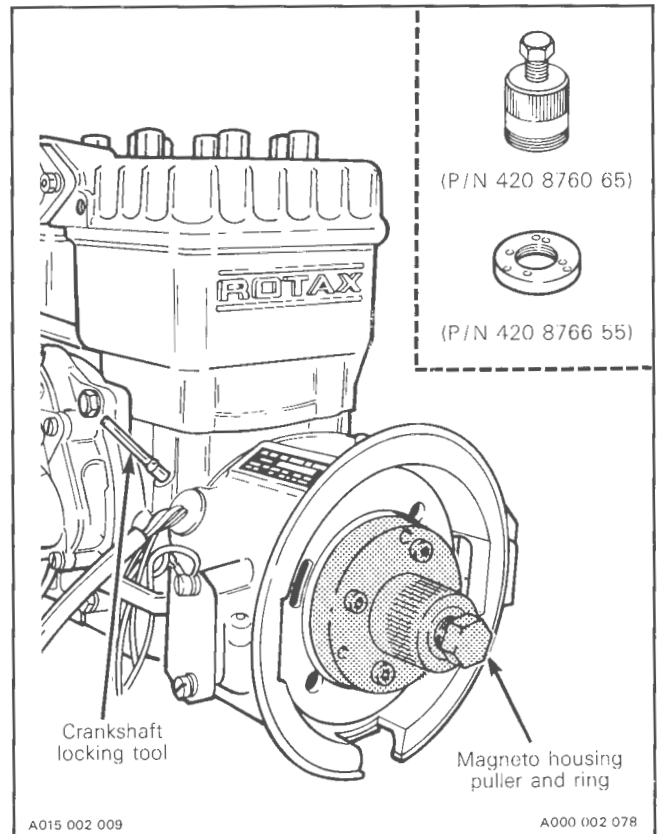


○ **NOTE :** It should be noted that to correctly remove a Loctite locked fastener it is first necessary to tap on the fastener to break the Loctite bond. This will eliminate the possibility of thread breakage.

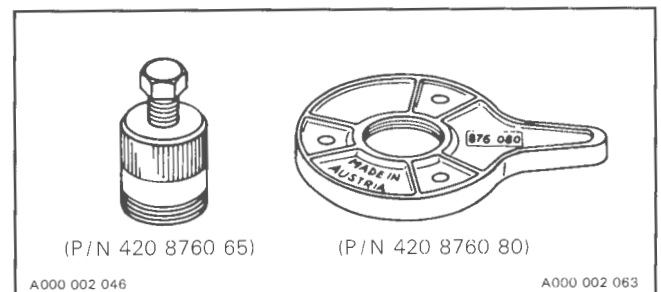
11, Flywheel

To remove magneto housing (flywheel) :

- Lock crankshaft with crankshaft locking tool as illustrated.
- Adjust magneto housing puller and puller ring as illustrated.



○ **NOTE :** For the above procedure, the locking type puller can be used without crankshaft locking tool.



Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

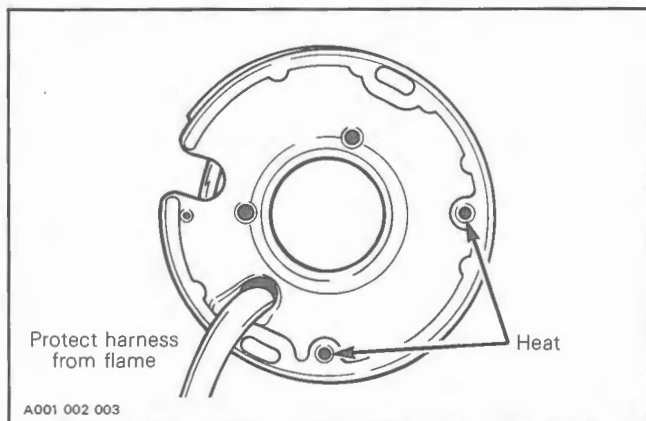
- Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

2, Generating coil

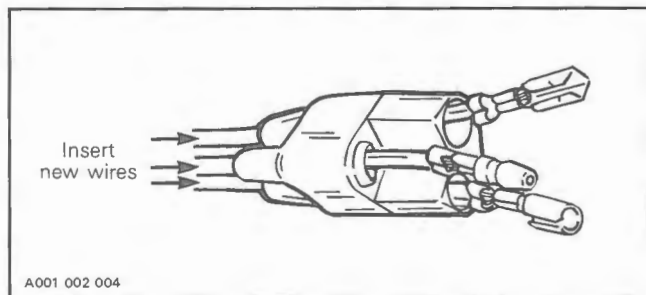
To replace generating coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



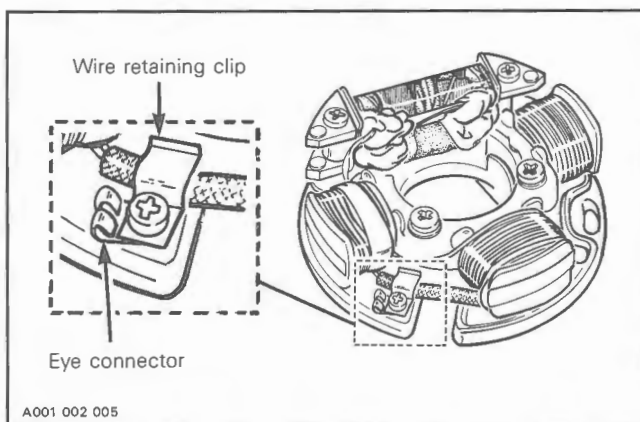
▼ **CAUTION :** Protect harness from flame.

- Remove screws (use Phillips no 2 or suitable flat screwdriver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector housing and install connectors.



▼ **CAUTION :** Replace the old wires in the connector with the same color coded new wires.

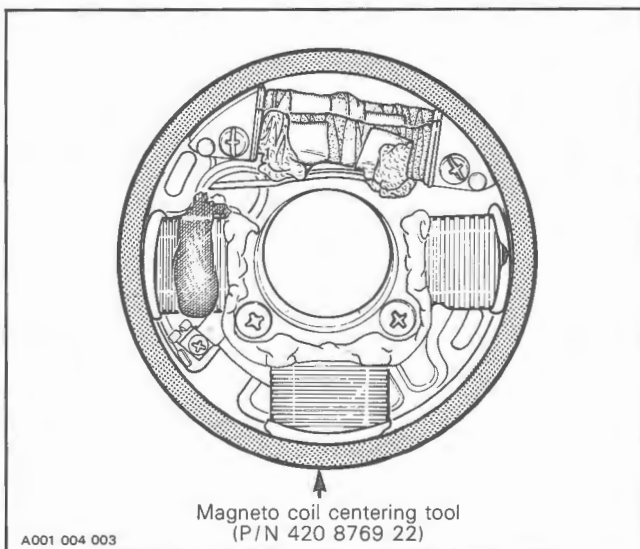
- Install a new receptacle connector to the black /yellow striped wire.
- To install the ground connector to the armature plate, tape the new black lead to the old one and pull it under the lighting coil with the old wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.



4,7, Generating coil screw & Loctite 242

To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



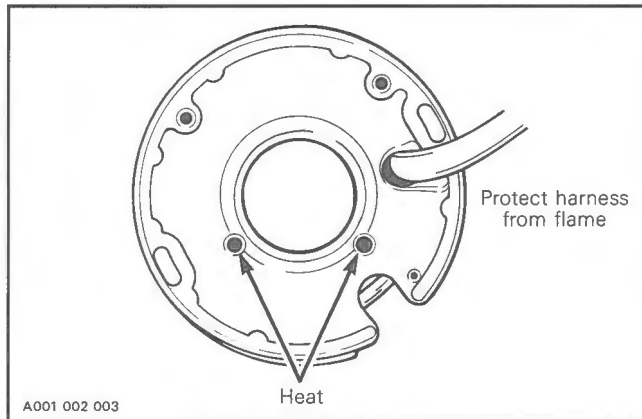
▼ **CAUTION :** Before reinstalling the magneto, remove the loose epoxy from harness.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

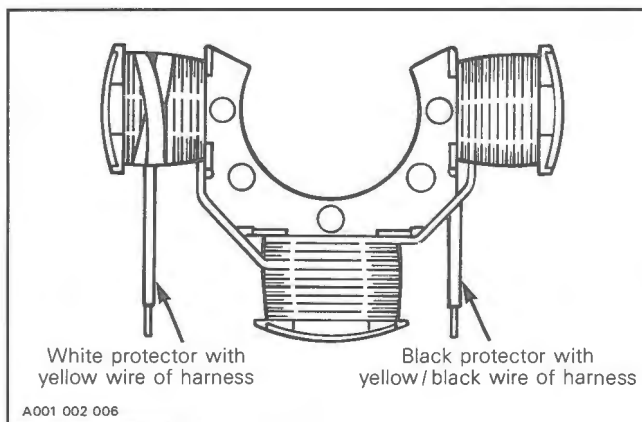
To replace lighting coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



CAUTION : Protect harness from flame.

- Remove screws (use Phillips no 3 screwdriver).
- Remove the wire retaining clip from armature plate.
- Pull out protector tubes and unsolder the splice connectors.
- Solder the yellow wire in the harness to the white tube protected wire of the coil.
- Solder the yellow/black striped wire in the harness to the black tube protected wire of the coil.



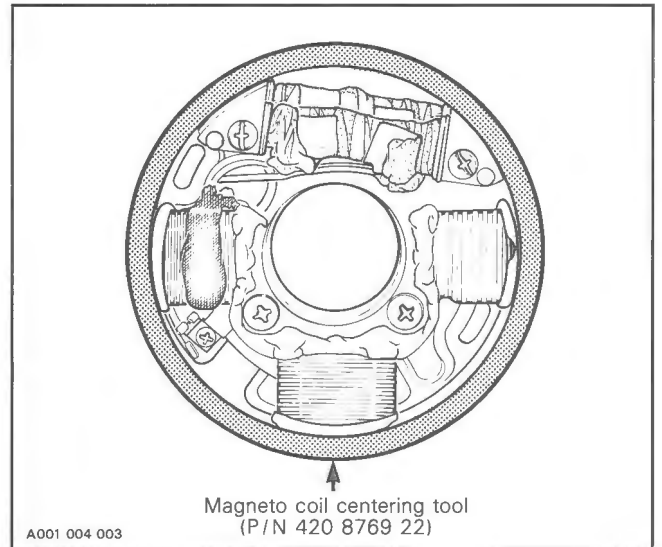
10, Protector tube

Position protector tubes over connections.

6,7, Lighting coil screw & Loctite 242

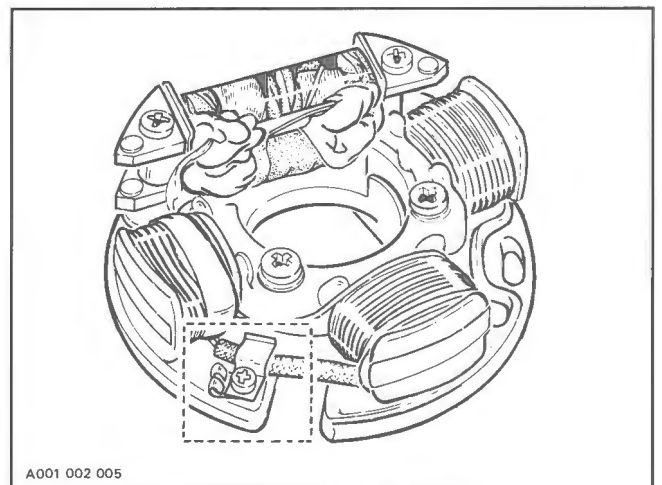
Prior to assembly, apply Loctite 242 (blue, medium strength).

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



- Fasten retaining clip onto protector tubes.

The ground terminal from generating coil must be fastened under this clip.



CAUTION : Before reinstalling magneto, remove the loose epoxy from harness.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

ASSEMBLY

1,7,15,16,17, Armature plate, Loctite 242, washer, lock washer & screw

Position the armature plate on the crankcase, aligning the marks on both parts.

Put a drop of Loctite 242 on screw threads and tighten.

Clean crankshaft extension (taper).

Apply Loctite 242 on taper.

7,11,19,20, Loctite 242, flywheel, lock washer & nut

Position Woodruff key, magneto flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 105 N•m (77 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 7017 00) to prevent corrosion or moisture penetration.



CAUTION: Do not use silicone “sealant”, this product will corrode contacts.

30, Flywheel counterweight

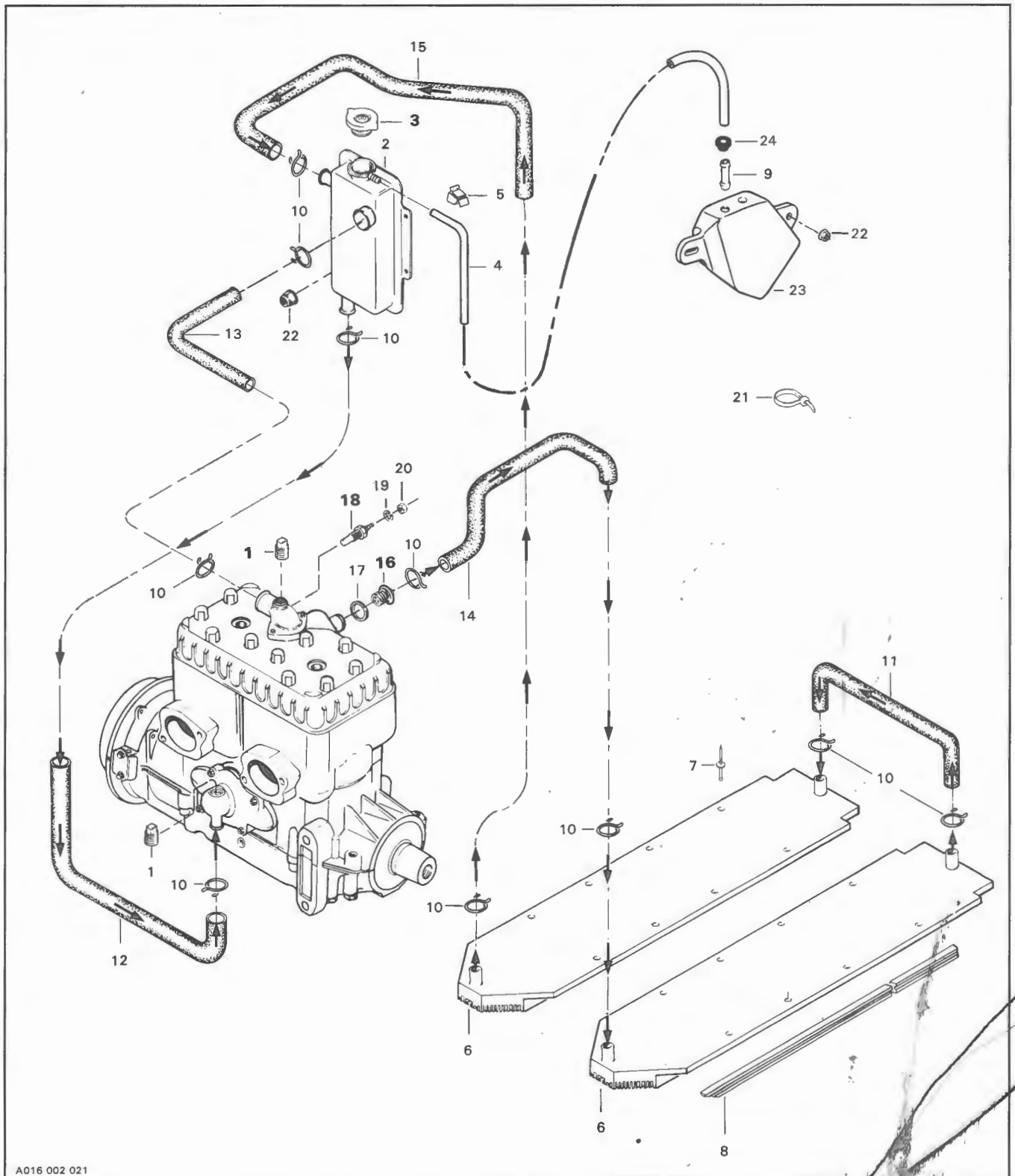
Whenever reassembling counterweight on flywheel, align marks from both parts.



NOTE: For ignition timing procedure refer to “Ignition timing”, section 04-02.

Section 02 ENGINE
Sub-section 06 (536 ENGINE TYPE)

COOLING SYSTEM



Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

1. Plug
2. Coolant tank
3. Pressure cap
4. Overflow hose 20 in (510 mm)
5. Clip
6. Radiator (2)
7. Rivet
8. Radiator protector (2)
9. Male connector
10. Hose clamp (10)
11. U-hose
12. Engine inlet hose
13. Engine outlet hose
14. Radiator inlet hose
15. Radiator outlet hose
16. Thermostat
17. Sealing ring
18. Sender
19. Lock washer
20. Hexagonal nut
21. Tie rap
22. Nut (2)
23. Overflow tank
24. Grommet

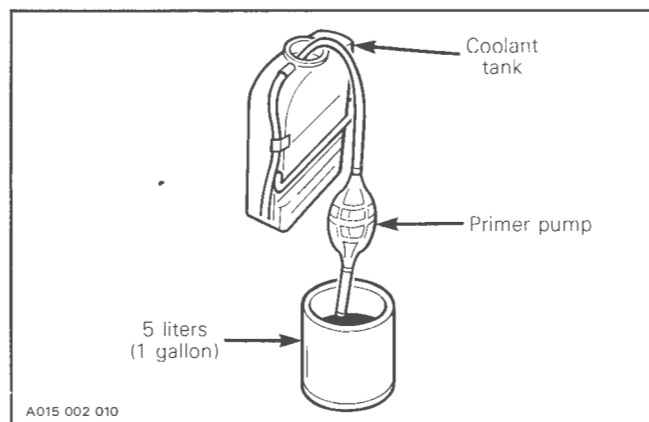
INSPECTION

Check general condition of hoses and clamp tightness.

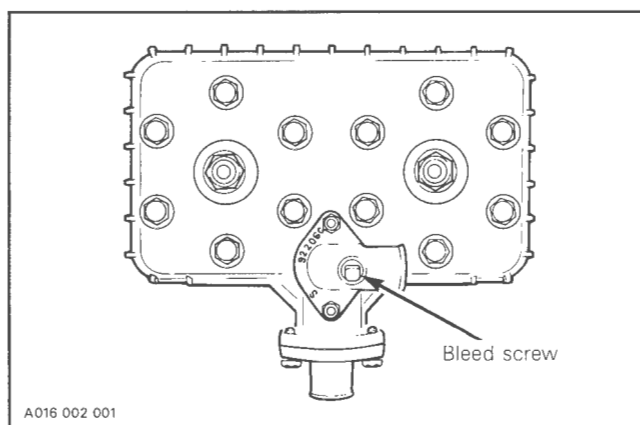
DRAINING THE SYSTEM

WARNING : Never drain or refill the cooling system when engine is hot.

To drain the cooling system, siphon the coolant mixture from the coolant tank, using a primer pump and length of plastic hose and steel tubing inserted as deep as possible into the lower hose of the tank.



When the coolant level is low enough, remove the engine bleed screw and lift the rear of vehicle to drain the radiators.



DISASSEMBLY & ASSEMBLY

1,18, Plug & sender

Apply thread sealant on sender and plug to avoid leaks.

3, Pressure cap

Check if the cap pressurizes the system. If not, install a new 90 kPa (13 PSI) cap. Do not exceed this pressure.

6,8, Radiator & radiator protector

Insert radiator protector into radiator C-rail and crimp C-rail at both ends.

16, Thermostat

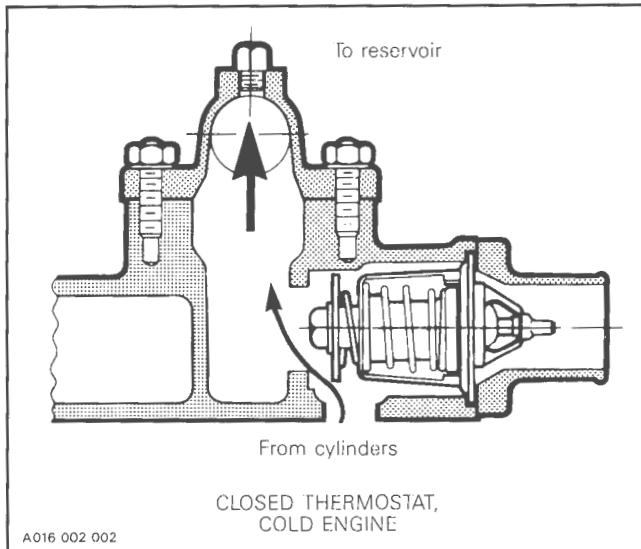
To check thermostat, put it in water and heat the water. Thermostat should open when water temperature reaches 42°C (107°F).

This thermostat is a "double action type".

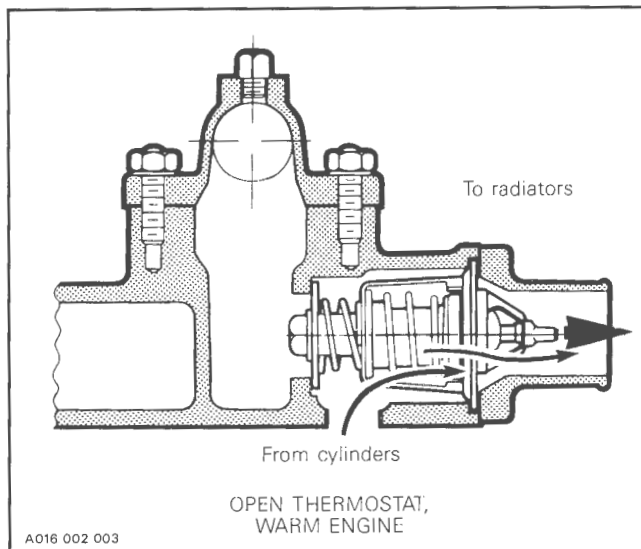
A- Its function is to give a faster warm up of the engine by provoking a circuit; water pump - engine - reservoir. This is done by closing the radiators circuit.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)



B- When the liquid is warmed to 42°C (107°F), the thermostat opens the circuit, water pump - engine - radiators - reservoir to keep the liquid at the desired temperature. (See the diagram of the exploded view).



These two functions have the advantage of preventing a massive entry of cold water into the engine.

REFILLING THE SYSTEM

Capacity :

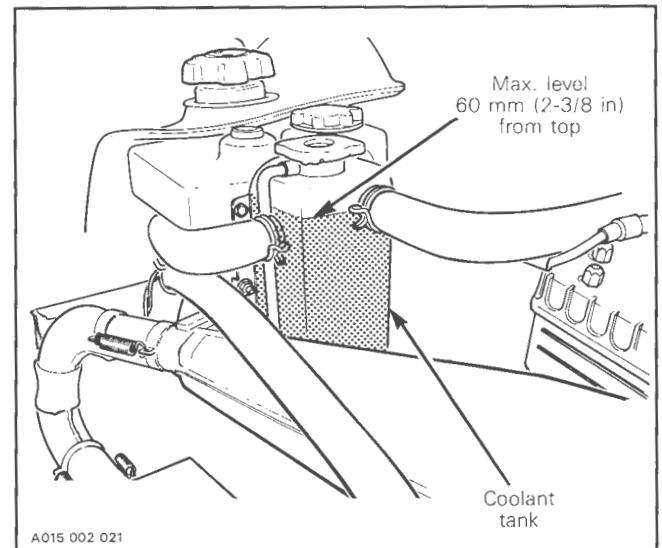
Approximately 4.2 liters (148 Imp. oz, 142 U.S. oz)

60 % antifreeze + 40 % water

▼ **CAUTION :** To prevent rust formation or freezing condition, always replenish the system with 60 % antifreeze and 40 % water. Pure antifreeze without water produces premature freezing. Always use ethylen-glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

To refill cooling system :

- Put back the rear of vehicle on the ground.
- Refill coolant tank slowly until coolant overfills at bleed hole.
- Reinstall bleed screw.
- Continue to pour coolant in the tank until level reaches 60 mm (2-3/8 in) below top of tank (engine cold).

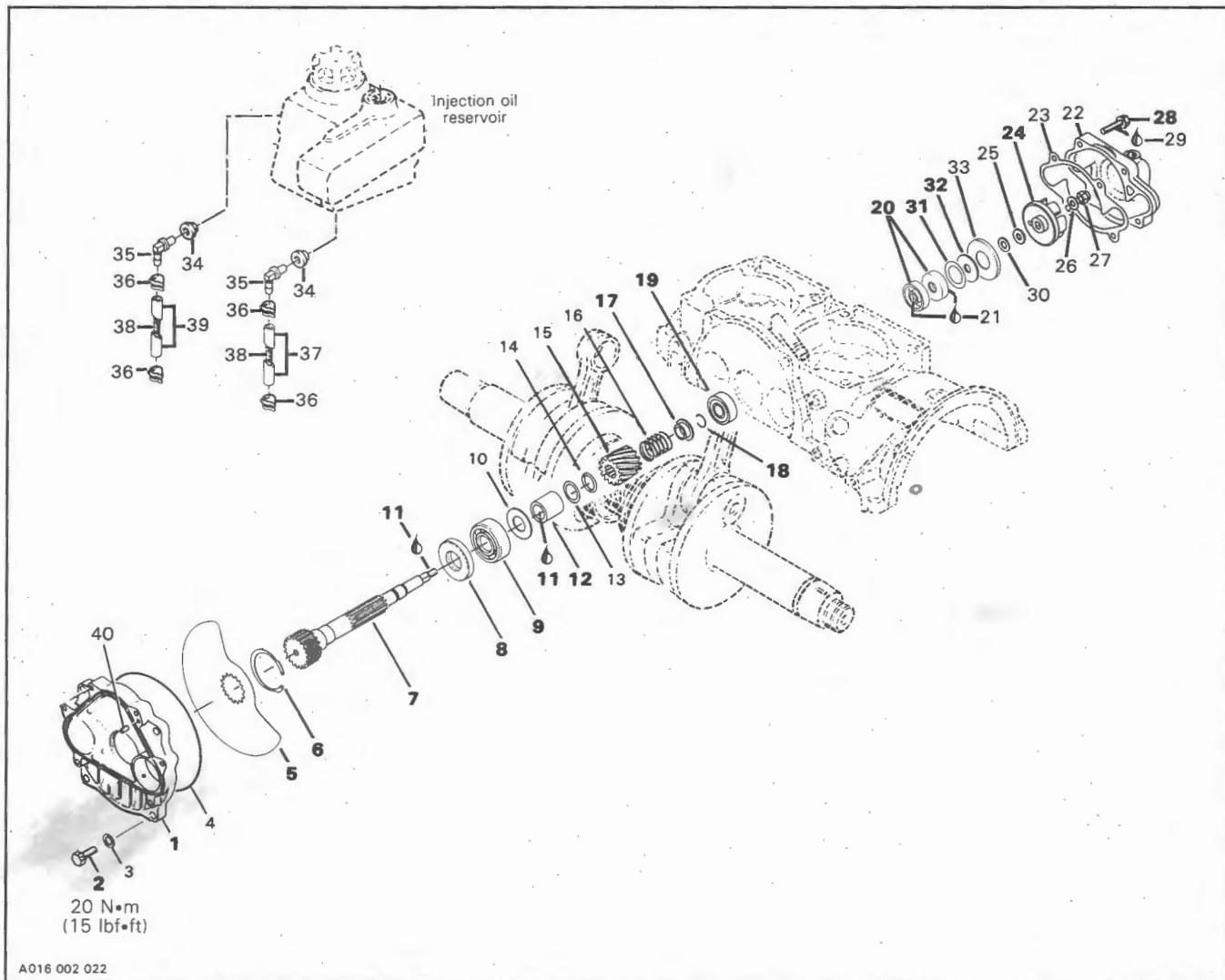


- With the coolant tank cap still removed, start engine and let it warm to reach its normal operating temperature and thermostat open. Allow it running a few minutes more.
- Stop engine and check coolant freezing point with a suitable tester. Coolant must be strong enough for the temperature in which the vehicle is operated.
- Recheck coolant level and add liquid if required. Put back the tank cap.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

ROTARY VALVE, COOLANT PUMP & RESERVOIR



- | | |
|-----------------------------|-----------------------------------|
| 1. Rotary valve cover | 21. Lithium grease |
| 2. Bolt M8 x 20 (4) | 22. Pump housing |
| 3. Lock washer 8 mm (4) | 23. Gasket |
| 4. O-ring | 24. Pump impeller |
| 5. Rotary valve | 25. Washer 8.1 mm |
| 6. Circlip | 26. Washer 6.4 mm |
| 7. Rotary valve shaft | 27. Nut M6 |
| 8. Seal | 28. Bolt M6 x 25 (4) |
| 9. Bearing 6203 | 29. Loctite 242 |
| 10. Shim 0.5 mm | 30. Friction washer |
| 11. Loctite RC 609 | 31. Shim 0.5 mm |
| 12. Distance sleeve 24.5 mm | 32. Rubber washer |
| 13. Shim 0.5 mm | 33. Support plate |
| 14. O-ring | 34. Isolating washer (2) |
| 15. Gear | 35. Elbow connector (2) |
| 16. Spring | 36. Hose clamp (6) |
| 17. Spring retaining cup | 37. Oil line 7.75 in (196 mm) (2) |
| 18. Circlip | 38. Spring (2) |
| 19. Bearing 6201 | 39. Oil line |
| 20. Seal (2) | 40. Pin |

CLEANING

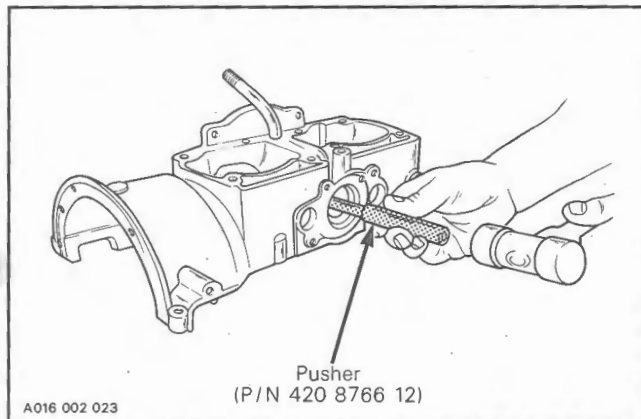
Discard all seals and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY & ASSEMBLY

6,24, Circlip & pump impeller

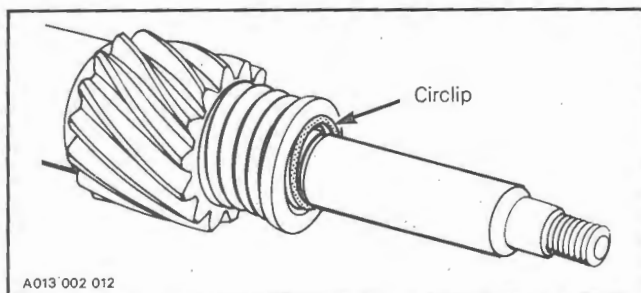
To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip. Using the suitable pusher (P/N 420 8766 12) and a fiber hammer, push shaft assembly.



CAUTION : To prevent damage to the end of the rotary valve shaft, use pusher (P/N 420 8766 12).

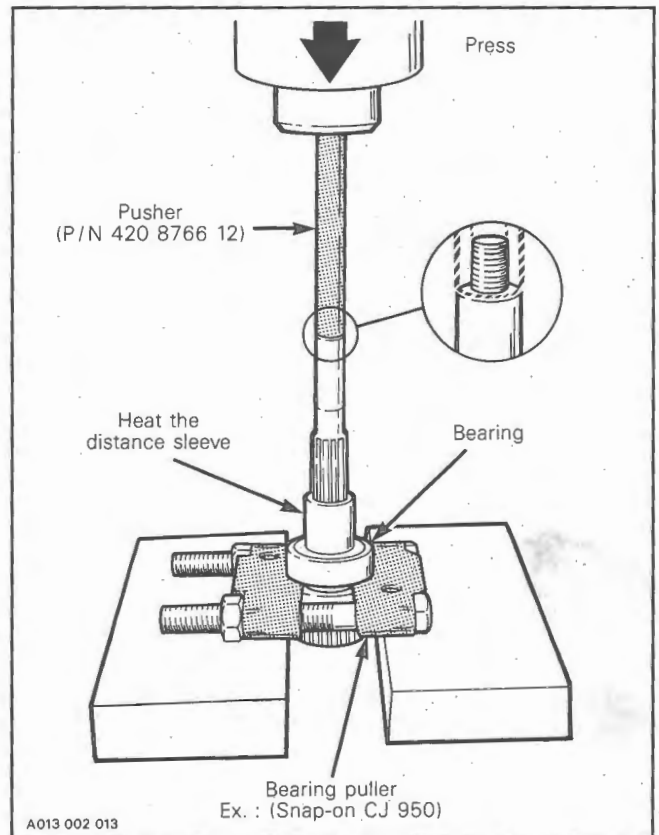
17,18, Spring retaining cup & circlip

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup in order to remove circlip.



11,12, Loctite 271 & distance sleeve

To remove the distance sleeve use a bearing puller (ex. : Snap-on no CJ 950) and pusher (P/N 420 8766 12) as illustrated. Heat the distance sleeve to 93°C (200°F) to break the Loctite bond and proceed as illustrated.



CAUTION : Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

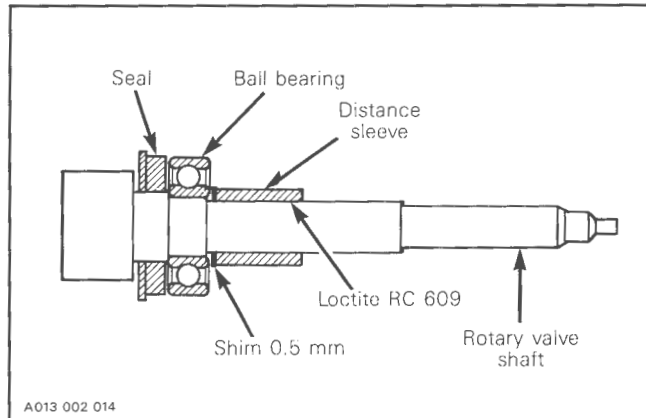
Clean rotary valve shaft and inside of distance sleeve. At assembly apply Loctite RC 609 inside of distance sleeve.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

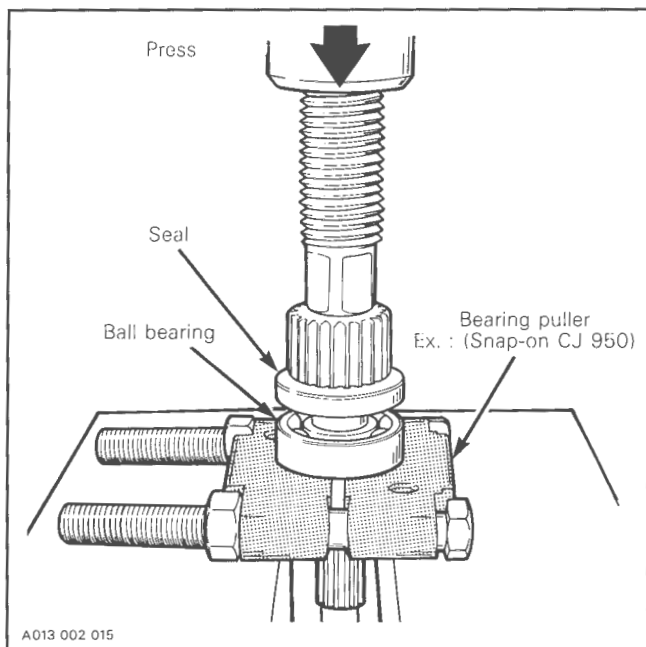
7,8, Rotary valve shaft & seal

At assembly apply lithium grease on seal lips. Position the seal with shield portion towards rotary valve.



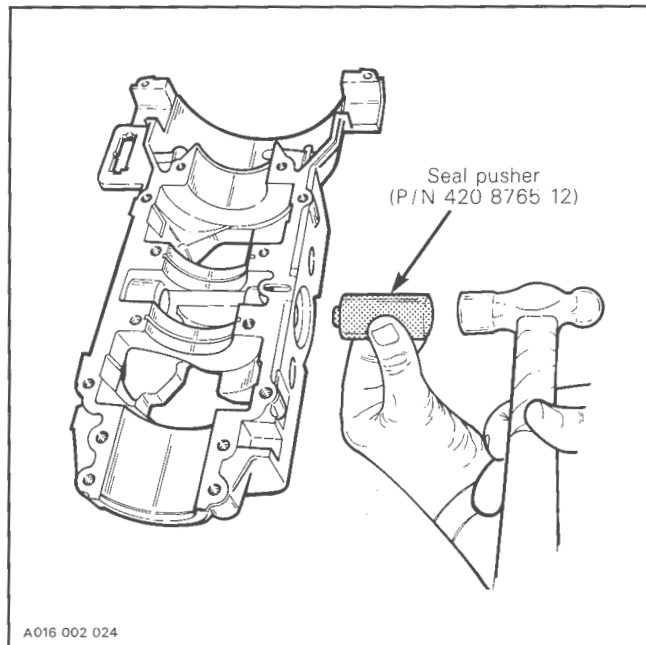
7,9, Rotary valve shaft & bearing 6203

Install ball bearing as illustrated.

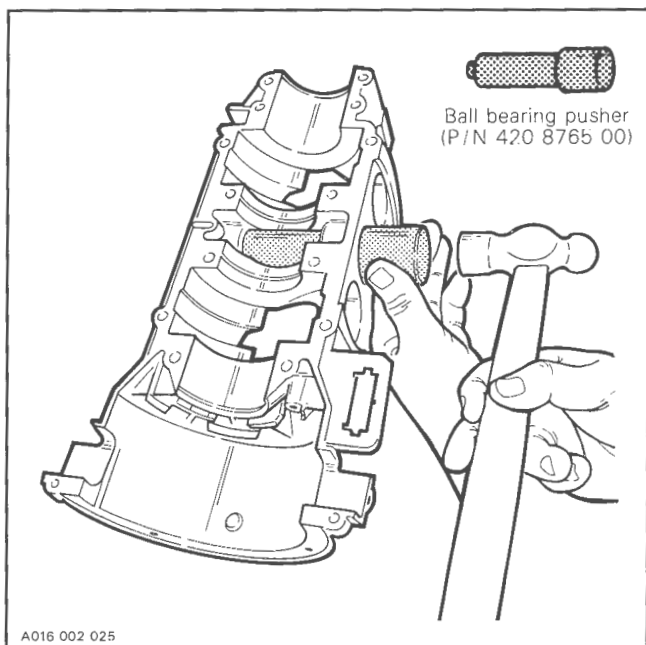


19,20,31,32 Bearing 6201, seal & rubber washer

To remove bearing 6201 (the smallest one), seals and rubber washer, use seal pusher (P/N 420 8765 12).



To install ball bearing 6201 use ball bearing pusher (P/N 420 8765 00).



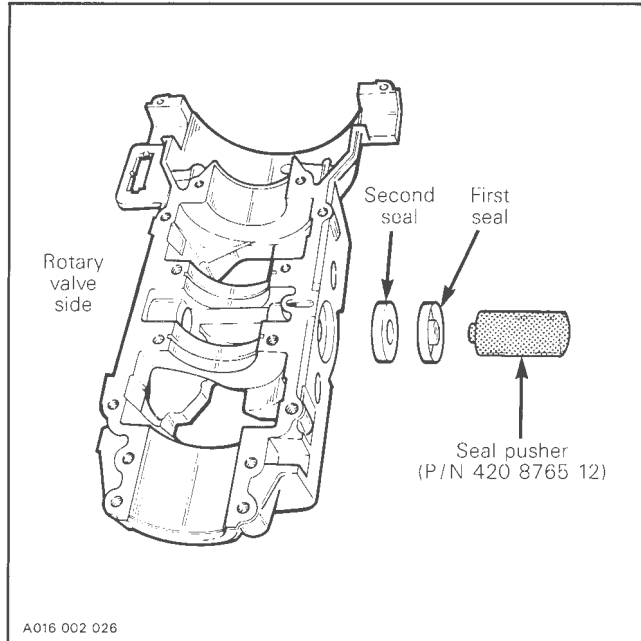
Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

○ **NOTE :** Ball bearing shielded side must be facing rotary valve.

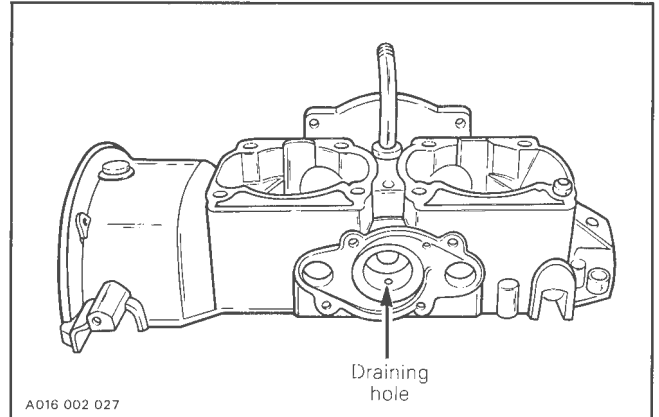
20,31,32, Seals, shim & rubber washer

To install seals on water pump side proceed as follows :



Apply some lithium grease or equivalent on lip of both seals. Position second seal shielded portion towards water pump side. Drive in place with seal pusher (P/N 420 8765 12). Install first seal with its shielded portion towards rotary valve side. Make sure not to obstruct draining hole. Install shim and pack space between seal and rubber washer with lithium grease then install rubber washer.

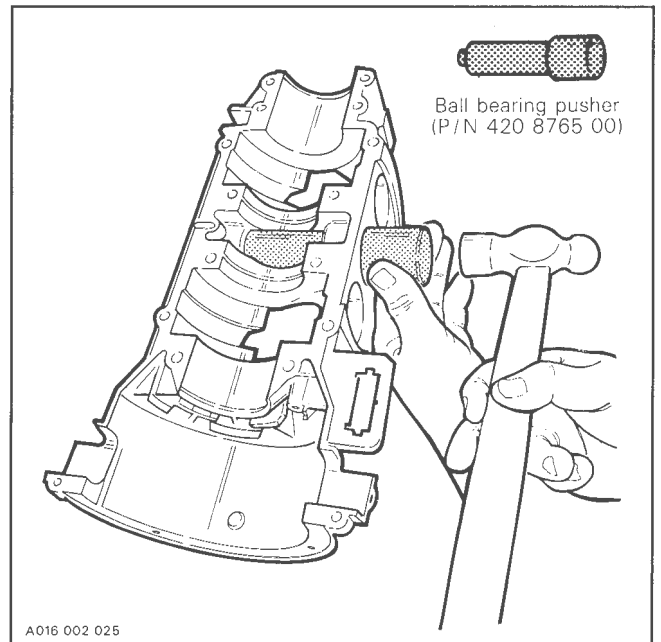
○ **NOTE :** The draining hole is used to detect seal malfunction. If you notice oil, or coolant at the exit of the draining hole, this means that oil seal or coolant seal leaks.



▼ **CAUTION :** Failure to position the seals as specified may cause the seal spring to be corroded by coolant. Severe damage may occur if these notices are disregarded.

19,20,21, Bearing 6201, seal & distance ring

○ **NOTE :** After seals installation, check if the water pump end bearing is correctly positioned with ball bearing pusher (P/N 420 8765 00).



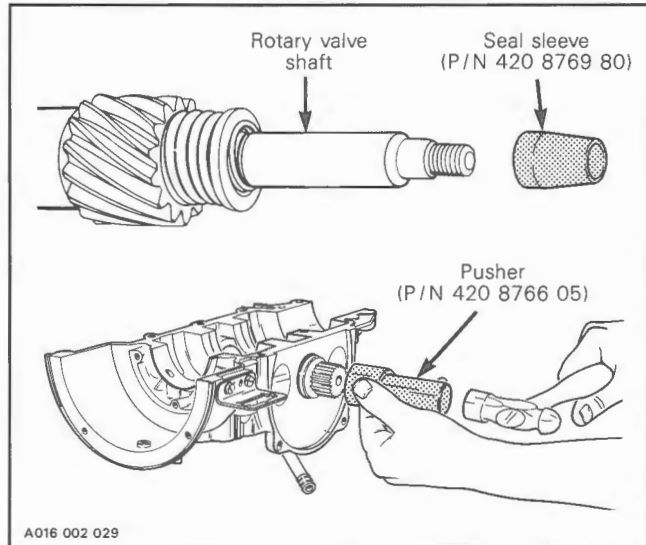
Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

7, Rotary valve shaft

To install rotary valve shaft proceed as follows with the suitable tools :

- pusher (P/N 420 8766 05).
- water pump seal sleeve (P/N 420 8769 80).

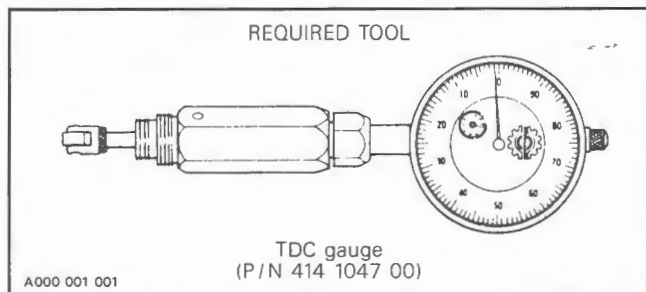


28,29, Pump housing bolt & Loctite 242

Apply Loctite 242 on bolts thread.

5, Rotary valve

Installation on genuine crankcase with mark (ridge)



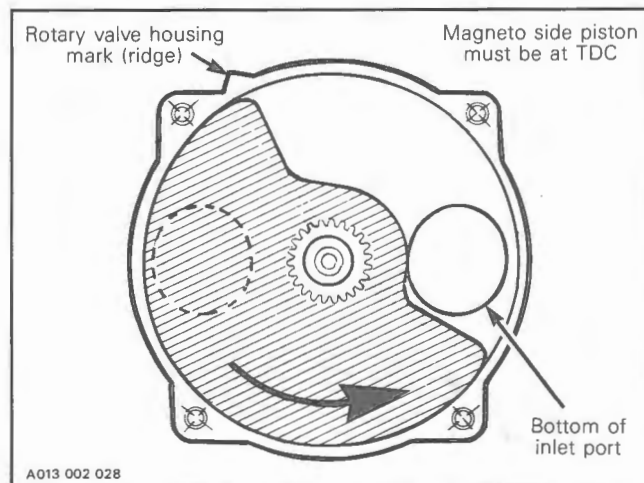
To correctly install the rotary valve, proceed as follows :

- Turning crankshaft counter clockwise, (drive pulley side) bring magneto side to top dead center using a TDC gauge.

NOTE : Do not use crankshaft locking tool to find out magneto side top dead center. It will not give the right position.

- Position the rotary valve on gear in such a way that its closing edge will be as close as possible to the **bottom** of the magneto side inlet port, and its opening edge in line with the mark (ridge) on the upper left side of the rotary valve housing.

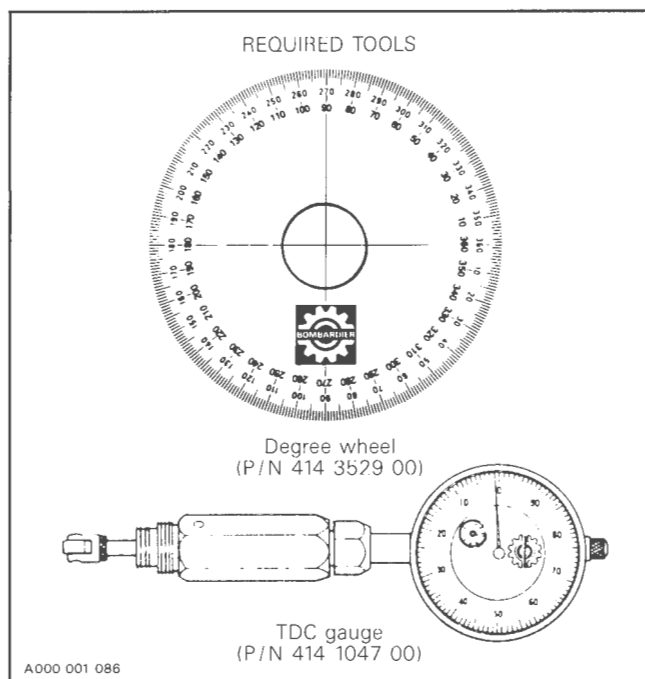
NOTE : The rotary valve is asymmetrical, therefore, at assembly try positioning each side of it on gear to determine best installation position.



Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

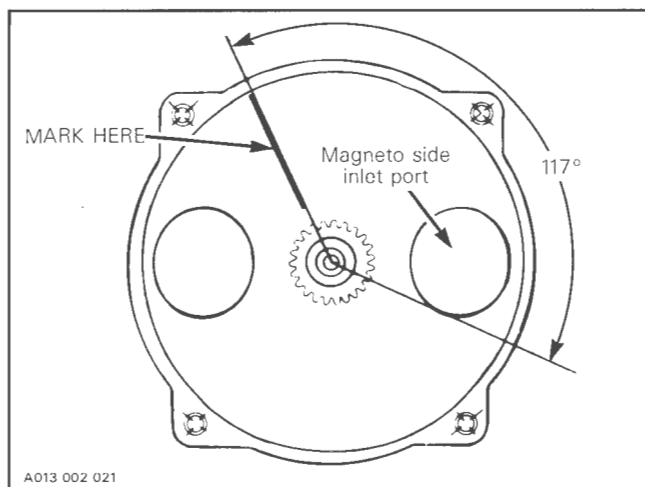
Installation on spare crankcase without mark (ridge)



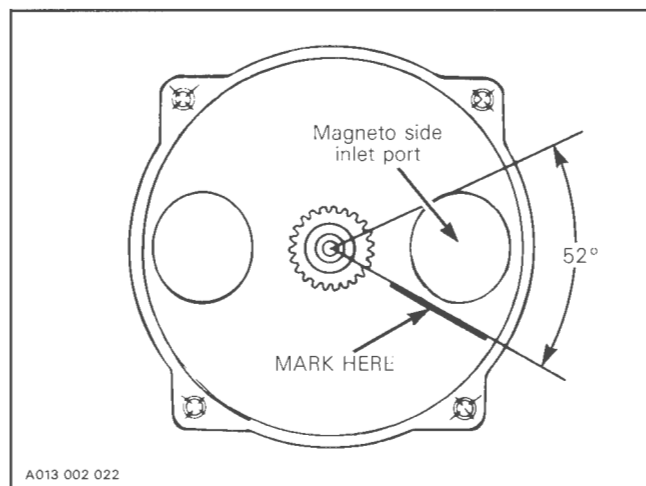
| ENGINE TYPE | TIMING MARKS | |
|-------------|--------------|---------|
| | OPENING | CLOSING |
| 536 | 117° | 52° |

For example : 117° opening
52° closing

Using degree wheel, mark crankcase at 117° from **bottom** edge of magneto side inlet port.



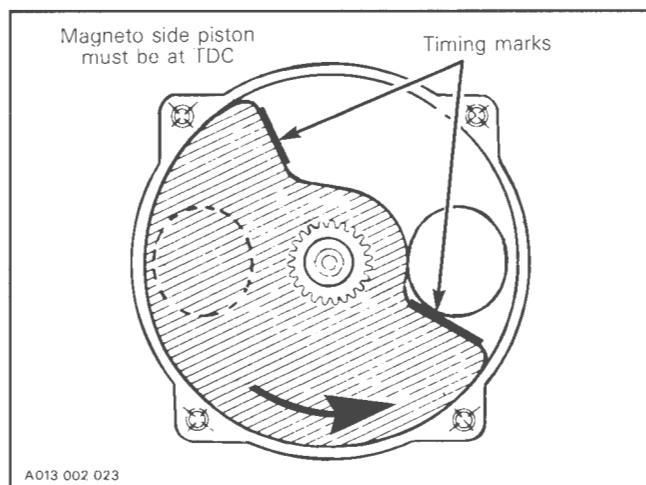
From **top** edge of magneto side inlet port, mark crankcase at 52°.



To correctly install the rotary valve disc proceed as follows :

- Turning crankshaft counterclockwise, (drive pulley side) bring magneto side piston to top dead center using a TDC gauge.
- Position the rotary valve disc on gear to have edges as close as possible to the marks.

NOTE : The rotary valve disc is asymmetrical, therefore at assembly, try positioning each side of disc on gear to determine best installation position.



Spray some injection oil on rotary valve before closing the rotary valve cover.

Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

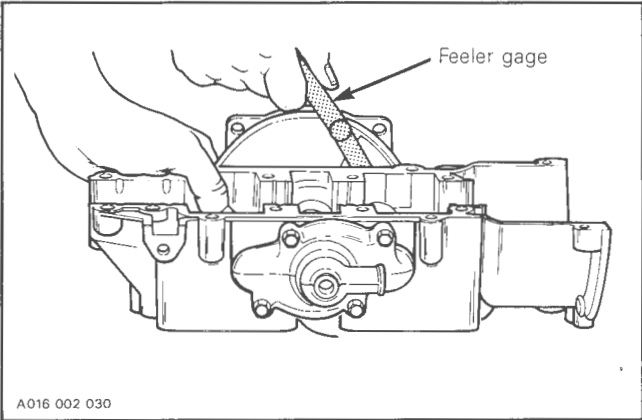
2, Rotary valve cover bolt

The rotary valve cover bolts must be torqued to 20 N•m (15 lbf•ft).

INSPECTION

1,5, Rotary valve cover & rotary valve

A gap of 0.27 - 0.48 mm (.011 in - .019 in) must be maintained between the rotary valve and the crankcase. To measure this gap use a feeler gage inserted between rotary valve and upper crankcase with the rotary valve cover in place **without it's O-ring**. Check as much surface as possible. Follow the same procedure for the lower crankcase.



7,15, Rotary valve shaft & gear

Backlash check

Engine do not have to be overhauled to check backlash of crankshaft and rotary valve shaft gears. Remove spark plugs, cover and rotary valve.

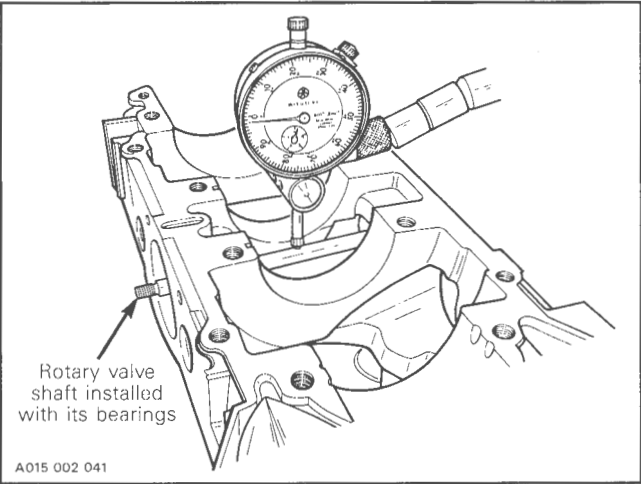
Check backlash at one position then turn crankshaft about 1/8 turn and recheck. Continue this way to complete one revolution.

Backlash must be even at all positions. Otherwise overhaul engine to find which part is faulty (gear, rotary valve shaft or crankshaft with excessive deflection).

Check for presence of brass filings in gear housing. Replace gear if needed.

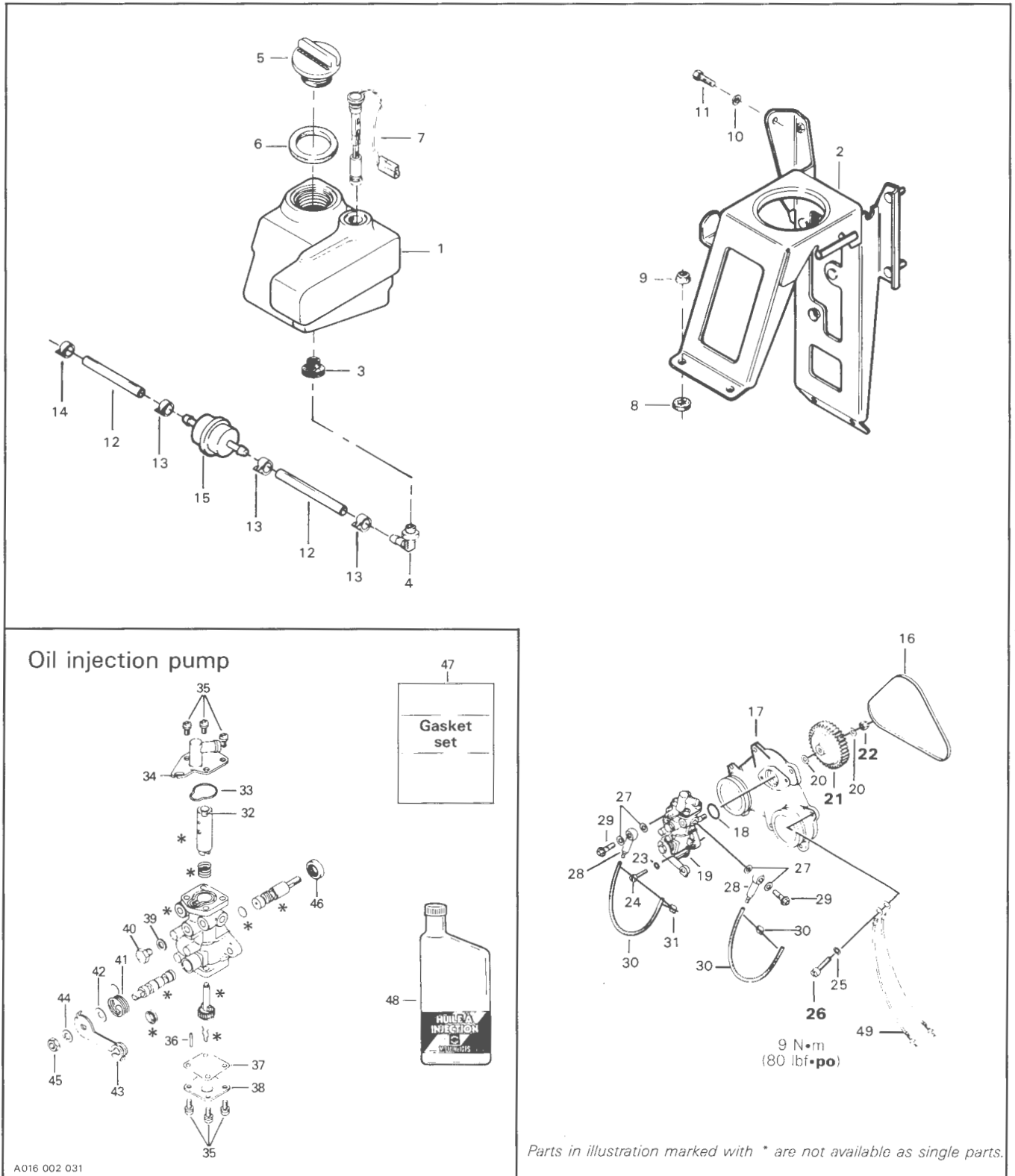
Besides, check deflection of rotary valve shaft and crankshaft close to gear. Replace as needed.

| MAXIMUM ROTARY VALVE SHAFT DEFLECTION | |
|--|-----------|
| 0.08 mm | (0.0031") |



Section 02 ENGINE
Sub-section 06 (536 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 06 (536 ENGINE TYPE)

1. Injection oil reservoir
2. Support
3. Grommet
4. Male connector
5. Oil tank cap
6. Gasket
7. Oil level sensor
8. Rubber spacer (4)
9. Flanged hexagonal elastic stop nut M6 (4)
10. Lock washer 6 mm (2)
11. Hexagonal head cap screw M6 x 12 (2)
12. Oil line 8 in (200 mm)
13. Spring clip (3)
14. Spring clip
15. Filter
16. Rubber ring
17. Oil pump mounting flange
18. O-ring
19. Oil pump
20. Washer 6.2 (2)
21. Oil pump gear - 44 teeth
22. Lock nut 6 mm
23. Lock washer 5 (2)
24. Cylindrical slotted screw M5 x 16 (2)
25. Lock washer 6 mm (7)
26. Cylindrical slotted screw M6 x 20 (7)
27. Oil banjo gasket (4)
28. Banjo (2)
29. Banjo bolt M6 x 16 (2)
30. Oil line 170 mm (2)
31. Clamp (4)
32. Retainer
33. O-ring
34. Plate
35. Screw with lock washer (8)
36. Stop pin
37. Gasket
38. Cam casing plate
39. Washer
40. Hexagonal head screw M6 x 7
41. Spring
42. Washer
43. Lever
44. Lock washer 6
45. Hexagonal nut 6 mm
46. Seal
47. Gasket set
48. Injection oil (1 liter)
49. Ground cable ass'y

CLEANING

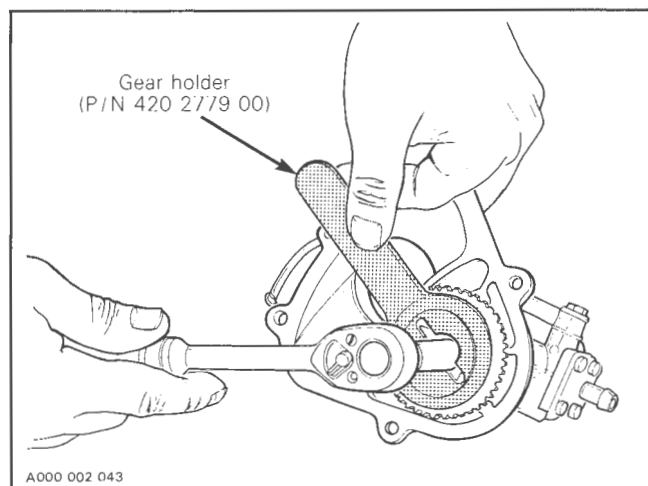
Discard all seals and O-rings. Clean metal components in a non-ferrous metal cleaner.

DISASSEMBLY

NOTE : Some oil pump parts are not available in single parts.

21,22, Oil pump gear & lock nut

To remove retaining nut, lock gear using gear holder (P/N 420 2779 00).

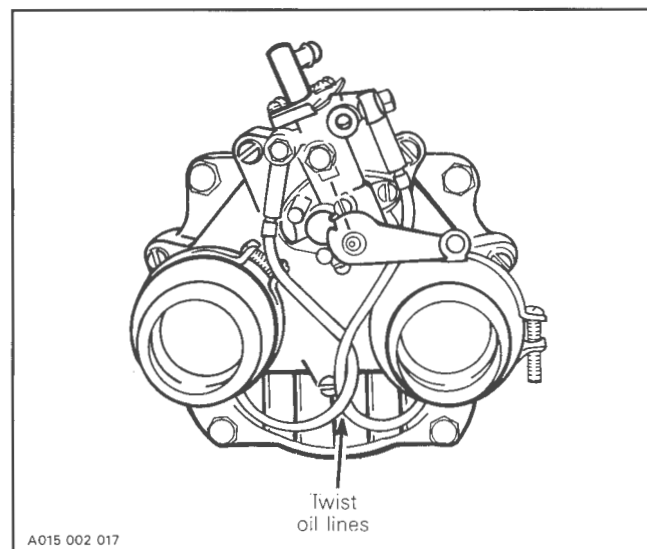


ASSEMBLY

26, Screw

Torque to 9 N•m (80 lbf•in).

CAUTION : Whenever oil injection lines are removed, always make the routing as shown.



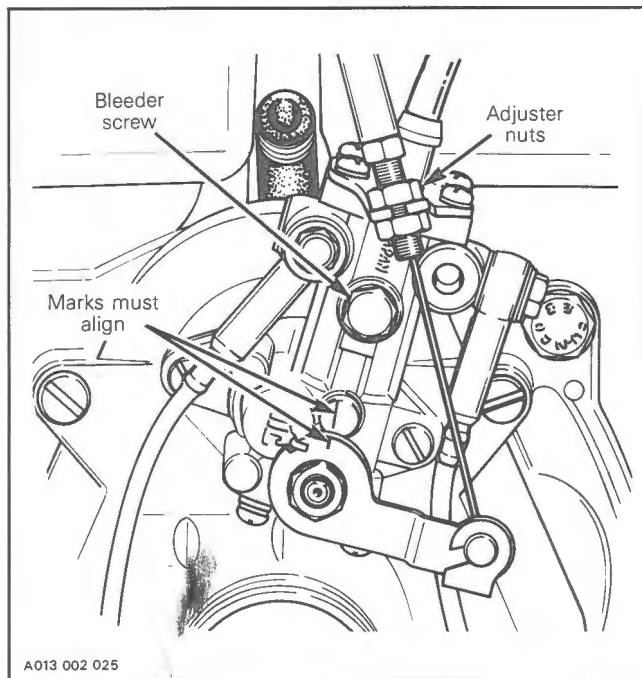
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

To synchronize pump with carburetor :

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



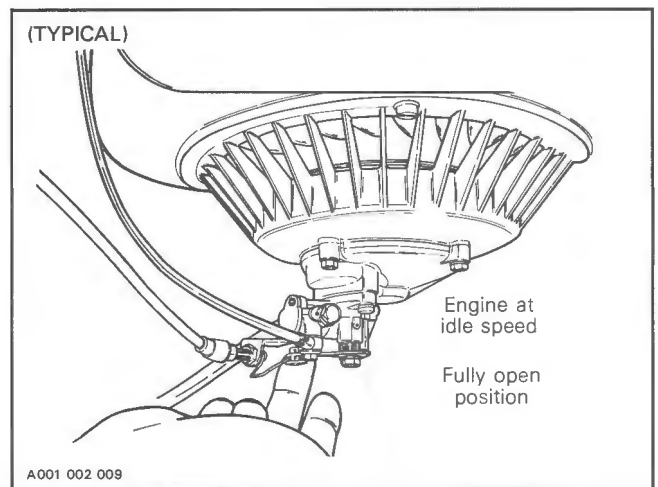
CAUTION : Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To bleed oil lines :

All oil lines should be full of oil. If required, bleed the main oil line (between tank and pump) by loosening the bleeder screw until all air escaped from the line.

Make sure the tank is sufficiently filled.

Check the small oil lines (between pump and intake manifold). If required, fill the lines by running the engine at idle speed while holding the pump lever in fully open position.



WARNING : Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

Section 02 ENGINE

Sub-section 06 (503 ENGINE TYPE)

CHECKING OPERATION

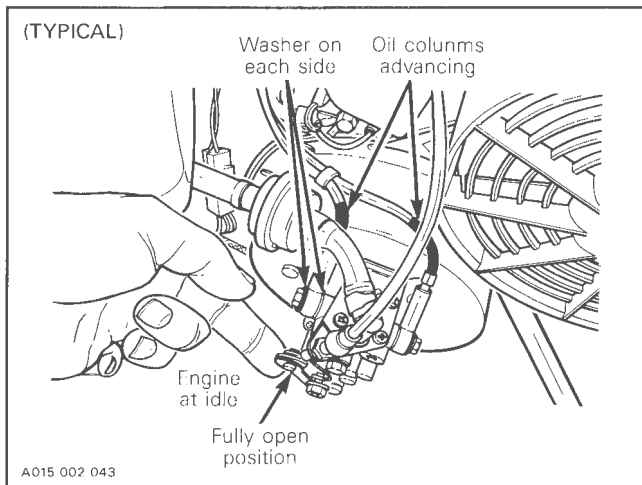
On vehicle

○ **NOTE :** Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unbolt banjo fittings from pump. Start engine and stop it as soon as it fires.

Check that oil level in small oil lines is passed banjo fitting end by about 25 mm (1 in) (this will be indicated by a clear section of small oil lines of about 25 mm (1 in)). Repeat the procedure until this condition is attained.

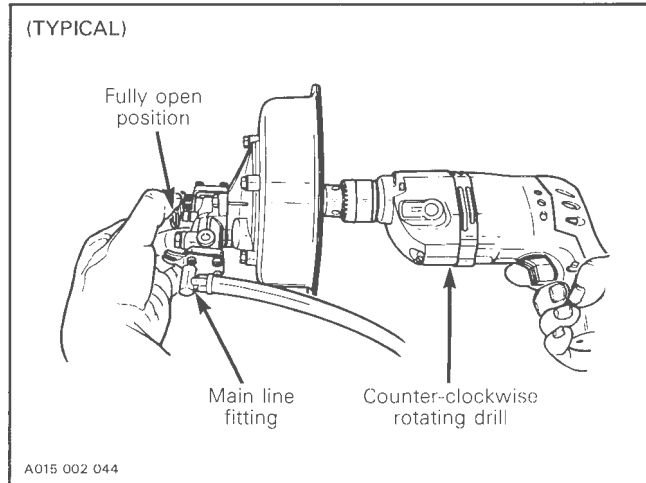
Reconnect banjo fittings with a washer on each side, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.



If not remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

Test bench

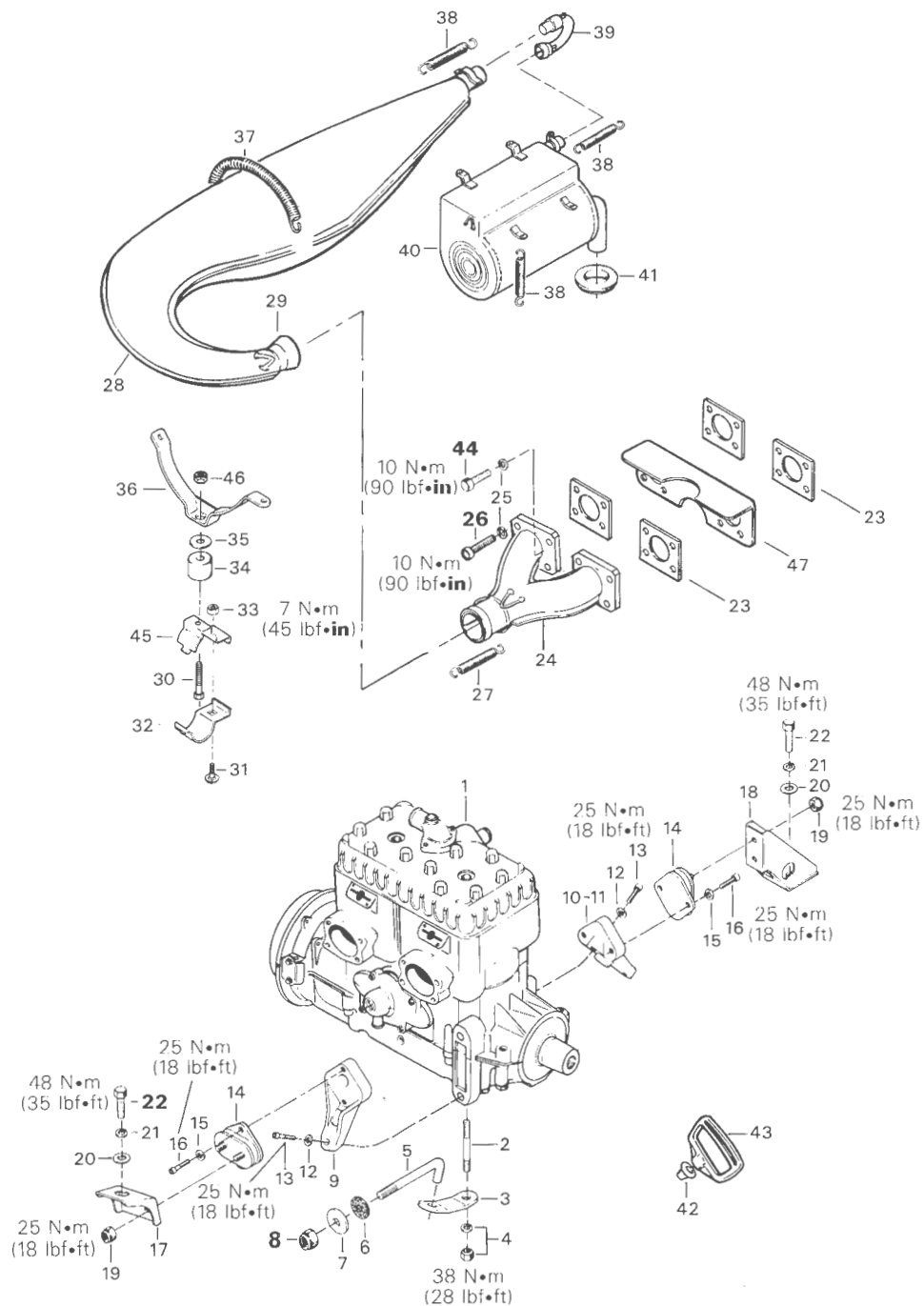
Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a counter-clockwise rotating drill rotate pump shaft. Oil must drip from outer holes while holding lever in a fully open position. If not replace pump.



583 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION

Engine support & muffler



Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

- | | |
|---|---|
| 1. 583 engine | 25. Lock washer 8 mm |
| 2. Stud M10 x 18/18 | 26. Cylindrical screw M6 x 25 (4) |
| 3. Clamp | 27. Spring |
| 4. Hexagonal elastic stop nut M10 | 28. Single exhaust pipe |
| 5. Support | 29. Female ball joint |
| 6. Rubber washer | 30. Hexagonal head cap screw M6 x 30 |
| 7. Washer | 31. Carriage bolt M6 x 20 |
| 8. Hexagonal elastic stop nut M10 | 32. Lower bracket |
| 9. Front support (2) | 33. Flanged elastic hexagonal stop nut M6 |
| 10. Right rear support | 34. Rubber spacer |
| 11. Left rear support | 35. Asbestos washer |
| 12. Lock washer 8 mm (8) | 36. Exhaust pipe support |
| 13. Allen screw M8 x 25 (8) | 37. Spring |
| 14. Bounding rubber mount (4) | 38. Spring (6) |
| 15. Lock washer 8 mm (8) | 39. Tail pipe |
| 16. Allen screw M8 x 20 (8) | 40. Muffler |
| 17. Front support (2) | 41. Exhaust grommet |
| 18. Rear support (2) | 42. Rubber buffer |
| 19. Flanged hexagonal elastic stop nut M8 (8) | 43. Starter grip |
| 20. Lock washer (4) | 44. Cap screw M6 x 25 (4) |
| 21. Spring lock washer 10 mm (4) | 45. Upper bracket |
| 22. Hexagonal head cap screw M10 x 20 (4) | 46. Nut M8 |
| 23. Gasket (4) | 47. Heat deflector |
| 24. Exhaust manifold | |
-

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle :

- air silencer
- pulley guard and drive belt
- throttle cable from carburetors, oil injection pump
- fuel lines, impulse line and primer tubes
- ignition coil and rotary valve reservoir
- electrical connectors and wires
- single tuned pipe
- rewind starter
- engine torque rod nut (item #8)

Drain the cooling system and disconnect hoses from the engine (see "Cooling system" in this section).

Remove the four screws retaining engine supports to frame.

ENGINE SUPPORT & MANIFOLD DISASSEMBLY & ASSEMBLY

22,26,44, Engine support screw & manifold screw


Torque the engine support screws to 48 N•m (35 lbf•ft).

Torque manifold screws to 10 N•m (90 lbf•in).

INSTALLATION ON VEHICLE

To install on vehicle, reverse removal procedure. However, pay attention to the following :

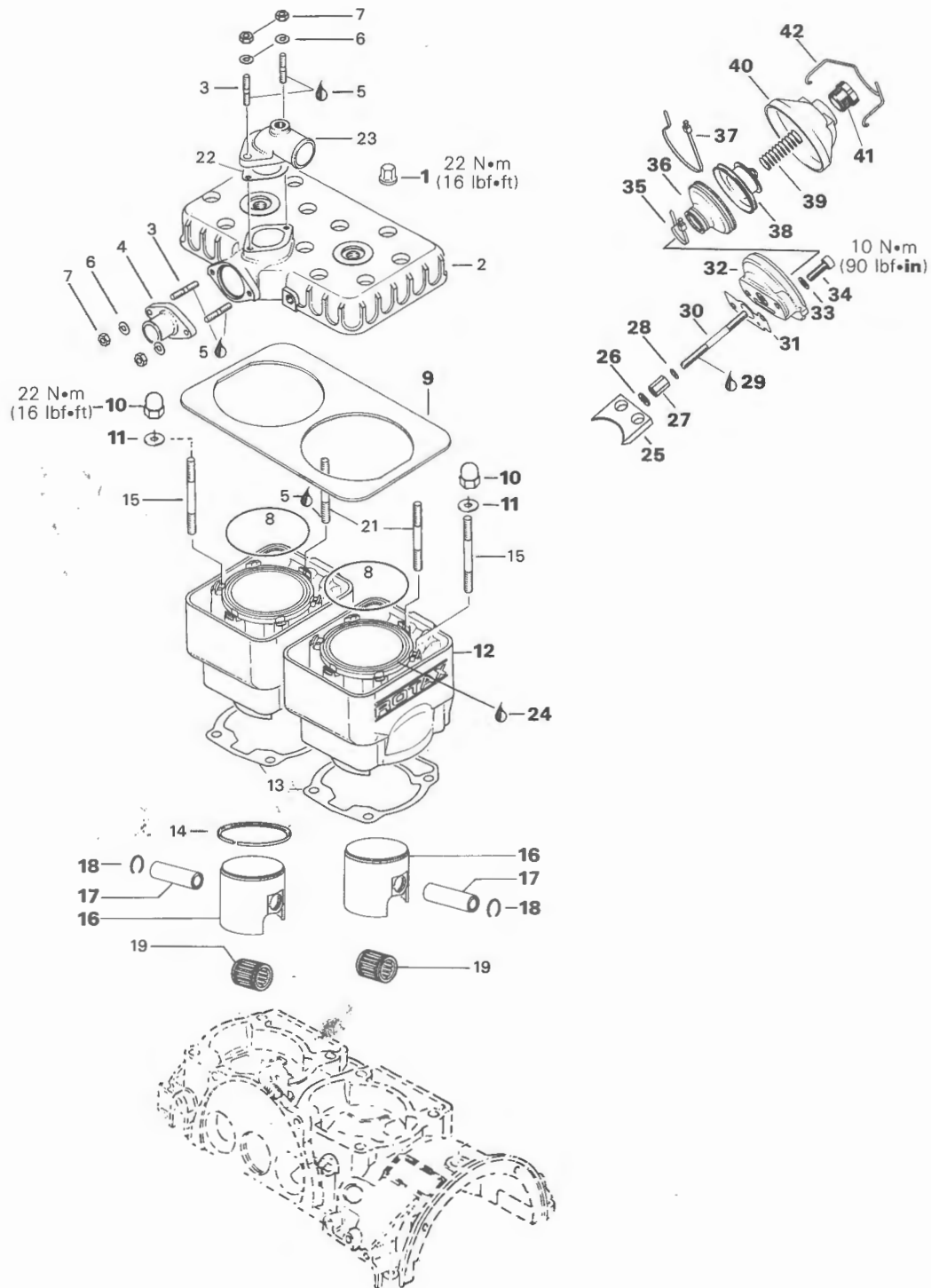
- Check tightness of engine rubber mounts screws and support nuts. Torque to 25 N•m (18 lbf•ft).
- Verify throttle cable condition then after throttle cable installation, check carburetor maximum throttle opening and oil injection pump adjustment.
- Check pulley alignment and drive belt tension.

 **CAUTION :** A red dot is printed on one carburetor and on oil pump mounting flange. Match the marked carburetor to the marked side of the oil pump mounting flange (magneto side). This procedure is required because of the different jettings.

- Should a light exhaust leak be experienced at muffler ball joint, Dow Corning sealer #763 RTV can be used. However after some hours of use, carbon deposits should seal joint.

Section 02 ENGINE
Sub-section 07 (583 ENGINE TYPE)


TOP END



Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

1. Cap nut M8 (12)
2. Cylinder head
3. Stud M6 x 15 (4)
4. Coolant outlet collar
5. Loctite 242 blue (medium strength)
6. Lock washer 6 mm (4)
7. Nut M6 (4)
8. Gasket (O-ring) (2)
9. Gasket
10. Cap nut M8 (8)
11. Flat washer 8.4 (8)
12. Cylinder (2)
13. Cylinder / crankcase gasket (2)
14. Semi-trapez ring
15. Stud M8 x 44 (2)
16. Piston
17. Piston pin
18. Circlip (4)
19. Needle bearing
20. Stud M8 x 97.5 (8)
21. Stud M8 x 50 (10)
22. Gasket
23. Water outlet socket
24. Loctite 515
25. Exhaust valve (2)
26. Washer 6.4 mm (2)
27. Distance nut M6 x 15.7 (2)
28. O-ring (2)
29. Loctite 271 red (high strength)
30. Valve rod (2)
31. Gasket (2)
32. Valve rod housing (2)
33. Lock washer 6 mm (4)
34. Cylindrical screw M6 x 20 (4)
35. Clamp 20 mm (2)
36. Bellows (2)
37. Clamp 50 mm (2)
38. Valve piston (2)
39. Spring (2)
40. Cover (2)
41. Adjustment screw (2)
42. Spring clip (2)


 **NOTE:** The following procedures can be done without removing the engine from chassis.

CLEANING

Discard all gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

Scrape off carbon formation from cylinder exhaust port, exhaust valve, cylinder head and piston dome using a wooden spatula.

 **NOTE:** The letters «AUS» (over an arrow on the piston dome) must be visible after cleaning.

Clean the piston ring grooves with a groove cleaner tool, or with a piece of broken ring.

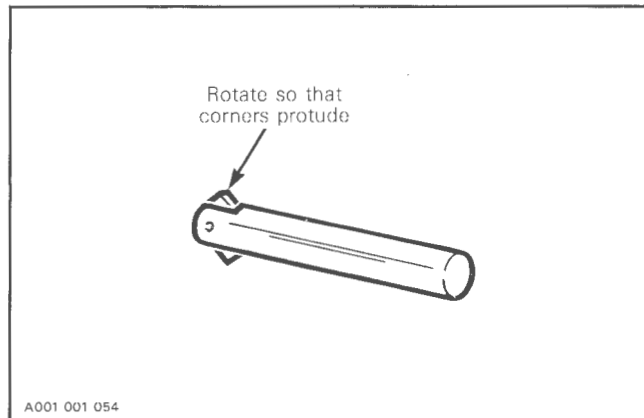
DISASSEMBLY

16,17,18, Piston, piston pin & circlip

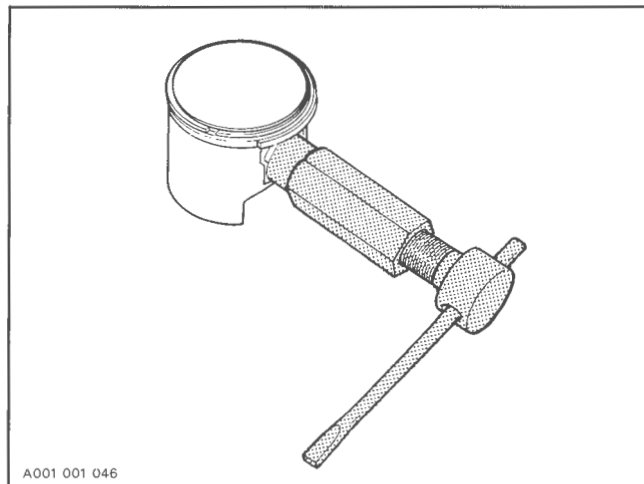
Place a clean cloth over crankcase then with a pointed tool inserted in piston notch, remove circlip from piston.

To remove piston pin, use piston pin puller (P/N 529 0068 00) as follows :

- Fully screw puller handle.
- Place stop notch of puller in line with the puller axis.
- Insert puller end into piston pin.
- Rotate stop notch of puller so that corners protude the puller end.



— Hold puller firmly and rotate puller handle counter-clockwise to pull piston pin.



Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

○ **NOTE :** 0.25 mm oversize piston and ring are available if necessary.

RAVE system

○ **NOTE :** RAVE stands for Rotax Adjustable Variable Exhaust.

39,40,42, Spring, cover & spring clip

Remove spring clip, cover and spring.

37,38, Clamp 50 mm & valve piston

Cut clamp and unscrew valve piston.

35,36, Clamp 20 mm & bellows

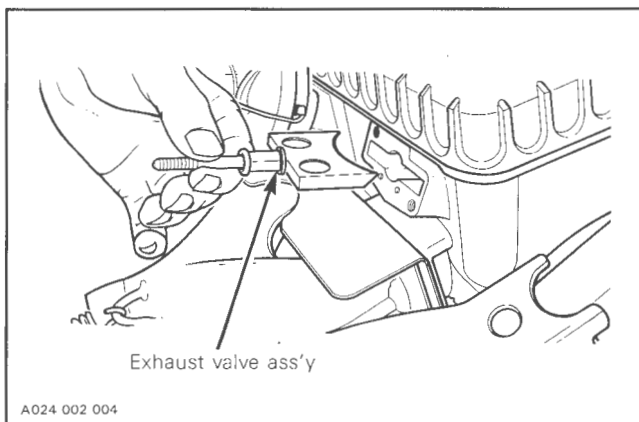
Cut clamp and remove bellows.

32,33,34, Valve rod housing, lock washer & cylindrical screw

Remove cylindrical screws and their washers then valve rod housing.

25,26,27,28,30, Exhaust valve, washer, distance nut, O-ring & valve rod

Pull out exhaust valve assembly.



Secure valve in a soft jaw vice. Remove O-ring, unscrew distance nut and remove washer. Unscrew valve rod from distance nut.

INSPECTION

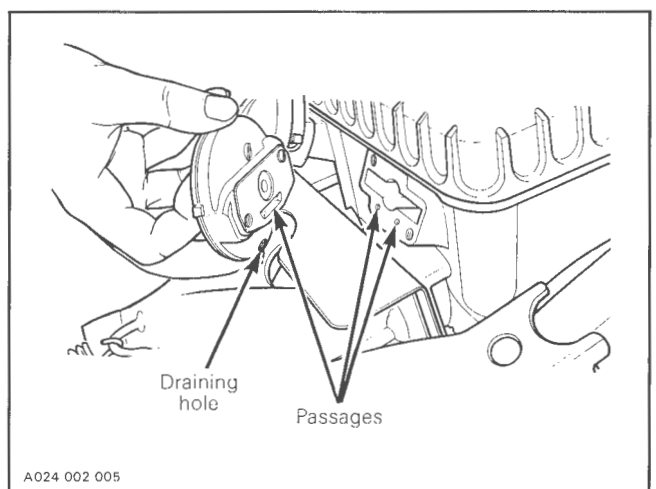
The inspection of the engine top end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | |
|-----------------------------------|-----------------------------|----------------------|----------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | WEAR LIMIT |
| Cylinder taper | N.A. | N.A. | 0.08 mm (.0031'') |
| Cylinder out of round | N.A. | N.A. | 0.05 mm (.0020'') |
| Cylinder / piston clearance | 0.11 mm (.0041'') | 0.13 mm (.0049'') | 0.20 mm (.008'') |
| Ring / piston groove clearance | 0.04 mm (.002'') | 0.11 mm (.004'') | 0.20 mm (.008'') |
| Ring end cap | 0.20 mm (.008'') | 0.35 mm (.014'') | 1.0 mm (.039'') |

○ **NOTE :** For the measurement procedures, refer to "Engine dimensions measurement", section 02-09.

RAVE system

Check valve rod housing and cylinder for clogged passages.



○ **NOTE :** Oil dripping from draining hole indicates a loosen clamp or damaged bellows.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

30, Valve rod

Check valve rod for straightness.

36, Bellows

Check for cracked, dried or perforated bellows.

39, Spring

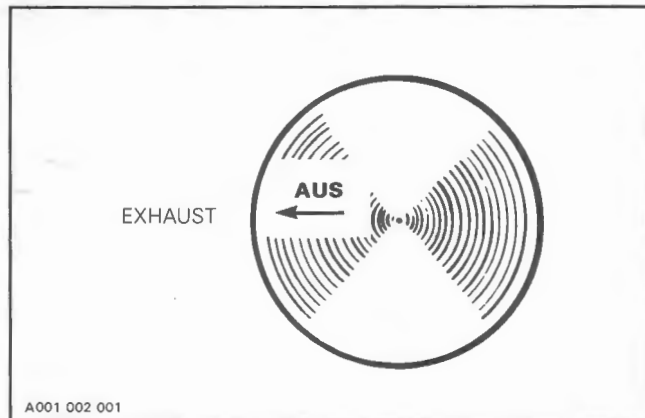
| SPRING P/N | WIRE DIA. | FREE LENGTH | PRELOAD IN N (lbf) AT COMPRESSED LENGTH | |
|-------------------------|--------------|----------------|--|----------------------|
| | mm (in) | mm (in) | OF 26 mm (1.023") | OF 14 mm (0.551") |
| STANDARD 420 2399 40 | 0.8 (.031) | 48.5 (1-29/32) | 5.4 (1.21) | 8.8 (1.97) |
| OPTIONAL 420 2399 44 | 0.9 (.035) | | 9.3 (2.08) | 15.9 (3.56) |

Make sure both springs have same characteristics.

ASSEMBLY

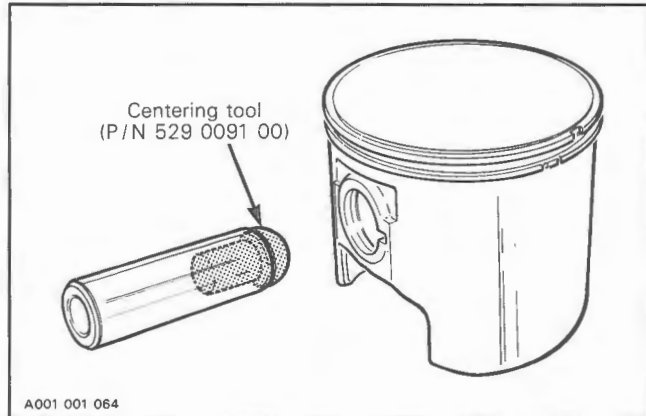
16,17,18, Piston, piston pin & circlip

At assembly, place the pistons over the connecting rods with the letters «AUS» (over an arrow on the piston dome) facing in direction of the exhaust port.



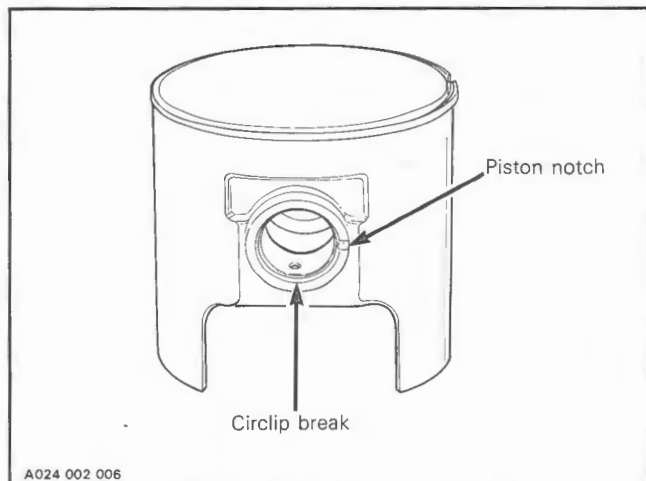
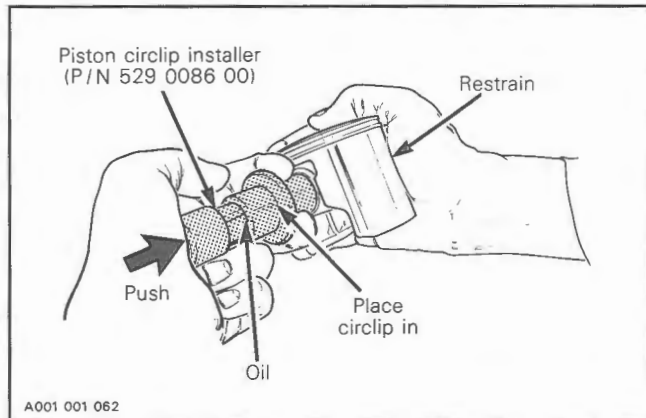
NOTE : Spare parts pistons and cylinders are identified with a green or red dot, it is important to match the piston with the cylinder of the same color.

To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00).



NOTE : The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0086 00).



Section 02 ENGINE

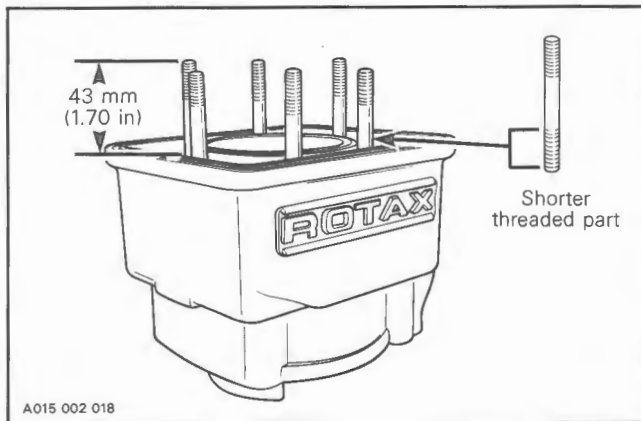
Sub-section 07 (583 ENGINE TYPE)

▼ **CAUTION:** Circlips must not move freely after installation if so, replace them.

12,15,21, Cylinder & cylinder head stud

For short studs (44 mm) location, refer to exploded view.

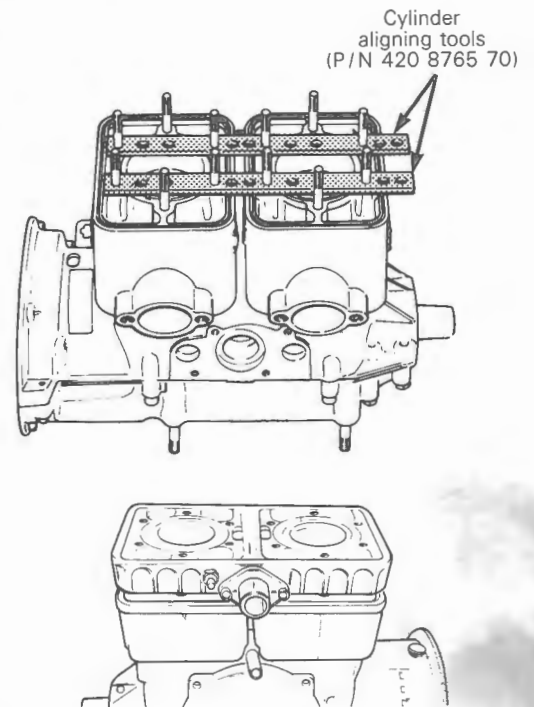
Because of cap nuts, cylinder head studs have to be screwed into the cylinder so that they do not protrude by more than 43 mm (1.70 in). If it is not possible to obtain this length, add a washer between cylinder head and cap nut. Shorter threaded part of stud should be screwed into cylinder.



12, Cylinder

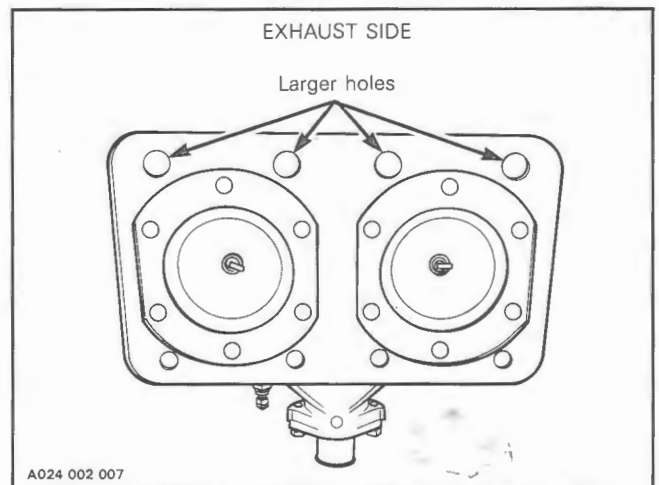
When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. Cylinder aligning tool (P/N 420 8765 70) or cylinder head itself can be used to align the cylinders. Prior to torquing crankcase/cylinder nuts, install exhaust manifold to properly align exhaust flanges.

(TYPICAL)



9, Gasket

Install gasket with its larger holes on exhaust side.

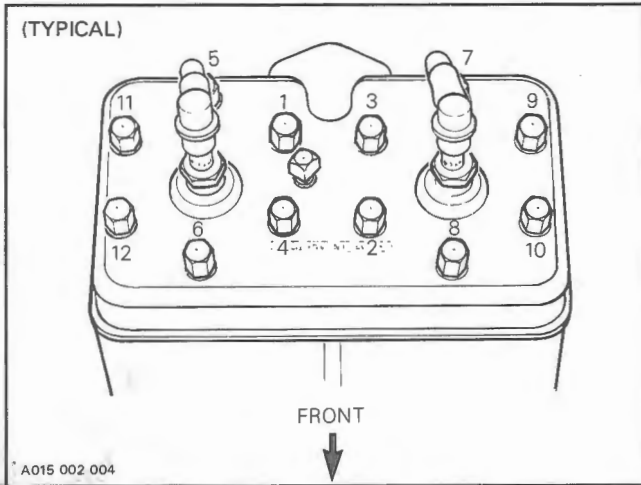


Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

1, Cylinder head nut

Torque cylinder head nuts to 22 N•m (16 lbf•ft) following illustrated sequence.



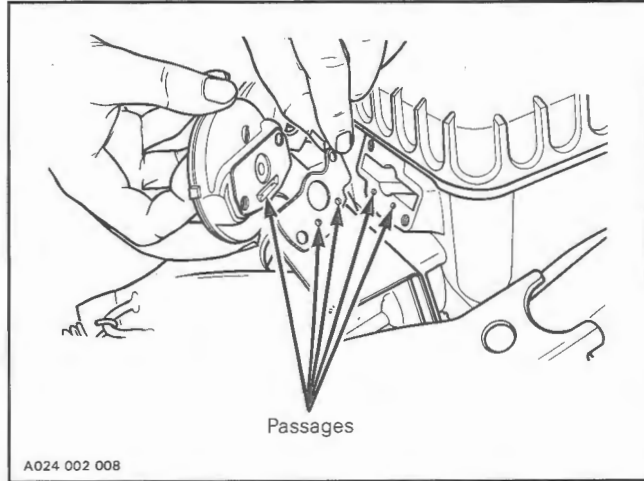
RAVE SYSTEM

25,26,27,28,29,30, Exhaust valve, washer, distance nut, O-ring, Loctite 271 & valve rod

Fully screw distance nut, with its notch first, on valve rod longer threaded portion. Install washer and apply Loctite 271 on threads. Fully screw valve rod into exhaust valve. Back off distance nut to jam the assembly. Install O-ring. Install exhaust valve assembly in cylinder.

31,32,33,34, Gasket, valve rod housing, lock washer and cylindrical screw

Install gasket and valve rod housing with their passages toward bottom.

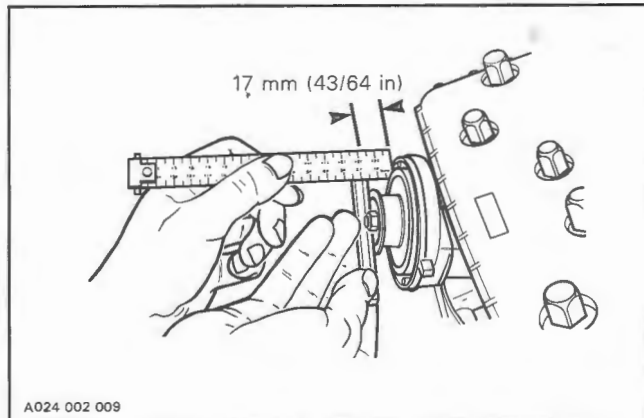


Torque cylindrical screws to 10 N•m (90 lbf•in). Check free sliding action of valve assembly.

35,36,37,38, Clamp 20 mm, bellows, clamp 50 mm & valve piston

Install bellows over valve rod housing groove and secure with a clamp.

Screw valve piston on valve rod until its edge exceeds valve rod housing by about 17 mm (43/64 in).



Secure bellows to valve piston with a clamp.

39,40,41,42, Spring, cover, adjustment screw & spring clip

Install spring, cover and spring clip. Turn adjustment screw by hand until it bottoms.

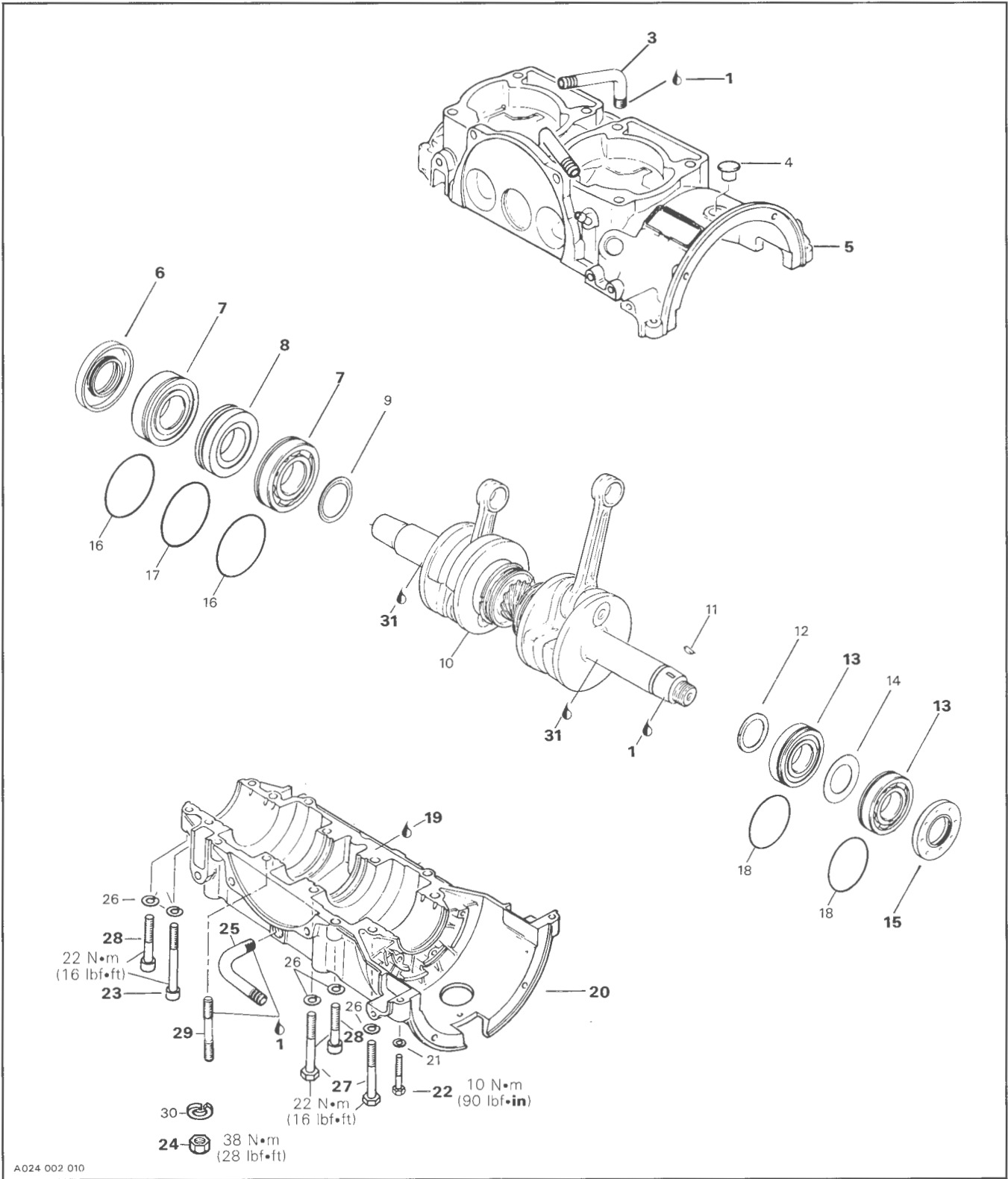
Section 02 ENGINE
Sub-section 07 (583 ENGINE TYPE)

RAVE SYSTEM TROUBLE SHOOTING

| SYMPTOM | CAUSE | REMEDY |
|---|--|---|
| Engine revs 500 to 1000 RPM lower than its maximum operational RPM. | 1. Valve piston too far out. 2. Bend valve rod. 3. Stuck valve. 4. Wrong spring tension. 5. Clogged passages. 6. Damaged bellows or clamp(s). | Respect 17 mm (43/64'') distance. Replace. Clean. Replace. Clean. Replace. |
| Engine hesitation in mid RPM range and full peak performance is available only after a while. | 1. Broken or weak spring. 2. Adjustment screw too far out. 3. Stuck opened valve. | Replace. Turn until it bottoms. Clean. |

Section 02 ENGINE
Sub-section 07 (583 ENGINE TYPE)

BOTTOM END




A024 002 010

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

1. Loctite 242
2. Stud M8 x 97.5 (8)
3. Angular tube, oil inlet
4. Plug
5. Crankcase upper half
6. Seal
7. Ball bearing 6207 (2)
8. Labyrinth sleeve
9. Distance ring
10. Crankshaft
11. Woodruff key 3 x 3, 7
12. Distance ring
13. Ball bearing 6206 (2)
14. Shim 1 mm
15. Seal
16. O-ring (2)


17. O-ring
18. O-ring (2)
19. Loctite 515
20. Crankcase lower half
21. Lock washer 6 mm (2)
22. Hexagonal screw M6 x 35 (2)
23. Cylinder screw M8 x 75 (2)
24. Hexagonal nut M10
25. Angular tube, oil outlet
26. Lock washer 8 mm (14)
27. Hexagonal screw M8 x 65 (6)
28. Cylinder screw M8 x 45 (6)
29. Stud M10 x 42
30. Lock washer 10 mm
31. Anti-seize lubricant

 **NOTE :** Engine must be removed from chassis to perform the following procedures.

CLEANING

Discard all oil seals, gaskets, O-rings and sealing rings. Clean all metal components in a non-ferrous metal cleaner.

Remove old Loctite from crankcase mating surfaces with Bombardier sealant stripper (P/N 413 7021 00).

 **CAUTION :** Never use a sharp object to scrape away old sealant as score marks incurred are detrimental to crankcase sealing.

DISASSEMBLY

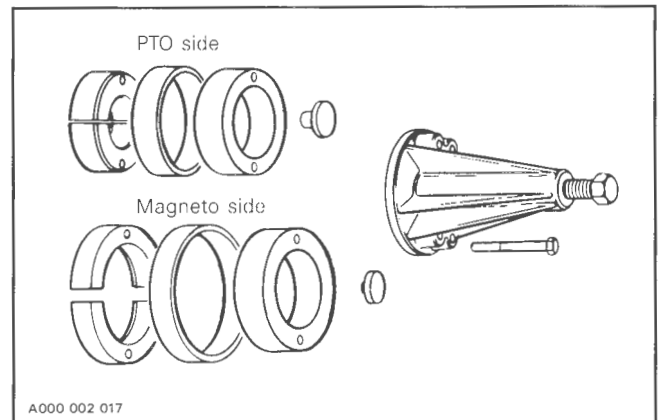
General

To remove drive pulley, refer to "Drive pulley", section 03-03.

To remove magneto, refer "Magneto" in this section.

7,13, Crankshaft bearing

To remove bearings from crankshaft, use a protective cap and special puller, as illustrated (see "Tools" section).



INSPECTION

The inspection of the engine bottom end must include the following measurements :

| MEASUREMENTS | TOLERANCES | | |
|--------------------------------------|-----------------------------|--------------------|--------------------|
| | FITTING NEW PARTS (MIN.) | (MAX.) | WEAR LIMIT |
| Crankshaft deflection | N.A. | N.A. | 0.08 mm (.003") |
| Connecting rod big end axial play | 0.40 mm (.016") | 0.73 mm (.029") | 1.2 mm (.047") |

 **NOTE :** For the measurement procedures, refer to "Engine Dimensions Measurement", section 02-09.

Section 02 ENGINE

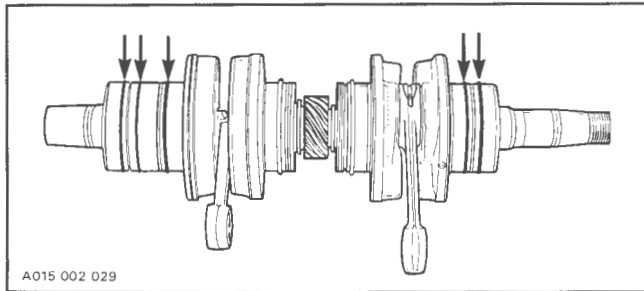
Sub-section 07 (583 ENGINE TYPE)

ASSEMBLY

2,7,8,13, Anti-seize lubricant, crankshaft bearing & labyrinth sleeve

Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with oil previously heated to 75°C (167°F). This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration.

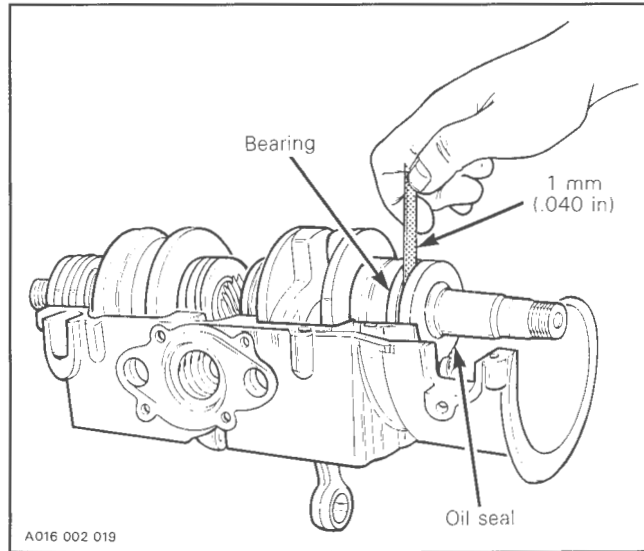


6,15, Seal

At seal assembly, apply a light coat of lithium grease on seal lips.

For bearing lubrication purpose, a gap of 1.0 mm (.040 in) must be maintained between seals and bearings.

When installing plain seals (seal without locating ring or without spacing legs), ensure to maintain the specified gap as illustrated. For seals with spacing legs, install them against the bearing.



5,19,20, Upper crankcase, Loctite 515 & lower crankcase

Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of Loctite 515 (P/N 413 7027 00) on mating surfaces.

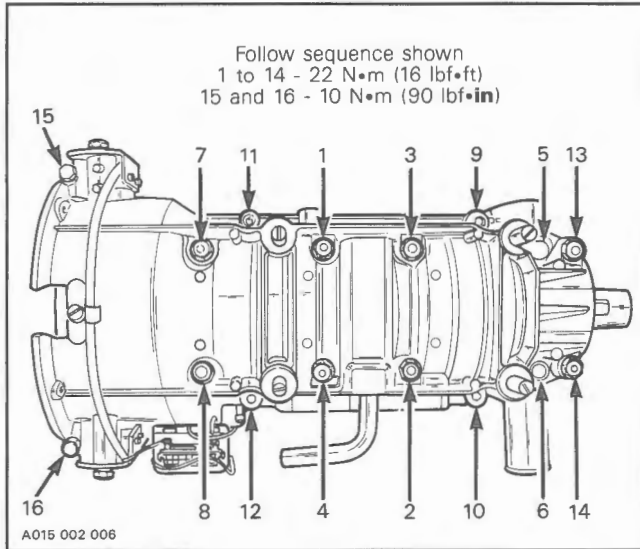
○ **NOTE :** Prior to applying Loctite 515 it is possible to use primer N (P/N 413 7053 00) or primer NF (P/N 413 7024 00). It increases cure speed and gap filling capability. Refer to supplier instructions.

▼ **CAUTION :** Before joining crankcase halves be sure that crankshaft rotary valve gear is well engaged with rotary valve shaft gear.

Position the crankcase halves together and tighten bolts by hand then install and tighten armature plate on magneto side to correctly align crankcase halves. Torque bolts as specified following illustrated sequence.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)



NOTE: Torque the two smaller bolts (15 and 16) on magneto side to 10 N•m (90 lbf•in).

1,3,25, Loctite 242, angular tube (oil inlet & oil outlet) & cover screw

Apply Loctite 242 on threads prior to assembly angular tubes.

23,27,28, Crankcase M8 Screw

Torque the crankcase M8 screws to 22 N•m (16 lbf•ft). Install them as per exploded view.

22, Crankcase M6 screw

Torque the crankcase M6 screws to 10 N•m (90 lbf•in).

1,29, Loctite 242 & crankcase stud

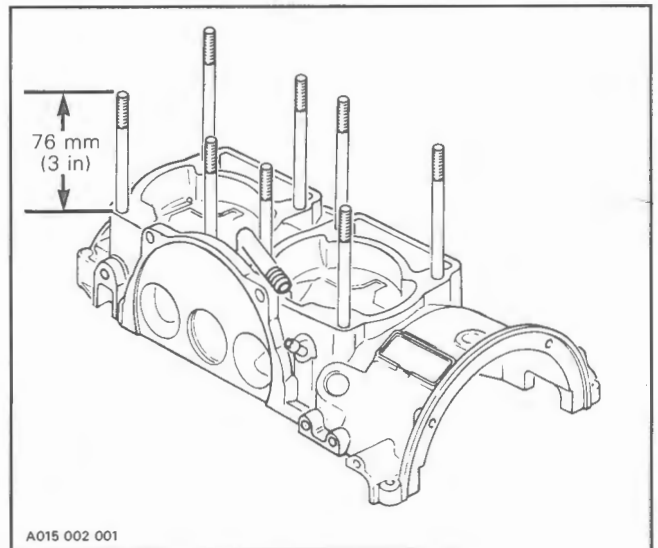
At assembly on crankcase, apply Loctite 242 on stud threads.

24, Crankcase/engine bracket nut

Torque the crankcase/engine bracket nut to 38 N•m (28 lbf•ft).

1,2 Loctite 242 & upper crankcase stud

Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not protrude by more than 76 mm (3 in).



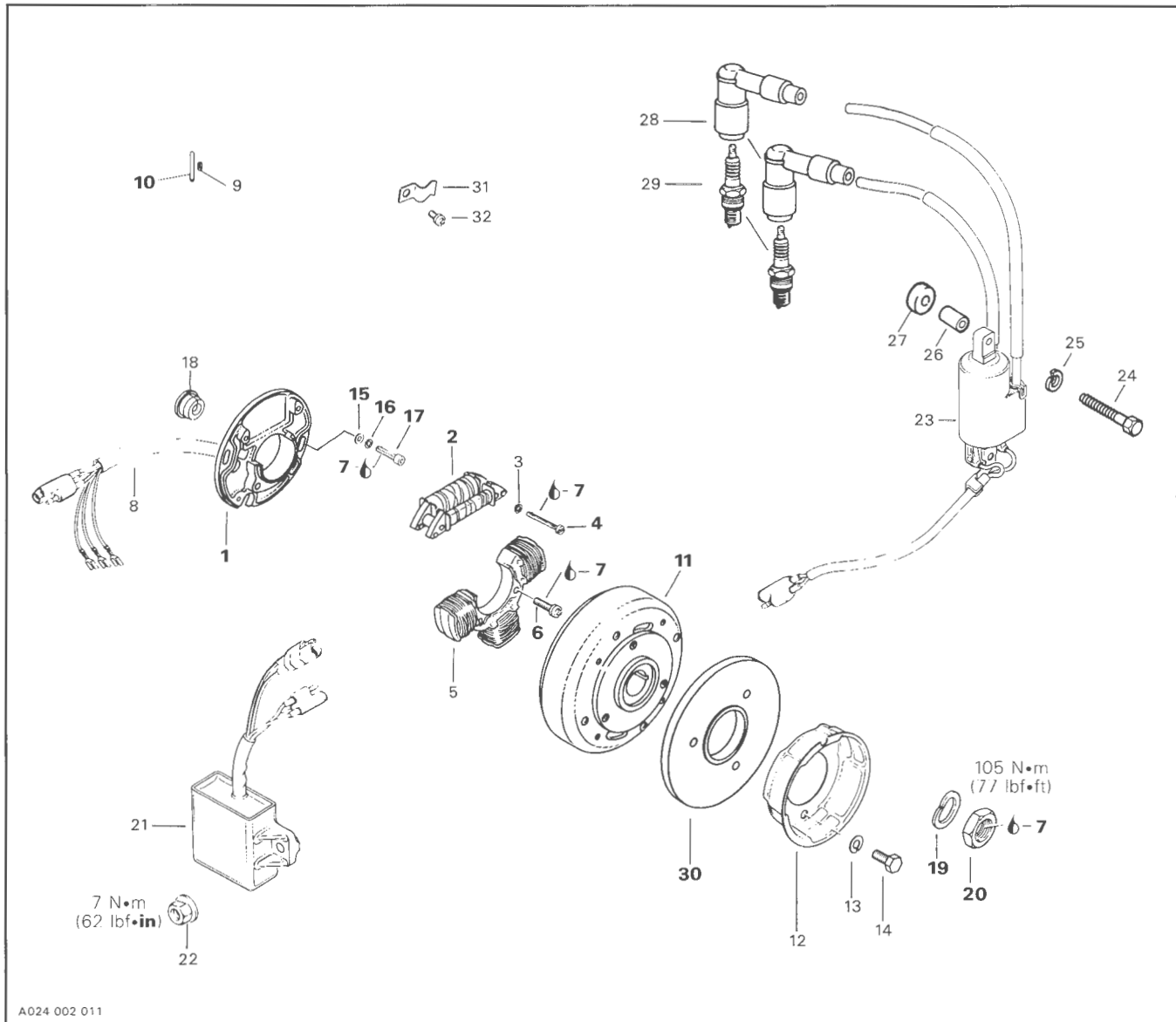
Apply Loctite 242 on the threaded end of the studs going into the crankcase.

To install magneto, refer to "Magneto" in this section.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

MAGNETO



1. Armature plate
2. Generating coil
3. Lock washer 5 mm (2)
4. Cylindrical slotted head screw M5 x 35 (2)
5. Lighting coil
6. Screw M6 x 25 (2)
7. Loctite 242 (blue, medium strength)
8. Harness
9. Splice connector (6)
10. Protector tube (6)
11. Flywheel
12. Starting pulley
13. Lock washer 8 mm (3)
14. Hexagonal screw M8 x 16 (3)
15. Washer 5.5 mm (3)
16. Lock washer 5 mm (3)

17. Allen screw M5 x 18 (3)
18. Cable grommet
19. Lock washer 22 mm
20. Hexagonal nut 22 x 1.5 mm
21. C.D. box
22. Flanged elastic hexagonal stop nut M6 (2)
23. Ignition coil
24. Hexagonal screw M6 x 85 (2)
25. Lock washer 6 mm (2)
26. Spacer (2)
27. Insulator
28. Spark plug protector (2)
29. Spark plug (2)
30. Flywheel counterweight
31. Clamp
32. Screw M4 x 8 mm

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

○ **NOTE:** The following procedures can be done without removing the engine from chassis.

CLEANING

Clean all metal components in a non-ferrous metal cleaner.

▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

DISASSEMBLY

To gain access to magneto assembly, remove :

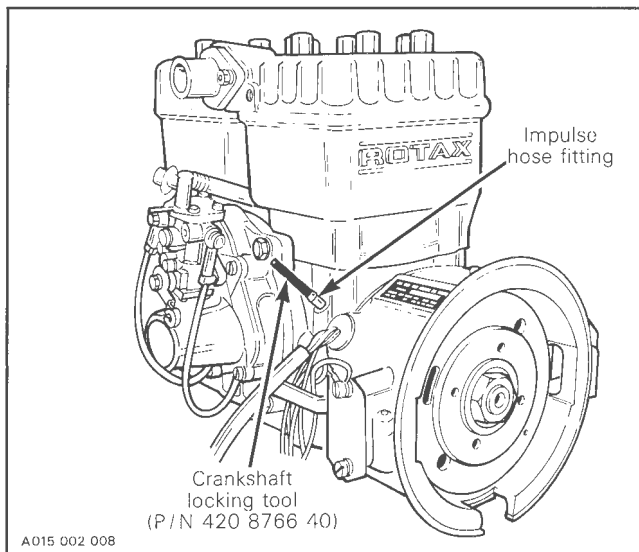
- muffler
- rewind starter
- starting pulley

○ **NOTE:** Before disassembling magneto plate, indexing marks should be scribed to facilitate reassembly.

20, Flywheel retaining nut

To remove magneto flywheel retaining nut :

- Lock crankshaft with crankshaft locking tool as illustrated.
- Remove magneto retaining nut.

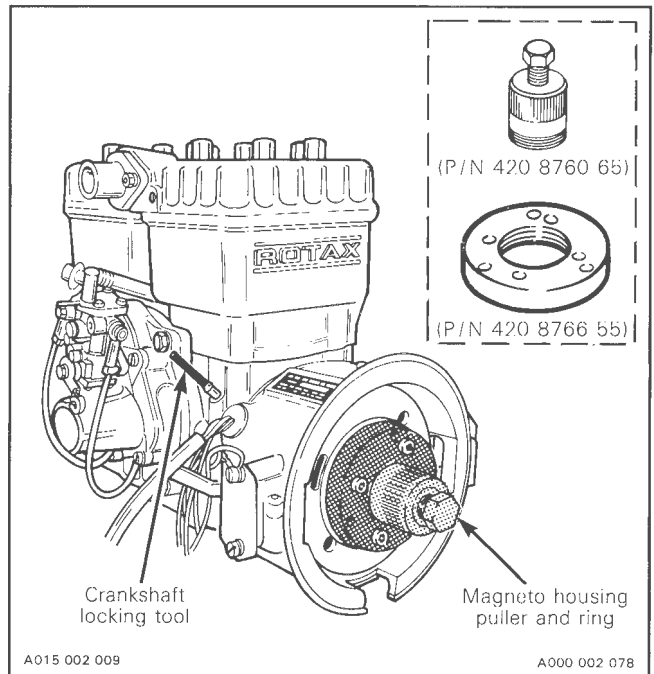


○ **NOTE:** It should be noted that to correctly remove a Loctite locked fastener it is first necessary to tap on the fastener to break the Loctite bond. This will eliminate the possibility of thread breakage.

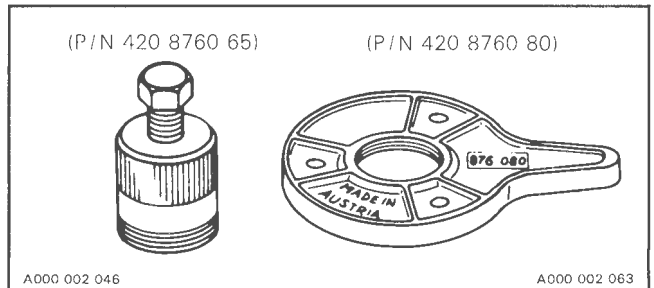
11, Flywheel

To remove magneto housing (flywheel) :

- Lock crankshaft with crankshaft locking tool as illustrated.
- Adjust magneto housing puller and puller ring as illustrated.



○ **NOTE:** For the above procedure, the locking type puller can be used without crankshaft locking tool.



Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

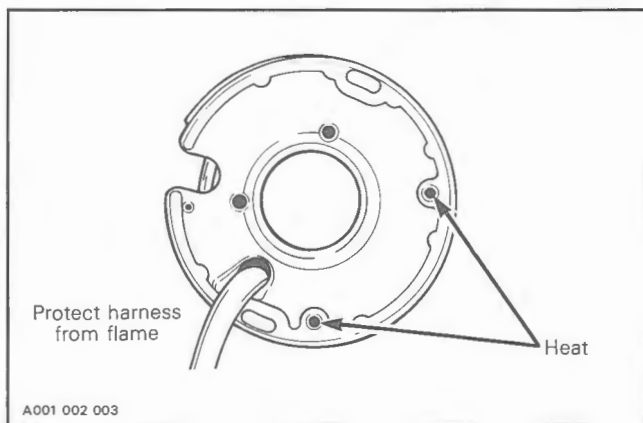
- Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

2, Generating coil

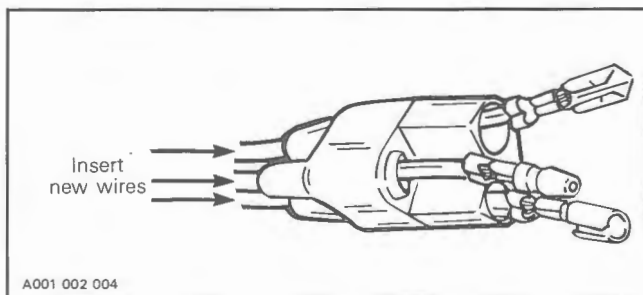
To replace generating coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



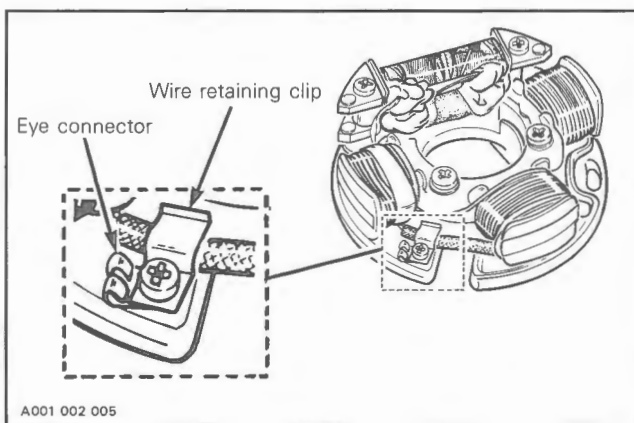
CAUTION : Protect harness from flame.

- Remove screws (use Phillips no 2 or suitable flat screwdriver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector housing and install connectors.



CAUTION : Replace the old wires in the connector with the same color coded new wires.

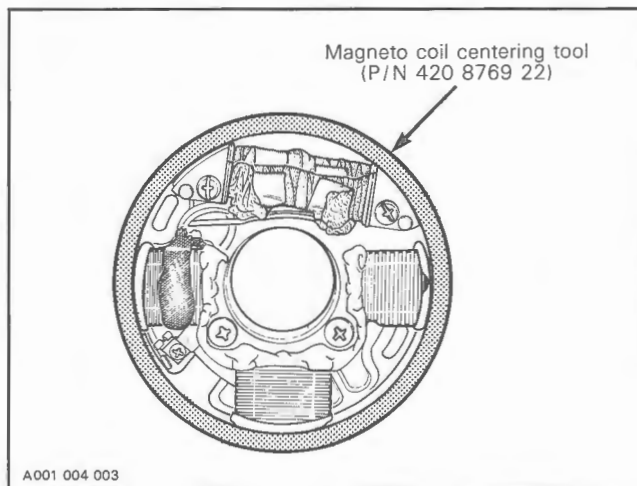
- Install a new receptacle connector to the black/yellow striped wire.
- To install the ground connector to the armature plate, tape the new black lead to the old one and pull it under the lighting coil with the old wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.



4,7, Generating coil screw & Loctite 242

To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



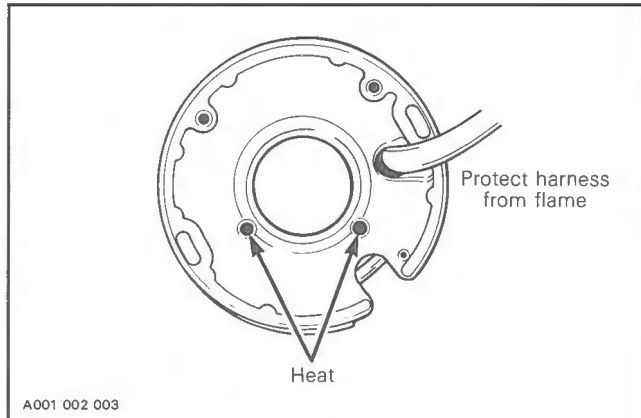
CAUTION : Before reinstalling the magneto, remove the loose epoxy from harness.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

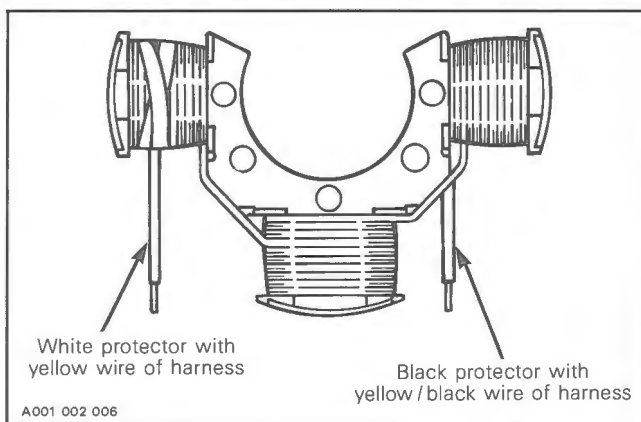
To replace lighting coil :

- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



CAUTION : Protect harness from flame.

- Remove screws (use Phillips no 3 screwdriver).
- Remove the wire retaining clip from armature plate.
- Pull out protector tubes and unsolder the splice connectors.
- Solder the yellow wire in the harness to the white tube protected wire of the coil.
- Solder the yellow/black striped wire in the harness to the black tube protected wire of the coil.



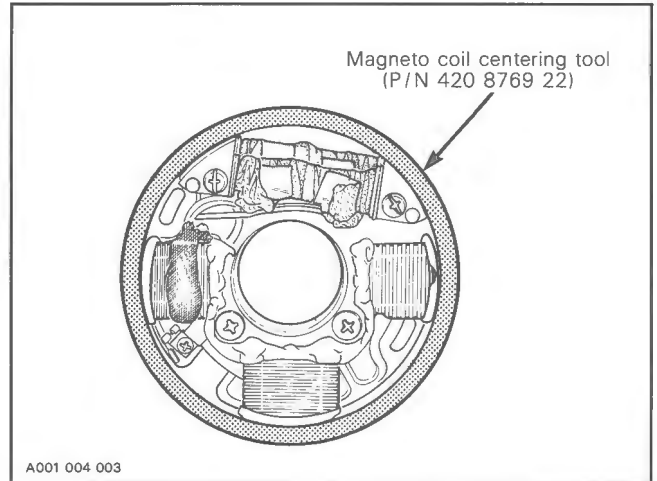
10, Protector tube

Position protector tubes over connections.

6,7, Lighting coil screw & Loctite 242

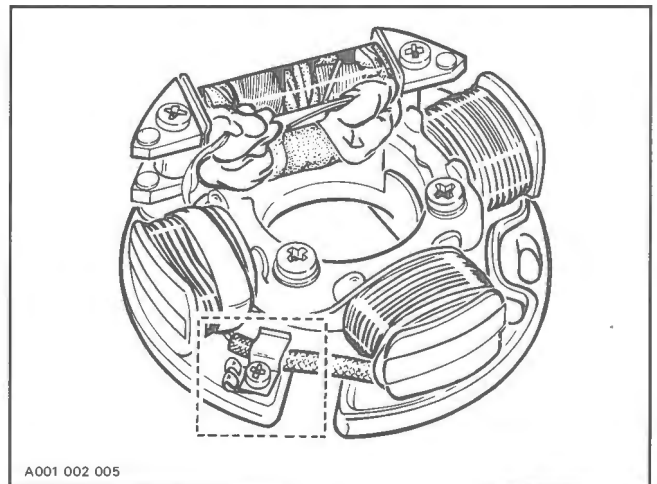
Prior to assembly, apply Loctite 242 (blue, medium strength).

Use magneto coil centering tool (P/N 420 8769 22) before tightening screws.



- Fasten retaining clip onto protector tubes.

The ground terminal from generating coil must be fastened under this clip.



CAUTION : Before reinstalling magneto, remove the loose epoxy from harness.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

ASSEMBLY

1,7,15,16,17, Armature plate, Loctite 242, washer, lock washer & screw

Position the armature plate on the crankcase, aligning the marks on both parts.

Put a drop of Loctite 242 on screw threads and tighten.

Clean crankshaft extension (taper).

Apply Loctite 242 on taper.

7,11,19,20, Loctite 242, flywheel, lock washer & nut

Position Woodruff key, magneto flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 105 N•m (77 lbf•ft).

At reassembly coat all electric connections with silicone dielectric grease (P/N 413 7017 00) to prevent corrosion or moisture penetration.

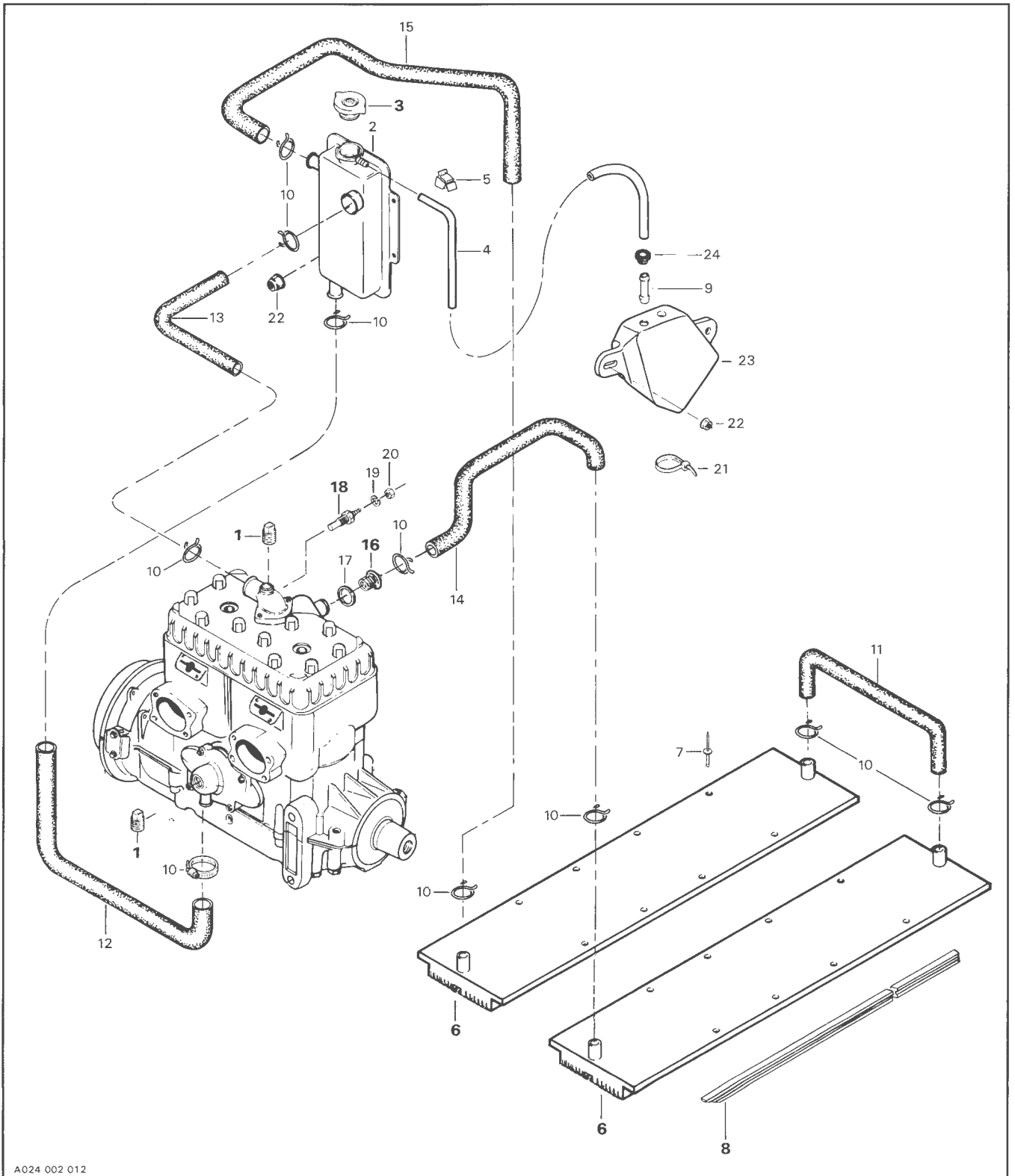
▼ **CAUTION:** Do not use silicone "sealant", this product will corrode contacts.

30, Flywheel counterweight

Whenever reassembling counterweight on flywheel, align marks from both parts.

○ **NOTE:** For ignition timing procedure refer to "Ignition timing", section 04-02.

COOLING SYSTEM



Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

1. Plug
2. Coolant tank
3. Pressure cap
4. Overflow hose 20 in (510 mm)
5. Clip
6. Radiator (2)
7. Rivet
8. Radiator protector (2)
9. Male connector
10. Hose clamp (10)
11. U-hose
12. Engine inlet hose

13. Engine outlet hose
14. Radiator inlet hose
15. Radiator outlet hose
16. Thermostat
17. Sealing ring
18. Sender
19. Lock washer
20. Hexagonal nut
21. Tie rap
22. Nut (2)
23. Overflow tank
24. Grommet

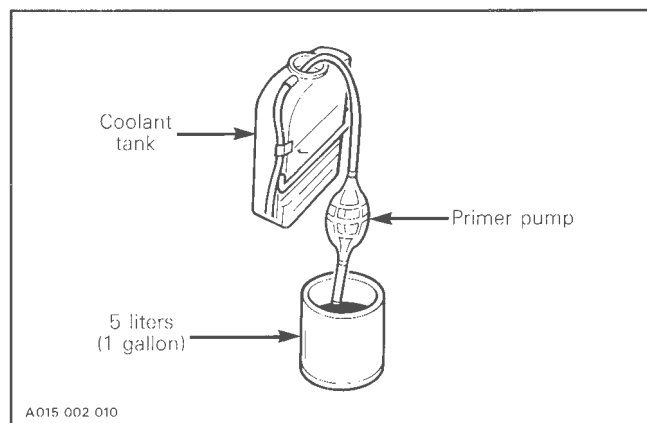
INSPECTION

Check general condition of hoses and clamp tightness.

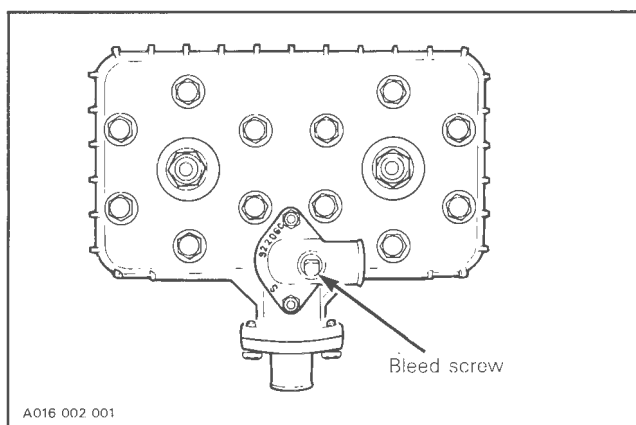
DRAINING THE SYSTEM

WARNING : Never drain or refill the cooling system when engine is hot.

To drain the cooling system, siphon the coolant mixture from the coolant tank, using a primer pump and length of plastic hose and steel tubing inserted as deep as possible into the lower hose of the tank.



When the coolant level is low enough, remove the engine bleed screw and lift the rear of vehicle to drain the radiators.



DISASSEMBLY & ASSEMBLY

1,18, Plug & sender

Apply thread sealant on sender and plug to avoid leaks.

3, Pressure cap

Check if the cap pressurizes the system. If not, install a new 90 kPa (13 PSI) cap. Do not exceed this pressure.

6,8, Radiator & radiator protector

Insert radiator protector into radiator C-rail and crimp C-rail at both ends.

16, Thermostat

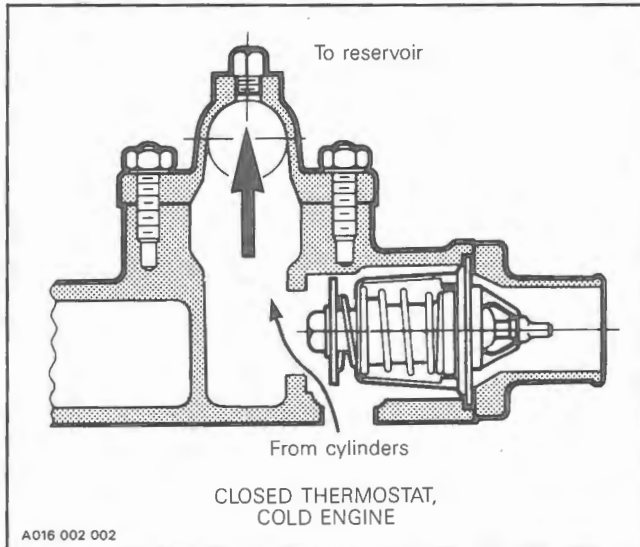
To check thermostat, put it in water and heat the water. Thermostat should open when water temperature reaches 42°C (107°F).

This thermostat is a "double action type".

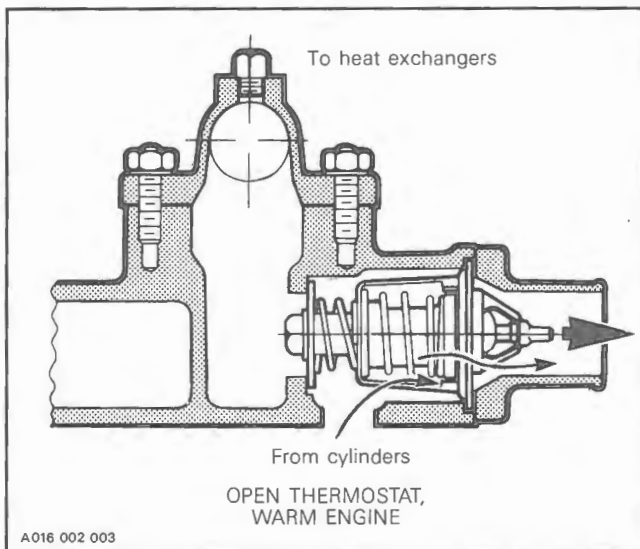
A- Its function is to give a faster warm up of the engine by provoking a circuit ; water pump - engine - reservoir. This is done by closing the heat exchanger circuit.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)



B- When the liquid is warmed to 42°C (107°F), the thermostat opens the circuit, water pump - engine - radiators - reservoir to keep the liquid at the desired temperature. (See the diagram of the exploded view).



These two functions have the advantage of preventing a massive entry of cold water into the engine.

REFILLING THE SYSTEM

Capacity :

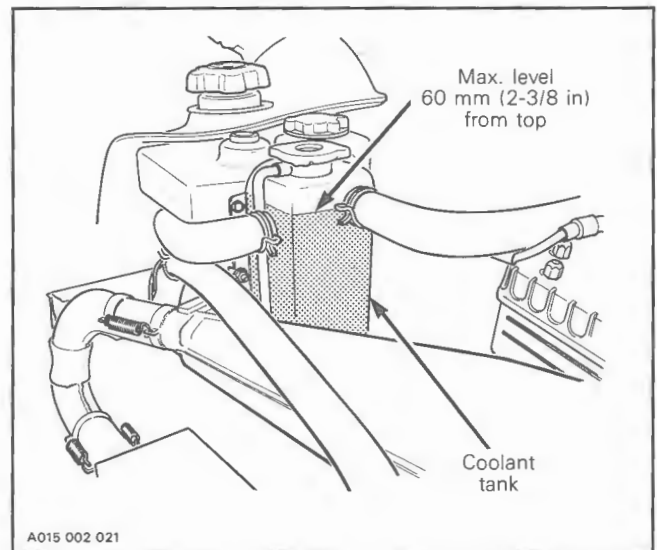
Approximately 4.2 liters (148 Imp. oz, 142 U.S. oz)

60 % antifreeze + 40 % water

CAUTION : To prevent rust formation or freezing condition, always replenish the system with 60 % antifreeze and 40 % water. Pure antifreeze without water produces premature freezing. Always use ethylen-glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

To refill cooling system :

- Put back the rear of vehicle on the ground.
- Refill coolant tank slowly until coolant overfills at bleed hole.
- Reinstall bleed screw.
- Continue to pour coolant in the tank until level reaches 60 mm (2-3/8 in) below top of tank (engine cold).

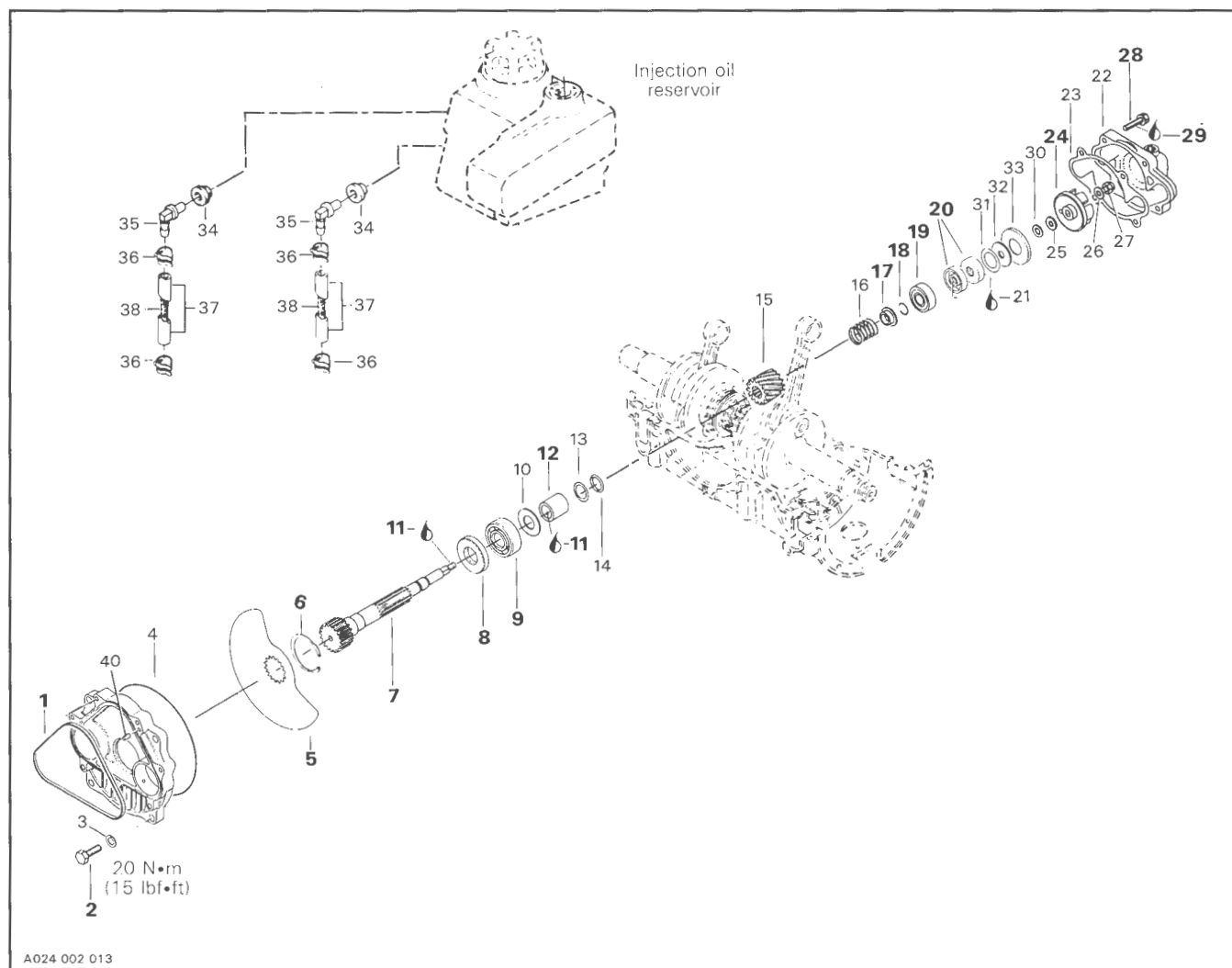


- With the coolant tank cap still removed, start engine and let it warm until thermostat opens. Allow it running a few minutes more.
- Stop engine and check coolant freezing point with a suitable tester. Coolant must be strong enough for the temperature in which the vehicle is operated.
- Recheck coolant level and add liquid if required. Put back the tank cap.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

ROTARY VALVE, COOLANT PUMP & RESERVOIR



1. Rotary valve cover
2. Bolt M8 x 20 (4)
3. Lock washer 8 mm (4)
4. O-ring
5. Rotary valve
6. Circlip
7. Rotary valve shaft
8. Seal
9. Bearing 6203
10. Shim 0.5 mm
11. Loctite RC 609
12. Distance sleeve 24.5 mm
13. Shim 0.5 mm
14. O-ring
15. Gear
16. Spring
17. Spring retaining cup
18. Circlip
19. Bearing 6201
20. Seal (2)

21. Lithium grease
22. Pump housing
23. Gasket
24. Pump impeller
25. Washer 8.1 mm
26. Washer 6.4 mm
27. Nut M6
28. Bolt M6 x 25 (4)
29. Loctite 242
30. Friction washer
31. Shim 0.5 mm
32. Rubber washer
33. Supporting plate
34. Isolating washer (2)
35. Elbow connector (2)
36. Hose clamp (6)
37. Oil line 7.75 in (196 mm) (2)
38. Spring (2)
39. Oil line
40. Pin

CLEANING

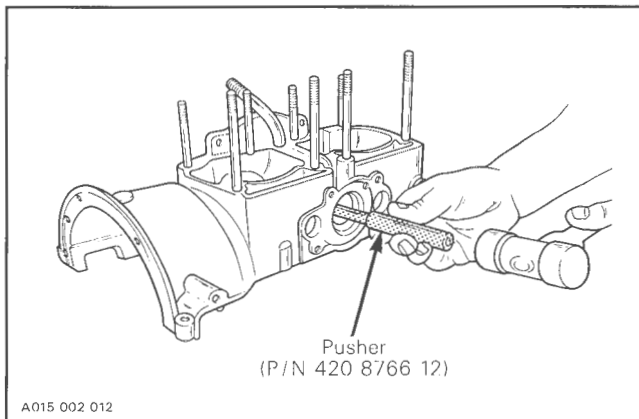
Discard all seals and O-rings.

Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY & ASSEMBLY

6,24, Circlip & pump impeller

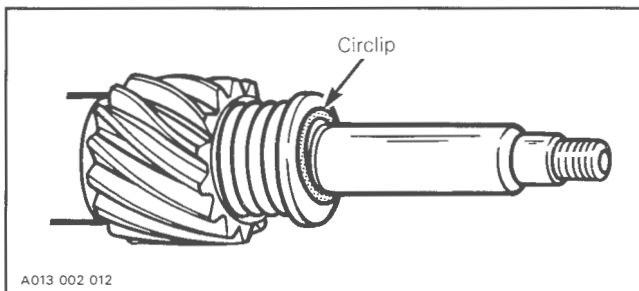
To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip. Using the suitable pusher (P/N 420 8766 12) and a fiber hammer, push shaft assembly.



▼ **CAUTION :** To prevent damage to the end of the rotary valve shaft, use pusher (P/N 420 8766 12).

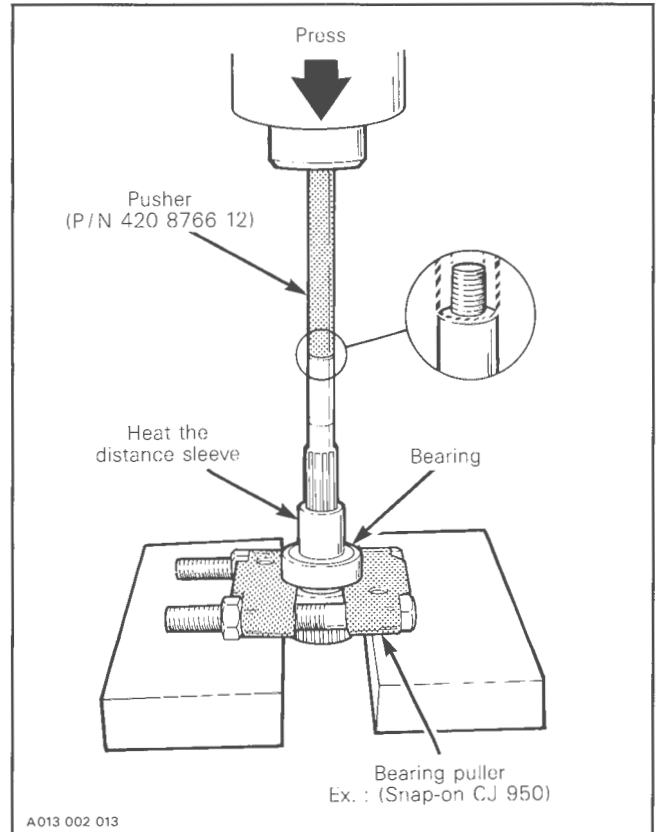
17,18, Spring retaining cup & circlip

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup in order to remove circlip.



11,12, Loctite 271 & distance sleeve

To remove the distance sleeve use a bearing puller (ex. : Snap-on no CJ 950) and pusher (P/N 420 8766 12) as illustrated. Heat the distance sleeve to 93°C (200°F) to break the Loctite bond and proceed as illustrated.



▼ **CAUTION :** Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

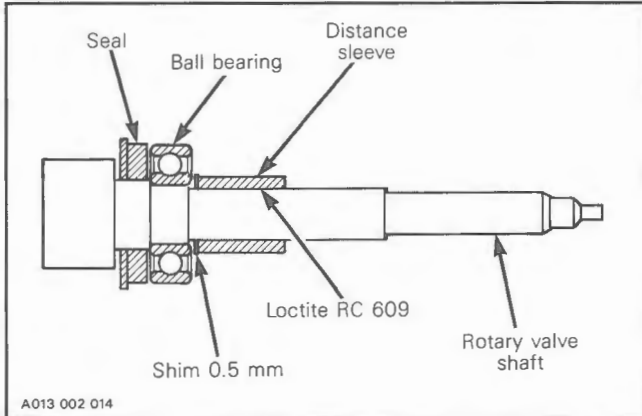
Clean rotary valve shaft and inside of distance sleeve. At assembly apply Loctite RC 609 inside of distance sleeve.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

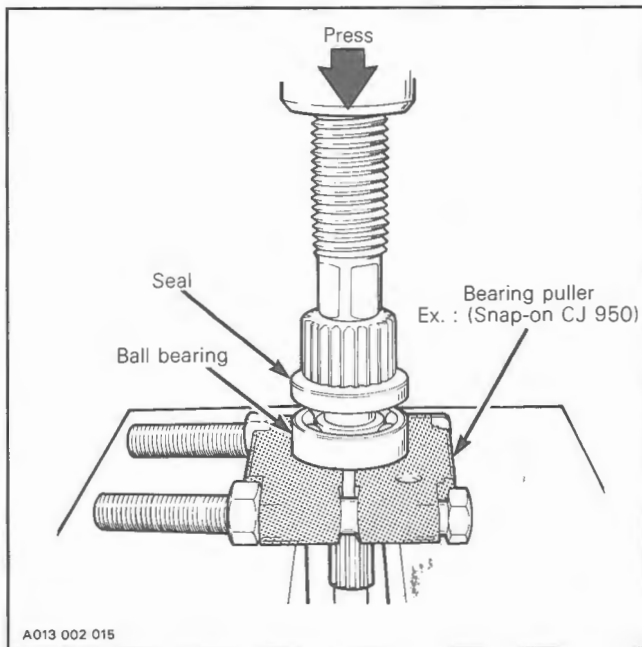
7,8, Rotary valve shaft & seal

At assembly apply lithium grease on seal lips. Position the seal with shield portion towards rotary valve.



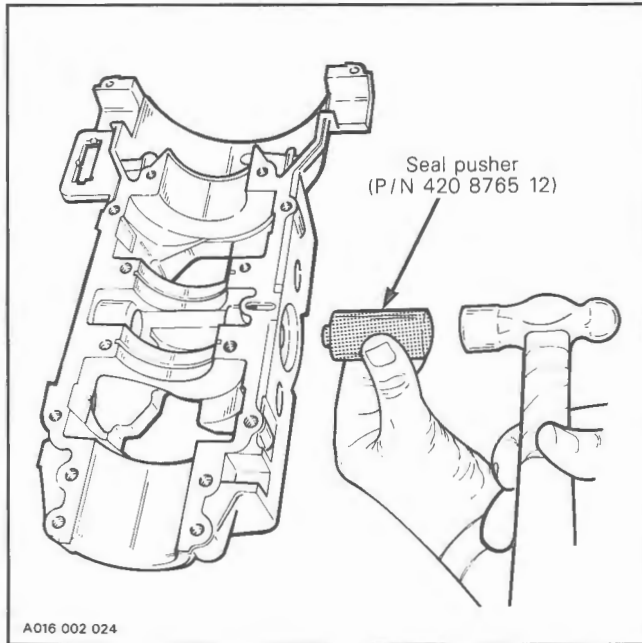
7,9, Rotary valve shaft & bearing 6203

Install ball bearing as illustrated.

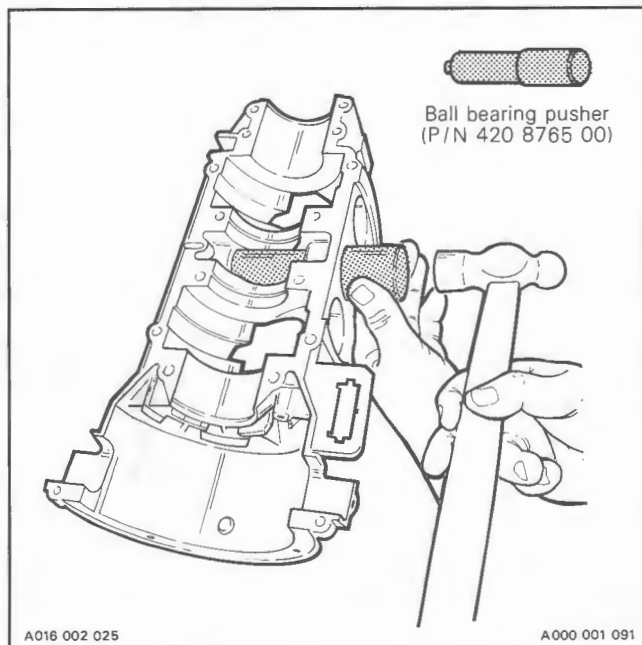


19,20,31,32 Bearing 6201, seal & rubber washer

To remove bearing 6201 (the smallest one), seals and rubber washer, use seal pusher (P/N 420 8765 12).



To install ball bearing 6201 use ball bearing pusher (P/N 420 8765 00).



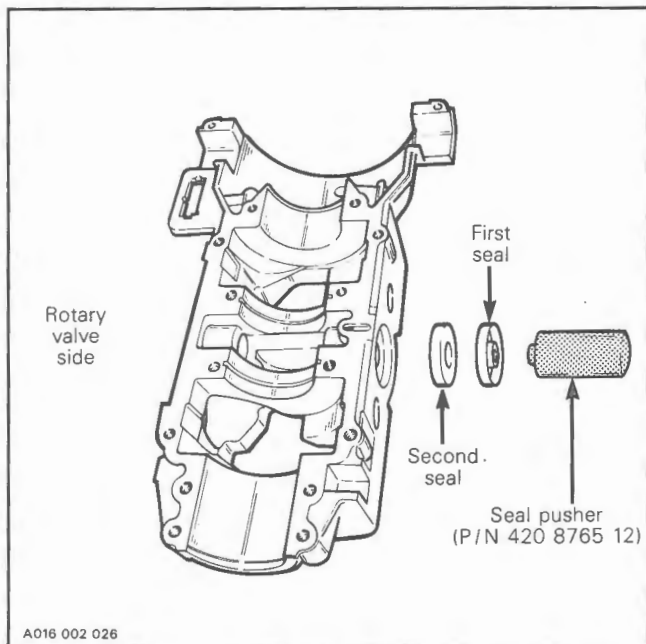
Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

○ NOTE : Ball bearing shielded side must be facing rotary valve.

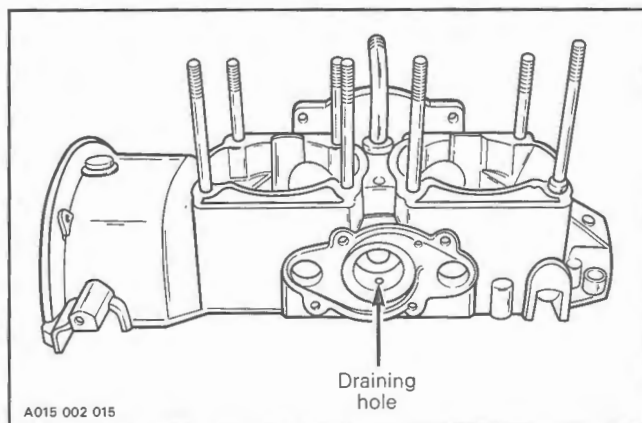
20,31,32, Seals, shim & rubber washer

To install seals on water pump side proceed as follows :



Apply some lithium grease or equivalent on lip of both seals. Position second seal shielded portion towards water pump side. Drive in place with seal pusher (P/N 420 8765 12). Install first seal with its shielded portion towards rotary valve side. Make sure not to obstruct draining hole. Install shim and pack space between seal and rubber washer with lithium grease then install rubber washer.

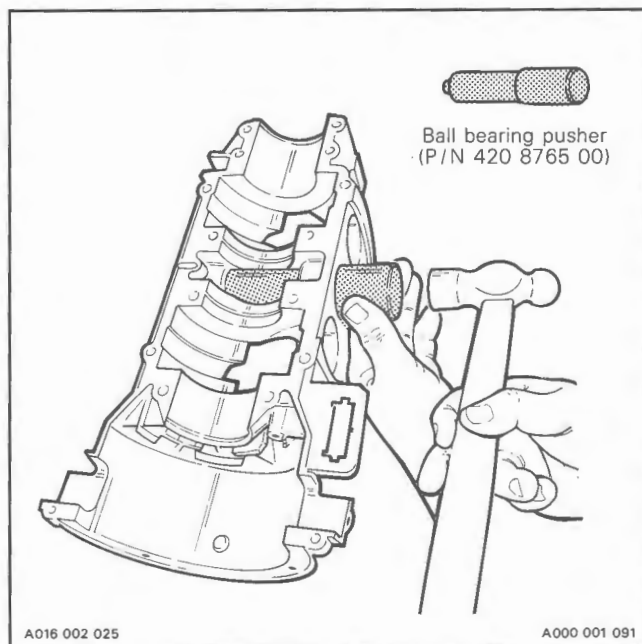
○ NOTE : The draining hole is used to detect seal malfunction. If you notice oil, or coolant at the exit of the draining hole, this means that oil seal or coolant seal leaks.



▼ CAUTION : Failure to position the seals as specified may cause the seal spring to be corroded by coolant. Severe damage may occur if these notices are disregarded.

19,20,21, Bearing 6201, seal & distance ring

○ NOTE : After seals installation, check if the water pump end bearing is correctly positioned with ball bearing pusher (P/N 420 8765 00).



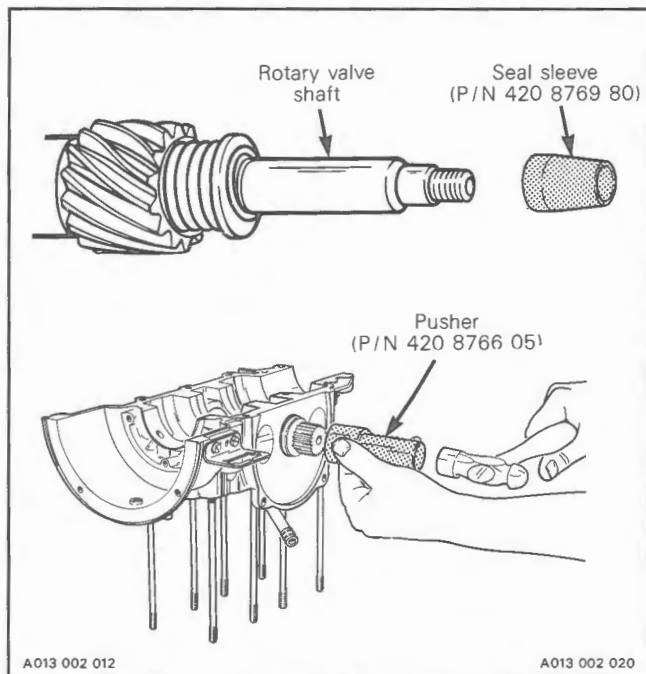
Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

7, Rotary valve shaft

To install rotary valve shaft proceed as follows with the suitable tools :

- pusher (P/N 420 8766 05).
- water pump seal sleeve (P/N 420 8769 80).

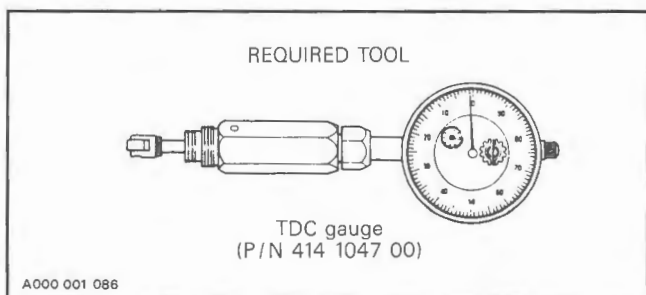


28,29, Pump housing bolt & Loctite 242

Apply Loctite 242 on bolts thread.

5, Rotary valve

Installation on genuine crankcase with mark (ridge)



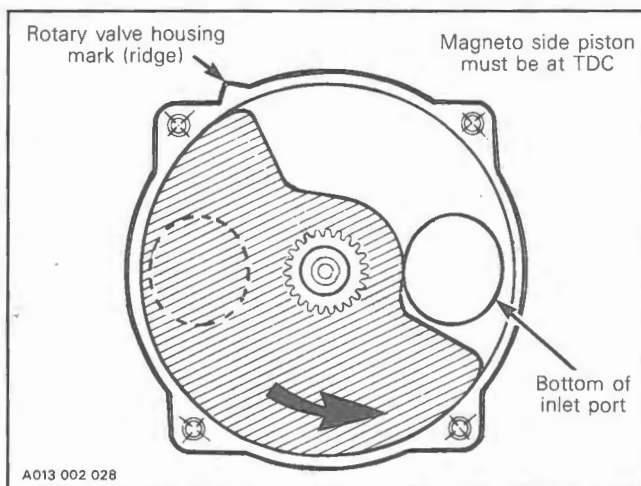
To correctly install the rotary valve, proceed as follows :

- Turning crankshaft counter clockwise, (drive pulley side) bring magneto side to top dead center using a TDC gauge.

○ **NOTE :** Do not use crankshaft locking tool to find out magneto side top dead center. It will not give the right position.

- Position the rotary valve on gear in such a way that its closing edge will be as close as possible to the **bottom** of the magneto side inlet port, and its opening edge in line with the mark (ridge) on the upper left side of the rotary valve housing.

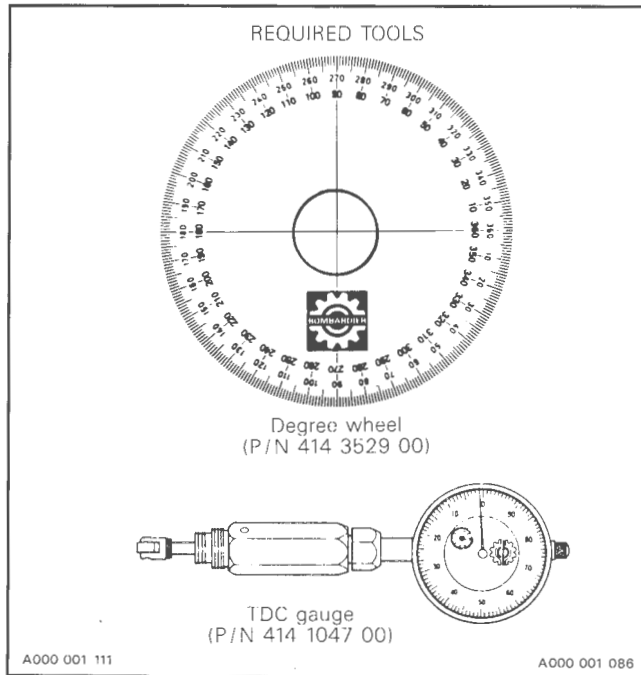
○ **NOTE :** The rotary valve is asymmetrical, therefore, at assembly try positioning each side of it on gear to determine best installation position.



Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

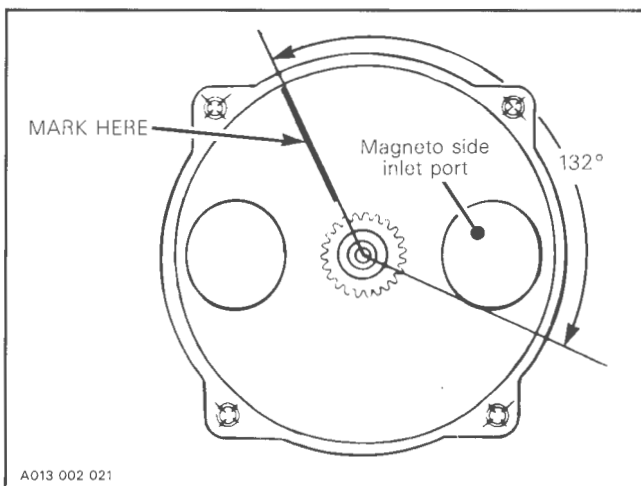
Installation on spare crankcase without mark (ridge)



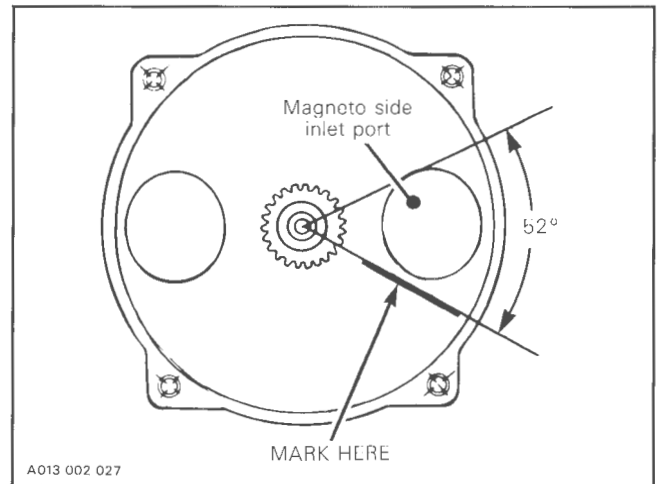
| ENGINE TYPE | TIMING MARKS | |
|-------------|--------------|---------|
| | OPENING | CLOSING |
| 583 | 140° | 61° |

For example : 132° opening
52° closing

Using angle finder, mark crankcase at 132° from **bottom** edge of magneto side inlet port.



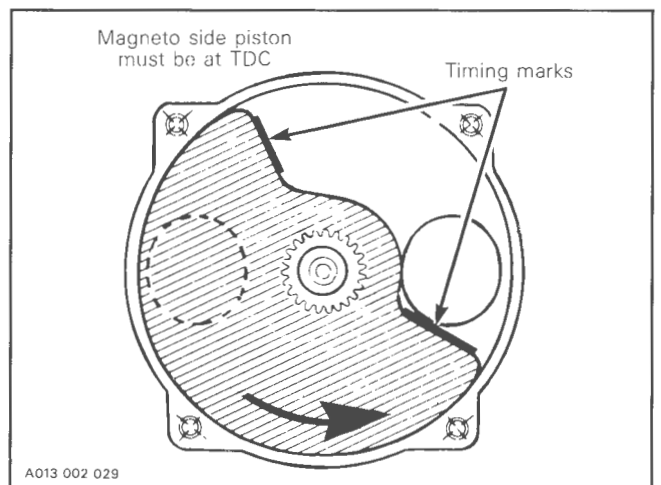
From **top** edge of magneto side inlet port, mark crankcase at 52°.



To correctly install the rotary valve disc proceed as follows :

- Turning crankshaft counterclockwise, (drive pulley side) bring magneto side piston to top dead center using a TDC gauge.
- Position the rotary valve disc on gear to have edges as close as possible to the marks.

NOTE : The rotary valve disc is asymmetrical, therefore at assembly, try positioning each side of disc on gear to determine best installation position.



Spray some injection oil on rotary valve before closing the rotary valve cover.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

2, Rotary valve cover bolt

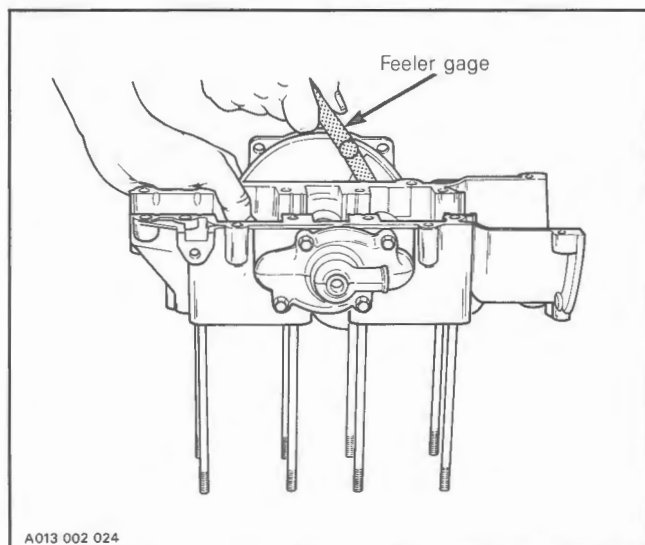
The rotary valve cover bolts must be torqued to 20 N•m (15 lbf•ft).

INSPECTION

1,5, Rotary valve cover & rotary valve

A gap of 0.27 - 0.48 mm (.011 in - .019 in) must be maintained between the rotary valve and the crankcase.

To measure this gap use a feeler gage inserted between rotary valve and upper crankcase with the rotary valve cover in place **without it's O-ring**. Check as much surface as possible. Follow the same procedure for the lower crankcase.



7,15, Rotary valve shaft & gear

Backlash check

Engine do not have to be overhauled to check backlash of crankshaft and rotary valve shaft gears. Remove spark plugs, cover and rotary valve.

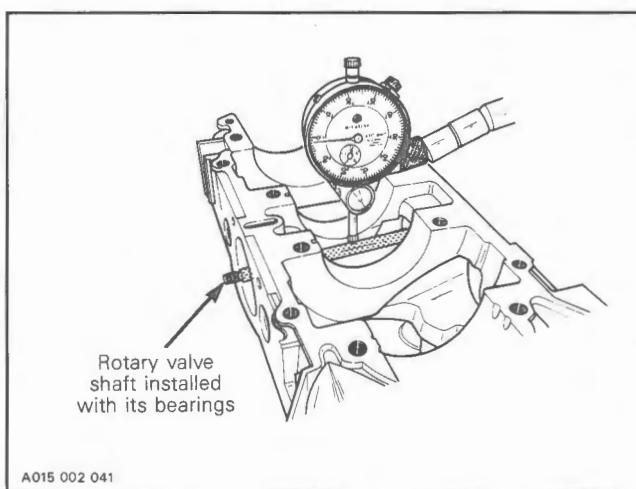
Check backlash at one position then turn crankshaft about 1/8 turn and recheck. Continue this way to complete one revolution.

Backlash must be even at all positions. Otherwise overhaul engine to find which part is faulty (gear, rotary valve shaft or crankshaft with excessive deflection).

Check for presence of brass filings in gear housing. Replace gear if needed.

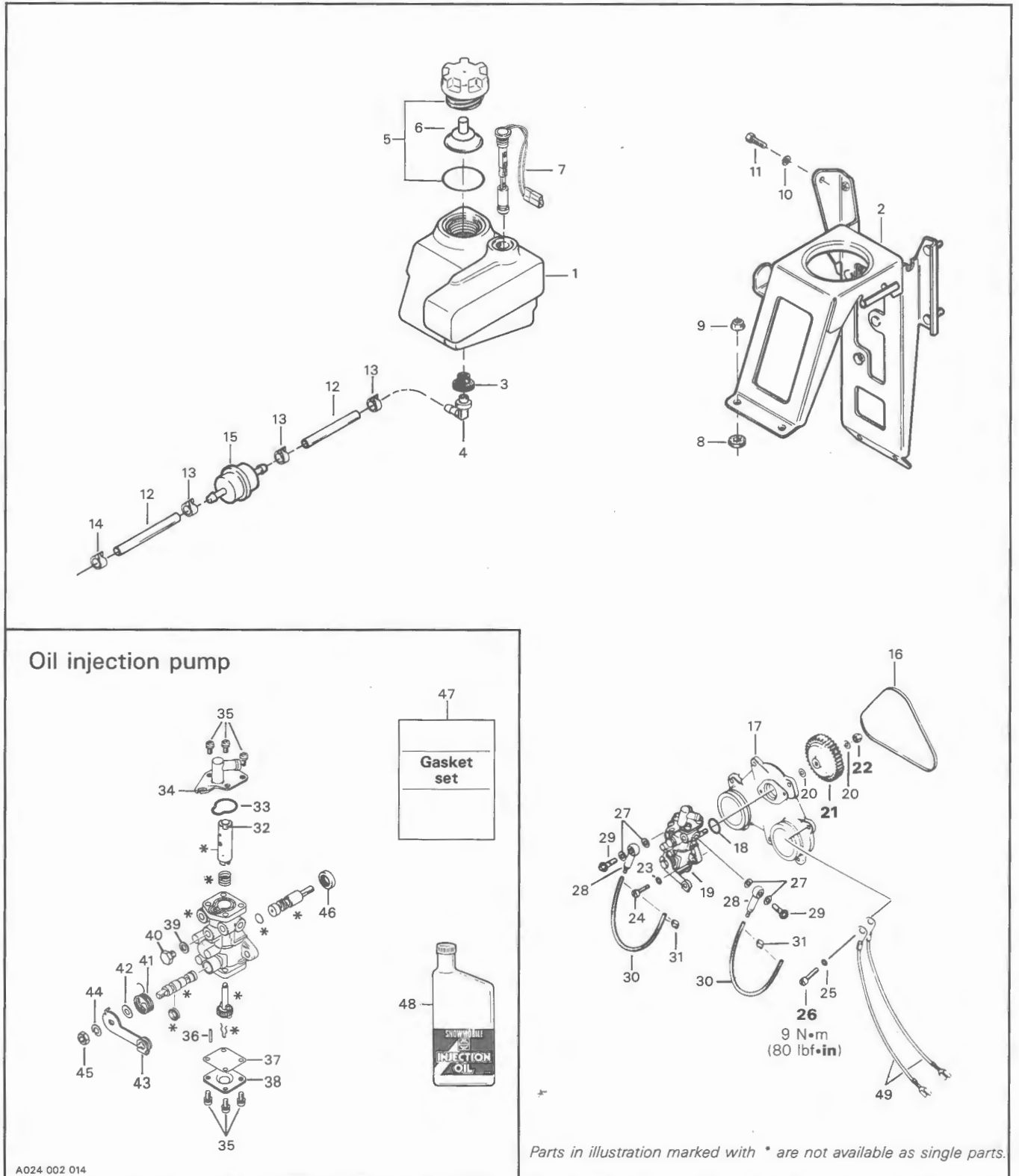
Besides, check deflection of rotary valve shaft and crankshaft close to gear. Replace as needed.

| MAXIMUM ROTARY VALVE SHAFT DEFLECTION | |
|--|------------|
| 0.08 mm | (0.0031'') |



Section 02 ENGINE
Sub-section 07 (583 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

1. Injection oil reservoir
2. Support
3. Grommet
4. Male connector
5. Oil tank cap
6. Gasket
7. Oil level sensor
8. Rubber spacer (4)
9. Flanged hexagonal elastic stop nut M6 (4)
10. Lock washer 6 mm (2)
11. Hexagonal head cap screw M6 x 12 (2)
12. Oil line 8 in (200 mm)
13. Spring clip (3)
14. Spring clip
15. Filter
16. Rubber ring
17. Oil pump mounting flange
18. O-ring
19. Oil pump
20. Washer 6.2 (2)
21. Oil pump gear - 44 teeth
22. Lock nut 6 mm
23. Lock washer 5 (2)
24. Cylindrical slotted screw M5 x 16 (2)
25. Lock washer 6 mm (7)

26. Cylindrical slotted screw M6 x 20 (7)
27. Oil banjo gasket (4)
28. Banjo (2)
29. Banjo bolt M6 x 16 (2)
30. Oil line 170 mm (2)
31. Clamp (4)
32. Retainer
33. O-ring
34. Plate
35. Screw with lock washer (8)
36. Stop pin
37. Gasket
38. Cam casing plate
39. Washer
40. Hexagonal head screw M6 x 7
41. Spring
42. Washer
43. Lever
44. Lock washer 6
45. Hexagonal nut 6 mm
46. Seal
47. Gasket set
48. Injection oil (1 L)
49. Ground cable ass'y

CLEANING

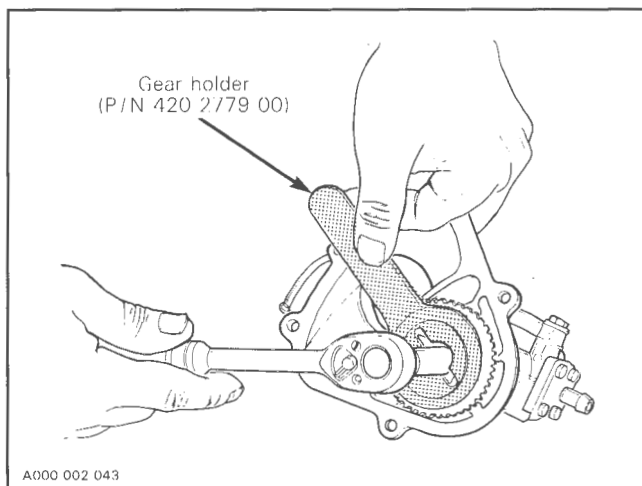
Discard all seals and O-rings. Clean metal components in a non-ferrous metal cleaner.

DISASSEMBLY

NOTE : Some oil pump parts are not available in single parts.

21,22, Oil pump gear & lock nut

To remove retaining nut, lock gear using gear holder (P/N 420 2779 00).

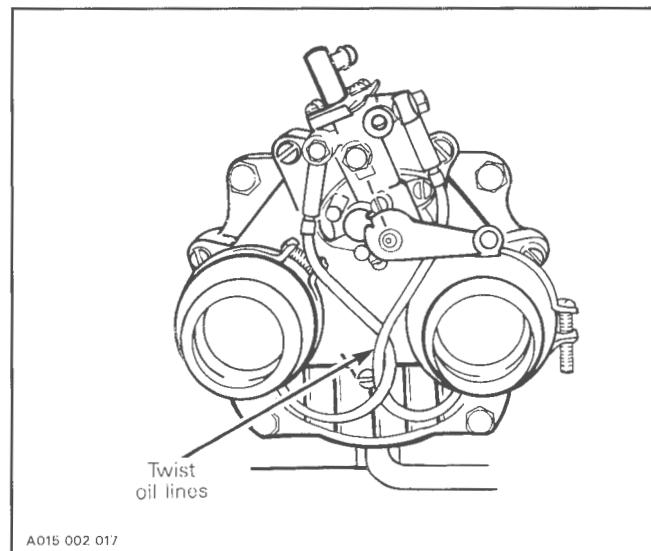


ASSEMBLY

26, Screw

Torque to 9 N•m (80 lbf•in).

CAUTION : Whenever oil injection lines are removed, always make the routing as shown.



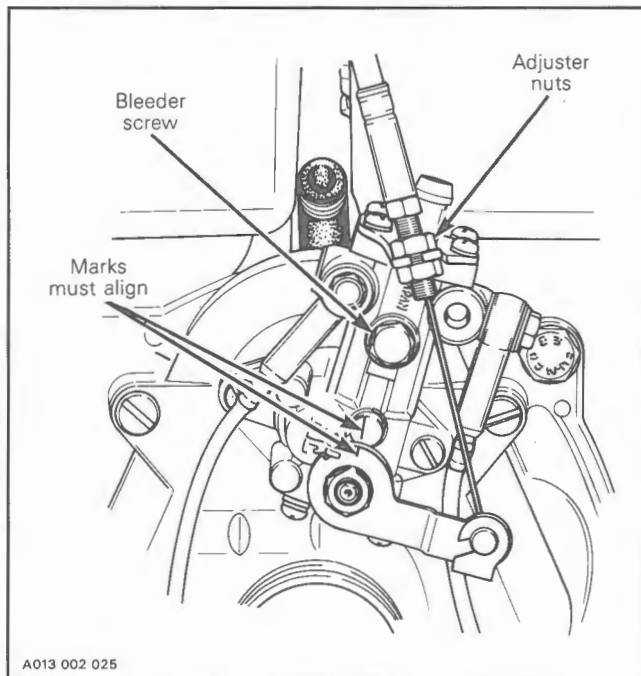
ADJUSTMENT

Prior to adjusting the pump, make sure all carburetor adjustments are completed.

To synchronize pump with carburetor :

Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



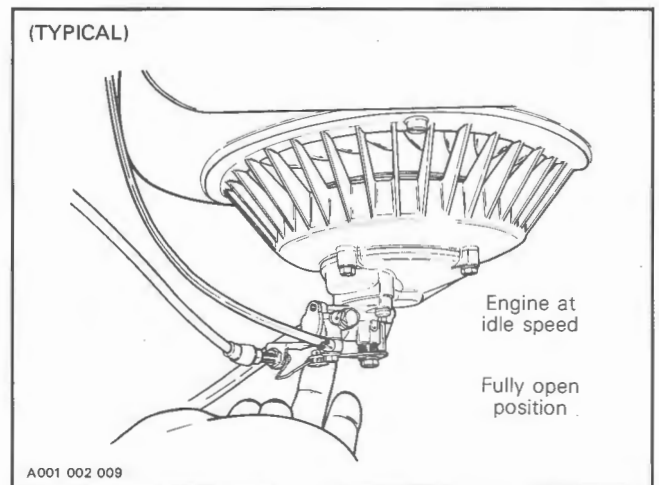
CAUTION : Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To bleed oil lines :

All oil lines should be full of oil. If required, bleed the main oil line (between tank and pump) by loosening the bleeder screw until all air escaped from the line.

Make sure the tank is sufficiently filled.

Check the small oil lines (between pump and intake manifold). If required, fill the lines by running the engine at idle speed while holding the pump lever in fully open position.



WARNING : Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.

Section 02 ENGINE

Sub-section 07 (583 ENGINE TYPE)

CHECKING OPERATION

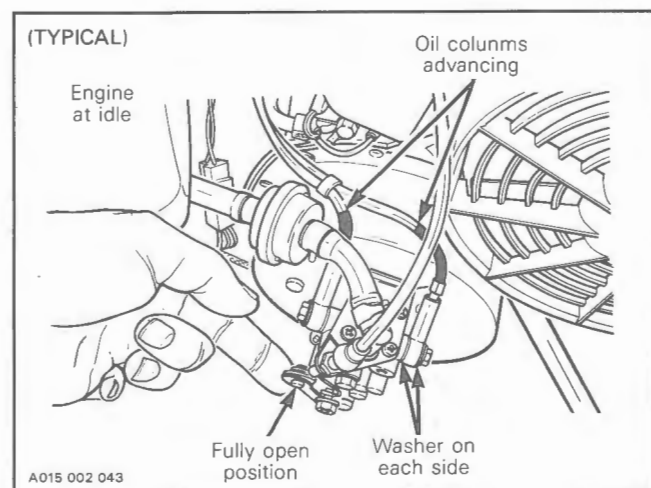
On vehicle

○ **NOTE :** Main oil line must be full of oil. See bleeding procedure above.

Lift rear of vehicle and support with a mechanical stand. Unbolt banjo fittings from pump. Start engine and stop it as soon as it fires.

Check that oil level in small oil lines is passed banjo fitting end by about 25 mm (1 in) (this will be indicated by a clear section of small oil lines of about 25 mm (1 in)). Repeat the procedure until this condition is attained.

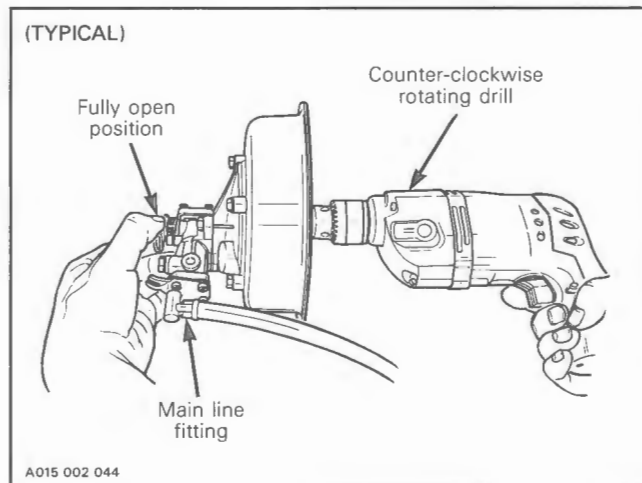
Reconnect banjo fittings with a washer on each side, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.



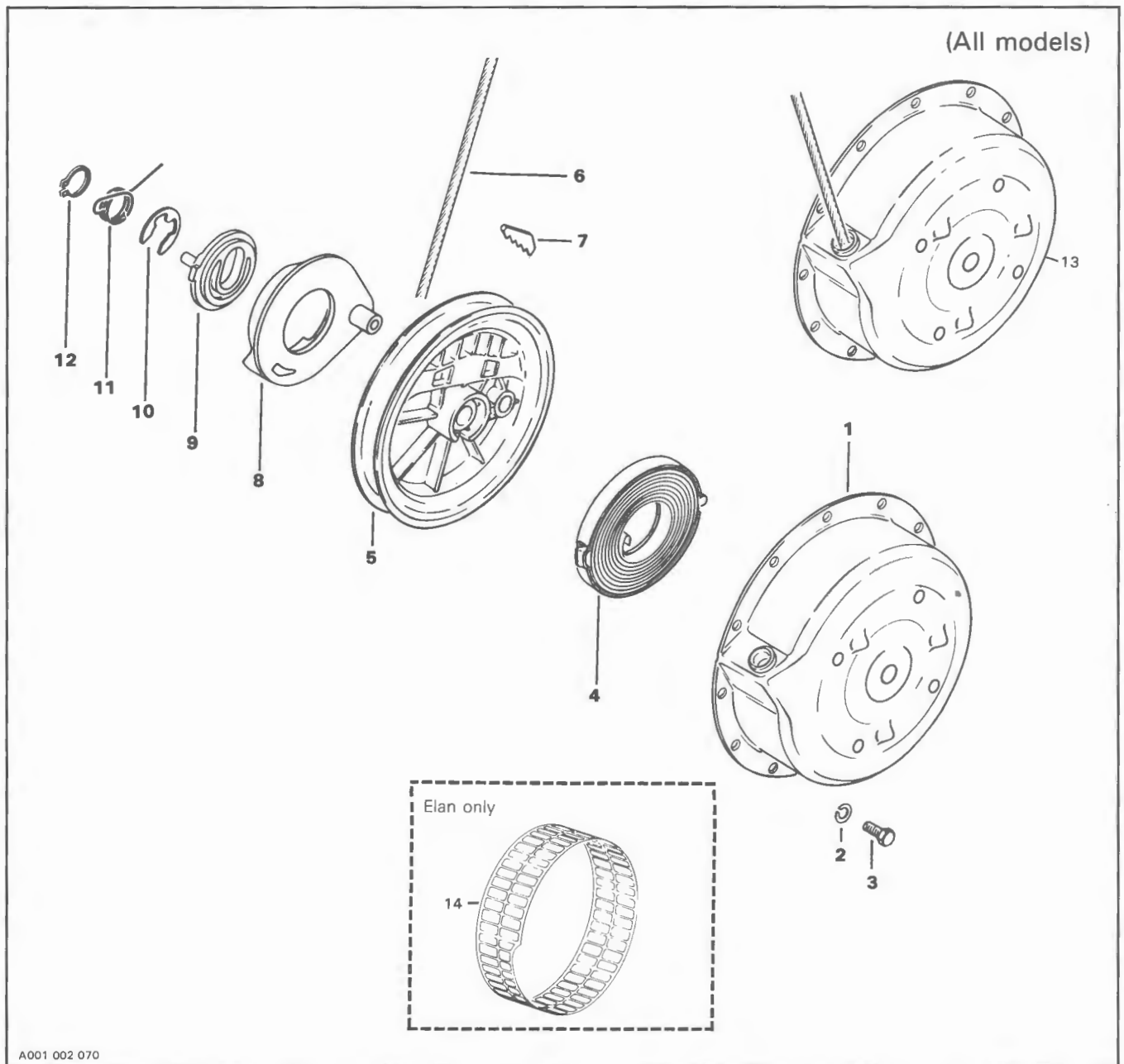
If not remove pump assembly and check the pump gear and drive shaft (if applicable) for defects, replace as necessary. Test pump as describes below.

Test bench

Connect a hose filled with injection oil to main line fitting. Insert other hose end in an injection oil container. Using a counter-clockwise rotating drill rotate pump shaft. Oil must drip from outer holes while holding lever in a fully open position. If not replace pump.



REWIND STARTER



- 1. Starter housing
- 2. Lock washer
- 3. Screw M6 x 14
- 4. Rewind spring & guide
- 5. Rope sheave
- 6. Starter rope
- 7. Key

- 8. Pawl
- 9. Pawl lock
- 10. Circlip
- 11. Lock spring
- 12. Lock ring
- 13. Starter ass'y
- 14. Protector (Elan only)

Section 02 ENGINE

Sub-section 08 (REWIND STARTER)

REMOVAL

1,2,3, Starter housing, lock washer & screw

Remove screws and washers securing rewind starter to engine then remove rewind starter.

NOTE : On some models the hood requires supporting before removing starter housing. (The retaining cable is attached to one of the rewind starter screws).

On fan cooled models with oil injection pump remove pump from rewind starter cover.

DISASSEMBLY

To remove rope from rewind starter mechanism :

8,9,10,11,12, Pawl, pawl lock, circlip, lock spring & lock ring

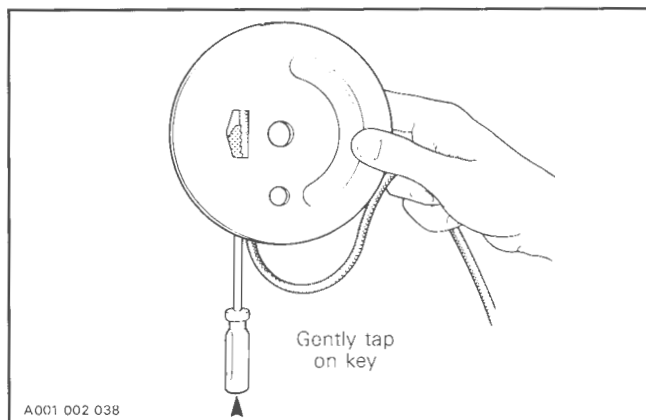
— First remove lock ring, lock spring, circlip, pawl lock and pawl.

1,5, Starter housing & rope sheave

— Remove sheave from starter housing.

6,7, Starter rope & key

— Disengage key and pull out rope.

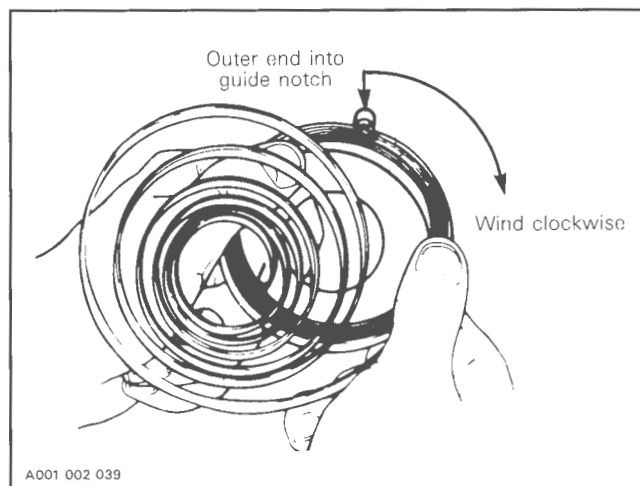


ASSEMBLY

4, Rewind spring & guide

At assembly, position spring outer end into spring guide notch then wind the spring clockwise into guide.

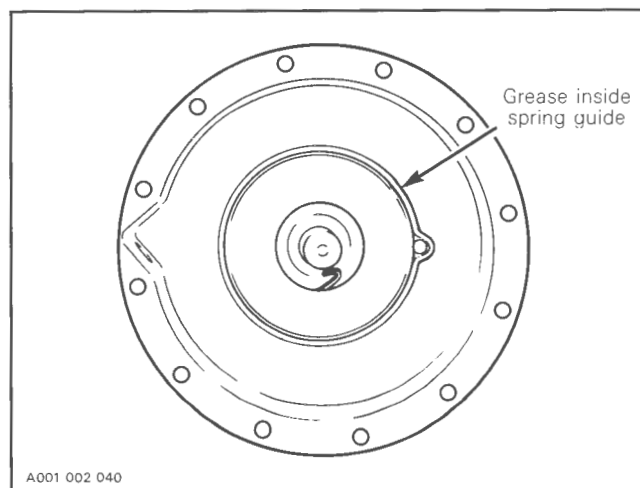
WARNING : Since the spring is tightly wound inside the guide it may fly out when the guide is handled. Always handle with care.



CAUTION : It is of the upmost importance that the rewind starter spring(s) be lubricated periodically using specific lubricants. Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly with low temperature grease "G.E. Versilube G 341 M" (P/N 413 7040 00) and position into starter housing as illustrated.

CAUTION : This lubricant must NOT be used on rewind starter locking spring as it does not stay on under vibration.



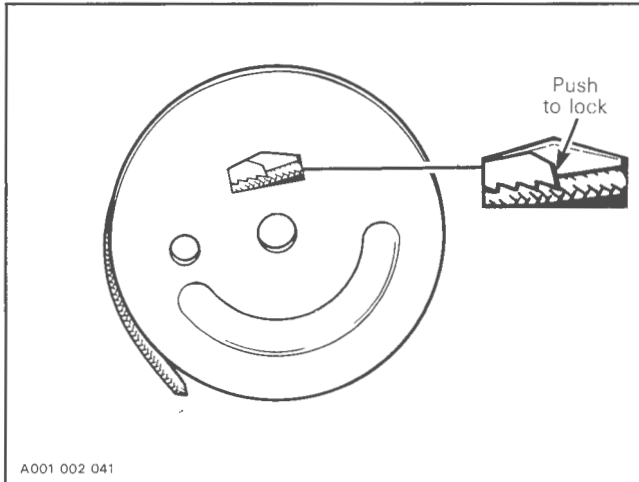
CAUTION : The use of standard multi-purpose grease could result in rewind starter malfunction.

Section 02 ENGINE

Sub-section 08 (REWIND STARTER)

5,6,7, Rope sheave, starter rope & key

To install a new rope : insert rope into sheave orifice and lock it with the key as illustrated.

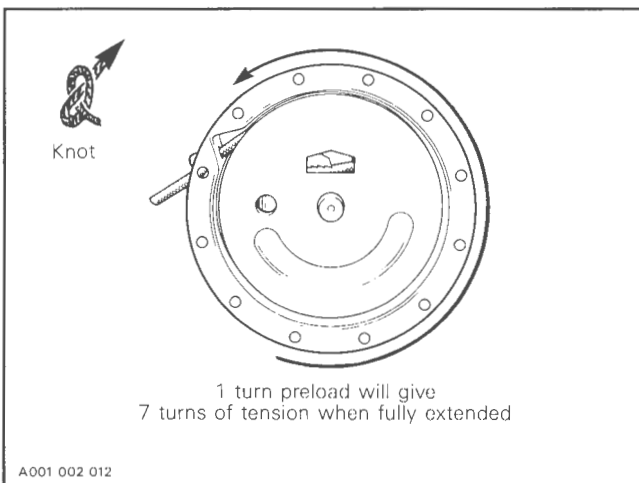


To adjust rope tension :

Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the spring hook.

Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

Pull the rope out of the starter housing and temporarily make a knot to hold it.

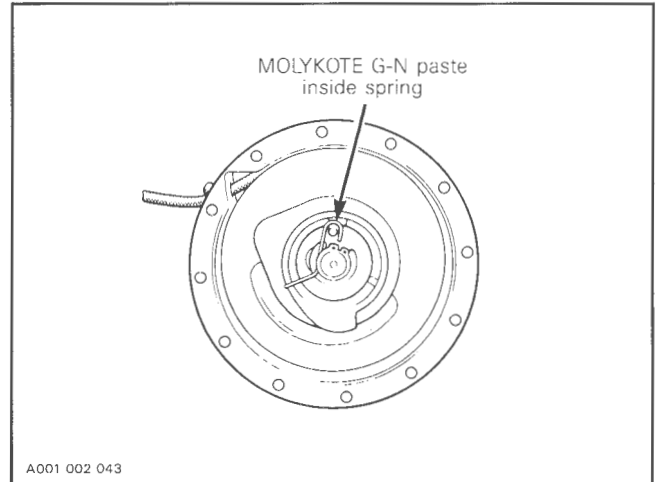


8,9,10, Pawl, pawl lock & circlip

Position pawl, pawl lock and circlip.

11, Lock spring

Install lock spring and lubricate with MOLYKOTE G-N paste P/N 413 7037 00.



Install lock ring.

CAUTION : This lubricant must NOT be used on rewind springs as it does not stay on when dry.

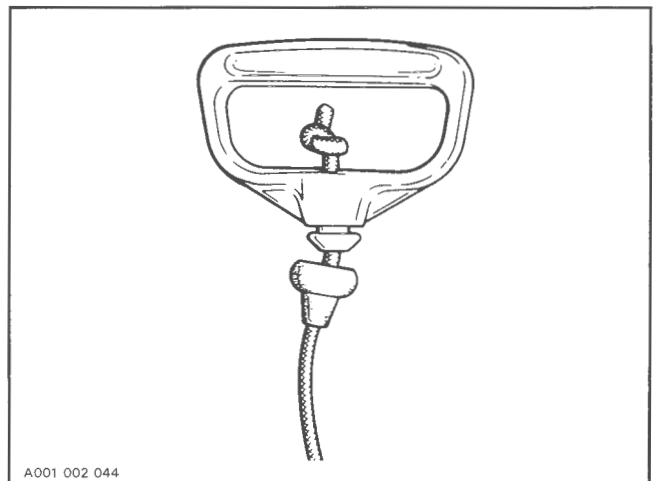
INSTALLATION

On fan cooled models with oil injection pump, reinstall oil pump on rewind starter assembly.

Reinstall rewind starter assembly on engine.

NOTE : If applicable, connect hood retaining cable to rewind starter screw.

Prior to installing starter grip on new rope, it is first necessary to fuse the rope end with a lit match. Pass rope through rubber buffer and starter grip and tie a knot in the rope end. Fuse the knot with a lit match then turn the knot end down and pull the starter grip over the knot.



ENGINE DIMENSION MEASUREMENT

This section covers these engine types : 247, 253, 377, 467, 503, 536, 583.

CYLINDER TAPER

253 Engine type

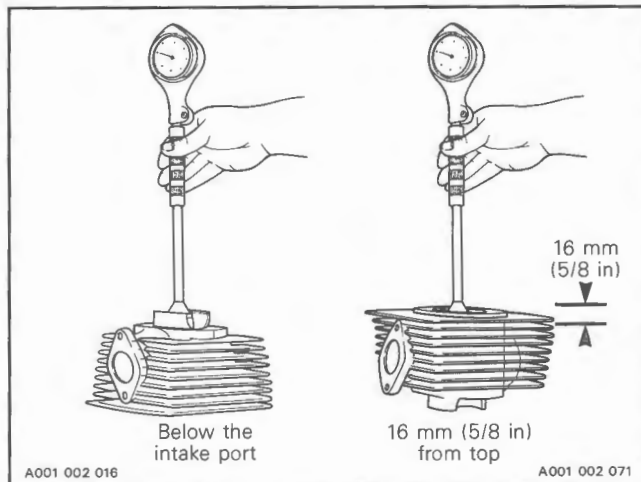
Not applicable.

All other engines

MAXIMUM : 0.08 mm (.003 in)

Compare cylinder diameter 16 mm (5/8 in) from top of cylinder to just below its intake port area.

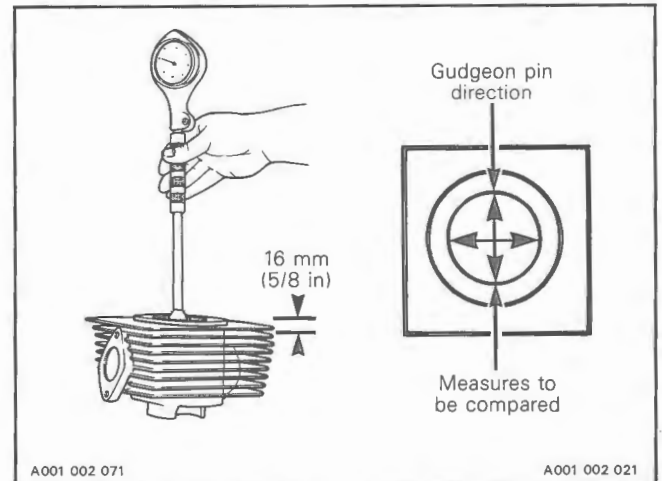
On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds 0.08 mm (.003 in) the cylinder should be rebored and honed or should be replaced.



CYLINDER OUT OF ROUND

| ENGINE TYPE | MAXIMUM |
|---------------|----------------------|
| 253 | 0.10 mm (.004 in) |
| Other engines | 0.05 mm (.002 in) |

Measuring 16 mm (5/8 in) from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than the specified dimension. If larger, cylinder should be rebored and honed or should be replaced.



NOTE : For the 253 engine type, insert the cylinder gauge from the bottom of the head cylinder and slide it up to 16 mm (5/8 in) from top. Compare the measurements at this position.

CYLINDER/PISTON CLEARANCE

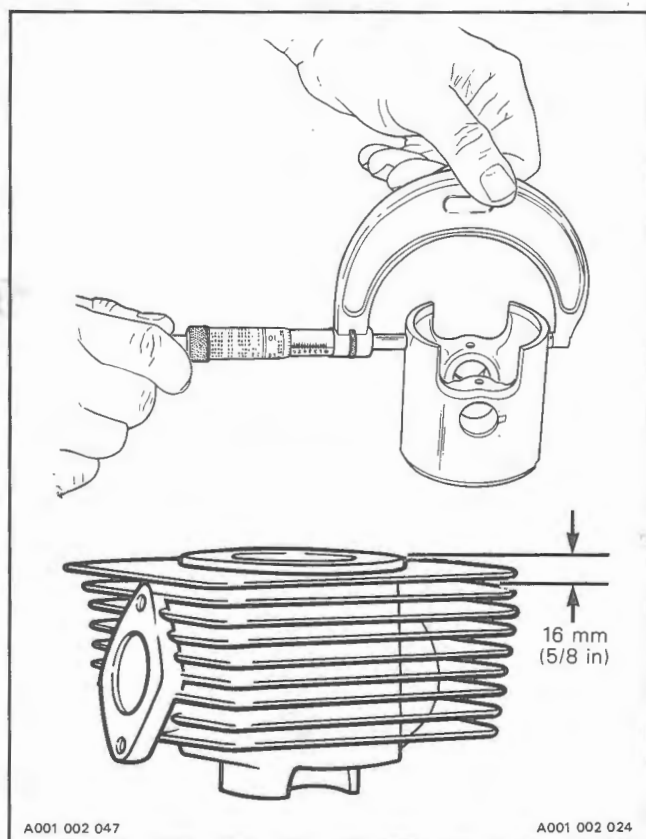
| ENGINE TYPE | NEW PARTS MINIMUM — MAXIMUM | WEAR LIMIT |
|-------------------|--------------------------------------|----------------------|
| 247 253 377 | 0.08 - 0.10 mm (.0031 - .0039 in) | 0.20 mm (.008 in) |
| 467 | 0.10 - 0.12 mm (.0039 - .0047 in) | |
| 503 | 0.07 - 0.09 mm (.0028 - .0035 in) | |
| 536 | 0.09 - 0.10 mm (.0035 - .0039 in) | |
| 583 | 0.11 - 0.13 mm (.0043 - .0051 in) | |

Section 02 ENGINE

Sub-section 09 (ENGINE DIMENSION MEASUREMENT)

Measurement

To accurately determine piston to wall clearance, the piston should be measured right under the axis hole and the cylinder should be measured 16 mm (5/8 in) below its top edge.



NOTE : For the 253 engine type, insert the cylinder gauge from the bottom of the head cylinder and slide it up to 16 mm (5/8 in) from top.

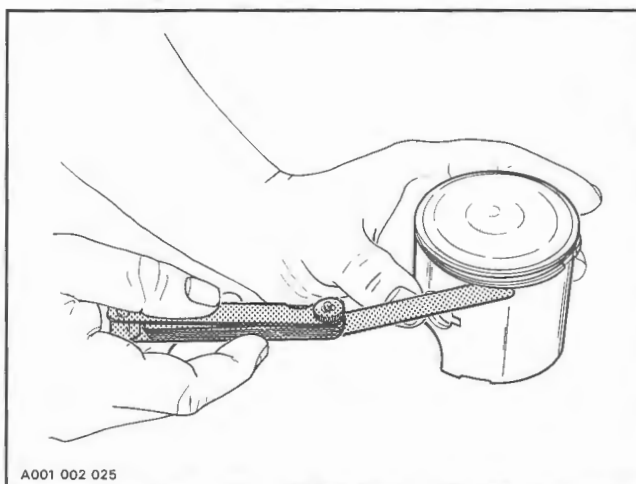
The difference between these two measurements should be within specified tolerance.

RING/PISTON GROOVE CLEARANCE

| ENGINE TYPE | NEW PARTS MIN. — MAX. | WEAR LIMIT |
|-------------|------------------------------------|----------------------|
| All engines | 0.04 - 0.11 mm (.002 - .004 in) | 0.20 mm (.008 in) |

Using a feeler gauge check clearance between rectangular ring and groove. If clearance exceeds specified tolerance, replace piston.

NOTE : Ring / piston groove clearance can be measured only on rectangular ring. On all engines except 247, only the bottom ring is rectangular.



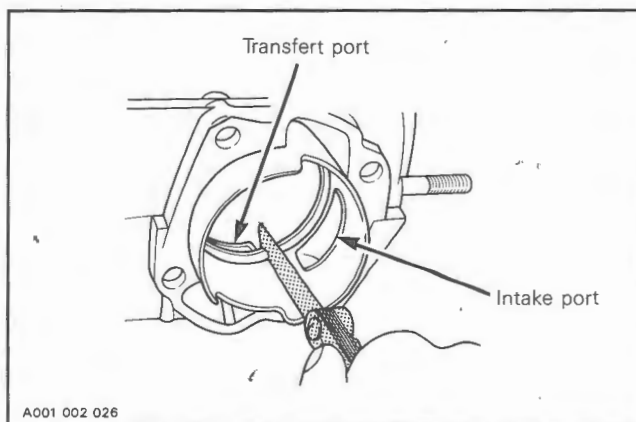
RING END GAP

| ENGINE TYPE | NEW RING MINIMUM—MAXIMUM | WEAR LIMIT |
|-------------|------------------------------------|---------------------|
| All engines | 0.20 - 0.35 mm (.008 - .014 in) | 1.0 mm (.039 in) |

Position ring half way between transfer ports and intake port. On rotary valve engines, position ring just below transfer ports.

NOTE : In order to correctly position the ring in the cylinder, use piston as a pusher.

Using a feeler gauge, check ring end gap. If gap exceeds specified tolerance the ring should be replaced.

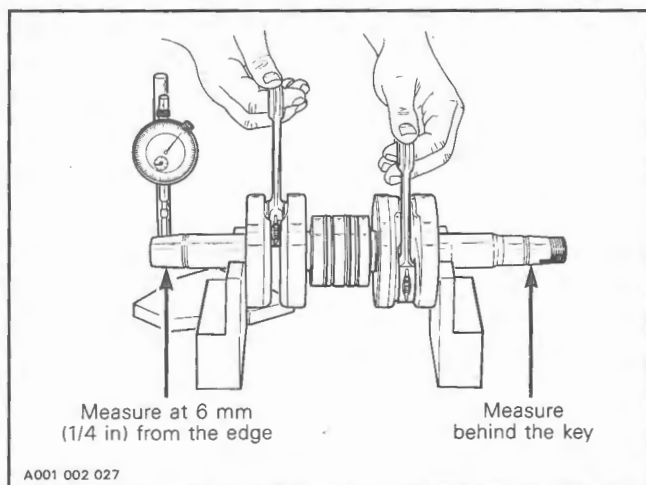


CRANKSHAFT DEFLECTION

| ENGINE TYPE | MAXIMUM |
|-------------|---------------------|
| All engines | 0.08 mm (0.0031 in) |

Crankshaft deflection is measured each end with a dial indicator.

First, check deflection with crankshaft in engine. If deflection exceeds the specified tolerance, it can be either ball bearing wear or bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks as illustrated.



NOTE : Crankshaft deflection can not be correctly measured between centers of a lathe.

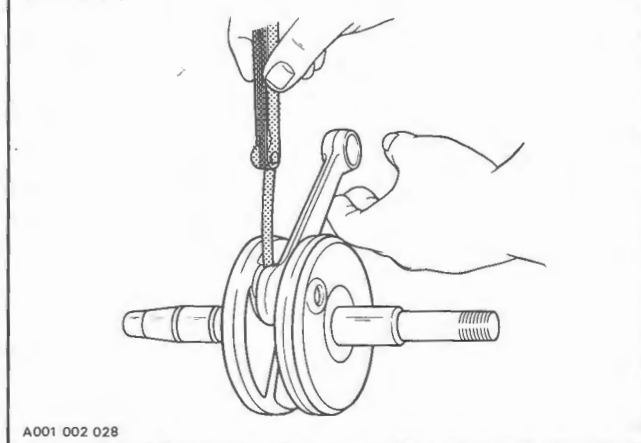
If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

| ENGINE TYPE | NEW PARTS MIN. — MAX. | WEAR LIMIT |
|--------------------|---------------------------------|-------------------|
| 247, 253, 377, 503 | 0.20 - 0.53 mm (.008 - .021 in) | 1.00 mm (.039 in) |
| 467, 536, 583 | 0.40 - 0.73 mm (.016 - .029 in) | 1.20 mm (.047 in) |

Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.

(TYPICAL)



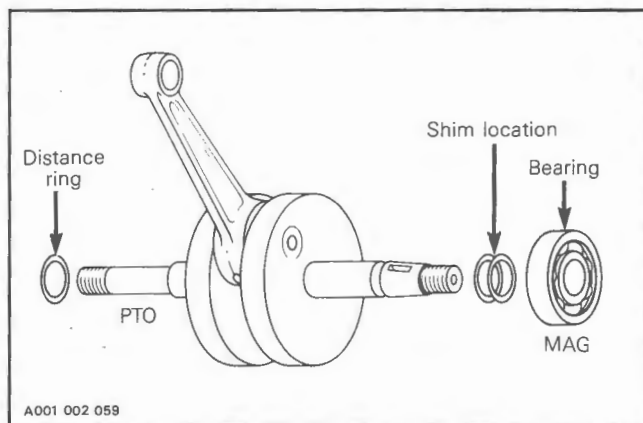
CRANKSHAFT END-PLAY

247 Engine type

| ENGINE TYPE | MINIMUM | MAXIMUM |
|-------------|-------------------|-------------------|
| 247 | 0.10 mm (.004 in) | 0.30 mm (.012 in) |

Adjustment

Crankshaft end-play is adjusted with shims located between crankshaft and magneto side bearing.



CAUTION : Always install end-play adjustment shims on the magneto side between bearing and crankshaft counterweight.

Section 02 ENGINE

Sub-section 09 (ENGINE DIMENSION MEASUREMENT)

The following is required for the adjustment procedure :

— adjustment shims (refer to parts catalog)

thicknesses available : - 0.10 mm (.004 in)
- 0.20 mm (.008 in)
- 0.30 mm (.012 in)
- 0.50 mm (.020 in)
- 1.00 mm (.040 in)

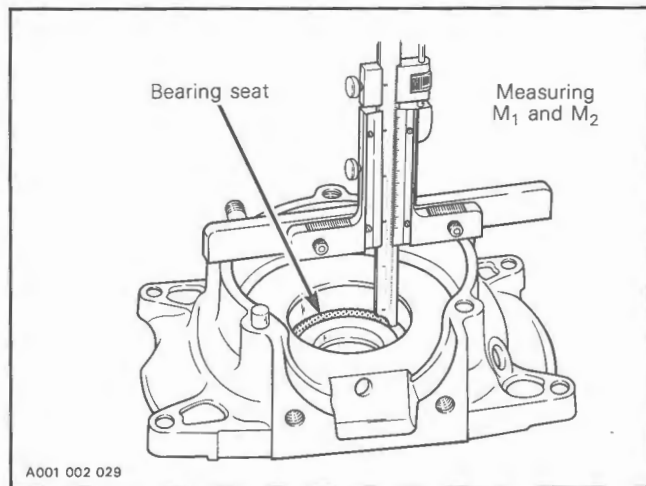
— micrometer

— vernier

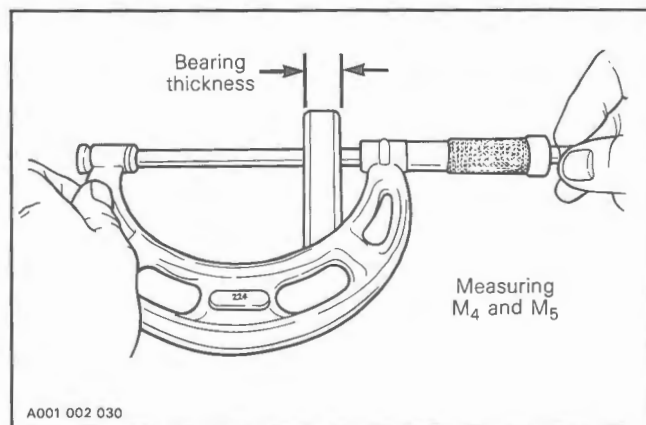
Total shim thickness needed for the end-play adjustment is determined with the following procedure :

a) Measure crankcase halves as illustrated (M_1 and M_2).

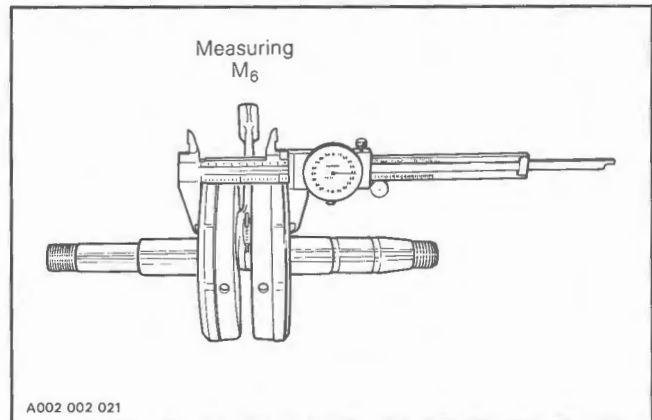
A standard compressed crankcase gasket will have a 0.30 mm (.012 in) thickness (M_3). **Add these measurements to obtain dimension "A".**



b) Measure the thickness of each ball bearing (M_4 and M_5).



c) Measure distance between bearing shoulders on crankshaft (M_6).



d) Measure the distance ring (M_7) and adjustment shims thickness (M_8). **Add these measurements to obtain dimension "B".**

e) **From dimension A, subtract dimension B.**

The result is the actual crankshaft end-play that must be within specification.

If the result is over specification, add adjustment shim(s) to reach this specification.

If the result is under specification, remove adjustment shim(s) to reach this specification.

To summarize

$$A = M_1 + M_2 + M_3$$

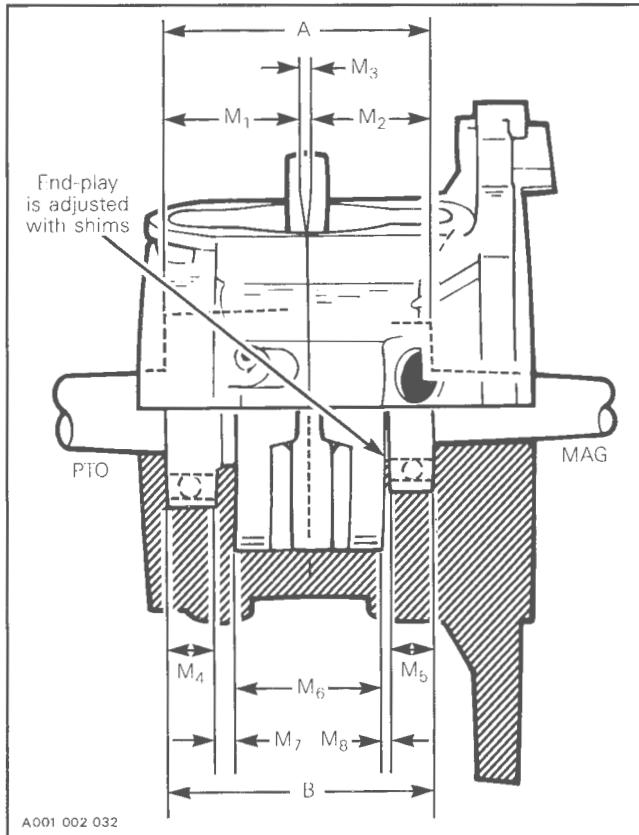
$$B = M_4 + M_5 + M_6 + M_7 + M_8$$

$A - B$ = Actual end-play that must be within specification.

Section 02 ENGINE

Sub-section 09 (ENGINE DIMENSION MEASUREMENT)

M_8 is the dimension that must be adjusted to obtain the specified crankshaft end-play.



253 Engine type

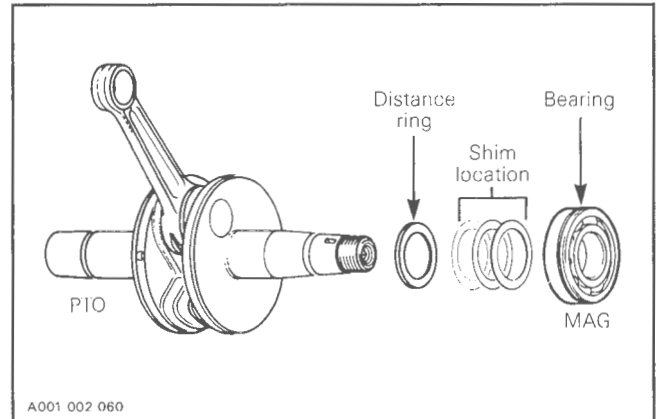
| ENGINE TYPE | MINIMUM | MAXIMUM |
|-------------|---------------------|---------------------|
| 253 | 0.1 mm (.004 in) | 0.3 mm (.012 in) |

Adjustment

Refer to illustrations related to the text.

NOTE : End-play adjustment is required only when crankcase and/or crankshaft are replaced.

Crankshaft end-play is adjusted with shim(s) located between distance ring and bearing on MAG side.



The following is required for the adjustment procedure :

- a feeler gauge
- adjustment shims (refer to parts catalog).

Thickness available : - 0.10 mm (.004 in)
 - 0.20 mm (.008 in)
 - 0.30 mm (.012 in)
 - 0.50 mm (.020 in)

- bearing simulator (P/N 420 8761 55).

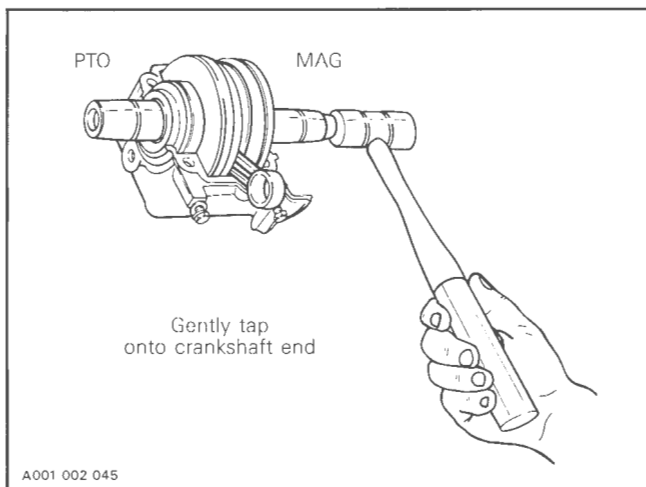
Total shim thickness needed for the end-play adjustment is determined by the following procedures :

- Distance ring and crankshaft bearing must be in place on PTO side.
- Install the distance ring and the bearing simulator onto crankshaft MAG side.
- Position the crankshaft into the lower half crankcase with the shim on PTO side.

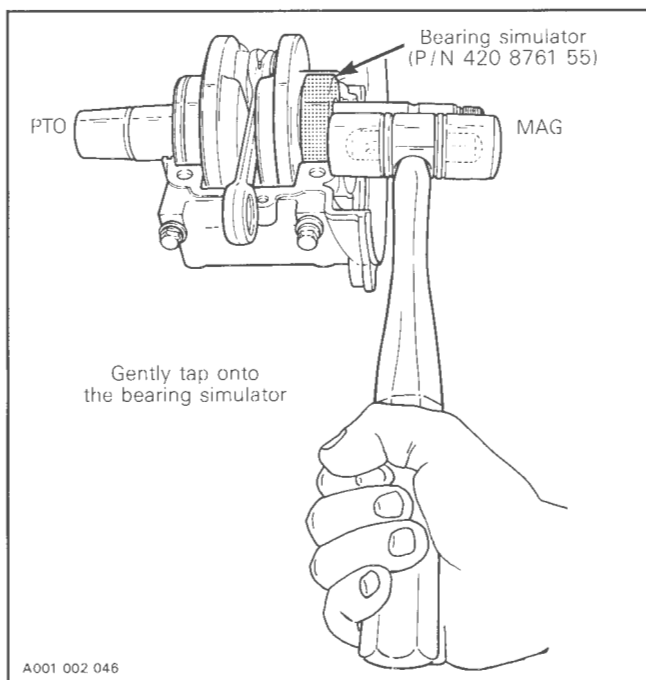
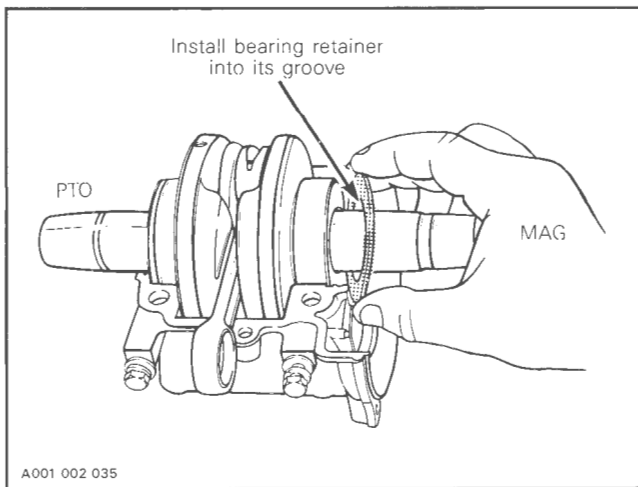
Section 02 ENGINE

Sub-section 09 (ENGINE DIMENSION MEASUREMENT)

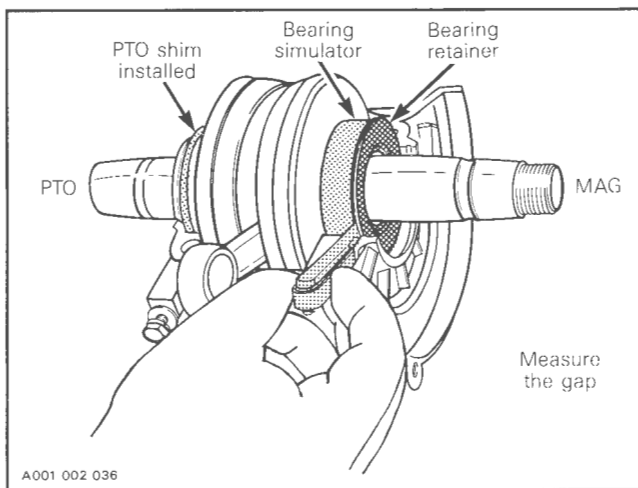
- Using a plastic hammer, gently tap the crankshaft end then the bearing simulator to take all the slack.



- Install the bearing retainer into crankcase groove on MAG side.



- Using a feeler gage, measure the gap between the bearing retainer and the bearing simulator close to the crankcase half.



- This gap is the actual crankshaft end-play. Add shim(s) to reach the specified end-play by repeating the procedures.
- Install MAG side bearing. Refer to 253 engine type section 02-02, Bottom end portion.

377, 467, 503, 536 Engine types

These engine types do not have end-play adjustment but it should be between 0.1 - 1.0 mm (.004 - .040 in).

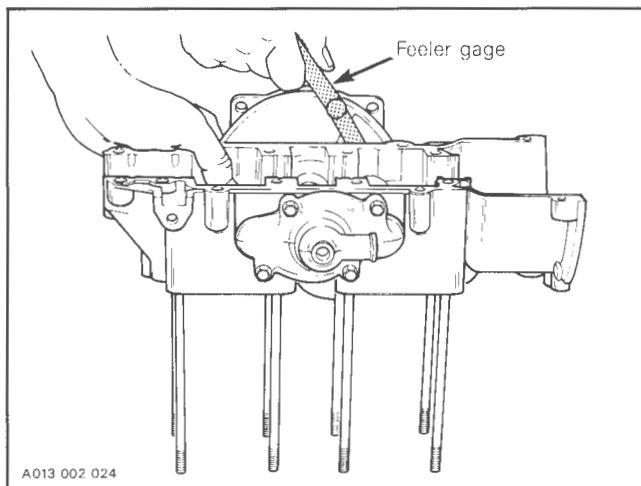
583 Engine type

Axial play is not adjustable but it should be between 0.10 - 0.30 mm (.004 - .012 in).

CRANKCASE/ROTARY VALVE GAP

| ENGINE TYPE | MINIMUM | MAXIMUM |
|-----------------------|-----------------------|-----------------------|
| Liquid cooled engines | 0.27 mm (0.011 in) | 0.48 mm (0.019 in) |

To measure this gap use a feeler gage inserted between rotary valve and upper crankcase with the rotary valve cover in place **without it's O-ring**. Check the most surface as possible. Follow the same procedure with the lower crankcase.

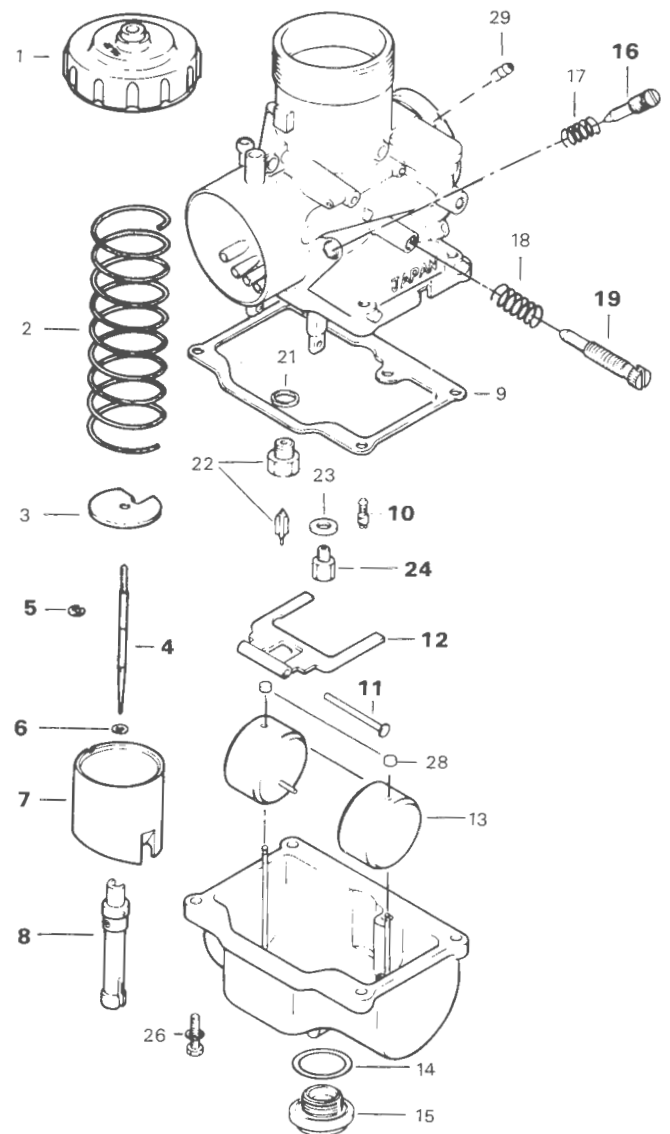


CARBURETOR & FUEL PUMP

FLOAT CARBURETOR

| List of engines and their respective carburetors | |
|--|------------------------------------|
| ENGINE TYPE | CARBURETOR MIKUNI NO |
| 247 | VM 28-242 |
| 253 | VM 34-319 |
| 377 | VM 34-309 |
| 467 | PTO : VM 34-352 MAG : VM 34-353 |
| 503, Alpine II | VM 30-159 |
| 503, Safari Cheyenne | VM 34-378 |
| 503, Safari Voyageur Safari Escapade | PTO : VM 34-379 MAG : VM 34-380 |
| 536 | 2 X VM 34-381 |
| 583 | PTO : VM 38-171 MAG : VM 38-172 |

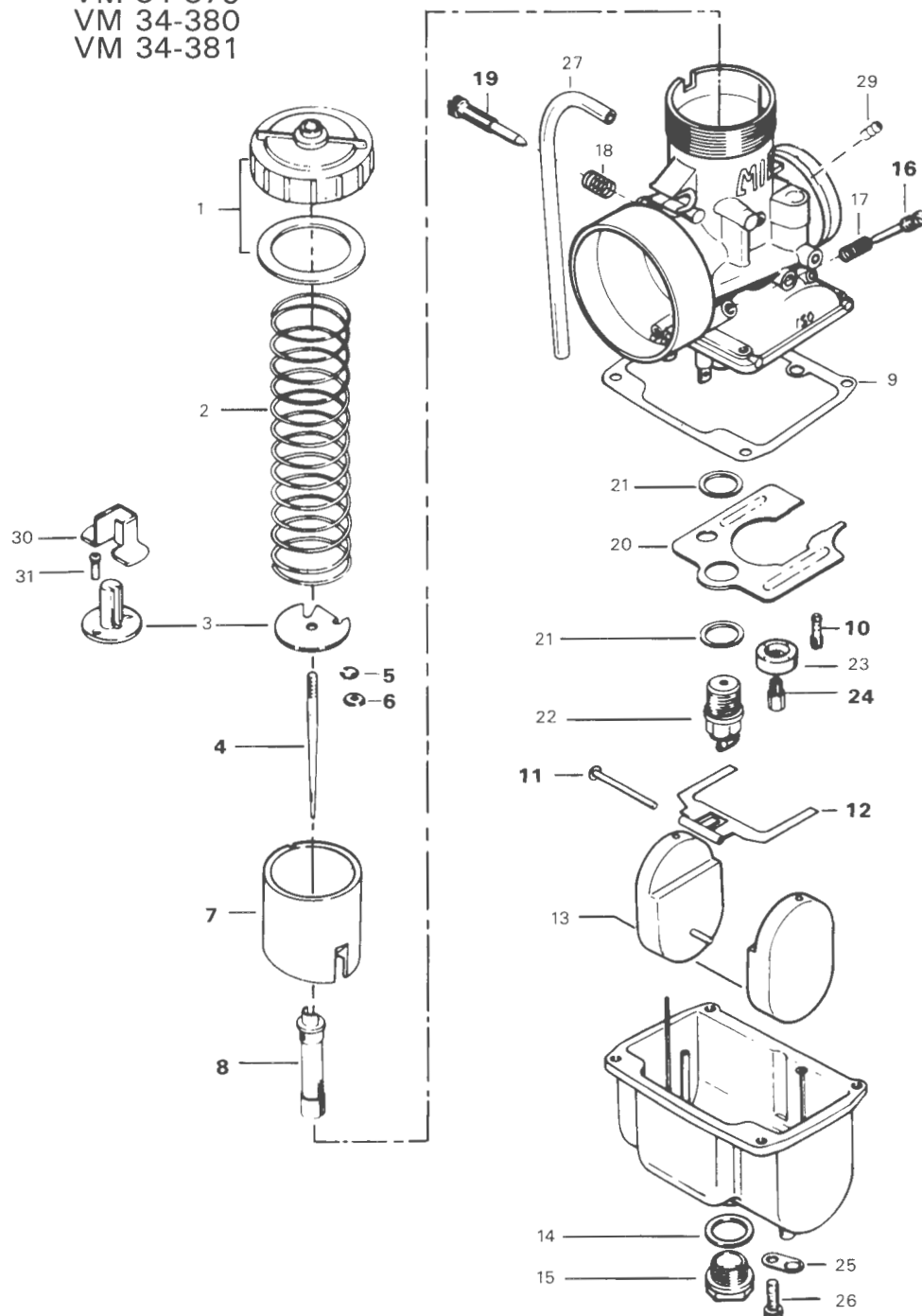
Carburetor VM 28-242



Section 02 ENGINE

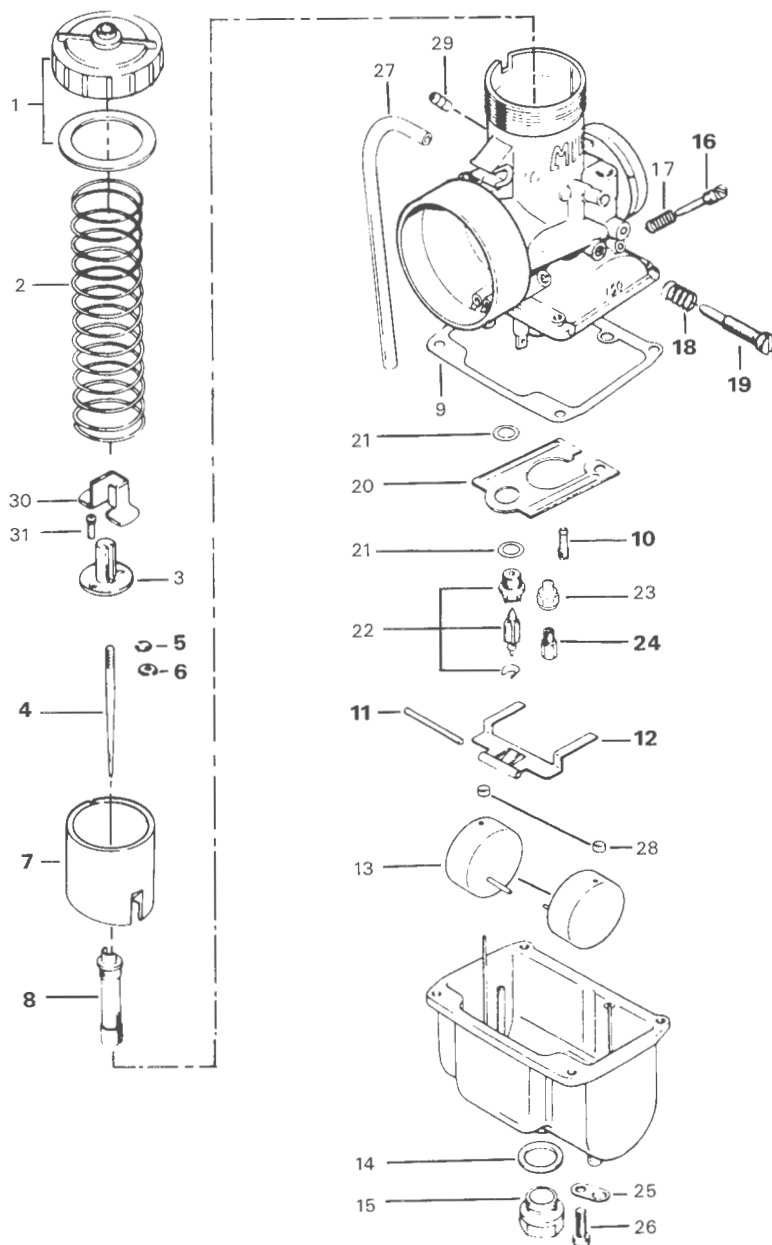
Sub-section 10 (CARBURETOR & FUEL PUMP)

Carburetors VM 30-159
VM 34-309
VM 34-319
VM 34-352
VM 34-353
VM 34-378
VM 34-379
VM 34-380
VM 34-381



Section 02 ENGINE
Sub-section 10 (CARBURETOR & FUEL PUMP)

Carburetors VM 38-171
VM 38-172



Section 02 ENGINE

Sub-section 10 (CARBURETOR & FUEL PUMP)

1. Cover
2. Spring (throttle slide)
3. Needle retainer plate (only on VM 34-379)
4. Needle
5. E-clip
6. Packing (on some models)
7. Throttle slide
8. Needle jet
9. Gasket
10. Pilot jet
11. Float arm pin
12. Float arm
13. Float
14. O-ring
15. Plug screw
16. Air screw
17. Spring
18. Spring (idle speed screw)
19. Idle speed screw
20. Baffle plate
21. Washer
22. Needle valve
23. Baffle ring or needle jet extension
24. Main jet
25. Tube retainer plate
26. Screw and lock washer
27. Vent tube
28. Cap
29. Nipple
30. Throttle cable retainer (except on VM 34-379)
31. Screw (except on VM 34-379)

REMOVAL

Remove air silencer box, fuel inlet line and primer line.

○ **NOTE :** To remove air silencer box on Voyageur & Escapade, remove seat then fuel tank to gain access.

Unscrew carburetor cover then pull out throttle slide ass'y from carburetor.

◆ **WARNING :** Exercise care when handling throttle slide. Scratches incurred may cause throttle slide to stick open in operation.

Disconnect throttle cable ass'y from throttle slide.

Untighten rubber flange clamp then remove carburetor from engine.

CLEANING & INSPECTION

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

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, benzol, etc., should not be used as they are flammable and explosive.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

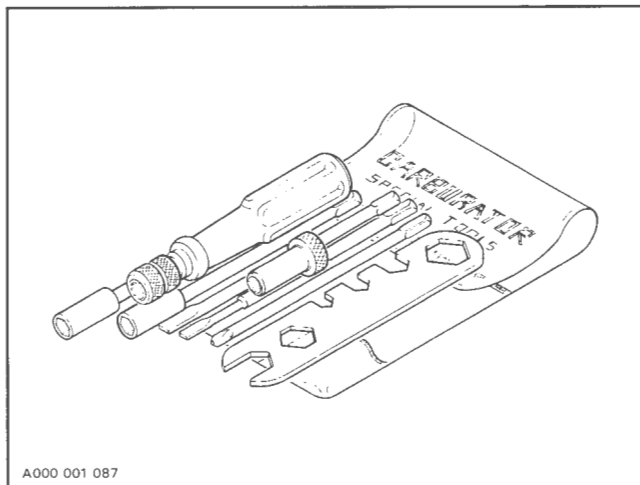
○ **NOTE :** Install needle valve for snowmobile carburetor only. It is designed to operate with a fuel pump system.

Check throttle slide for wear. Replace as necessary.

▼ **CAUTION :** Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O-ring, etc. Therefore, it is recommended to remove those parts prior to cleaning.

DISASSEMBLY & ASSEMBLY

○ **NOTE :** To ease the carburetor disassembly and assembly procedures it is recommended to use carburetor tool kit (P/N 404 1120 00).



4,5, Needle, E-clip

The position of the needle in the throttle slide is adjustable by means of an E-clip inserted into one of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

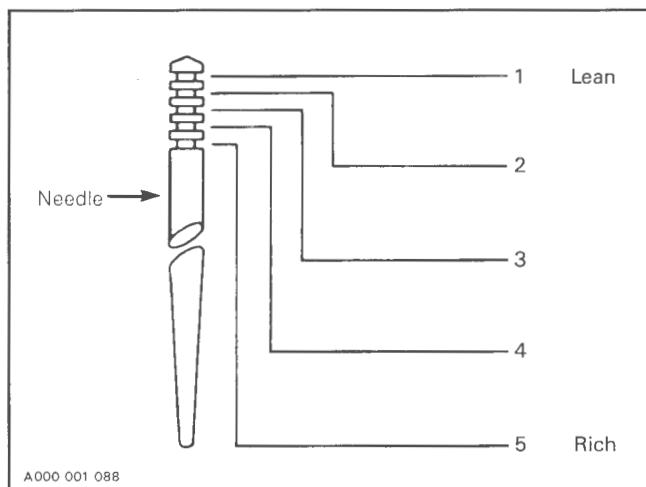
○ **NOTE :** The last digit of the needle identification number gives the recommended position of the E-clip from the top of the needle.

Section 02 ENGINE

Sub-section 10 (CARBURETOR & FUEL PUMP)

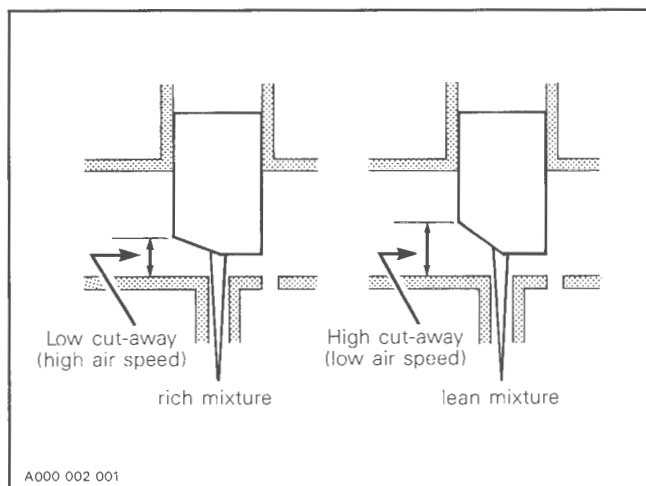
Example : 6DH4-3

Needle identification Recommended position of the E-clip from top



7, Throttle slide

The size of the throttle slide cut-away affects the fuel mixture between 1/8 to 1/2 throttle opening. A certain amount of richness is needed for that particular range because this is where the transition from the low speed to the high speed circuit takes place.



24, Main jet

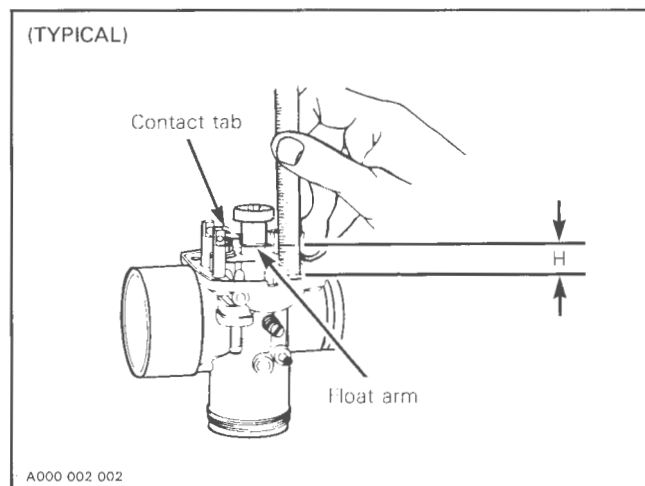
The main jet installed in the carburetor is suitable for a wide range of temperature from -30° to 5°C (-20° to 40°F) at sea level. However, different jetting can be installed. Always check spark plug tip and/or piston dome color to find out correct jetting.

CARBURETOR FLOAT LEVEL ADJUSTMENT

11,12, Float arm pin & float arm

Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows :

- Remove float chamber and gasket from carburetor.
- With carburetor chamber upside-down, measure height "H" between float chamber flange rib and top edge of float arm.



Float arm height dimensions :

| CARBURETOR MODEL | VM 28 | VM 30 VM 34 | VM 38 |
|-------------------|----------------------|----------------------|----------------------|
| H mm (inch) | 15-17 (.59 - .66) | 22-24 (.86 - .94) | 16-18 (.63 - .71) |

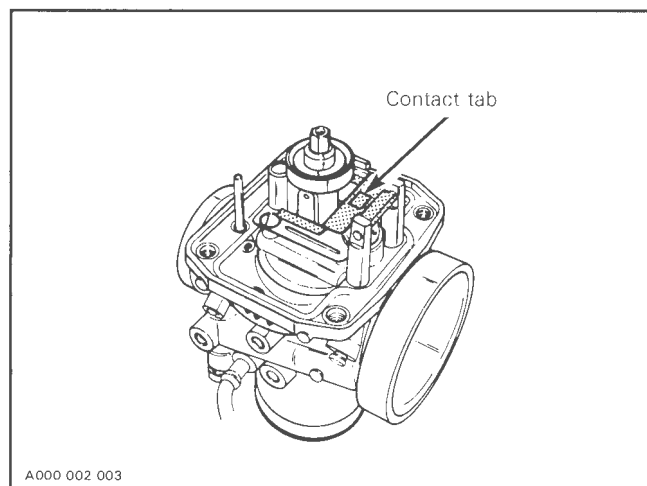
NOTE : As a general rule, the float arm must be parallel with the flange rib.

Section 02 ENGINE

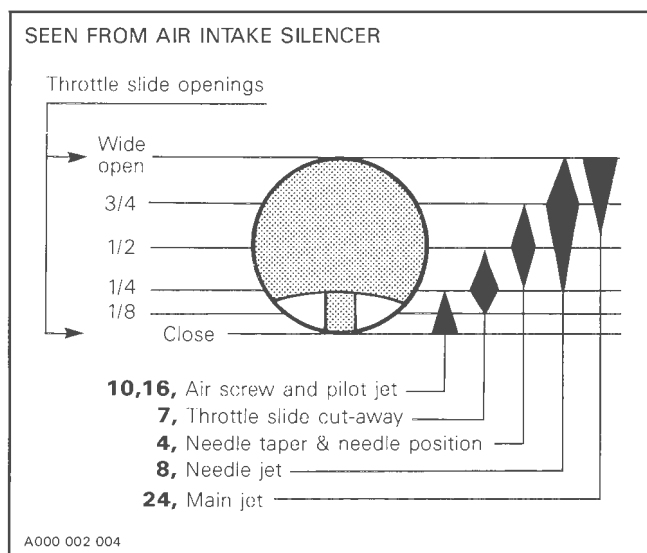
Sub-section 10 (CARBURETOR & FUEL PUMP)

To adjust height "H" :

- Bend the contact tab of float arm until the specified height is reached.



The illustration below shows which part of the carburetor begins to function at different throttle slide openings.



NOTE : For fine tuning refer to section 08, "Technical data" and to section 04-03, "Spark plug".

NOTE : For high altitude regions, the "high altitude technical booklet" (P/N 484 0552 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

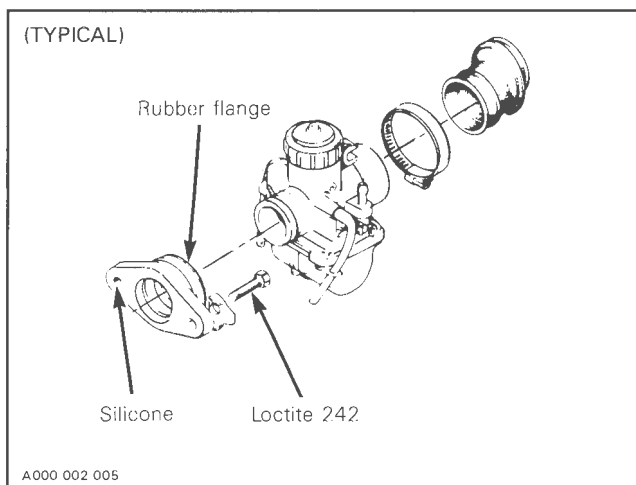
INSTALLATION

CAUTION : Never allow throttle slide(s) to snap shut.

To install carburetor on engine, inverse removal procedure.

However, pay attention to the following :

- Inspect throttle cable and housing prior to installation.
- Apply a thin layer of silicone sealant between carburetor rubber flange and intake cover on engine.
- Apply Loctite 242 on bolts retaining flange to intake cover if it was removed.



On all models except Elan, Alpine II 503, Formula MX/MX LT/PLUS/PLUS LT/MACH I make sure to insert tab into the notch to assemble the carburetor adaptor with the engine, or the carburetor or the air silencer. Beside on Safari Voyageur & Escapade, install the longer air intake silencer adaptor on the left side.

CAUTION : The rubber flange must be checked for cracks and/or damage. At assembly, the flange must be perfectly matched with the air intake manifold or severe engine damage will occur.

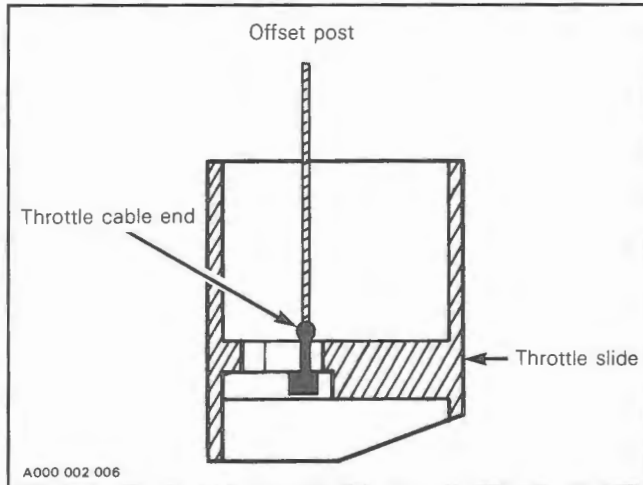
Two types of cable retaining can be found on carburetors :

Offset post retaining

When installing throttle cable end in throttle slide, hook up cable by using the stopper at the extremity of the cable.

Section 02 ENGINE

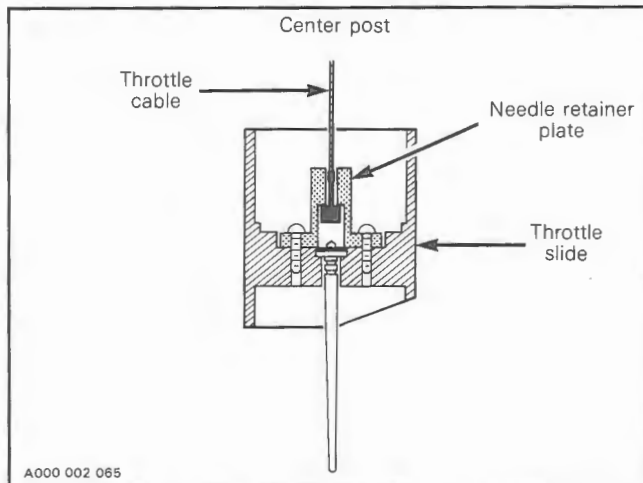
Sub-section 10 (CARBURETOR & FUEL PUMP)



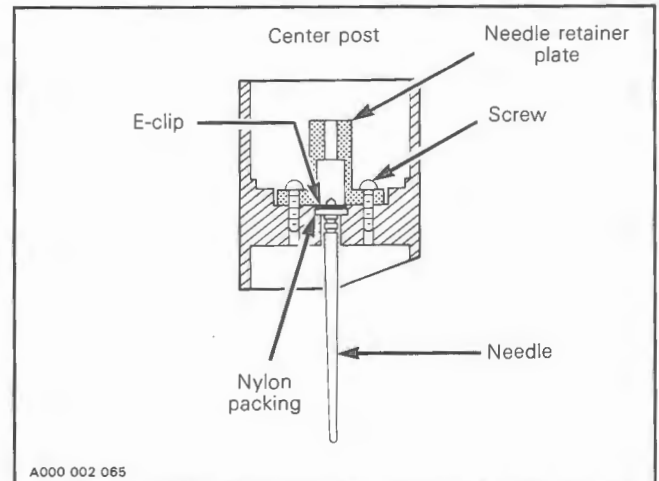
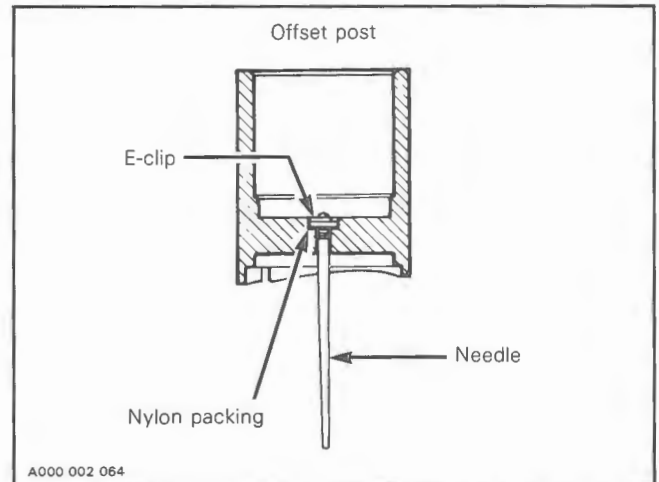
Center post retaining

Hook throttle cable into the needle retainer plate.

○ **NOTE :** Do not obstruct hole in throttle slide when installing needle retainer plate. This is important to allow air escaping through and thus allowing a quick response.



4,6, Needle, nylon packing



Make sure the nylon packing is installed on all applicable throttle slides.

▼ **CAUTION :** Serious engine damage can occur if this notice is disregarded.

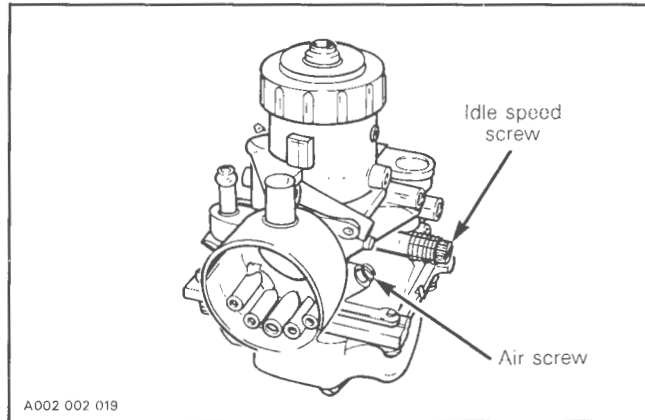
○ **NOTE :** With carburetors equipped with the center post retaining device, remove the needle retainer plate (remove both screws) to withdraw the needle.

Section 02 ENGINE

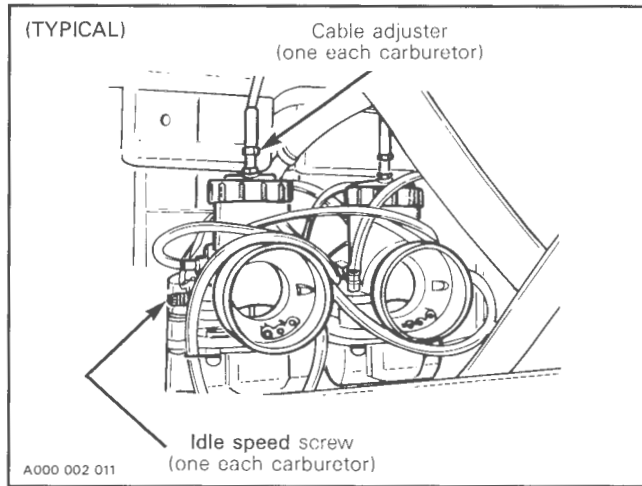
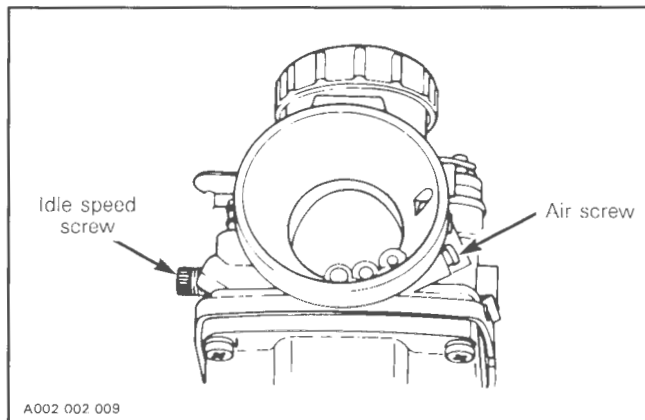
Sub-section 10 (CARBURETOR & FUEL PUMP)

CARBURETOR ADJUSTMENTS

Elan only



Other models



Turn the **idle speed** screw clockwise until it contacts the throttle slide then continue turning two (2) additional turns. On twin carburetor models, repeat on the other one. This will ensure identical throttle slide preliminary idle setting.

With the throttle cable adjuster jam nut unlocked, press the throttle lever against the handle grip.

All models except Safari Citation, Tundra/LT

By turning the cable adjuster, adjust the carburetor slide so that it is flush with the top of the carburetor **inlet** bore, thus allowing full mixture flow through carburetor bore.

16, Air screw adjustment

Completely close the **air screw** (until a slight seating resistance is felt) then back off as specified.

Refer to section 08 "Technical data" for the specifications.

7, Throttle slide adjustment

◆ **WARNING** : Ensure the engine is turned **OFF**, prior to the throttle slide adjustment.

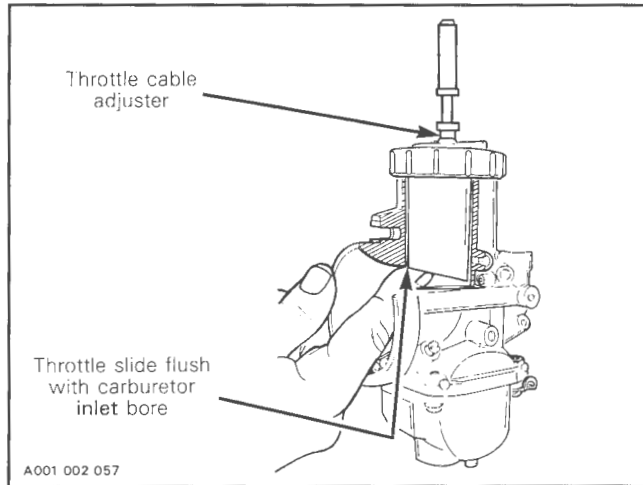
For maximum performance, correct carburetor throttle slide adjustment is critical.

The following method should be used with engine turned off :

- Back off the **idle speed** screw completely.

Section 02 ENGINE

Sub-section 10 (CARBURETOR & FUEL PUMP)



Safari Citation/E, Tundra, Tundra LT :

Throttle slide must be 1.5 mm (1/16 in) lower than the top of carburetor inlet bore.

All models

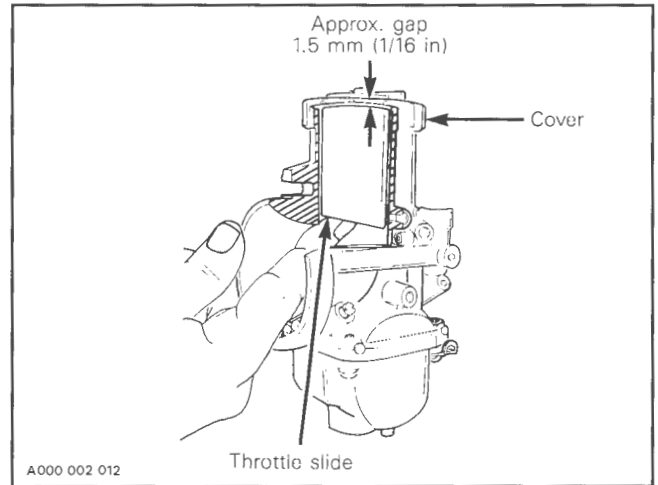
Tighten the cable adjuster jam nut.

Repeat for the other carburetor on twin carburetor models.

▼ **CAUTION :** On twin carburetor models, make sure both carburetors start to operate simultaneously. Beside do not interchange carburetors, the jetting is different on each side. A red dot is printed on one carburetor and on the engine. Match the carburetor and the engine dots.

◆ **WARNING :** It is important that the throttle slide adjustment be performed to ensure proper functioning of throttle mechanism.

Once carburetor adjustment is performed, check that with the throttle lever fully depressed, there is a free play of 1.5 mm (1/16 in) between the carburetor cover and top of throttle slide.



◆ **WARNING :** This gap is very important. If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable.

Recheck carburetor synchronization on twin carburetor models.

▼ **CAUTION :** On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to the specific engine type section 02 for procedure.

19, Idle speed final adjustment

Start engine and allow it to warm then adjust idle speed to specifications by turning **idle speed** screw clockwise or counterclockwise.

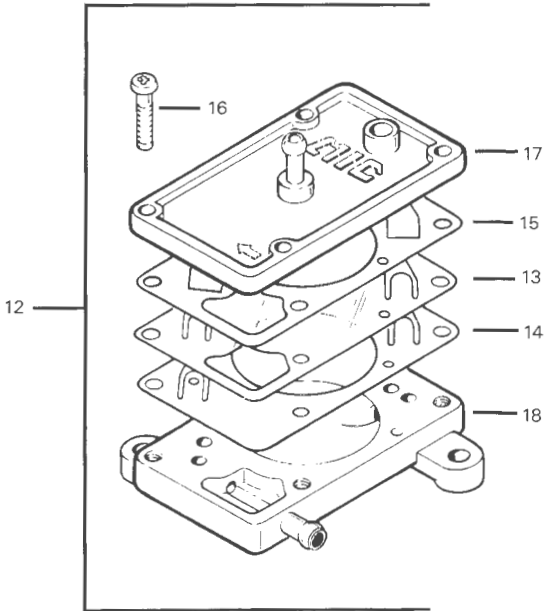
○ **NOTE :** On twin carburetor models, turn adjustment screw the same amount to keep carburetors synchronized.

Refer to section 08 "Technical data" for the specifications.

▼ **CAUTION :** Do not attempt to set the idle speed by using the **air** screw. Severe engine damage can occur.

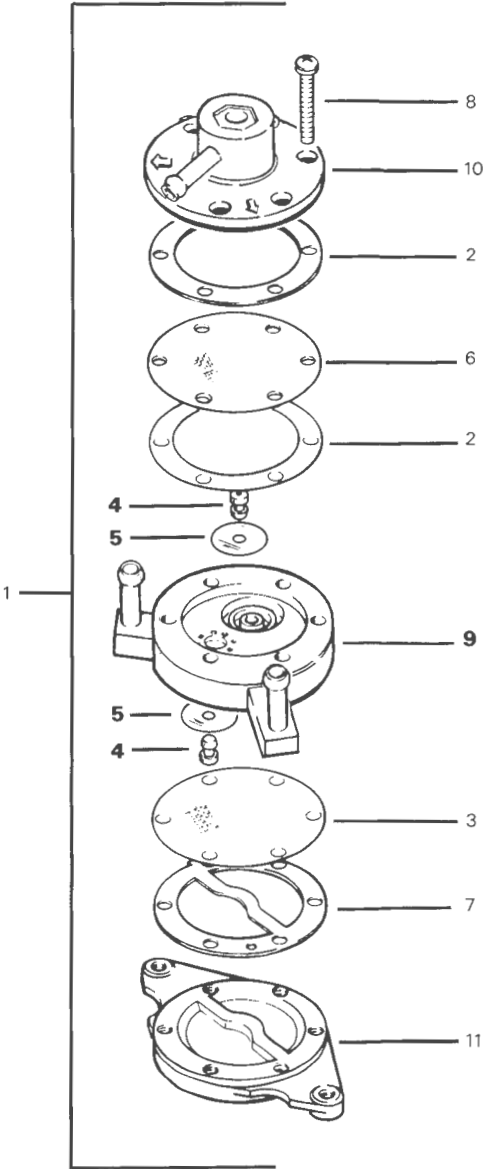
FUEL PUMP

Single outlet pump



A000 002 076

Twin outlet pump



A000 002 077

Section 02 ENGINE

Sub-section 10 (CARBURETOR & FUEL PUMP)

1. Fuel pump assembly
2. Packing
3. Diaphragm
4. Grommet
5. Valve
6. Diaphragm
7. Packing (cap)
8. Screw
9. Pump body

10. Impulse chamber
11. Cover
12. Fuel pump assembly
13. Diaphragm
14. Membrane
15. Packing (cap)
16. Screw
17. Cover
18. Impulse chamber

REMOVAL

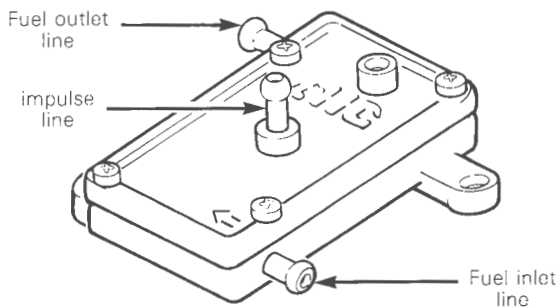
Disconnect fuel inlet line at fuel pump then secure fuel line to steering support so that the open end is located higher than the fuel tank or plug it.

Disconnect fuel outlet line(s).

Disconnect impulse line.

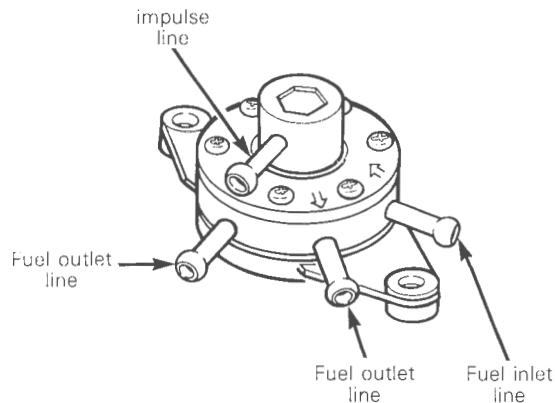
Remove screws (or nuts if applicable) securing fuel pump.

SINGLE OUTLET PUMP



A000 002 079

TWIN OUTLET PUMP



A000 002 072

DISASSEMBLY & ASSEMBLY

4,5,9, Grommet, valve, pump body (twin outlet pump only)

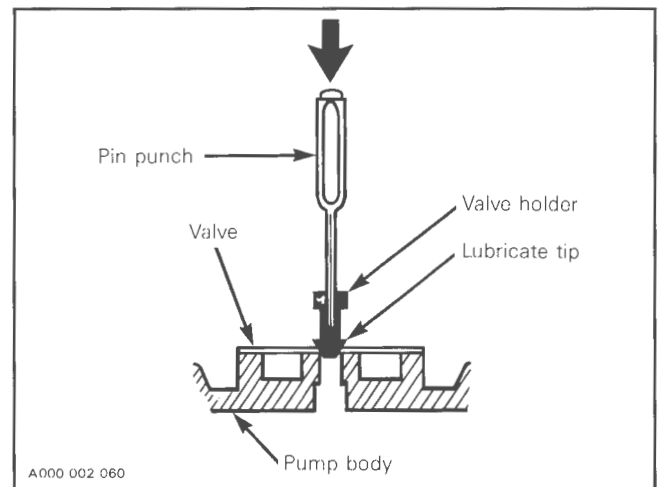
Do not disassemble valve unless replacement is indicated.

To install a new valve, proceed as follows :

— Place new valve flat on its seat.

— Insert a 2.5 mm (3/32 in) pin punch inside valve holder and lubricate tip of holder with a drop of oil.

-- Push holder into pump body as illustrated.



A000 002 060

CLEANING & INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

◆ **WARNING :** Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as each is flammable and explosive.

Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.


Section 02 ENGINE

Sub-section 10 (CARBURETOR & FUEL PUMP)

Check fuel pump valves operation as follows :

Connect a length of clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with the mouth. The inlet valve should release with pressure and hold under vacuum.

Repeat the same procedure at the outlet nipple. This time the outlet valve should hold with pressure and release under vacuum.

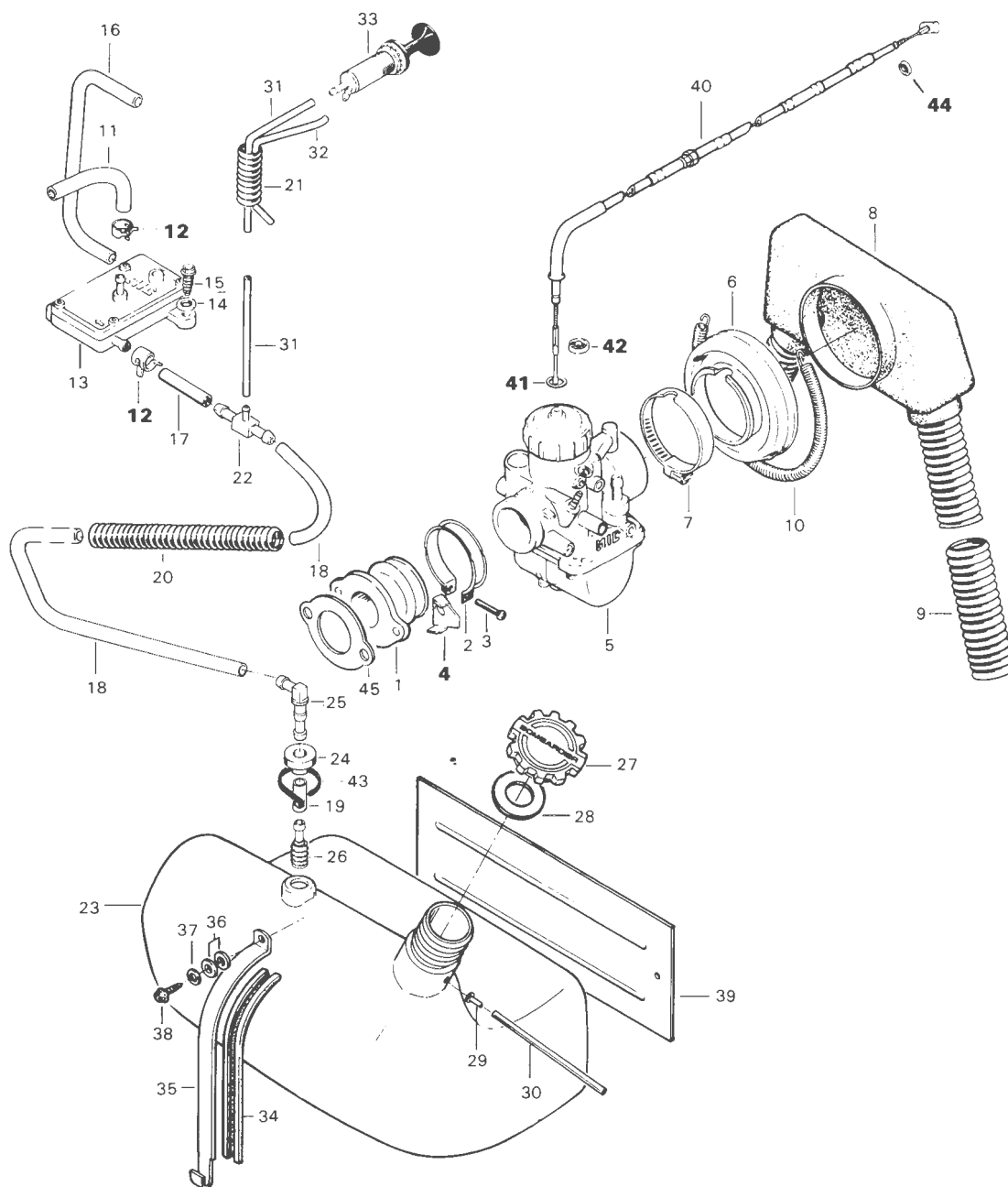
 **NOTE :** On model fitted with two outlets, plug one outlet with finger while checking outlet valve.

INSTALLATION

To install, inverse removal procedure.

AIR INTAKE SILENCER & FUEL TANK

Elan



Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

1. Carburetor adaptor
2. Clamp
3. Screw
4. Lock tab (2)
5. Carburetor VM28-242
6. Adaptor
7. Clamp
8. Air intake box
9. Tube (2)
10. Spring
11. Impulse hose 7-1/4 in (184 mm)
12. Spring clip (2)
13. Fuel pump
14. Internal tooth lock washer 1/4 in (2)
15. Hexagonal washer head metal screw 12 x 3/4 in (2)
16. Fuel line 1/ in (332 mm)
17. Fuel line 1-1/2 in (38 mm)
18. Fuel line 36-1/2 in (927 mm)
19. Fuel line 14 in (356 mm)
20. Isolating line 29-1/2 in (750 mm)
21. Isolating line 4 in (102 mm)
22. Tee
23. Fuel tank
24. Grommet
25. Male connector
26. Fuel filter
27. Fuel tank cap
28. Gasket
29. Air vent fitting
30. Air vent tube 27 in (586 mm)
31. Primer tube 18-1/2 in (470 mm)
32. Primer tube 7 in (178 mm)
33. Primer valve
34. Protector strip 9 in (229 mm)
35. Retainer strip
36. Rubber spacer (2)
37. Flat washer 7/32 in x 5/8 in x .060 in
38. Hexagonal washer head self tapping screw 12 x 1 in
39. Heat shield
40. Throttle cable & housing
41. O-ring
42. Retaining ring
43. Tie wrap
44. Circlip
45. Gasket

4, Lock tab

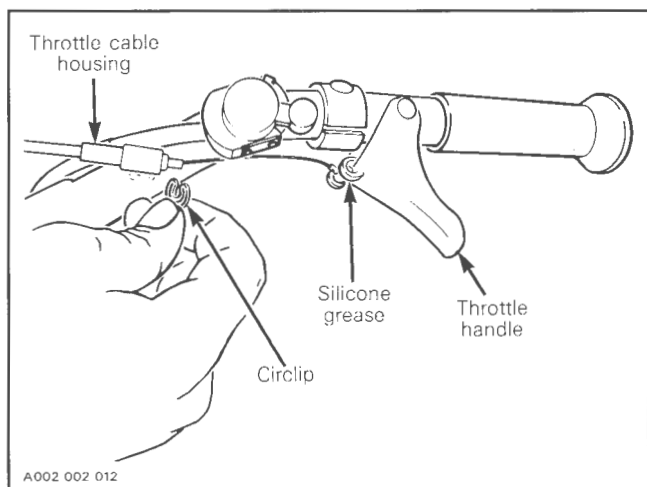
Always bend lock tab over screws and replace if worn.

12, Spring clip

Always reposition spring clips after any repair to prevent possible leaks.

44, Circlip

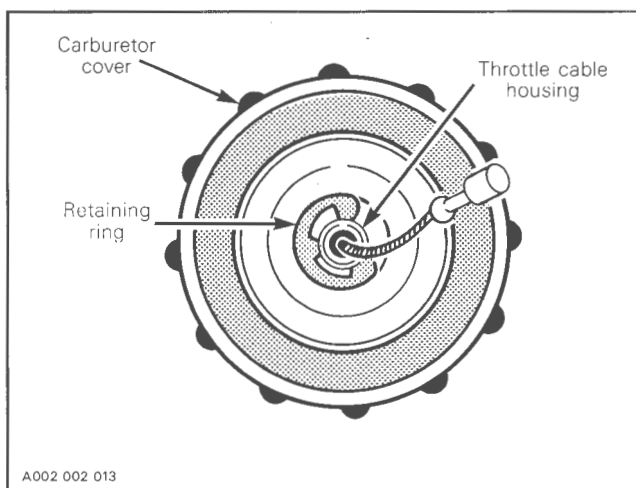
Put silicone grease (P/N 413 7017 00) around cable barrel. Locate circlip as per illustration.



WARNING : If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

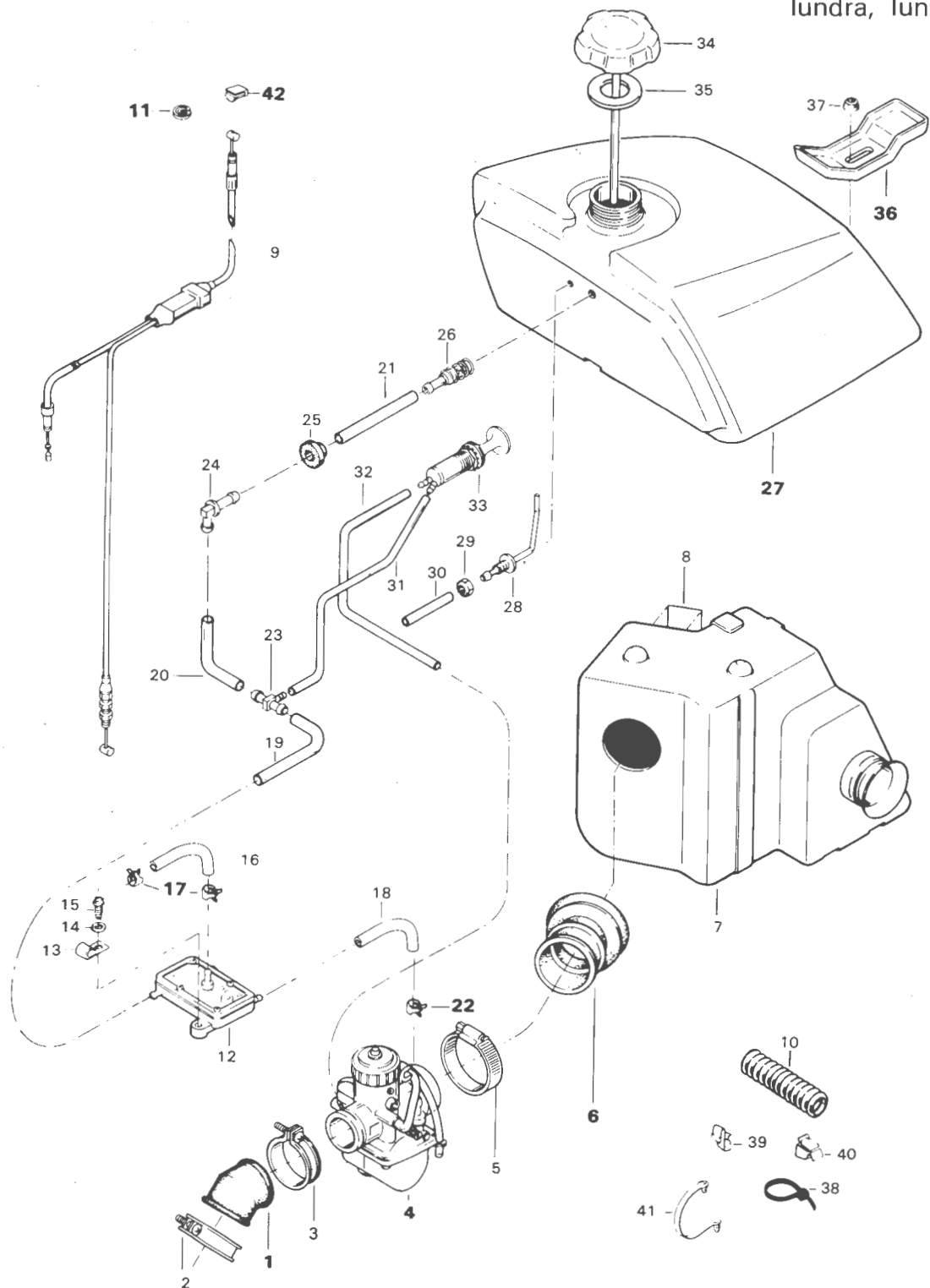
41,42, O-ring & retaining ring

Locate O-ring outside of carburetor cover and retaining ring inside.



Section 02 ENGINE
Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

Safari Citation/E
Tundra, Tundra LT



Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

1. Rubber flange
2. Collar
3. Clamp
4. Carburetor VM 34-319
5. Clamp
6. Intake adaptor
7. Air silencer
8. Warning label
9. Throttle cable & housing
10. Tubing
11. Circlip
12. Fuel pump
13. Clip (2)
14. Internal tooth lock washer 1/4 in (2)
15. Hexagonal washer head self-tapping screw 1/2 in x 3/4 in (2)
16. Impulse hose 9 in (228 mm)
17. Spring clip (2)
18. Fuel line 15 in (380 mm)
19. Fuel line 9.5 in (241 mm)
20. Fuel line 18 in (457 mm)
21. Fuel line 14 in (356 mm)

22. Spring clip
23. Tee
24. Male connector
25. Grommet
26. Fuel filter
27. Fuel tank
28. Air vent fitting
29. Hexagonal nut 5/16 in-18
30. Air vent tube 55 in (1398 mm)
31. Primer tube 16 in (406 mm)
32. Primer tube 19 in (483 mm)
33. Primer valve
34. Fuel tank cap
35. Gasket
36. Retainer (2)
37. Hexagonal flanged elastic stop nut 6 mm (4)
38. Tie rap
39. Clip
40. Clip
41. Cable clip
42. Retainer

17,22, Spring clip

Always reposition spring clips after any repair to prevent possible leaks.

1,4,6, Rubber flange, carburetor & intake adaptor

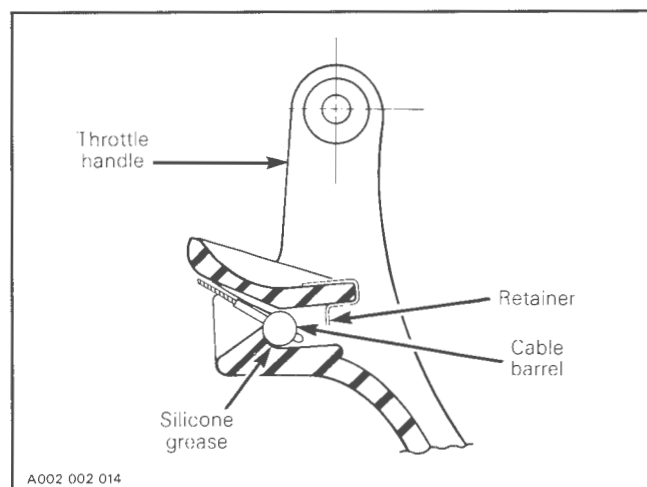
Always insert engine and carburetor tabs into rubber flange notches.

CAUTION : Disregarding indexation might cause severe engine damage.

42, Retainer

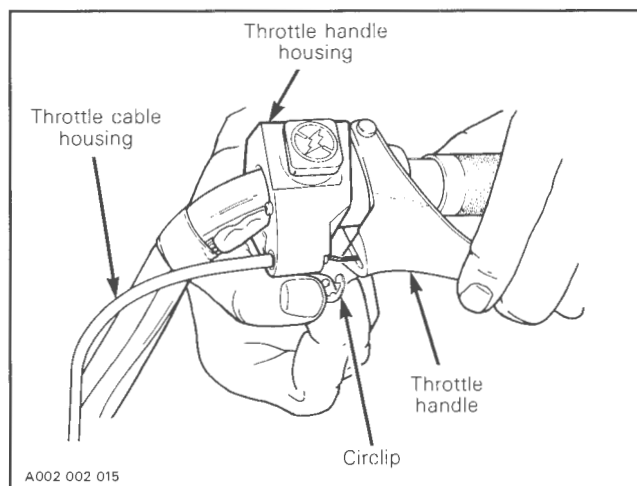
Put silicone grease (P/N 413 7017 00) around cable barrel.

The retainer must be pushed on the throttle handle tab until it sits properly.



11, Circlip

Locate as per illustration.



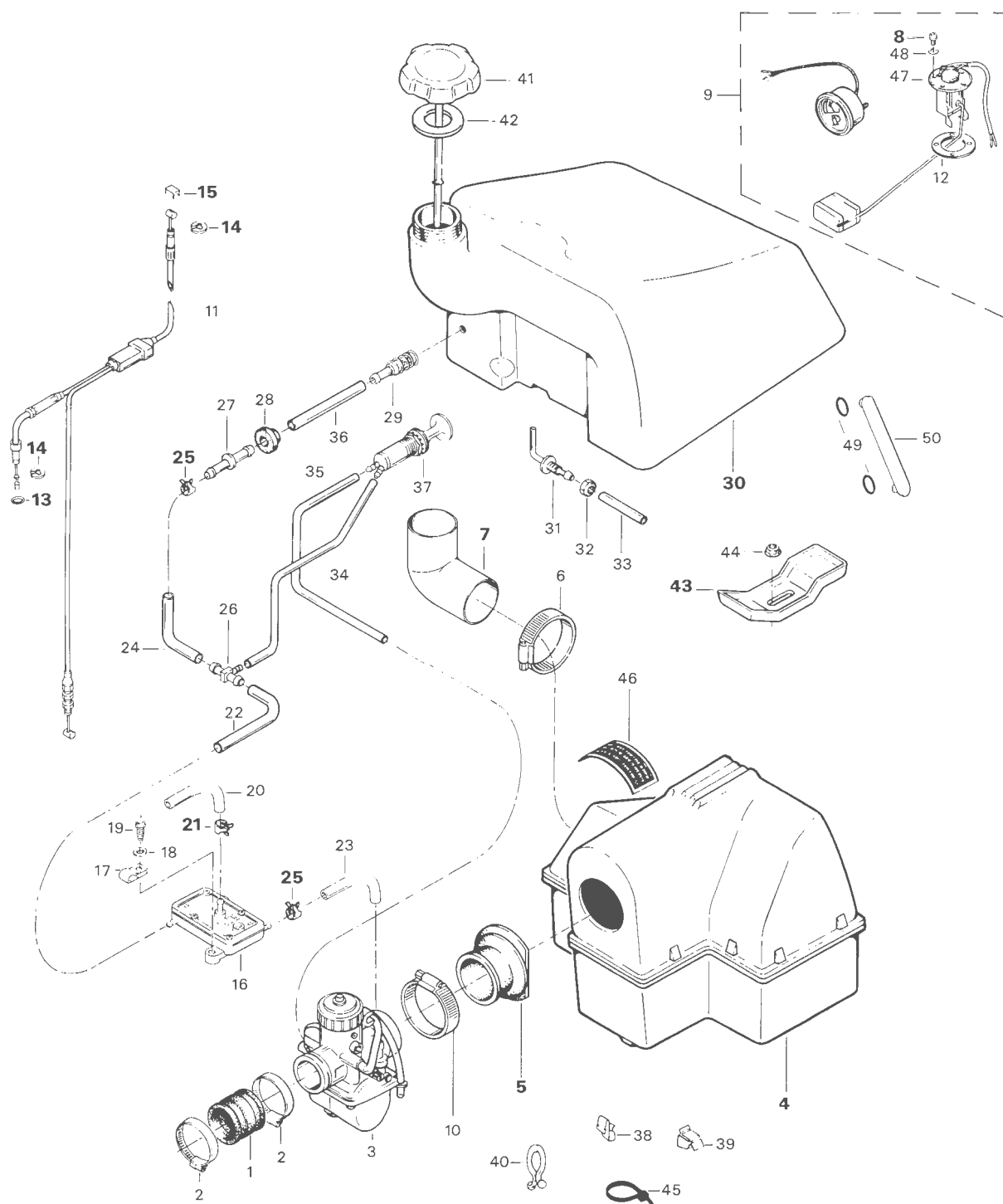
WARNING : If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

27,36, Fuel tank, retainer

When installing fuel tank, position retainers so that fuel tank has 1.6 mm (1/16 in) of play to allow expansion.

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

Optional on Safari Scout/E, Cheyenne



Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

1. Rubber flange
2. Clamp (2)
3. Carburetor
4. Air silencer
5. Adaptor
6. Clamp
7. Elbow
8. Cylindrical Phillips head screw M5 x 14 (5)
9. Fuel level sensor kit with dial indicator
10. Clamp
11. Throttle cable & housing
12. Gasket
13. O-ring
14. Circlip
15. Lock tab
16. Fuel pump
17. Clip
18. Internal tooth lock washer 1/4 in (2)
19. Hexagonal washer head self-tapping screw 12 x 3/4 in (2)
20. Impulse hose
21. Spring clip (2)
22. Fuel line
23. Fuel line
24. Fuel line 6.5 in (177 mm)
25. Spring clip
26. Tee
27. Male connector
28. Grommet
29. Fuel filter
30. Fuel tank
31. Air vent fitting
32. Hexagonal nut 5/16 in-18
33. Air vent tube 65 in (1665 mm)
34. Primer tube 7.0 in (177 mm)
35. Primer tube 16.5 in (419 mm)
36. Fuel line 17 in
37. Primer valve
38. Clip
39. Clip
40. Cable clip
41. Cap
42. Gasket
43. Retainer (2)
44. Hexagonal flanged elastic stop nut 6 mm (4)
45. Tie rap
46. Warning label
47. Fuel level sensor
48. External tooth lock washer 5 mm (5)
49. O-Ring (2)
50. Fuel gauge

21,25, Spring clip

Always reposition spring clips after any repair to prevent possible leaks.

7, Elbow

The air box elbow must be pointing upward, under all condition, on all fan cooled engines.

4,5, Air silencer, adaptor

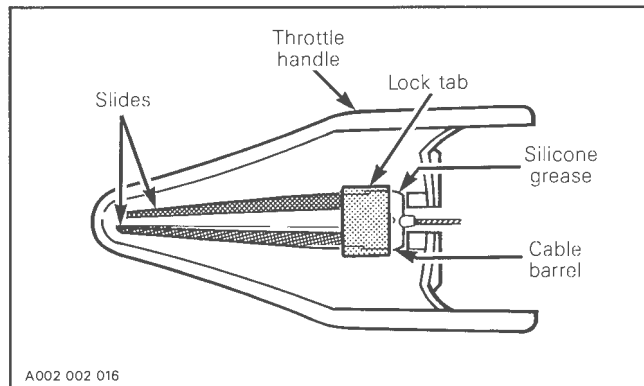
Always insert tab of adaptor into notch of air silencer.

CAUTION : Disregarding indexation might cause severe engine damage.

15, Lock tab

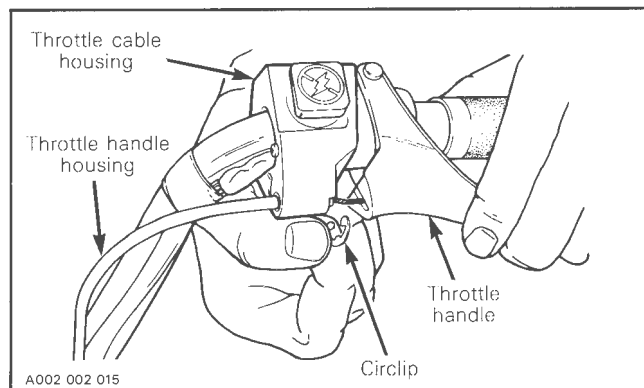
Put silicone grease (P/N 413 7017 00) around cable barrel.

The lock tab must be pushed on the throttle handle slides until it blocks the cable barrel opening of the throttle handle.



14, Circlip

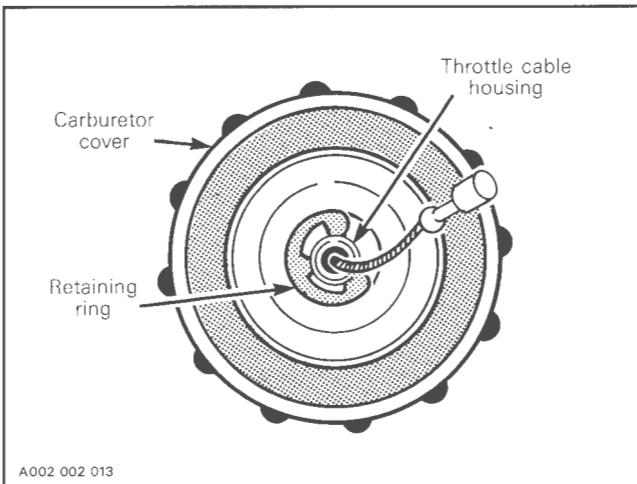
Locate as per illustration.



◆ **WARNING :** If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

13,14, O-ring & retaining ring

Locate O-ring outside of carburetor cover and retaining ring inside.

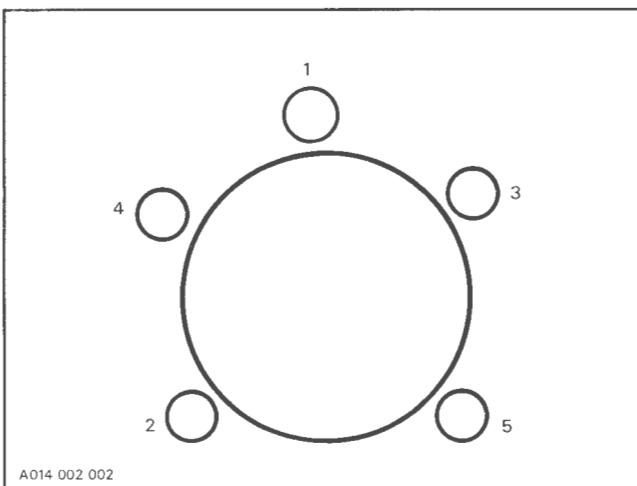


30,43, Fuel tank, retainer

When installing fuel tank, position retainers so that fuel tank has 1.6 mm (1/16 in) of play to allow expansion.

8, Phillips head screw

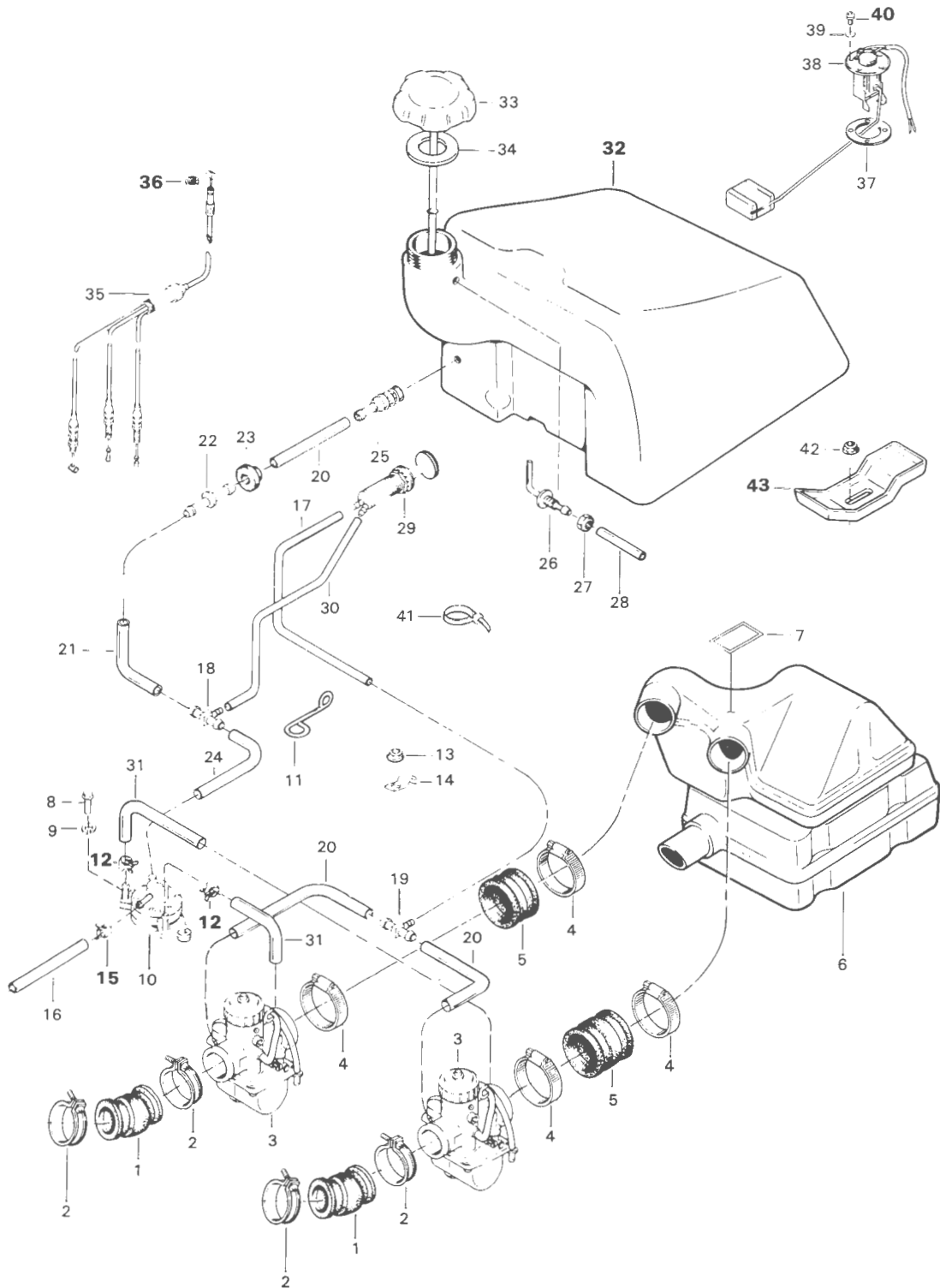
Torque fuel level sensor retaining screws to 1 N•m (8 lbf•in) in the sequence shown and then to 2.5 N•m (22 lbf•in), using the same sequence.



Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

Safari Voyageur
Safari Escapade



Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

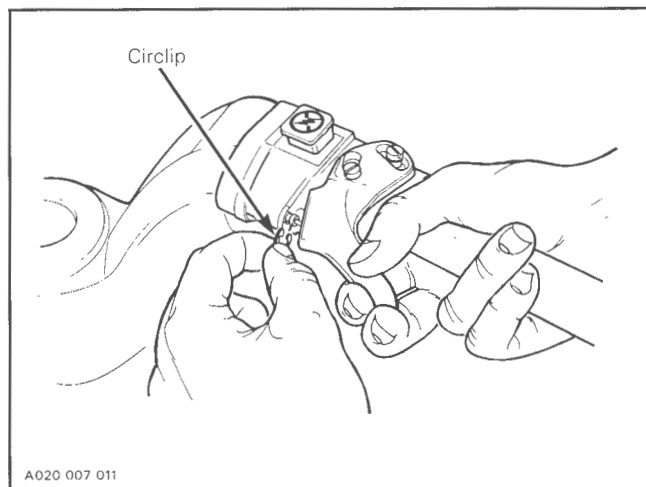
1. Rubber flange (2)
2. Clamp (4)
3. Carburetor, mag & PTO
4. Clamp (4)
5. Intake adaptor, mag & PTO
6. Air silencer
7. Warning label
8. Screw #12 x 3/4 in (2)
9. Lock washer (2)
10. Fuel pump
11. Support
12. Spring clip (5)
13. Nut M6
14. Bracket
15. Spring clip (2)
16. Impulse hose 290 mm (11.4 in)
17. Fuel line 439 mm (17.3 in)
18. Tee
19. Tee
20. Fuel line 100 mm (3.9 in) (3)
21. Fuel line 165 mm (6.5 in)
22. Male connector
23. Grommet
24. Fuel line 150 mm (5.9 in)
25. Fuel filter
26. Air vent fitting
27. Nut 5/16 in
28. Air vent tube 1651 mm (65 in)
29. Primer valve
30. Fuel line 175 mm (6.8 in)
31. Fuel line 400 mm (15.7 in) (2)
32. Fuel tank
33. Cap
34. Gasket
35. Throttle cable
36. Circlip
37. Gasket
38. Fuel level sensor
39. Lock washer 5 mm (5)
40. Screw M5 x 14 mm (5)
41. Tie rap
42. Nut 6 mm (4)
43. Retainer (2)

12,15, Spring clip

Always reposition spring clips after any repair to prevent leaks.

36, Circlip

Locate as per illustration.



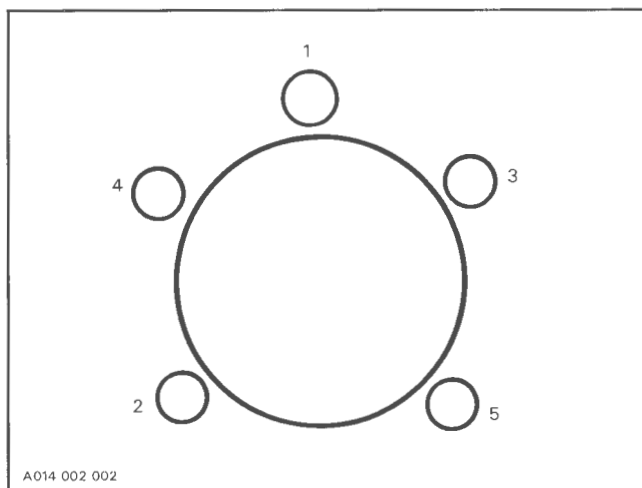
WARNING : If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

32,43, Fuel tank, retainer

When installing fuel tank, position retainers so that fuel tank has 1.6 mm (1/16 in) of play to allow expansion.

40, Phillips head screw

Torque fuel level sensor retaining screws to 1 N•m (8 lbf•in) in the sequence shown and then to 2.5 N•m (22 lbf•in), using the same sequence.

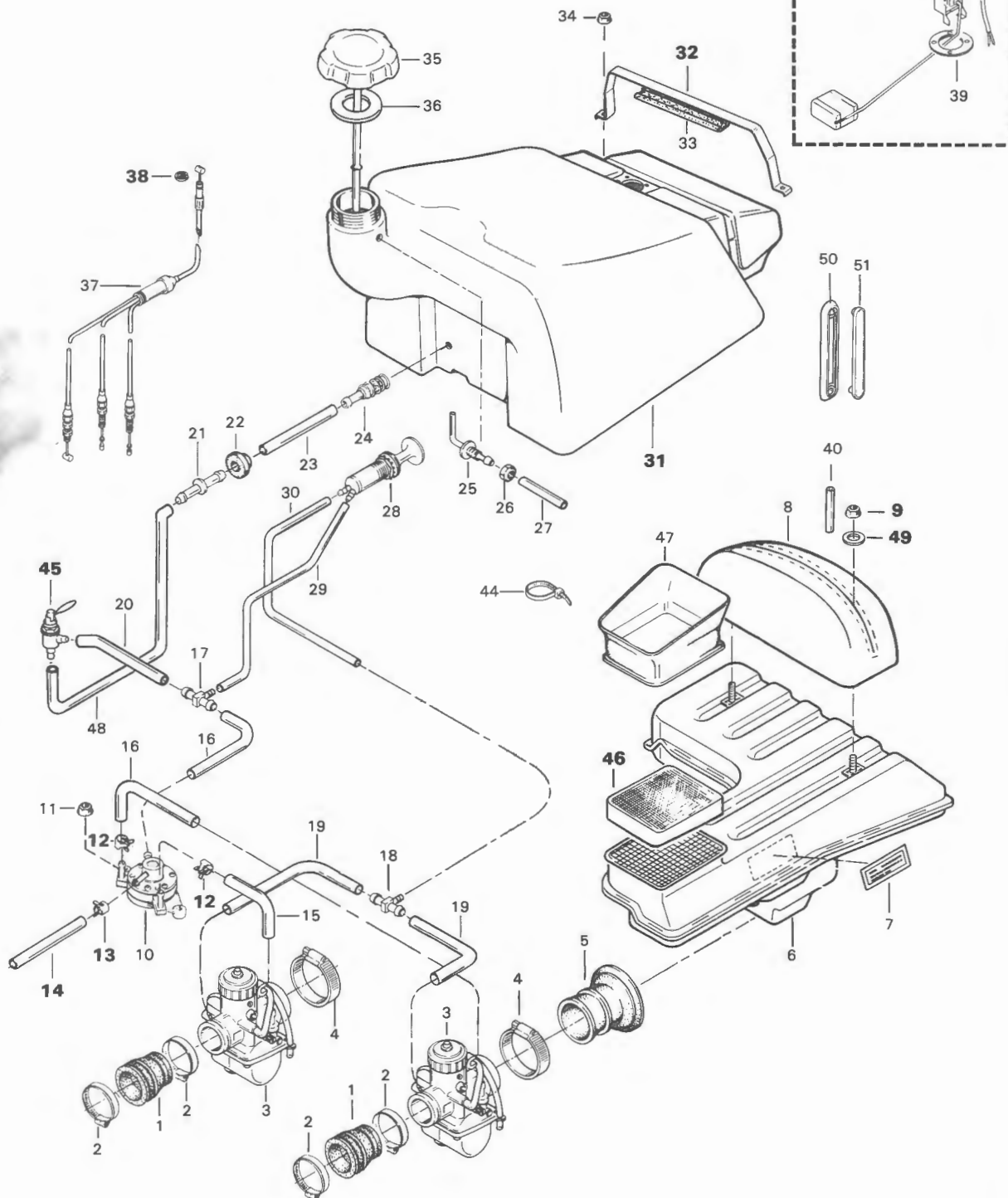


Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

Formula MX/MX LT/PLUS/PLUS LT/MACH I

Optional on Formula MX/MX LT



A015 008 009

Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

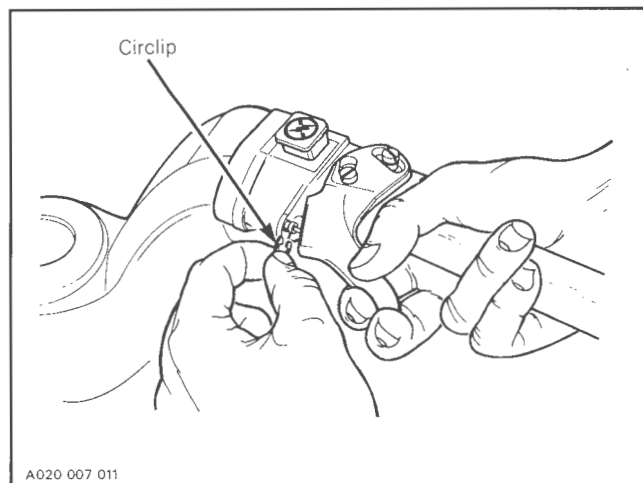
1. Rubber flange (2)
2. Clamp (4)
3. Carburetor (2)
4. Clamp (2)
5. Intake adaptor (2)
6. Air silencer
7. Warning label
8. Tool bag (Formula MX/MX LT only)
9. Hexagonal flanged elastic stop nut M5 (2)
(Formula MX/MX LT only)
10. Fuel pump
11. Hexagonal flanged elastic stop nut M6 (2)
12. Spring clip (4)
13. Spring clip (2)
14. Impulse hose 11 in (279 mm)
15. Fuel line 13 in (330 mm) (2)
16. Fuel line 10 in (254 mm)
17. Tee
18. Tee
19. Fuel line 5 in (127 mm) (2)
20. Fuel line 5 in (127 mm)
21. Male connector
22. Grommet
23. Fuel line 12 in (304 mm)
24. Fuel filter
25. Air vent fitting
26. Hexagonal nut 5/16-18
27. Air vent tube 70 in (1778 mm)
28. Primer valve
29. Fuel line 12 in
30. Fuel line 24 in
31. Fuel tank
32. Fuel tank bracket
33. Protector strip 15 in
34. Flanged hexagonal elastic stop nut (2)
35. Cap
36. Gasket
37. Throttle cable & housing
38. Circlip
39. Gasket
40. Protector (Formula Plus/Plus LT/Mach I)
41. Fuel level sensor
42. External tooth lock washer 5 mm (5)
43. Cylindrical Phillips head screw M5 x 14 (5)
44. Tie rap
45. Fuel shut off valve
46. Air filter
47. Gasket
48. Fuel line 12 in (304 mm)
49. Flat washer (Formula MX/MX LT only)
50. Gauge housing (Formula MX/MX LT)
51. Fuel gauge (Formula MX/MX LT)

12,13, Spring clip

Always reposition spring clips after any repair to prevent leaks.

38, Circlip

Locate as per illustration.



WARNING : If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

46, Air filter

Remove air filter from air silencer opening. Check for cleanliness and presence of ice, snow or water. If necessary, clean with a general solvent. Gently squeeze then dry with compressed air. Ensure air filter is free of cleaning solvent, snow or water. Check that air box is clean and dry before installing air filter.

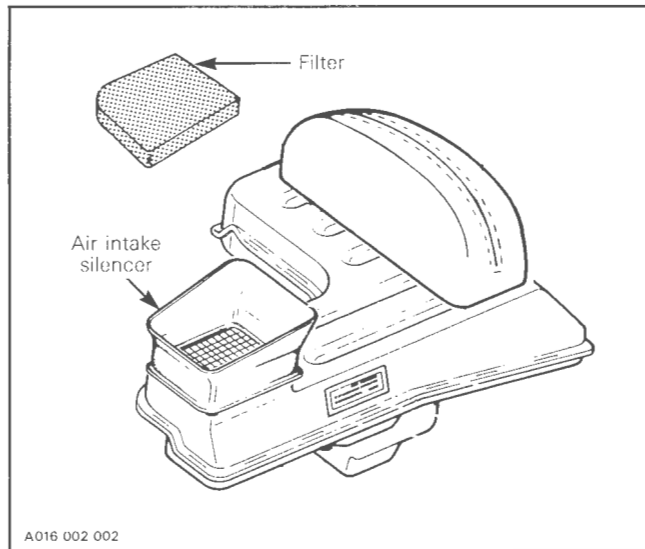
CAUTION : Do not apply heat to dry out air filter.

WARNING : Always wear safety goggles when using compressed air.

Reinstall properly.

Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)



○ **NOTE** : Should the vehicle be used in powder snow, air filter may clog causing a "choke effect". Check regularly and dry as needed.

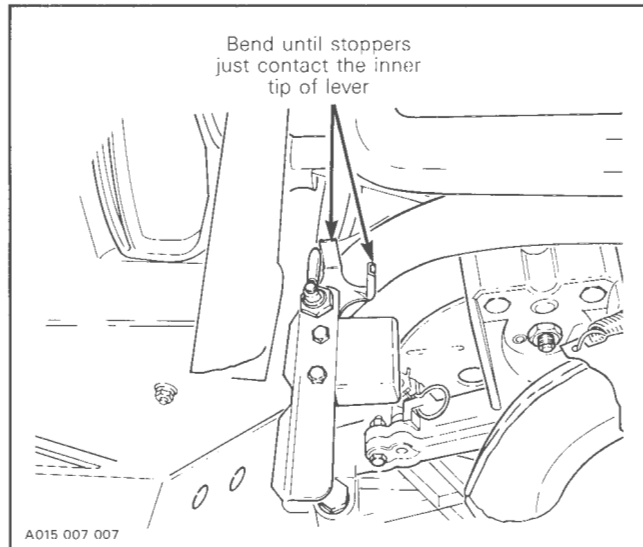
31,32, Fuel tank, retainer

When installing fuel tank, position retainers so that fuel tank has 1.6 mm (1/16 in) of play to allow expansion.

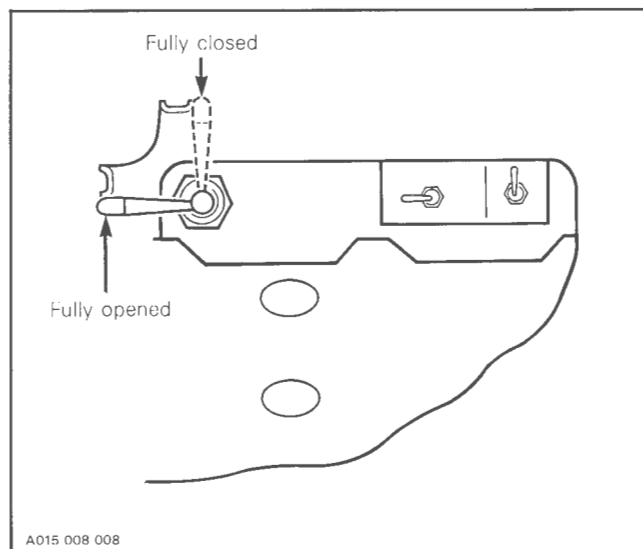
45, Fuel shut-off valve

Two stoppers are provided on the fuel shut-off valve to prevent the lever from rotating due to vibrations.

These stoppers are set so that the inner tip of the lever slightly contacts the stoppers while in the fully opened or fully closed positions. If necessary, adjust by bending the stoppers.

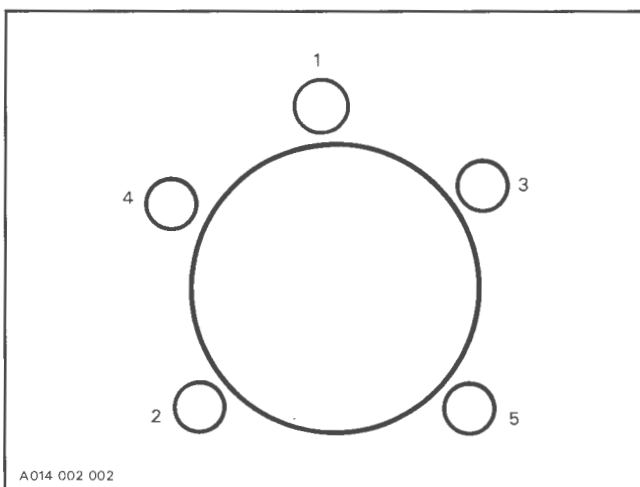


▼ **CAUTION** : Improper adjustment of the stoppers may cause the valve lever to move to a partially closed position which could lead to engine damage. **NEVER** allow lever to remain between stoppers, i.e. partially closed.



43, Phillips head screw

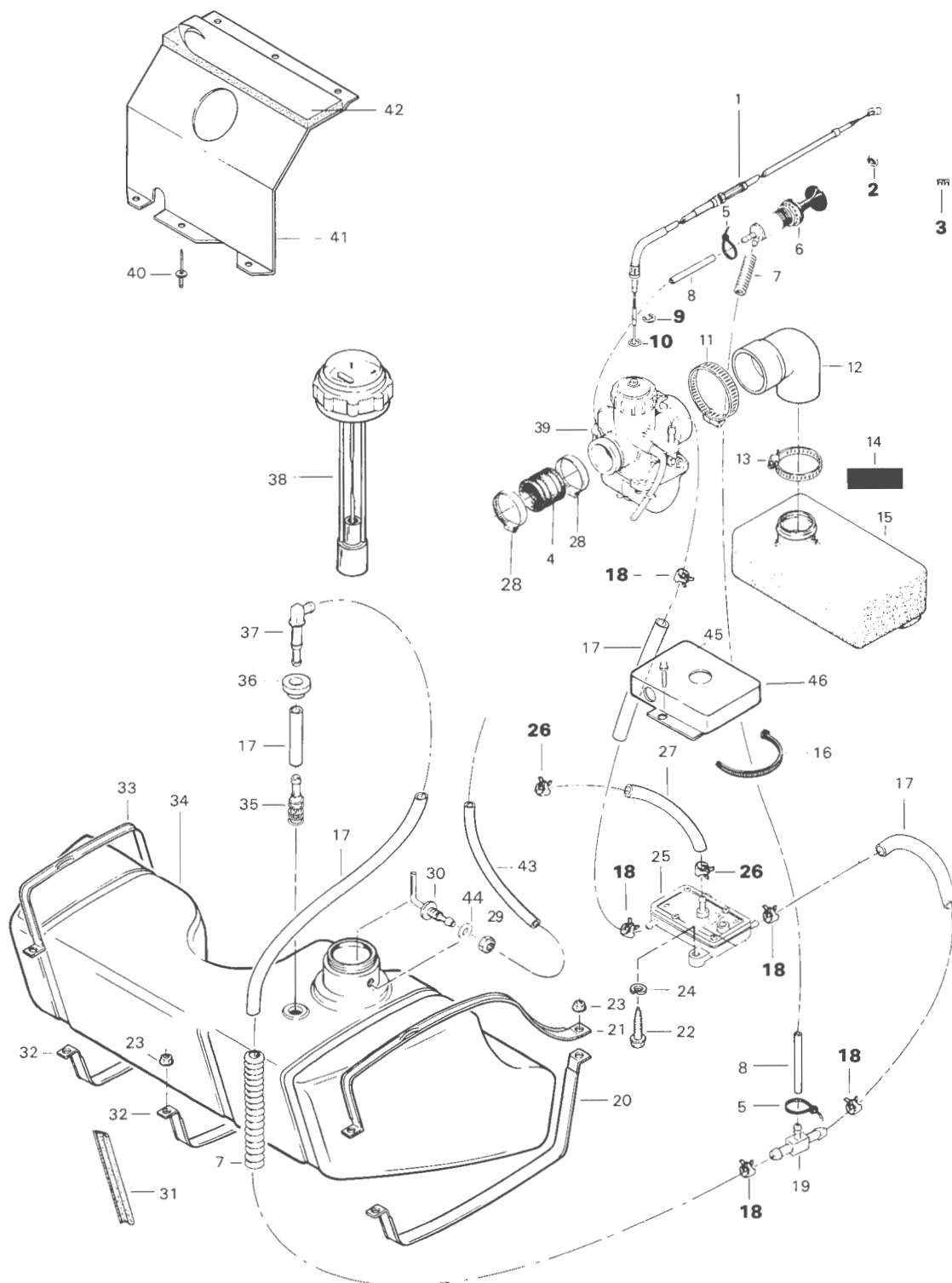
Torque fuel level sensor retaining screws to 1 N•m (8 lbf•in) in the sequence shown and then to 2.5 N•m (22 lbf•in), using the same sequence.



Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

Alpine II 503



Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

1. Throttle cable & housing
2. Circlip
3. Lock tab
4. Carburetor adaptor
5. Tie rap
6. Primer valve
7. Isolating line
8. Primer tube
9. Retainer ring
10. O-ring
11. Gear clamp
12. Air intake elbow
13. Hose clamp
14. Warning label
15. Air intake
16. Tie rap
17. Fuel line
18. Spring clamp (5)
19. Tee (primer valve)
20. Retainer strip
21. Retainer strip
22. Hexagonal head metal screw 12 x 3/4 in
23. Hexagonal flanged elastic stop nut M6 (6)

24. Lock washer
25. Fuel pump
26. Spring clamp (2)
27. Impulse hose
28. Clamp (2)
29. Hexagonal nut 5/16 in-18
30. Air vent fitting
31. Protector strip
32. Retainer strip (2)
33. Retainer strip
34. Fuel tank
35. Fuel filter
36. Grommet
37. Male connector
38. Fuel tank gauge/cap
39. Carburetor VM34-297
40. Rivet (4)
41. Baffle
42. Foam for baffle
43. Air vent tube
44. Washer
45. Metal screw 8 x 1/2 in
46. Protector

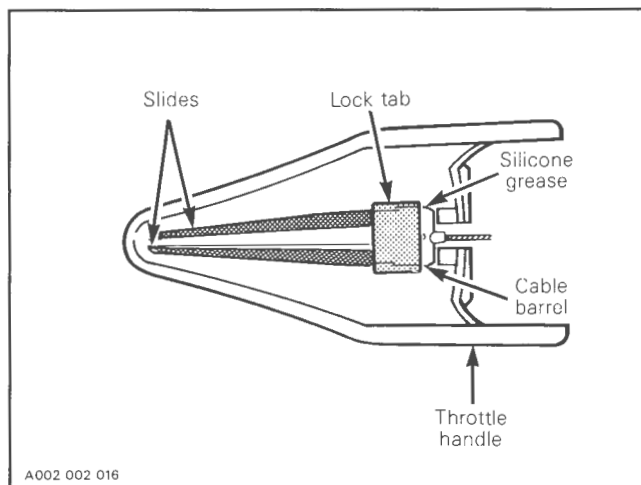
18,26 Spring clamp

Always reposition spring clamps after any repair to prevent possible leaks.

3, Lock tab

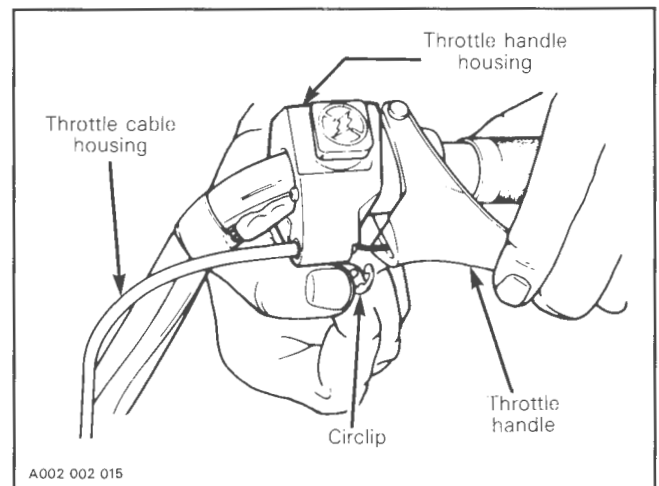
Put silicone grease (P/N 413 7017 00) around cable barrel.

The lock tab must be pushed on the throttle handle slides until it blocks the cable barrel opening of the throttle handle.



2, Circlip

Locate as per illustration.



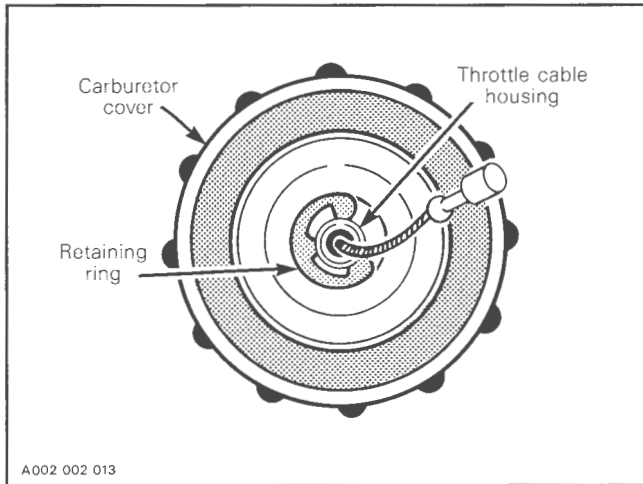
WARNING : If this procedure is disregarded, throttle will be half-open at normally closed position and the engine will speed up when starting.

Section 02 ENGINE

Sub-section 11 (AIR INTAKE SILENCER & FUEL TANK)

9,10, Retaining ring & O-ring

Locate O-ring outside of carburetor cover and retaining ring inside.



PULLEY GUARD

DISASSEMBLY & ASSEMBLY

○ NOTE : For additional information (ex. : exploded view) refer to the 1989 correspondent parts catalog.

◆ WARNING : Engine should be running only with belt guard and/or pulley guard well secured in place.

INSPECTION

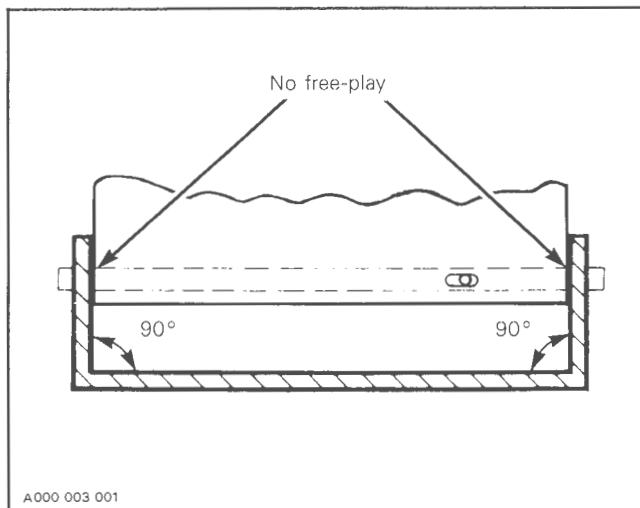
All models

Check pulley guard mounting bosses, clips and retainers for wear.

Elan

Check the spring-loaded retaining pin for free operation. Replace any damaged parts.

Prior to installation, ensure that pulley guard and frame bracket are 90° with frame.



◆ WARNING : No lateral free-play should exist between drive pulley guard and frame bracket.

Safari Scout/Scout E/Saga/Voyageur/ Escapade/Cheyenne

Make sure the spring wire support is well inserted in pulley guard grommet.

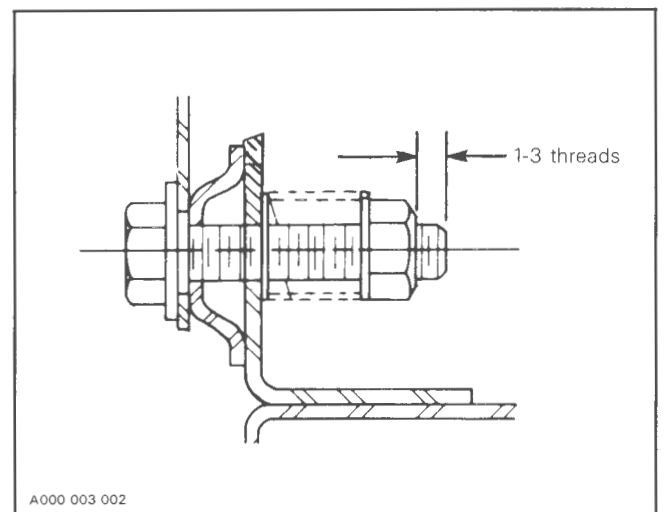
○ NOTE : Pulley guards are purposely made slightly oversize to maintain tension on their clips and retainers preventing undue noise and vibration. It is important that this tension be maintained when re-assembling.

ADJUSTMENT

Elan

The length of the uncompressed retaining pin spring should not be less than 47 mm (1-7/8 in).

An uncompressed front guard spring should not be less than 20 mm (13/16 in). When assembling adjust length as illustrated below.



Section 03 TRANSMISSIONSub-section 02 (DRIVE BELT)

DRIVE BELT

1989 APPLICATION CHART

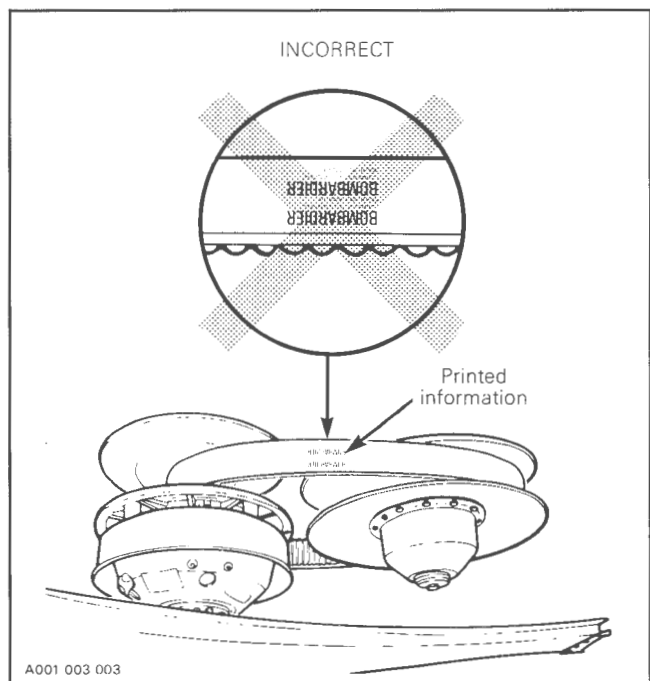
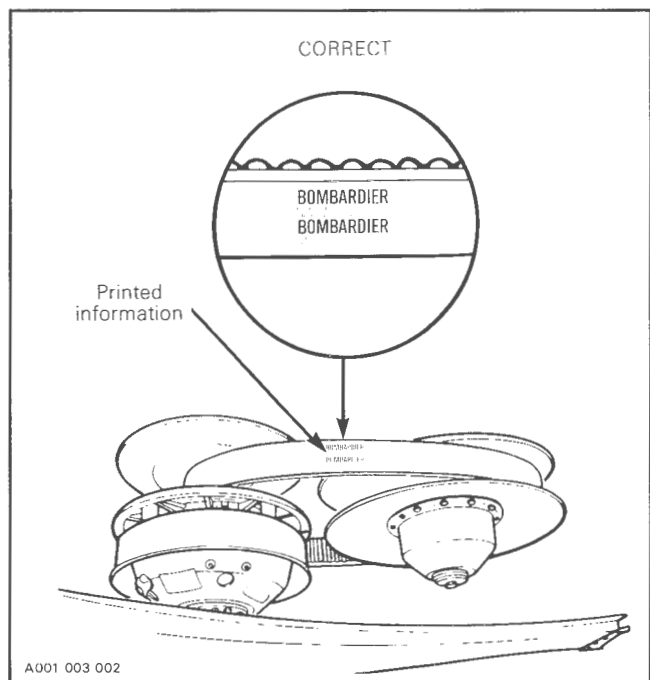
| MODEL | PART NUMBER | MAX. WIDTH (NEW) | MIN. WIDTH (WEAR LIMIT) |
|--|----------------|---------------------|----------------------------|
| ELAN | 570 0411 00 | 30 mm (1-3/16") | 27 mm (1-1/16") |
| SAFARI CITATION SAFARI CITATION E TUNDRA TUNDRA LT | 414 5234 00 | 33.3 mm (1-5/16") | 30 mm (1-3/16") |
| SAFARI CHEYENNE SAFARI VOYAGEUR SAFARI ESCAPADE | 414 6175 00 | 34.5 mm (1-27/64") | 32 mm (1-1/4") |
| FORMULA MX FORMULA MX LT FORMULA PLUS FORMULA PLUS LT | 414 5823 00 | | |
| SAFARI SCOUT SAFARI SCOUT E SAFARI SAGA | 414 5233 00 | 35 mm (1-3/8") | 32 mm (1-1/4") |
| ALPINE II 503 | 570 2777 00 | | |
| FORMULA MACH I | 414 6338 00 | | |

Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

ROTATION DIRECTION

The maximum drive belt life span is obtained when the drive belt is installed as shown. This will ensure that correct direction of rotation is respected.



NOTE : For used drive belt, mark and reinstall in the same position.

REMOVAL & INSTALLATION

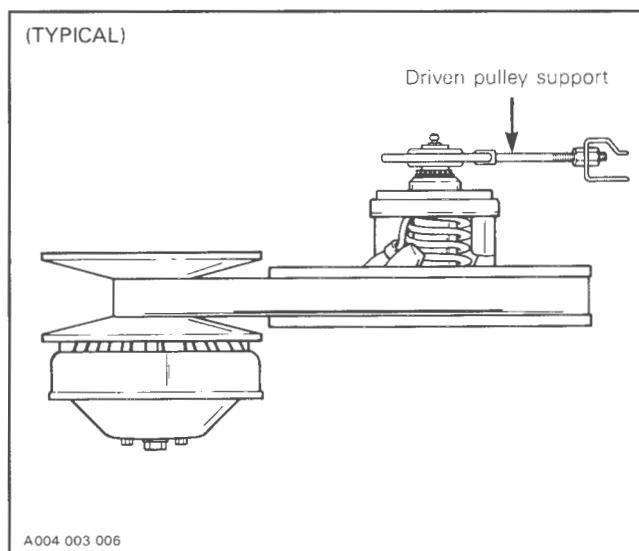
CAUTION : Do not force or use tools to pry the belt into place, this could cut or break the cords in the belt.

WARNING : Do not operate engine without drive belt or guard installed. Serious bodily injury could occur.

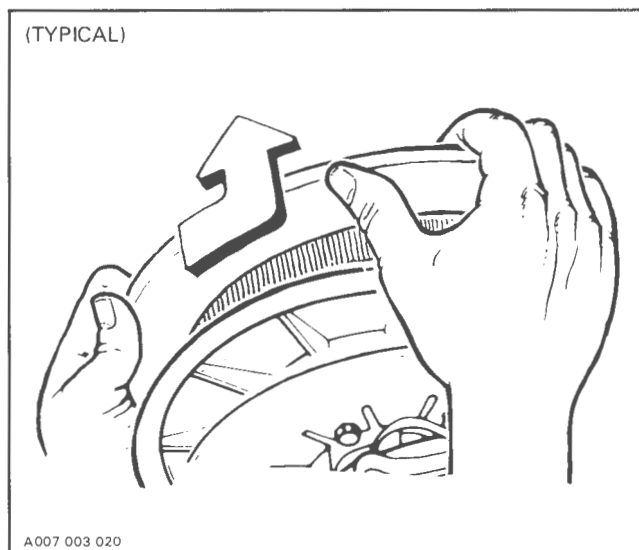
Tilt cab and remove pulley or belt guard.

All models except Elan & Alpine II 503

Unlock and raise the driven pulley support, where applicable.



Open the driven pulley by twisting and pushing the sliding half. Hold in fully open position.

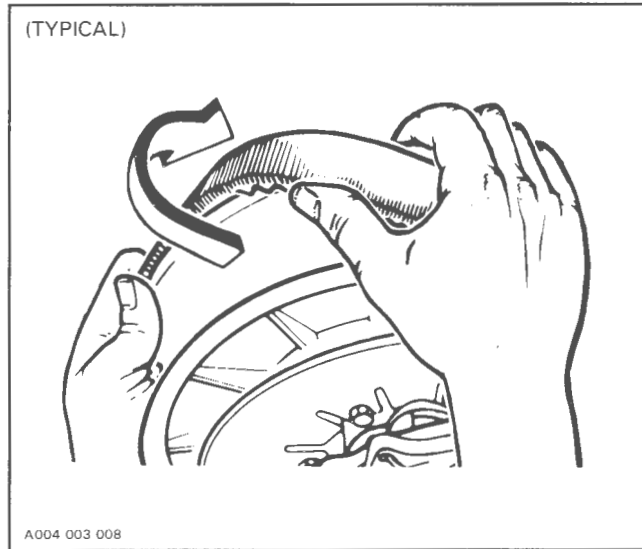


Section 03 TRANSMISSION

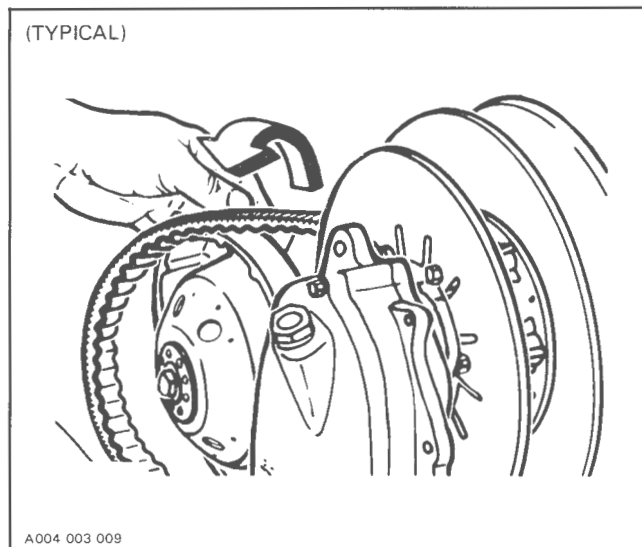
Sub-section 02 (DRIVE BELT)

○ **NOTE :** To ease belt removal and installation on models using two Allen screws in driven pulley hub, tighten one of the screws using a 3 mm Allen wrench until drive belt can be slipped out of pulley.

Slip slackened belt over the top edge of the sliding half.



Slip the belt out from the drive pulley and remove from vehicle.



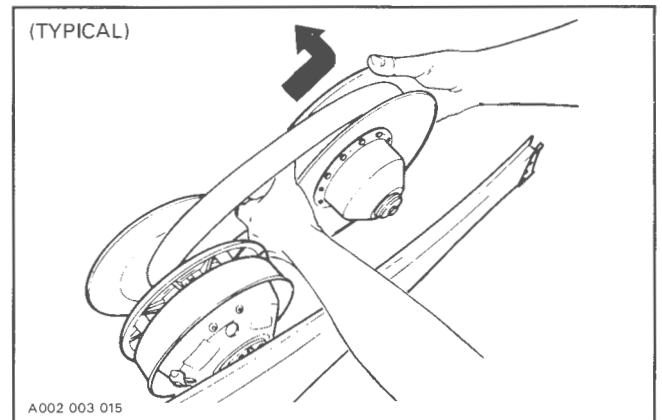
To install drive belt, reverse the procedure.

○ **NOTE :** On Models using a driven pulley with two Allen screws in driven pulley hub. The top of the drive belt must be flush with the driven pulley edge. Screw or unscrew each Allen screw equally to obtain proper belt position. Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check again, repeat as required.

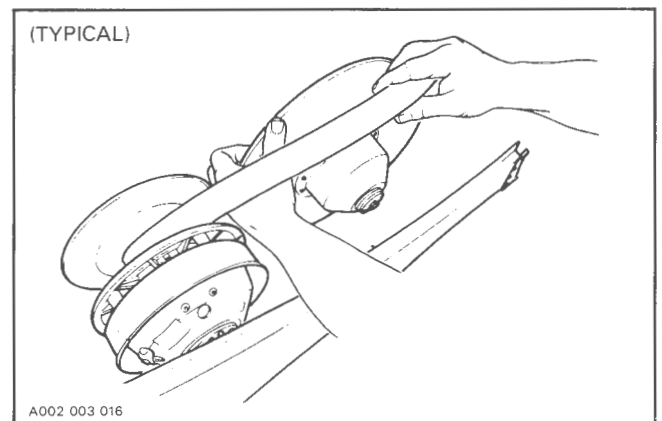
Elan, Alpine II 503

○ **NOTE :** On Alpine model, console may be removed to give an easier access.

Open the driven pulley by twisting and pushing the sliding half. Hold in fully open position.



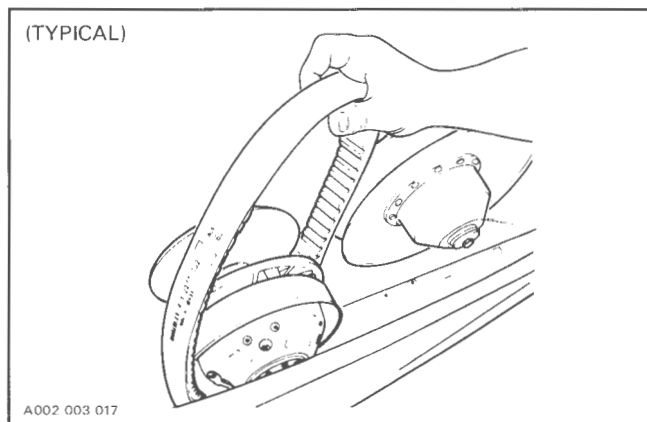
Slip the belt over the top edge of the fixed half.



Section 03 TRANSMISSION

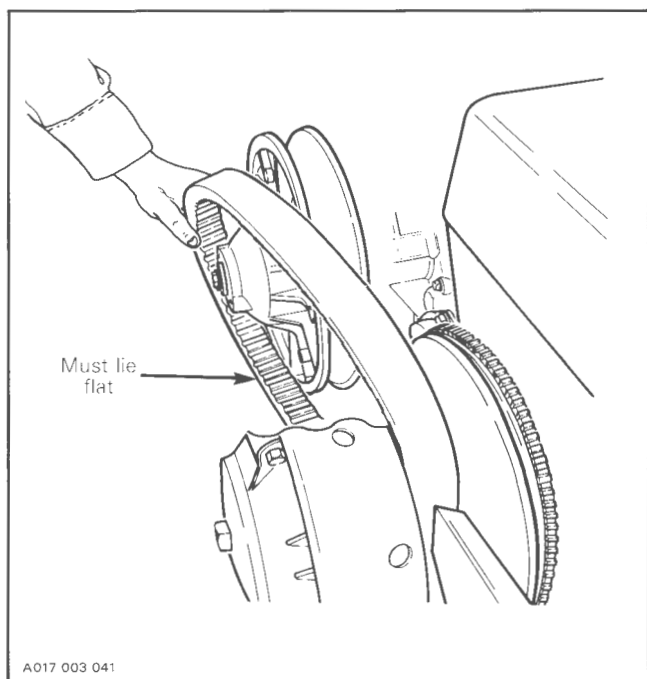
Sub-section 02 (DRIVE BELT)

Slip the belt out from the drive pulley and remove it completely from the vehicle.



To install the drive belt, reverse the procedure.

NOTE : On Alpine model the belt must lie flat on bottom pan to clear the driven pulley.



DRIVE BELT DEFLECTION MEASUREMENT

NOTE : The drive belt deflection measurement must be performed each time a new drive belt is installed.

NOTE : To obtain an accurate drive belt deflection measurement, it is suggested to allow a break-in period of 50 km (30 mi).

Before checking the belt deflection, ensure vehicle has the proper belt number and correct belt width. (Refer to the application chart, at the beginning of this sub-section).

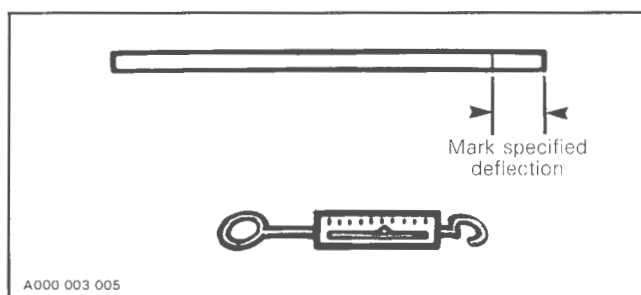
To obtain maximum vehicle performance, the belt tension must be adjusted according to specifications shown in the accompanying chart.

| MODEL | DEFLECTION mm (in) | FORCE Kg (lb) |
|--|-----------------------------------|------------------|
| ELAN | 19 (3/4) | 4.5 (9.9) |
| SAFARI CITATION/E | 19 ± 3 (3/4 \pm 1/8) | 5 (11) |
| TUNDRA, TUNDRA LT, SAFARI SCOUT/E, SAFARI SAGA SAFARI CHEYENNE SAFARI VOYAGEUR SAFARI ESCAPADE ALPINE II 503 | 32 ± 5 (1-1/4 \pm 13/64) | 6.8 (15) |
| FORMULA MX / MX LT / PLUS / PLUS LT / MACH I | 32 (1-1/4) | 6.8 (15) |

To check tension,

Position a reference rule on drive belt.

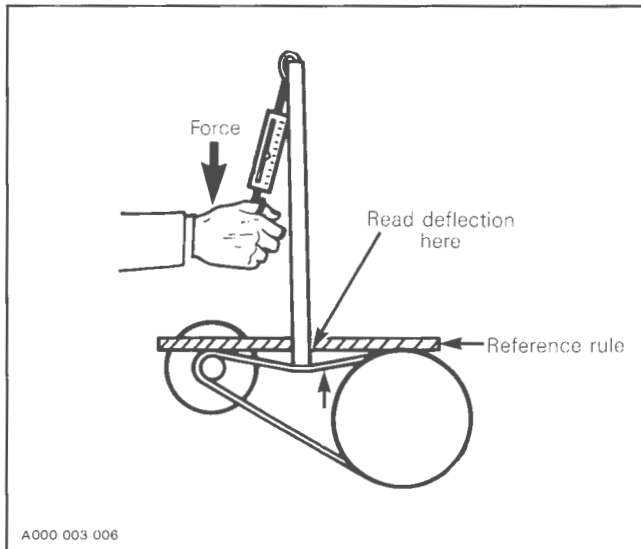
Wooden stick and spring scale method :



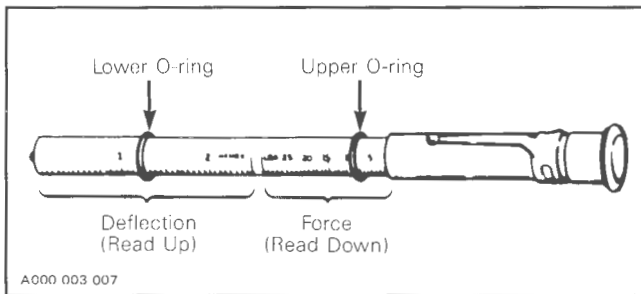
Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

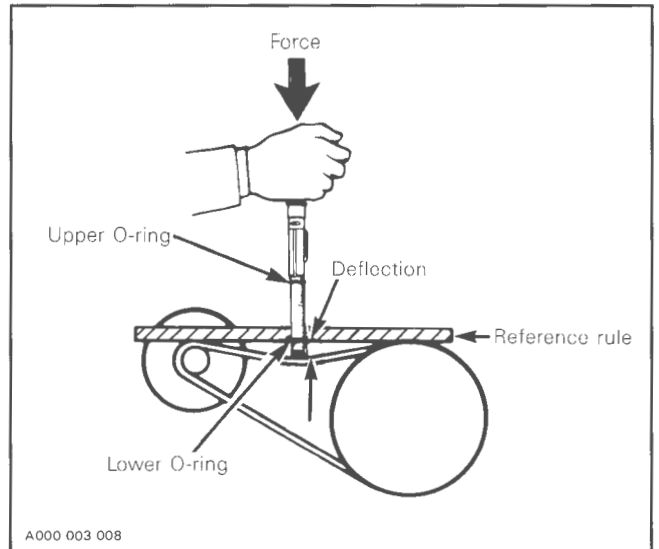
Using spring scale and stick, apply specified force on drive belt halfway between pulleys as shown.



Or use the belt tension tester (P/N 414 3482 00).



1. Slide lower O-ring of deflection scale to specified measure.
2. Slide upper O-ring to zero on the force scale.
3. Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.

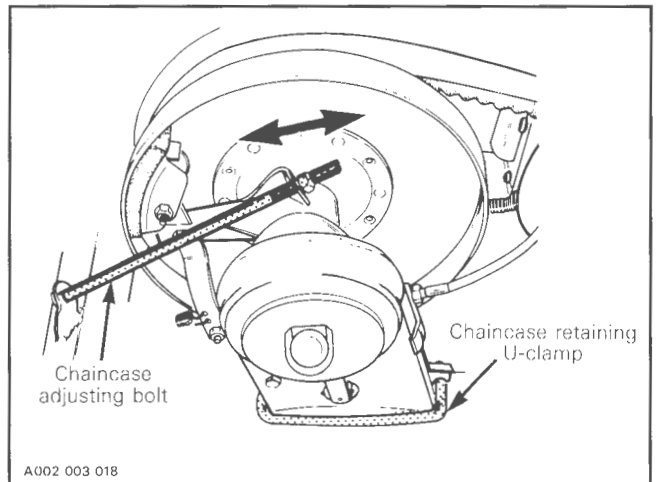


DEFLECTION ADJUSTMENT

Elan

Drive belt deflection is adjusted by moving chaincase.

To do so, loosen the chaincase retaining U-clamp and screw or unscrew the chaincase adjusting bolt.



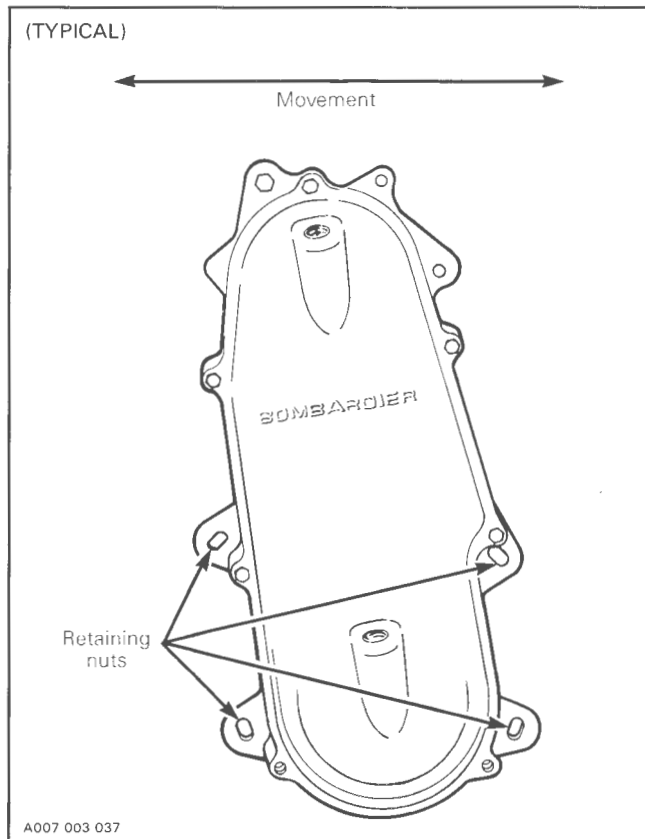
Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

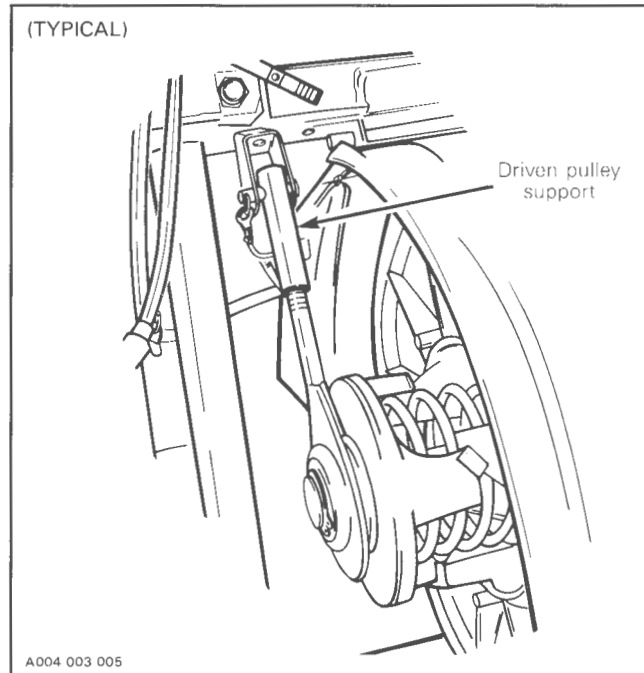
Adjust pulley distance according to specification (see pulley distance & alignment section 03-05) and measure drive belt deflection. Readjust pulley distance if required then tighten retaining U-clamp.

**Safari Citation/E, Tundra, Tundra LT,
Safari Scout/E, Safari Saga, Safari Cheyenne,
Safari voyageur & Safari Escapade**

Drive belt deflection is adjusted by moving chaincase.



To do so, loosen the 4 chaincase retaining nuts, unlock and raise driven pulley support.



Adjust pulley distance according to specification (see pulley distance & alignment section 03-05) and measure drive belt deflection. Readjust pulley distance if required, then tighten the 4 nuts. Adjust driven pulley support and lock it to chassis.

On models using two Allen screws in driven pulley hub, adjust pulley distance according to specification (see pulley distance and alignment section 03-05) then adjust drive belt deflection using the two Allen screws, as shown.

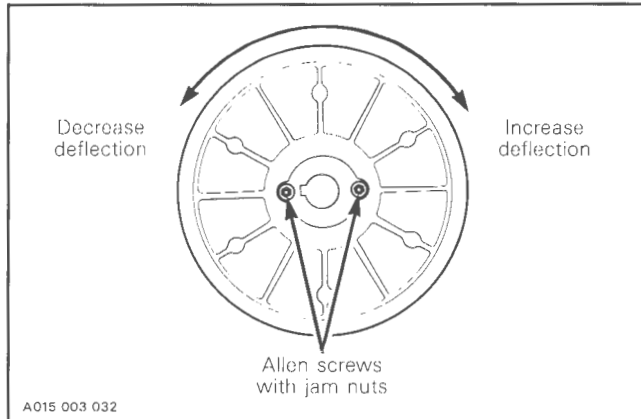
To increase deflection : turn each Allen screw equally clockwise.

To decrease deflection : turn each Allen screw equally counter clockwise.

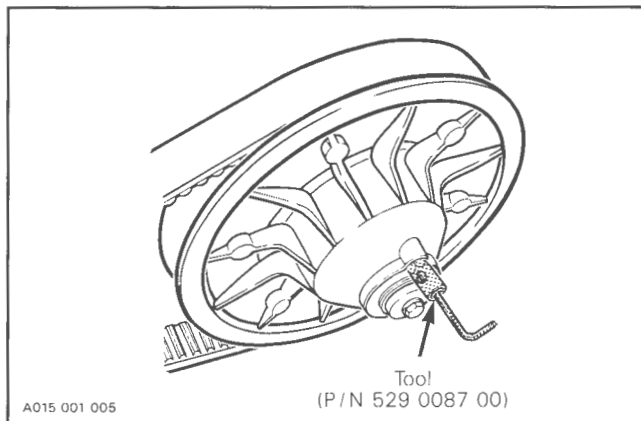
○ **NOTE :** Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check deflection, repeat as required.

Section 03 TRANSMISSION

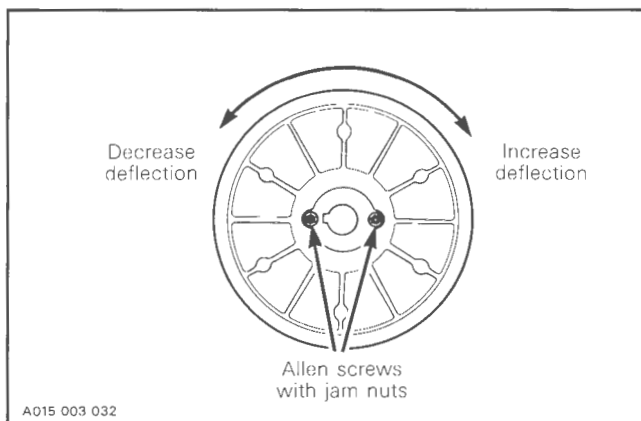
Sub-section 02 (DRIVE BELT)



Allen screw should be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 0087 00).



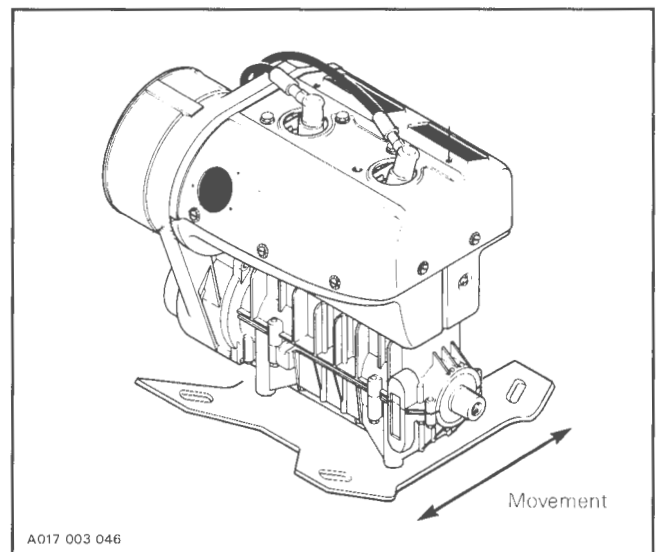
Restrain Allen screw with the wrench and tighten nut with the socket using socket handle provided in tool box.



NOTE : The top of the drive belt must be flush with the driven pulley edge. Screw or unscrew each Allen screw equally to obtain proper belt position. Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check again, repeat as required.

Alpine II 503

Drive belt deflection is adjusted by loosening engine support nuts and moving engine backward or forward as required.

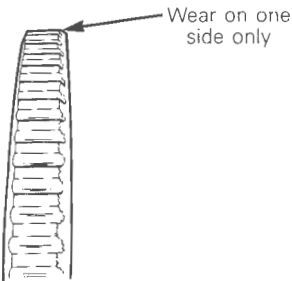
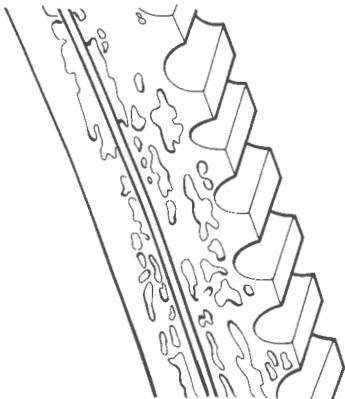
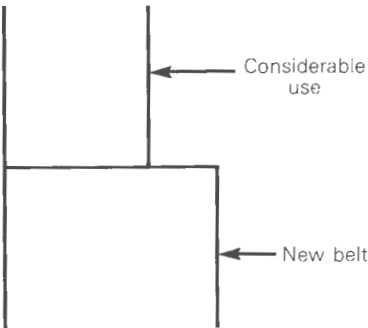


Adjust pulley distance according to specification (see pulley distance & alignment section 03-05) and measure drive belt deflection. Readjust pulley distance if required. Use Allen screws in driven pulley hub to finalize drive belt deflection.

Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

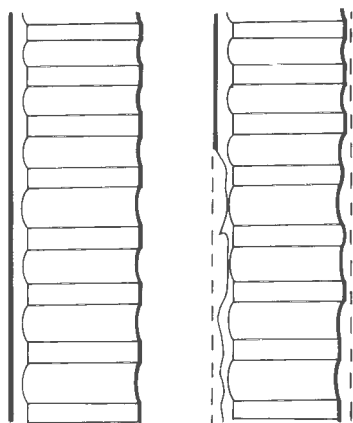
TROUBLESHOOTING

| | | |
|---|---|--|
| 1. Uneven belt wear on one side only. | | |
|  <p>A000 003 009</p> | CAUSE <ul style="list-style-type: none">a) Loose engine mount.b) Pulley misalignment.c) Rough or scratched pulley surfaces.d) Driven pulley bushing worn | REMEDY <ul style="list-style-type: none">a) Tighten engine mount nuts equally.b) Align pulleys.c) Repair or replace pulley half.d) Replace bushing |
| 2. Belt glazed excessively or having baked appearance. | | |
|  <p>A000 003 010</p> | CAUSE <p>Excessive slippage caused by :</p> <ul style="list-style-type: none">a) Insufficient pressure on belt sides.b) Rusted drive or driven pulley shafts.c) Oil on pulley surfaces.d) Incorrect centrifugal governor. | REMEDY <ul style="list-style-type: none">a) Check drive pulley for worn or missing flyweights/rollers.b) Clean shaft with fine steel wool and lubricate with low temperature grease (If applicable only).c) Clean pulley surfaces with fine emery cloth and clean cloth.d) Install correct governor. |
| 3. Belt worn excessively in top width. | | |
|  <p>A000 003 011</p> | CAUSE <ul style="list-style-type: none">a) Excessive slippage due to irregular outward actuation movement of drive pulley.b) Rough or scratched pulley surfaces.c) Improper belt angle.d) Considerable use. | REMEDY <ul style="list-style-type: none">a) Carry out inspection.b) Repair or replace pulley.c) Using unspecified type of belt. Replace belt with correct Bombardier belt.d) Replace belt if 3 mm (1/8'') less than recommended width (see Technical Data). |

Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

4. Belt worn narrow in one section.



A000 003 012

CAUSE

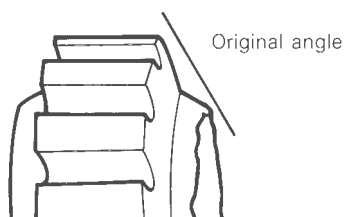
Excessive slippage in drive pulley caused by :

- a) Frozen or too tight track.
- b) Drive pulley not functioning properly.
- c) Engine idle speed too high.
- d) Incorrect belt length.
- e) Incorrect pulley distance.

REMEDY

- a) Liberate track from ice or check track tension and alignment.
- b) Repair or replace drive pulley.
- c) Adjust to specification.
- d) Using unspecified type of belt. Replace belt with correct Bombardier belt.
- e) Readjust to specifications.

5. Belt sides worn concave.



A000 003 013

CAUSE

- a) Rough or scratched pulley surfaces.
- b) Unspecified type of belt.

REMEDY

- a) Repair or replace.
- b) Replace belt with correct Bombardier belt.

6. Belt desintegration.



A000 003 014

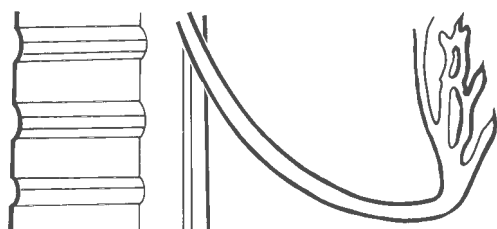
CAUSE

- a) Excessive belt speed.
- b) Oil on pulley surfaces.

REMEDY

- a) Using unspecified type of belt. Replace belt with proper type of belt.
- b) Clean pulley surfaces with fine emery cloth and wipe clean using alcohol and a clean cloth.

7. Belt edge cord breakage.



A000 003 015

CAUSE

- a) Pulley misalignment.

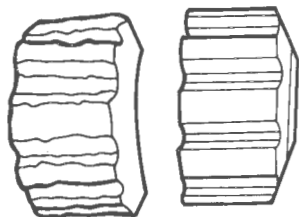
REMEDY

- a) Align pulleys to specifications.

Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

8. Flex cracks between cogs.



A000 003 016

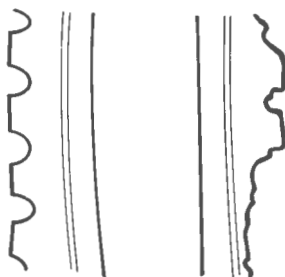
CAUSE

- a) Considerable use, belt wearing out.

REMEDY

- a) Replace belt with correct Bombardier belt.

9. Sheared cogs, compression section fractured or torn.



A000 003 017

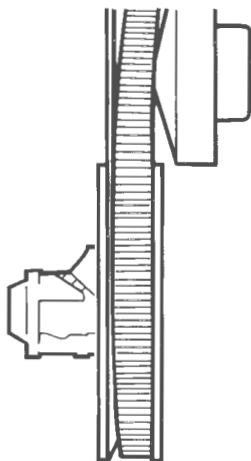
CAUSE

- a) Improper belt installation.
- b) Belt rubbing stationary object on pulleys.
- c) Violent engagement of drive pulley.

REMEDY

- a) Refer to Installation section.
- b) Check drive components.
- c) Check drive pulley engagement speed and drive pulley bushings and components.

10. Belt "Flip-Over" at high speed.



A000 003 018

CAUSE

- a) Pulley misalignment.
- b) Using unspecified type of belt.

REMEDY

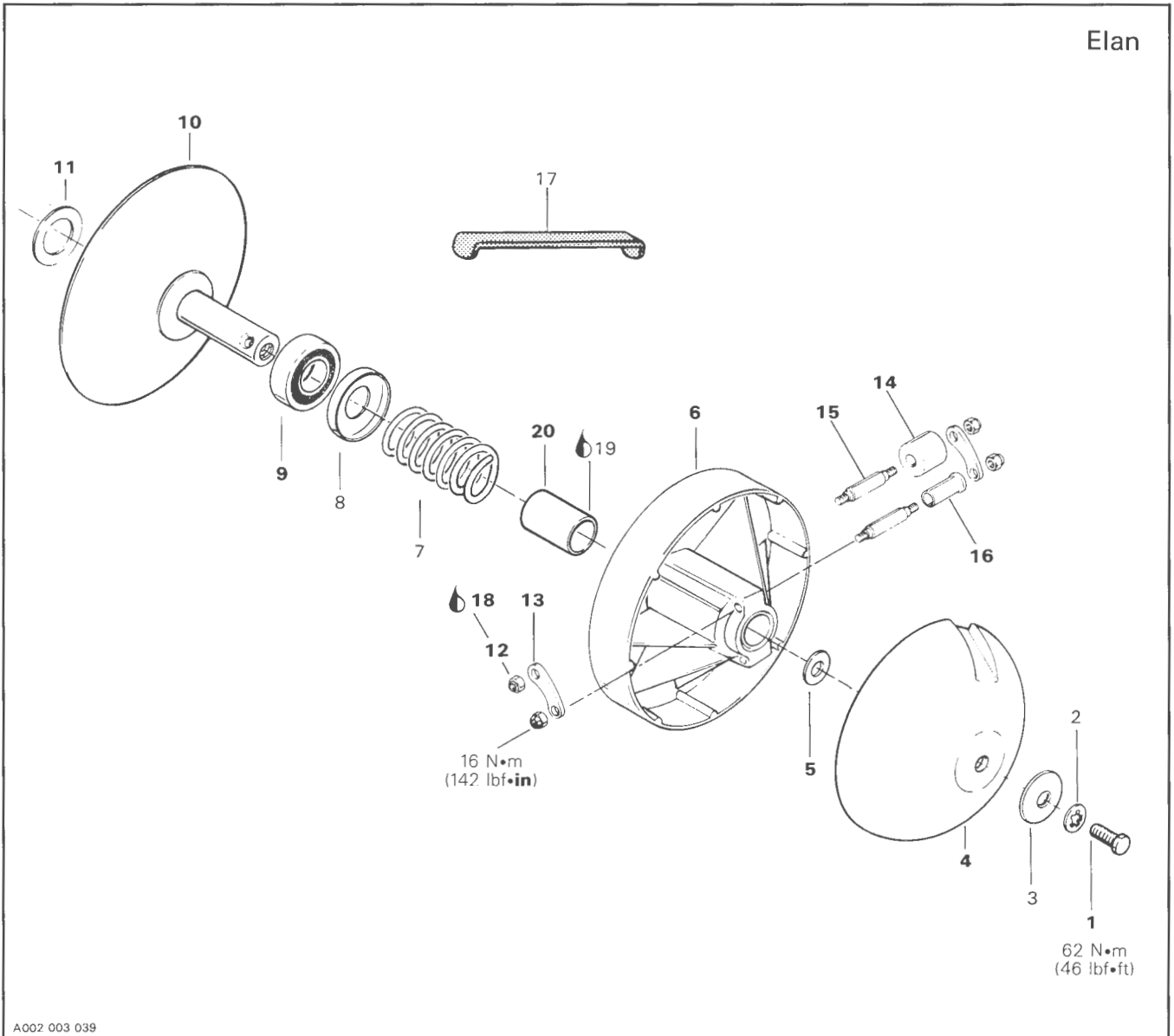
- a) Align pulleys to specifications.
- b) Replace belt with correct Bombardier belt.

DRIVE PULLEY

ROLLER ROUND SHAFT TYPE

LUBRICATION FREE

Elan



1. Cap screw
2. Lock washer
3. Washer
4. Governor cup
5. Shim
6. Outer half
7. Spring
8. Spring seat
9. Bearing
10. Inner half

11. Shim
12. Nut
13. Counterweight
14. Roller
15. Shouldered pin
16. Shouldered bushing
17. Drive pulley retainer (P/N 529 0017 00)
18. Loctite 242
19. Loctite 609
20. Kahrlon bushing

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

GENERAL

Some drive pulley components (return spring, counterweight, calibration washer) can be changed to improve vehicle performance in high altitude regions. The "high altitude technical data booklet" (P/N 484 0552 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

▼ **CAUTION** : Such modifications should only be performed by experience mechanics since they can greatly affect vehicle performance.

◆ **WARNING** : Drive pulley repairs that include any disassembly or assembly procedures must be performed by an authorized Bombardier dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

1,4,6, Cap screw, outer half & governor cup

Lock the crankshaft by using one of the following method :

Insert the crankshaft locking tool (P/N 420 8766 40) into the impulse hole of the engine. Slowly rotate the crankshaft until it locks into position.

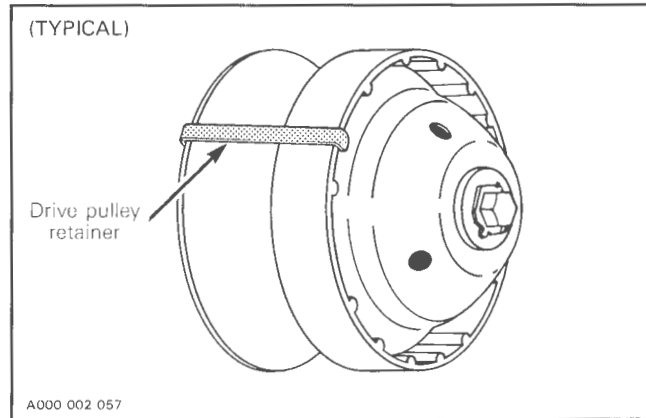
▼ **CAUTION** : Do not use any type of pin other than the tool P/N 420 8766 40.

Or :

Remove spark plug then bring PTO piston at TDC position.

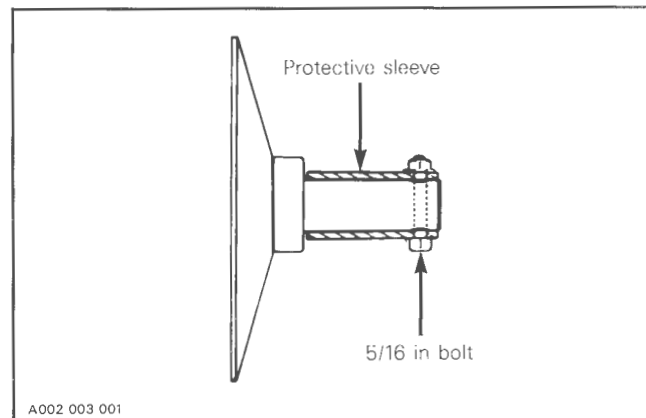
Rotate drive pulley 45° **clockwise** then insert enough starter rope into cylinder to fill it completely.

◆ **WARNING** : Spring pressure can force assembly apart ; therefore, it is imperative that the governor cup be held firmly during governor retaining bolt removal. Use drive pulley retainer (P/N 529 0052 00).



10, Inner half

To remove the inner half, slide a length of steel pipe over shaft. Attach with a 5/16 in nut and bolt, as illustrated. The inner half can then be removed with a pipe wrench. (Unscrew counterclockwise).



DISASSEMBLY

▼ **CAUTION** : Do not disassemble counterweights unless replacement is necessary.

9,10, Bearing & Inner half

To disassemble bearing from inner half, use a suitable bearing puller.

CLEANING

6,10, Inner & outer half

Clean pulley faces and shaft with fine steel wool and dry cloth. Clean outer half bushing with clean dry cloth.

INSPECTION

Drive pulley should be inspected annually.

6,10, Inner & outer half

Check outer half for excessive lateral play and inner half shaft for scratches.

14, Roller

Check for roundness of external diameter.

▼ **CAUTION :** Ensure rollers are in good condition. Replace as required.

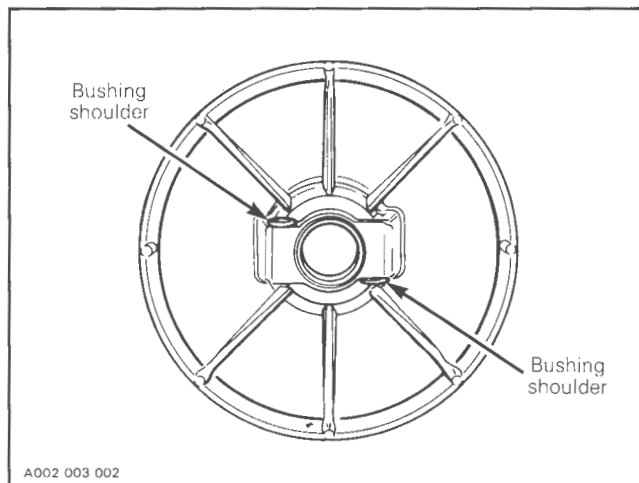
16, Shouldered bushing

Check for wear.

ASSEMBLY

6,16, Shouldered bushing

Shouldered bushings must be assembled in outer half as per illustration.

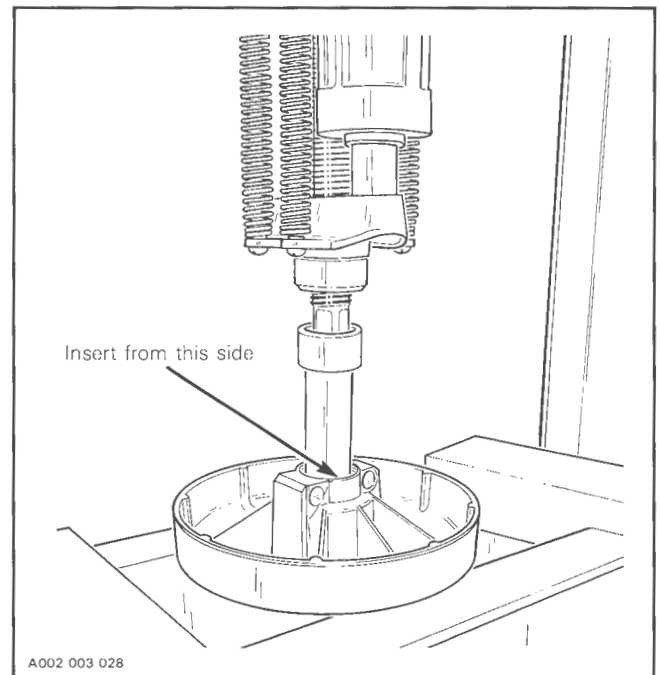


6,20, Outer half & Kahrlon bushing

Use a suitable pusher to remove the old bushing. Clean outer half with ethyl alcohol.

▼ **CAUTION :** Bushing must be bonded with Loctite 609 to prevent displacement in outer half.

Apply Loctite 609 outside of bushing then insert into its housing from the shown side. (So that using housing chamfer).



Push until bushing comes flush with its housing.

12,13,14,15, Counterweight ass'y

Apply Loctite 242 or equivalent on threads then torque nuts to 16 N•m (142 lbf•in).

▼ **CAUTION :** Counterweights and rollers must move easily after installation.

9,10, Bearing & inner half

To assemble bearing on inner half, press on bearing inner race with a suitable pusher.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

INSTALLATION

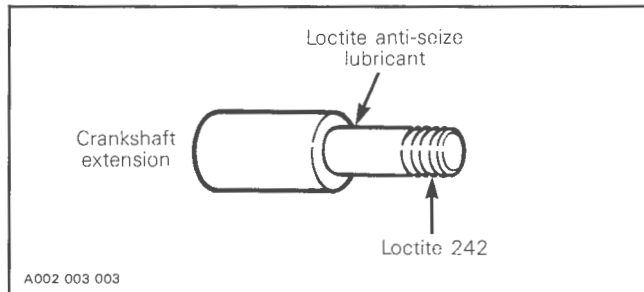
11, Shim (alignment)

This shim is used to obtain correct pulley alignment, refer to section 03-05.

10, Inner half

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° **counter-clockwise** from TDC position.

Clean crankshaft extension and apply Loctite anti-seize lubricant (P/N 413 7010 00) on the unthreaded portion and Loctite 242 or equivalent on threads, (as illustrated) then install inner half on extension.



To tighten inner half, use a protective sleeve as shown in the removal procedure.

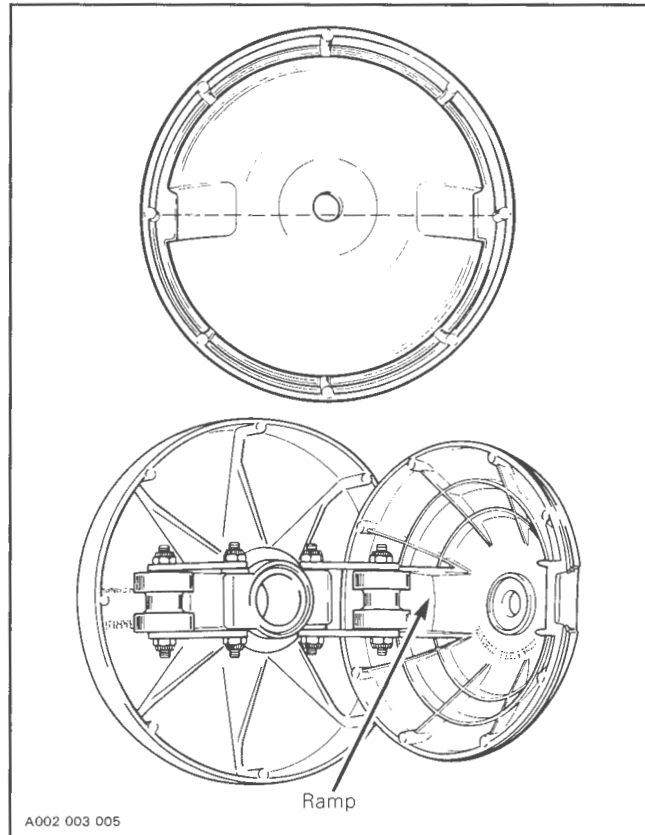
5, Shim (neutral)

This shim is used to obtain the neutral function of the drive pulley when engine is idling : use as required, maximum of two. Refer to ADJUSTMENT.

1,4,6, Cap screw, governor cup & outer half

Install governor cup correctly as per illustration making sure that the rollers are sliding on their ramp.

▼ **CAUTION :** Ensure rollers are in good condition. Replace as required.



Position the cap screw and torque to 62 N•m (46 lbf•ft).

Install drive belt, pulley guard and close cab. Accelerate vehicle and bring at intermediate speed then at the same time apply brake. Repeat 2 or 3 times. Stop engine and retorque cap screw.

ADJUSTMENT

11, Shim (alignment)

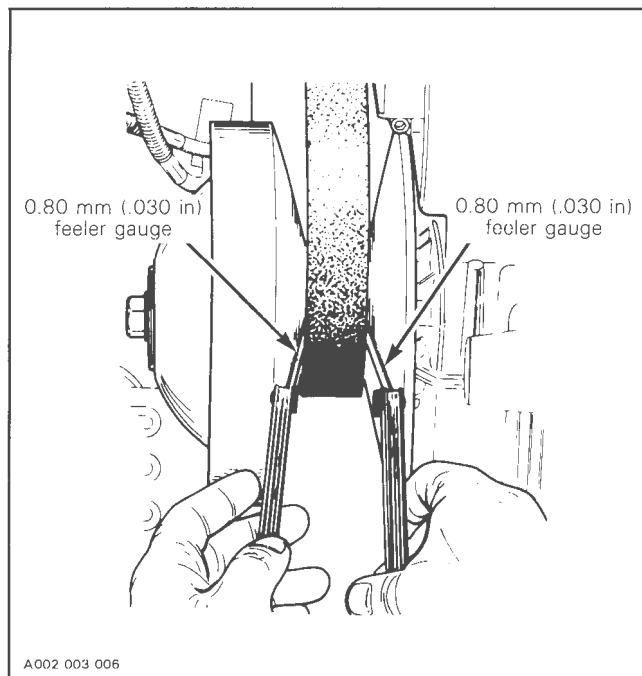
For pulley alignment procedure, refer to section 03-05.

5, Shim (neutral)

For the neutral adjustment, proceed as indicated below.

◆ **WARNING :** One or two shims #5 are used to obtain the neutral function of the drive pulley when engine is idling. Proceed as follows when retaining bolt is torqued :

With a **new** drive belt installed, it should be possible to insert a minimum of 0.80 mm (.030 in) thick feeler gauge on each side of the drive belt simultaneously pushing drive belt to sit on bearing.



Shims located between governor cup and drive pulley shaft will help in obtaining correct adjustment. Do not use more than two shims.

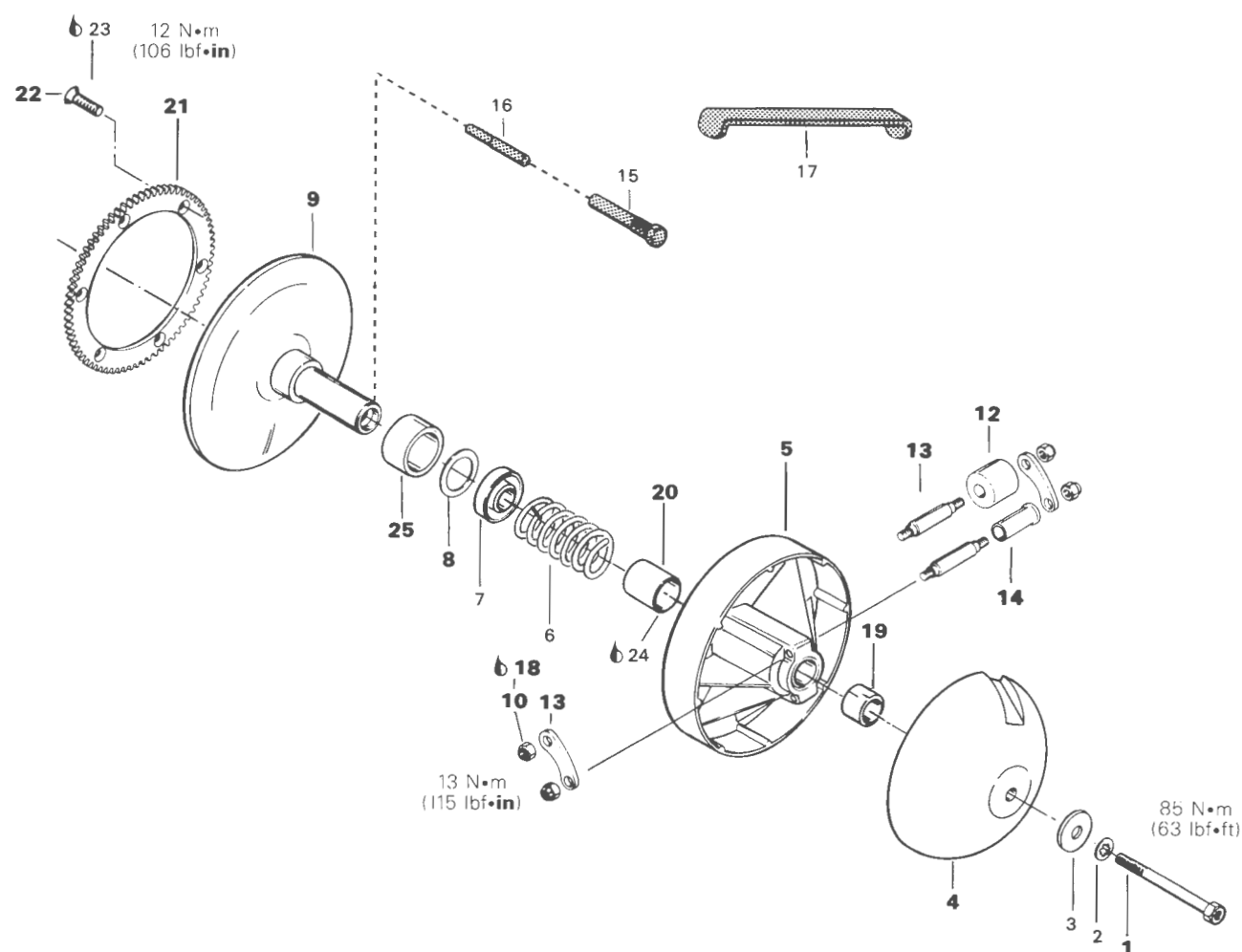
Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

ROUND SHAFT (TAPER) TYPE

LUBRICATION FREE

Safari Citation/E



A004 003 015

1. Cap screw
2. Lock washer
3. Spacer
4. Governor cup
5. Outer half
6. Spring
7. Spring seat
8. Shim
9. Inner half
10. Nut
11. Lever
12. Roller
13. Shouldered pin

14. Shouldered bushing
15. Puller P/N 529 0028 00
16. Puller pin P/N 529 0048 00
17. Drive pulley retainer P/N 529 0017 00
18. Loctite 242
19. Kahrlon bushing (small)
20. Kahrlon bushing (large)
21. Starter ring gear (electric starting)
22. Self locking screw (electric starting)
23. Loctite 271 (electric starting)
24. Loctite 609
25. Duralon bushing

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

GENERAL

Some drive pulley components (return spring, counterweight, calibration washer) can be changed to improve vehicle performance in high altitude regions. The "high altitude technical data booklet" (P/N 484 0552 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

▼ **CAUTION :** Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

◆ **WARNING :** Drive pulley repairs that include any disassembly or assembly procedures must be performed by an authorized Bombardier dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

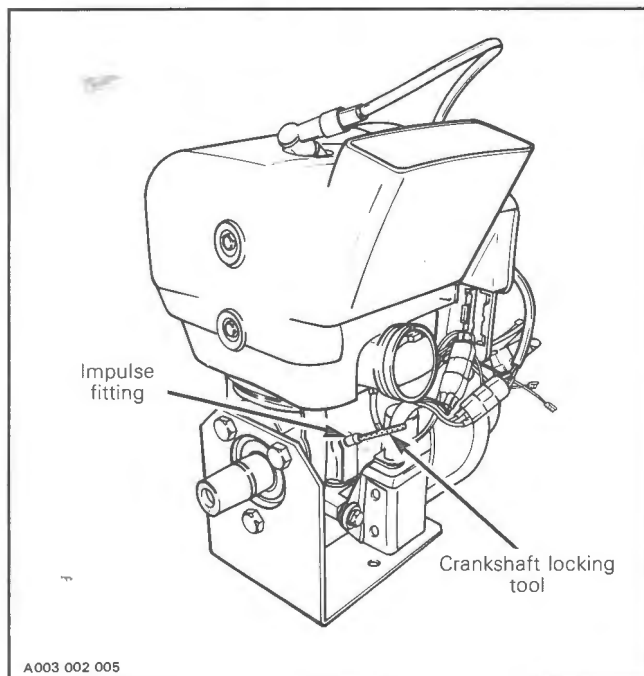
REMOVAL

1,4,5, Cap screw, outer half & governor cup

Lock the crankshaft by using one of the following method :

Insert the crankshaft locking tool (P/N 420 8766 40) into the impulse hole of the engine. Slowly rotate the crankshaft until it locks into position.

▼ **CAUTION :** Do not use any type of pin other than the tool P/N 420 8766 40.

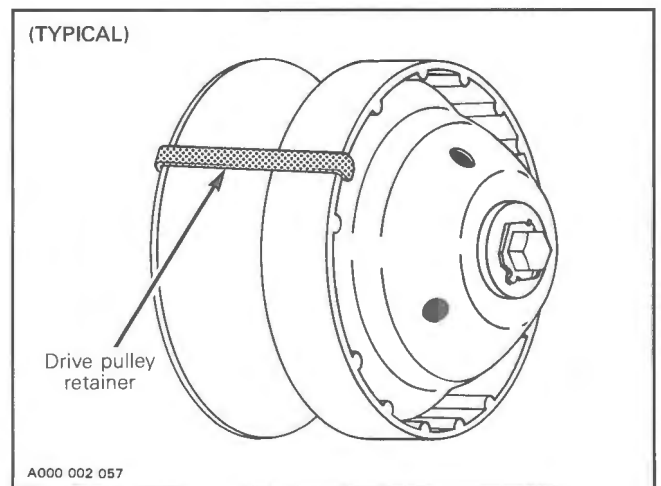


Or :

Remove spark plug then bring PTO piston at TDC position.

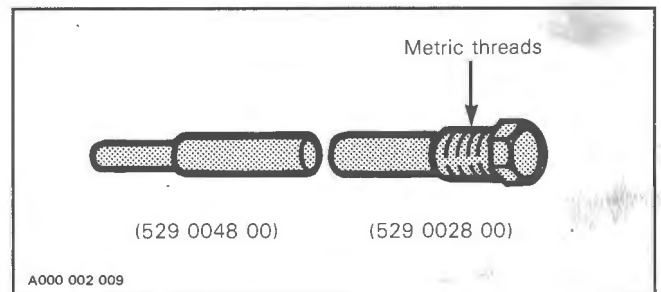
Rotate drive pulley 45° **clockwise** then insert enough starter rope into cylinder to fill it completely.

◆ **WARNING :** Spring pressure can force assembly apart ; therefore, it is imperative that the governor cup be held firmly during governor retaining bolt removal. Use drive pulley retainer (P/N 529 0052 00).



9, Inner half

If it is necessary to remove inner half, use drive pulley puller (P/N 529 0028 00 & 529 0048 00).



▼ **CAUTION :** This pulley has metric threads. Do not use imperial thread puller. Always tighten puller **by hand** to ensure that the drive pulley have the same type of threads (metric vs imperial) prior to fully tighten.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

To block engine crankshaft :

Remove starter rope blocking piston, then reblock piston after having turned 45° **counterclockwise** from TDC position ; or install crankshaft locking tool.

To remove inner half :

Install puller in pulley shaft then tighten, at the same time, knock slightly on puller head to disengage pulley from engine crankshaft.

DISASSEMBLY

▼ **CAUTION** : Do not disassemble counterweights unless replacement is necessary.

CLEANING

5,9, Inner & outer half

Clean pulley faces and shaft with acetone then with fine steel wool and dry cloth. Clean outer half bushing with clean dry cloth.

9, Inner half & crankshaft end

Parts must be at room temperature before cleaning.

Using a paper towel with acetone or Loctite Safety Solvent (# 75559), clean crankshaft tapered end and the taper inside the fixed half of the drive pulley.

◆ **WARNING** : This procedure must be performed in a well ventilated area.

▼ **CAUTION** : Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all harden oil deposits that have "baked" on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper #600.

▼ **CAUTION** : Do not use any other type of abrasive.

Re-clean mounting surfaces with paper towel and acetone or Loctite Safety solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

▼ **CAUTION** : Mounting surfaces must be free of any oil, cleaner or towel residue.

INSPECTION

Drive pulley should be inspected annually.

5,9, Inner & outer half

Check outer half for excessive lateral play and inner half shaft for scratches.

▼ **CAUTION** : Ensure rollers are in good condition. Replace as required.

25, Duralon bushing

Check for excessive play on inner half shaft. Replace as required.

12, Nylon roller

Check for roundness of external diameter.

14, Shouldered bushing

Check for any wear. Replace as required.

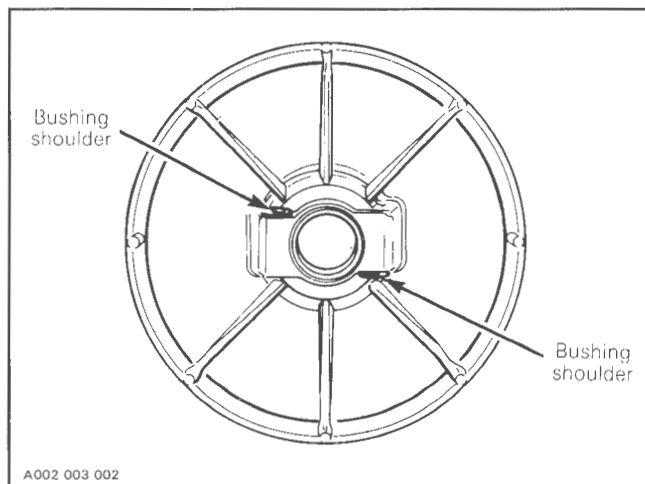
ASSEMBLY

21,22, Starter ring gear, self locking screw

Apply Loctite 271 on threads and head countersink then torque to 12 N•m (106 lbf•in).

14, Shouldered bushing

Shouldered pin bushings must be installed in outer half as per illustration.

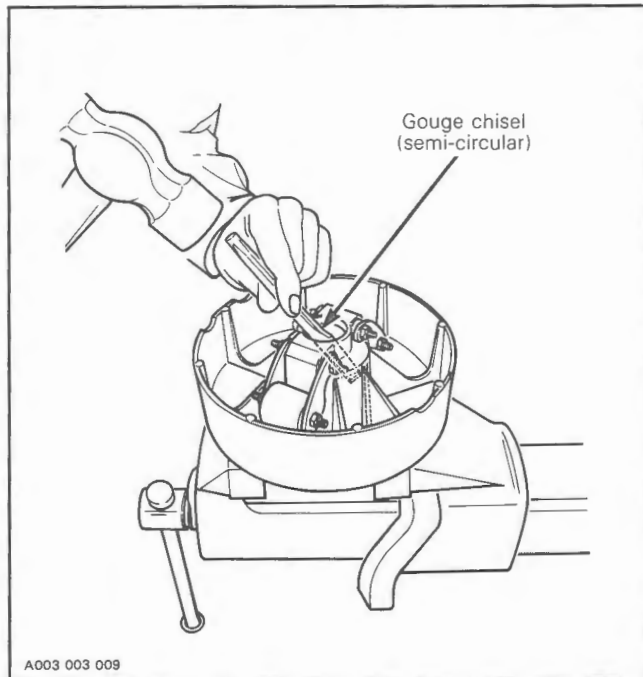


Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

5,20, Outer half & kahrlon bushing (large)

Using a gouge chisel (semi-circular) or a suitable pusher, remove the large bushing.



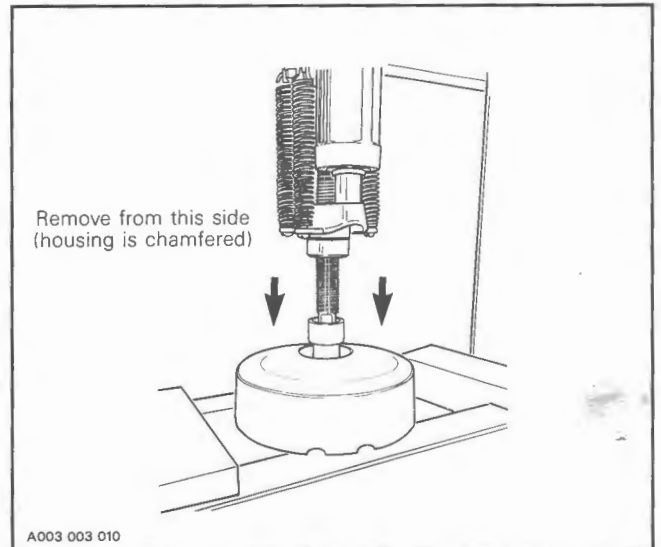
Clean outer half with ethyl alcohol.

▼ **CAUTION :** Bushing must be bonded with Loctite 609 to prevent displacement in outer half.

Apply Loctite 609 outside of bushing then insert until it comes flush with housing edge.

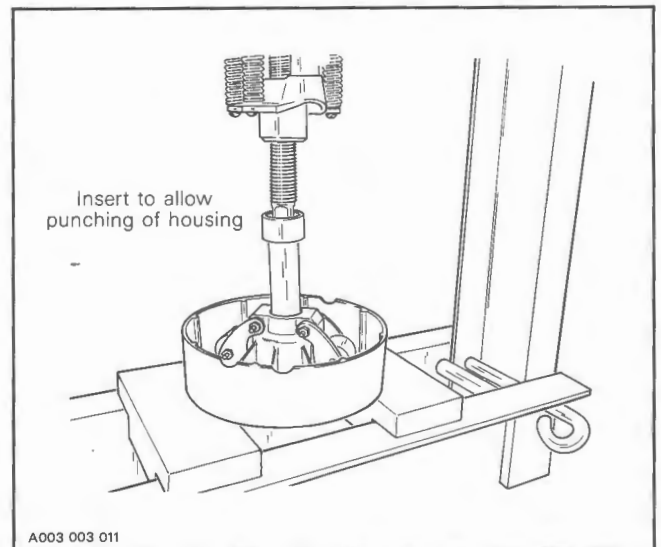
5,19, Outer half & kahrlon bushing (small)

Use a suitable pusher to remove the old bushing as shown. Clean outer half with ethyl alcohol.



▼ **CAUTION :** Bushing must be bonded with Loctite 609 then punched to prevent displacement in outer half.

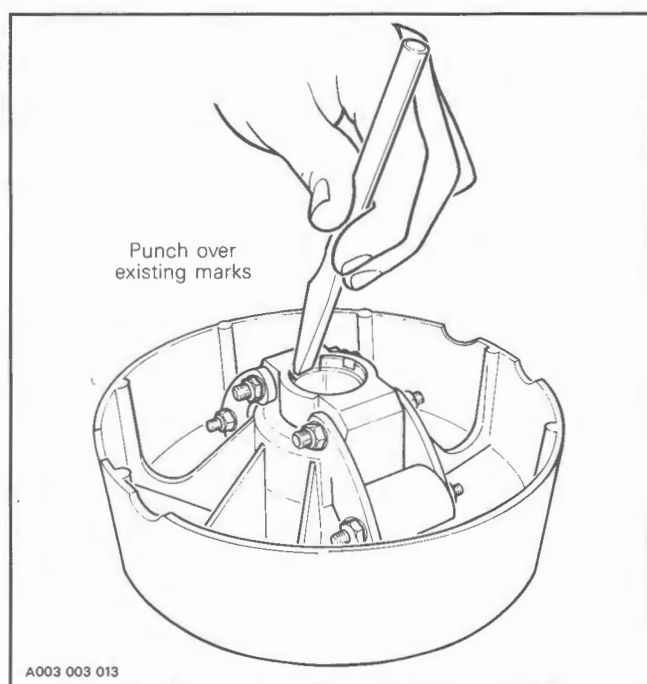
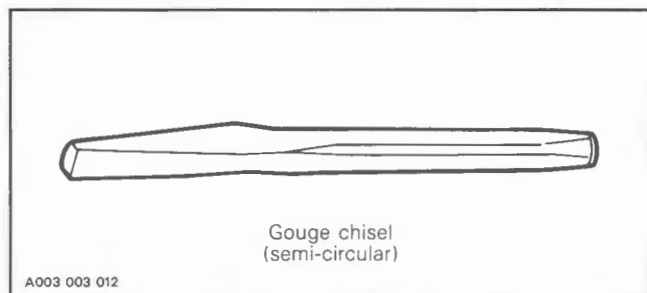
Apply Loctite 609 outside of bushing then insert into its housing (from the shown side) to allow punching of housing.



Using a gouge chisel (semi-circular) such as Snap-On part no PPC 12 A, punch over the existing marks.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)



10,11,12,13, Counterweight ass'y

Apply Loctite 242 or equivalent on nut threads then torque nuts to 13 N•m (115 lbf•in).

▼ **CAUTION:** Counterweights and rollers must move easily after installation.

9,25, Inner half & Duralon bushing

Bushing must rotate freely on inner half shaft.

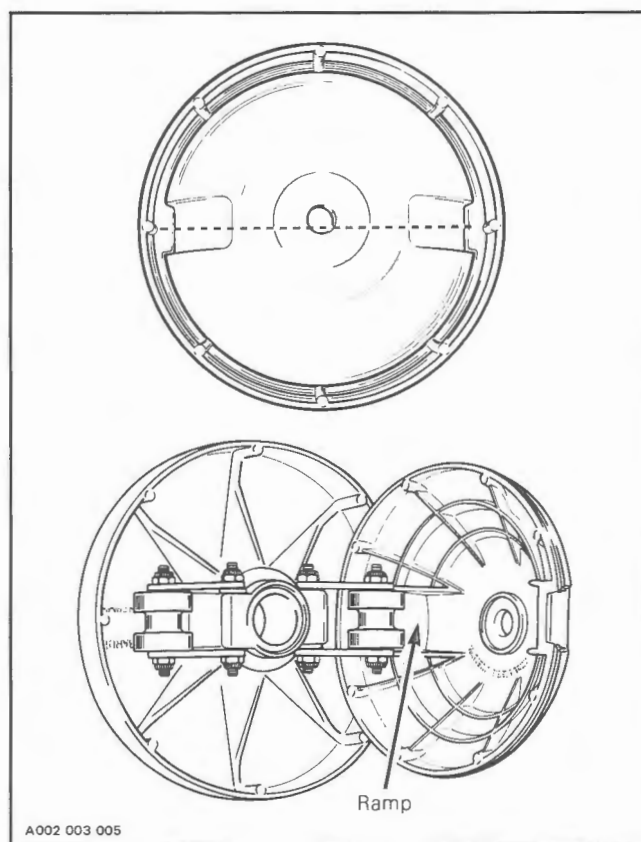
INSTALLATION

◆ **WARNING:** Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° **counter-clockwise** from TDC position.

Install governor cup correctly as per illustration making sure that the rollers are sliding on their ramp.

▼ **CAUTION:** Ensure rollers are in good condition. Replace as required.



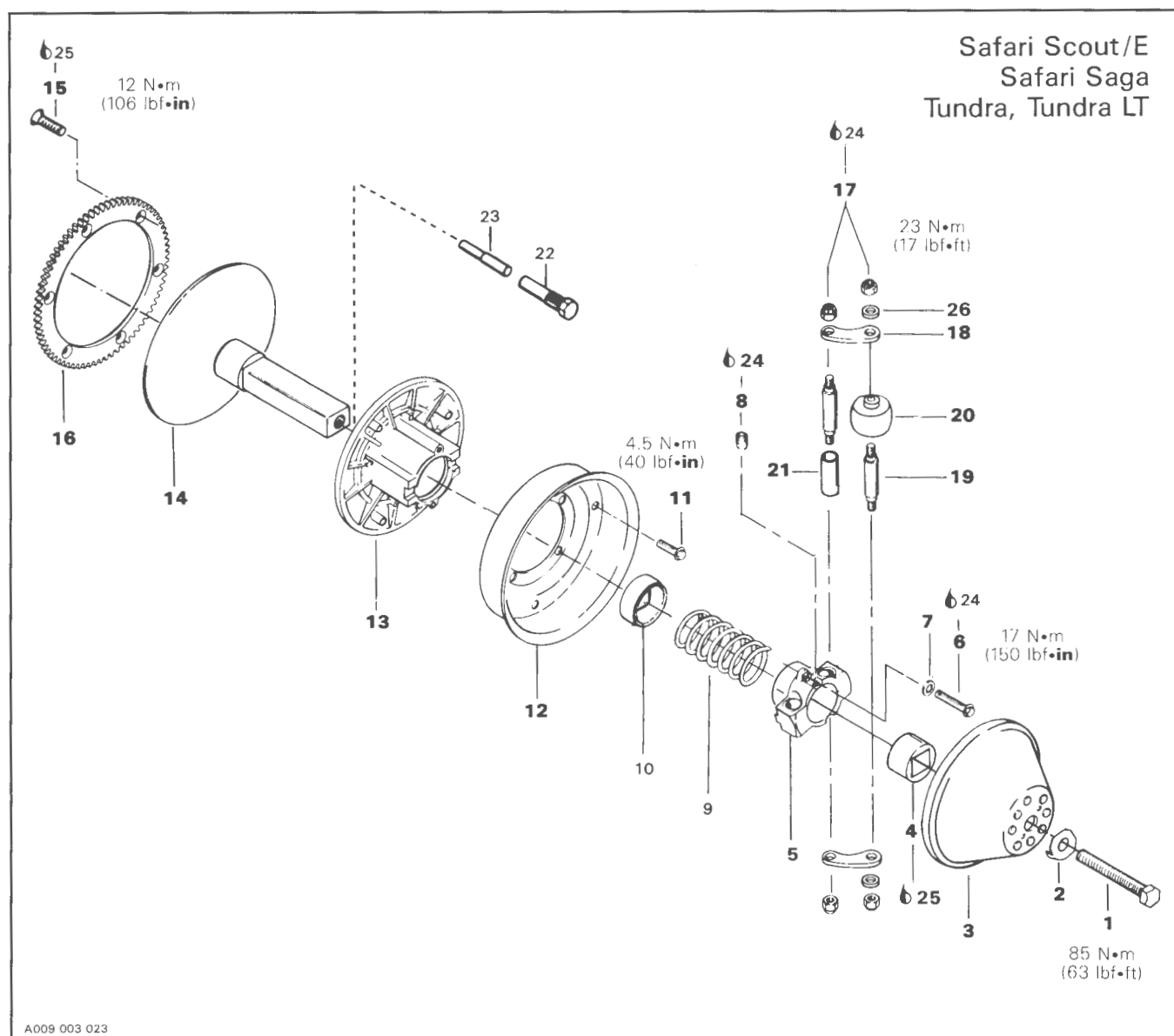
Position the cap screw and torque to 85 N•m (63 lbf•ft).

Install drive belt, pulley guard and close cab. Accelerate vehicle and bring at intermediate speed then at the same time apply brake. Repeat 2 or 3 times. Stop engine and retorque cap screw.

Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

ROLLER SQUARE SHAFT (2 ROLLERS)

LUBRICATION FREE



1. Cap screw
2. Lock tab
3. Governor cup
4. "Duralon" bushing
5. Hub plug
6. Cap screw
7. Internal tooth lock washer
8. Allen setscrew
9. Spring
10. Spring seat
11. Cap screw
12. Guard
13. Outer half

14. Inner half
15. Self locking screw (electric starting)
16. Starter gear (electric starting)
17. Nut
18. Counterweight
19. Shouldered pin
20. Roller
21. Bushing
22. Puller (P/N 529 0028 00)
23. Puller pin (P/N 529 0030 00)
24. Loctite 242
25. Loctite 271
26. Washer

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

GENERAL

Some drive pulley components (return spring, counterweight, calibration washer) can be changed to improve vehicle performance in high altitude regions. The "high altitude technical data booklet" (P/N 484 0552 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

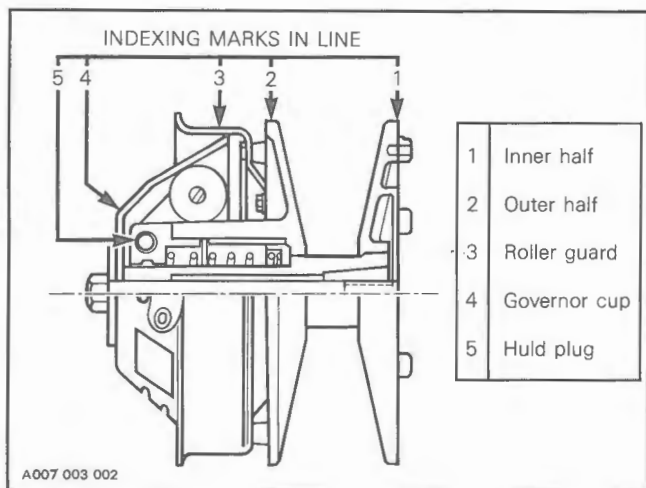
CAUTION : Such modifications should only be performed by experience mechanics since they can greatly affect vehicle performance.

WARNING : Drive pulley repairs that include any disassembly or assembly procedures must be performed by an authorized Bombardier dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

NOTE : Some pulley components are marked to insure proper assembly, there by maintaining optimum balancement.

If components lack such marks, marking should be done manually before disassembly, as per illustration.

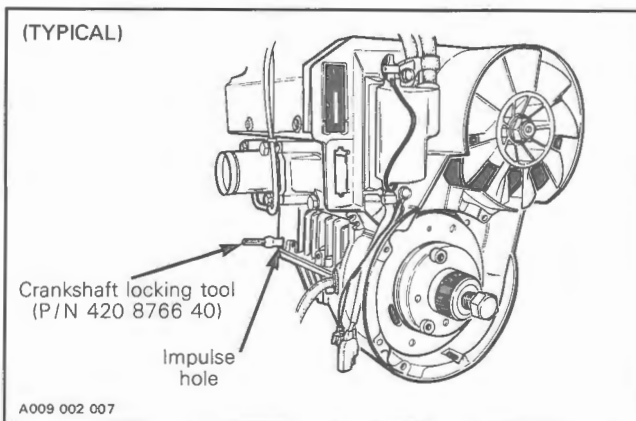


1,3,13, Screw, governor cup & outer half

In order to remove drive pulley retaining screw, lock the crankshaft by using one of the following method :

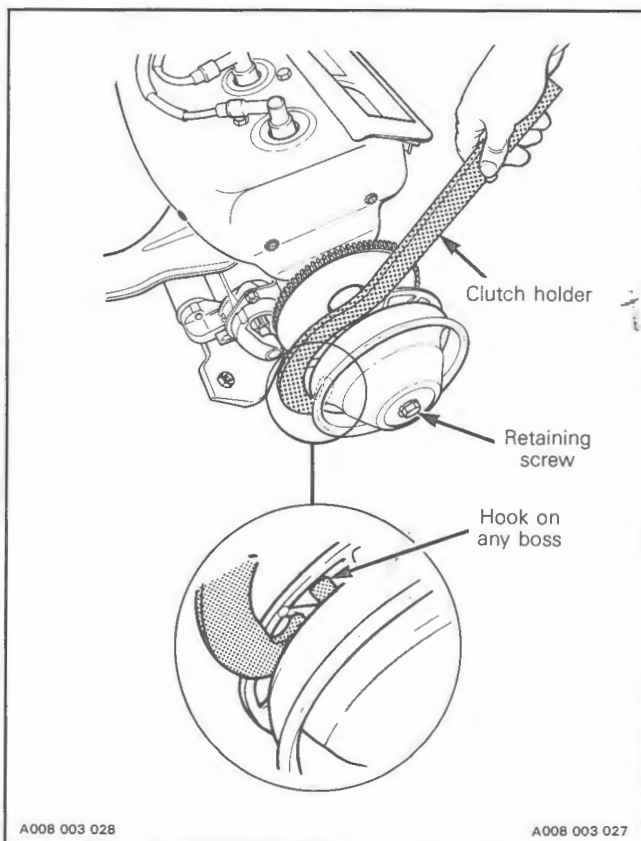
Insert the crankshaft locking tool (P/N 420 8766 40) into the impulse hole of the engine. Slowly rotate the crankshaft until it locks into position.

CAUTION : Do not use any type of pin other than the tool P/N 420 8766 40.



Or :

Use clutch holder (P/N 529 0064 00)



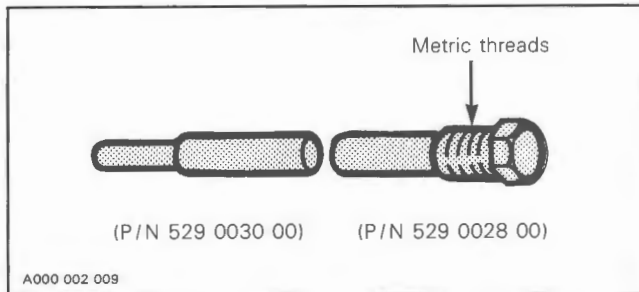
Remove the cap screw.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

14, Inner half

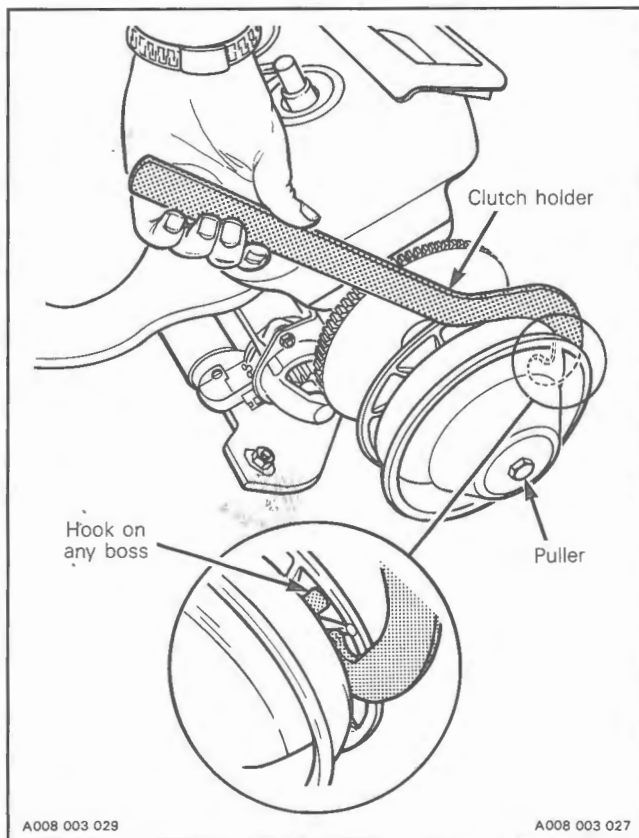
To remove inner half, use metric threads puller :



▼ **CAUTION :** Drive pulley has metric threads. Do not use imperial thread puller. Always tighten puller **by hand** to ensure that the drive pulley have the same type of threads (metric vs imperial) prior to fully tighten.

To block engine crankshaft :

Use crankshaft locking tool or clutch holder.



To remove inner half :

Install puller in pulley shaft then tighten, at the same time knock slightly on puller head to disengage pulley from engine crankshaft.

DISASSEMBLY

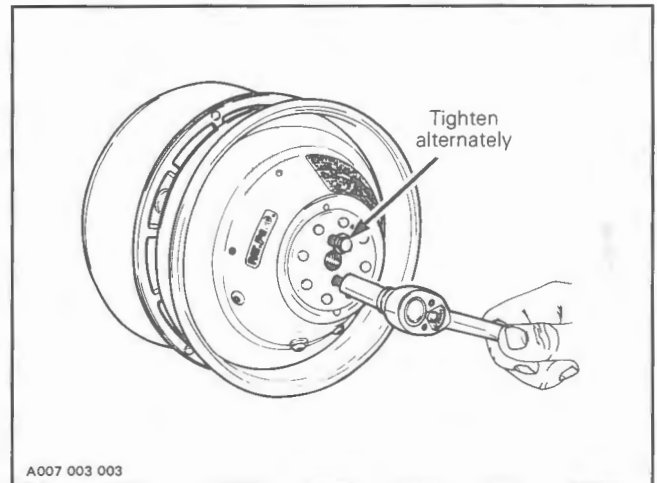
○ **NOTE :** Some screws of the drive pulley have Loctite on their threads, it is advisable to use a tool such as an impact to break the Loctite bond before attempting to unscrew.

3,13, Outer half assembly & governor cup

▼ **CAUTION :** Do not tap on the governor cup.

The governor cup can be easily removed by inserting two M6 x 1.0 x 25 mm screws into governor cup holes.

▼ **CAUTION :** Do not use imperial screws in governor cup having metric threads.



5,6,7, Hub plug

The hub plug is pushed by the clutch spring pressure. At disassembly, hold hub plug firmly against outer half until the two bolts are completely removed. This will prevent damage of the outer half threads.

4,5,8, "Duralon" bushing

To disassembly "Duralon" bushing from hub plug, remove set screw and use a suitable pusher and hammer or press.

▼ **CAUTION :** Do not disassemble counterweights unless replacement is necessary.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

CLEANING

13,14, Inner & outer half

Clean pulley faces and shaft with fine steel wool and dry cloth.

14, Inner half & crankshaft end

Parts must be at room temperature before cleaning.

Using a paper towel with acetone or Loctite Safety Solvent (# 75559), clean crankshaft tapered end and the taper inside the fixed half of the drive pulley.

◆ **WARNING :** This procedure must be performed in a well ventilated area.

▼ **CAUTION :** Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all harden oil deposits that have "baked" on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper #600.

▼ **CAUTION :** Do not use any other type of abrasive.

Re-clean mounting surfaces with paper towel and acetone or Loctite Safety solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

▼ **CAUTION :** Mounting surfaces must be free of any oil, cleaner or towel residue.

INSPECTION

Drive pulley should be inspected annually.

20, Roller

Check for roundness of external diameter.

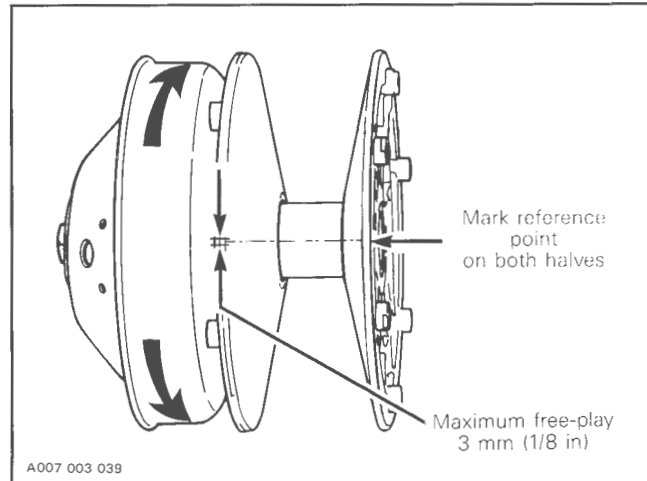
▼ **CAUTION :** Ensure rollers are in good condition. Replace as required.

21, Shouldered bushing

Check for wear.

4, "Duralon" bushing

Inspect "the Duralon" bushing condition by checking the free-play of the sliding half pulley. This is achieved by restraining the inner half and checking if the sliding half moves in the direction of the arrows more than 3 mm (1/8 in).



ASSEMBLY

15,16, Starter ring gear (electric starting)

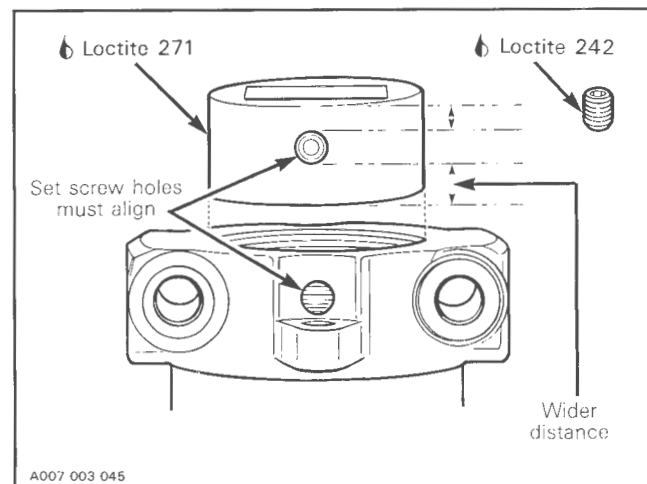
Apply Loctite 271 or equivalent on threads and head countersink then torque the screws to 12 N•m (106 lbf•in).

11,12, Screw & guard

Torque screws to 4.5 N•m (40 lbf•in).

4,5,8, "Duralon" bushing

To install "Duralon" bushing on hub plug, use suitable pusher and hammer or press. Install bushing as per illustration.



Apply Loctite 271 on "Duralon" bushing. Do not fill set screw holes with Loctite.

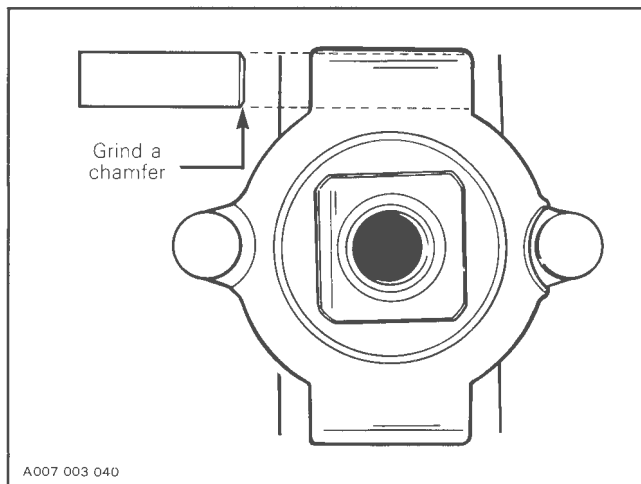
Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

Apply Loctite 242 on set screw threads, then tighten screw slightly until it rests against bottom of "Duralon" bushing hole.

5,21, Hub plug & bushing

Gently grind a small chamfer at one end to ease bushing assembly and push into hub plug as illustrated.



17,18,19,20,21,24,26, Counterweight ass'y & Loctite 242

Make sure to install washers as shown in exploded view. Apply Loctite 242 on threads and torque to 14 N•m (124 lbf•in).

▼ **CAUTION :** Counterweights and rollers must move easily after installation.

▼ **CAUTION :** Be careful when installing outer half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

5,6,7,13, Hub plug

Apply Loctite 242 on threads of bolts then torque to 17 N•m (150 lbf•in).

INSTALLATION

◆ **WARNING :** Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

▼ **CAUTION :** When installing drive pulley on engine, reference mark on inner half, outer half, roller guard and governor cup must be in line.

13,14, Inner & outer half

Lock crankshaft in position as explained in removal procedure.

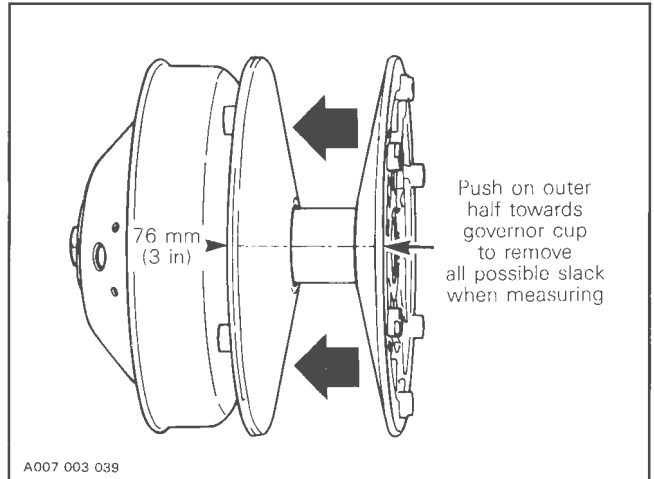
Install inner half on crankshaft extension then position outer half assembly on inner half square shaft.

▼ **CAUTION :** Be careful when installing outer half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

1,2,3, Governor cup

Install governor cup making sure that the shaft end rests in governor cup seating. Position cap screw with a new locking tab then torque to 85 N•m (63 lbf•ft). Do not bend lock tab yet.

▼ **CAUTION :** Incorrect seating of shaft end in governor cup can cause crankshaft bending. When pulley is completely assembled always measure distance of both pulley halves to make sure that the pulley is properly installed. Distance must be 76 mm (3 in).



2, Lock tab

Install drive belt, pulley guard and close cab. Accelerate vehicle and bring at intermediate speed then at the same time apply brake. Repeat 2 or 3 times. Stop engine and retorque cap screw. Bend one side of locking tab over a flat of cap screw head.

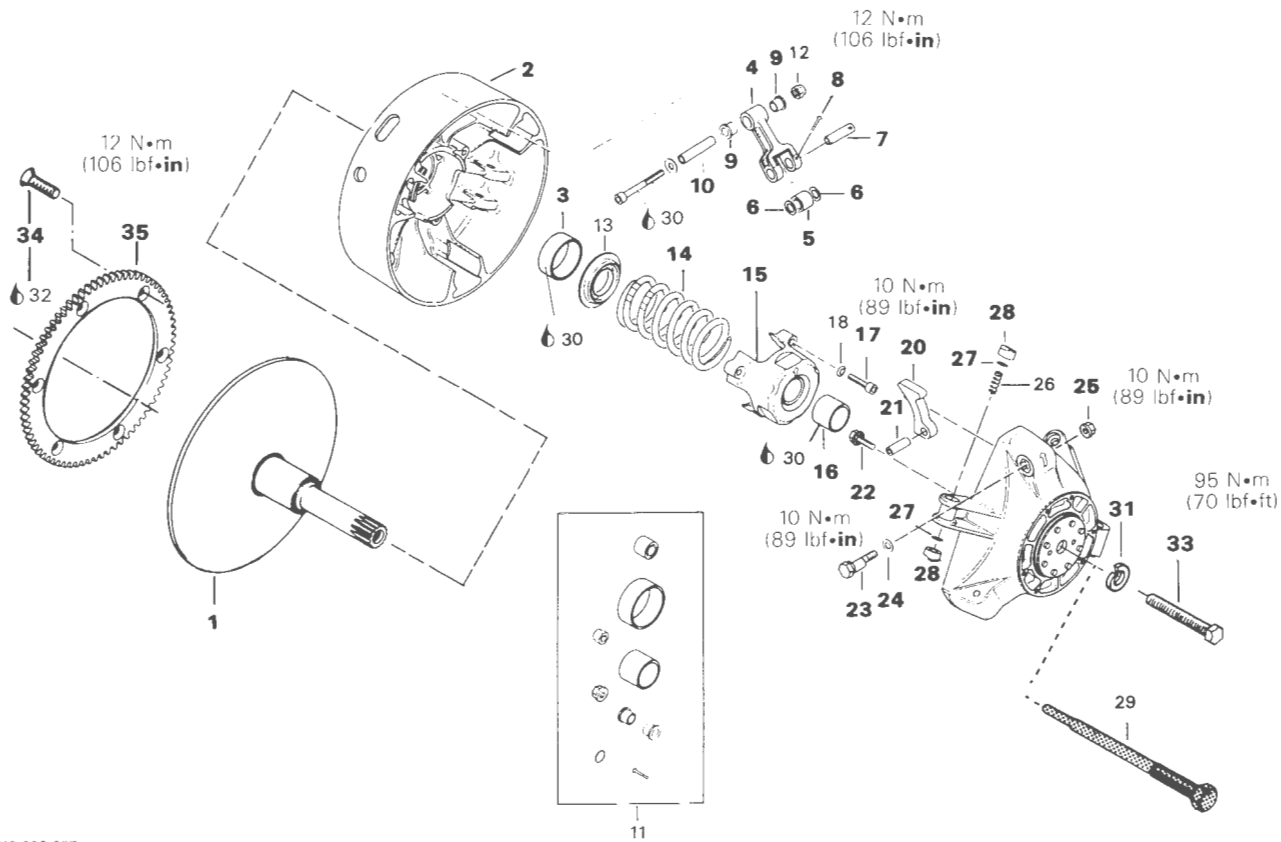
Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

TRA CLUTCH

LUBRICATION FREE

Alpine II 503
Safari Cheyenne
Safari Voyageur
Safari Escapade
Formula MX/MX LT/PLUS/PLUS LT/MACH I



1. Inner half ass'y
2. Outer half ass'y
3. Kahlron bushing (outer half)
4. Lever ass'y (3)
5. Roller ass'y (3)
6. Thrust washer 9,5/15/1,2 (6)
7. Pin (3)
8. Cotter pin 2,5 x 22 (3)
9. Flange bushing (6)
10. Fitting bolt ass'y (3)
11. Repair kit
12. Locking-nut M7 (3)
13. Spring seat
14. Spring
15. Spring cover ass'y
16. Kahlron bushing (spring cover)
17. Cylinder screw M6 x 40 (3)
18. Friction-washer (3)
19. Governor cup ass'y
20. Ramp (3)
21. Dowel tube 8 x 24 (3)
22. Hex.-locking screw M6 x 20 (6)
23. Calibration screw (3)
24. Washer 6,0/12/1 (3)
25. Locking-nut M6 (3)
26. Spring (slider shoe) (3)
27. O-ring (3)
28. Slider shoe (3)
29. Inner half puller
30. Loctite 609
31. Lock washer
32. Loctite 271 (red) (electric starting)
33. Cap screw
34. Screw (6) (electric starting)
35. Ring gear (electric starting)

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. The "high altitude technical data booklet" (P/N 484 0552 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

▼ **CAUTION** : Such modifications should only be performed by experience mechanics since they can greatly affect vehicle performance.

○ **NOTE** : TRA clutch stands for Total Range Adjustable clutch.

◆ **WARNING** : Drive pulley repairs that include any disassembly or assembly procedures must be performed by an authorized Bombardier dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

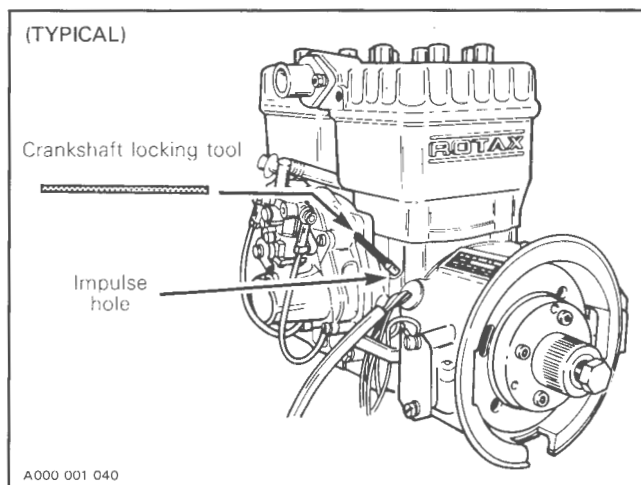
REMOVAL

31,33, Lock washer & cap screw

In order to remove drive pulley retaining screw, lock the crankshaft by using one of the following method:

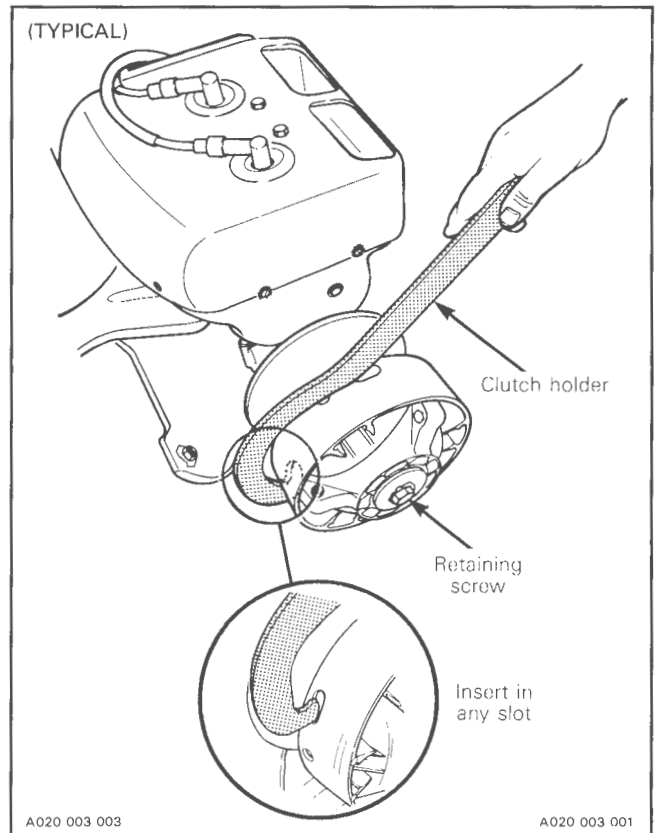
Insert the crankshaft locking tool (P/N 420 8766 40) into the impulse hole of the engine. Slowly rotate the crankshaft until it locks into position.

▼ **CAUTION** : Do not use any type of pin other than the tool P/N 420 8766 40.



Or:

Use clutch holder (P/N 529 0064 00)



On Safari Cheyenne and Formula models, remove access plug on left side of bottom pan.

○ **NOTE** : Outer half can be removed while inner half remains on crankshaft. In such case, on Safari Cheyenne and Formula models, slacken bottom pan front support nut to allow pulling bottom pan edge to ease removal.

◆ **WARNING** : Never use any type of impact wrench at drive pulley removal and installation.

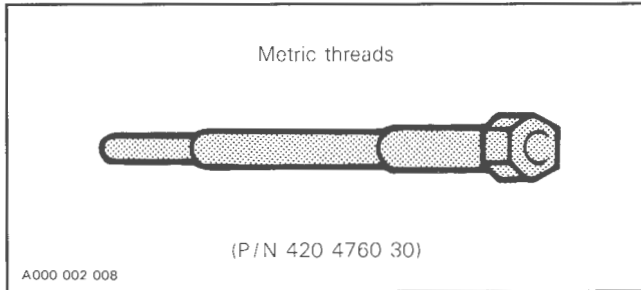
Remove retaining screw.

To remove drive pulley ass'y and/or inner half from engine, use puller P/N 420 4760 30.

▼ **CAUTION** : This pulley has metric threads. Do not use imperial threads puller. Always tighten puller **by hand** to ensure that the drive pulley have the same type of threads (metric vs imperial) prior to fully tighten.

Section 03 TRANSMISSION

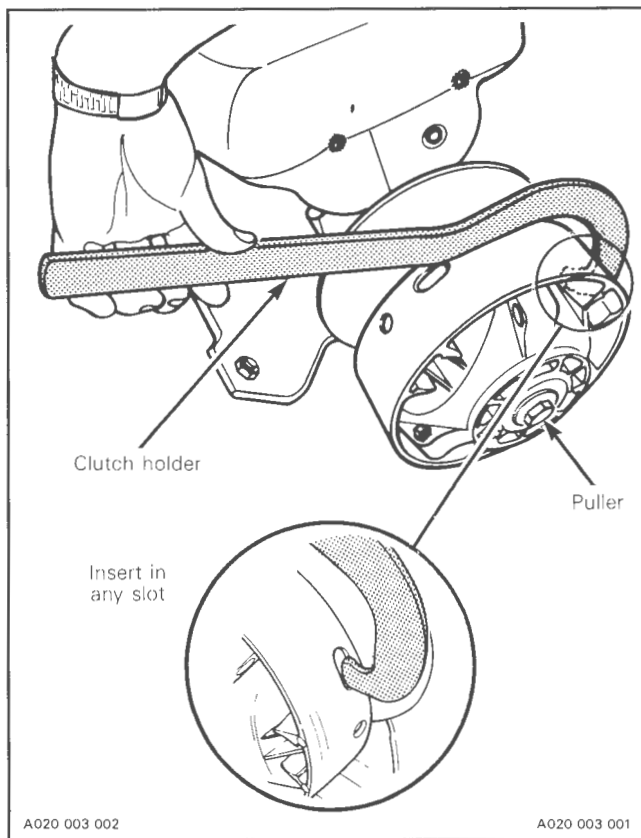
Sub-section 03 (DRIVE PULLEY)



NOTE : If necessary, slacken bottom pan front support nut to allow inserting puller into drive pulley ass'y.

To block crankshaft :

Use crankshaft locking tool or clutch holder.



To remove drive pulley ass'y

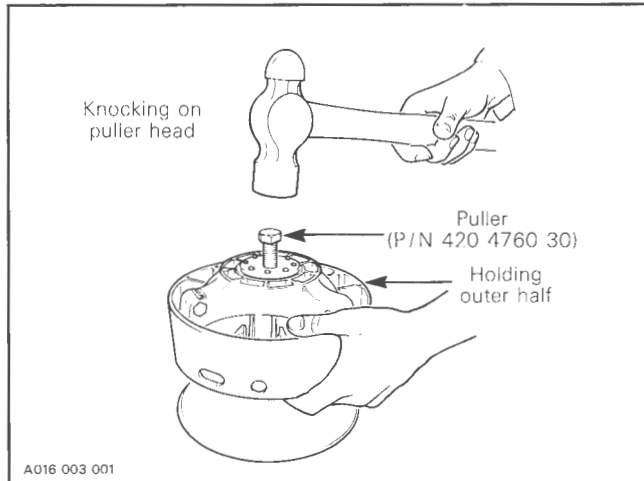
Install puller in pulley shaft then tighten, at the same time, knock slightly on puller head to disengage pulley from engine crankshaft.

NOTE : On Formula models ; free drive pulley ass'y from crankshaft, raise it so that side frame tube be inserted between pulley sheaves, then lean and pull drive pulley out.

1,2, Inner & outer half

CAUTION : Do not tap on governor cup.

Screw puller into inner half shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the outer half while knocking on puller head to disengage inner half.

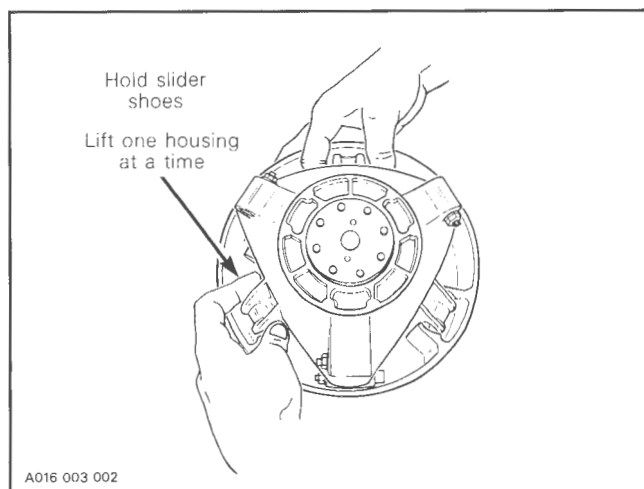


NOTE : No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

19,28, Governor cup, slider shoe

Carefully lift governor cup until slider shoes come at their highest position into guides.

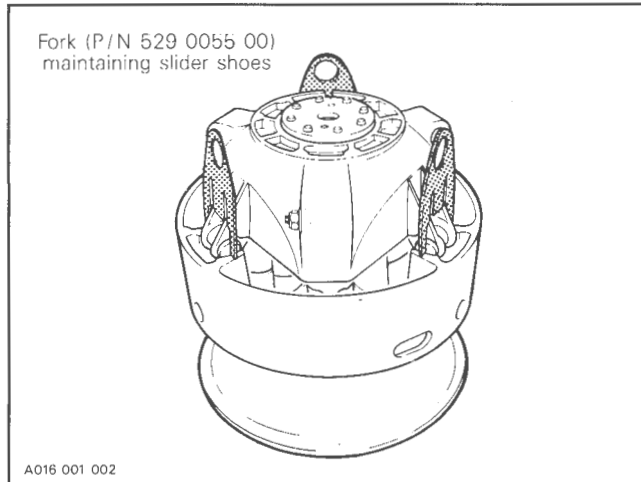
Hold a slider shoe set then carefully lift its housing and remove them. Proceed the same way for other housings lifting one at a time.



Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

○ **NOTE :** To ease disassembly, forks (P/N 529 0055 00) should be used to hold slider shoes prior to removing governor cup

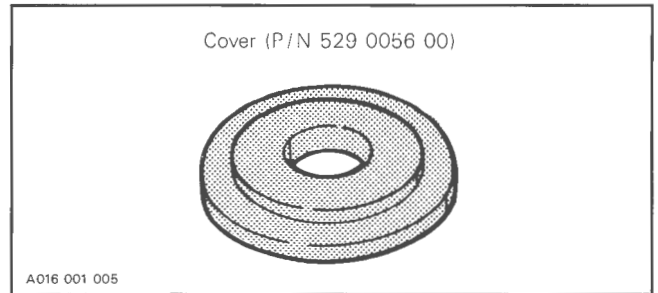
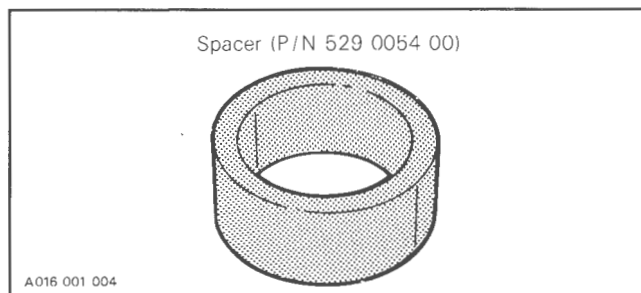
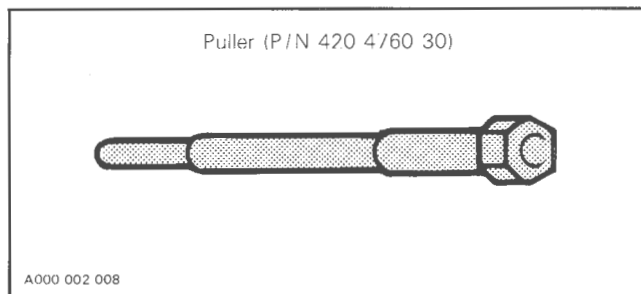


15, Spring cover ass'y

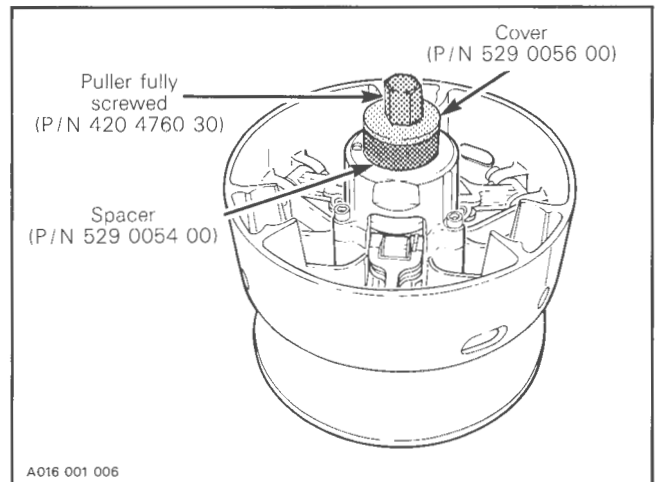
It is pushed by clutch spring pressure.

Assemble inner half with outer half and use the following tools to remove spring cover.

◆ **WARNING :** Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools:



Install tools as shown making sure puller is **fully** screwed. Remove 3 Allen screws retaining spring cover then unscrew puller while holding inner half to prevent from turning.



CLEANING

1,2, Inner & outer half

Clean pulley faces and shaft with fine steel wool and dry cloth.

1, Inner half & crankshaft end

Parts must be at room temperature before cleaning.

Using a paper towel with acetone or Loctite Safety Solvent (# 75559), clean crankshaft tapered end and the taper inside the inner half of the drive pulley, crankshaft threads and retaining screw threads.

◆ **WARNING :** This procedure must be performed in a well ventilated area.

▼ **CAUTION :** Avoid contact between cleaner and crankshaft seal because damage may occur.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

Remove all harden oil deposits that have "baked" on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper #600.

▼ **CAUTION :** Do not use any other type of abrasive.

Re-clean mounting surfaces with paper towel and acetone or Loctite Safety solvent.

Wipe off the mounting surfaces with a clean, dry paper towel.

▼ **CAUTION :** Mounting surfaces must be free of any oil, cleaner or towel residue.

INSPECTION

Drive pulley should be inspected annually.

5,6, Roller & thrust washer

Check roller for roundness of external diameter. Check thrust washer for thickness wear. Replace as required.

▼ **CAUTION :** Ensure rollers are in good condition. Replace as required.

9,10, Flanged bushing & fitting bolt ass'y

Check for wear, replace as required. When installing old style flanged bushing (made of black plastic), use a size "O" (letter) drill bit to ream inside diameter.

27,28, O-ring, slider shoe

Check if o-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

1,19, Inner half & governor cup

Inspect splines and free play between both parts. Replace if required.

3,16, Outer half & spring cover kahrlon bushing

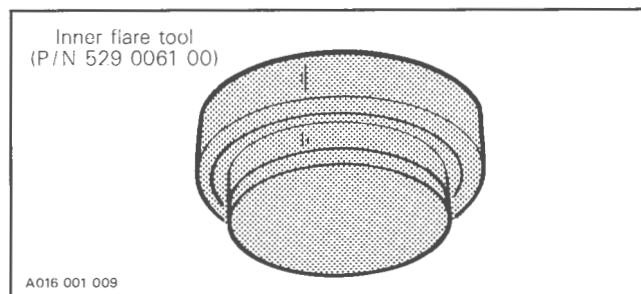
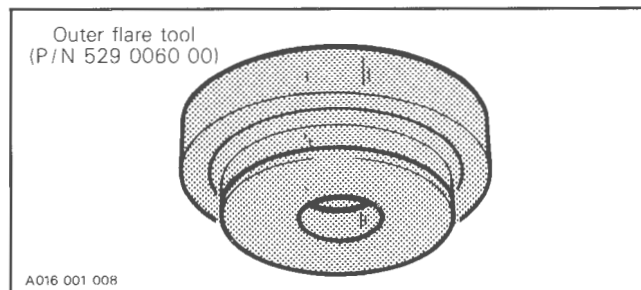
Visually inspect kahrlon coating. Replace if worn.

Outer half bushing replacement

Use a suitable pusher to remove the old bushing. Clean outer half with ethyl alcohol.

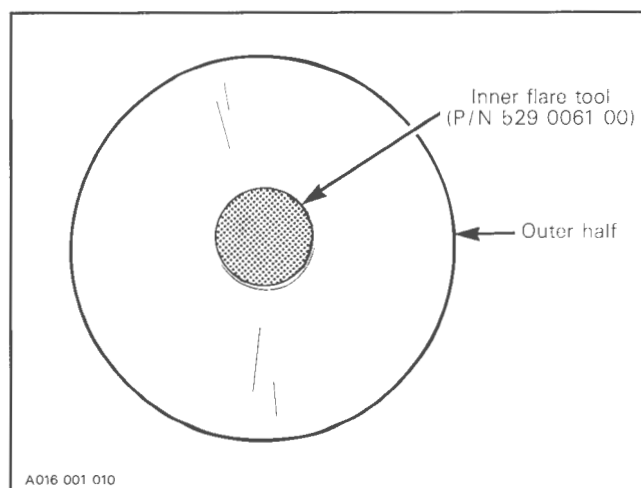
▼ **CAUTION :** Bushing must be bonded with Loctite 609 then flared to prevent displacement in outer half.

To flare bushing, use following tools :



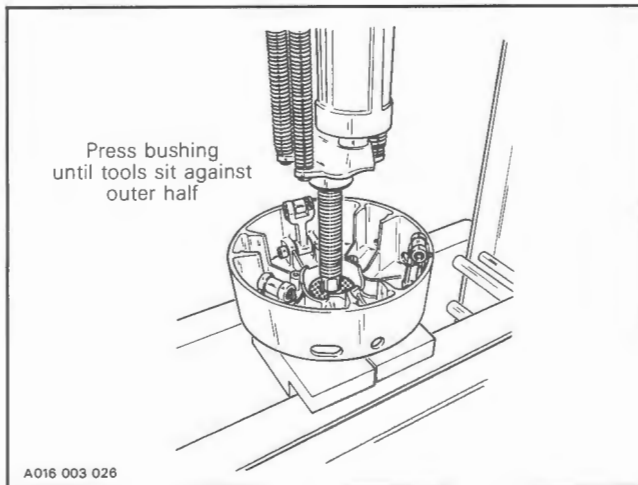
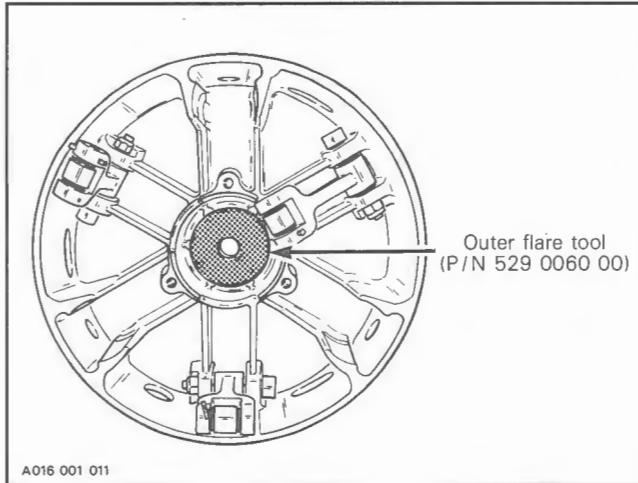
Apply Loctite 609 outside of bushing then insert into its housing making sure there is the same distance both sides.

Place flaring tools each side of outer half then use a press to flare the bushing.

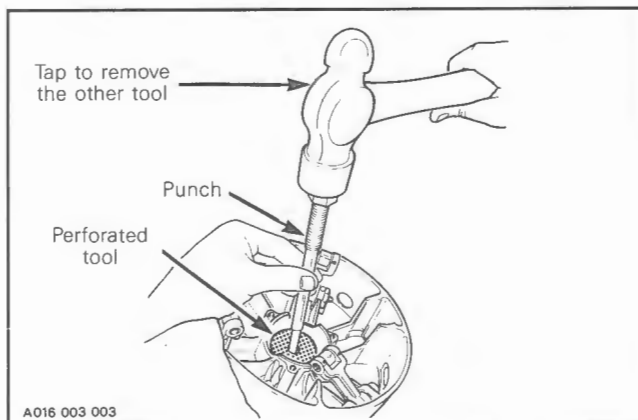


Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

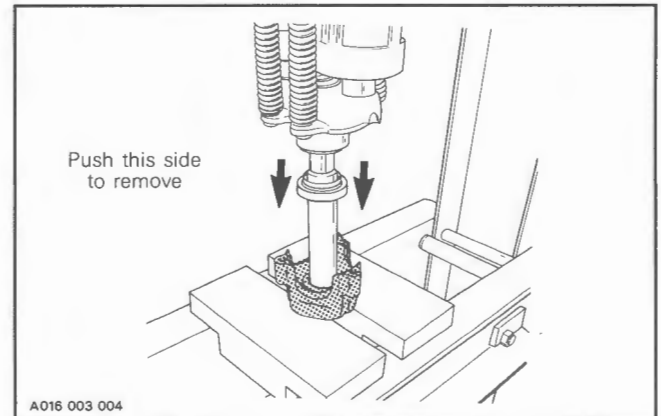


To remove tools from outer half, insert a suitable punch through the perfored tool and tap to release the other thus giving access to remove perfored one.



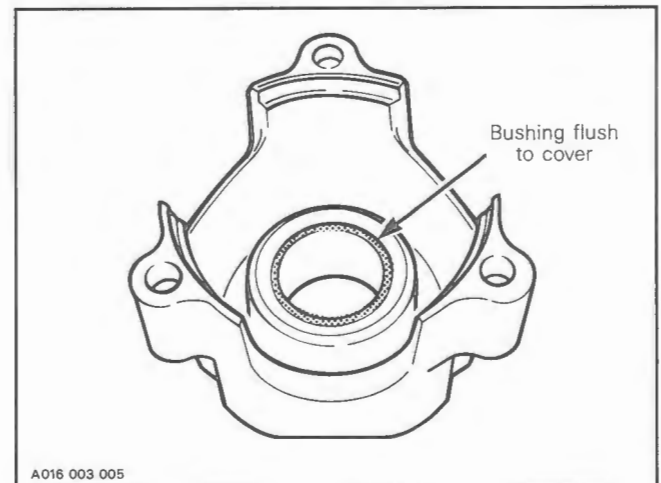
Spring cover bushing replacement

Use a suitable pusher to remove old bushing. Push bushing as shown due to the flared side.



CAUTION : Bushing must be bonded with Loctite 609 then flared to prevent displacement in spring cover.

Apply Loctite 609 outside of bushing then insert flush to spring cover (spring side).



Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

ASSEMBLY

○ NOTE : This drive pulley is lubrication free. Do not lubricate any component.

34,35, Screw & ring gear

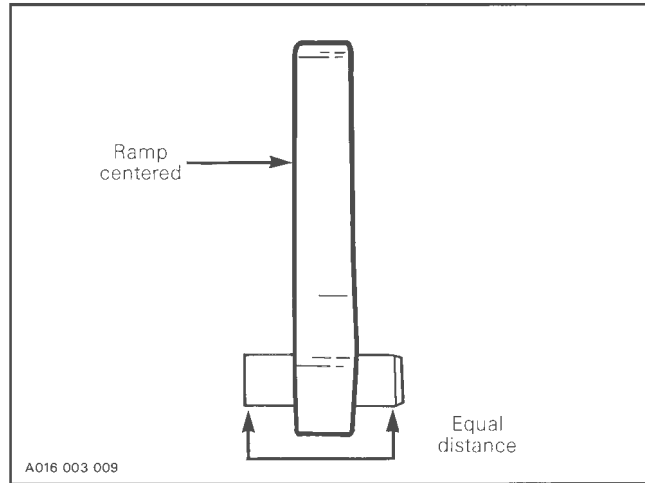
Apply Loctite 271 on threads and head countersink then torque to 12 N•m (106 lbf•in)

23,24,25, Calibration screw, washer & locking nut

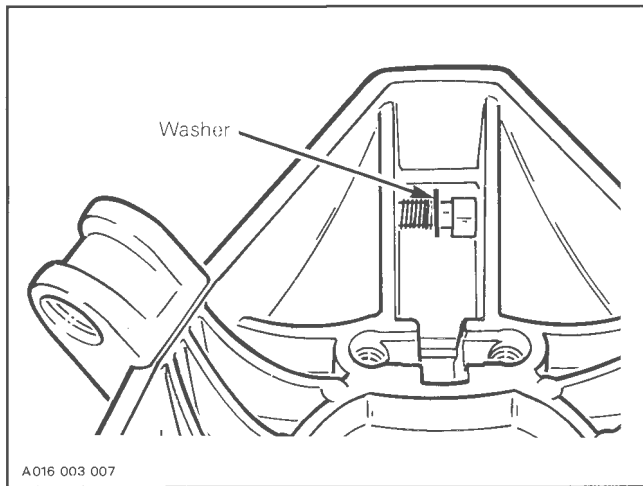
When installing calibration screw, make sure to install washer as shown.

7, Pin

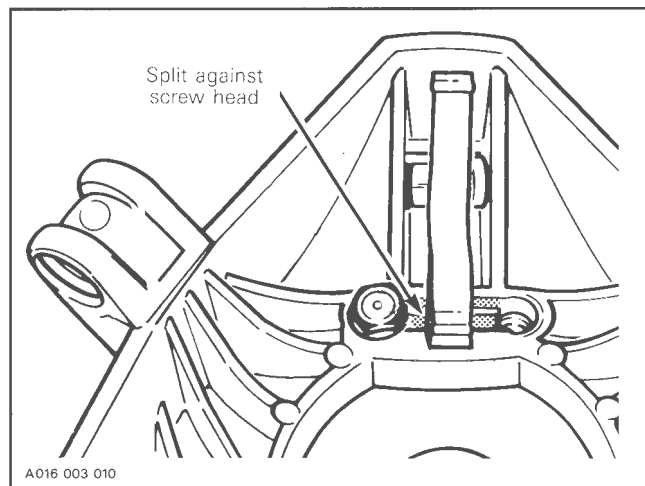
Always use the same type of pin as originally installed when servicing. Different types have different weights for calibration purpose.



▼ CAUTION : Dowel tube split must be installed against screw head to block properly and prevent from turning.



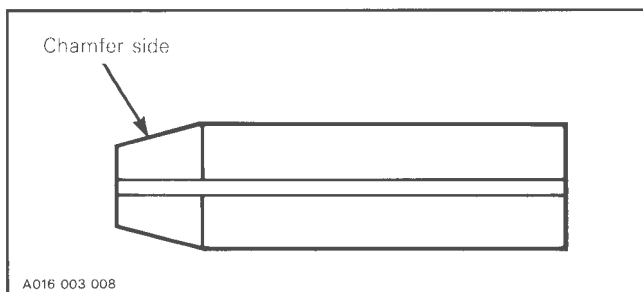
Torque locking nut to 10 N•m (89 lbf•in).



Torque screws to 10 N•m (89 lbf•in)

20,21,22, Ramp, dowel tube & screw

Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.

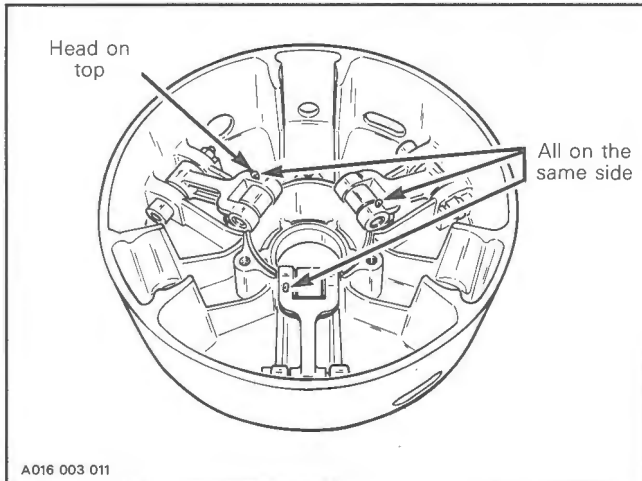


Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

4,8,10,12, Lever ass'y, cotter pin, screw & nut

Always install lever assemblies so that cotter pins are at the shown side. Besides install cotter pin head on top when lever is sat at bottom of outer half. Bend cotter pin ends to sit perfectly against lever.



▼ **CAUTION :** Lever assemblies must be installed so that cotter pins are on the same side.

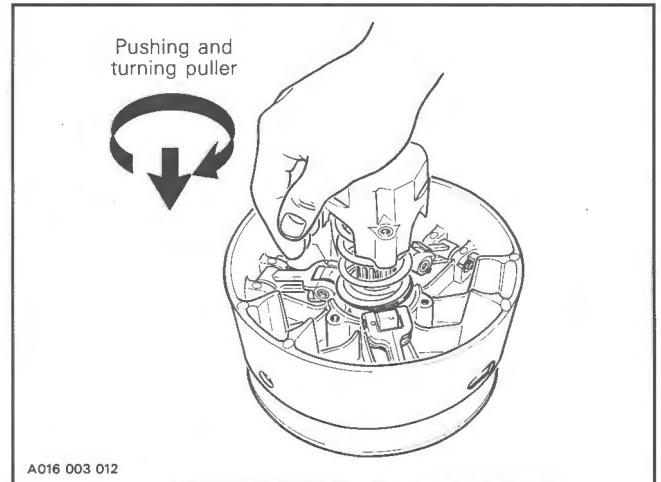
Torque nuts to 12 N•m (106 lbf•in).

▼ **CAUTION :** Lever ass'y and rollers must move easily after installation.

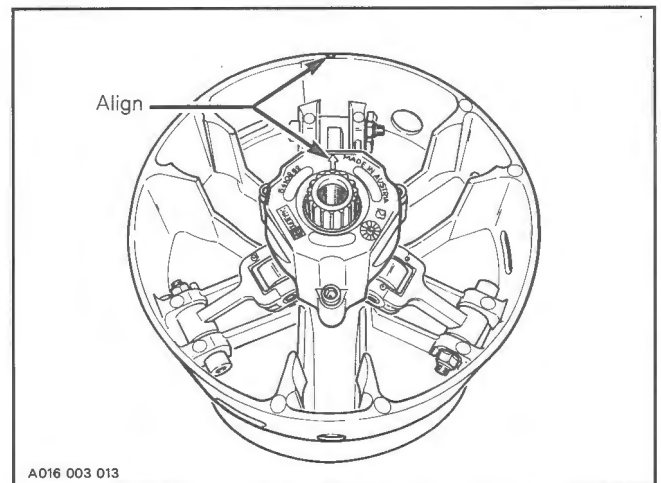
2,14,15, Outer half, spring, spring cover & screw

To install spring cover, use same special tools used for removal.

Assemble inner and outer half. Install special tools then manually push on puller while turning to engage threads into inner half shaft.



Fully screw puller while holding inner half. Lift outer half against spring cover and align spring cover arrow with outer half mark.



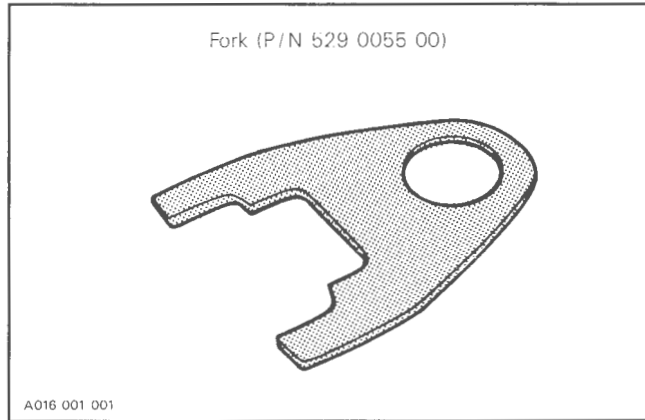
Install and torque screws to 10 N•m (89 lbf•in).

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

2,19,28, Outer half, governor cup & slider shoe

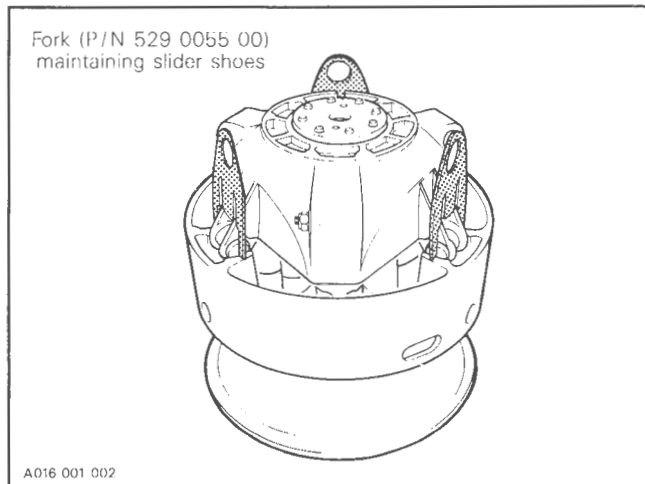
To install governor cup, use following tool :



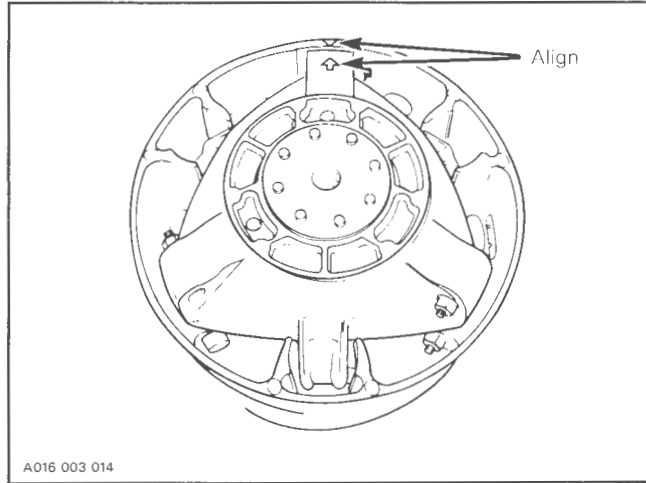
Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

▼ **CAUTION :** Make sure O-rings are installed on slider shoes and their grooves are positioned vertically.

Install fork (P/N 529 0055 00) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



Make sure to align governor cup arrow with outer half mark.



Carefully slide governor cup into outer half.

Remove forks and push governor cup so that its splines engage with inner half shaft splines.

▼ **CAUTION :** Make sure splines of both parts are fully engaged.

INSTALLATION

◆ **WARNING :** Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.

◆ **WARNING :** Never use any type of impact wrench at drive pulley removal and installation.

Drive pulley ass'y

The installation procedure must be strictly adhered to as follows.

Lock crankshaft in position as explained in removal procedure.

Install drive pulley on crankshaft extension.

Install lock washer and screw.

◆ **WARNING :** Never substitute lock washer and/or screw with "jobber" ones. Always use Bombardier genuine parts for this particular case.

Torque screw to 105 N•m (77 lbf•ft).

Install drive belt and pulley guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

◆ **WARNING :** Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at intermediate speed and apply the brake, repeat five times.

Reduce the screw torque to 85 N•m (63 lbf•ft) then, retorque to 95 N•m (70 lbf•ft).

◆ **WARNING :** After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

DRIVE PULLEY ADJUSTMENT

A drive pulley is factory calibrated to transmit engine maximum power at predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

This adjustable drive pulley allows setting maximum engine RPM in vehicle to maintain the maximum power.

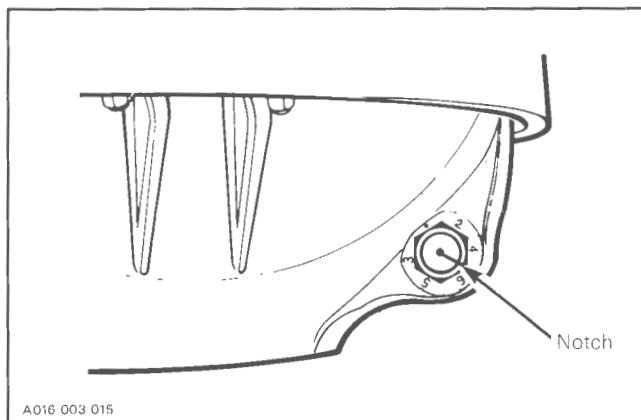
Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches with the maximum horsepower RPM given in Bombardier snowmobile specifications.

○ **NOTE :** The adjustment has an effect on high RPM only.

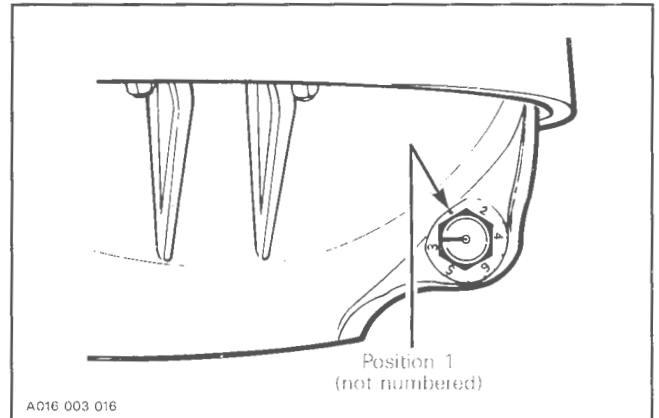
To adjust, modify ramp end position by turning calibration screws.

19,23,25, Governor cup, calibration screw & locking nut

Calibration screw has a notch on top of its head.



Governor cup has six positions numbered 2 to 6. Note that in position 1 the number is substituted by a dot (due to its location on casting).



Each number modify maximum engine RPM by about 200 RPM.

Number 3 represent the factory set-up on Alpine II 503, Formula models and Safari Cheyenne while it is number 5 on Safari Voyageur and Safari Escapade.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

EXAMPLE :

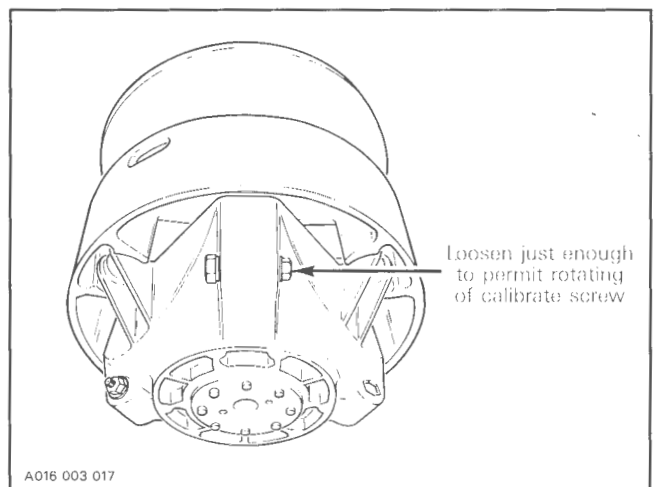
Calibration screw is set at position 4 and is changed to position 6. So engine RPM is increased of 400 RPM.

To adjust :

Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•in).

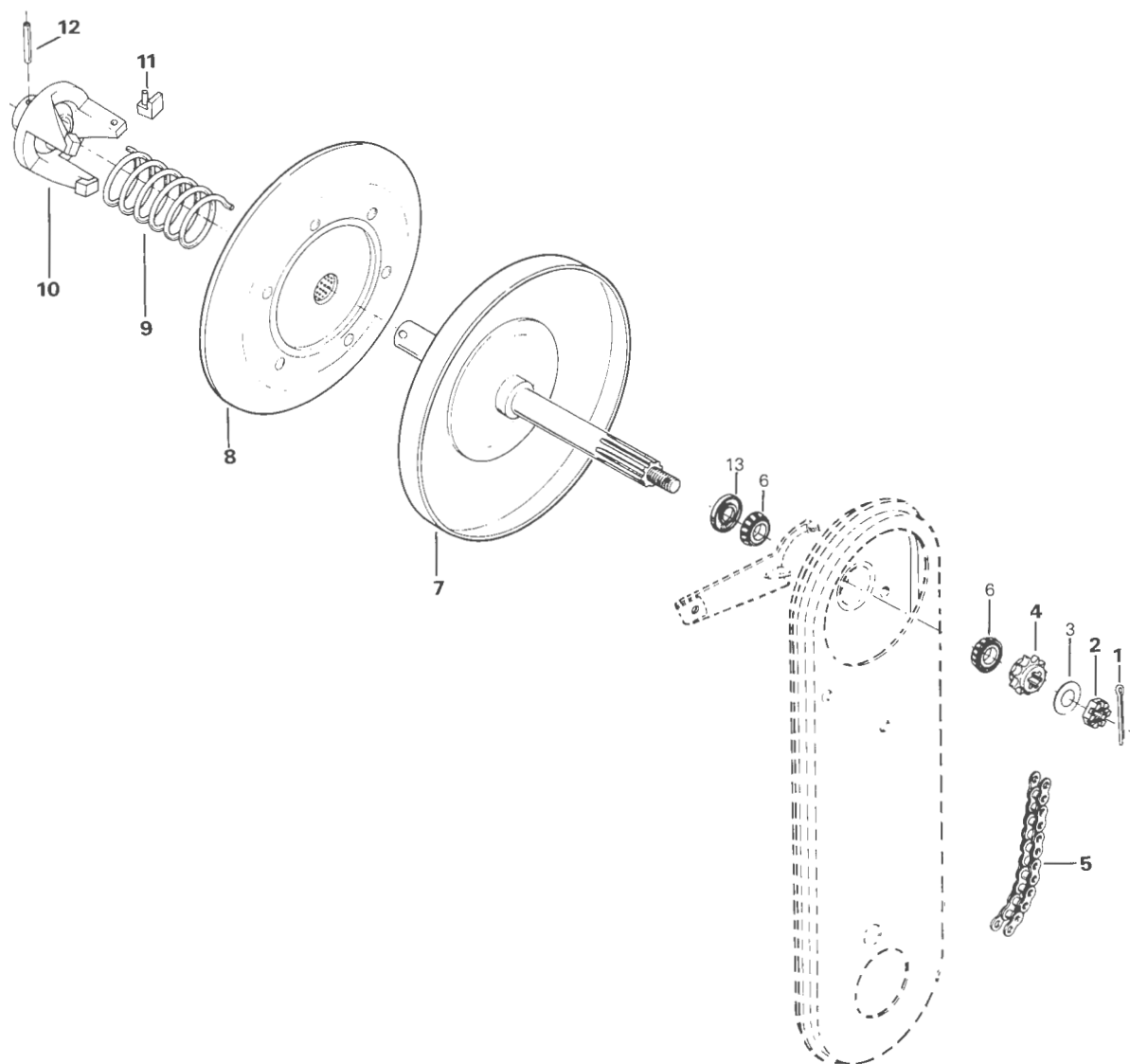
▼ **CAUTION :** Do not completely remove calibration screw so its washer inside will fall.

▼ **CAUTION :** Always adjust all three calibration screws and make sure they are all set at the same number.



DRIVEN PULLEY

Elan



A002 003 037

- 1. Cotter pin
- 2. Castellated nut
- 3. Spring washer
- 4. Sprocket
- 5. Driving chain
- 6. Bearing cone
- 7. Fixed half

- 8. Sliding half
- 9. Release spring
- 10. Outer cam
- 11. Cam slider shoe (3)
- 12. Roll pin
- 13. Oil seal

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

○ **NOTE :** Driven pulley components (cam, shoes, spring etc) except fixed half can be serviced without removing the whole driven pulley from chaincase. Simply remove roll pin as explained in disassembly portion.

REMOVAL

Pulley guard & drive belt

Remove.

Steering column bolts

Slacken.

5, Drive chain

Release tension.

1,2, Cotter pin & castellated nut

Remove from fixed half shaft.

5, Drive chain

Attach to frame to prevent from falling inside chaincase.

Driven pulley assembly

Pull toward engine and remove from vehicle.

DISASSEMBLY

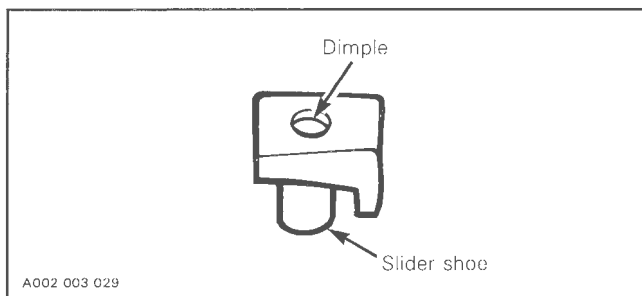
10,12, Roll pin & outer cam

Use a pin punch to remove roll pin from the outer cam.

INSPECTION

11, Cam slider shoe

Slider shoe must be replaced when dimple in the working surface is barely visible or worn to less than 3/4 of its original depth. See illustration.



ASSEMBLY

11, Cam slider shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

7, Fixed half shaft

Thoroughly clean the fixed half shaft.

Apply a light film of low-temperature grease (P/N 413 7061 00) on the shaft. Always wipe off surplus.

○ **NOTE :** Activate the sliding half several times to distribute lubricant over full length of shaft. Be careful that lubricant does not get on inner halves of pulley.

Assemble driven pulley components by reversing disassembly procedure.

INSTALLATION

Install a new upper chaincase oil seal.

Reinstall the driven pulley on vehicle by reversing the removal procedure.

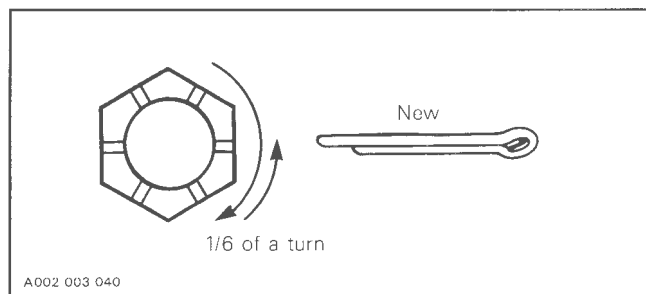
4,5, Sprocket & chain

With drive chain tension released, hold upper sprocket and chain in position then insert assembled driven pulley shaft through chaincase and sprocket.

2, Castellated nut

Install spring washer and castellated nut.

Tighten castellated nut fully then back off nut 1/6 of a turn.



▼ **CAUTION :** It is important that nut is backed off or damage may occur due to a burnt or seized bearing.

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

1, Cotter pin

Lock assembly in position with a new cotter pin.

5, Drive chain

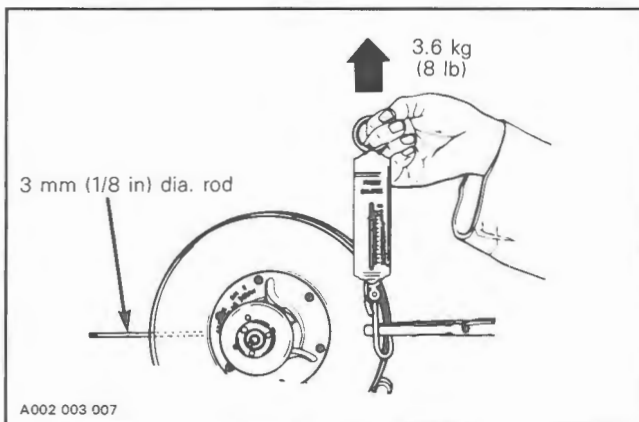
Check chain tension.

ADJUSTMENT

9, Release spring

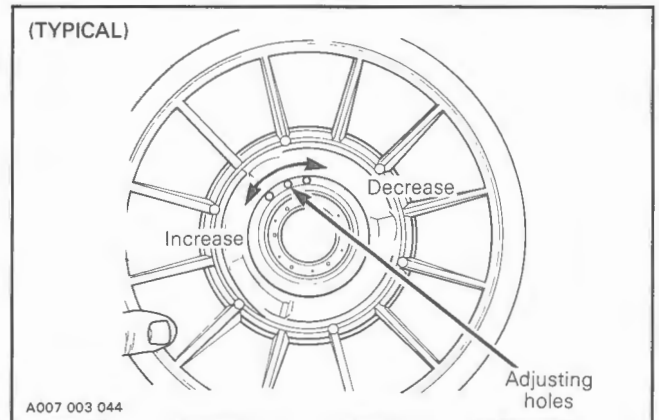
Spring torsional pre-load

In order to measure driven pulley spring torsional preload, pulley halves must be separated. To do this, insert length of 3 mm (1/8 in) dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle.



Spring pre-load should be 3.6 kg (8 lb).

To correct spring pre-load, relocate spring end in sliding pulley half, moving it clockwise to decrease the pre-load or counterclockwise to increase it.



NOTE : Always recheck torsional spring pre-load after adjusting.

Chaincase

Check oil level and refill as required. Refer to section 03-07, "Chaincase".

Pulley alignment & drive belt deflection

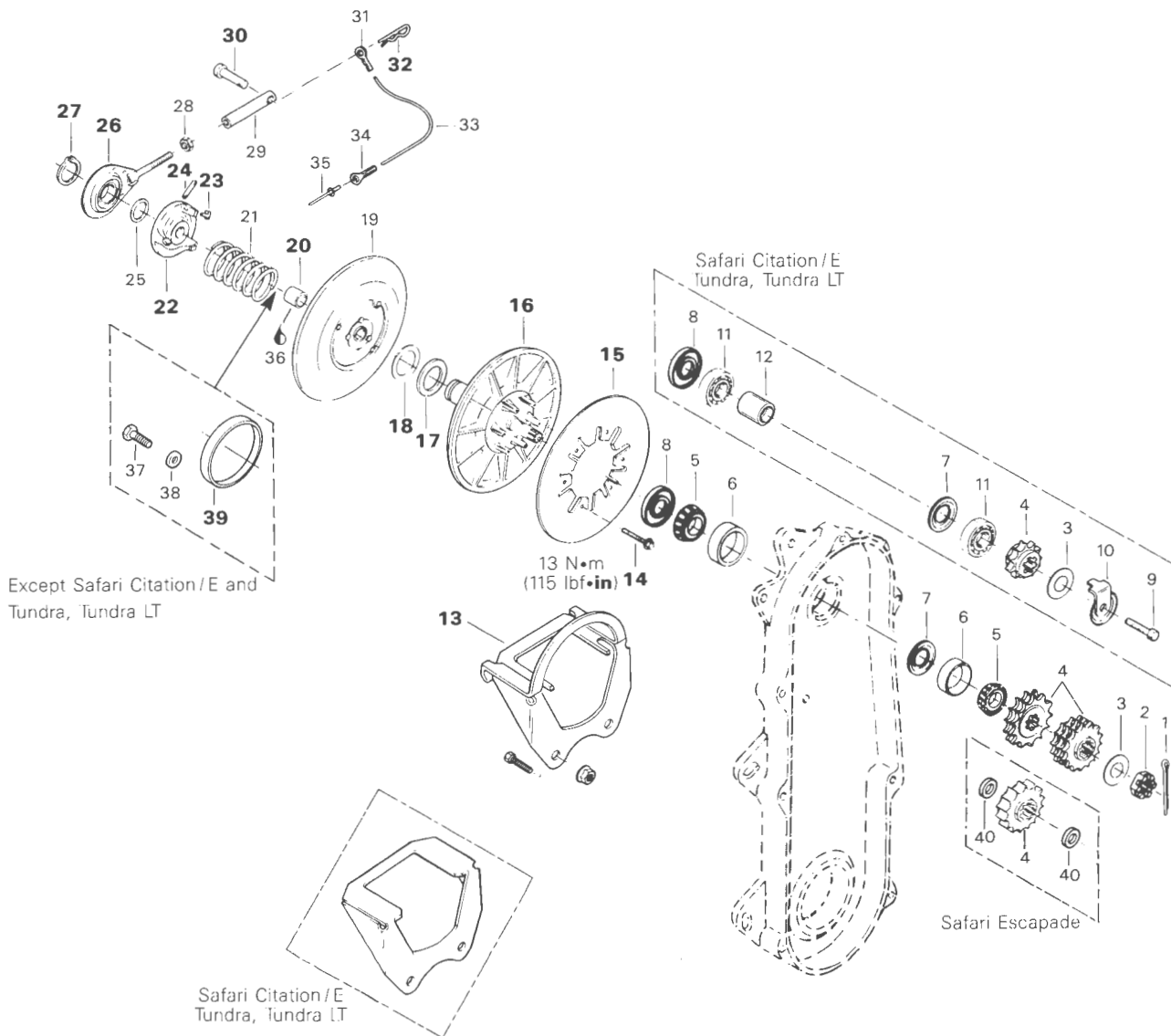
Refer to section 03-05, "Pulley alignment" and section 03-02, "Drive belt" to perform adjustments.

CAUTION : Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

Safari Citation/E
Safari Scout/E
Safari Saga
Safari Voyageur
Safari Escapade
Tundra, Tundra LT



Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

1. Cotter pin
(Except Safari Citation/E and Tundra, Tundra LT)
2. Castellated nut
(Except Safari Citation/E and Tundra, Tundra LT)
3. Washer
4. Sprocket
5. Bearing cone
(Except Safari Citation/E and Tundra, Tundra LT)
6. Bearing cup
(Except Safari Citation/E and Tundra, Tundra LT)
7. Oil deflector
8. Oil seal
9. Cap screw M6 x 20
(Safari Citation /E, Tundra, Tundra LT only)
10. Lock tab
(Safari Citation/E, Tundra, Tundra LT only)
11. Ball bearing (2)
(Safari Citation/E, Tundra, Tundra LT only)
12. Spacer
(Safari Citation/E, Tundra, Tundra LT only)
13. Brake ass'y
14. Tapite screw M6 x 16 (6)
15. Brake disc
16. Fixed half

17. Shim
18. Shim
19. Sliding half
20. Sliding half bushing
21. Spring
22. Outer cam
23. Slider shoe (3)
24. Roll pin
25. Spacer
26. Support
27. Snap ring
28. Nut
29. Threaded attachment
30. Clevis pin
31. Ring terminal
32. Hair pin
33. Wire
34. Ring terminal
35. Rivet
36. Loctite 609
37. Screw (3) (Except Safari Citation/E and Tundra, Tundra LT)
38. Washer (3) (Except Safari Citation/E and Tundra, Tundra LT)
39. Bushing (Except Safari Citation/E and Tundra, Tundra LT)
40. Spacer (2) (Safari Escapade only)

○ **NOTE :** Driven pulley components (support, cam, shoes etc) can be serviced without removing the whole driven pulley from chaincase. Refer to the following procedures but neither remove brake caliper nor open chaincase for those cases.

REMOVAL

To remove driven pulley from chaincase, follow this procedure.

Pulley guard & drive belt

Remove from vehicle.

13, Brake ass'y

Remove from chaincase with brake support.

26,30,32, Countershaft support, clevis pin & hair pin

To free countershaft support from support clamp, remove hair pin and clevis pin.

Chaincase

○ **NOTE :** On electric starting, remove battery and its rack.

Open chaincase and drain oil. Unlock and remove upper sprocket.

The following is required to have enough space to remove driven pulley from chaincase :

Safari Citation/E, Tundra, Tundra LT only : Slacken upper retaining screws of steering column.

Disconnect carburetor boots from intake manifold and air intake silencer. Slacken mag side carburetor boots on Safari Voyageur and Safari Escapade.

Disconnect impulse hose from engine, except on Safari Scout/E and Safari Saga.

Disconnect oil injection supply line at injection pump (except on Safari Scout/E, Safari Saga) and plug line to prevent draining.

Safari Citation/E, Tundra & Tundra LT only : Remove screws retaining rear engine support to chassis.

Safari Voyageur and Safari Escapade only : Remove both nuts at the rear of engine support.

Tip engine forward just enough (except for Safari Scout/E and Safari Saga) to allow driven pulley removal from chaincase. Block in this position.

○ **NOTE :** In some cases, chaincase retaining screws might have to be slackened to allow pivoting of chaincase. In this case, note position of alignment shims. Besides, air intake silencer and oil injection reservoir might have to be slightly displaced to get enough space to pull driven pulley.

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

DISASSEMBLY

Chaincase & driven pulley

All except Safari Citation/E and tundra, Tundra LT.

Remove bearing cone.

Knock driven pulley shaft with a plastic hammer and pull driven pulley out.

26,27, Snap ring & support

Remove snap ring and support using a suitable puller.

22,24, Roll pin & outer cam

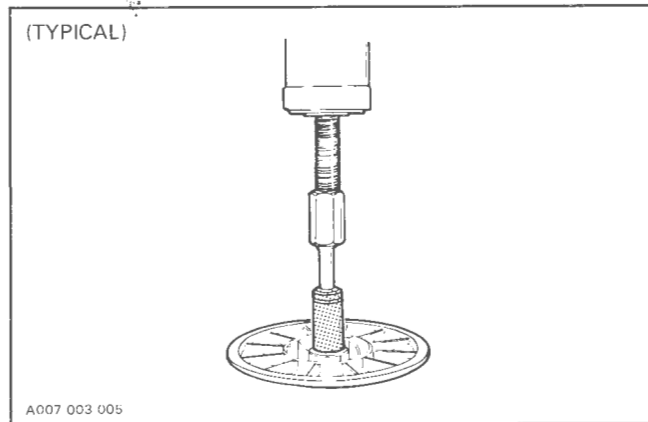
Remove roll pin and slide outer cam out of pulley shaft.

INSPECTION

20,39, Sliding half bushing & bushing

Check bushings for wear, replace bushings if lateral play exceeds 1.75 mm (.070 in).

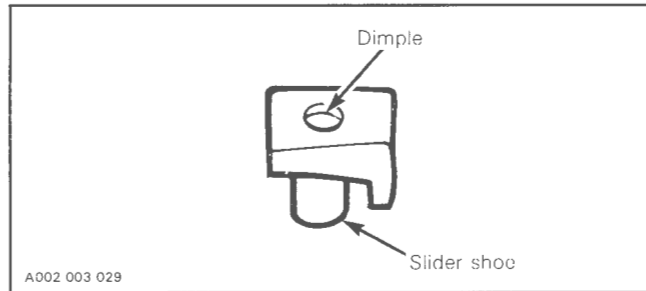
To disassemble a worn bushing (small), use a press and a suitable pusher.



Remove three screws and washers and pry large bushing out.

23, Slider shoe

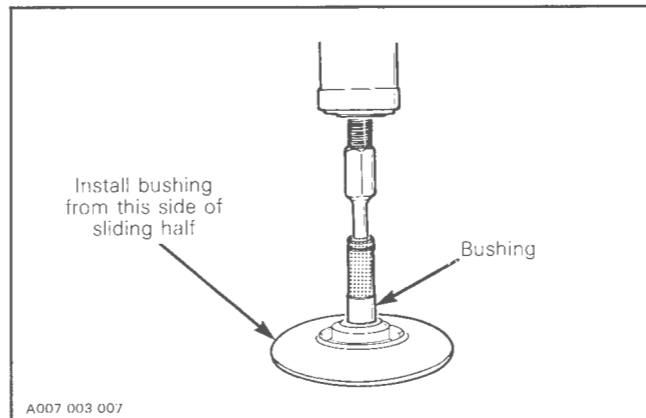
Slider shoe must be replaced when dimple in the working surface is barely visible or worn to less than 3/4 of it's original depth. See illustration.



ASSEMBLY

20, Sliding half bushing

Clean mounting surfaces with Loctite Safety Solvant then apply Loctite 609. Using a press and a suitable pusher, install bushing as illustrated. Wait six hours for complete cure.



37,39, Screw & bushing

Apply Loctite 609 on bushing, align notches with screw positions and press down. Torque screws to 5 N•m (44 lbf•in).

23, Slider shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

16, Fixed half shaft

Thoroughly clean the fixed half shaft. Remove rust with no 320 grit sand paper.

Apply a light film of low-temperature grease (P/N 413 7061 00) on the shaft. Always wipe off surplus.

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

○ **NOTE :** Activate the sliding half several times to distribute lubricant over full length of shaft. Be careful that lubricant does not get on inner halves of pulley.

14,15, Screw & brake disc

Install brake disc on fixed half and torque screws to 13 N•m (115 lbf•in).

Assemble driven pulley components by reversing the disassembly procedure.

INSTALLATION

Driven pulley & chaincase

Install a new upper chaincase oil seal and a new chaincase cover seal.

Reinstall the driven pulley on vehicle by reversing the removal procedure.

○ **NOTE :** If chaincase retaining screws have been slackened, chaincase can be reinstalled to its initial position by securing driven pulley support before tightening chaincase retaining screws. Make sure to install alignment shims as noted at removal.

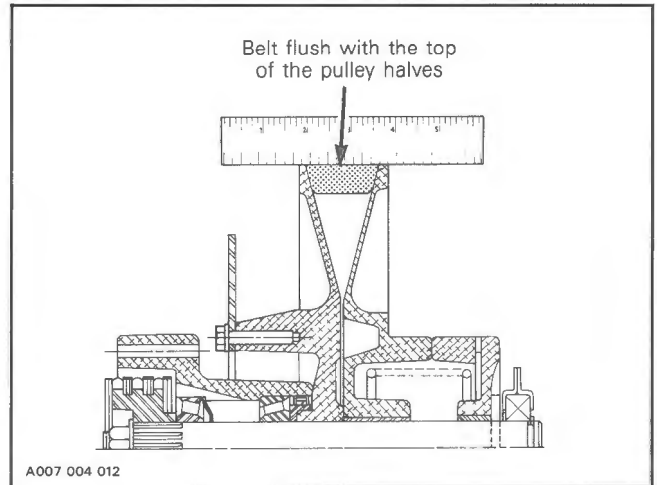
▼ **CAUTION :** Bleed oil injection pump on models that injection oil supply line has been removed. Refer to section 02, "Engine".

ADJUSTMENT

17,18, Shim

○ **NOTE :** The following adjustment must be performed with a new drive belt.

For best performance, particularly at starting, top of drive belt should be flush with top of driven pulley halves.

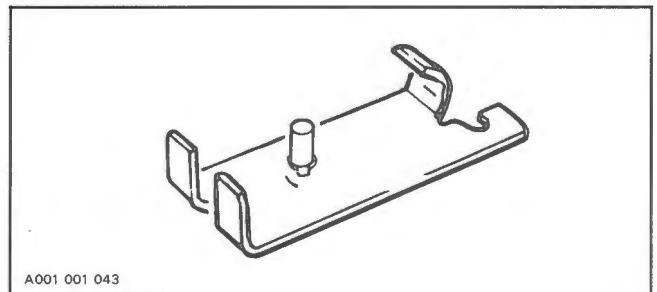


Shim(s) #17 and #18 provide belt height adjustment between pulley halves. Adding shim lower the belt in driven pulley while removing shim raise the belt. Adjust properly.

24, Spring

Spring torsional pre-load.

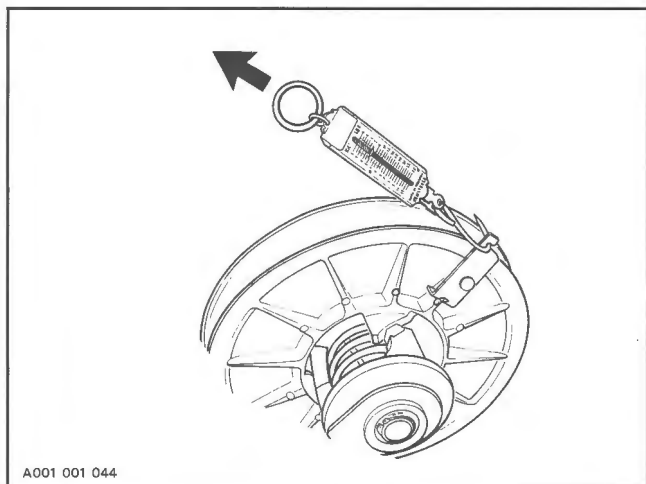
To check spring pre-load adjustment, use spring scale hook (P/N 529 0065 00) and a spring scale.



Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

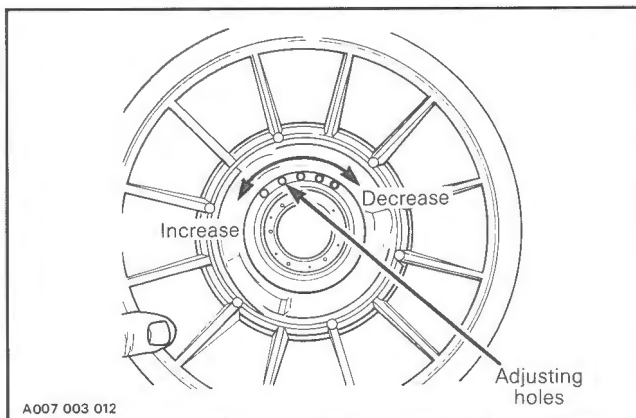
Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicular with pulley axle.



Spring pre-load should be as follows :

| MODEL | PRE-LOAD kg (lb) |
|---|---------------------|
| Safari Citation / E Tundra Tundra LT | 3.6 (8) |
| Safari Scout / E Safari Saga Safari Voyageur Safari Cheyenne | 4.1 (9) |

To adjust spring pre-load relocate spring end in sliding pulley, moving it clockwise to decrease the pre-load and counter-clockwise to increase it.



NOTE : Always recheck torsional pre-load after adjusting.

Chaincase

Check oil level and refill as required. Refer to section 03-07, "Chaincase".

Pulley alignment & drive belt deflection

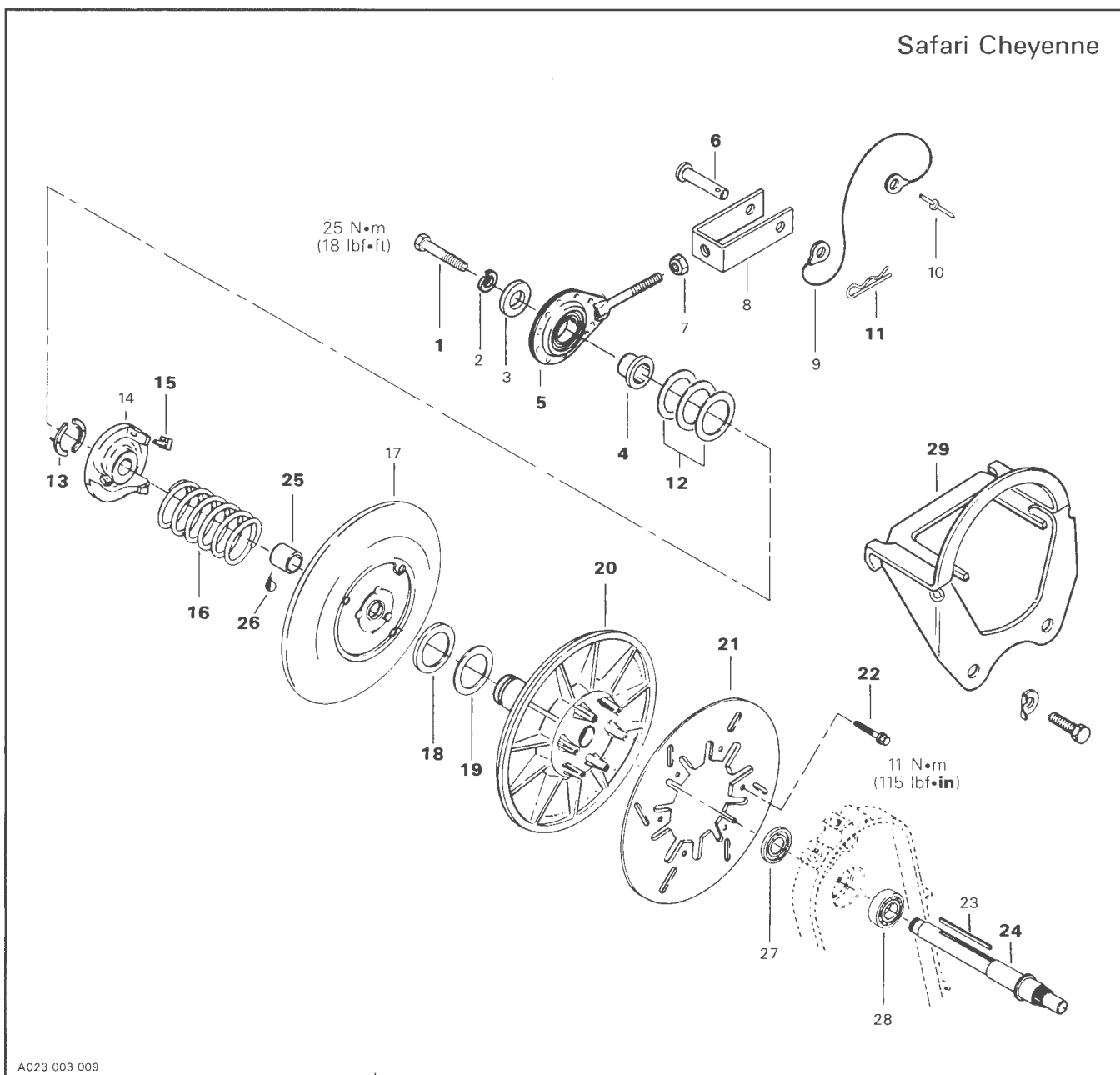
Refer to section 03-05, "Pulley Alignment" and section 03-02, "Drive belt" to perform adjustments.

CAUTION : Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

Safari Cheyenne




A023 003 009

- | | |
|-------------------------------|-----------------------|
| 1. Screw M8 x 20 | 16. Spring |
| 2. Lock washer | 17. Sliding half |
| 3. Snap ring | 18. Shim |
| 4. Flanged ring | 19. Shim |
| 5. Support | 20. Fixed half |
| 6. Clevis pin | 21. Brake disc |
| 7. Nut M8 | 22. Screw M6 x 16 (6) |
| 8. U-bracket | 23. Key |
| 9. Sling | 24. Countershaft |
| 10. Rivet | 25. Bushing |
| 11. Hair pin | 26. Loctite 609 |
| 12. Shim | 27. Oil seal |
| 13. Retaining half washer (2) | 28. Bearing |
| 14. Outer cam | 29. Brake ass'y |
| 15. Slider shoe (3) | |

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

 **NOTE :** Some driven pulley components (support, cam, slider shoes) can be serviced without removing the whole driven pulley from transmission neither removing brake caliper nor open transmission.

Should sliding half or whole driven pulley removal be required, refer to the following procedures.

REMOVAL

To remove driven pulley from chaincase, follow this procedure.

Pulley guard & drive belt

Remove from vehicle.

29, Brake caliper

Unfold lock tab and remove retaining screws. Take off brake support from transmission.

5,6,11, Countershaft support, clevis pin & hair pin

To disconnect from steering support remove hair pin and clevis pin.

1,5, Screw & countershaft support

Remove screw and countershaft support from driven pulley.

Transmission cover


Remove transmission cover and drain oil. Slacken chain tension. Remove planet carrier, sun gear, ring gear then sliding sleeve.

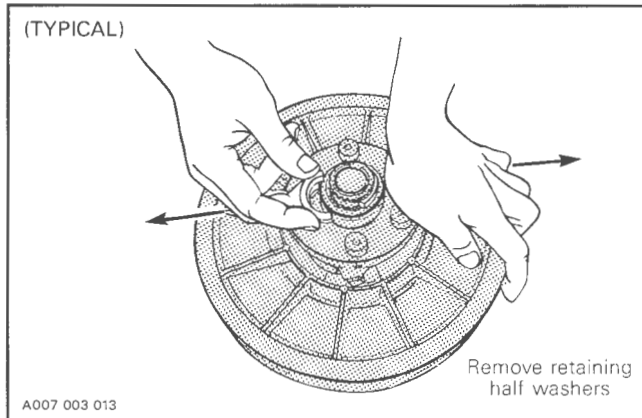
Using a suitable pusher, strike on countershaft from driven pulley side to free from transmission and thus withdrawing driven pulley.

DISASSEMBLY

13, Retaining half washer

Push outter cam and remove the retaining half washers.

 **WARNING :** Driven pulley cam is spring loaded. Hold it in place when removing the retaining half washers.

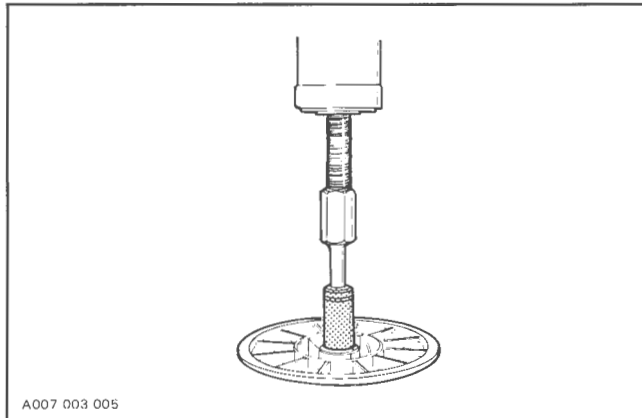


INSPECTION

25, Sliding half bushing

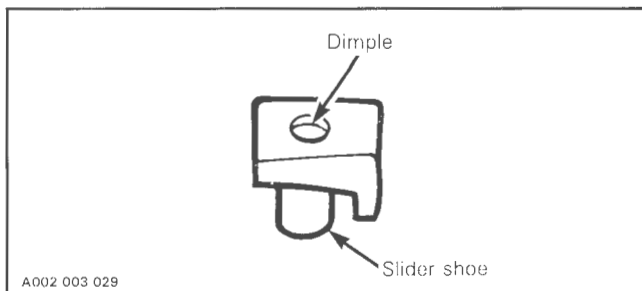
Check sliding half bushing wear, replace bushing if lateral play exceeds 1.75 mm (.070 in).

To disassemble a worn bushing, use a press and a suitable pusher.



15, Slider shoe

Slider shoe must be replaced when dimple in the working surface is barely visible or worn to less than 3/4 of its original depth. See illustration.



Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

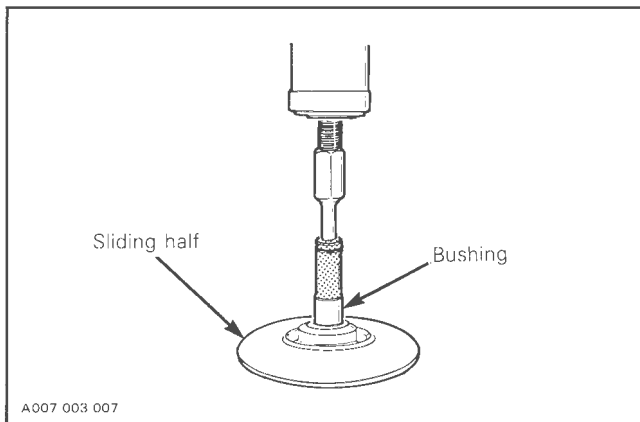
13, Retaining half washer

Check for wear and particularly at spring pin.

ASSEMBLY

25, Sliding half bushing

To assemble a new bushing, use a press and a suitable pusher. Secure with Loctite 609 and stake with a center punch on both flanges (6 points per side).



15, Slider shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

20, Fixed half shaft

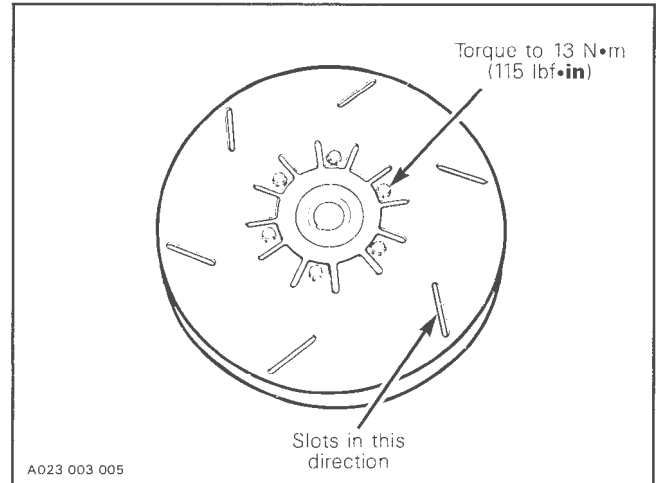
Thoroughly clean the driven pulley shaft.

Apply a light film of low-temperature grease (P/N 413 7061 00) on the shaft. Always wipe off surplus.

NOTE : Activate the sliding half several times to distribute lubricant over full length of shaft. Be careful that lubricant does not get on inner halves of pulley.

21,22, Brake disc & screw

The slotted disk have to be installed with its slots properly oriented as shown. This will eject heat outward of disc.

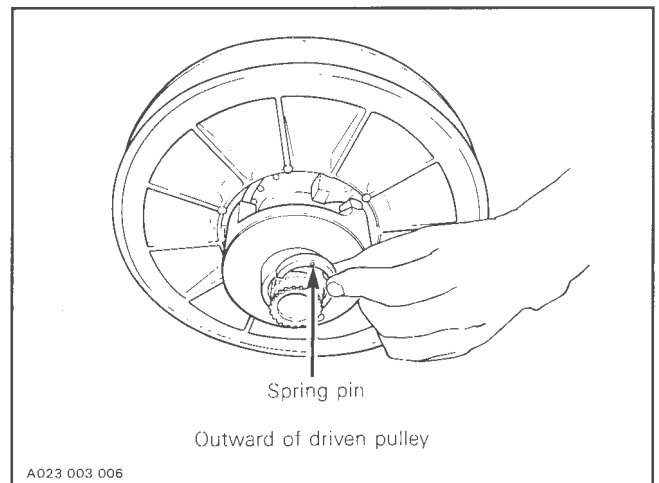


Torque screws to 13 N•m (115 lbf•in).

13, Retaining half washer

Install so that their spring pins are oriented outward of driven pulley as shown. Make sure that spring pins are properly inserted into splines.

NOTE : The cam spring has been removed for clarity in the following illustration.



Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

INSTALLATION

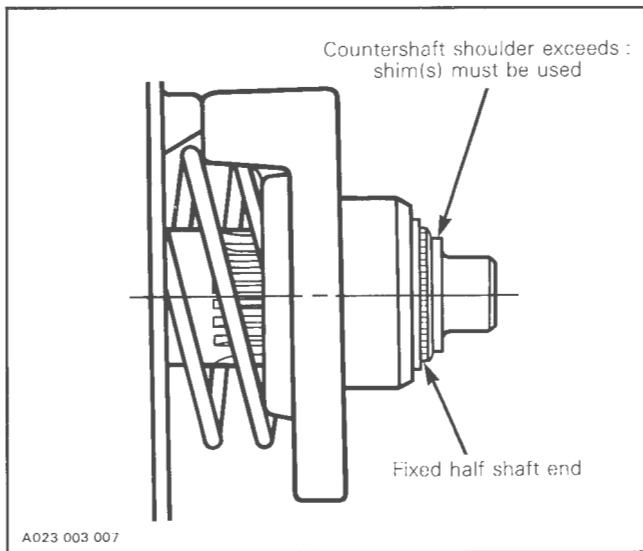
Install a new upper transmission oil seal and a new transmission cover O'ring.

Installation is essentially the reverse of removal procedure however, pay attention to the following.

Slightly insert countershaft through transmission bore and install driven pulley on countershaft from outside of transmission, Fully push countershaft against transmission bore shoulder.

12, Shim

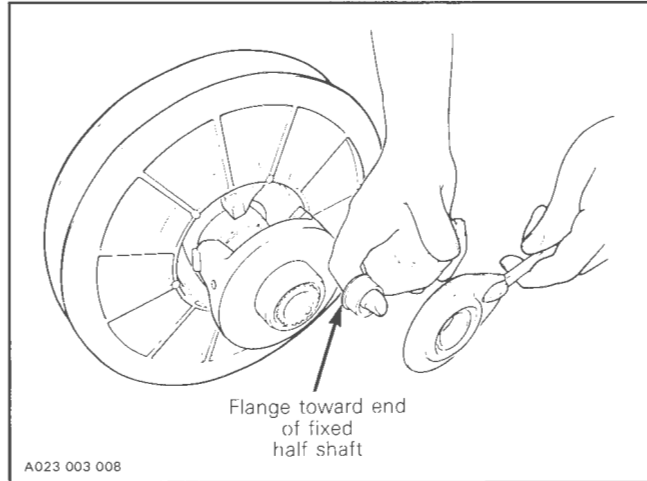
Driven pulley **must not** have any axial play. Shim(s) **#12** have to be installed as needed to eliminate the possible play. Should countershaft shoulder exceed fixed half shaft end, shim(s) have to be used.



Install enough shims so that they come flush or slightly exceed countershaft shoulder.

4,5, Flanged ring & countershaft support

Flanged ring **must** be installed so that its flange is toward the end of fixed half shaft as shown.



Install countershaft support and torque screw to 25 N•m (18 lbf•ft).

For transmission assembly procedure, refer section 03-08, 2-speed gearbox. Check oil level and refill as required.

29, Brake ass'y

Install brake ass'y with the support on transmission. Use new lock tabs and bend over a flat of each screw after proper tightening.

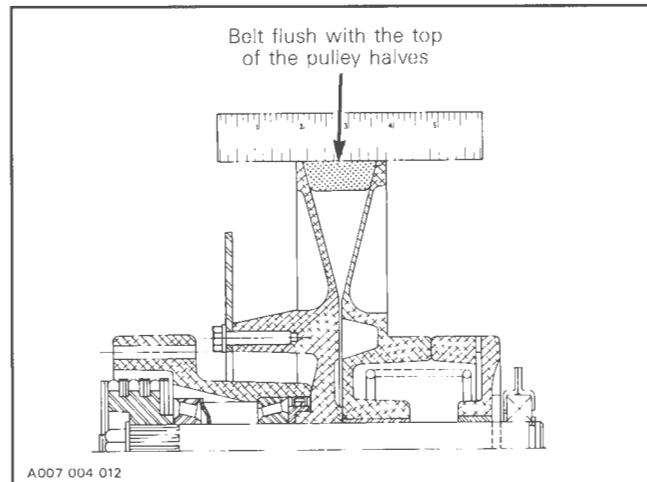
ADJUSTMENT

18,19, Shim



NOTE : The following adjustment must be performed with a new drive belt.

For best performance, particularly at starting, top of drive belt should be flush with top of driven pulley halves.



Section 03 TRANSMISSION

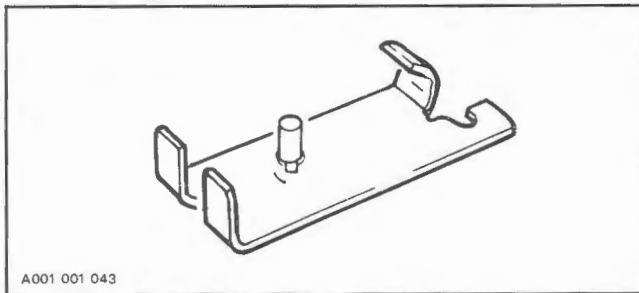
Sub-section 04 (DRIVEN PULLEY)

Shim(s) **#17** and **#18** provide belt height adjustment between pulley halves. Adding shim lower the belt in driven pulley while removing shim raise the belt. Adjust properly.

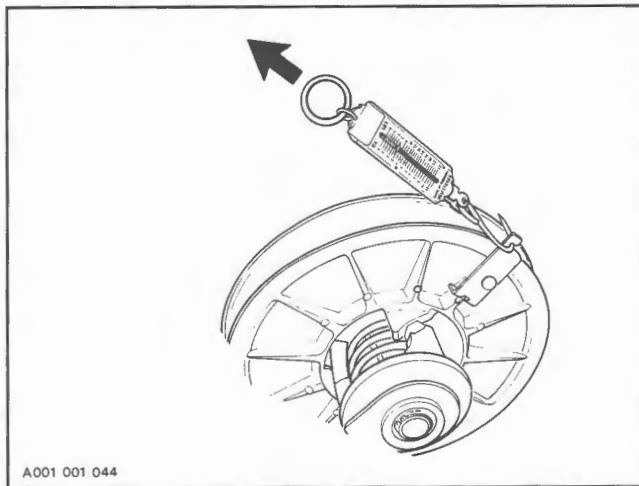
9, Spring

Spring torsional pre-load.

To check spring pre-load adjustment, use spring scale hook (P/N 529 0065 00) and a spring scale.

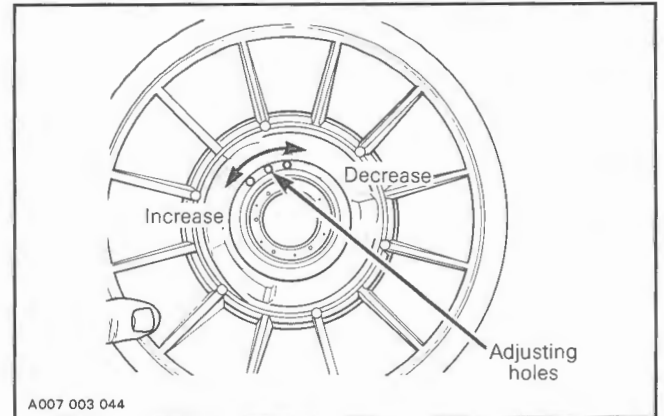


Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicular with pulley axle.



Spring pre-load should be 4.1 kg (9 lb).

To adjust spring pre-load, relocate spring end in sliding pulley, moving it clockwise to decrease the pre-load and counter-clockwise to increase it.



NOTE : Always recheck torsional pre-load after adjusting.

Pulley alignment & drive belt deflection

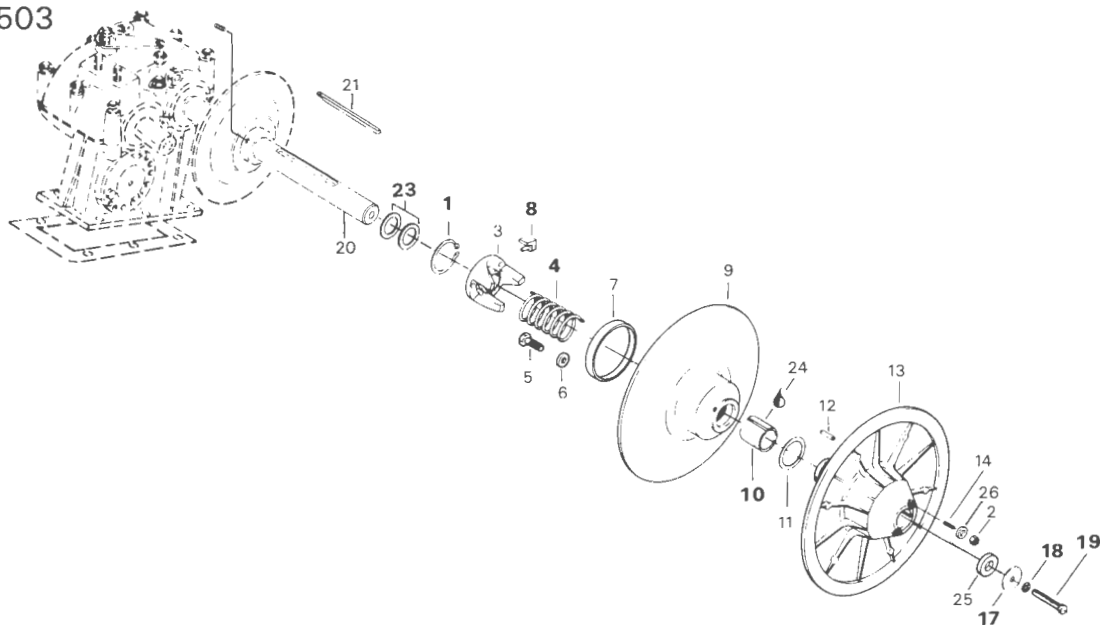
Refer to section 03-05, "Pulley Alignment" and section 03-02, "Drive belt" to perform adjustments.

CAUTION : Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

Section 03 TRANSMISSION

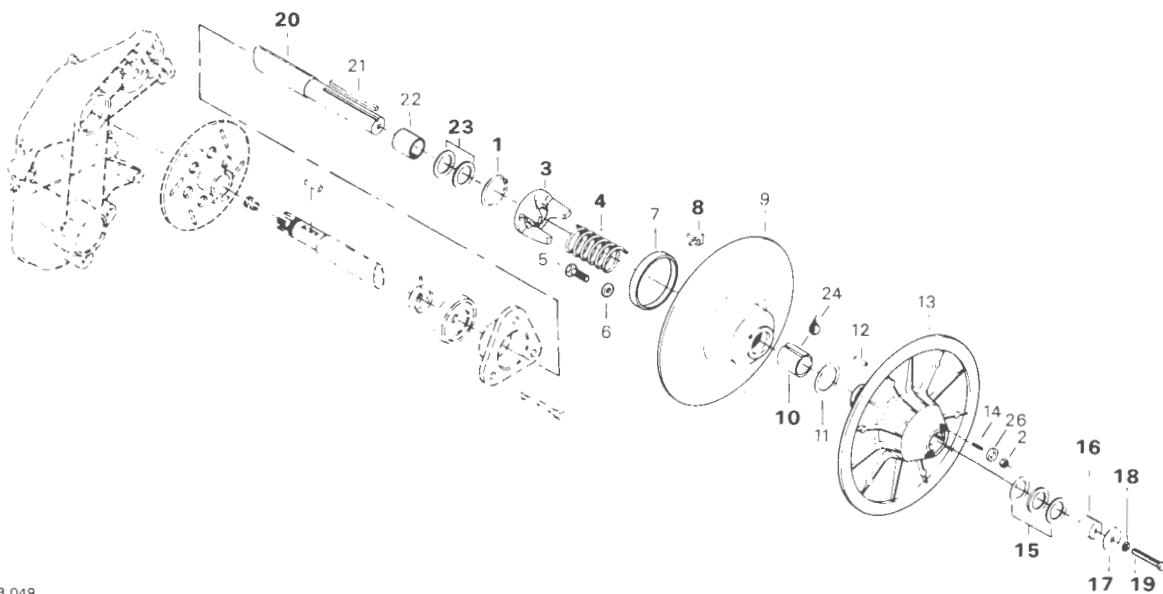
Sub-section 04 (DRIVEN PULLEY)

Alpine II 503



A017 003 059

Formula MX/MX LT/Plus LT/Mach I



A015 003 049

- | | |
|--------------------------|-------------------------------------|
| 1. Snap ring | 14. Set screw (2) |
| 2. Nut (2) | 15. Shim (as required) |
| 3. Outer cam | 16. Extension (Formula models only) |
| 4. Spring | 17. Washer |
| 5. Screw | 18. Lock washer 8 mm |
| 6. Flat washer | 19. Screw M8 x 15 mm |
| 7. Bushing | 20. Countershaft |
| 8. Slider shoe | 21. Key (pulley ass'y) |
| 9. Sliding half | 22. Spacer (Formula models only) |
| 10. Sliding half bushing | 23. Shim (as required) |
| 11. Thrust washer | 24. Loctite 609 |
| 12. Key (cam) | 25. Flat washer 2 mm thick |
| 13. Fixed half | 26. Flat washer (2) |

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

REMOVAL

Pulley guard & drive belt

Remove from vehicle.

15,16,17,18,19, Shim, extension, washer, lock washer & screw

Remove the cap screw, pull the driven pulley from the countershaft.

20, Countershaft (Formula models only)

Should removal be required, refer to section 03-06 "Brake" and look for "Brake Disc".

DISASSEMBLY

1, Snap ring

Remove snap ring to disassemble the outer cam and the two pulley halves.

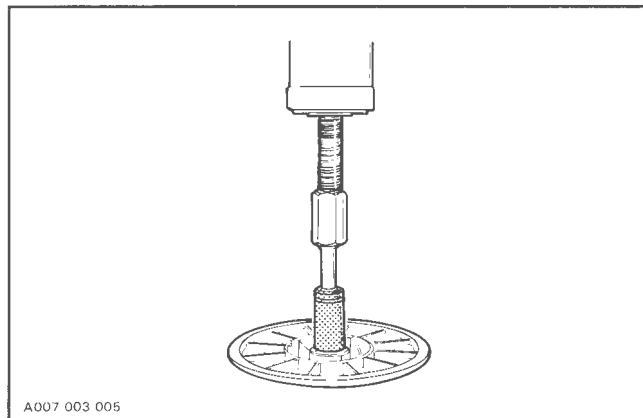
◆ **WARNING :** Driven pulley cam is spring loaded, hold firmly while removing snap ring.

INSPECTION

7,10, Sliding half bushings

Check bushings for wear, replace if lateral play exceed 1.75 mm (.070 in).

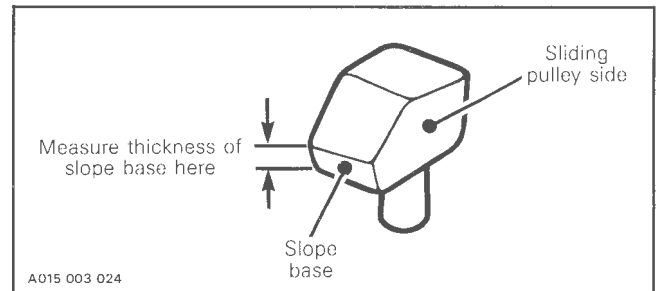
To disassemble a worn bushing (small), use a press and a suitable pusher.



Remove three screws and washers and pry large bushing out.

8, Slider shoe

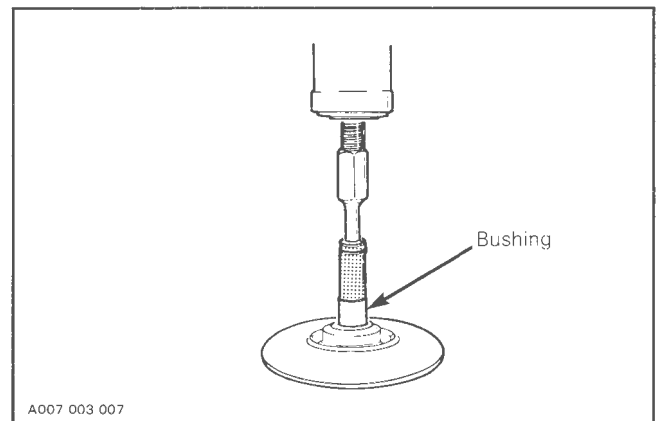
Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



ASSEMBLY

10, Sliding half bushing

Assemble a new bushing using a press and a suitable pusher. Secure with Loctite 609 only.



37,39, Screw & bushing

Apply Loctite 609 on bushing, align notches with screw positions and press down. Torque screws to 5 N•m (44 lbf•in).

8, Cam slider shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

Section 03 TRANSMISSION

Sub-section 04 (536 DRIVEN PULLEY)

INSTALLATION

20, Countershaft

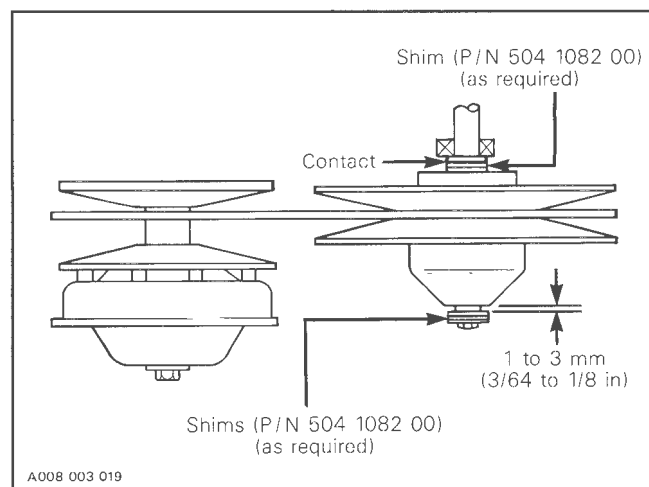
CAUTION : Always apply Loctite anti-seize lubricant (P/N 413 7010 00) on the countershaft before final pulley installation.

Formula models only : Should installation procedure be required, refer to section 03-06 "Brake" then look for "Brake Disc" and "Countershaft Bearing Adjustment".

Reinstall the pulley on the countershaft by reversing the removal procedure.

Formula models and Alpine II only : Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 1082 00) contact it. Measure end play at the mounting screw end between shim(s) and pulley. See illustration.

NOTE : Formula models and Alpine II only : A straight bar (see section 03-05) must be inserted between driven pulley halves before measuring end play.



19, Pulley retaining screw

Torque to 25 N•m (18 lbf•ft).

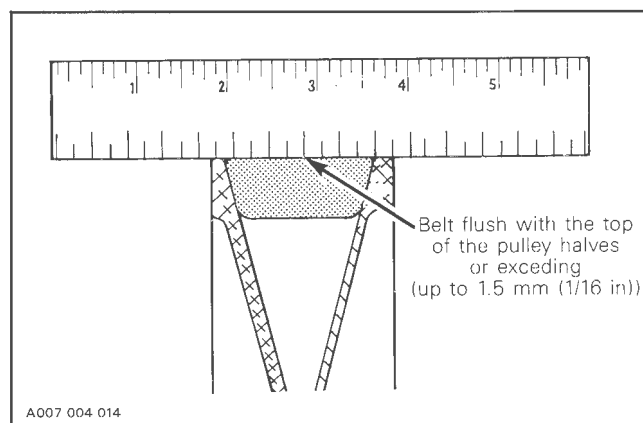
ADJUSTMENT

13,14, Fixed half & set screw

NOTE : The following adjustment should be performed with a new drive belt.

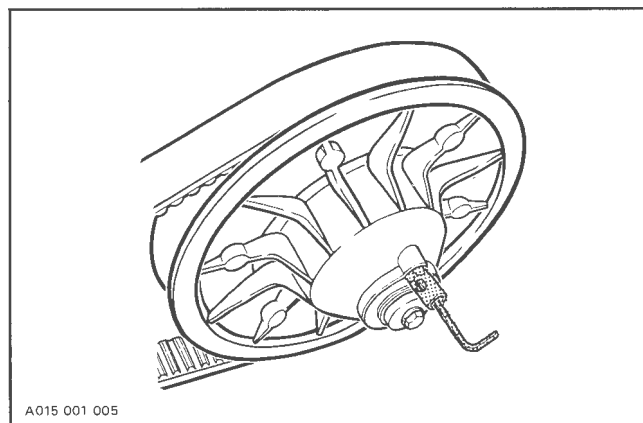
Adjust pulley distance (see section 03-05). Adjust drive belt height between pulley halves to obtain specified belt deflection.

NOTE : For best performance, particularly at starting, drive belt should be flush with driven pulley edge or slightly exceeding (up to 1.5 mm (1/16 in)).



Allen set screws provide belt height adjustment between pulley halves. Tightening screws lower the belt in driven pulley while slackening screws raise the belt. Adjust properly.

Allen screw should be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 0087 00).



Section 03 TRANSMISSION

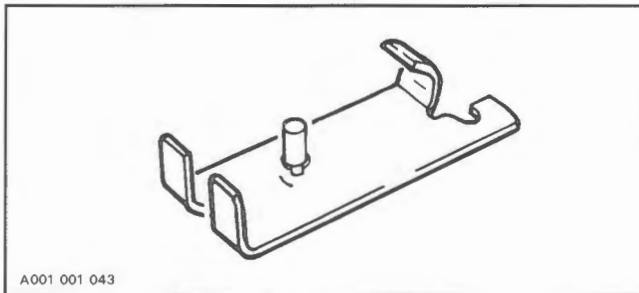
Sub-section 04 (536 DRIVEN PULLEY)

Restrain Allen screw with the wrench and tighten nut with the socket using socket handle provided in tool box.

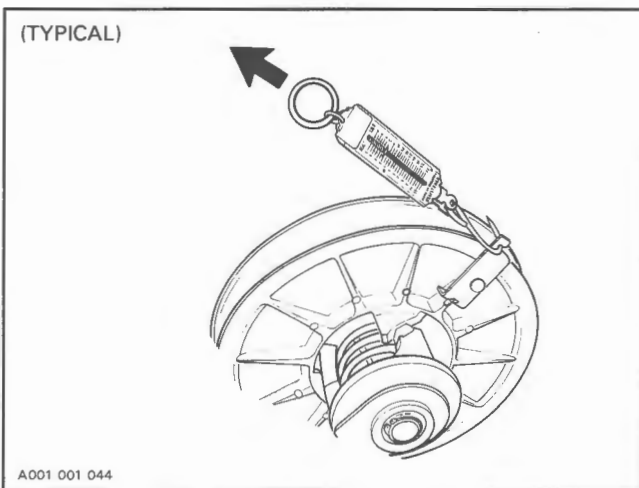
4, Spring

Spring torsional pre-load.

To check spring pre-load adjustment, use spring scale hook (P/N 529 0065 00) and a spring scale.

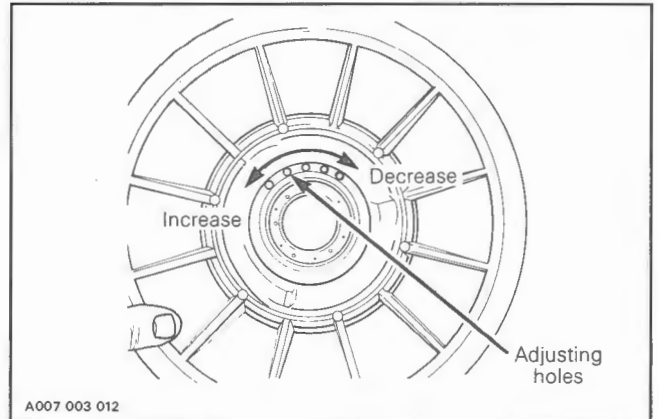


Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicular with pulley axle.



Spring pre-load should be : 5.4 - 7.3 kg (12 - 16 lb).

To adjust spring pre-load, relocate spring end in sliding pulley, moving it clockwise to decrease the pre-load and counterclockwise to increase it.



NOTE : Always recheck torsional pre-load after adjusting.

Pulley alignment & drive belt deflection

Refer to section 03-05, "Pulley Alignment" and section 03-02, "Drive belt" to perform adjustments.

CAUTION : Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

3, Outer cam

Formula models only

For particular applications cam with different lead angles are available. 36° and 44° angles can be used.

CAUTION : Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

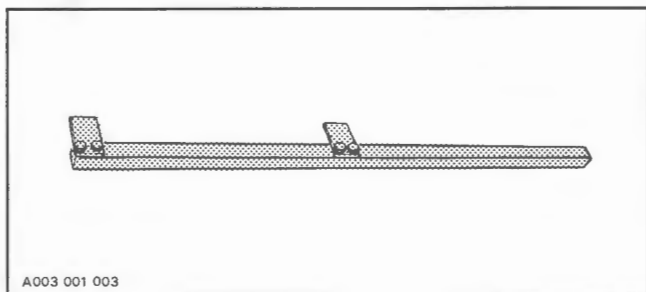
NOTE : For high altitude regions, the "High Altitude Technical Data booklet" (P/N 484 0552 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

Section 03 TRANSMISSION

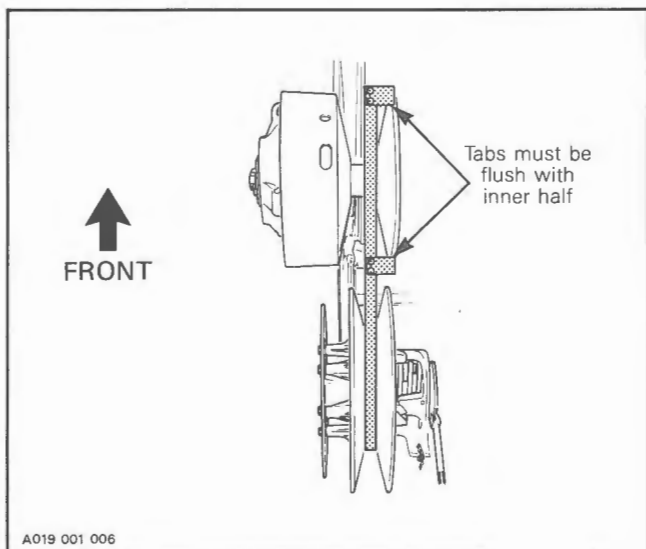
Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

Nominal value procedure

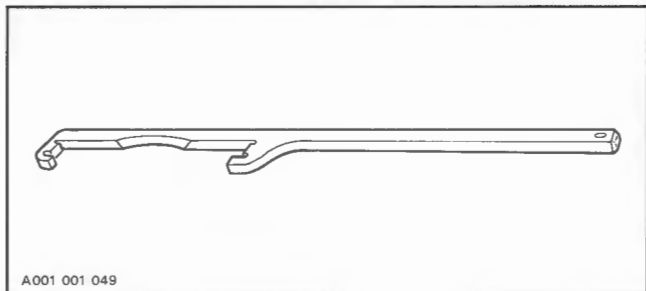
Using alignment template (all except Formula models and Alpine II)



Alignment template tabs must be flush with drive pulley inner half.

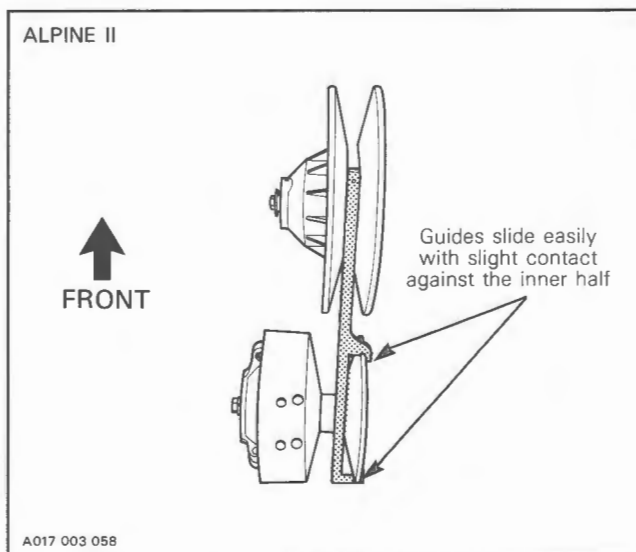
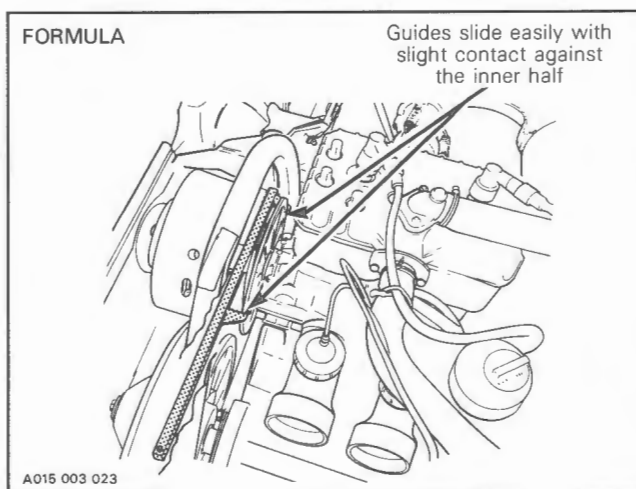


Using alignment bar (All Formula models and Alpine II)



Alignment is correct when this tool slides easily over drive pulley with slight contact against inner half.

CAUTION : Do not force the tool guides on the inner half and do not perform alignment when the tool rests in both pulleys, since tool distortion may occur.



Drive belt deflection

NOTE : When pulley distance and alignment are adjusted to specifications, adjust drive belt deflection in accordance with section 03-02.

CAUTION : This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

Section 03 TRANSMISSION

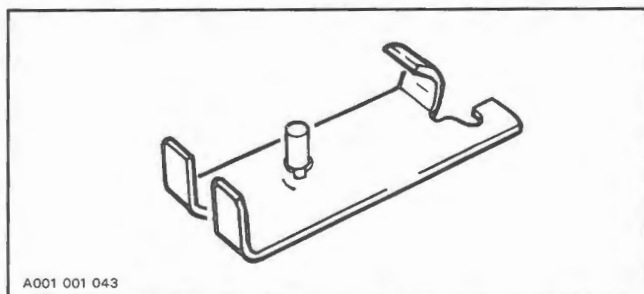
Sub-section 04 (536 DRIVEN PULLEY)

Restrain Allen screw with the wrench and tighten nut with the socket using socket handle provided in tool box.

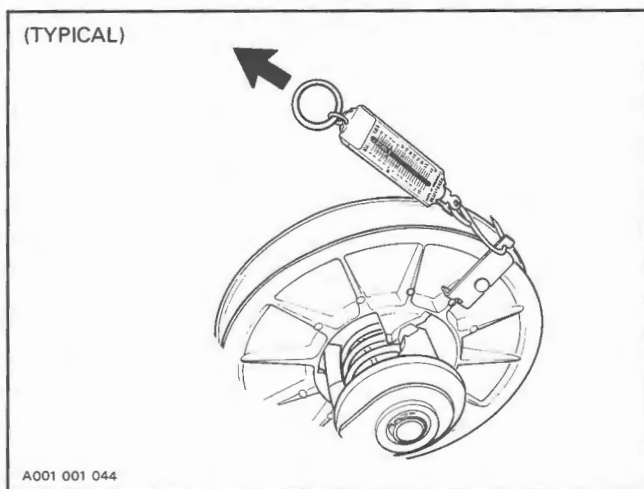
4, Spring

Spring torsional pre-load.

To check spring pre-load adjustment, use spring scale hook (P/N 529 0065 00) and a spring scale.

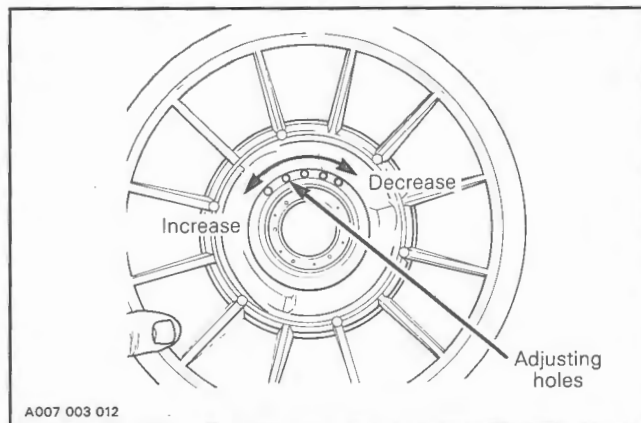


Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicular with pulley axle.



Spring pre-load should be : 5.4 - 7.3 kg (12 - 16 lb).

To adjust spring pre-load, relocate spring end in sliding pulley, moving it clockwise to decrease the pre-load and counterclockwise to increase it.



NOTE : Always recheck torsional pre-load after adjusting.

Pulley alignment & drive belt deflection

Refer to section 03-05, "Pulley Alignment" and section 03-02, "Drive belt" to perform adjustments.

CAUTION : Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

3, Outer cam

Formula models only

For particular applications cam with different lead angles are available. 36° and 44° angles can be used.

CAUTION : Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

NOTE : For high altitude regions, the "High Altitude Technical Data booklet" (P/N 484 0552 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

PULLEY DISTANCE & ALIGNMENT

GENERAL

The pulley distance we will refer to, in this section, is the space separating the drive and driven pulley outside diameters ("Z" measure).

This basic distance is provided as an assembly guide and indicates the dimensions between which satisfactory belt deflection will be obtained.

Both pulley distance adjustment and pulley alignment must be carried out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

▼ **CAUTION :** Before checking pulley adjustment, the rear suspension must be mounted on the vehicle and track tension/alignment must be done. Always check pulley adjustment after suspension is adjusted.

◆ **WARNING :** Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

All pulley alignment specifications refer to :

X = Distance between straight bar and drive pulley inner half edge, **measured between pulleys.**

Y = Distance between straight bar and drive pulley inner half edge, **measured at the end of straight bar.**

Z = Distance between outside diameter of pulleys.

○ **NOTE :** On Elan & Alpine II 503 drive & driven pulleys are inverted compared with other models.

GENERAL PROCEDURE

Remove belt guard and drive belt.

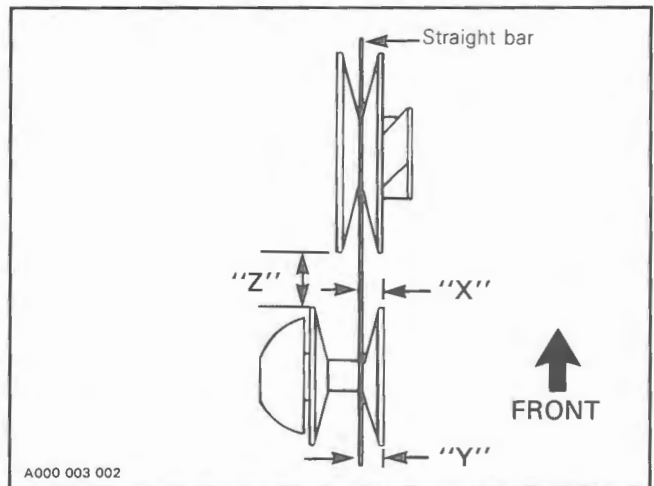
By turning and pushing the sliding half, open the driven pulley. Insert a straight bar $9.5 \text{ mm } \begin{smallmatrix} +0.05 \\ -0 \end{smallmatrix}$ ($.375 \text{ po } \begin{smallmatrix} +.002 \\ -0 \end{smallmatrix}$) square, 48 cm (19 in) long or the proper alignment gauge into the opened driven pulley.

Measuring procedure

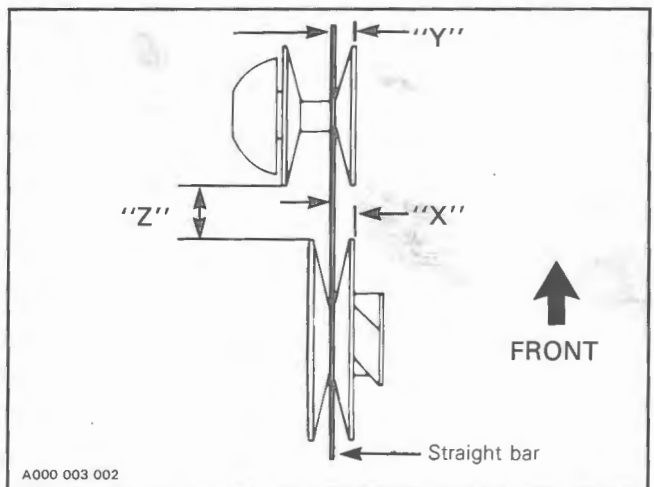
Using straight bar :

Always measure distances X & Y from the farther straight bar side (including its thickness to the inner half edge.)

ELAN & ALPINE II 503



ALL OTHERS



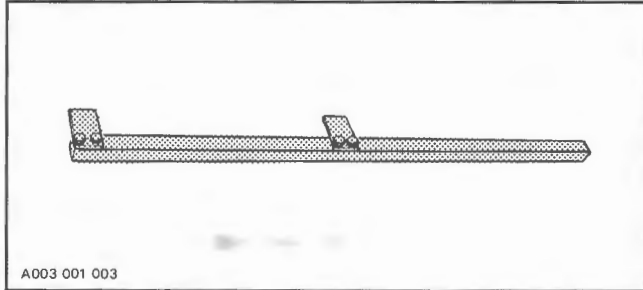
On all models, the distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

Section 03 TRANSMISSION

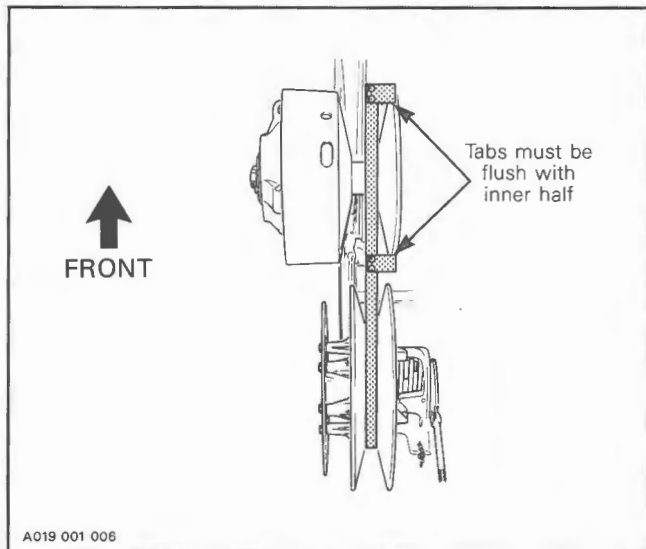
Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

Nominal value procedure

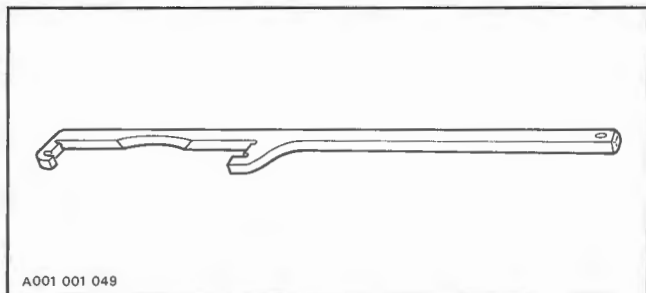
Using alignment template (all except Formula models and Alpine II)



Alignment template tabs must be flush with drive pulley inner half.

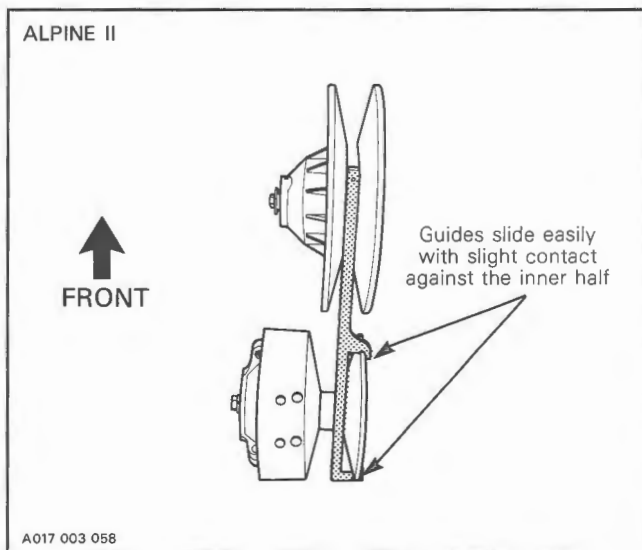
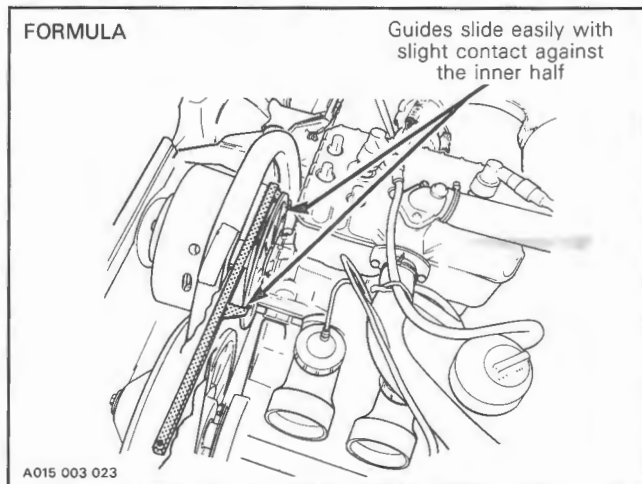


Using alignment bar (All Formula models and Alpine II)



Alignment is correct when this tool slides easily over drive pulley with slight contact against inner half.

CAUTION : Do not force the tool guides on the inner half and do not perform alignment when the tool rests in both pulleys, since tool distortion may occur.



Drive belt deflection

NOTE : When pulley distance and alignment are adjusted to specifications, adjust drive belt deflection in accordance with section 03-02.

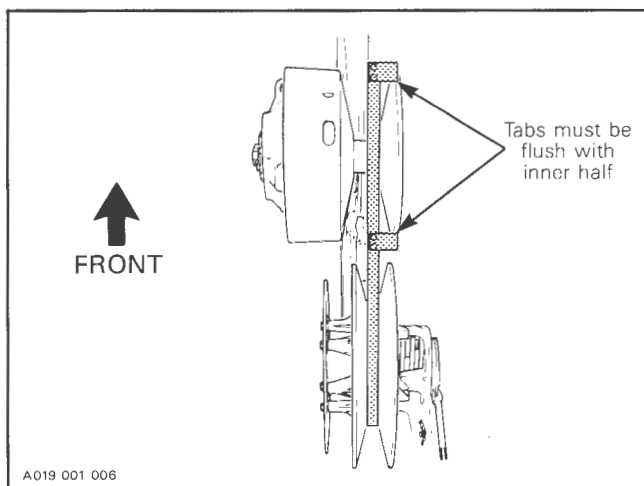
CAUTION : This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

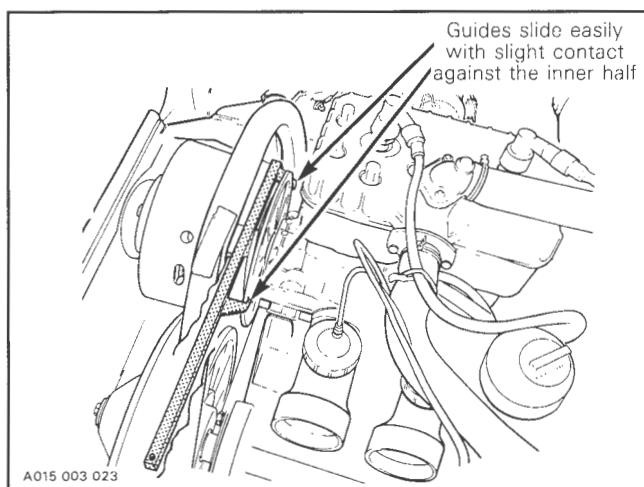
Quick alignment check

Using alignment template (all except Formula models and Alpine II)



Pulley alignment nominal values are reached when alignment template tabs are flush with drive pulley inner half.

Using alignment bar (all Formula models and Alpine II)



Pulley alignment nominal values are reached when alignment bar can slide easily over drive pulley with slight contact against inner half.

▼ **CAUTION :** Do not force the tool guides on the inner half and do not perform alignment when the tool rests in both pulley, since tool distortion may occur.

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

PULLEY ALIGNMENT SPECIFICATIONS CHART :

| MODEL | PULLEY DISTANCE | OFFSET | | Alignment ② template or bar P/N |
|---|----------------------------------|--------------------------|---|---|
| | "Z" | "X" | "Y" | |
| | + 0 - 1 mm (+ 0 - 3/64 in) | ± 0.40 mm (± 1/64 in) | | |
| Elan | 44.5 (1-3/4) | 34.5 (1-23/64) | Must exceed "X" from 0.75 mm (1/32 in) to 1.5 mm (1/16 in) | 529 0080 00 |
| Alpine II 503 | 43.0 (1-11/16) | 36.0 (1-27/64) | | 529 0071 00 |
| Safari Citation | 33.2 (1-5/16) | 34.5 (1-23/64) | | 529 0080 00 use with engine support positioner (P/N 529 0081 00) |
| Safari Citation E | 33.2 (1-5/16) | 45.5 (1-51/64) ① | | |
| Tundra Tundra LT | 36.5 (1-7/16) | 34.5 (1-23/64) | | |
| Safari Scout Safari Scout E Safari Saga | 36.5 (1-7/16) | 36.0 (1-27/64) | | 529 0083 00 |
| Safari Cheyenne Safari Voyageur Safari Escapade | 27.0 (1-1/16) | 37.0 (1-29/64) | | |
| Formula MX/ MX LT/PLUS PLUS LT/MACH I | 27.0 (1-1/16) | 36.0 (1-27/64) | | 529 0071 00 |

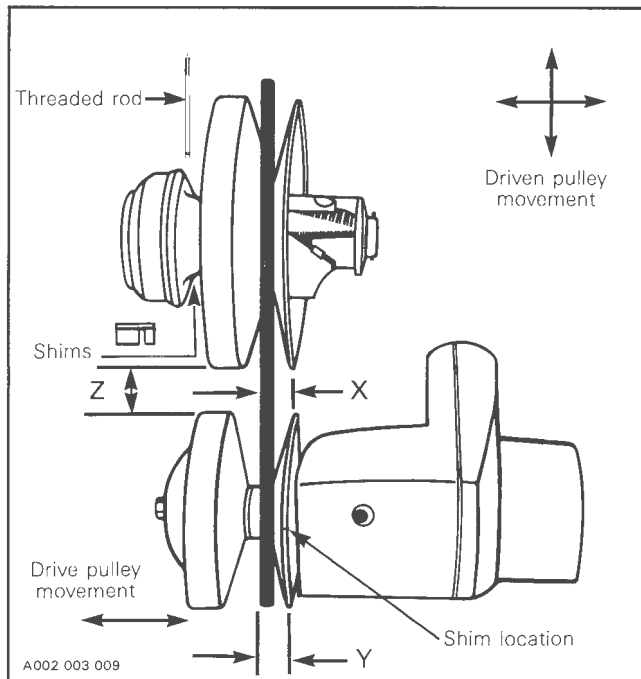
① Including ring gear thickness.

② Alignment bar and templates have been made according to pulley alignment nominal values. However, they do not take into account attowed tolerances for alignment specifications. They are used as go / no go gauges for quick alignment check and as templates to reach alignment nominal values.

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

ELAN 250



Pulley distance adjustment method

With the threaded rod and nut located between chaincase and frame, shift chaincase to obtain the specified distance.

Pulley alignment methods

Drive pulley movement

If drive pulley is too far in, remove drive pulley and add shim(s) on crankshaft. Use shim P/N 504 1115 00.

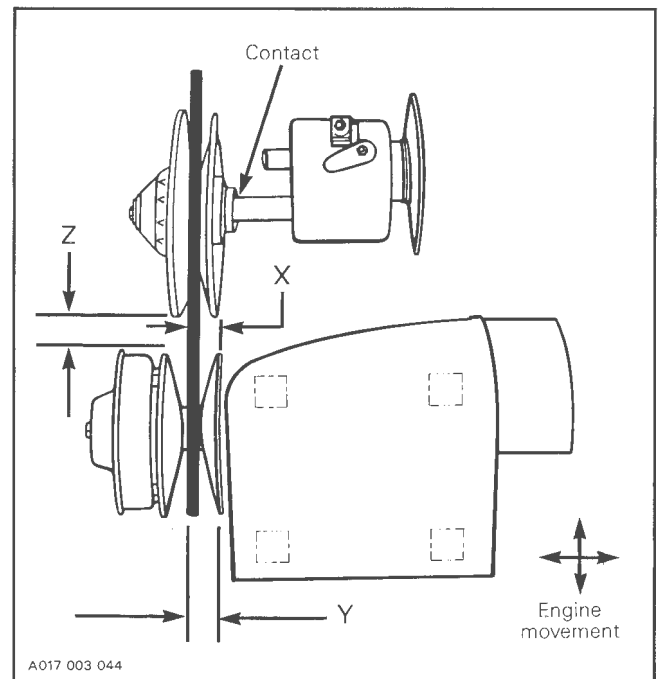
▼ **CAUTION:** Never use more than 5 shims on crankshaft.

◆ **WARNING:** Always torque drive pulley bolt within specifications. (See section 03-03).

Driven pulley movement

If driven pulley is too far in, add shim(s) between frame and chaincase. Use shim P/N 504 0504 00, 0.81 mm (.032'') thickness.

ALPINE II 503



○ **NOTE:** For proper measuring, driven pulley must be pushed toward gearbox.

Pulley distance adjustment method

Engine mounting bracket is provided with slotted holes. Move engine to obtain specified distance between pulleys.

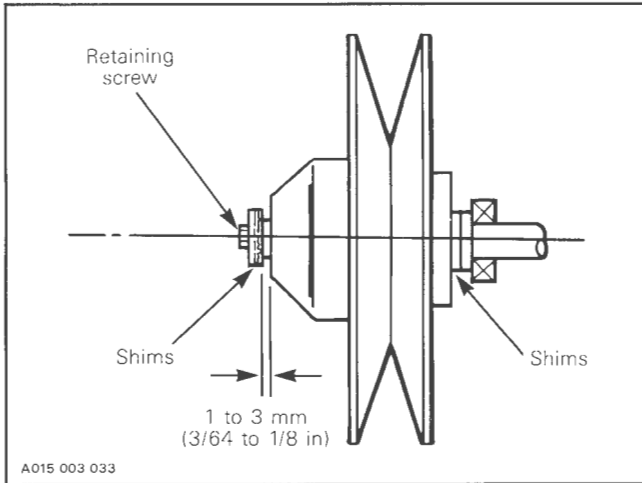
Pulley alignment method

Move engine to obtain the specified pulley alignment.

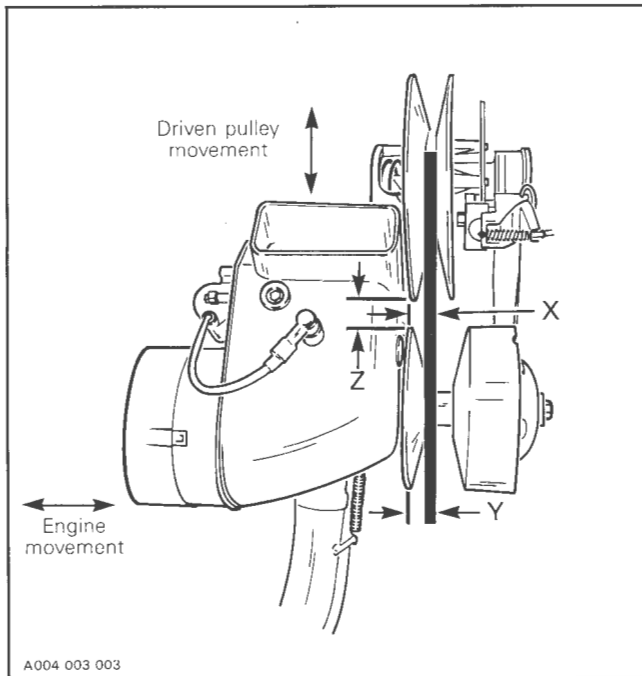
To allow driven pulley self alignment, a gap of 1 to 3 mm (3/64 to 1/8 in) is required between driven pulley and shims on retaining screw side. Adjust accordingly with shims (P/N 504 1082 00).

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)



SAFARI CITATION/E, TUNDRA, TUNDRA LT

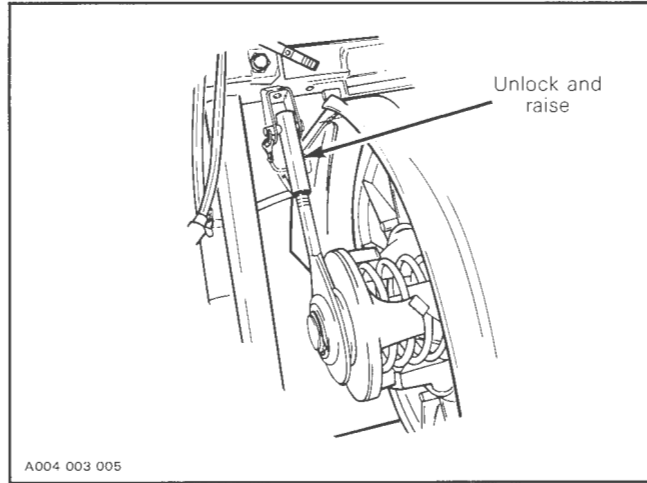


CAUTION : The rear suspension must be mounted on the vehicle and track tension and alignment must be done to provide the right frame width.

Pulley distance adjustment method

Slacken the four (4) chaincase retaining bolts, unlock and raise pulley support.

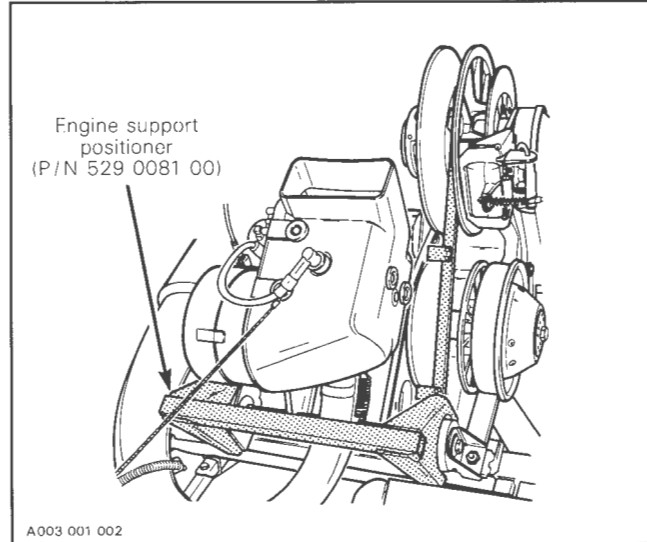
Move chaincase to obtain specific adjustment and adjust driven pulley support accordingly.



Pulley alignment method

Engine movement

Slacken the support retaining bolts and install engine support positioner (P/N 529 0081 00) to keep from altering distance between both supports.



Move the engine to obtain specified pulley alignment, torque engine support bolts to 55 N•m (41 lbf•ft) and remove engine support positioner.

Driven pulley movement

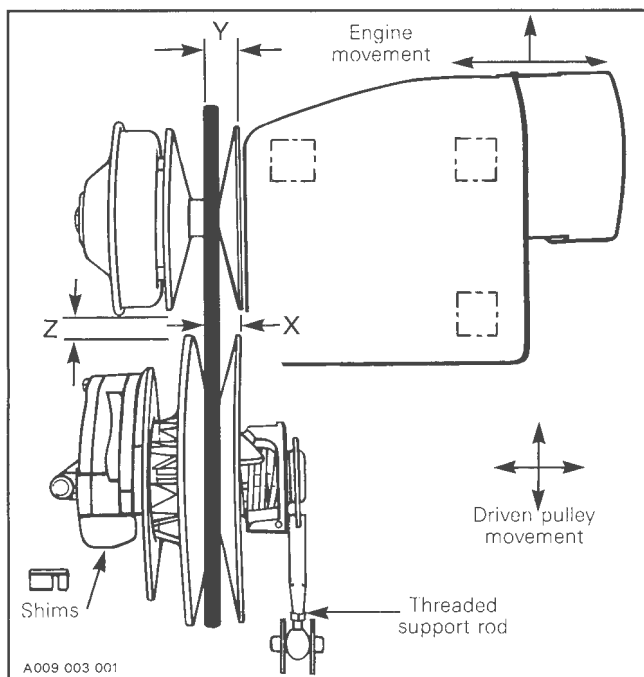
Shims can be mounted between chaincase and frame. Use shim P/N 504-0398 00, 0.53 mm (.021 po) thick.

On Safari Citation E only, use shim P/N 504 0565 00, 0.5 mm (.020 po) thick available for bottom bolts.

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

SAFARI SCOUT/SCOUT E/SAGA/ CHEYENNE/VOYAGEUR/ESCAPADE



Pulley distance adjustment method

Slotted lugs on chaincase casting allow movement of the chaincase. Pulley support has a threaded rod.

Adjustment

Loosen the lock nut on the threaded support rod.

Slacken the four nuts on the chaincase. Adjust driven pulley support until specified pulley distance is obtained.

Pulley alignment method

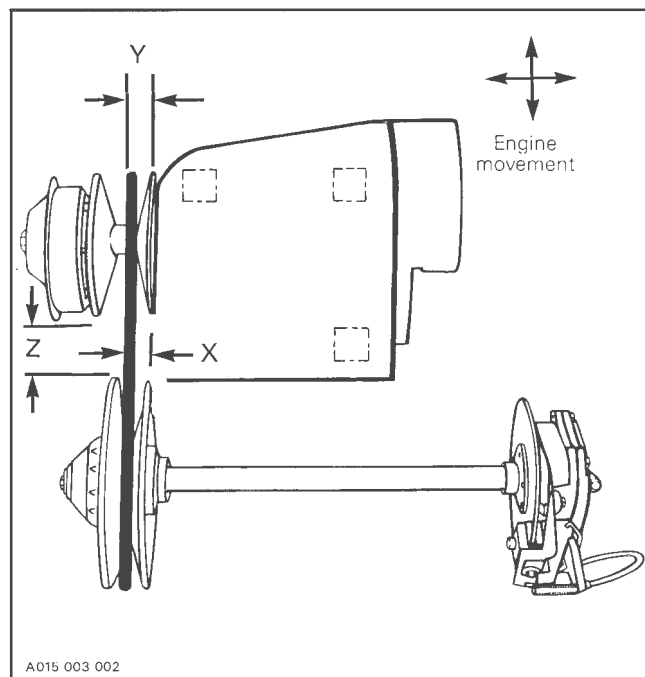
Engine movement

Engine mounting bracket has slotted holes. Slide engine bracket on mounting studs to obtain specified pulley alignment. In most cases there is enough adjustment to align pulleys.

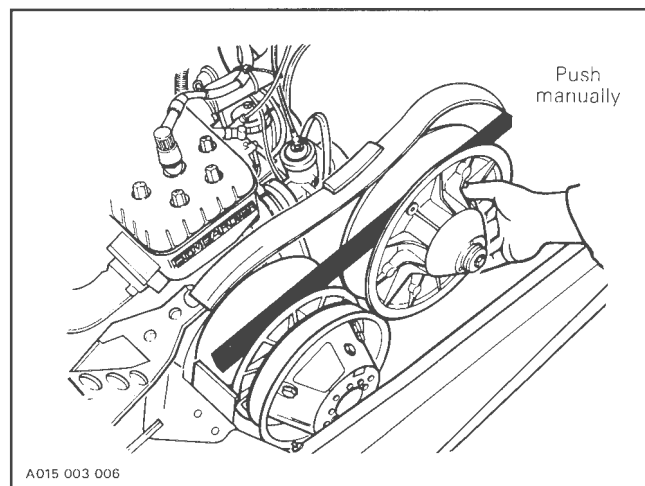
Driven pulley movement

Shims can be mounted between chaincase and frame. Use shim P/N 504 0398 00, 0.53 mm (.021") thick.

FORMULA MX/MX LT/PLUS/PLUS LT/ MACH 1



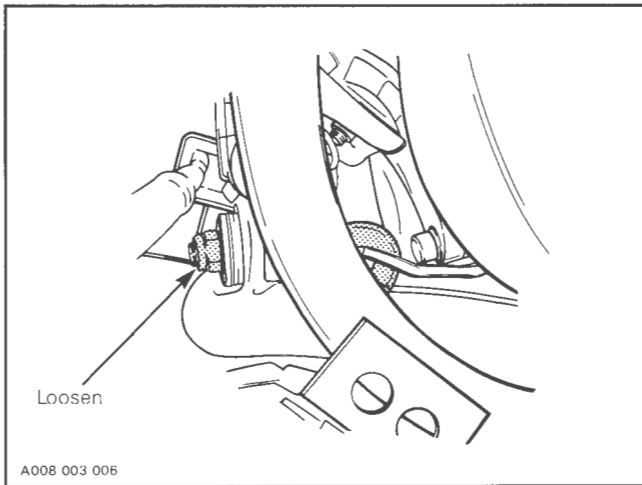
NOTE : For proper measuring, driven pulley must be pushed toward brake disc.



NOTE : Prior to performing pulley adjustment, loosen torque rod nut to allow engine movement. Engine brackets have tendency to stick to frame, work engine loose prior to aligning.

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)



Pulley distance adjustment method

Engine movement

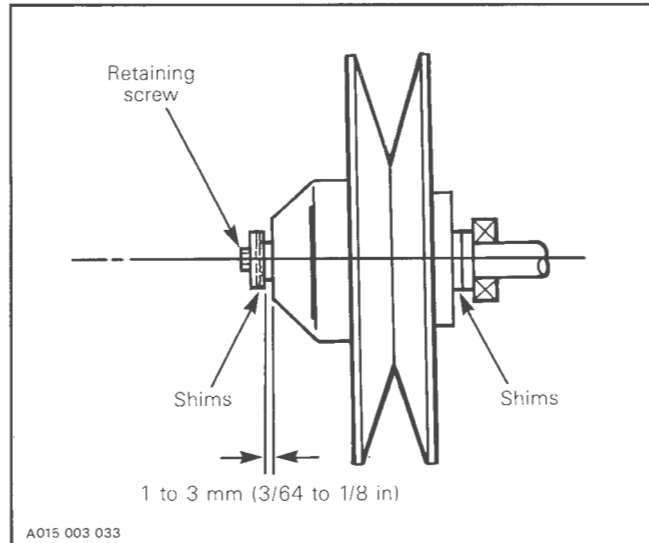
The engine bracket has slotted mounting holes. Move engine to obtain specified distance between pulleys.

Pulley alignment method

Driven pulley movement

Adjust pulley offset ("X") with shims (P/N 504 1082 00) between pulley and counter-shaft bearing support (pulley pushed toward brake disc).

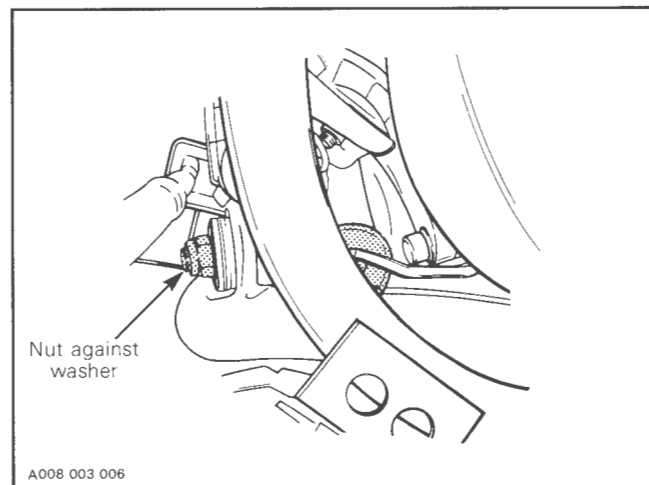
To allow driven pulley self alignment, a gap of 1 to 3 mm (3/64 to 1/8 in) is required between driven pulley and shims on retaining screw side. Adjust accordingly with shims (P/N 504 1082 00).



Engine movement

Loosen the four bolts retaining engine bracket to the frame. Position engine to obtain the specified alignment.

NOTE : After adjustment, just tighten torque rod nut so it sits against washer. Do not over tighten, it will disalign pulleys.



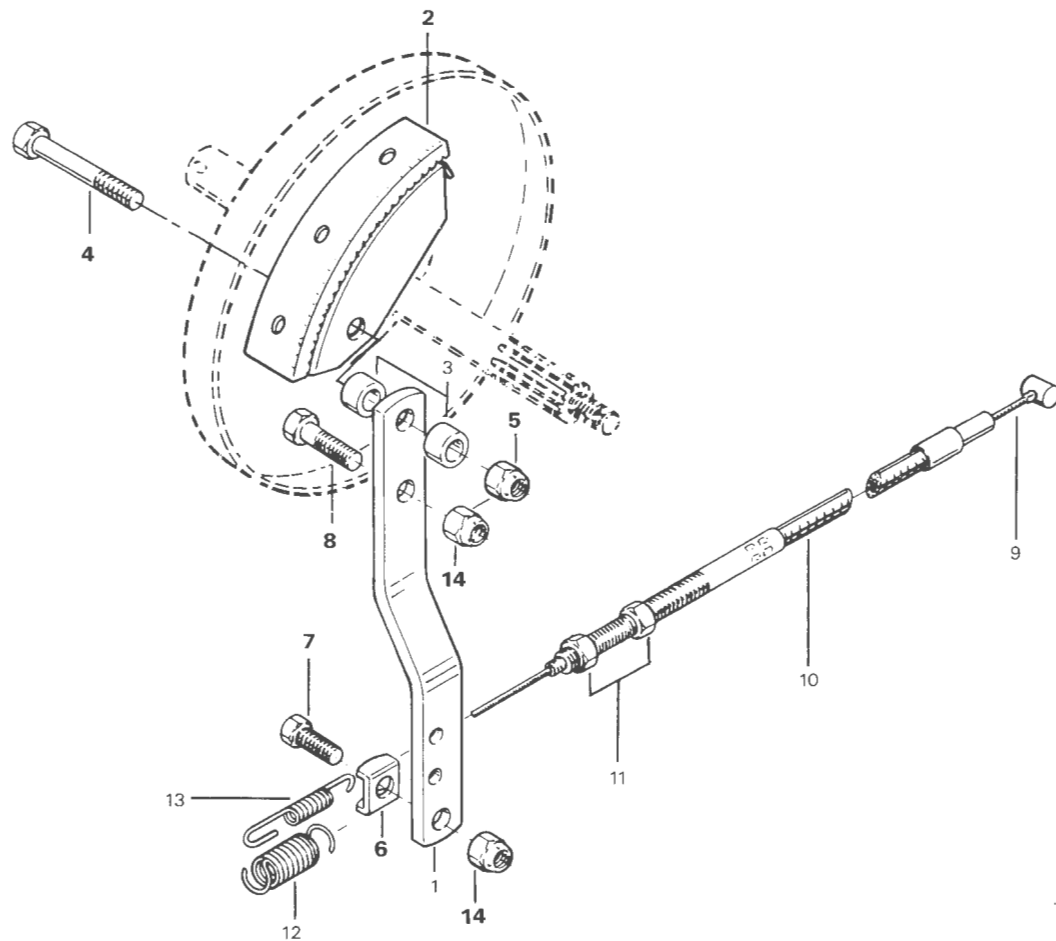
Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

BRAKE

DRUM BRAKE

Elan



A002 003 041

1. Brake lever
2. Brake shoe
3. Spacer (2)
4. Shoe retaining bolt 1/4-20 x 1-1/4
5. Shoe retaining nut 1/4-20
6. Cable bracket
7. Cap screw 1/4-20 x 3/4

8. Cap screw 1/4-20 x 7/8
9. Brake cable
10. Cable housing
11. Nut (adjusting) 5/16-24 (2)
12. Spring (brake lever)
13. Spring (brake light switch)
14. Stop nut 1/4-20 (2)

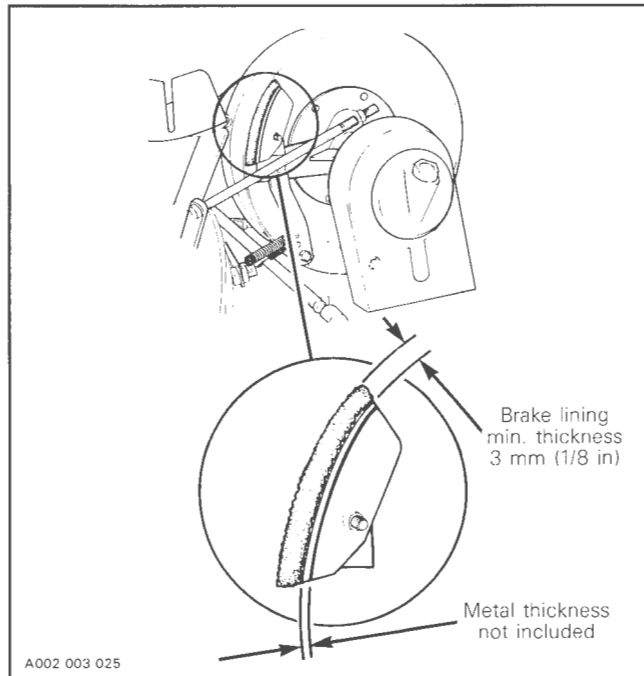
Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

INSPECTION

2, Brake shoe

Check brake lining for wear. Replace if brake lining thickness is less than 3 mm (1/8 in).



○ NOTE : If traces of oil are found on lining and/or pulley, check chaincase seal for leaks or incorrect installation. Replace or repair as needed. Wipe all traces of oil from pulley. Install new brake shoe.

INSTALLATION

4,5, Shoe retaining bolt & nut

When torquing shoe retaining nut, shoe must pivot when slight pressure is applied.

8,14, Lever retaining bolt & nut

When attaching brake lever assembly to chaincase bracket, tighten nut until all side play is eliminated and brake lever can still pivot freely.

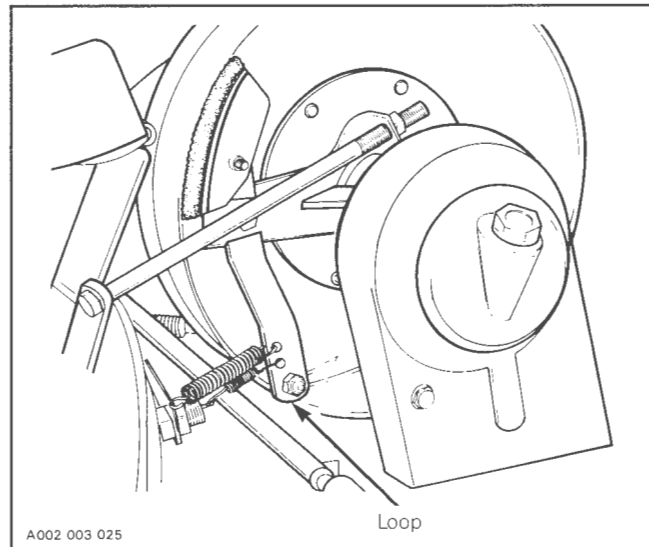
LUBRICATION

○ NOTE : Lubricate all moving metal parts of brake with light machine oil.

◆ WARNING : Avoid getting oil on brake shoe. Do not lubricate or apply anti-rust or anti-freeze solution in cable.

6,7,14, Cable retaining bracket, bolt & nut

Brake cable must form a loop around the bolt so that the cable may be firmly pinched between the bolt head and the bracket.

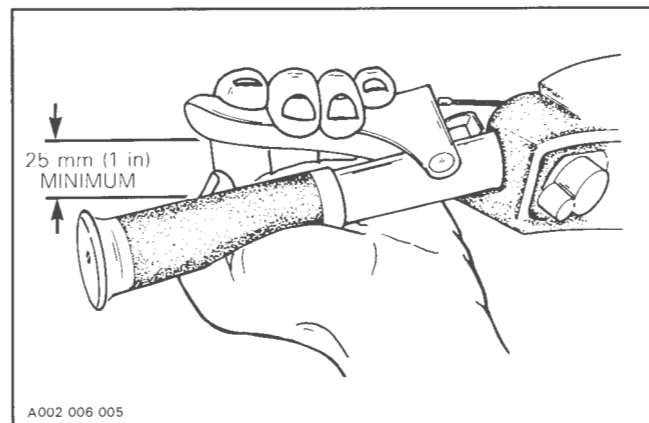


○ NOTE : When replacing brake cable, adjust the length of the loop so that the cable adjusting nuts are halfway on their threads. This will allow adequate final adjustment.

ADJUSTMENT

Brake handle

Adjust so that brake applies fully when brake handle is 25 mm (1 in) from handlebar grip.

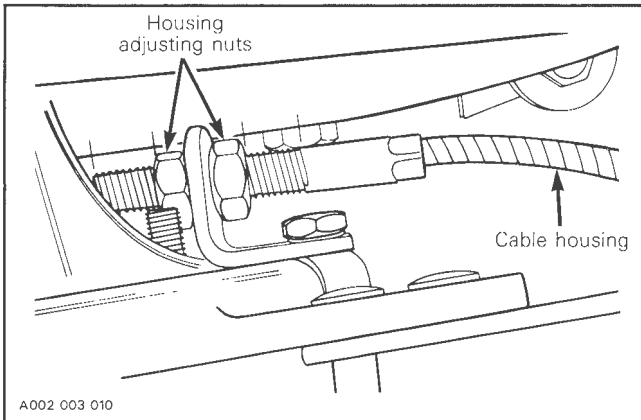


Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

○ **NOTE :** Prior to cable installation, make sure cable housing adjusting nuts are located halfway on adjuster threads.

If a final adjustment is indicated, use housing adjusting nuts.



Brake light operation

To check operation :

Pull the brake handle and check that a light resistance is felt while rotating the driven pulley. This is the position where the switch should have lit the brake light.

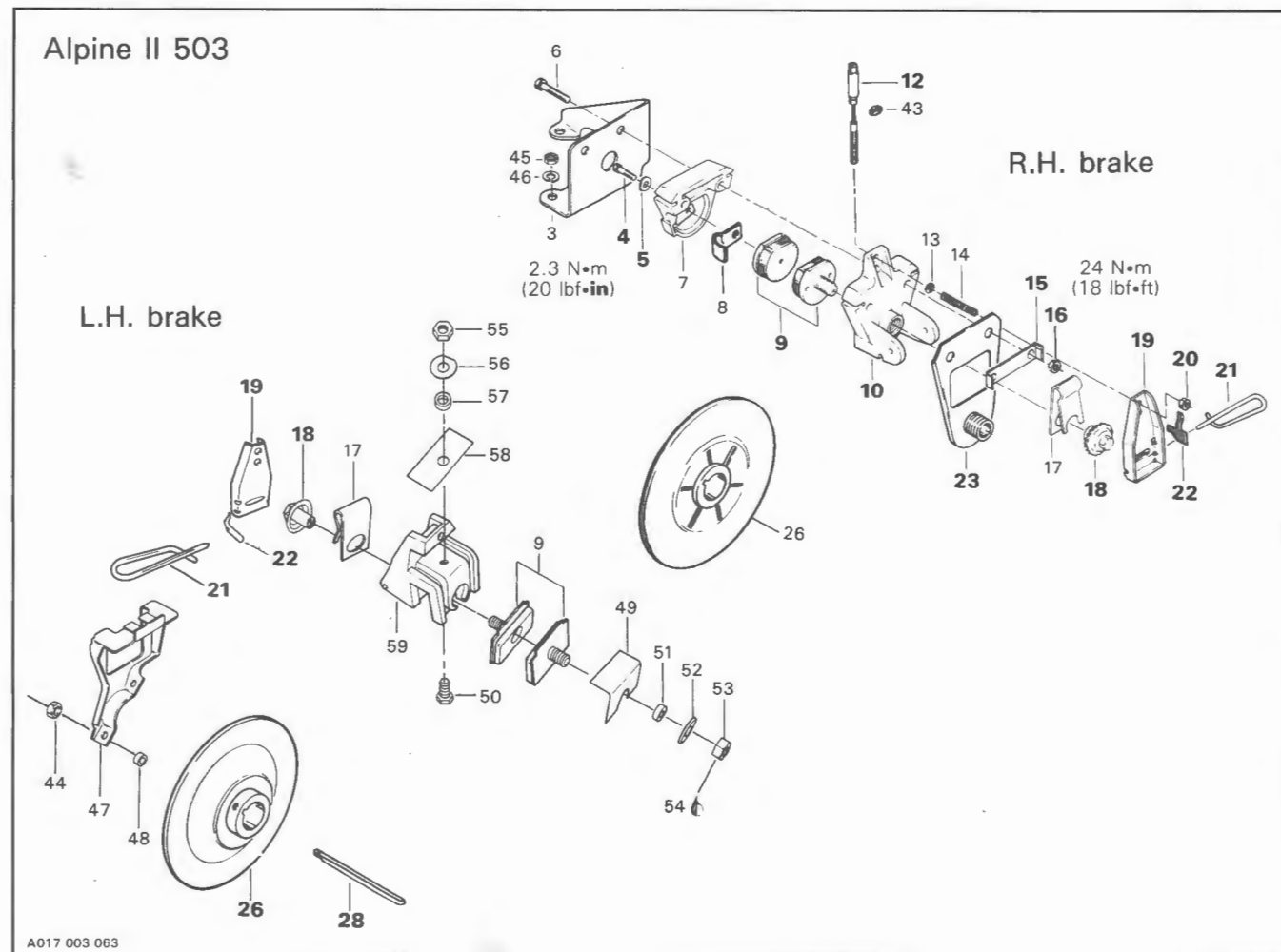
To adjust :

- Loosen the brake switch lock nut.
- Holding brake handle at the lit position, unscrew the switch to put on the light or screw it in to put it out.

Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

DISC BRAKE



- | | |
|------------------------|--------------------------------|
| 3. Brake support | 23. Angle drive support |
| 4. Screw | 26. Brake disc (2) |
| 5. Lock tab | 28. Key (brake disc) |
| 6. Screw M8 | 43. Circlip |
| 7. Inner caliper half | 45. Nut M8 (4) |
| 8. Wear indicator | 46. Lock washer |
| 9. Brake pad (4) | 47. Brake support |
| 10. Outer caliper half | 48. Spacer (2) |
| 12. Brake cable | 49. Spacer |
| 13. Circlip (2) | 50. Bolt 5/16-18 x 3/4 |
| 14. Spring (2) | 51. Bushing |
| 15. Lock tab | 52. Washer |
| 16. Nut | 53. Nut |
| 17. Release spring (2) | 54. Loctite 271 |
| 18. Ratchet wheel (2) | 55. Nut 5/16-18 |
| 19. Brake Lever (2) | 56. Washer |
| 20. Nut (2) | 57. Bushing |
| 21. Pin (2) | 58. Spacer |
| 22. Ratchet spring (2) | 59. Mobile brake lining holder |

NOTE: Some reference numbers are deliberately missing. Only numbers reporting to the above specified vehicle are listed.

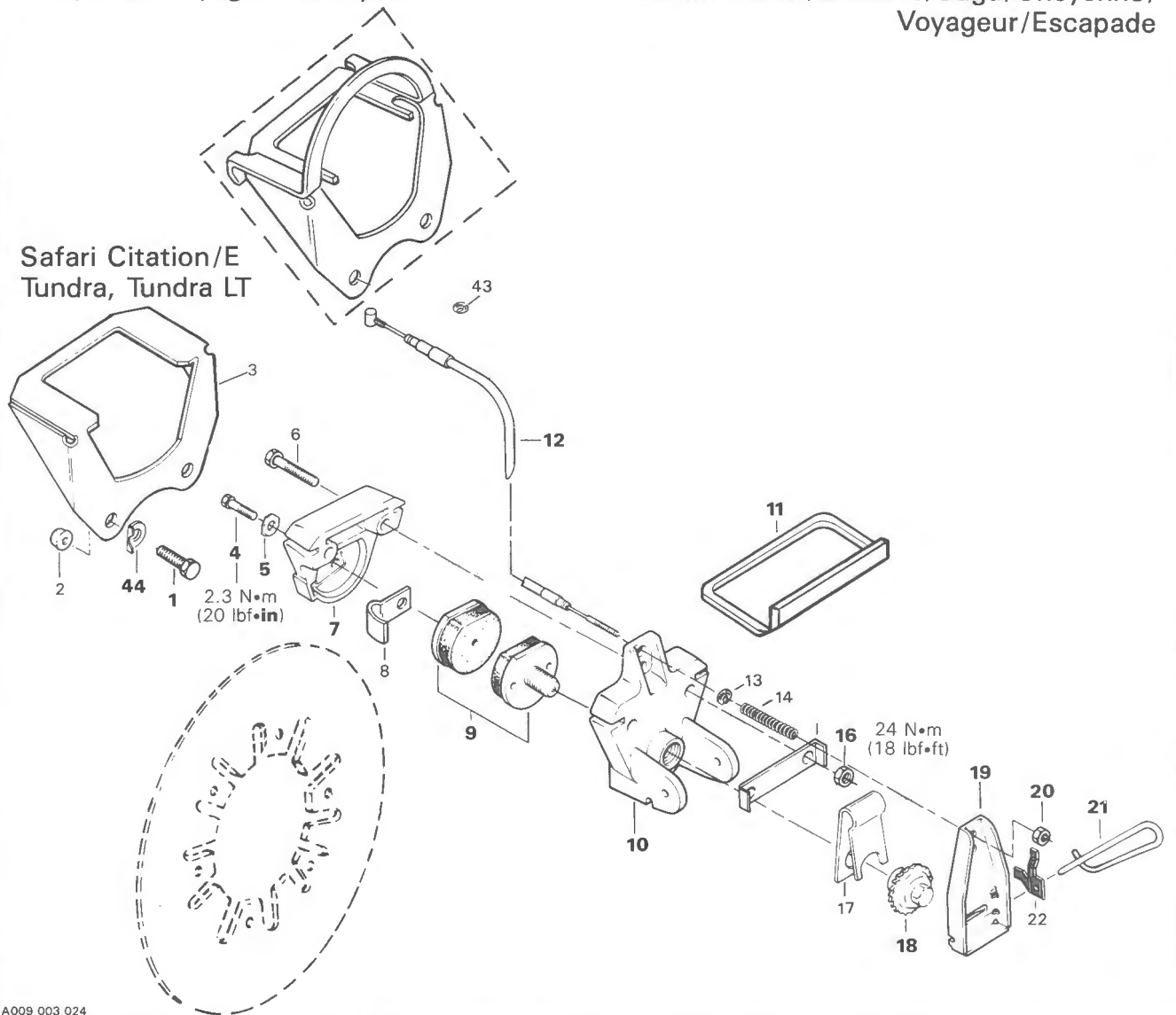
Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

Safari Scout/Scout E/Saga
Cheyenne/Voyageur/Escapade

Safari Citation/E, Tundra, Tundra LT,
Safari Scout/Scout E/Saga/Cheyenne/
Voyageur/Escapade

Safari Citation/E
Tundra, Tundra LT



A009 003 024

1. Screw
2. Nut (Not applicable on Safari Cheyenne)
3. Brake support
4. Screw M5
5. Lock tab
6. Screw M8
7. Inner caliper half
8. Wear indicator
9. Brake pad (2)
10. Outer caliper half
11. Slider
12. Brake cable

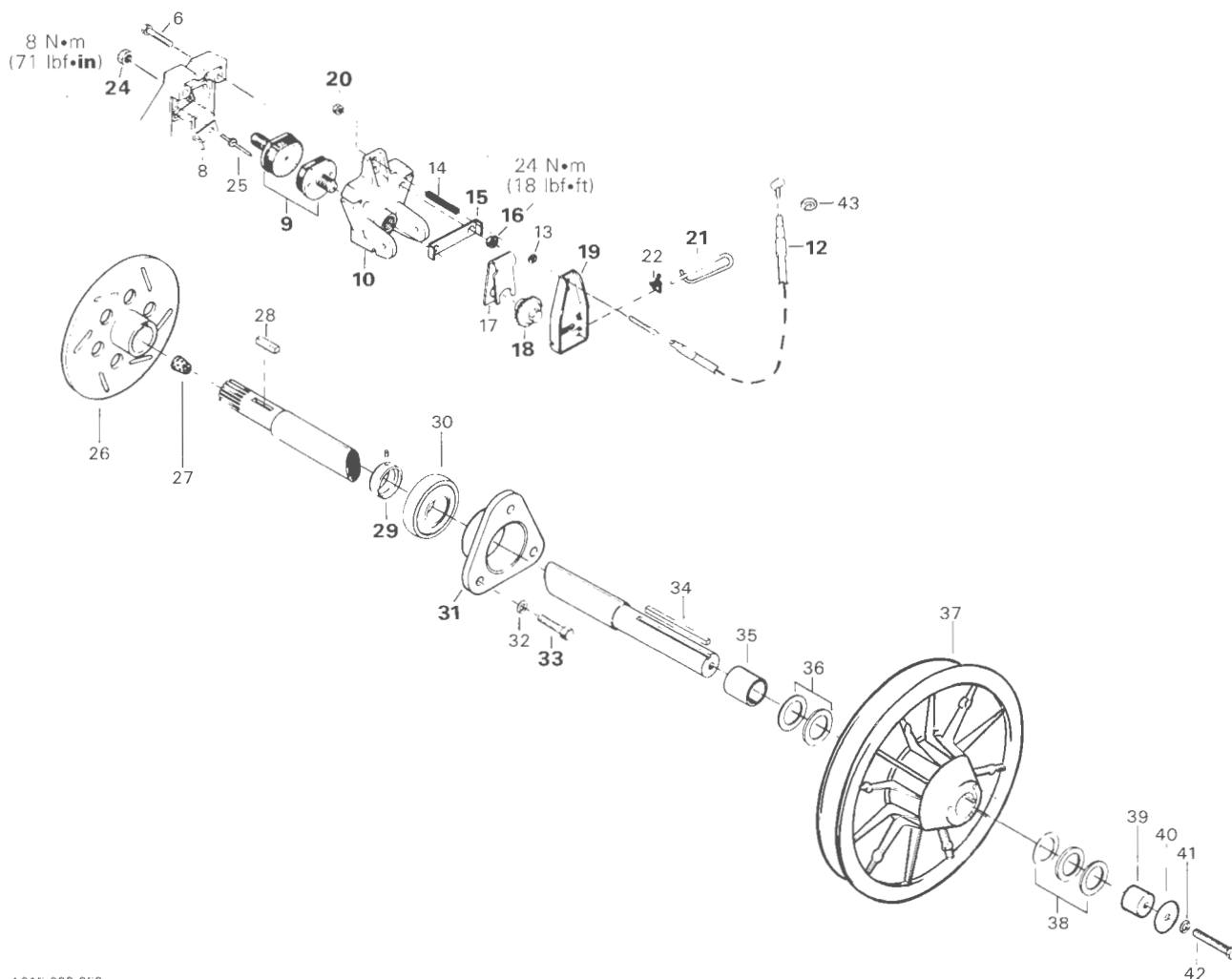
13. Circlip
14. Spring
15. Lock tab
16. Nut M8
17. Release spring
18. Ratchet wheel
19. Brake Lever
20. Nut
21. Pin
22. Ratchet spring
43. Circlip
44. Lock tab (Safari Cheyenne only)

NOTE: Some reference numbers are deliberately missing. Only numbers reporting to the above specified vehicle are listed.

Section 03 TRANSMISSION


Sub-section 06 (BRAKE)

Formula MX/MX LT/Plus/Plus LT/Mach I



A015 003 050

- | | |
|------------------------|----------------------------------|
| 6. Screw M8 | 27. Cork |
| 8. Wear indicator | 28. Key (brake disc) |
| 9. Brake pad (2) | 29. Collar with Allen screw |
| 10. Outer caliper half | 30. Bearing |
| 12. Brake cable | 31. Countershaft bearing housing |
| 13. Circlip | 32. Lock washer |
| 14. Spring | 33. Screw |
| 15. Lock tab | 34. Key (driven pulley) |
| 16. Nut M8 | 35. Spacer |
| 17. Release spring | 36. Shim |
| 18. Ratchet wheel | 37. Driven pulley |
| 19. Brake lever | 38. Shim |
| 20. Nut | 39. Extension |
| 21. Pin | 40. Washer |
| 22. Ratchet spring | 41. Lock washer |
| 24. Nut | 42. Screw |
| 25. Rivet | 43. Circlip |
| 26. Brake disc | |

 **NOTE:** Some reference numbers are deliberately missing. Only numbers reporting to the above specified vehicle are listed.

Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

REMOVAL

Alpine II 503

R.H. brake :

- Remove speedometer cable and angle drive.
- Unfold lock tab and remove retaining nuts **#16**.
- Pull outer caliper half, brake disc, then inner caliper half.
- To remove brake support, first remove fuel tank to give access to the most forward retaining nut.

L.H. brake :

- Remove pulley guard.
- Remove brake cable.
- Unscrew two nuts retaining brake bracket to gearbox and remove caliper with its bracket.

Safari Citation/E, Tundra, Tundra LT, Safari Scout/Scout E/Saga/Cheyenne/Voyageur/Escapade

The split caliper type brake should be removed from chaincase as an assembly. Proceed as follows :

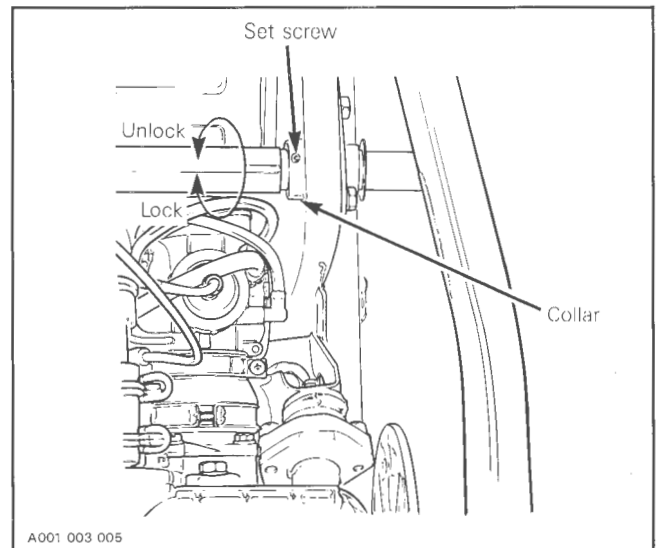
- Remove belt guard.
- Disconnect brake cable.
- Remove bolts **#1** securing brake support to chaincase.
- Slide brake caliper ass'y out of brake support.
- To remove brake disc, refer to driven pulley, section 03-04.

Formula MX/MX LT/PLUS/PLUS LT/Mach I

- Remove air silencer.
- Remove injection oil and coolant reservoirs.
- Unfold lock tab and unscrew both nuts **#16** from caliper.
- Remove bolts **#6** and outer caliper half from disc.
- Disconnect brake cable.

COUNTERSHAFT & BRAKE DISC REMOVAL

- Remove muffler.
- Refer to chaincase, section 03-07 in order to remove chaincase cover.
- Remove upper sprocket castellated nut.
- Remove belt guard, drive belt and driven pulley referring to Driven Pulley, section 03-04.
- Slacken set screw and unlock collar **# 29**.



- Remove 3 retaining screws **#33** from countershaft bearing housing.
- Pull countershaft toward driven pulley side to free from chaincase. Withdraw countershaft toward chaincase.
- Remove brake disc from countershaft.

DISASSEMBLY

9,19,21, Brake pad, brake lever & pin

Pull pin out of caliper and remove lever. Unscrew ratchet wheel in order to remove moving pad.

Remove fixed pad.

CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

▼ **CAUTION :** Do not clean brake pads in solvent. Soiled brake pads must be replaced by new ones.

Section 03 TRANSMISSION

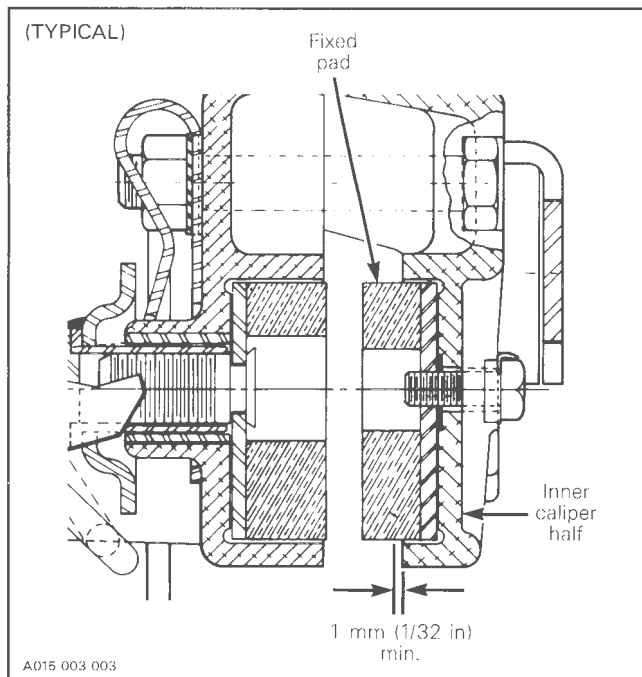
Sub-section 06 (BRAKE)

INSPECTION

9, Brake pad thickness

Brake pads must be replaced when **fixed** pad projects only 1 mm (1/32 in) from caliper.

▼ **CAUTION** : Brake pads must always be replaced in pairs.



Brake disc

Check for scoring, cracking or heat discoloration, replace as required. Refer to driven pulley, section 03-04 for procedures on applicable models.

▼ **CAUTION** : Brake disc should never be machined.

ASSEMBLY

18, Ratchet wheel

Apply low temperature grease (P/N 413 7061 00) on threads and spring seat prior to installing. Fully tighten then back off 1 turn.

21, Pin

Install so that it can only be removed upward. Lock it in the caliper casting notch.

○ **NOTE** : On Alpine II 503, install angle drive support #23 prior to assembling lever and pin on caliper.

4,5,9, Screw, lock tab & fixed brake pad

All except Formula models

Torque screw to 2.3 N•m (20 lbf•in). Bend lock tab over a flat of screw head.

9,24, Fixed brake pad & nut

Formula models

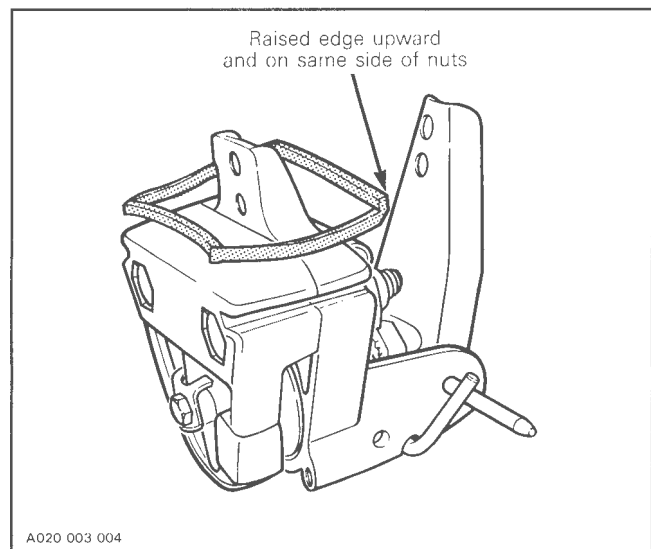
Torque nut to 8 N•m (71 lbf•in).

7,10,15,16, Inner & outer caliper, lock tab & nut

Safari Citation/E, Tundra/LT, Safari Scout/Scout E/Saga/Cheyenne/Voyageur/Escapade

Assemble both caliper halves. Insert bolts, lock tab, then nuts. Torque nuts to 24 N•m (18 lbf•ft). Caliper half side slots must align to allow proper sliding in brake support. Bend lock tab over a flat of each nut.

Install rubber slider #11 into side slots of caliper. It must be installed so that the raised edge is upward and on the same side of nuts as shown.



▼ **CAUTION** : Positioning of rubber slider is important to avoid the possibility of damage against lock tab edges.

Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

INSTALLATION

To install brake, reverse removal procedure paying attention to the following.

◆ **WARNING :** Avoid getting oil on brake pads. Do not lubricate or apply antirust or anti-freeze solution in brake cable.

26, Brake disc

Formula models and Alpine II R.H. brake only

The brake disc must be floating on countershaft for efficient operation of brake.

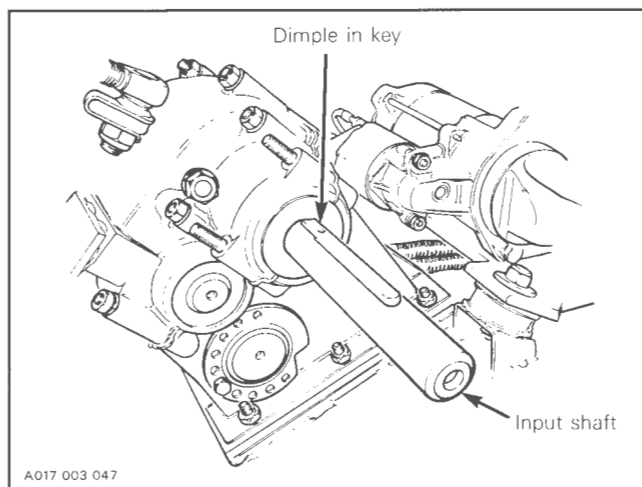
Apply antiseize lubricant (P/N 413 7010 00) on shaft and check that disc slides freely.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward gearbox on Alpine II 503 and toward driven pulley on Formula models.

26,28, Brake disc & key

Alpine II L.H. brake only

Install key on input shaft making sure dimple in key is up and toward transmission. Slide brake disc on input shaft until set screw hole is over dimple in key. Lock brake disc to shaft with set screw, use Loctite 271 (red).



Countershaft bearing adjustment

Formula models only

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing #31 and ensure that countershaft is properly aligned, then tighten 3 retaining screws.

○ **NOTE :** A misaligned countershaft will result in difficulty to center the bearing in its support. Refer to Drive axle, section 05-09 and see for "Chaincase perpendicularity adjustment".

Torque castellated nut of upper sprocket to 53 N•m (39 lbf•ft).

▼ **CAUTION :** Upper sprocket castellated nut must be tightened **before** adjusting bearing collar.

Slide collar #29 towards bearing and turn, by hand, to engage the eccentric. This should require about a quarter turn.

Turn collar in direction of countershaft rotation until collar and inner race lock together.

Insert a punch into collar hole and strike sharply in the same direction to lock firmly.

Apply Loctite 242 (blue) on set screw threads, then tighten.

Close chaincase referring to Chaincase, section 03-07.

1,44, Screw & lock tab

Safari Cheyenne

Tighten brake support screws. Install new lock tabs and bend over a flat of each screw head.

10,15,16, Outer caliper, lock tab & nut

Formula models and Alpine II 503 R.H. brake only

Install caliper retaining bolts.

Install inner caliper on Alpine II 503.

Assemble outer caliper. Install lock tab then nuts. Torque nuts to 24 N•m (18 lbf•ft). Bend lock tab over a flat of each nut.

Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

Alpine II 503 L.H. brake

Torque nuts holding caliper support to transmission to 27 N•m (20 lbf•ft).

12,20, Brake cable & nut

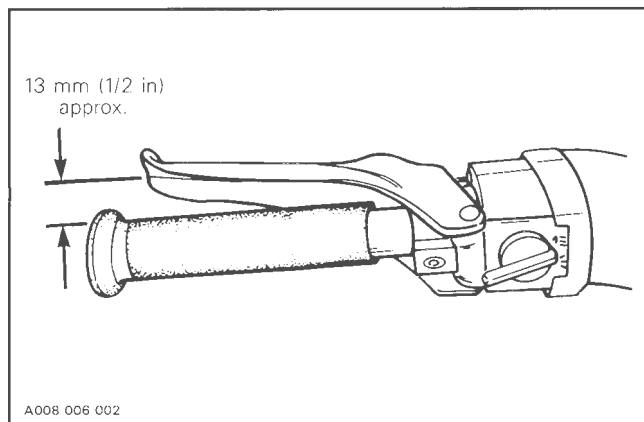
Insert brake cable into upper hole in brake lever and caliper. Install nut and tighten until a few threads exceed.

◆ **WARNING :** At least 3 threads must exceed the elastic stop nut.

ADJUSTMENT

Brake

Fully depress brake handle several times to obtain 13 mm (1/2 in) between brake handle and handlebar grip when brake is fully applied.



Should this adjustment be unattainable, retighten nut **#20** as needed.

Alpine II 503 only

Verify that both brakes apply at the same time, if necessary re-adjust brake cable(s).

Brake light

Brake light should light up before brake pads touch brake disc. To adjust, unscrew nut **#20** until brake light goes on.

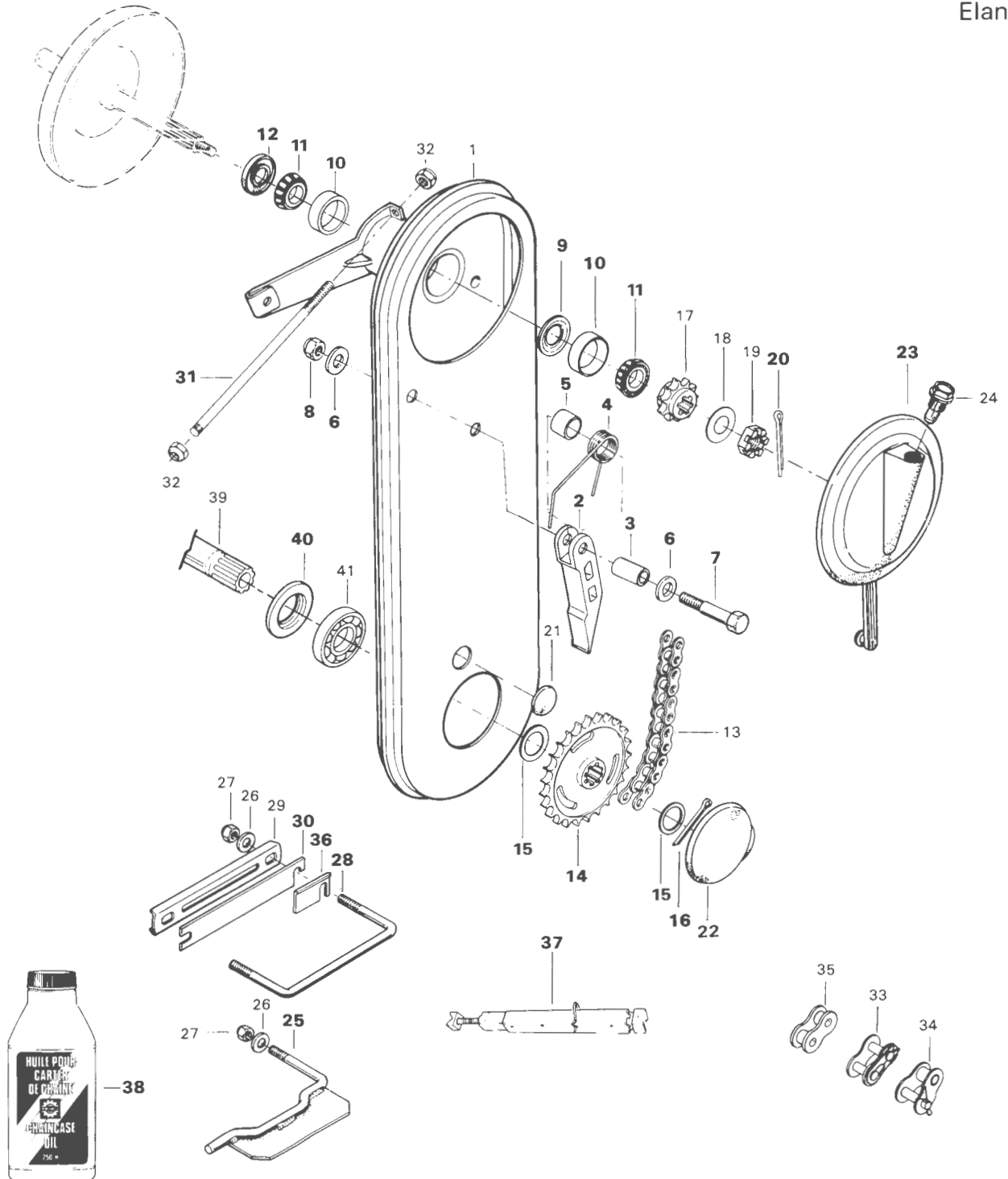
◆ **WARNING :** At least three threads must exceed the elastic stop nut.

Check brake adjustment as described above.

○ **NOTE :** If brake light adjustment is unattainable while respecting brake adjustment, ratchet wheel may be too far out. If so, tighten ratchet wheel.

CHAINCASE

Elan



Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

1. Chaincase
2. Chain tensioner
3. Bushing
4. Spring
5. Spacer
6. Fiber washer (2)
7. Hexagonal cap screw 1/4-20 x 1-3/4
8. Elastic stop nut 1/4-20
9. Oil deflector
10. Bearing cup (2)
11. Bearing cone (2)
12. Oil seal
13. Chain
14. Sprocket 25 teeth
15. Spacer (2)
16. Cotter pin
17. Sprocket 10 teeth
18. Washer
19. Castellated nut 1/2-20
20. Cotter pin
21. Chaincase oil level plug
22. Access plug
23. Inspection cover
24. Breather
25. Bracket
26. Flat washer (3)
27. Elastic stop nut 5/16-18 (3)
28. U-clamp
29. Spacer plate
30. Shim (as required)
31. Threaded rod
32. Elastic stop nut 5/16-18 (2)
33. Connecting link
34. Cranked link single, 1/2 in pitch
35. Inner link, 1/2 in pitch
36. Shim (as required)
37. Drive axle holder
38. Chaincase oil 250 ml (9 oz)
39. Drive axle
40. Lower oil seal
41. Bearing

REMOVAL

Chaincase & driven pulley assembly

Chaincase and driven pulley are removed from vehicle as a complete assembly. Proceed as follows :

Remove tool box, pulley guard and drive belt.

2 to 8,23, Tensioner assembly & inspection cover

Remove inspection cover and hold tensioner assembly. Remove chain tensioner bolt, elastic stop nut and fiber washers. Remove tensioner assembly from chaincase.

38,40, Chaincase oil & lower oil seal

Pry lower oil seal from chaincase and drain oil.

Brake cable

Disconnect from chaincase.

15,16,22 Spacer, lower sprocket cotter pin & access plug

Pry out access plug, remove cotter pin and spacer.

31, Threaded rod

Disconnect from chaincase.

25,28, Bracket & U-clamp

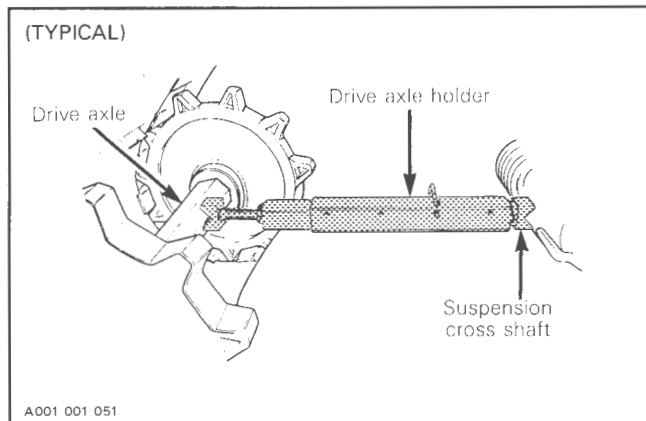
From the inner side of the frame, remove the nut securing chaincase lower bracket and remove bracket. Remove the nuts, washers and U-clamp holding the chaincase to frame.

30,36, Shim

Remove and save for installation.

37, Drive axle holder

Release track tension and use drive axle holder (P/N 529 0072 00).

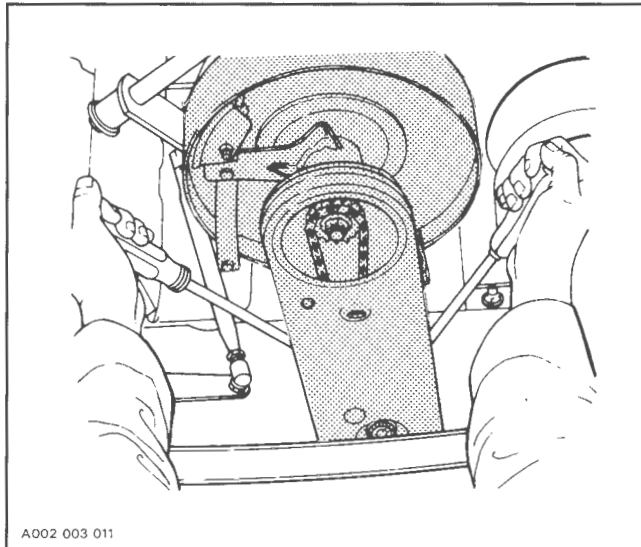


Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

Chaincase & driven pulley assembly

Using two large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.



DISASSEMBLY

Disassemble driven pulley from chaincase. Refer to Driven pulley section 03-04.

INSPECTION

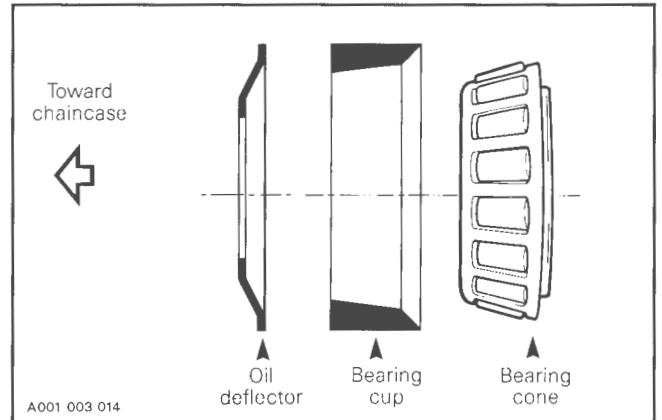
Visually inspect chain for cracked, damaged or missing link rollers. Check for defective bearing cones, bearing cups and oil deflector. Inspect sprockets and chain tensioner assembly for wear.

◆ **WARNING :** If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

ASSEMBLY

9,10,11, Oil deflector, bearing cup & bearing cone

Position oil deflector ring then sit bearing cup in chaincase aperture as shown.

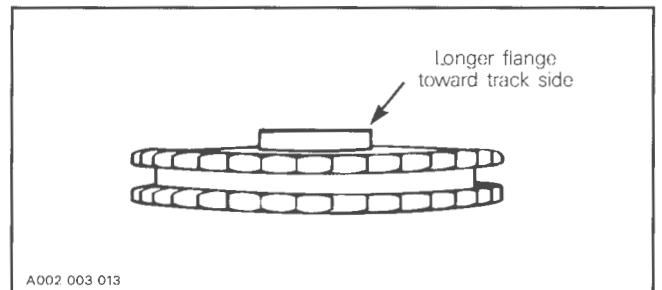


12, Oil seal

Using an appropriate pusher, press new oil seal into chaincase hub. Oil seal must sit flush with case hub edge.

14, Sprocket

Place lower sprocket with longer flange toward track side of chaincase.



INSTALLATION

To install chaincase driven pulley assembly, reverse removal procedure paying special attention to the following :

16,20, Cotter pin

Install new cotter pins.

▼ **CAUTION :** When removing a cotter pin always replace with a new one.

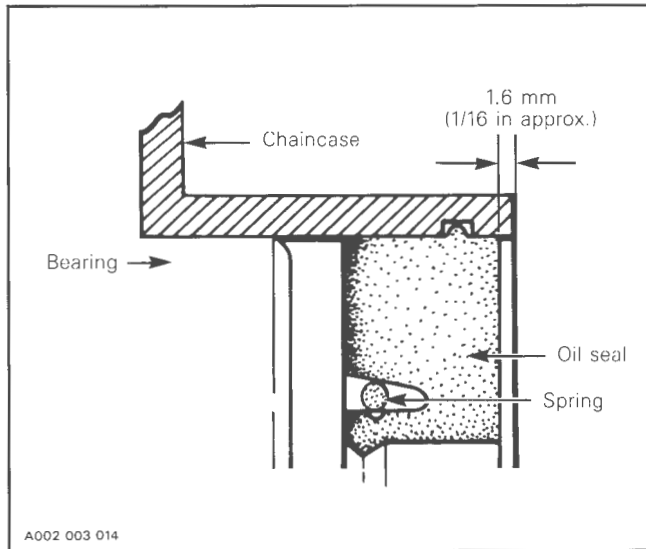
Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

40, Lower oil seal

Install new oil seal into chaincase flange as shown.

○ **NOTE :** A gap of approximately 1.6 mm (1/16 in) should exist between the end of chaincase flange and oil seal.

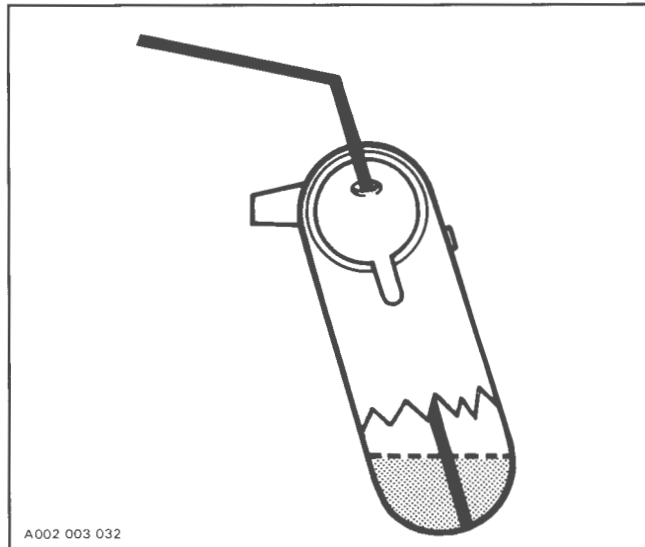


38, Chaincase oil

Remove filler cap and pour 200 ml (7 fl. oz) of chaincase oil (P/N 413 8019 00) into chaincase.

○ **NOTE :** Chaincase oil capacity is 200 ml (7 fl. oz).

Using a rigid wire as a "dipstick", check oil level. The oil level on the "dipstick" should be 50-65 mm (2 in to 2-1/2 in).



ADJUSTMENT

Pulley alignment

Refer to section 03-05.

Brake operation & brake light

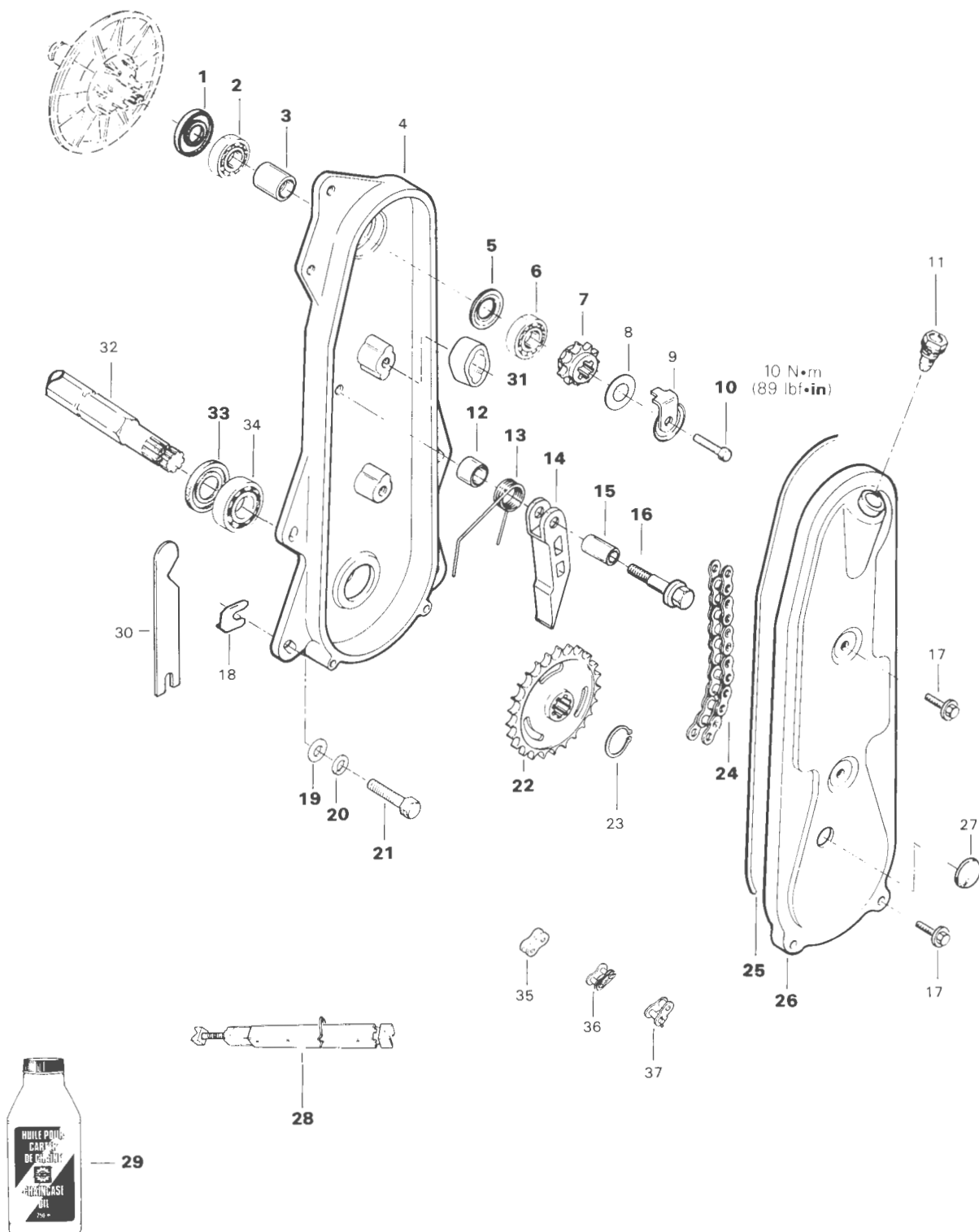
Refer to section 03-06.

Track tension & alignment

Refer to section 05-10.

Section 03 TRANSMISSION **Sub-section 07 (CHAINCASE)**

Safari Citation/E, Tundra/LT



Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

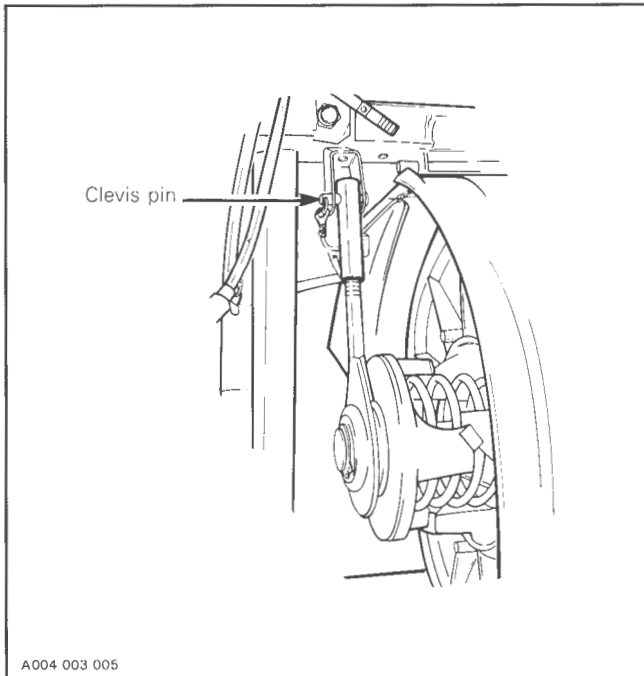
1. Oil seal
2. Ball bearing
3. Spacer
4. Chaincase
5. Oil retainer ring
6. Ball bearing
7. Single sprocket (small)
8. Washer
9. Lock tab
10. Cap screw M8 x 1.25 x 16
11. Breather
12. Spacer
13. Spring
14. Chain tensioner
15. Bushing
16. Cap screw M6 x 1 x 40
17. Taptite screw M6 x 1 x 16 (4)
18. Shim (as required)
19. Flat washer 8.4 mm (except Safari Citation E)
20. Lock washer 8 mm
21. Cap screw M8 x 1.25 x 25
22. Single sprocket (large)
23. Circlip
24. Driving chain
25. Gasket
26. Chaincase cover
27. Chaincase oil level plug
28. Drive axle holder
29. Chaincase oil 250 ml (9 oz)
30. Shim (Safari Citation E) (as required)
31. Protector (2) (if needed)
32. Drive axle
33. Seal
34. Bearing
35. Inner link, 1/2 in pitch
36. Connecting link, 1/2 in pitch
37. Cranked link, 1/2 in pitch

REMOVAL

Chaincase and driven pulley can be removed from the vehicle as an assembly.

Remove pulley guard and drive belt.

Remove clevis pin from the bracket.



26, Chaincase cover

Remove and drain oil.

33, Drive axle oil seal

Pry out from chaincase.

7,12 to 16,22,24, Sprockets, tensioner assembly & chain

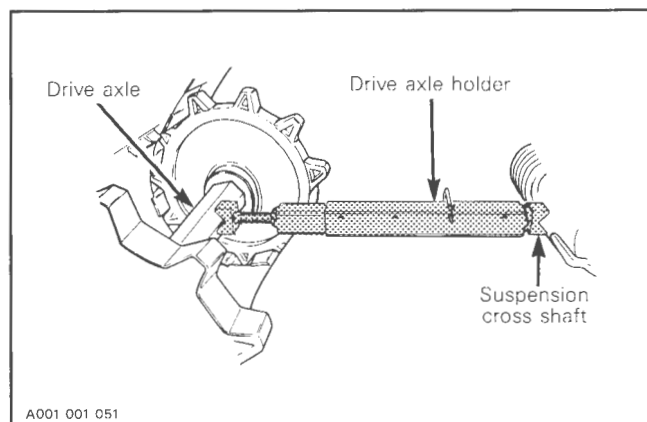
Unscrew the bolt on the upper sprocket and remove circlip on the bottom one. Remove chain tensioner assembly, then simultaneously remove chain and both sprockets.

19,20,21, Washer & cap screw

Remove the four cap screws securing chaincase to frame. Save alignment shims for installation.

28, Drive axle holder

Release track tension, use drive axle holder (P/N 529 0072 00).



NOTE : On electric starting model, disconnect and remove battery from its rack.

CAUTION : Be careful not to ground positive terminal with the chassis. Always disconnect black negative cable first.

Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

Chaincase & driven pulley assembly

Using two large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.

DISASSEMBLY

Disassemble driven pulley from chaincase. Refer to Driven pulley section 03-04.

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Check for defective bearings, sprockets and worn chain tensioner components.

◆ **WARNING :** If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Available lower sprocket :
27 teeth

Available upper sprockets :
11, 12, 15 teeth

Available chains :
62, 64 links

The chain length may be affected depending the combination of lower/upper sprockets as follows :

| GEAR RATIO/CHAIN LENGTH CHART | | |
|-------------------------------|----------------------|-------------------|
| GEAR RATIO | CHAIN LENGTH (LINKS) | STANDARD ON |
| 11/27* | 62 | OPT. |
| 12/27 | 62 | Tundra/LT |
| 15/27 | 64 | Safari Citation/E |

OPT.= Optional

* Chaincase protector #31 is mandatory with this sprocket.

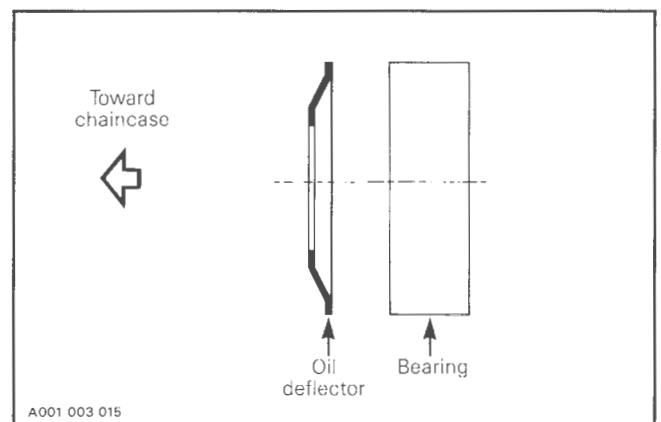
▼ **CAUTION :** Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

○ **NOTE :** For high altitude regions, the "High altitude technical booklet" (P/N 484 0552 00 and P/N 484 0545 00 for binder) gives information about calibration according to altitude.

ASSEMBLY

2,3,5,6, Oil deflector, spacer & bearing

Position oil deflector ring then sit bearing in chaincase aperture. Install spacer then the other bearing.



1, Oil seal

Using an appropriate pusher, press new oil seal into chaincase hub. Oil seal must sit flush with case hub edge.

INSTALLATION

Reverse removal procedure. Pay particular attention to the following :

10, Cap screw

Torque to 10 N•m (89 lbf•in).

31, Protector

In case of a vehicle equipped with an 11 tooth sprocket, check the wear of protectors. Replace if required.

Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

25, Gasket

Grease new gasket with petroleum jelly, or other suitable product, and install making sure gasket does not shift from it's correct position. Tighten bolts evenly.

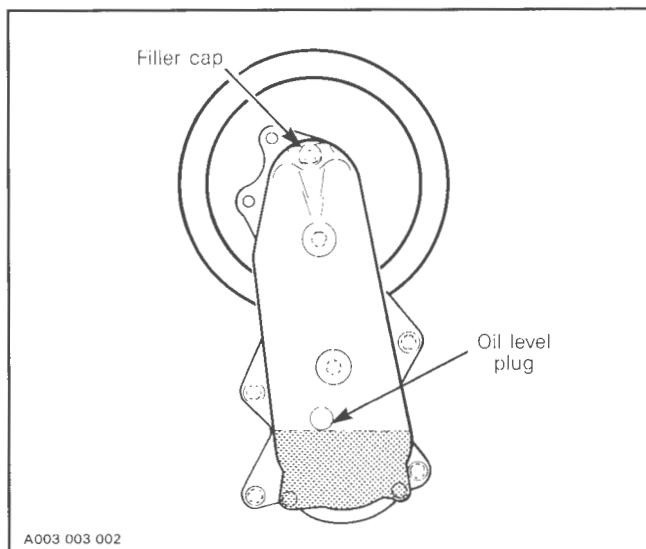
○ **NOTE :** Bottom pan has an emboss below chaincase housing to ease installation.

29, Chaincase oil

Remove filler cap and pour 200 ml (7 fl. oz) of chaincase oil (P/N 413 8019 00) into chaincase.

○ **NOTE :** Chaincase oil capacity is 200 ml (7 fl. oz).

Check the oil level by removing the chaincase oil level plug.



The oil should be level with the bottom of the oil level orifice.

Reinstall battery and connect cables on electric starting model.

▼ **CAUTION :** Always connect positive red cable first to prevent sparks.

ADJUSTMENT

Pulley alignment

For pulley distance and adjustment, refer to section 03-05.

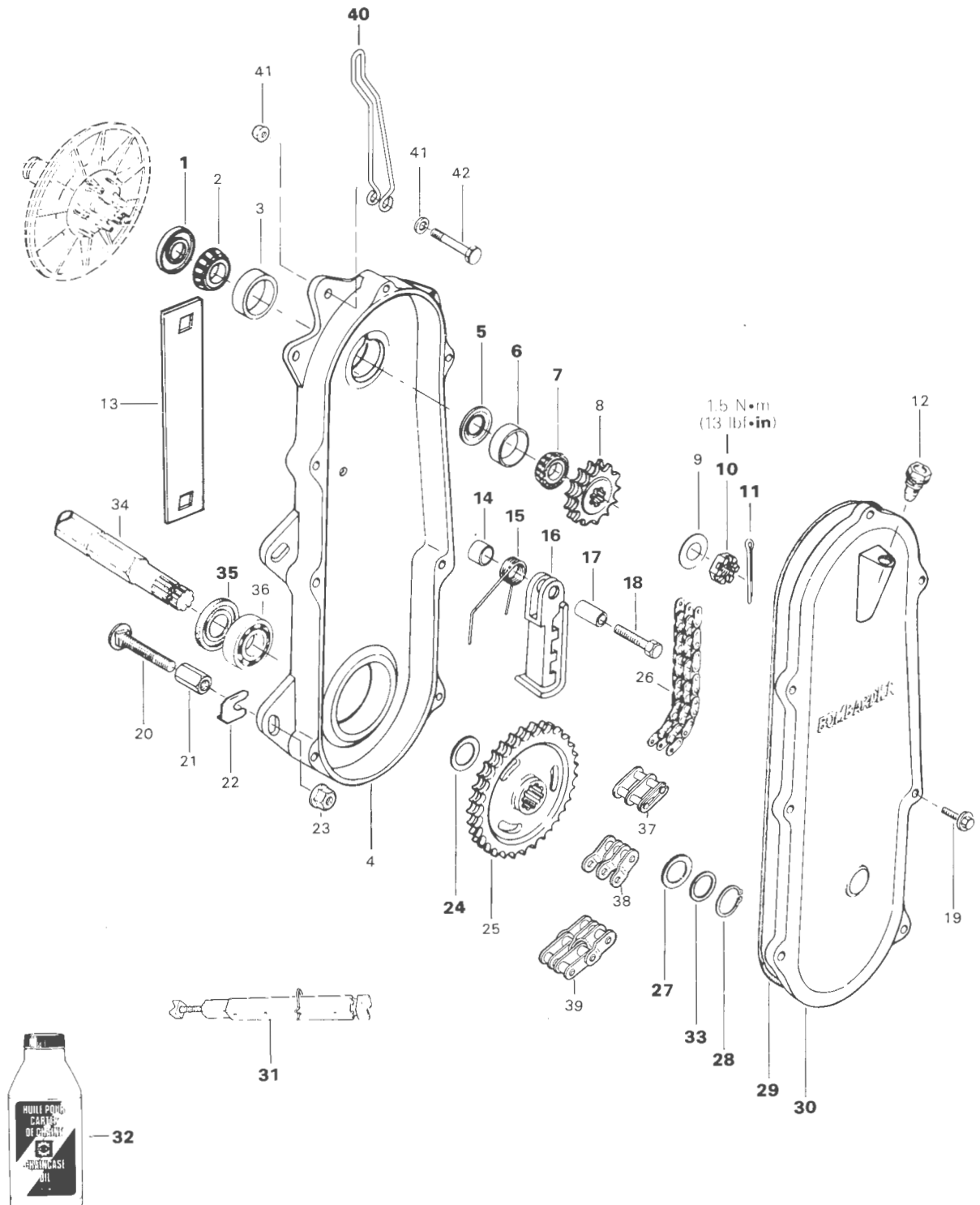
Track tension & alignment

Refer to section 05-10.

Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

Safari Scout/Scout E/Saga/Voyageur



Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

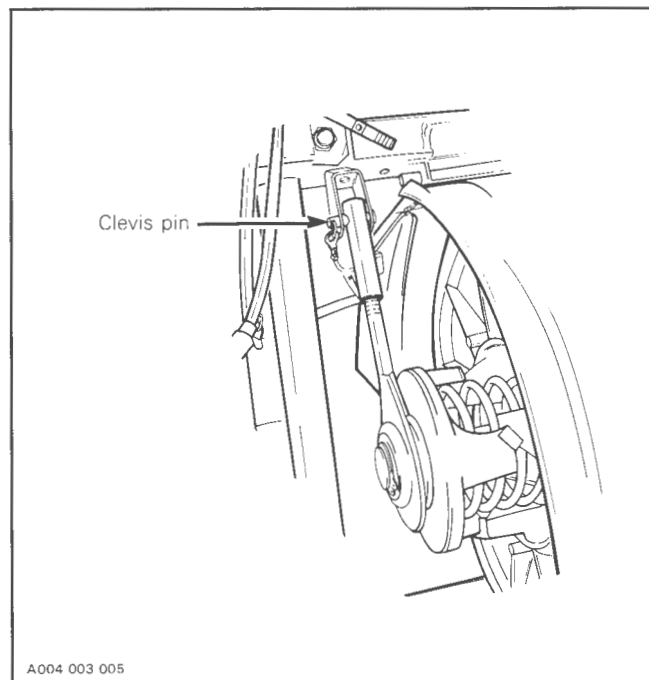
1. Oil seal
2. Bearing cone
3. Bearing cup
4. Chaincase
5. Oil deflector
6. Bearing cup
7. Bearing cone
8. Upper sprocket (small)
9. Spring washer
10. Castellated nut
11. Cotter pin
12. Breather
13. Reinforcement
14. Spacer (2)
15. Spring (2)
16. Chain tensioner (2)
17. Bushing (2)
18. Screw (2)
19. Taptite screw M6 x 30 (7)
20. Carriage bolt M8 x 1.25 x 55 (4)
21. Threaded spacer (4)
22. Shim (as required)
23. Elastic stop nut M8 x 1.25 (4)
24. Spacer (thicker) (3)
25. Lower sprocket (large)
26. Drive chain
27. Spacer (thinner) (3)
28. Snap ring
29. O-ring
30. Chaincase cover
31. Drive axle holder
32. Chaincase oil 250 ml (9 oz)
33. Special spacer (1)
34. Drive axle
35. Oil seal
36. Bearing
37. Connecting link, 3/8 in pitch
38. Cranked link, 3/8 in pitch
39. Inner link, 3/8 in pitch
40. Support
41. Washer
42. Screw M6 x 30

REMOVAL

Chaincase and driven pulley can be removed from the vehicle as an assembly.

Remove pulley guard and drive belt.

Remove clevis pin from the bracket.



30, Chaincase cover

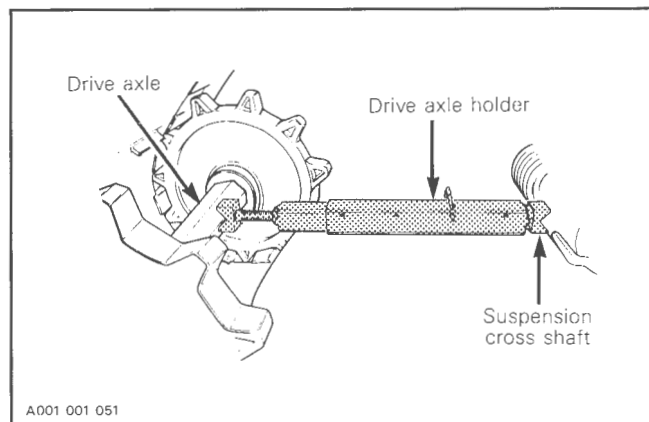
Remove and drain oil.

35, Drive axle oil seal

Pry out from chaincase.

32, Drive axle holder

Release track tension, use drive axle holder (P/N 529 0072 00).



Chaincase & driven pulley assembly

Using two large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.

DISASSEMBLY

Disassemble driven pulley from chaincase. Refer to Driven pulley section 03-04.

NOTE : On electric starting model, disconnect and remove battery from its rack.

CAUTION : Be careful not to ground positive terminal with the chassis. Always disconnect black negative cable first.

Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Check for worn or defective bearings, sprockets and tensioner components.

◆ **WARNING :** If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Available lower sprockets :
33, 34, 35, 37, 38, 39 teeth

Available upper sprockets :
14, 15, 16, 17, 18, 19, 20 teeth

Available chains :
88, 90, 92 links

The chain length may be affected depending the combination of lower / upper sprockets. Select chain length according to this chart.

| GEAR RATIO/CHAIN LENGTH CHART | | |
|-------------------------------|----------------------|-------------|
| GEAR RATIO | CHAIN LENGTH (LINKS) | STANDARD ON |
| 14/35 | 88 | OPT. |
| 15/34 | 88 | OPT. |
| 15/35 | 88 | Saga |
| 15/38 | 90 | OPT. |
| 16/33 | 88 | OPT. |
| 16/34 | 88 | Scout/E |
| 17/33 | 88 | OPT. |
| 17/39 | 92 | Voyageur |
| 18/39 | 92 | OPT. |
| 19/39 | 92 | OPT. |
| 20/37 | 92 | OPT. |

OPT.= Optional

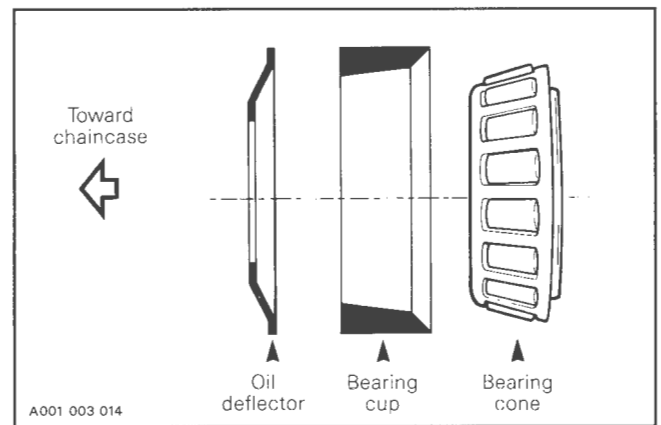
▼ **CAUTION :** Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

○ **NOTE :** For high altitude regions, the "High altitude technical booklet" (P/N 484 0552 00 and P/N 484 0545 00 for binder) gives information about calibration according to altitude.

ASSEMBLY

5,6,7, Oil deflector, bearing cup & bearing cone

Position oil deflector ring then sit bearing cup in chaincase aperture as shown.



1, Oil seal

Using an appropriate pusher, press new oil seal into chaincase hub. Oil seal must sit flush with case hub edge.

INSTALLATION

Reverse removal procedure and pay attention to the following :

24,27,33, Spacer

Install the thicker spacer on the chaincase side of the sprocket.

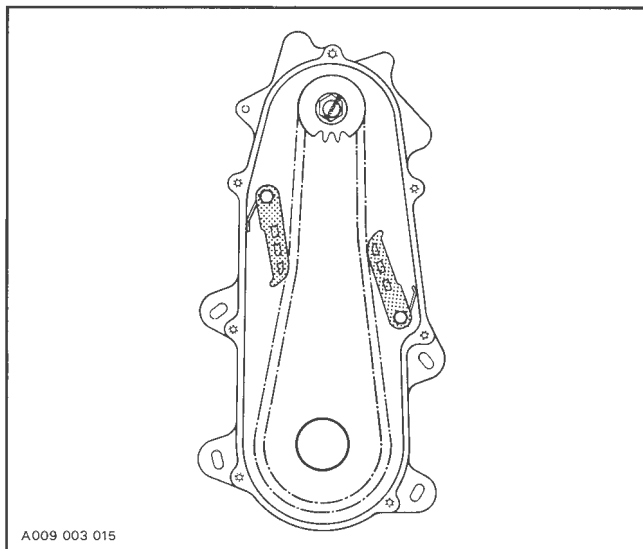
▼ **CAUTION :** Amount of spacers used is critical and varies from one model to the other, if in doubt refer to illustration and parts list for each particular model.

Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

14,15,16,17,18, Chain tensioner

See illustration for proper positioning of chain tensioners in chaincase.



10, Castellated nut

Tighten nut sufficiently to seat bearings, then loosen nut 1/4 turn and torque to 1.5 N•m (13 lbf•in).

1,11,29, Seal, cotter pin & O-ring

Install a new cotter pin and replace seal and O-ring.

▼ **CAUTION :** When removing a cotter pin always replace with a new one.

28, Snap ring

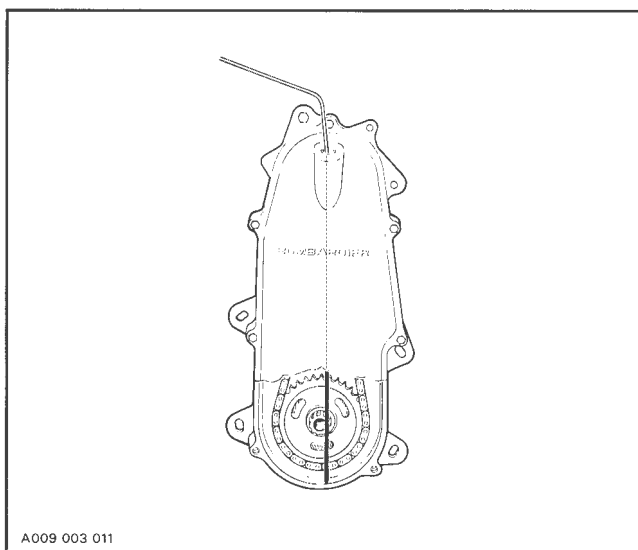
▼ **CAUTION :** It is of the utmost importance to install the snap ring otherwise damage to the chaincase components may occur.

32, Chaincase oil

Pour 200 ml (7 fl. oz) of chaincase oil (P/N 413 8019 00) into chaincase.

○ **NOTE :** Chaincase oil capacity is 200 ml (7 fl. oz).

Remove the filler cap then using a rigid wire as a "dipstick", check oil level. The oil level on the "dipstick" should be 50-65 mm (2 in to 2-1/2 in).



Reinstall battery and connect cables on electric starting models.

▼ **CAUTION :** Always connect positive red cable first to prevent sparks.

40, Support

Pivot support as required so that it matches pulley guard slot.

ADJUSTMENT

Pulley alignment

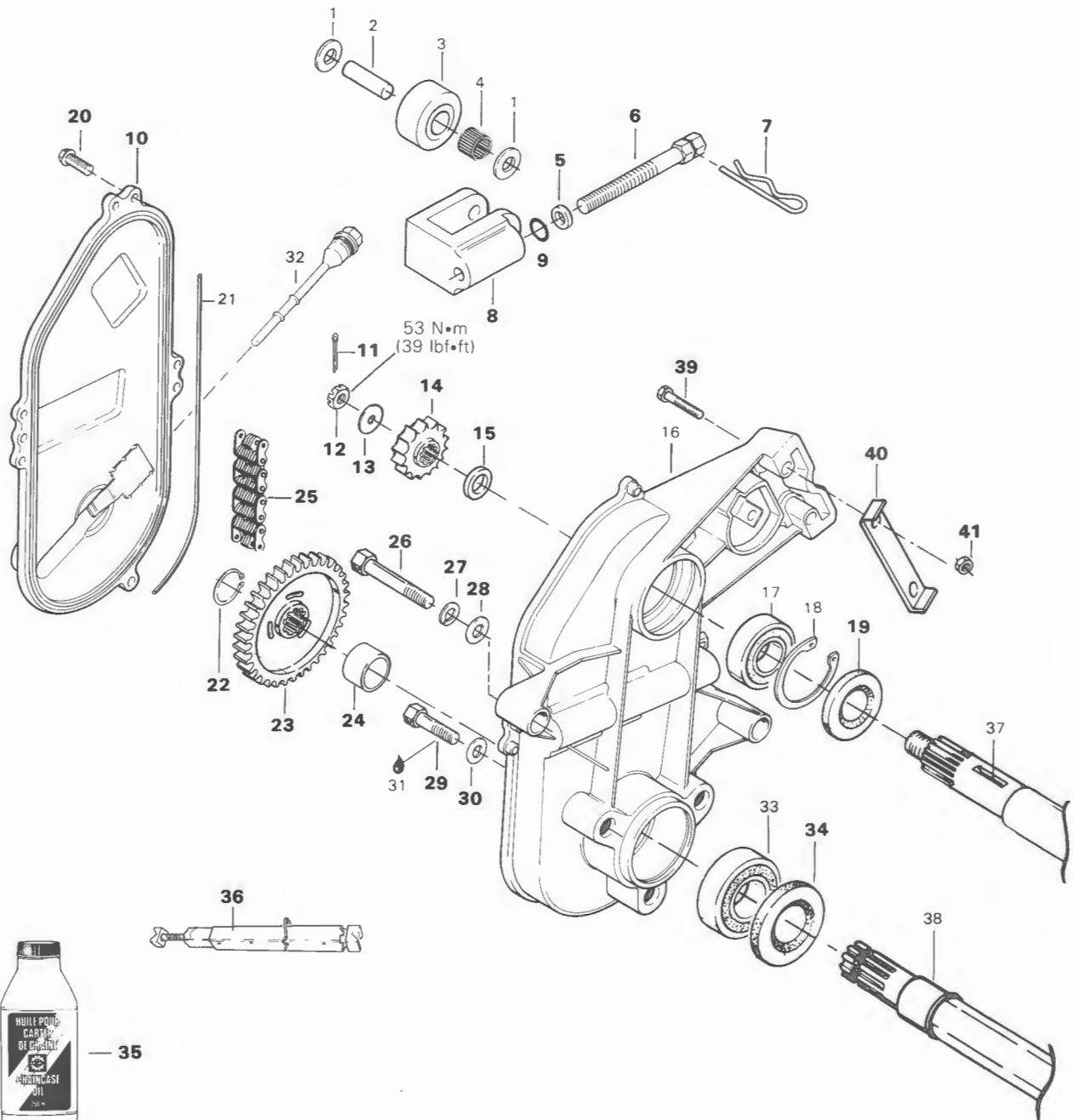
For pulley distance and adjustment, refer to section 03-05.

Track tension & alignment

Refer to section 05-10.

Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

Formula MX/MX LT/PLUS/PLUS LT/MACH I



Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

1. Shim (2)
2. Tensioner shaft
3. Roller
4. Needle bearing
5. Brass washer
6. Tensioner adjustment screw
7. Hair pin
8. Chain tensioner
9. O-ring
10. Chaincase cover
11. Cotter pin
12. Castellated nut
13. Washer
14. Sprocket (small)
15. Shim (1)
16. Chaincase
17. Ball bearing
18. Retaining ring
19. Oil seal
20. Taptite screw M6 x 30 (4)
21. O-ring gasket
22. Circlip
23. Sprocket (large)
24. Shim (1)
25. Drive chain
26. Cap screw M10 x 45 (2)
27. Spring lock washer (2)
28. Flat washer 10.5 mm (2)
29. Cap screw M10 x 20 (3)
30. Brass washer (3)
31. Loctite 242
32. Filler cap/dipstick
33. Drive axle bearing
34. Drive axle oil seal
35. Chaincase oil
36. Drive axle holder
37. Countershaft
38. Drive axle
39. Screw M8 x 50 (2)
40. Lock tab
41. Nut M8 (2)

REMOVAL

To remove chaincase proceed as follows.

Remove tuned exhaust pipe and muffler.

◆ **WARNING :** Never remove exhaust components when engine is hot.

6,7,8, Adjustment screw, hair pin & chain tensioner

Remove hair pin. Release drive chain tension by unscrewing tensioner adjustment screw.

10,20, Chaincase cover & screw

Drain oil by removing chaincase cover.

11,12,13,14,15,22,23,24,25, Sprocket & drive chain

Remove cotter pin, nut, washer retaining upper sprocket and circlip retaining lower sprocket. Pull sprockets and drive chain simultaneously. Remove shims.

○ **NOTE :** Should countershaft removal be required, refer to section 03-06, Brake, and look for Brake disc.

26,27,28,29,30, Cap screw & washer

Remove cap screws (5). Three cap screws are behind the lower sprocket location.

39,40,41, Screw, lock tab & nut

Unfold lock tab, unscrew nuts then remove caliper retaining screws.

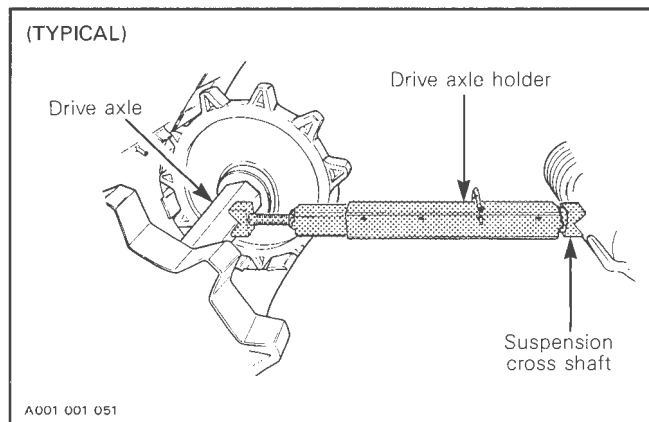
34, Drive axle oil seal

Pry out from chaincase.

Pull chaincase from drive axle and countershaft.

36, Drive axle holder

Release track tension, use drive axle holder (P/N 529 0072 00).



Chaincase

Using two large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.

INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Check for worn or defective bearings, sprockets and chain tensioner components.

◆ **WARNING :** If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Available lower sprockets :
 38, 40, 44, teeth

Available upper sprockets :
 20, 22 teeth

Available chains :
 68, 70, 72 links

The chain length may be affected depending the combination of lower /upper sprockets. Select chain length according to this chart.

| GEAR RATIO/CHAIN LENGTH CHART | | |
|-------------------------------|----------------------|----------------------|
| GEAR RATIO | CHAIN LENGTH (LINKS) | STANDARD ON |
| 20/38 | 68 | Formula Plus/Plus LT |
| 20/44 | 72 | OPT. |
| 22/44 | 72 | Formula MX/MX LT |
| 22/40 | 70 | Formula MACH I |

OPT.= Optional

▼ **CAUTION :** Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

○ **NOTE :** For high altitude regions, the "High altitude technical booklet" (P/N 484 0552 00 and P/N 484 0545 00 for binder) gives information about calibration according to altitude.

INSTALLATION

Reverse removal procedure and pay attention to the following. Replace oil seals, gaskets and O-rings.

Refer to section 05-09 for drive axle axial play adjustment.

19, Oil seal

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the chaincase edge.

○ **NOTE :** Should installation procedure for countershaft be required, refer to section 03-06, Brake then look for Brake disc and Countershaft bearing adjustment.

14,23, Sprockets

Position the sprockets with the writing facing the chaincase cover.

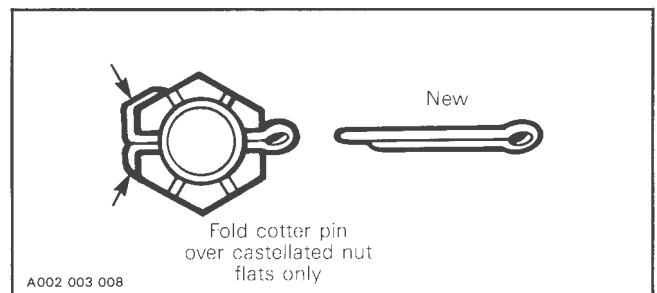
12, Upper sprocket castellated nut

Torque to 53 N•m (39 lbf•ft).

Install new cotter pin in the position shown.

▼ **CAUTION :** When removing a cotter pin always replace with a new one.

▼ **CAUTION :** Cotter pin will rub on chaincase housing if installed otherwise.



22, Snap ring

▼ **CAUTION :** It is of the utmost importance to install the snap ring otherwise damage to the chaincase components may occur.

Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

DRIVE CHAIN ADJUSTMENT

9, O-ring

Replace O-ring on tensioner adjustment screw. Fully tighten tensioner adjustment screw **by hand**, then back off only far enough for hair pin to engage in locking hole.

This initial adjustment should provide 3-5 mm (1/8-13/64 in) free-play when measured at the outer circumference of the brake disk.

▼ **CAUTION** : Free-play must not exceed 5 mm (13/64 in), re-adjust if necessary.

◆ **WARNING** : If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

35, Chaincase oil

Pour 250 ml (9 fl. oz) of chaincase oil (P/N 413 8019 00) into chaincase.

○ **NOTE** : Chaincase oil capacity is 250 ml (9 fl. oz).

Check oil level with the dipstick **unscrewed** then add if required.

Do not exceed dipstick lower level mark.

○ **NOTE** : Chaincase must be in its proper position when checking oil level.

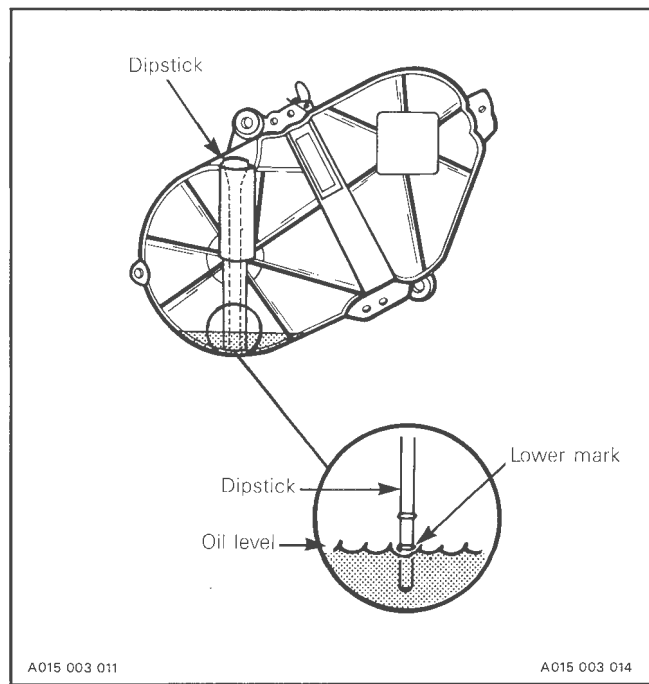
ADJUSTMENT

Pulley alignment

For pulley distance and adjustment, refer to section 03-05.

Track tension & alignment

Refer to section 05-10.



THREE SPEED GEARBOX (SHIFTER MECHANISM)

This diagram illustrates the assembly of a mechanical component, likely a pump or valve, showing the relationship between various parts. The components are numbered as follows:

- 1**: A circular cover or end plate.
- 2**: A long vertical rod or pin.
- 3**: A horizontal rod or pin.
- 4**: A hex nut.
- 5**: A small cylindrical pin or bush.
- 6**: A small cylindrical component, possibly a seal or bush.
- 7**: A horizontal rod or pin.
- 8**: A horizontal rod or pin.
- 9**: A base plate or mounting flange.
- 10**: A circular flange or seal.
- 11**: A circular cover or end plate.
- 12**: A small cylindrical pin or bush.
- 13**: A rectangular plate or bracket.
- 14**: A hex nut.
- 15**: A hex nut.
- 16**: A horizontal rod or pin.
- 17**: A small cylindrical pin or bush.
- 18**: A threaded rod or pin.
- 19**: A horizontal rod or pin.
- 20**: A hex nut.
- 21**: A horizontal rod or pin.

The diagram shows the assembly of these parts into a central body (9) which has a large horizontal shaft. Dashed lines indicate the assembly path and alignment of the components.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

- | | |
|--|---|
| 1. Ball (handle) | 12. Key |
| 2. Loctite 242 (blue, medium strength) | 13. Steering support |
| 3. Shifter arm | 14. Breather |
| 4. Elastic stop nut M10 (4) | 15. Ball joint R.H. thread |
| 5. Elastic stop nut M8 | 16. Hexagonal jam nut R.H. thread 10 mm |
| 6. Ball joint L.H. thread | 17. Dowel pin |
| 7. Hexagonal jam nut L.H. thread 10 mm | 18. Spring |
| 8. Tie rod | 19. Transmission lever |
| 9. Gasket | 20. Hexagonal head screw M8 x 1.25 x 80 |
| 10. Rubber cover | 21. Bushing |
| 11. Brake disc | |
-

ADJUSTMENT

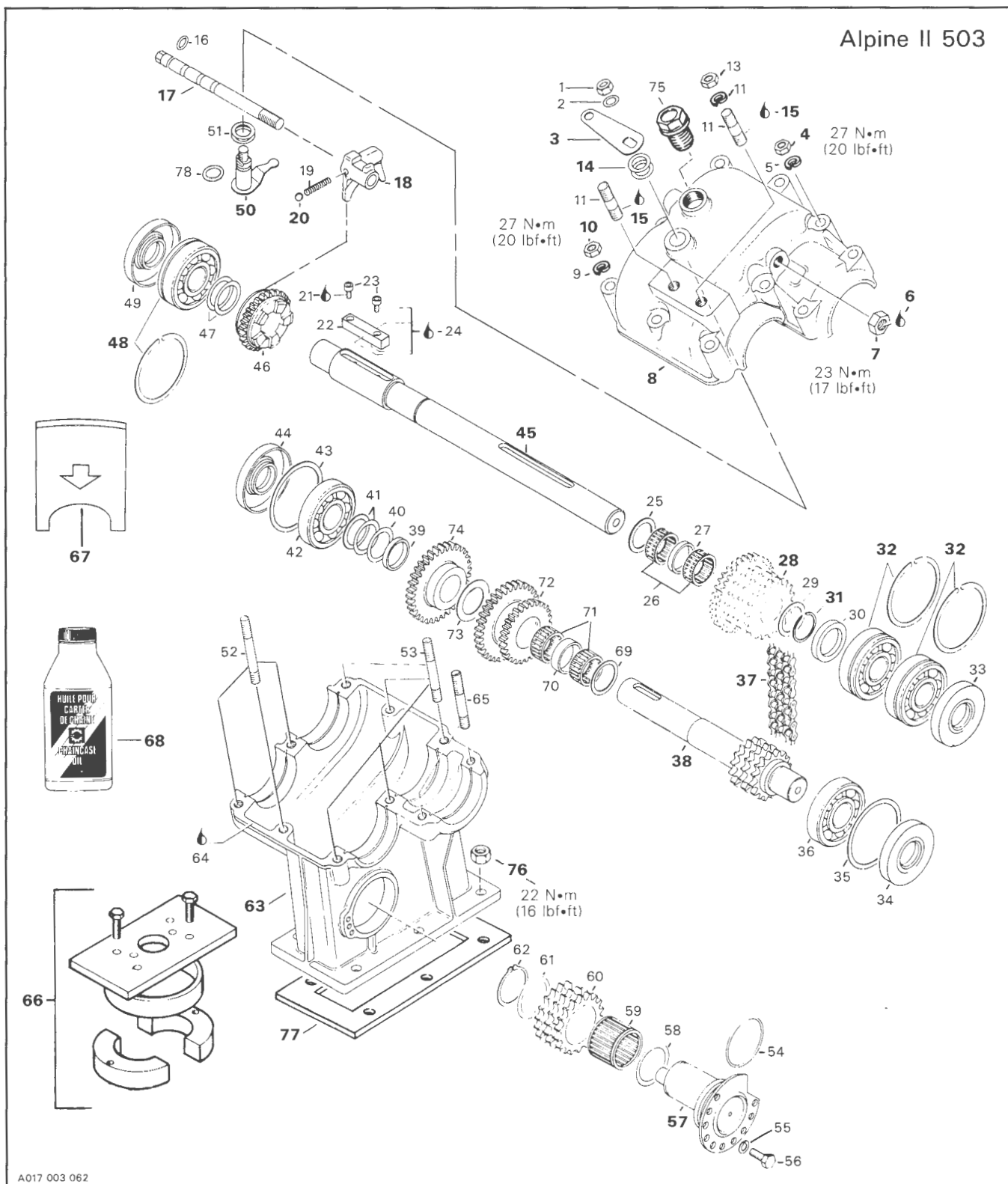
7,8,16, Jam nut & tie rod

Proper gearbox shifter mechanism adjustment should be carried out as follows :

- - Make sure shifter lever on gearbox is in **second** gear.
- - Slacken tie rod jam nuts and adjust tie rod so that shifter arm end centers into proper hole in curved plate.
- Tighten both jam nuts.
- - Check shifter mechanism in all positions for normal operation. If malfunction occurs, perform index rod adjustment as explained in the next section, 3-Speed gearbox.

Section 03 TRANSMISSION
Sub-section 08 (GEARBOX)

THREE SPEED GEARBOX




Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

- | | |
|---------------------------------|---|
| 1. Lock nut M8 | 40. Shim 25.5/34/1 |
| 2. Washer | 41. Shim |
| 3. Gear change lever | 42. Ball bearing 6005 |
| 4. Hexagonal nut M8 | 43. Washer |
| 5. Lock washer | 44. Seal |
| 6. Loctite 242 (blue) | 45. Drive shaft |
| 7. Hexagonal nut M10 | 46. 23-tooth shift sprocket |
| 8. Gearbox cover | 47. Shim |
| 9. Lock washer | 48. Ball bearing 6205 |
| 10. Hexagonal nut M8 | 49. Seal |
| 11. Stud M10 x 23 | 50. Gear change shaft |
| 12. Lock washer | 51. Shim |
| 13. Hexagonal nut M10 | 52. Stud M8 x 56 |
| 14. Shim | 53. Stud M8 x 52 |
| 15. Loctite 242 (blue) | 54. O-ring |
| 16. O-ring | 55. Lock washer |
| 17. Index rod | 56. Cap screw M6 x 14 |
| 18. Gear change fork | 57. Tensioner axle |
| 19. Gear change fork spring | 58. Washer |
| 20. Steel ball (1/4 in) | 59. Needle bearing |
| 21. Loctite 271 (red) | 60. 18-tooth tensioner sprocket |
| 22. Key | 61. Washer |
| 23. Allen cap screw M4 x 8 | 62. Snap ring |
| 24. Loctite 271 (red) | 63. Gearbox housing |
| 25. Washer | 64. Loctite 515 (violet) |
| 26. Needle bearing | 65. Stud M8 x 41 |
| 27. Distance sleeve | 66. Bearing puller ass'y |
| 28. 19-tooth shift sprocket | 67. Chain alignment tool |
| 29. Shim 25.5/34/1 | 68. Chaincase oil 250 ml (9 oz) (P/N 413 8019 00) |
| 30. Distance ring | 69. Shim |
| 31. Snap ring | 70. Distance sleeve |
| 32. Ball bearing 6205 | 71. Needle bearing |
| 33. Seal | 72. Gear 23/29 teeth |
| 34. Seal | 73. Shim |
| 35. Washer | 74. Gear 29 teeth |
| 36. Ball bearing 6005 | 75. Breather |
| 37. 90 link triple roller chain | 76. Nut |
| 38. Layshaft | 77. Gasket |
| 39. Distance sleeve | 78. O-ring |
-

REMOVAL

 **NOTE :** This section gives procedures for gearbox removal. Some parts require more detailed disassembly procedures, in these particular cases, refer to the pertaining section in this manual (ex. : track, drive axle, etc.).

Remove the following parts :

- fuel tank and muffler
- pulley guard, drive belt, driven pulley and L.H. brake and disc
- steering arm
- steering column support nuts
- front suspension cap
- upper column struts
- steering column support
- shifter nut from gearbox
- speedometer angle drive
- R.H. brake and disc

57, Tensioner


Release drive chain tension.

4,8,10, Nut & gearbox cover

Remove nuts then gearbox cover.

Important note :

Depending on the repair involved, the drive chain may not have to be removed and thus greatly reduce repair time.

 **CAUTION :** With a broken drive chain, tracks, suspensions and drive axles have to be removed to allow cleaning of gearbox and bearing of drive axles from particles.

Should drive chain removal be needed, chain could be cut and thereafter re-installed with a master link. However, it is better to keep it endless for best reliability.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

The most recommended method is to remove suspensions, tracks, drive axles then drive chain and thereafter, re-install a genuine endless chain.

Gearbox components repair can be performed without removing drive chain as follows :

- - Using a hammer, gently push bearings out of layshaft ends.
- Using a hammer, gently push bearings out of drive shaft ends.

○ **NOTE :** Should these bearings can not be removed, drive chain removal is needed in order to withdraw layshaft and drive shaft from gearbox. Then, use bearing extractor tools as explained farther in this section.

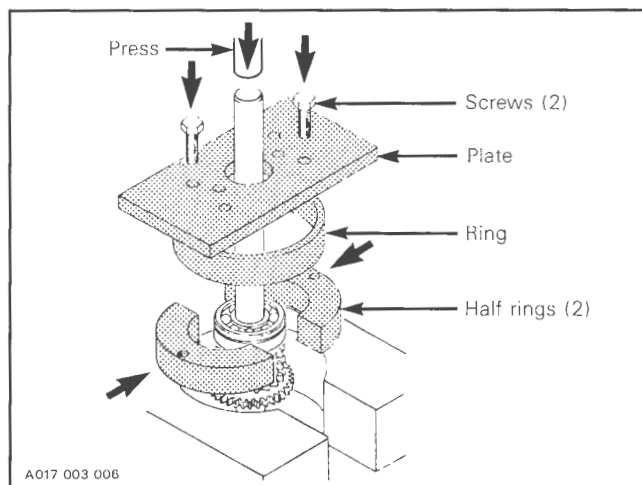
- Remove four layshaft studs from gearbox (driven pulley side).
- - Take drive shaft off (remove more stud(s) if required).
- - Take layshaft off (remove more stud(s) if required).
- Remove gearbox and gasket from frame.

DISASSEMBLY

32,48, Bearing

Should bearings have not been removed yet and can not be easily pushed out, use the following tools :

- 1 hydraulic press
- 2 ring halves (P/N 420 8763 30)
- 1 ring (P/N 420 9774 80)
- 1 plate (P/N 420 9777 00)
- 2 hexagonal screws M8 x 25 (P/N 420 2402 75)



Remove the circlip, the distance ring, the shim, the shift sprocket (19 th), the needle bearings, the distance sleeve, the washer and the shift sprocket (23 th) from shaft.

CLEANING

8,63, Gearbox housing & cover

Clean mating surfaces of cover, top and bottom of gearbox and frame.

INSPECTION

Visually inspect the components for damage or wear.

ASSEMBLY

○ **NOTE :** Apply a small amount of motor oil (SAE 30) to the components before assembly.

38, Layshaft & components

Reinstall the layshaft components on the layshaft.

Compensate the distance on the layshaft up to a clearance of 0.1 to 0.3 mm (.003 to .011 in) and assemble.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

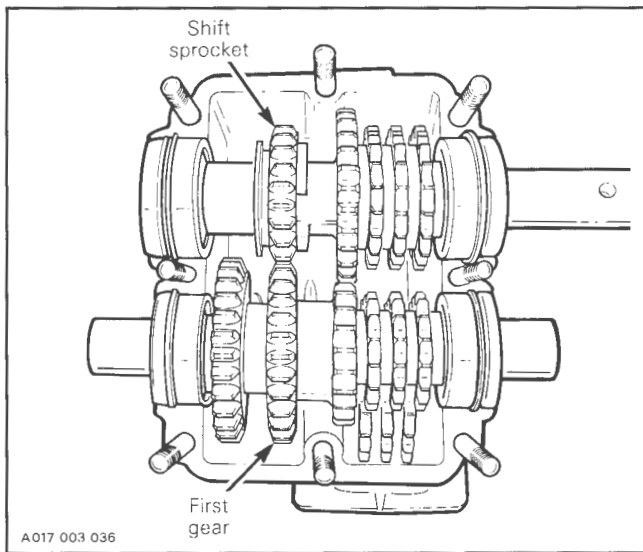
ADJUSTMENT

6,7,17, Loctite 242, nut & index rod

Temporarily install gearbox cover and put shifter in **first** gear position and remove cover.

The 23-tooth shift sprocket **#46** should align with first gear sprocket as illustrated.

NOTE : Take care that gear change fork engages in shift sprocket.



Slacken index rod lock nut and adjust index rod until both gears align.

Check second gear position, shift fork must not be under pressure.

Apply Loctite 242 (blue) to lock nut threads and torque to 23 N•m (17 lbf•ft).

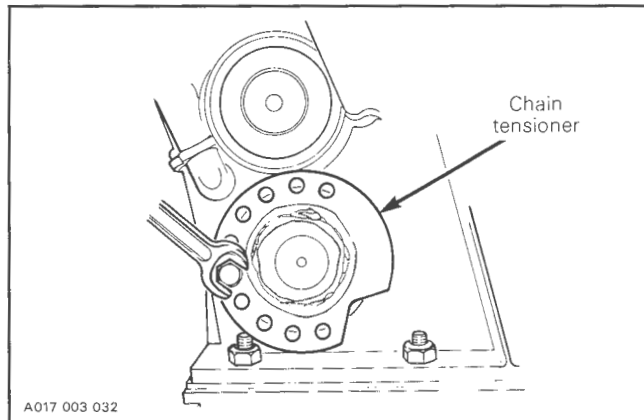
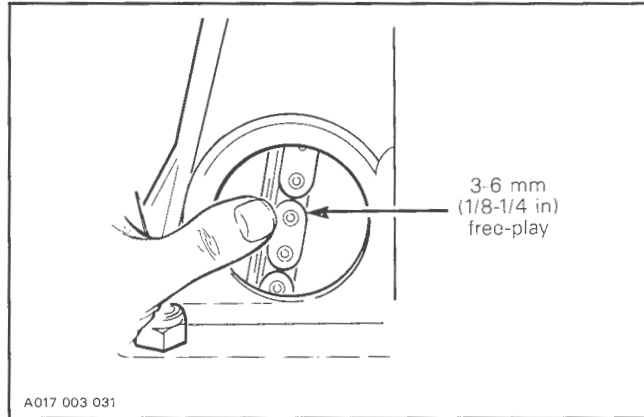
Apply Loctite 515 (P/N 413 7027 00) to the gearbox mating surface and install gearbox cover then torque nuts in a criss-cross sequence to 27 N•m (20 lbf•ft).

Proceed with shifter mechanism adjustment as specified in the previous section.

Drive chain tension

Rotate driven pulley forward so that true free-play can be taken. Check tension then turn driven pulley 1/2 turn towards and recheck. Starting from maximum reading, adjust chain tension to obtain 3-6 mm (1/8-1/4 in) free-play.

Remove capscrew locking chain tensioner in place.



Rotate the tensioner as required to obtain correct chain tension.

Reinstall capscrew to lock chain tensioner in place.

Pulley alignment

Perform pulley alignment referring to section 03-05.

Track tension & alignment

Perform track tension and alignment referring to section 05-10.

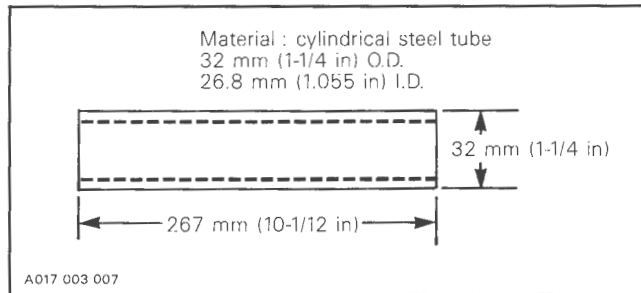
Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

45, Drive shaft & components

To reinstall the drive shaft components on the drive shaft, proceed as follows :

- Install the driven pulley shaft side bearing #32 on the shaft using a cylindrical steel tube.



- Install the circlip over the bearing.
- Install the remaining components.
- Install the other shaft end bearing with shim(s) as required using the above mentioned tool.
- Available shims :
 - 25.5/34/0.2 (P/N 420 9444 70)
 - 25.5/34/0.3 (P/N 420 9444 71)
 - 25.5/34/0.5 (P/N 420 9444 72)

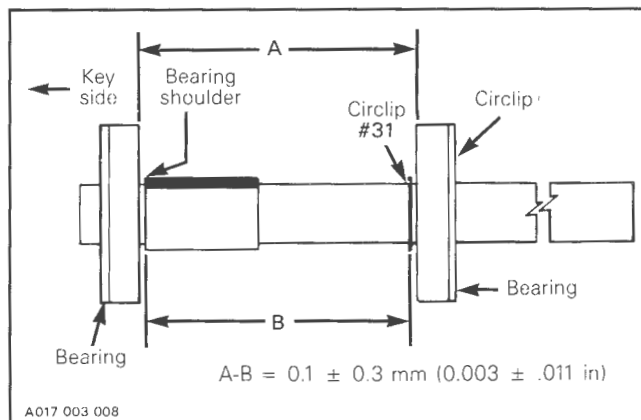
Drive shaft clearance

Place ball bearings with circlips mounted in the transmission housing and measure distance **A** between the bearings.

Measure distance **B** on drive shaft between the circlip #31 and the shaft bearing shoulder (key side).

The difference between measures **A** and **B** should be 0.1 ± 0.3 mm ($0.003 \pm .011$ in).

Refer to the following illustration.

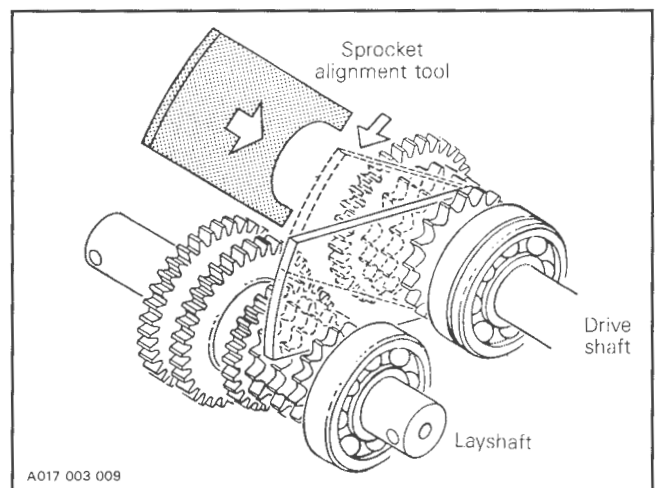


To obtain the proper drive shaft clearance it may be necessary to add or remove shim(s) between the key side bearing and the shaft bearing shoulder.

28,38, Sprocket alignment

Verify sprocket alignment using the alignment tool (P/N 420 476 010). Proceed as follows :

- Set alignment tool on shift sprocket 19 th #28 and turn it into the corresponding layshaft and tensioner sprockets as illustrated.



If necessary readjust clearance by transferring shim(s) on drive shaft to the opposite side.

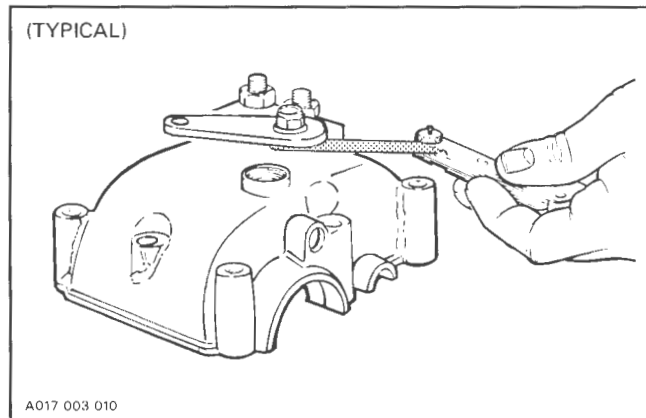
CAUTION : Ensure the drive shaft and layshaft gears align with the tensioner gear and that all clearances are respected.

14, Gear change lever shim

Lubricate gear change shaft and compensate clearance with shims (required end play 0.3 mm ($.011$ in)). Set one shim 0.3 mm on inner side and as many as required on outer side under gear change lever, leaving 0.3 mm ($.011$ in) play.

Section 03 TRANSMISSION

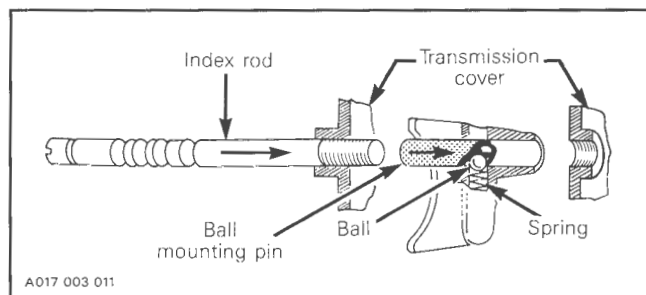
Sub-section 08 (GEARBOX)



▼ **CAUTION:** The finger of the gear change shaft must not block the gear change fork.

17,18,20, Gear change fork & components

Mount gear change fork and index rod with index spring and ball. To do this, press ball and index spring into the bore of gear change using a ball mounting pin (P/N 420 4760 20) then the ball mounting pin is pushed through with the index rod and the index rod is screwed in.



INSTALLATION

63,77, Gearbox & gasket

Method when drive chain was not removed :

- After clearance adjustment has been performed, remove bearings from layshaft and drive shaft.
- Properly install gasket on frame.
- Hook chain with a wire and lift it.
- Install gearbox then layshaft and drive shaft through chain.
- Install bearings and studs.

Method when endless drive chain was removed (not cut)

- Properly install gasket on frame then gearbox.
- Install lower sprocket through chain, tracks, drive axles and suspensions.

76, Nut

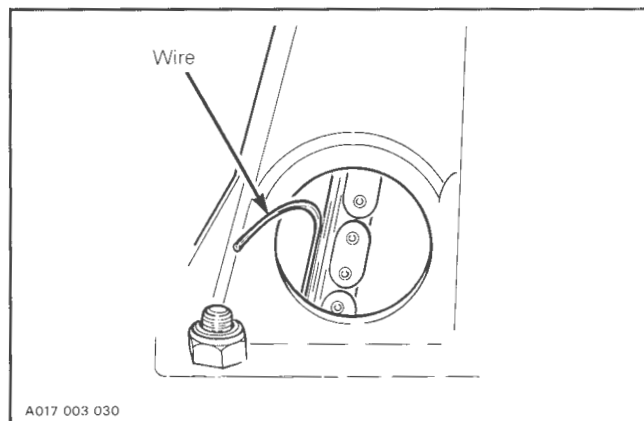
Torque gearbox nuts to 22 N•m (16 lbf•ft).

68, Chaincase oil

The gearbox oil capacity is 500 ml (18 imp. oz).

To check level :

Remove rubber inspection cover located on bottom right side of gearbox. Using a rigid piece of wire as dipstick, check oil level. Oil level must reach 92 mm (3 5/8 in) on dipstick.



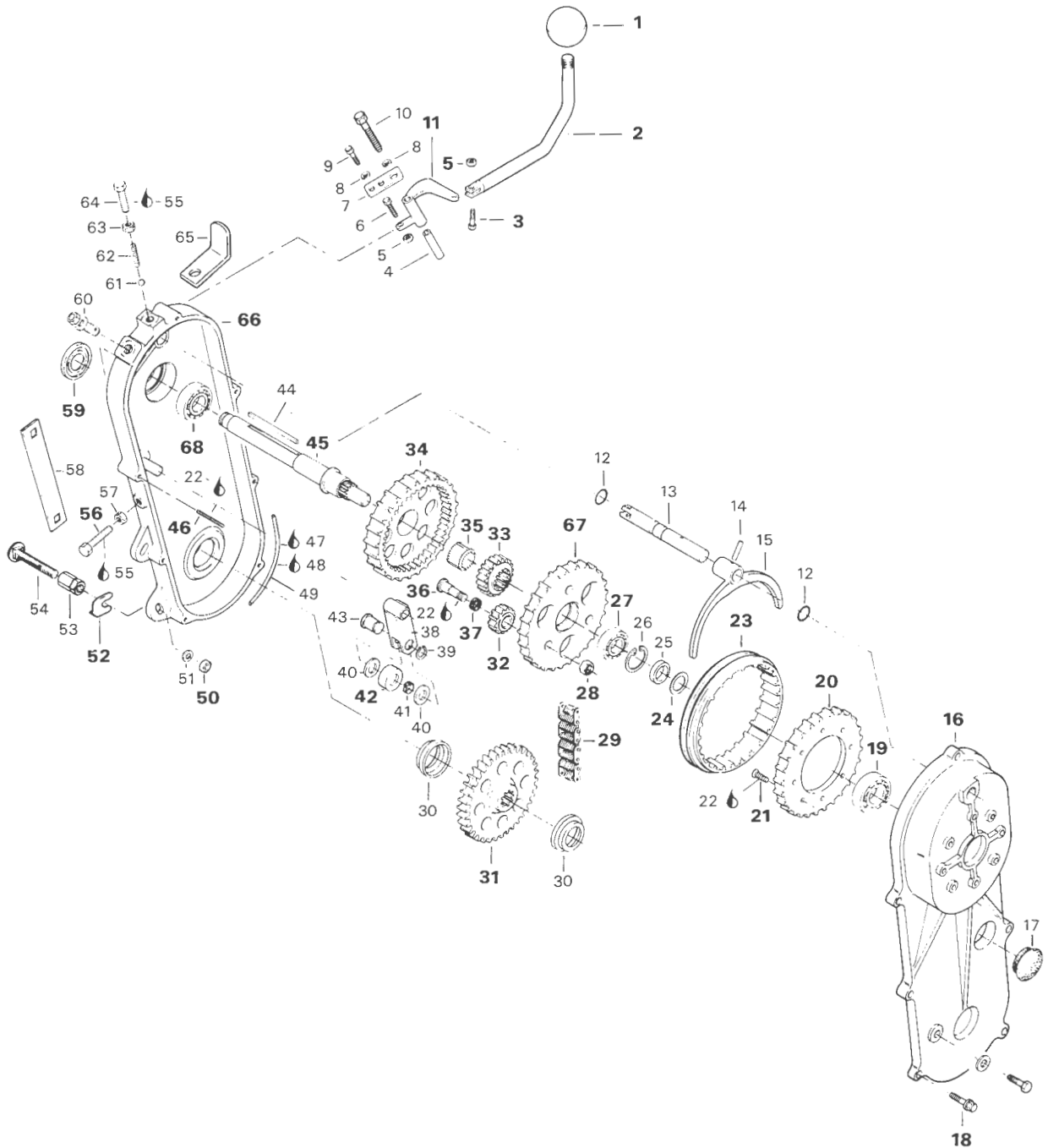
To fill, pour oil through gears. Refill as required using Bombardier chaincase oil (P/N 413 8019 00, 250 ml).

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

TWO SPEED GEARBOX

Safari Cheyenne



Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

- | | |
|--|---|
| 1. Ball (handle) | 35. Needle bearing (3) |
| 2. Transmission lever | 36. Planet shaft (3) |
| 3. Hexagonal head screw M5 x .80 x 20 | 37. Needle bearing (3) |
| 4. Spacer | 38. Chain tensioner |
| 5. Elastic stop nut M5 (2) | 39. Circlip |
| 6. Hexagonal head screw M5 x .80 x 25 | 40. Spacer (2) |
| 7. Lever support | 41. Needle bearing |
| 8. Lock washer (3) | 42. Tensioner roller |
| 9. Hexagonal head screw M6 x 1.00 x 16 (2) | 43. Tensioner shaft |
| 10. Hexagonal head screw M6 x 1.00 x 75 | 44. Key (brake disc) |
| 11. Gear selector | 45. Countershaft |
| 12. O-ring (2) | 46. Stud (2) |
| 13. Fork shaft | 47. Loctite 515 |
| 14. Pin | 48. Loquic primer N |
| 15. Fork | 49. O-ring |
| 16. Transmission cover | 50. Elastic stop nut M8 x 1.25 (4) |
| 17. Rubber cap | 51. Brass washer 11/32 in x 11/16 in x .090 (4) |
| 18. Flanged hexagonal head bolt M8 x 1.25 x 30 (4) | 52. Shim |
| 19. Ball bearing | 53. Spacer (4) |
| 20. Blocking wheel | 54. Carriage bolt (4) |
| 21. Flat head screw 5/8 in (8) | 55. Teflon sealant |
| 22. Loctite 242 | 56. Chain tensioner adjustment screw |
| 23. Sliding sleeve | 57. Hexagonal nut M10 x 1.5 |
| 24. Shim (2) | 58. Reinforcement |
| 25. Spacer | 59. Seal |
| 26. Circlip | 60. Breather plug |
| 27. Ball bearing | 61. Ball #8 |
| 28. Hexagonal nut M10 x 1.5 (3) | 62. Spring |
| 29. Chain 92 links | 63. Hexagonal nut M12 |
| 30. Flanged ring (2) | 64. Hexagonal screw M12 x 1.75 x 25 |
| 31. Sprocket 40 teeth | 65. Support |
| 32. Planet gear (21 teeth) (3) | 66. Transmission case |
| 33. Sun-gear (33 teeth) | 67. Planet carrier |
| 34. Ring gear | 68. Ball bearing |
-

REMOVAL

Transmission and driven pulley can be removed from vehicle as an assembly. Proceed as follows :

Belt guard, countershaft support & drive belt

Remove belt guard. Disconnect countershaft support from upper column by removing hair pin and clevis pin. Take drive belt off.

2,3,5,11, Transmission lever, screw, nut & gear selector

Disconnect transmission lever from gear selector and brake cable from caliper.

Chain tension

Slacken drive chain tension.

Rear suspension

Remove suspension from vehicle.

End bearing housing

Remove speedometer angle drive then end bearing housing. Free drive axle from track notches then pull drive axle in order to free the most possible from transmission.

50, Nut & transmission ass'y with driven pulley

Remove transmission retaining nuts then take transmission off the vehicle.

DISASSEMBLY

Brake caliper & driven pulley

Remove brake caliper from transmission. Pull driven pulley support out then remove driven pulley from countershaft.

16, Transmission cover

Remove transmission cover and drain.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

23,33,67, Sliding sleeve, sun-gear & planet carrier

Pull out from countershaft.

29,31,34, Chain, sprocket & ring gear

Pull out from transmission case.

59, Seal

Remove seal from transmission case.

45, Countershaft

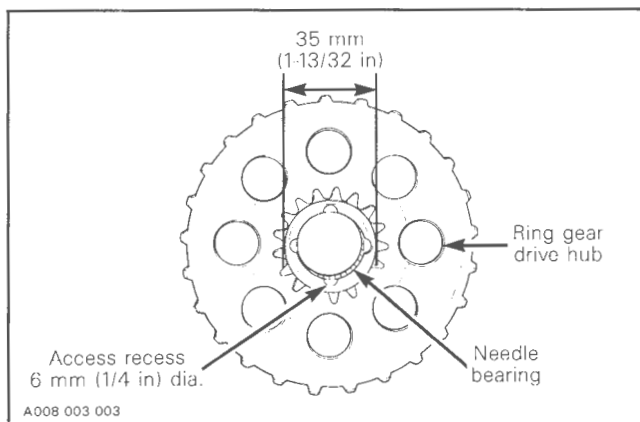
Press countershaft out of transmission case.

68, Ball bearing (case)

Press countershaft out of bearing.

35, Needle bearing (ring gear)

Use a suitable pusher through bearing access recess and press bearing out of ring gear.



28,32,37, Nut, planet gear & needle bearing

Loctite mounted shaft nut may require heat for disassembly. For easier disassembly heat up to 150°C (300°F).

To remove bearing from planet gear, use a press and a suitable pusher (15.96 mm (5/8 in) dia. max.).

27, Planet carrier bearing

Remove snap ring and use a suitable pusher to press bearing out of planet carrier.

20, Blocking wheel (reverse driving hub)

Loctite mounted screws may require heat for disassembly. For easier disassembly heat up to 150°C (300°F).

CLEANING

16,66, Transmission cover & case

Remove Loctite residue from cover and case mating surfaces.

INSPECTION

Visually inspect the components for excessive wear and damage.

WARNING : If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

ASSEMBLY

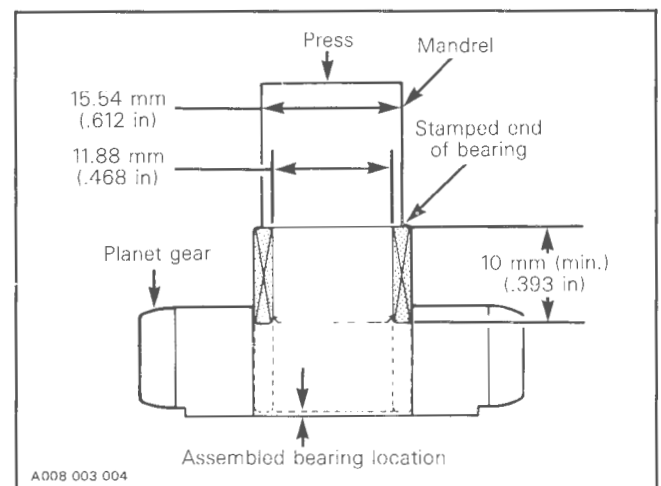
20,21, Blocking wheel (reverse driving hub) & screw

Apply Loctite 242 on screw threads, and torque to 12 N•m (106 lbf•in).

32,37, Planet gear & needle bearing

The bearing is press fitted into the planet gear and must be pushed down only from its stamped end.

CAUTION : Never pound the bearing into its housing with a hammer or other impact tool, even in conjunction with the proper assembly mandrel.



NOTE : Assembled bearing must not project out of planet gear.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

28,67, Nut & planet carrier

Apply Loctite 242 in planet carrier shaft bores. With planet carrier installed on shaft, press shaft into planet carrier bore.

Apply Loctite 242 on shaft threads. Install and torque nut to 35 N•m (26 lbf•ft).

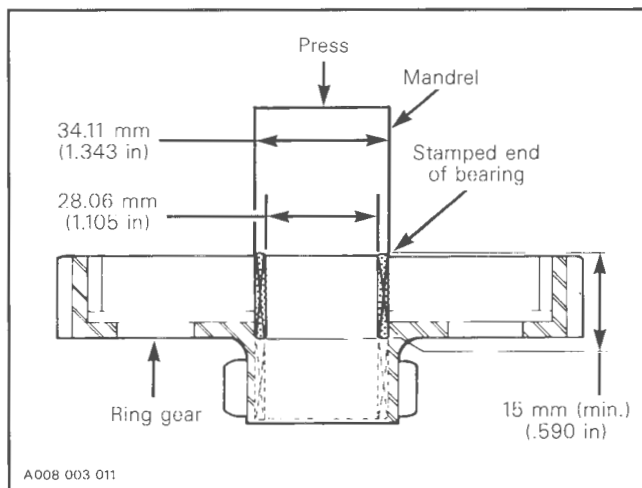
27, Planet carrier bearing

With a suitable pusher, press bearing into planet carrier bore and lock in place with snap ring.

35, Ring gear needle bearing

The bearing is press fitted into the ring gear and must be pushed down only from its stamped end.

▼ **CAUTION** : Never pound the bearing into its housing with a hammer or other impact tool, even in conjunction with the proper assembly mandrel.



19, Cover bearing

With a suitable pusher, press bearing into cover.

68, Case bearing

With a suitable pusher, press bearing on countershaft.

45, Countershaft

Press countershaft with the assembled ball bearing into the transmission case bore.

46, Stud

Assemble studs in transmission case with Loctite 242 and torque to 5 N•m (44 lbf•in).

1, Ball (handle)

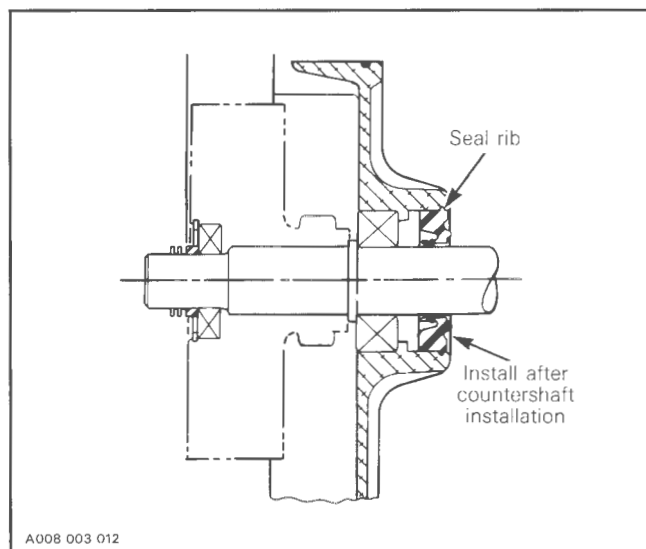
Put Loctite 242 on handle threads.

42, Tensioner ass'y

Ensure that roller turns freely.

59, Seal (countershaft)

Install seal in transmission case so that the seal rib is seated in the bore groove.



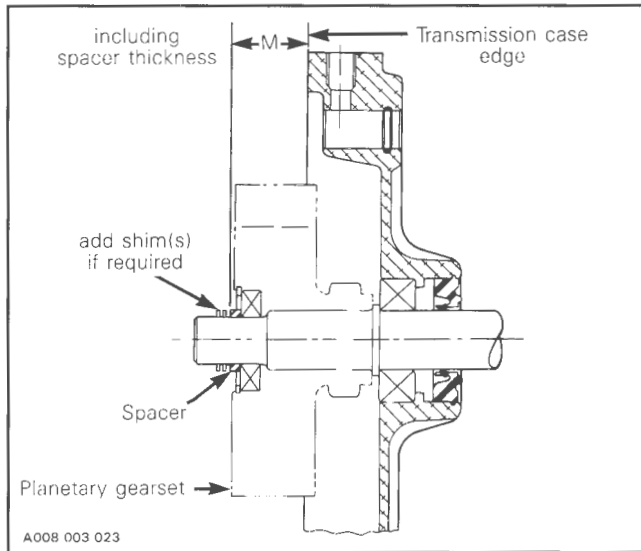
24, Shim (axial play)

The planetary gearset axial free-play must be controlled with shims. To determine required thickness, measure distance "M" from transmission case edge to spacer. In accordance with the following table, select the proper amount of shims.

| M | | REQUIRED SHIMS |
|-------------------|-------------------|----------------|
| FROM | TO | |
| 31.5 mm (1.240'') | 32.3 mm (1.274'') | 2 |
| 32.4 mm (1.275'') | 33.1 mm (1.303'') | 1 |
| 33.2 mm (1.304'') | 34.0 mm (1.339'') | 0 |

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)



○ **NOTE :** Planet carrier bearing must be assembled in carrier and locked with snap ring. Spacer must be installed on countershaft prior to measuring.

16,66, Transmission cover & case

To properly seal the transmission, proceed as follows :

- Apply Locquic Primer N on both case and cover flanges and in the cover o-ring groove. Allow 5 minutes to dry.
- Put Loctite 515 in the o-ring cover groove, install o-ring and install cover to case.
- Install cover lock washer and screws and torque to 24 N•m (18 lbf•ft).

○ **NOTE :** Cover must be installed within ten minutes of Loctite application.

○ **NOTE :** Allow a drying period of two (2) hours before refilling with oil.

INSTALLATION

Reverse removal procedure, paying particular attention to the following :

Driven pulley & brake caliper

Coat countershaft with antiseize compound and assemble driven pulley and support. Install brake caliper on transmission. Refer to Brake, section 03-06.

50, Nut

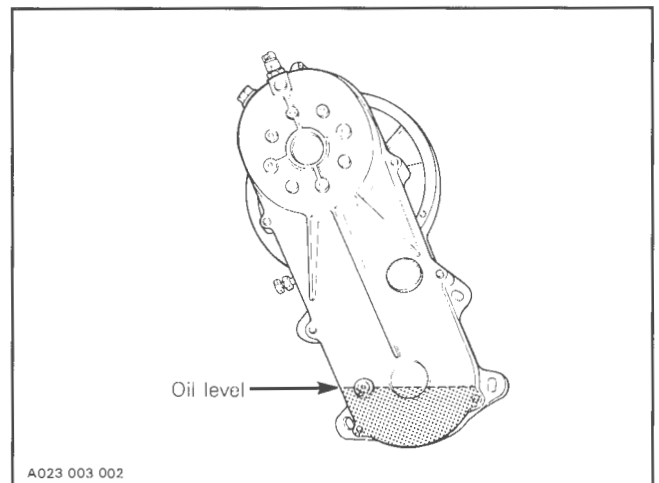
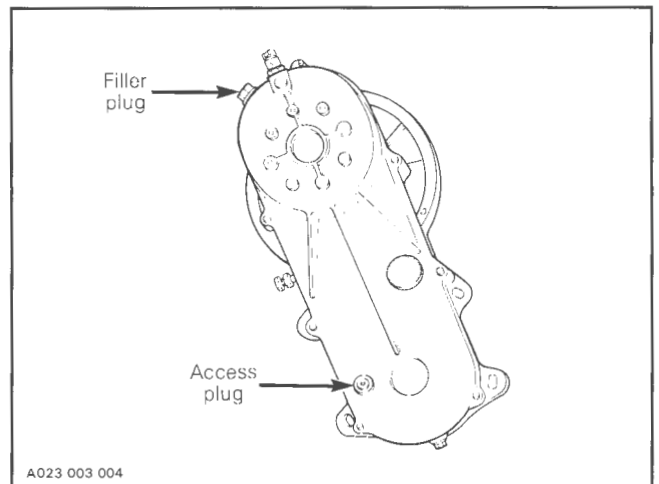
Install transmission in vehicle. Torque retaining nuts to 24 N•m (18 lbf•ft).

Install drive axle & suspension. Refer to Drive axle, section 05-08 and Hinged suspension, section 05-06.

Transmission oil level

Remove filler plug from top of transmission and access cap plug. Pour chaincase oil (P/N 413 8019 00 - 250 ml (9 oz)) through filling hole until oil begins to flow out of access hole.

○ **NOTE :** The transmission oil capacity is about 250 ml (9 oz).



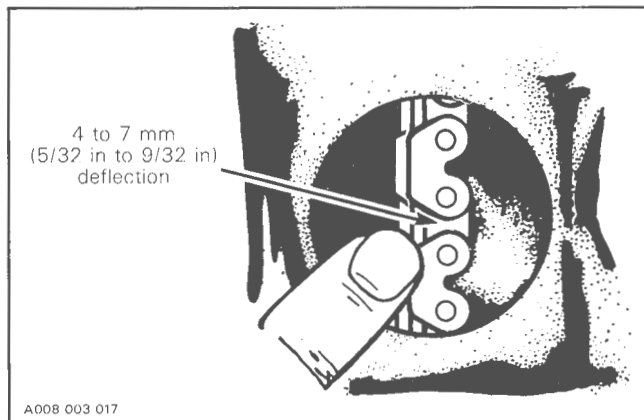
Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

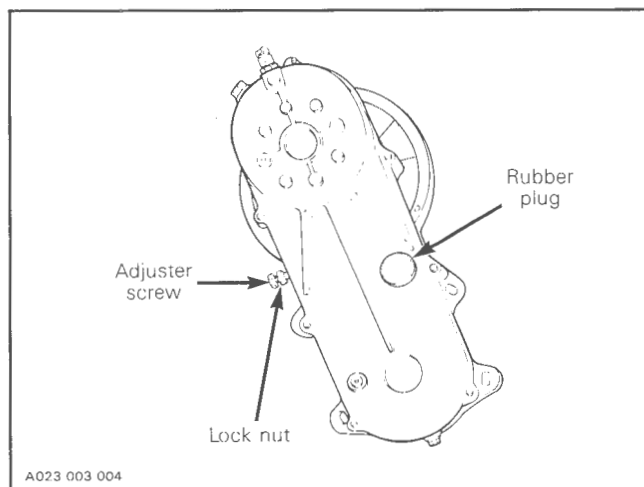
ADJUSTMENT

56, Chain tensioner

Rotate driven pulley forward so that true deflection can be taken. Remove rubber plug and check chain tension.



To adjust, loosen lock nut and fully tighten adjuster screw by hand then back off to obtain 4 - 7 mm (5/32 in - 9/32 in) deflection. Tighten lock nut and recheck chain tension.



▼ **CAUTION:** Deflection must not exceed 7 mm (9/32 in), readjust if necessary.

Pulley alignment

For pulley distance and alignment, refer to section 03-05.

Track tension & alignment

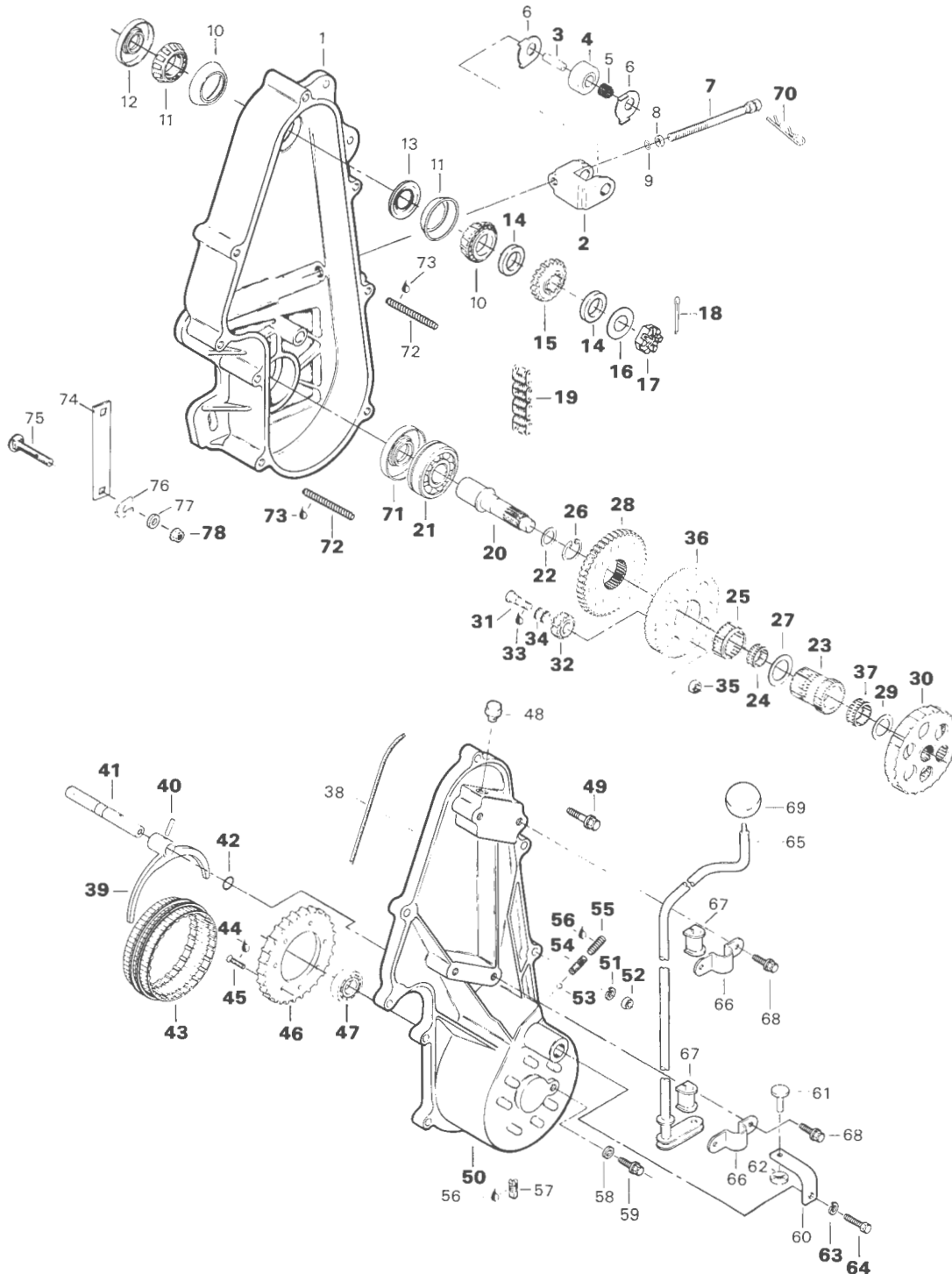
Refer to section 05-10.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

TWO SPEED GEARBOX


Safari Escapade



Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

1. Transmission case
2. Chain tensioner
3. Tensioner shaft
4. Roller
5. Needle bearing
6. Shim (2)
7. Tensioner adjustment screw
8. Brass washer
9. O-ring
10. Bearing cup (2)
11. Bearing cone (2)
12. Seal
13. Oil retaining ring
14. Spacer (2)
15. Sprocket 17 teeth
16. Spring washer
17. Slotted nut
18. Cotter pin
19. Driving chain, 94 links
20. Countershaft
21. Ball bearing
22. Hard washer
23. Sun gear 29 teeth
24. Needle bearing
25. Needle bearing
26. Circlip
27. Hard washer
28. Sprocket 44 teeth
29. Hard washer
30. Planetary gear
31. Planet shaft (4)
32. Planet 21 teeth (4)
33. Loctite 271
34. Needle bearing (4)
35. Nut M10 (4)
36. Planet carrier
37. Needle bearing
38. O-ring
39. Fork
40. Pin
41. Fork axle
42. O-ring
43. Sliding sleeve
44. Loctite 271
45. Flat head screw 1/4-20 x 5/8 (4)
46. Blocking wheel
47. Ball bearing
48. Breather
49. Flanged head screw M6 x 1.00 x 30 (5)
50. Cover
51. Lock washer (2)
52. Nut M8 (2)
53. Ball #8
54. Spring
55. Set screw M10 x 1.5 x 10
56. Teflon sealant
57. Magnetic cap
58. Brass washer
59. Flanged head bolt M8 x 1.25 x 15
60. Elbow
61. Rivet
62. Push nut
63. Lock washer
64. Hexagonal head screw M8 x 1.25 x 16
65. Transmission lever
66. Clamp (2)
67. Cushion (2)
68. Flanged head bolt M6 x 1.00 x 16 (4)
69. Ball (handle)
70. Wave pin
71. Seal
72. Stud M8 x 25 (2)
73. Loctite 271
74. Reinforcement
75. Carriage Bolt (4)
76. Shim
77. Shim
78. Flanged elastic stop nut M8 (4)

 **NOTE :** Some components (cover, chain and sprockets, tensioner etc.) can be removed without removing the whole gearbox. Proceed as follows :

- Shift to reverse position, unscrew drain plug and cover.
- Lean cover toward front of vehicle and remove it.

REMOVAL

Gearbox and driven pulley can be removed from vehicle as an assembly. Proceed as follows :

Belt guard, countershaft support & drive belt

Remove belt guard. Disconnect countershaft support from upper column by removing hair pin and clevis pin. Take drive belt off.

Drive axle

install drive axle holder.

Brake cable

Disconnect brake cable from caliper.

78, Nut & gearbox with driven pulley

Remove four nuts and take gearbox off the vehicle.

DISASSEMBLY

Brake caliper

Remove brake caliper from gearbox.

49,50,51,52, Screw, cover, lock washer & nut

Remove screws, nuts and washers then cover assembly.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

7,70, Tensioner adjustment screw & wave pin

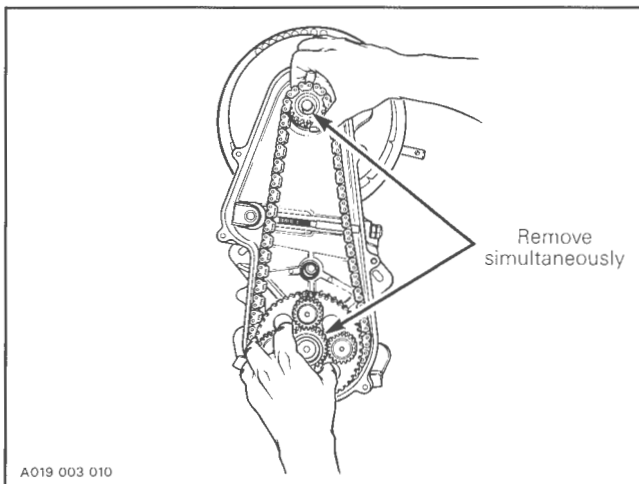
Remove wave pin and slack chain tension.

29,30, Hard washer & planetary gear

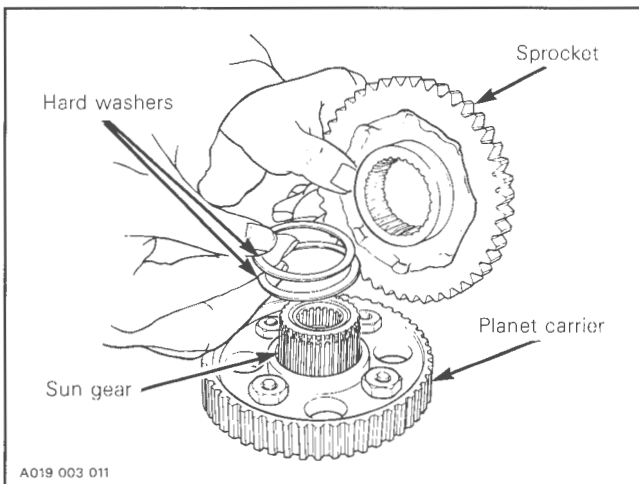
Remove planetary gear and hard washer.

14,15,16,17,18,19,23,26,27,28, Spacer, sprocket, spring washer, slotted nut, cotter pin, chain, sun gear, snap ring, hard washer & sprocket

Remove cotter pin, slotted nut, spring washer and spacer. Remove sprocket, chain and planetary gear train simultaneously.

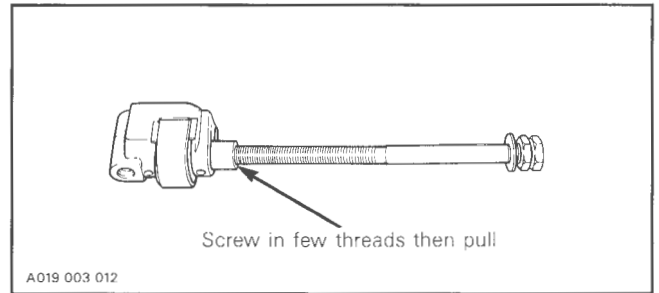


Remove snap ring, sprocket, two hard washers and planet carrier from sun gear.



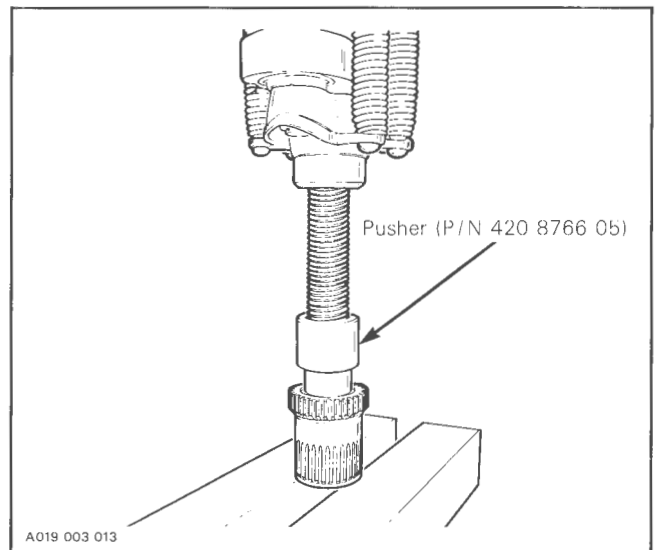
2,3,4,7, Chain tensioner, tensioner shaft, roller & tensioner adjustment screw

Completely unscrew adjustment screw then remove chain tensioner. Pull out tensioner shaft (using adjustment screw) to free the roller.



24,25, Needle bearing

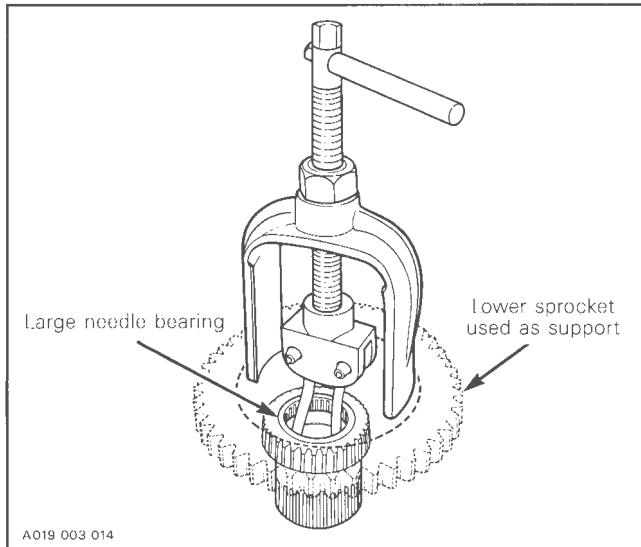
Press small needle bearing out of sun gear using pusher (P/N 420 8766 05).



Pull large needle bearing using a puller such as SNAP-ON A78 and the lower sprocket used as a support.

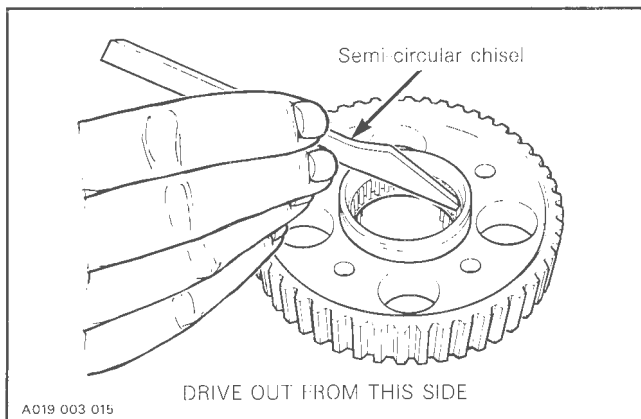
Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)



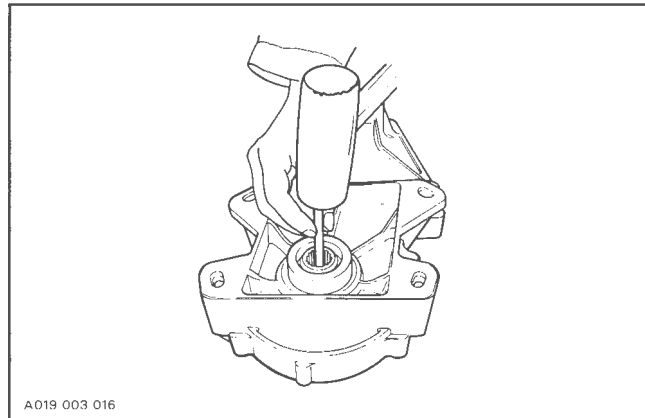
31,32,34,35,36,37, Planet shaft, planet, needle bearing, nut, planet carrier & needle bearing

Unscrew nuts then using a proper pusher, press planet shafts out of planet carrier. Press needle bearing out of planet. Using a semi-circular chisel, drive needle bearing out of planet carrier.

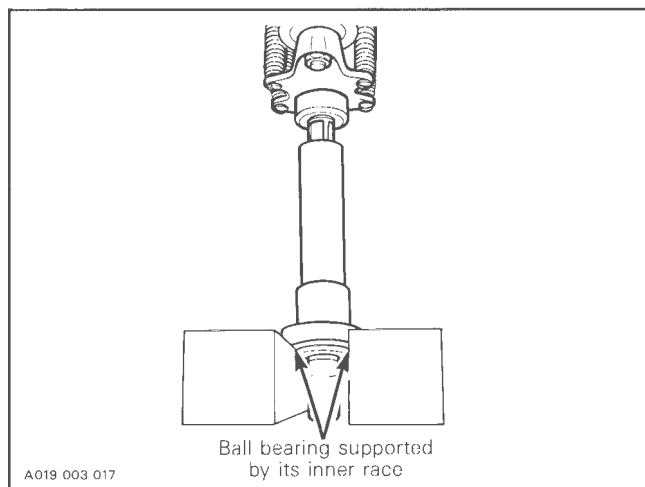


20,21,22,71, Countershaft, ball bearing, hard washer & seal

Remove hard washer. Drive countershaft out transmission case.



With plates supporting inner race of ball bearing, press out countershaft.



Remove seal from transmission case bore.

39,40,41,42,43,53,54,55,63,64, Fork, pin, fork axle, O-ring, sliding sleeve, ball, spring, set screw, lock washer & screw

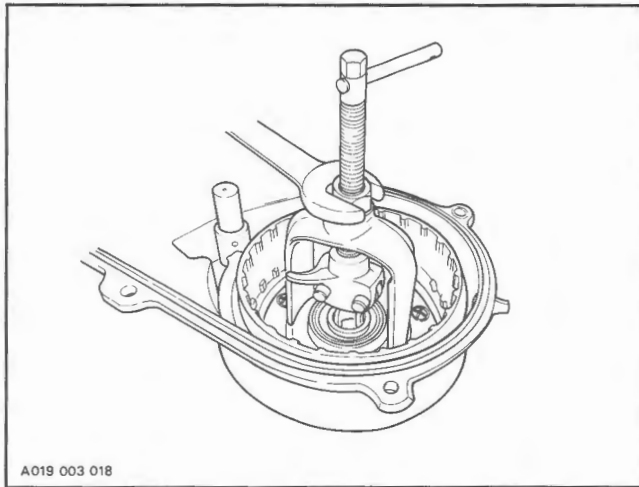
Remove screw and lock washer. Remove set screw, spring and ball. pull fork axle and sliding sleeve out transmission cover. Remove O-ring. Drive out pin and separate fork from fork axle.

45,46,47, Screw, blocking wheel & ball bearing

Using a puller such as SNAP-ON A78, pull ball bearing out transmission cover.

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)



A socket driver POZIDRIV #3 such as SNAP-ON FPD 32 is recommended to unscrew blocking wheel screws.

INSPECTION

Visually inspect the components for excessive wear and damage.

◆ **WARNING :** If chain deflection is greater than 25 mm (1 in) (without chain tensioner), replace chain and check condition of sprockets.

ASSEMBLY

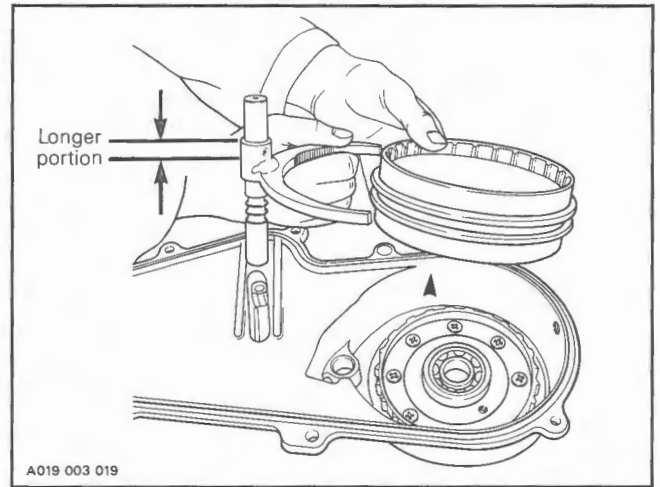
Reverse disassembly procedure, paying attention to the following :

44,45,46, Screw, Loctite 271 & Blocking wheel

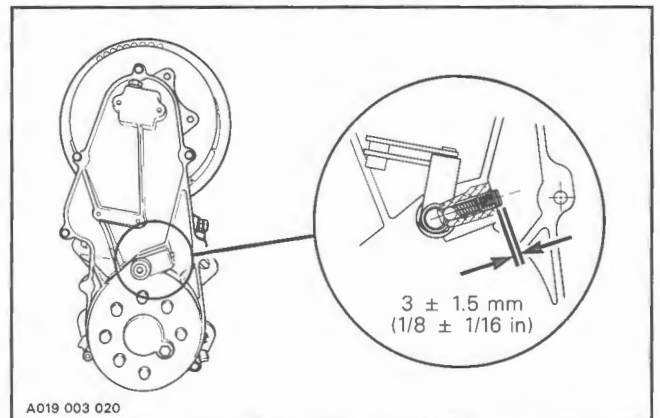
Apply Loctite 271 on screw threads and torque with a POZIDRIV #3 socket to 12 N•m (106 lbf•in) in a criss-cross pattern.

39,41,43,55,56, Fork, fork axle, sliding sleeve, set screw & teflon sealant

Install fork on fork axle. Make sure longer portion is facing transmission case. The sliding sleeve is symmetric, no specific side goes first.



Coat set screw threads with teflon sealant. Set screw should project from transmission cover by 3 ± 1.5 mm ($1/8 \pm 1/16$ in).

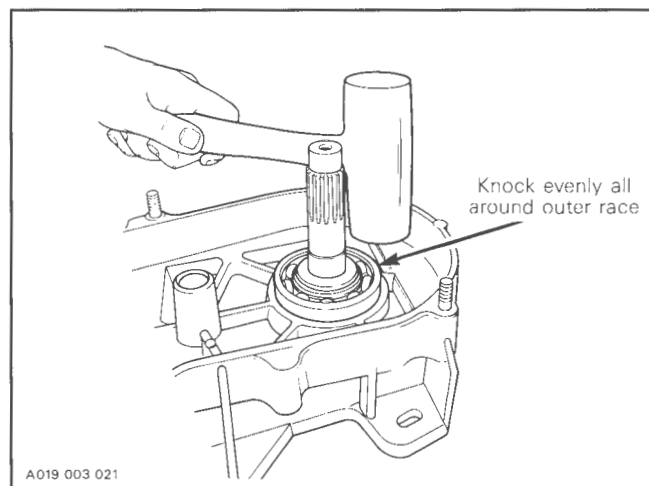


20,21,71, Countershaft, ball bearing & seal

Press ball bearing on countershaft with its sealed side first. Drive seal into transmission case bore until its shielded side seats against shoulder. Install countershaft assembly in transmission case.

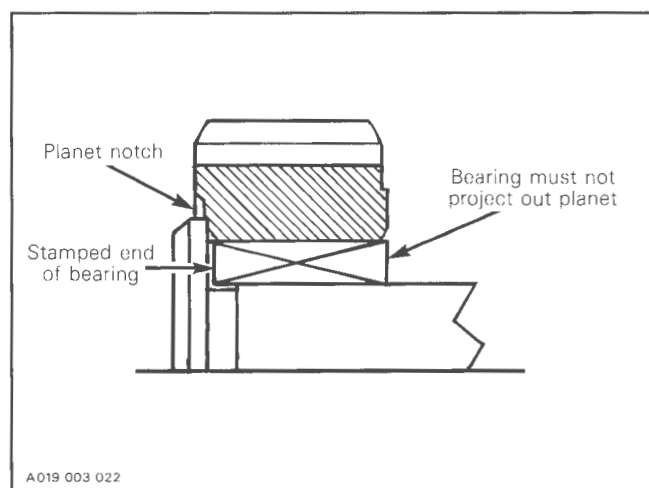
Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

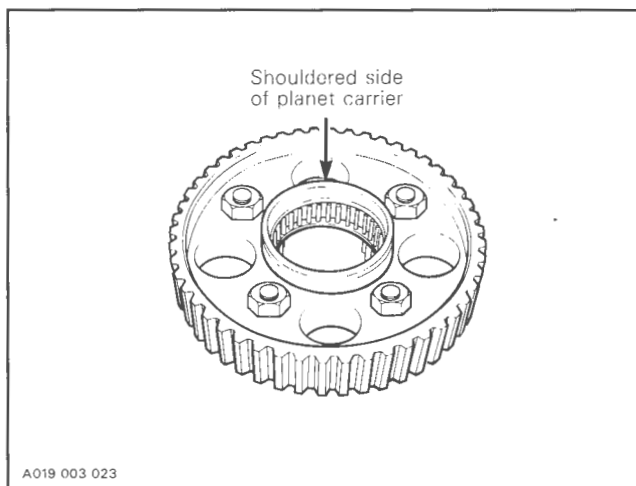


24,31,32,33,34,35,36, Needle bearing, planet shaft, planet, Loctite 271, needle bearing, nut & planet carrier

Press needle bearing into planet carrier until it bottoms. Press needle bearing into planet until it is centered. Stamped end of bearing must face toward planet notch. Press planet shaft into planet from planet notch side.



Press planet shaft into planet carrier so its retaining nut will be on shouldered side of planet carrier. Apply Loctite 271 on planet shaft threads and torque nut to 48 N•m (35 lbf•ft).

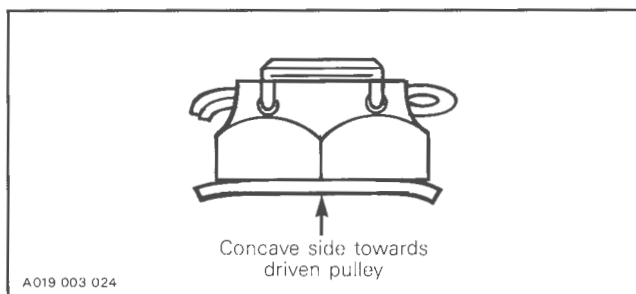


23,24,25, Sun gear & needle bearing

Press needle bearings into sun gear until they do not protrude. The larger needle bearing stamped end must face outside of sun gear.

16,17,18, Spring washer, slotted nut & cotter pin

Install spring washer with its concave side towards driven pulley. Torque slotted nut to 15 N•m (133 lbf•in), untighten then retighten to 0.5 to 2.5 N•m (14 to 24 lbf•in). Bend cotter pin end as shown.



72,73, Stud & Loctite 271

Apply Loctite 271 to stud threads and torque to 5 N•m (44 lbf•in). They should project out of case by 25 mm (1 in).

Section 03 TRANSMISSION

Sub-section 08 (GEARBOX)

INSTALLATION

Reverse removal procedure, paying attention to the following :

78, Flanged elastic stop nut

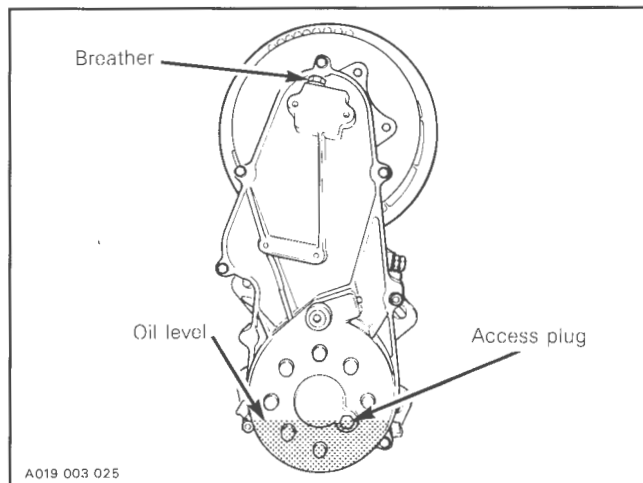
Install transmission in vehicle. Torque retaining nuts to 24 N•m (18 lbf•ft).

Drive axle

Remove drive axle holder.

Transmission oil level

Unscrew breather and access plug. Pour chaincase oil (P/N 413 8019 00 - 250 ml (9 oz)) through filling hole (breather hole) until oil begins to flow out of access hole.

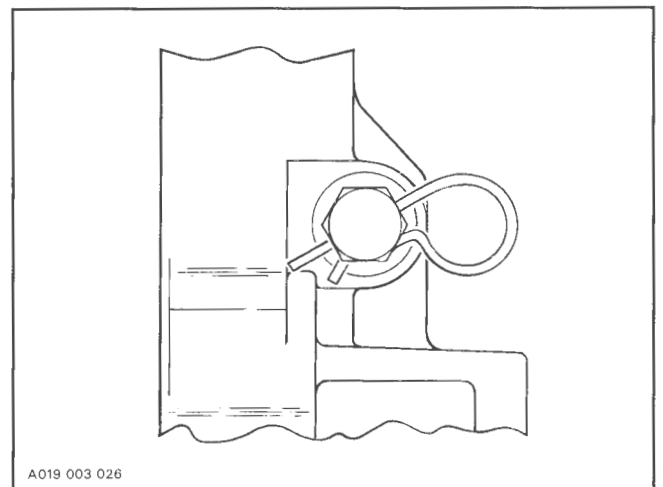


ADJUSTMENT

7,70, Tensioner adjustment screw & wave pin

Torque tensioner adjustment screw to 0.33 to 0.44 N•m (3 to 4 lbf•in) then install wave pin as shown.

NOTE : With the above adjustment, the adjustment screw head must contact transmission case with preload. If not, screw threads or tensioner threads are damaged.



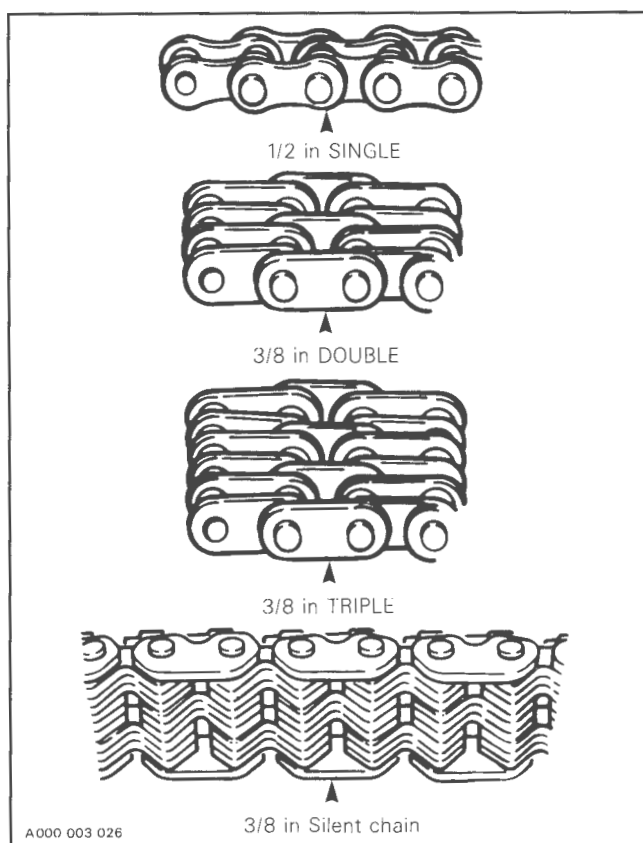
Pulley alignment

For pulley distance and alignment, refer to section 03-05.

DRIVE CHAIN

GENERAL

Bombardier drive chains exist in four types, for proper use refer to Technical Data section 08.

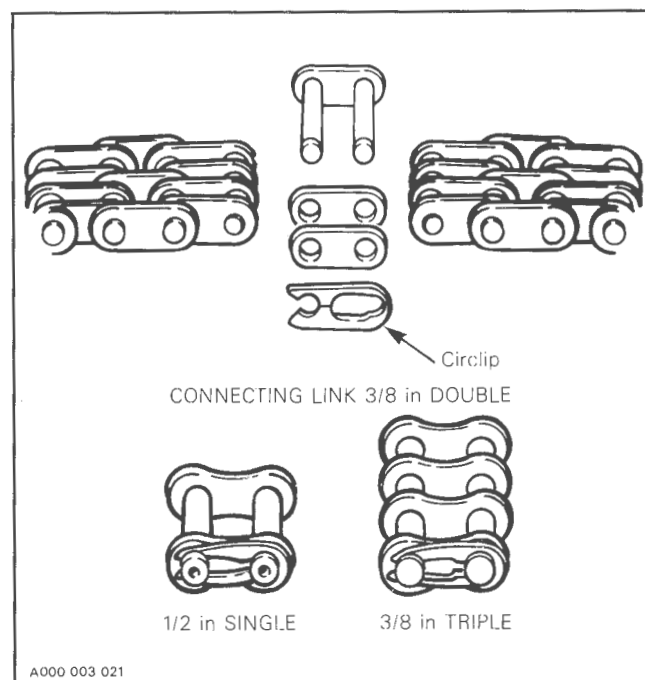
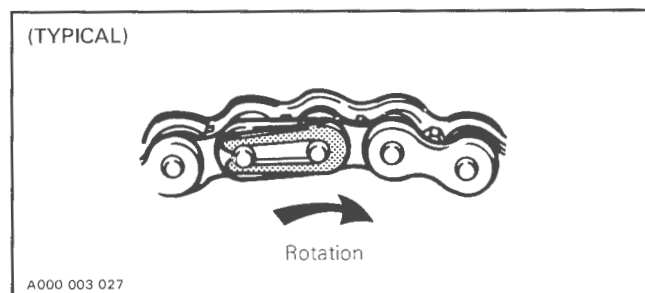


○ **NOTE :** No work (separation, lengthening) can be done on the silent chain type.

CHAIN ATTACHMENT

When joining chain ends, the open end of the circlip must be on opposite side of chain rotation. The circlip should also be facing the outer side of chaincase.

◆ **WARNING :** Always ensure that the connecting link circlip is in good condition and is properly secured.

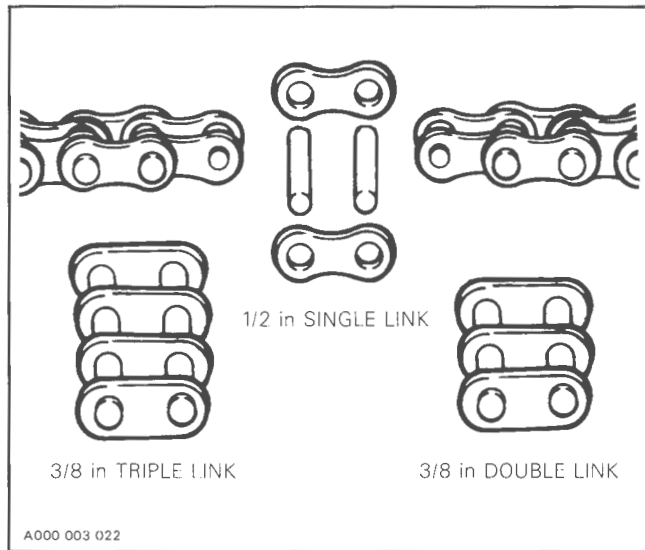


Section 03 TRANSMISSION

Sub-section 09 (DRIVE CHAIN)

CHAIN SEPARATION

When separating an endless chain, always use a chain bearing pin extractor. Also, make sure to remove one complete link.



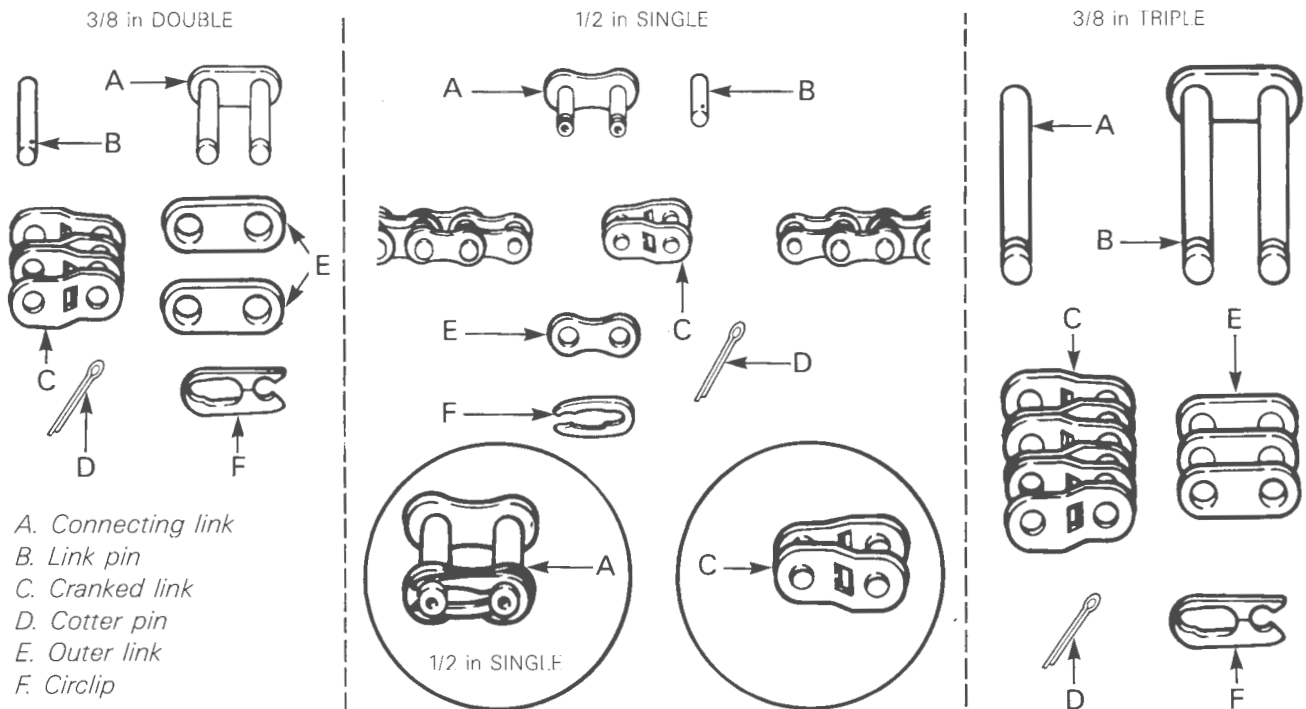
○ **NOTE :** Chain connecting link should only be used to lengthen or shorten a chain when changing the number of teeth of sprocket(s). A stretched chain should never be shortened because the chain pitch has changed (stretched) and will not properly match the sprocket pitch, causing premature wear.

○ **NOTE :** Refer to chaincase, section 03-07, for chain length according to gear ratio of each specific vehicle.

Section 03 TRANSMISSION

Sub-section 09 (DRIVE CHAIN)

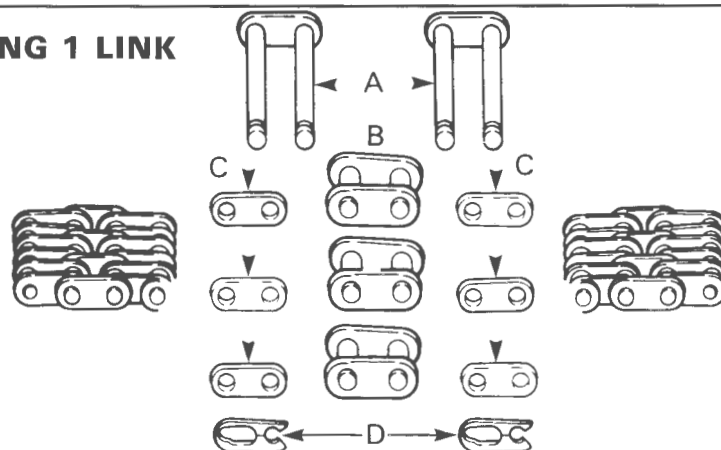
LENGTHENING 1/2 LINK



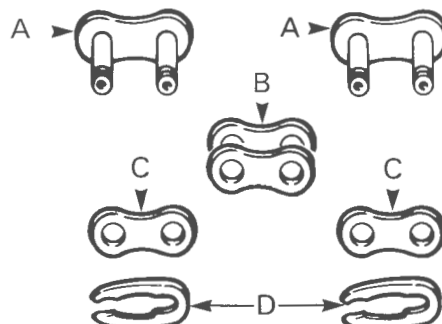
A000 003 023

LENGTHENING 1 LINK

3/8 in TRIPLE

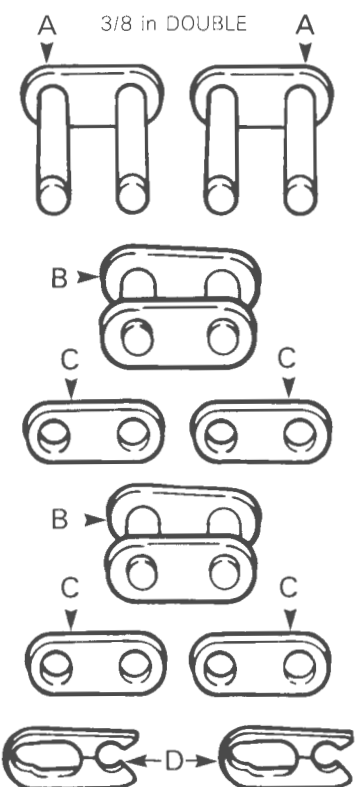


1/2 in SINGLE



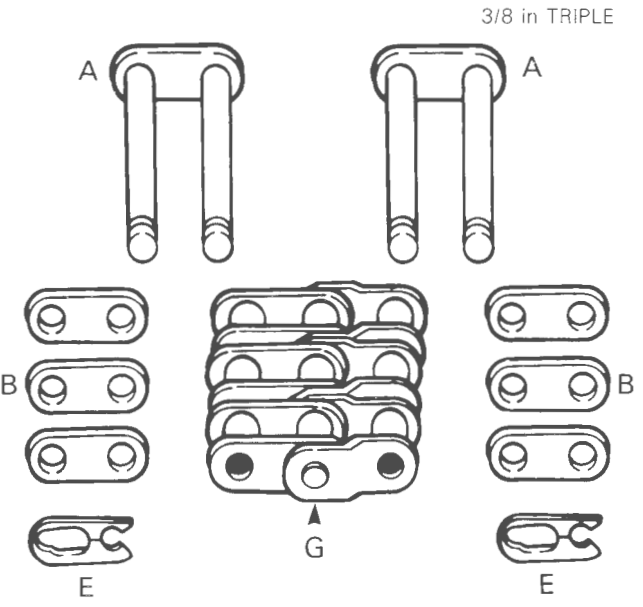
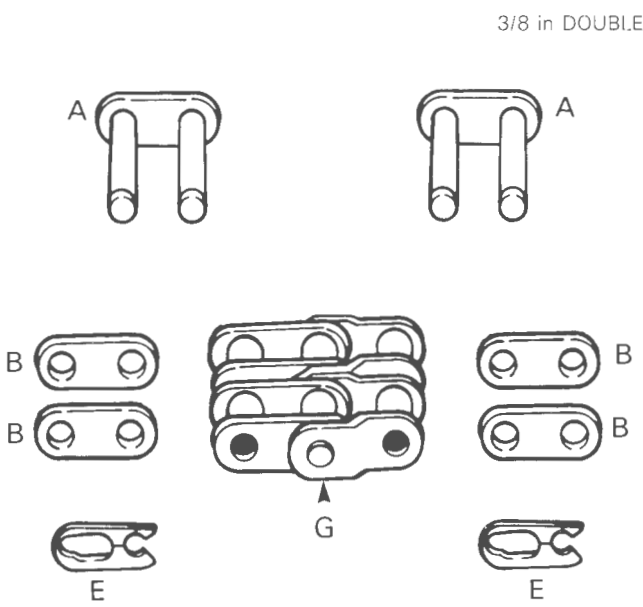
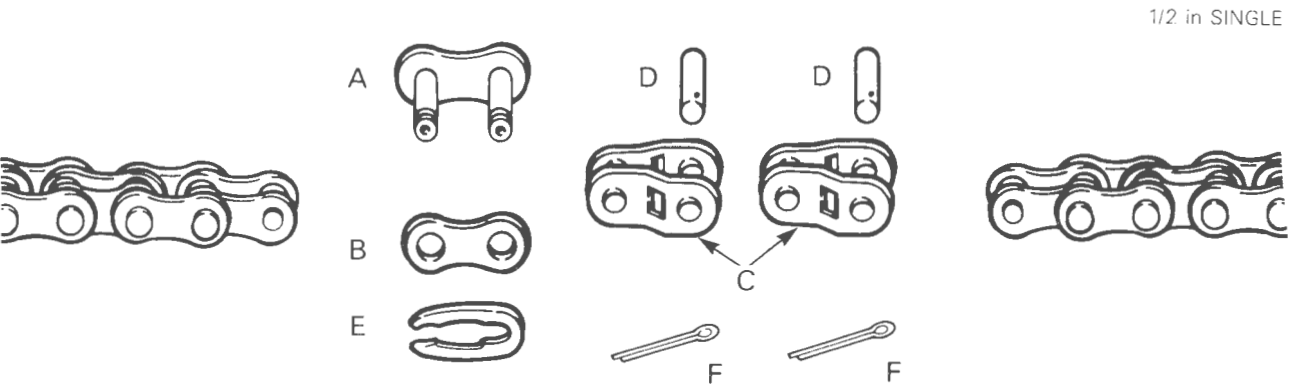
A. Connecting link
B. Inner link
C. Outer link
D. Circlip

A000 003 024



Section 03 TRANSMISSION
Sub-section 09 (DRIVE CHAIN)

LENGTHENING 1-1/2 LINK



- A. Connecting link
- B. Outer link
- C. Cranked link
- D. Link pin
- E. Circlip
- F. Cotter pin
- G. Double cranked link

WIRING DIAGRAMS

| MODEL | WIRING DIAGRAM PAGE | HEADLAMP (watt) | TAILLIGHT (watt) | ELECTRICAL SYSTEM OUTPUT (watt) |
|--------------------------------|---------------------------|--------------------|---------------------|---------------------------------------|
| Elan | 04-01-3 | 60/60 | 5/21 | 75/23 |
| Safari Citation | 04-01-4 | 60/60 | 5/21 | 160 |
| Tundra, Tundra LT | 04-01-4 | 60/60 | 5/21 | 160 |
| Safari Citation E | 04-01-5 | 60/60 | 5/21 | 160 |
| Safari Scout | 04-01-6 | 60/60 | 5/21 | 160 |
| Safari Cheyenne | 04-01-6 | 60/60 | 5/21 | 160 |
| Safari Scout E | 04-01-7 | 60/60 | 5/21 | 160 |
| Safari Saga | 04-01-7 | 60/60 | 5/21 | 160 |
| Safari Voyageur/Escapade | 04-01-8 | 60/55 hal. | 5/21 | 160 |
| Formula MX/MX LT | 04-01-9 | 60/60 | 5/21 | 160 |
| Formula Plus/Plus LT/MACH I | 04-01-9 | 60/55 hal. | 5/21 | 160 |
| Alpine II 503 | 04-01-10 | 60/60 | 5/21 | 160 |

hal. = halogen

CHART CODES

Wiring color code

The first color of a wire is the main color, second color is the stripe.

Example : YL/BK is a yellow wire with a black stripe.

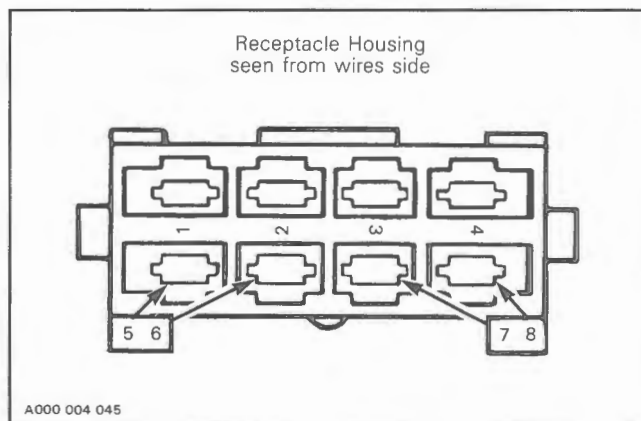
Color codes

| | |
|-------------|-------------|
| BK — BLACK | GN — GREEN |
| WH — WHITE | GY — GREY |
| RD — RED | VI — VIOLET |
| BL — BLUE | OR — ORANGE |
| YL — YELLOW | BR — BROWN |

8-circuit connector identification code

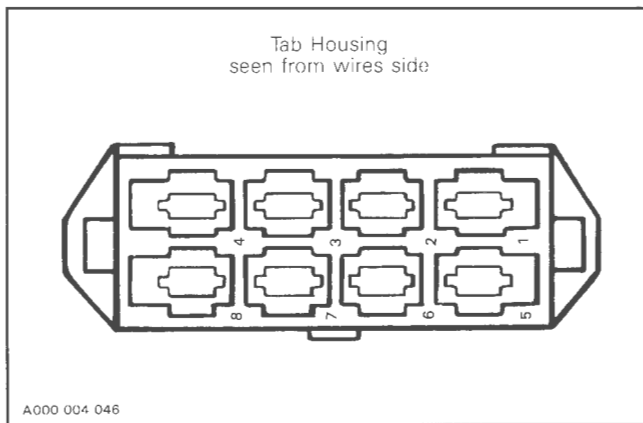
Numbers are printed on the back of the 8-circuit connector housings. They correspond to the numbers on the connectors in the electrical chart when applicable.

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



Section 04 ELECTRICAL

Sub-section 01 (WIRING DIAGRAMS)



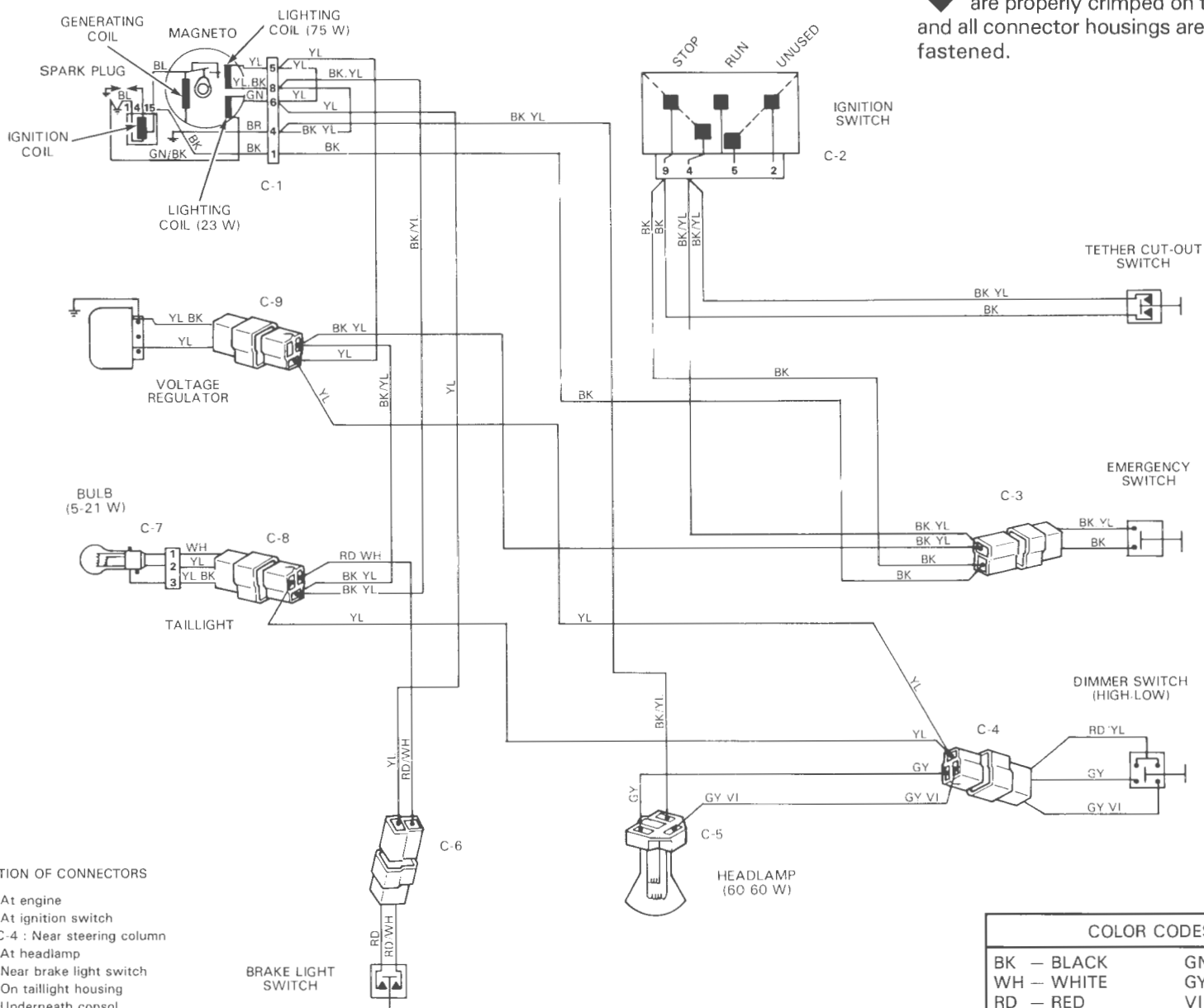
IMPORTANT : On all **electric start models** the snowmobile frame carries a negative direct current (DC) while all alternating current (AC) consumers (lights, heated grips, fuel gauge, etc.) utilize a separate ground wire.

Never interconnect AC and DC grounds as an AC voltage drop will result. When installing accessories on **any** snowmobile, connect their wires to the yellow and yellow/black lighting coil wires.

Even if **manual start models** have an AC ground to the chassis (on voltage regulator), all accessories utilize a separate ground wire also. When an electric starter kit is installed, the voltage regulator and its ground wire are replaced by a voltage rectifier/regulator unit permitting a completely insulated AC circuit.

Elan

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



LOCATION OF CONNECTORS

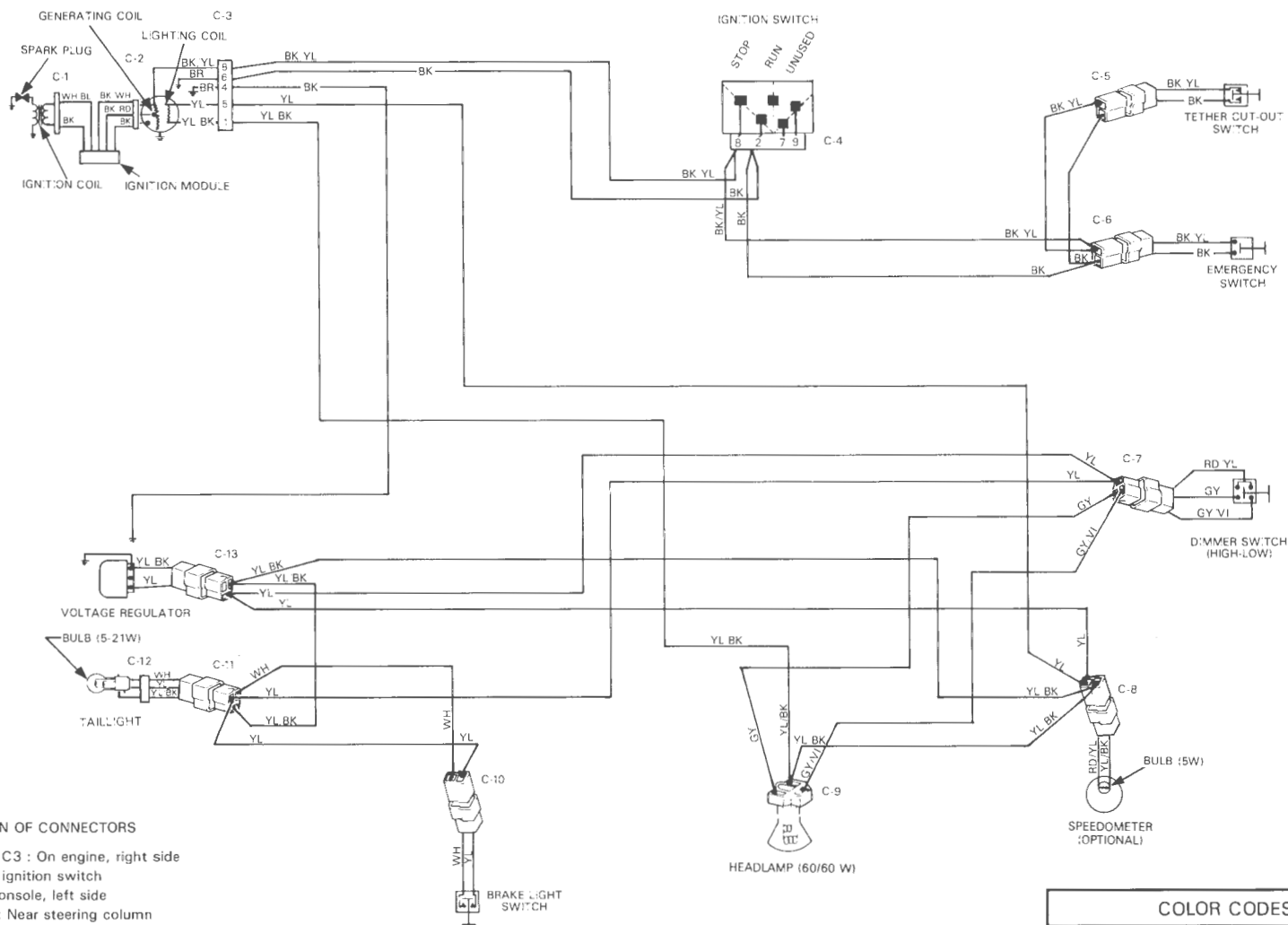
- C-1 : At engine
- C-2 : At ignition switch
- C-3, C-4 : Near steering column
- C-5 : At headlamp
- C-6 : Near brake light switch
- C-7 : On taillight housing
- C-8 : Underneath consol
- C-9 : On right side of steering support

COLOR CODES

| | |
|-------------|-------------|
| BK - BLACK | GN - GREEN |
| WH - WHITE | GY - GREY |
| RD - RED | VI - VIOLET |
| BL - BLUE | OR - ORANGE |
| YL - YELLOW | BR - BROWN |

Safari Citation Tundra Tundra LT

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



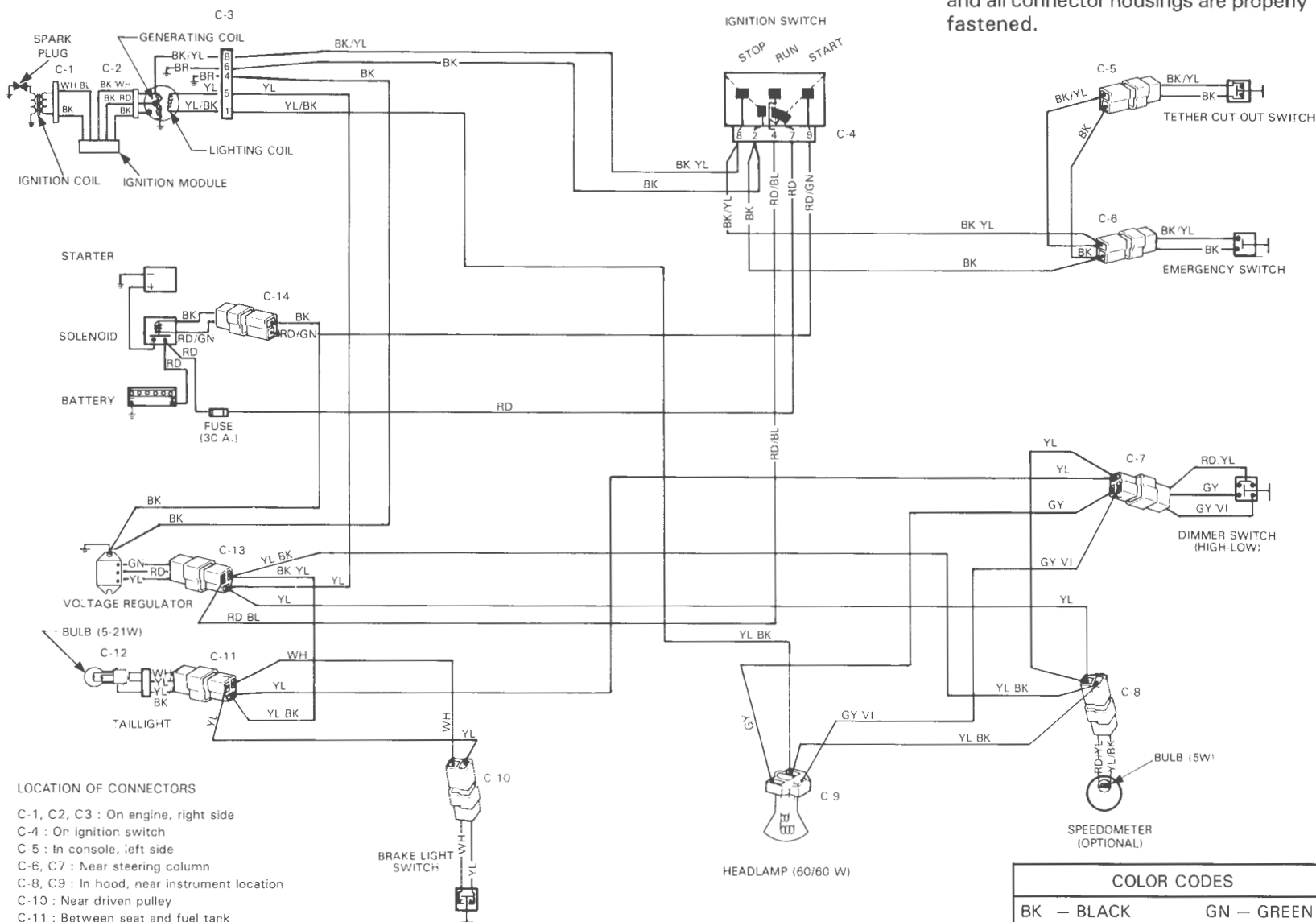
LOCATION OF CONNECTORS

- C-1, C-2, C-3 : On engine, right side
- C-4 : On ignition switch
- C-5, in console, left side
- C-6, C-7 : Near steering column
- C-8, C-9 : In hood, near instrument location
- C-10 : Near driven pulley
- C-11 : Between seat and fuel tank
- C-12 : On taillight
- C-13 : Near voltage regulator

COLOR CODES

| | |
|-------------|-------------|
| BK — BLACK | GN — GREEN |
| WH — WHITE | GY — GREY |
| RD — RED | VI — VIOLET |
| BL — BLUE | OR — ORANGE |
| YL — YELLOW | BR — BROWN |

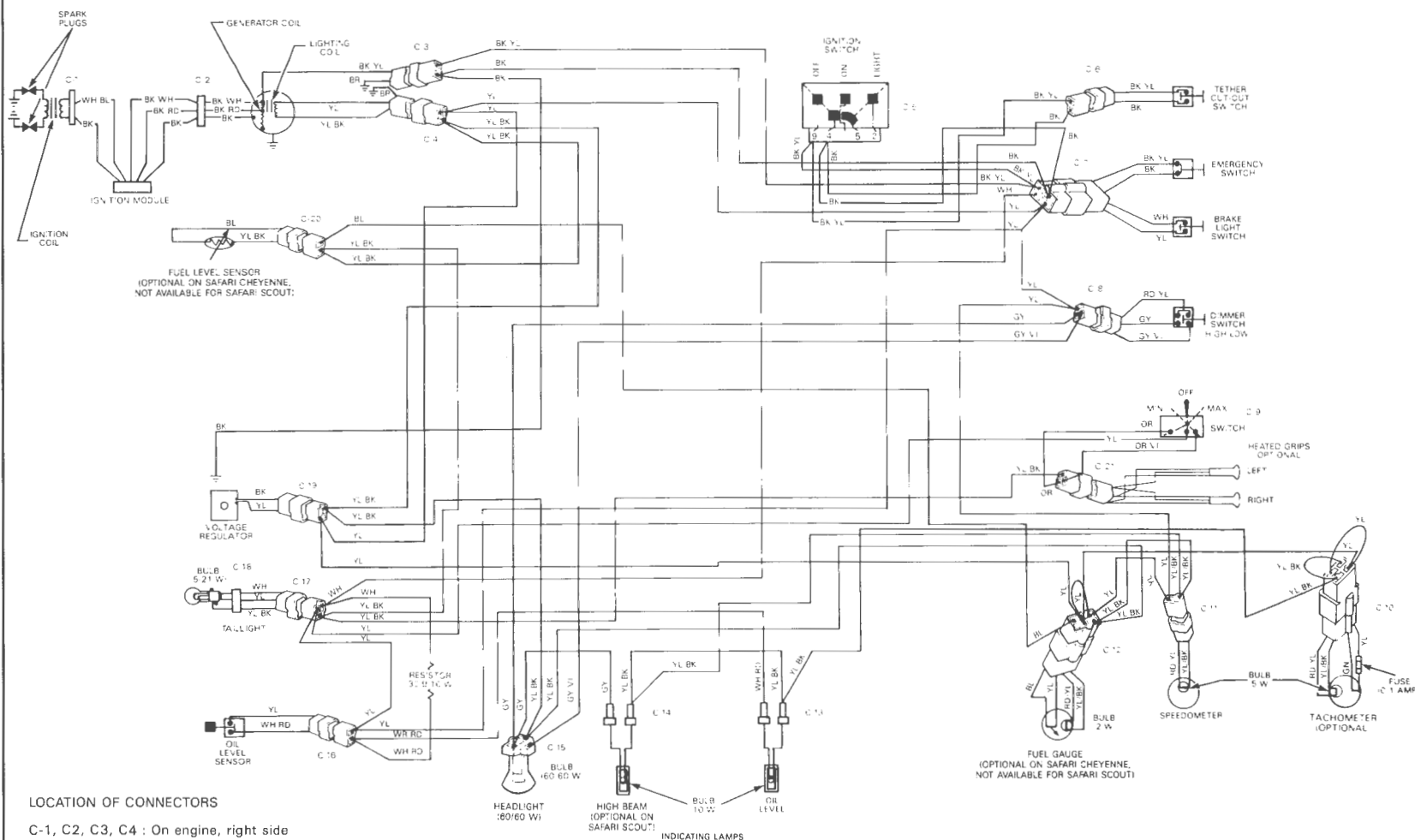
Safari Citation E



Section 04 ELECTRICAL Sub-section 01 (WIRING DIAGRAMS)

Safari Scout Safari Cheyenne

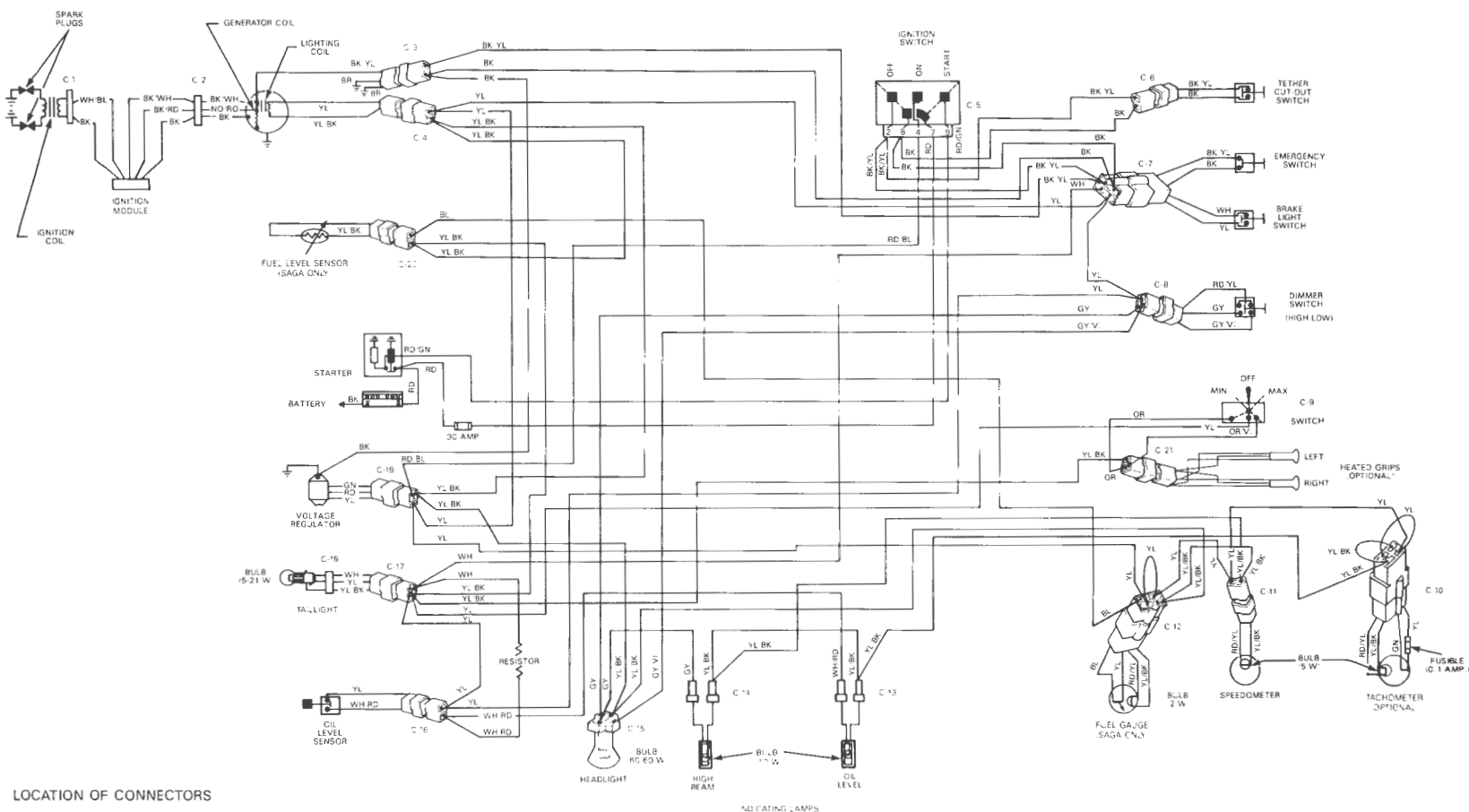
WARNING : Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.



Section 04 ELECTRICAL Sub-section 01 (WIRING DIAGRAMS)

Safari Scout E Safari Saga

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



LOCATION OF CONNECTORS

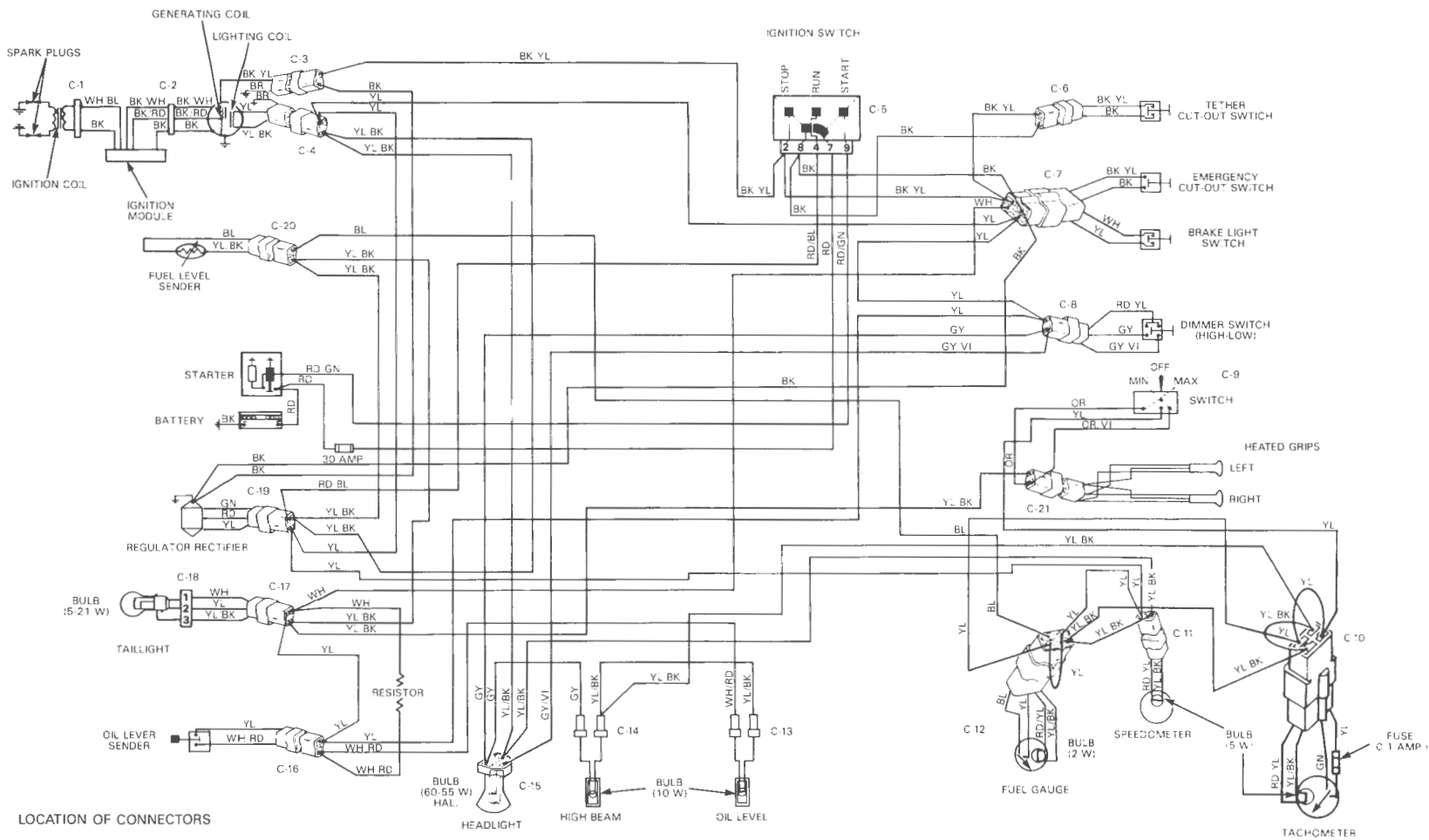
- C-1, C-2, C-3, C-4 : On engine, right side
- C-5 : On ignition switch
- C-6, C-21 : In console, left side
- C-7, C-8 : Near steering column
- C-9 : In console
- C-10, C-11, C-12, C-13, C-14, C-15 : In hood, near instruments
- C-16 : Near injection oil reservoir
- C-17, C-20 : Between seat and fuel tank
- C-18 : On taillight
- C-19 : Near regulator/rectifier
- C-21 : In console, left side

COLOR CODES

| | |
|-------------|-------------|
| BK — BLACK | GN — GREEN |
| WH — WHITE | GY — GREY |
| RD — RED | VI — VIOLET |
| BL — BLUE | OR — ORANGE |
| YL — YELLOW | BR — BROWN |

Safari Voyageur Safari Escapade

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



LOCATION OF CONNECTORS

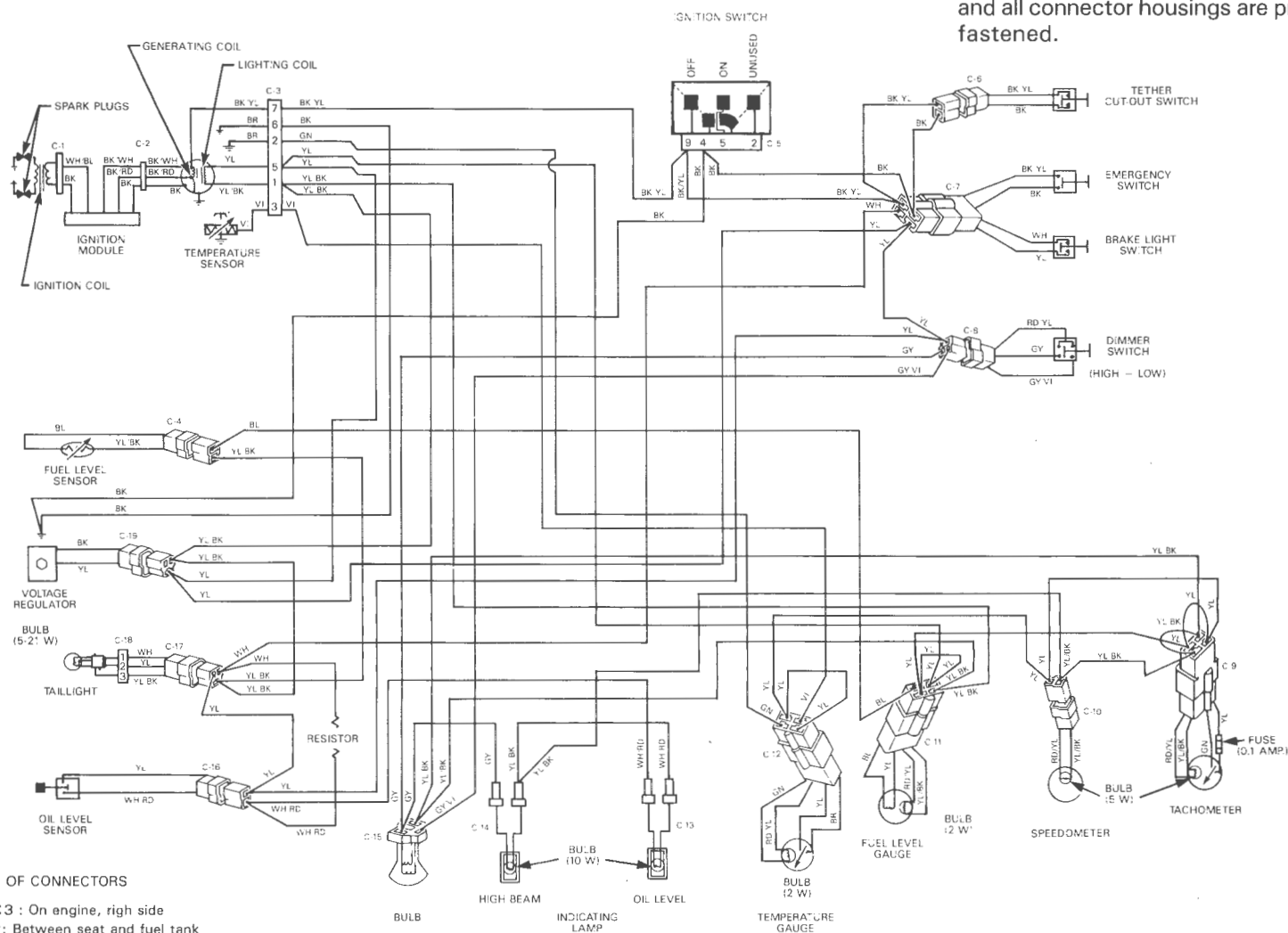
- C-1, C-2, C-3, C-4 : On engine, right side
- C-5 : On ignition switch
- C-6, C-21 : In console, left side
- C-7, C-8 : Near steering column
- C-9, C-10, C-11, C-12, C-13, C-14, C-15 : In hood, near instrument location
- C-16 : Near injection oil reservoir
- C-17, C-20 : Between seat and fuel tank
- C-18 : On taillight
- C-19 : Near voltage regulator

COLOR CODES

| | |
|-------------|-------------|
| BK — BLACK | GN — GREEN |
| WH — WHITE | GY — GREY |
| RD — RED | VI — VIOLET |
| BL — BLUE | OR — ORANGE |
| YL — YELLOW | BR — BROWN |

Formula MX/MX LT/Plus/Plus LT/MACH I

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



LOCATION OF CONNECTORS

- C-1, C-2, C-3 : On engine, high side
- C-4, C-17 : Between seat and fuel tank
- C-5 : On ignition switch
- C-6 : On console, left side
- C-7, C-8 : Near steering column
- C-9, C-10, C-11, C-12, C-13, C-14, C-15 : In hood, near instruments
- C-16 : Near injection oil reservoir
- C-18 : On taillight
- C-19 : Near voltage regulator

(FORMULA MX/MX LT : 60/60 W
FORMULA PLUS/PLUS LT/MACH I : 60/55 W HALOGEN)

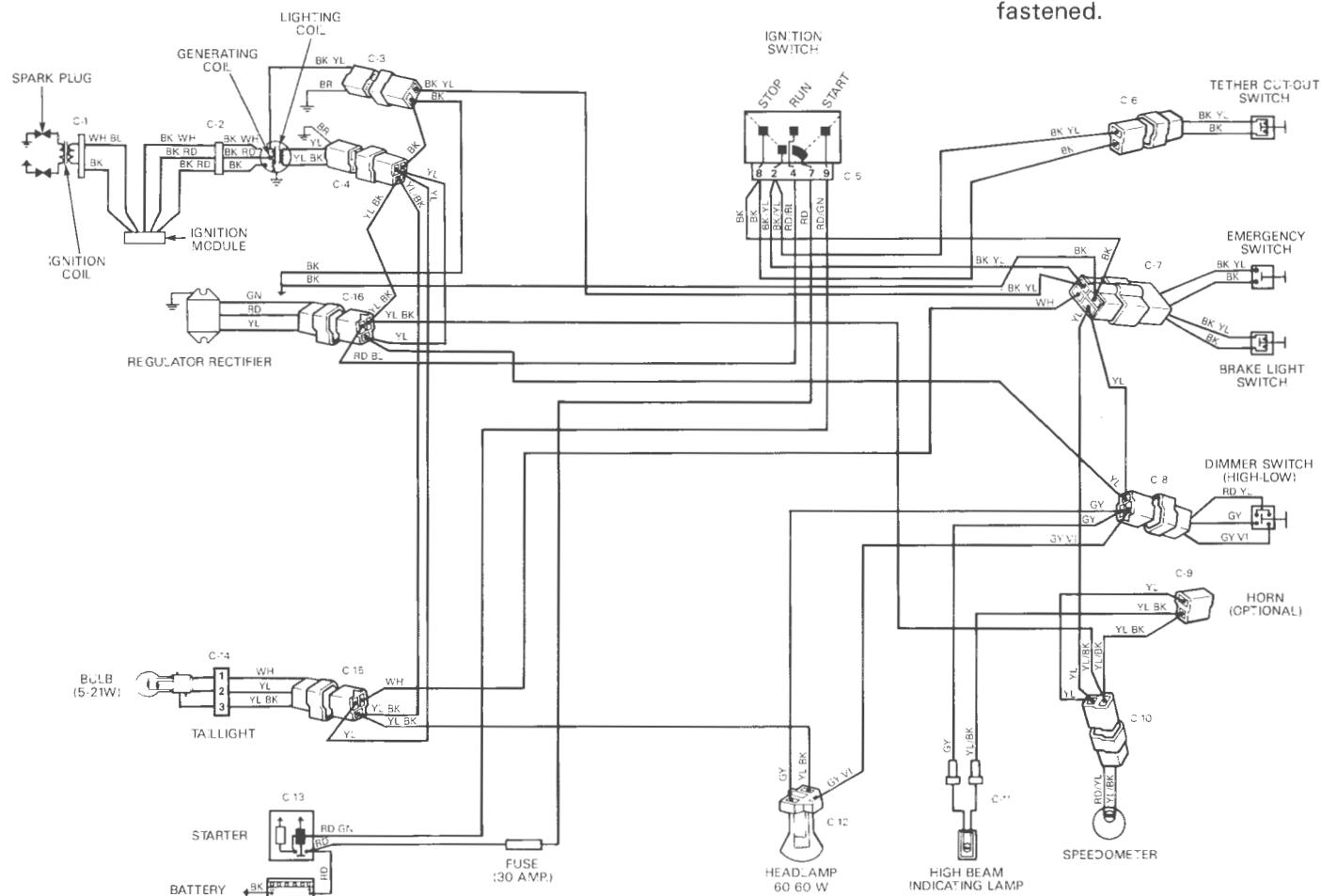
HEADLAMP

COLOR CODES

| | |
|-------------|-------------|
| BK — BLACK | GN — GREEN |
| WH — WHITE | GY — GREY |
| RD — RED | VI — VIOLET |
| BL — BLUE | OR — ORANGE |
| YL — YELLOW | BR — BROWN |

Alpine II 503

◆ **WARNING :** Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.



LOCATION OF CONNECTORS

- C-1, C-2, C-3, C-4 : On engine, right side
 C-5, C-6, C-7, C-8, C-9, C-10, C-11 :
 Underneath dashboard
 C-12 : Near headlamp
 C-13 : Near electric starter
 C-14 : On taillight housing
 C-15 : Under carburetor
 C-16 : Near regulator/rectifier

COLOR CODES

| | |
|-------------|-------------|
| BK — BLACK | GN — GREEN |
| WH — WHITE | GY — GREY |
| RD — RED | VI — VIOLET |
| BL — BLUE | OR — ORANGE |
| YL — YELLOW | BR — BROWN |

IGNITION TIMING

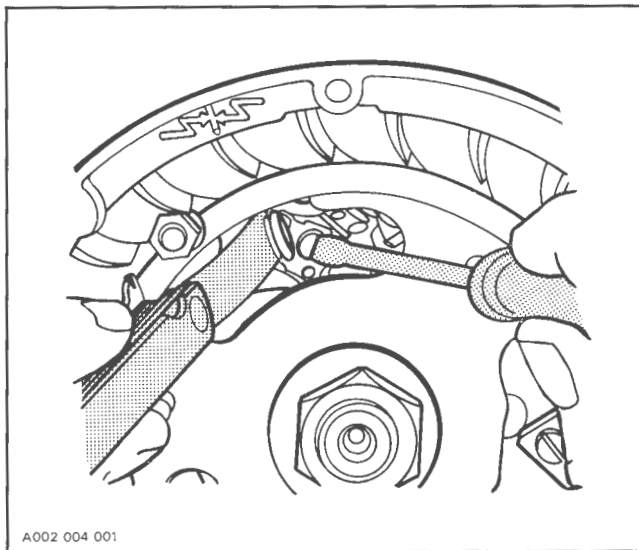
BREAKER POINTS IGNITION SYSTEM

247 ENGINE TYPE

Two methods are detailed in this section ; the first using the **timing marks**, stamped on the engine, the second using a **Top Dead Center gauge**.

Timing marks procedure

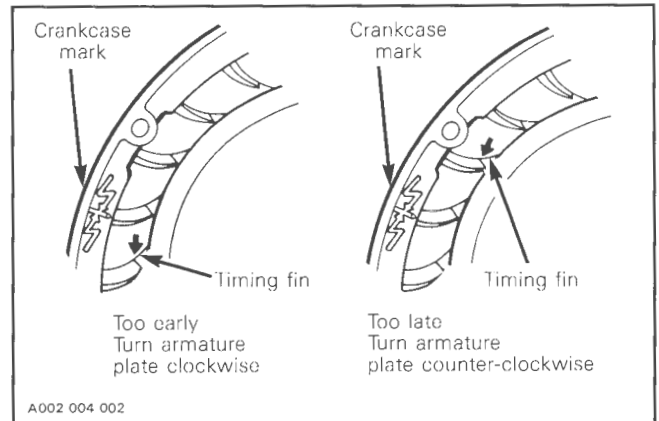
1. Disconnect spark plug wire and remove spark plug.
2. Remove rewind starter assembly from engine then remove the starting pulley from magneto ring.
3. Rotate flywheel until breaker points, visible through magneto ring opening, are fully opened. Adjust points gap to 0.35-0.40 mm (0.014-0.016 in) using a feeler gauge and a screwdriver as illustrated.



○ **NOTE :** Breaker points gap may change upon tightening. Always recheck after tightening.

4. Disconnect junction block at engine then connect one lead of a timing instrument (ex : flashlight type P/N 414 0122 00) to the blue wire leading from engine. Connect other to ground (metallic portion of the engine).
5. Turn timing instrument ON and rotate flywheel until timing marks align. Slacken the three armature plate retaining screws then rotate armature plate until timing instrument fluctuates.

Retighten retaining screws at this position.



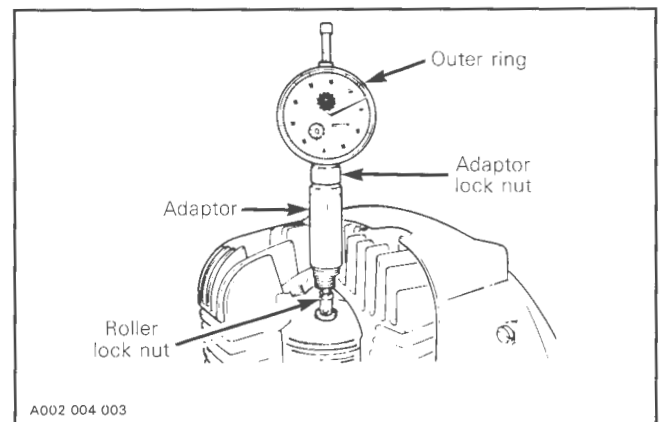
○ **NOTE :** The arrow (embossed on the fan) indicates the timing fin.

○ **NOTE :** Ignition timing may change upon tightening. Always recheck after tightening.

Top dead center gauge procedure

The first four steps are the same as timing marks procedure.

5. Install and adjust TDC gauge on engine as follows :
 - Rotate flywheel clockwise until piston is just before top dead center.
 - With gauge in adaptor, adjust roller so that it is parallel with dial face. Tighten roller lock nut.



Section 04 ELECTRICAL

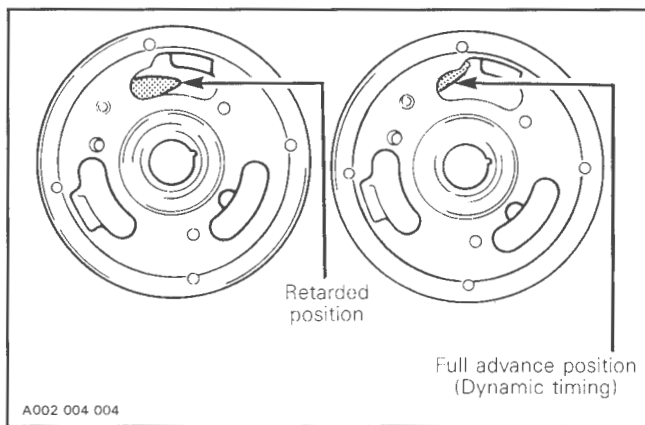
Sub-section 02 (IGNITION TIMING)

- Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in spark plug hole.
 - Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
 - Rotate flywheel until piston is at Top Dead Center.
 - Unlock outer ring of dial and turn it until "0" (zero) on dial aligns with pointer.
 - Lock outer ring in position.
6. Slacken the three (3) armature plate retaining screws and turn timing instrument ON.
7. Rotate flywheel counter-clockwise until dial reads :
 3.98 ± 0.25 mm BTDC
($0.157 \pm .010$ in)

BTDC : Before Top Dead Center.

Slightly rotate armature plate until timing instrument switch off. Retighten retaining screws.

NOTE : Hold advance mechanism centrifugal lever in full advance position (toward magneto rim) to perform dynamic timing.



NOTE : Ignition timing may change upon tightening. Always recheck after tightening.

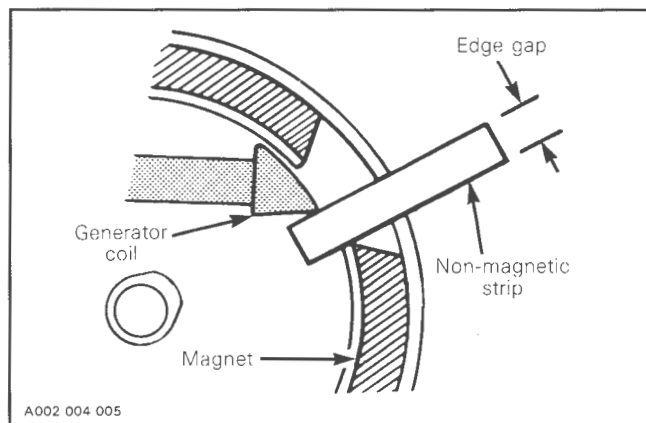
Edge gap verification

By following either of the two procedures herein mentioned the edge gap should automatically be adjusted. However, if the edge gap is to be verified, proceed as follows :

From timing marks, rotate flywheel clockwise 1/4 of a turn (hold advance mechanism centrifugal lever in full advance position toward magneto rim to perform dynamic edge gap verification), then slowly turn flywheel back counter-clockwise until timing instrument fluctuates.

At this point check the distance between generator coil end and magnet (edge gap), with a non-magnetic strip of appropriate width.

| ENGINE TYPE | DYNAMIC EDGE GAP |
|-------------|-------------------------------|
| 247 | 7 - 10 mm (9/32" - 25/64") |



If edge gap is more or less than specified, the problem lies with engine internal components (crankshaft out of alignment, broken Woodruff key, loose breaker cam, etc.) ; corrective measures should be applied.

ELECTRONIC IGNITION SYSTEMS — NIPPONDENSO

ALL ENGINES WITH NIPPONDENSO ELECTRONIC IGNITION SYSTEM

This section is mainly divided in two parts, the first one using a top dead center gauge to **verify the flywheel timing mark position**. The second one using a stroboscopic timing light to **check ignition timing**.

Flywheel timing mark position verification is required to :

1. Troubleshoot a twisted crankshaft ;
2. Troubleshoot a missing or broken flywheel woodruff key ;
3. Troubleshoot a flywheel corresponding to a different engine type ;
4. Scribe the timing mark on a new service flywheel.

Always verify flywheel timing mark position before checking ignition timing.

Verifying flywheel timing mark position.

1. Disconnect spark plug wire(s) and remove spark plug(s).

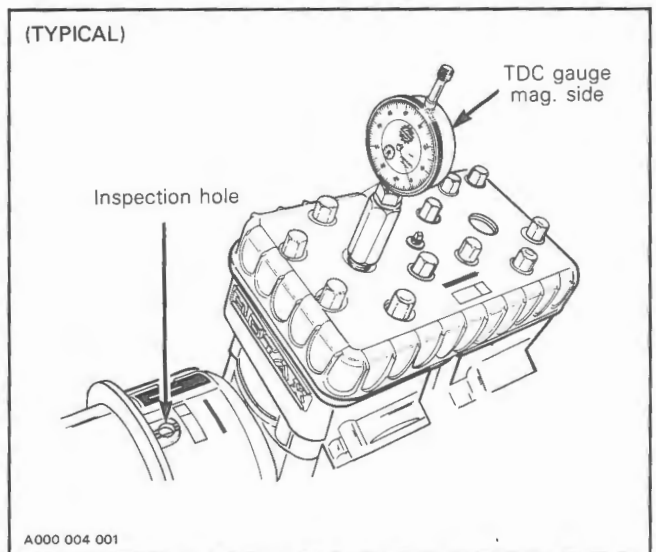
○ **NOTE :** On 503 engine type, remove fan cover.

◆ **WARNING :** Ensure the engine is cold before fan cover removal.

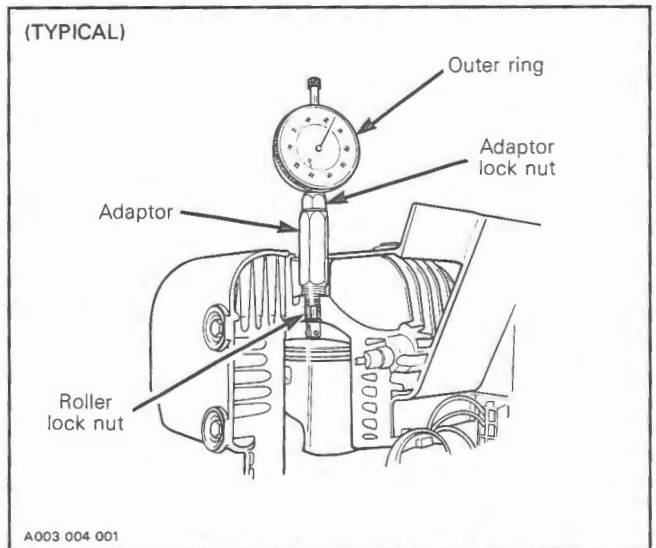
2. Remove inspection plug on crankcase (except 503 engine type).

3. Install and adjust TDC gauge on engine as follows :

○ **NOTE :** On twin cylinder engines, install it on magneto side. The following procedure will report to this side.



- Rotate flywheel clockwise until piston is just before top dead center.
- With gauge in adaptor, adjust roller so that it is parallel with dial face. Tighten roller lock nut.



- Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in spark plug hole.
- Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.

Section 04 ELECTRICAL

Sous-section 02 (IGNITION TIMING)

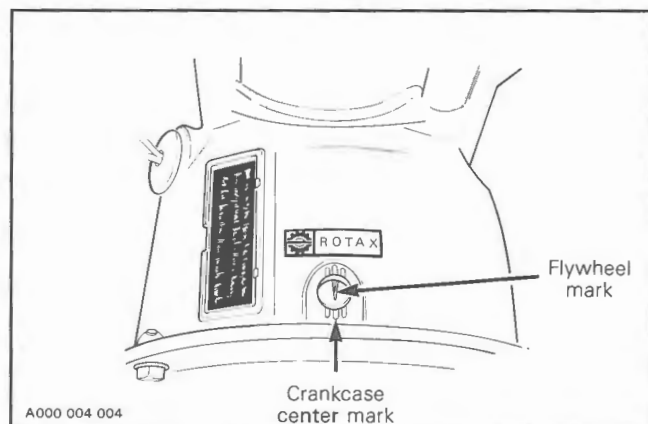
- Rotate flywheel clockwise until piston is at top dead center.
 - Unlock outer ring of dial and turn it until "O" (zero) on dial aligns with pointer.
 - Lock outer ring in position.
4. From this point, rotate flywheel back 1/4 turn then rotate it clockwise to reach the specified position :

| ENGINE TYPE | DIRECT TIMING (ADVANCE) * |
|---|------------------------------|
| | mm (in) |
| 253 | 1.88 (.074) |
| 377 | 2.31 (.091) |
| 467 | 2.51 (.099) |
| 503 Safari Cheyenne Safari Escapade/ Voyageur | 2.29 (.090) |
| 503 Alpine II | 2.29 (.090) |
| 536 | 2.18 (.086) |
| 583 | 1.75 (.069) |

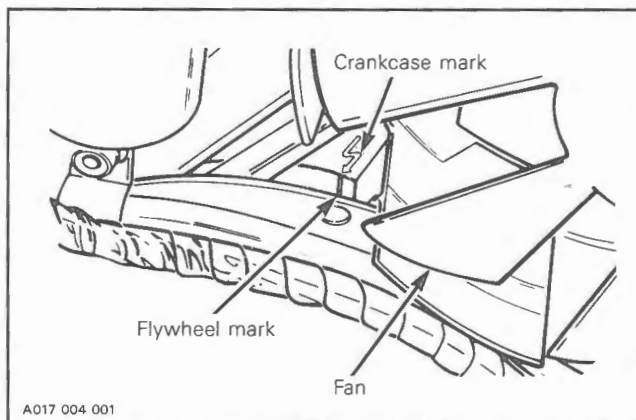
* BTDC = Before Top Dead Center

5. Look through inspection hole and check if flywheel mark align with **center** mark on crankcase. (except on 503 type).

All engines except 503 type.



503 engine type : Look through the fan and check if the flywheel and the crankcase marks align.



If marks do not align, scribe a new one onto flywheel facing **center** mark on crankcase (except on 503 type which has an arrow on crankcase).

This new mark becomes the reference when using stroboscopic timing light.

CAUTION : Timing mark position verification cannot be used as a timing procedure, therefore, always check the timing with a stroboscopic timing light at 6000 RPM after the marks have been checked.

Checking ignition timing

NOTE : To perform this procedure we strongly recommend a stroboscopic timing light which is able to exceed 6000 RPM such as :

SNAP-ON MT 212

ELECTRO-SPECIALTY, model 978.

ELECTRO-SPECIALTY, model TL 2802

NOTE : The last timing light has its own batteries (two batteries, type "C") and therefore needs no auxiliary power source.

The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold, after **MAXIMUM 20 seconds** idling.

NOTE : Turn headlamp on when checking ignition timing.

1. Connect timing light pick-up to the spark plug lead (mag side on twin cylinder engines). On vehicle without tachometer, connect one to the yellow and yellow/black wires of magneto.

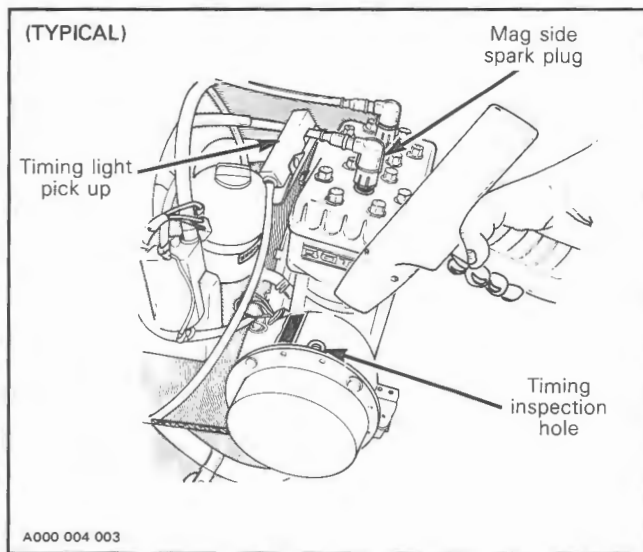
Section 04 ELECTRICAL

Sous-section 02 (IGNITION TIMING)

○ **NOTE :** Use a separate battery to supply timing light (except on electric starting models ; or when using the Electro-Specialty, model TL 2802 timing light).

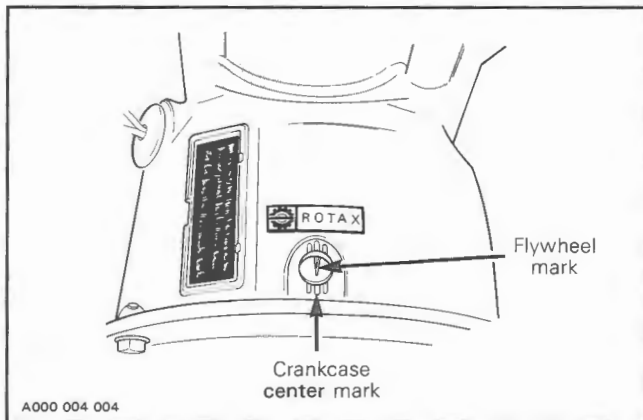
◆ **WARNING :** Place ski tips against a wall, raise rear of vehicle on a stand so that track does not contact the ground. Make sure no one passes behind the vehicle while engine is running. Keep clear of track and other moving parts.

2. Start the engine and point timing light straight in line with the crankcase timing mark. Bring engine to 6000 RPM for a brief instant.

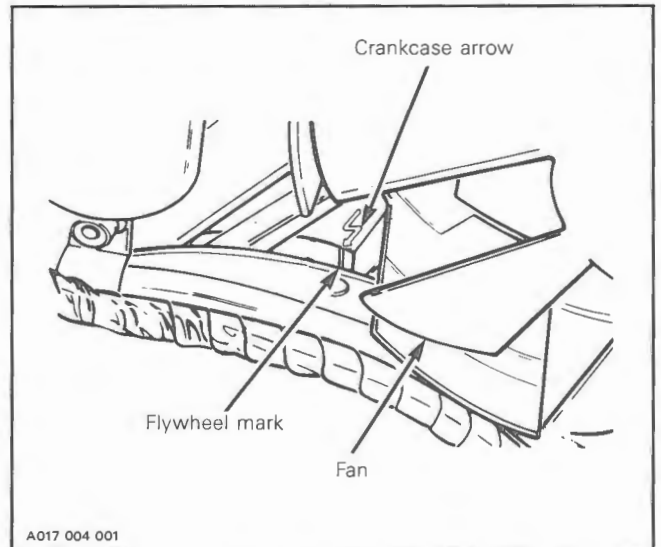


3. Look through inspection hole (except on 503 type) and check if flywheel mark (or reference one previously scribed) aligns with crankcase center mark.

All engine except 503 type



503 engine type : Look through the fan and check if the flywheel and the crankcase marks align.



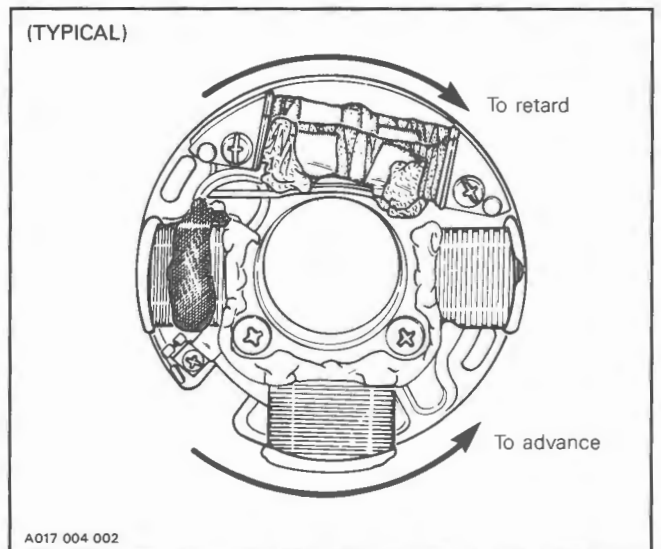
If flywheel mark (or reference one previously scribed) align with **center** mark on crankcase (except on 503 type which has an arrow on crankcase), timing is correct.

○ **NOTE :** All engines except 503 type : Center mark shows ideal position. Each mark corresponds to 2°.

If timing adjustment is required, rewind starter and starter pulley have to be removed. For removal procedure, refer to magneto into specific engine section.

IGNITION TIMING ADJUSTMENT

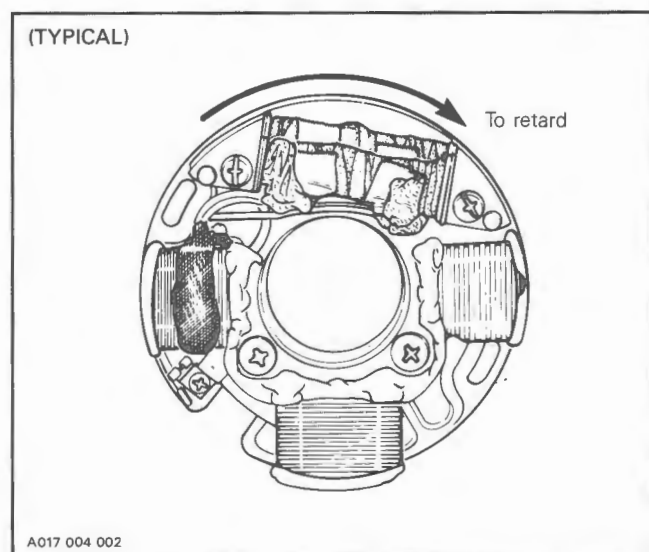
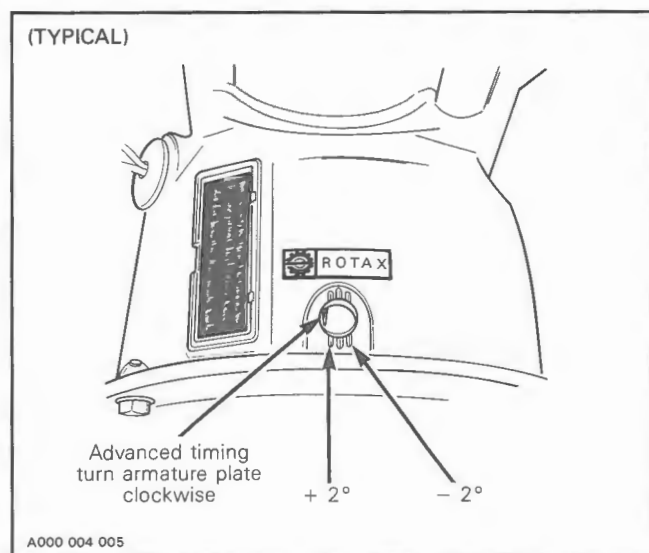
Timing is performed by moving armature plate, clockwise to retard, counter-clockwise to advance.



Section 04 ELECTRICAL

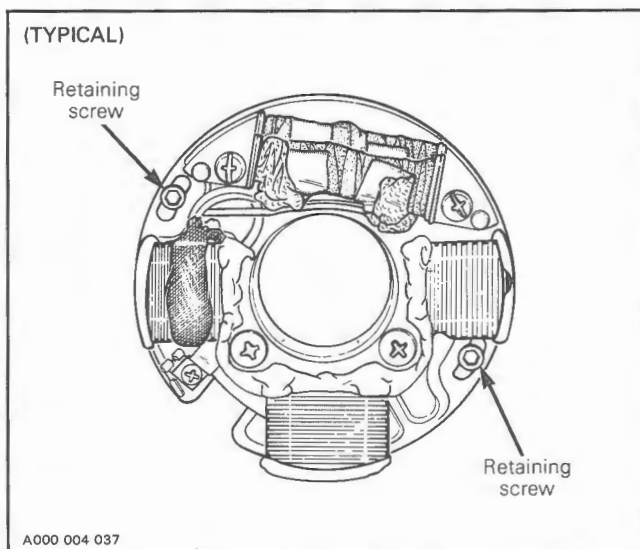
Sub-section 02 (IGNITION TIMING)

When flywheel mark is on left side of crankcase mark, it indicates advanced timing.



When flywheel mark is on right side of crankcase mark, it indicates retarded timing.

To adjust, loosen both armature plate retaining screws and lightly rotate armature plate in proper direction.



Refer to the difference between flywheel mark and crankcase **center** mark to determine the amount of rotation.

Tighten armature plate retaining screws.

▼ **CAUTION :** Make sure armature plate screws are well secured.

Reinstall removed parts.

Recheck ignition timing (make sure engine is cold).

SPARK PLUGS

○ **NOTE :** The 1989 Bombardier snowmobiles are using two (2) spark plug brands, Bosch and NGK spark plugs.

BOSCH SPARK PLUG TYPE

Elan

SPARK PLUG NUMBERING SYSTEM

The heat range identification system is :

High number  hot plug

Low number  cold plug

1989 REFERENCE CHART

Bosch spark plugs used on 1989 Bombardier snowmobiles :

New number

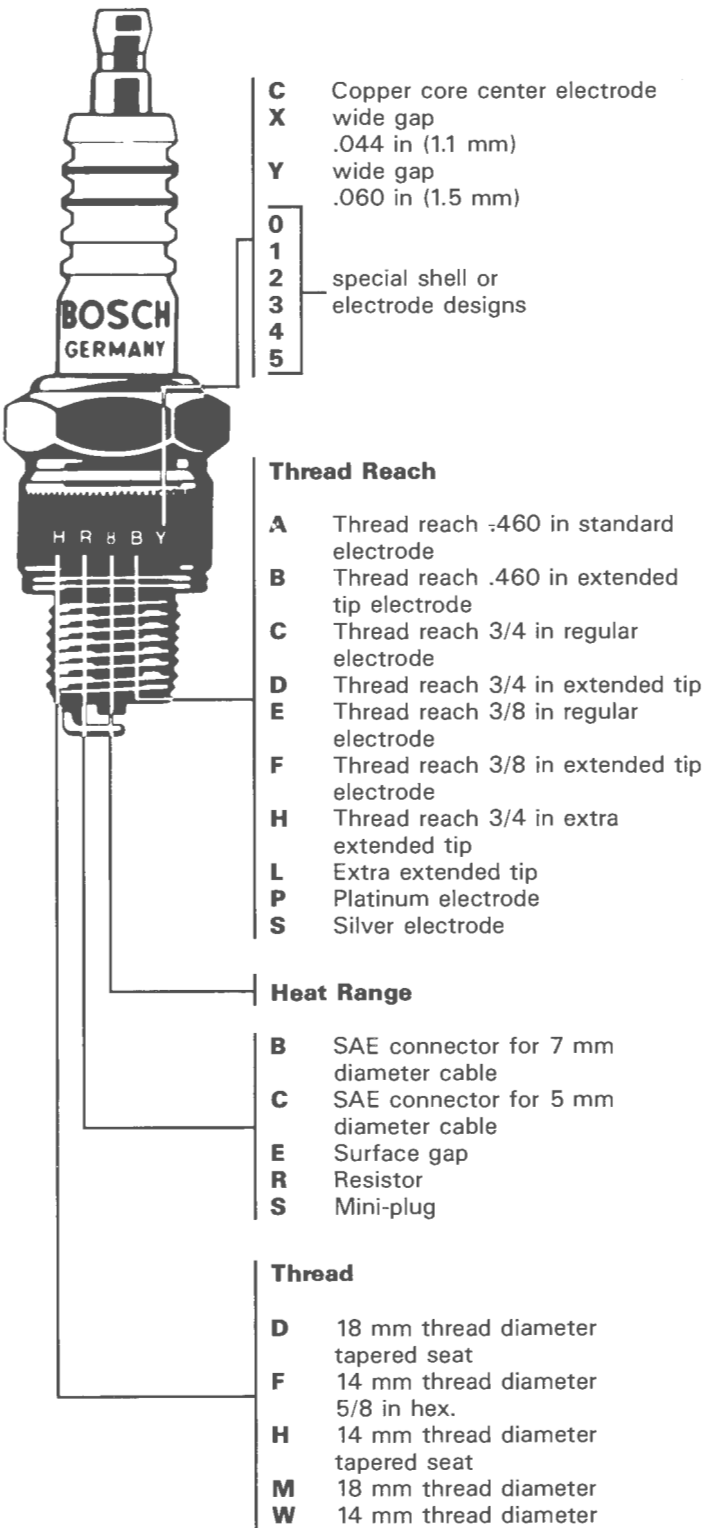
— M 7 A

Old number

— M 175 T 1

Section 04 ELECTRICAL SYSTEM
Sub-section 03 (SPARK PLUGS)

DESIGN SYMBOLS USED ON BOSCH SPARK PLUGS



NGK SPARK PLUG TYPE

All models except Elan

SPARK PLUG NUMBERING SYSTEM

Bombardier is using the NGK spark plug type on most of the 1989 snowmobile models.

The heat range identification system is :

| | | |
|-------------|-------|-----------|
| High number | ————→ | cold plug |
| Low number | ————→ | hot plug |

1989 REFERENCE CHART

NGK spark plugs used on 1989 Bombardier snowmobiles :

- BR7ES
- BR8ES
- BR9ES

Section 04 ELECTRICAL SYSTEM

Sub-section 03 (SPARK PLUGS)

DESIGN SYMBOLS USED ON NGK SPARK PLUGS

First letter prefix for thread and hexagon size Second & third letter prefix for construction feature, except single prefix Heat rating number First letter suffix for thread : reach Second letter suffix for construction feature, etc.

| Letter | Thread size | Hexagon size | Letter | Construction feature | <div>2</div> <div>Hotter Type</div> <div>4</div> <div>5</div> <div>6</div> <div>Ordinary plugs</div> <div>(85)</div> <div>(95)</div> <div>9</div> <div>10</div> <div>(105)</div> <div>11</div> <div>12</div> <div>13</div> <div>14</div> <div>Colder type</div> | Letter | Thread reach | Letter | Construction feature, etc. | |
|--------|---------------|--------------|--------|-------------------------------|---|--|---------------------------------|--|----------------------------|---|
| A | 18 mm | 25.4 mm | B | Hexagon size 20.6 mm | | <div>None</div> <div>L</div> <div>H</div> <div>E</div> <div>F</div> <div>A - F 10.9 mm</div> <div>B - F 11.2 mm</div> <div>BM - F 7.8 mm</div> <div>BE - F 17.5 mm</div> | A | Specials | | |
| B | 14 mm | 20.6 mm | C | Hexagon size 16.0 mm | | | B | Special plug for Honda vehicles | | |
| C | 10 mm | 16.0 mm | G | Hexagon size 23.8 mm | | | C | Competition type | | |
| D | 12 mm | 18.0 mm | L | Compact type (SHORTY) | | | G | Racing plugs, center electrode of nickel alloy | | |
| F | 7/8 in -18 | 23.8 mm | M | Compact type (BANTAM) | | | GV | Racing plugs, center electrode of precious metal | | |
| G | PF 1/2 in -14 | 23.8 mm | P | Projected insulator nose type | | | N | Racing plugs, nickel electrode | | |
| | | | R | Resistor type | | | P | Racing plugs, platinum ground electrode | | |
| | | | S | Shielded type | | | R | Shielded resistor plugs | | |
| | | | U | Surface discharge type | | | S | Copper core center electrode (Super) | | |
| | | | | | | | V | Center electrode of precious metal | | |
| | | | | | | | W | Tungsten electrode | | |
| | | | | | | | X | Series gap plugs | | |
| | | | | | | | Y | V-Grooved center electrode | | |
| | | | | | | | Multiple ground electrodes type | | | |
| | | | | | | | K | 2 | T | 3 |
| | | | | | | | M | 2 | Q | 4 |
| | | | | | Others Except for above letters, there are special plugs of J, L, Z, etc. | | | | | |

(*Standard regulation is drawn here. There also exist a few extraordinary symbols.

Wide gap type (mm)



Section 04 ELECTRICAL SYSTEM

Sub-section 03 (SPARK PLUGS)

DISASSEMBLY

First unscrew the spark plug one turn.

Clean the spark plug and cylinder head with pressurize air then completely unscrew.

HEAT RANGE

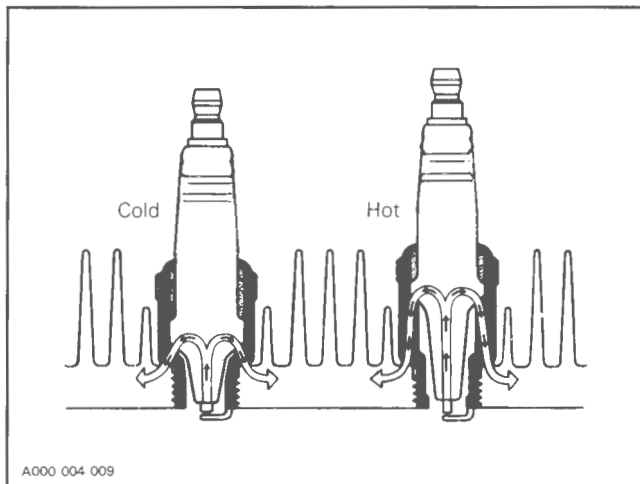
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be — and inversely, the shorter the heat path, the colder the operating temperature will be.

A "cold" type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The "hot" type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



▼ **CAUTION** : Severe engine damage might occur if a wrong heat range plug is used :

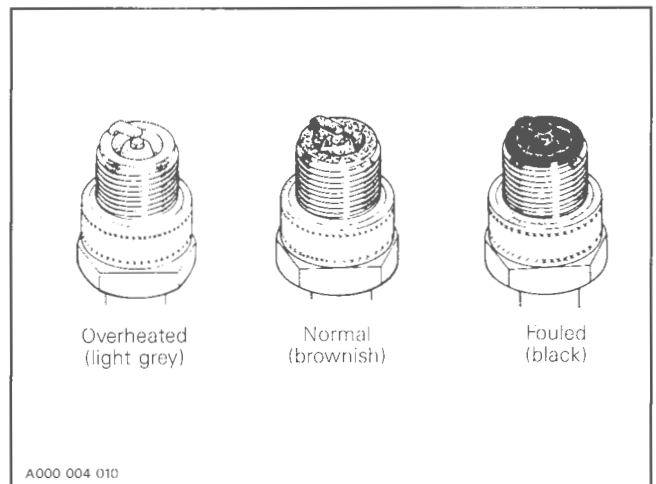
A too "hot" plug will result in overheating and pre-ignition, etc.

A too "cold" plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

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 running on a too rich mixture due to a faulty carburetor adjustment or incorrect fuel and/or fuel mixing. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

SPARK PLUG ANALYSIS



The plug face (and piston dome) 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) and the piston dome.

Section 04 ELECTRICAL SYSTEM

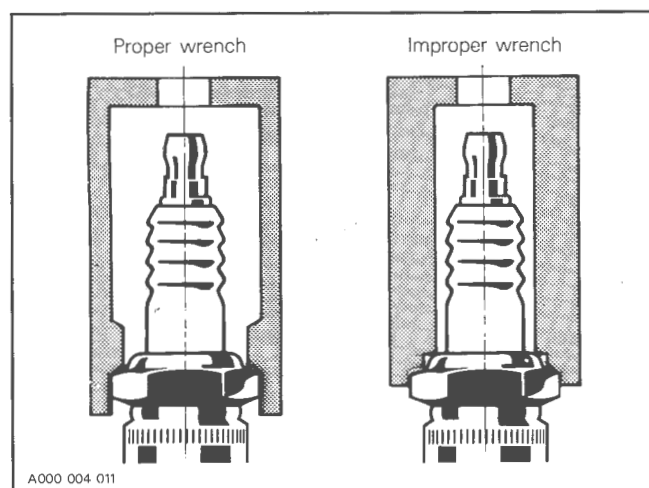
Sub-section 03 (SPARK PLUGS)

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to chart on next page.
2. Apply loctite antiseize lubricant (P/N 413 7010 00) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench :

Use a proper wrench to tighten the spark plug.



SPARK PLUG CHART

| Models | Engine type | Spark plugs | Torque N•m (lbf•ft) | Gap mm (inch) |
|---|-------------|-------------|------------------------|------------------|
| Elan | 247 | Bosch M7A | 37 (27) | 0.50 (.020) |
| Safari Citation / E Tundra, Tundra LT | 253 | NGK BR9ES | 27 (20) | 0.40 (.016) |
| Safari Scout / E Saga | 377 | NGK BR9FS | | |
| Formula MX / MX LT | 467 | NGK BR9ES | | |
| Safari Cheyenne Safari Escapade Safari Voyageur | 503 | NGK BR9ES | | |
| Alpine II | 503 | NGK BR8ES | | |
| Formula Plus Plus LT | 536 | NGK BR9ES | | |
| Formula MACH I | 583 | NGK BR9ES | | |

Section 04 ELECTRICAL SYSTEM

Sub-section 04 (BATTERY)

BATTERY

REMOVAL

◆ **WARNING :** Battery black negative cable must always be disconnected first and connected last.

CLEANING

Clean the battery casing, vent caps, cables and battery posts using a solution of baking soda and water.

▼ **CAUTION :** Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.

INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casing is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

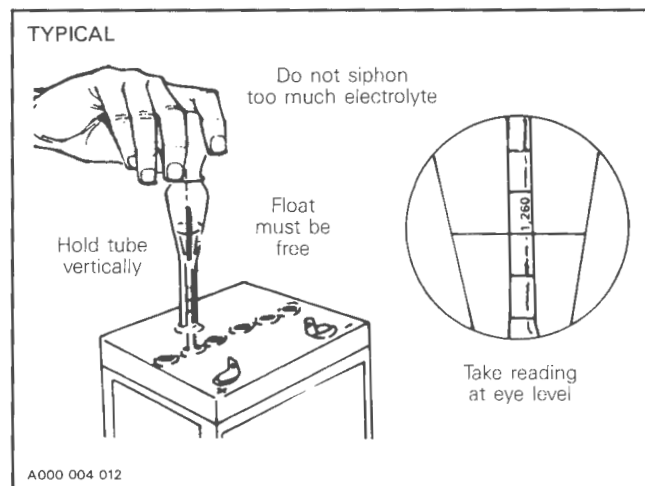
◆ **WARNING :** Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

◆ **WARNING :** Battery caps do not have vent holes. Make sure that vent tube is not obstructed.

HYDROMETER TEST



A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 27°C (80°F).

In order to obtain correct readings, adjust the initial reading by adding .004 points to the hydrometer readings for each 5.5°C (10°F) above 27°C (80°F) and by **subtracting** .004 point for every 5.5°C (10°F) below 27°C (80°F).

This chart will be useful to find the correct reading.

| ELECTROLYTE TEMPERATURE | | OPERATION TO PERFORM | |
|-------------------------|-----|----------------------|-----------------------|
| °C | °F | | |
| 38 | 100 | add | .008 to the reading |
| 32 | 90 | | .004 |
| 27 | 80 | correct reading | |
| 21 | 70 | subtract | .004 from the reading |
| 16 | 60 | | .008 |
| 10 | 50 | | .012 |
| 4 | 40 | | .016 |
| -1 | 30 | | .020 |
| -7 | 20 | | .024 |
| -12 | 10 | | .028 |
| -18 | 0 | | .032 |
| -23 | -10 | | .036 |
| -29 | -20 | | .040 |
| -34 | -30 | | .044 |
| -40 | -40 | | .048 |

EXAMPLE NO 1

Temperature below 27°C (80°F) :
Hydrometer Reading : 1.250
Electrolyte temperature : -7°C (20°F)
Subtract .024 Sp. Gr.
Corrected Sp. Gr. is 1.226

EXAMPLE NO 2

Temperature above 27°C (80°F) :
Hydrometer Reading : 1.235
Electrolyte temperature : 38°C (100°F)
Add .008 Sp. Gr.
Corrected Sp. Gr. is 1.243

▼ **CAUTION :** Do not install a partially charged battery on a snowmobile since the casing might crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the charge of the battery.

Section 04 ELECTRICAL SYSTEM

Sub-section 04 (BATTERY)

| Temperature-Corrected Specific Gravity | Battery Charge | Freezing Point of Electrolyte |
|--|----------------|-------------------------------|
| 1.260 | Fully Charged | -59°C (-74°F) |
| 1.230 | 3/4 charged | -40°C (-40°F) |
| 1.200 | 1/2 charged | -27°C (-16°F) |
| 1.170 | 1/4 charged | -18°C (0°F) |
| 1.110 | Discharged | -7°C (+19°F) |

BATTERY STORAGE

Disconnect and remove battery from the vehicle.

Check electrolyte level in each cell, add distilled water up to upper level line.

▼ **CAUTION :** Do not overfill.

The battery must always be stored in fully charged condition. If required, charge until specific gravity of 1.260 is obtained.

▼ **CAUTION :** Battery electrolyte temperature must not exceed 50°C (122°F). The casing should not feel hot.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P / N 413 7017 00) or petroleum jelly on terminals.

Clean battery casing and caps using a solution of baking soda and water. (Do not allow cleaning solution to enter battery, otherwise it will destroy the electrolyte). Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum.

During the storage period, recheck electrolyte level and specific gravity readings at least every forty (40) days. As necessary, keep the battery at its upper level line and near full charge as possible (trickle charge).

ACTIVATION OF NEW BATTERY

▼ **CAUTION :** Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

A new battery is factory fresh dry charged. For storage purposes, it is fitted with a temporary sealing tube.

Do not remove the sealing tube or loosen battery caps unless activation is desired.

In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

Perform the following operations anytime a new battery is to be installed.

1. Remove the sealing tube from the vent elbow. Install vent tube, included in the battery kit, to battery elbow.

◆ **WARNING :** Failure to remove the sealing tube could result in an explosion.

2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity : 1.260 at 20°C (68°F)).
3. Allow the battery to stand for 30 minutes MINIMUM so that electrolyte soak through battery cells.
4. Readjust the electrolyte level to the UPPER LEVEL line.
5. Charge battery at a charging rate of 2.0 amperes for 10 to 20 hours.

▼ **CAUTION :** If charging rate raises higher than 2.4 amps reduce it immediately. If cell temperature rises higher than 50°C (122°F) (if the casing feels hot) discontinue charging temporarily or reduce the charging rate.

◆ **WARNING :** Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Always turn battery charger off **prior** to disconnecting cables. Otherwise a spark will occur and battery might explode.

6. After charging, allow the gas bubbles to escape by lightly shaking the battery by hand. Let it settle for 1 hour.
7. Readjust electrolyte level to UPPER LEVEL line if required.
8. Reinstall the caps and clean any electrolyte spilled on battery using a solution of baking soda and water.

▼ **CAUTION :** Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

9. Install battery in rack and secure properly.
10. Hook up battery cables observing correct polarity, connecting positive (red) cable first.

▼ **CAUTION :** Negative battery terminal should always be disconnected **FIRST** and reconnected **LAST**.

Section 04 ELECTRICAL SYSTEM

Sub-section 04 (BATTERY)

11. Connect one end of vent tube to battery vent elbow and insert other end through bottom pan hole.

◆ **WARNING :** Vent tube must be free and open. A kinked or bent tube will restrict ventilation and create gas accumulation that might result in an explosion.

12. Coat terminals with petroleum jelly to prevent corrosion.
13. Install protectors on exposed ends of retainer rods if applicable.

○ **NOTE :** It is recommended to verify the battery charge once a month. If necessary, fully charge battery.

TIPS FOR CHARGING A USED BATTERY

▼ **CAUTION :** Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging begun.

Do not charge frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about 2 hours before charging.

◆ **WARNING :** Do not place battery near open flame.

The time required to charge a battery will vary depending some factors such as :

- Battery temperature : The charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warm up, it will accept a higher rate of charge.
- State of charge : Because the electrolyte is nearly pure water in a completely discharged battery, it cannot accept current as well as electrolyte. This is the reason the battery will not accept current when the charging cycle first begins. As the battery remains on the charger, the current from the charger causes the electrolytic acid content to rise which makes the electrolyte a better conductor and then, the battery will accept a higher charging rate.
- Type of charger : Battery chargers vary in the amount of voltage and current that they can supply. Therefore, the time required for the battery to begin accepting measurable current will also vary.

Charging a very flat or completely discharged battery :

Unless this procedure is properly followed, a good battery may be needlessly replaced.

- Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in term of milliamperes, because electrolyte is nearly pure water as explained above. It could be some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem not to accept any charge.

- Exceptionnally for this particular case, set the charger to a high rate.

○ **NOTE :** Some chargers have a polarity protection feature which prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. This will make it appear that the battery will not accept a charge. Follow the charger manufacturer's instruction telling how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

- Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.
- If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.
- If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner as specified in "activation of a new battery".
- It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

BATTERY CHARGING EQUIPMENT

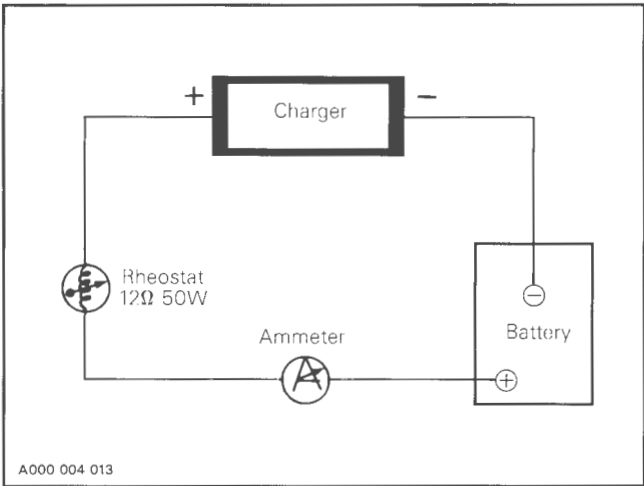
The battery charger should have an adjustable charging rate. Variable adjustment is preferred, but a unit which can be adjusted in small increments is acceptable.

The battery charger must be equipped with an ammeter capable of accurately measuring current of less than one ampere.

Section 04 ELECTRICAL SYSTEM
Sub-section 04 (BATTERY)

If the present charger is not adjustable to the proper current values, a rheostat can be connected in series with the battery to provide adjustment. 12 Ohm, 50 watt rheostats, such as OHMITE - 0314 or MALLORY 50K 12P, are available from electronic parts supply shops and they are suitable for use with most chargers if the peak current is to be held below 2 amps.

If you need an accurate ammeter, we recommend the use of: SHURITE - 5202 (0 to 3 amps) or - 5203 (0 to 5 amps) available from electronic parts supply shops.



For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent to your charger.

CAUTION : Adequate ventilation **MUST** be provided to cool the rheostat.

INSTALLATION OF BATTERY

Install battery, connect red positive cable then black negative cable.

WARNING : Battery black negative cable must always be disconnected first and connected last.

Coat battery posts with petroleum jelly then slide protective cap over positive post.

Insert vent tube into appropriate body hole and cut excessive length if required.

CAUTION : Ensure that neither the positive or the negative cables touch the muffler (if applicable).

TROUBLE SHOOTING :

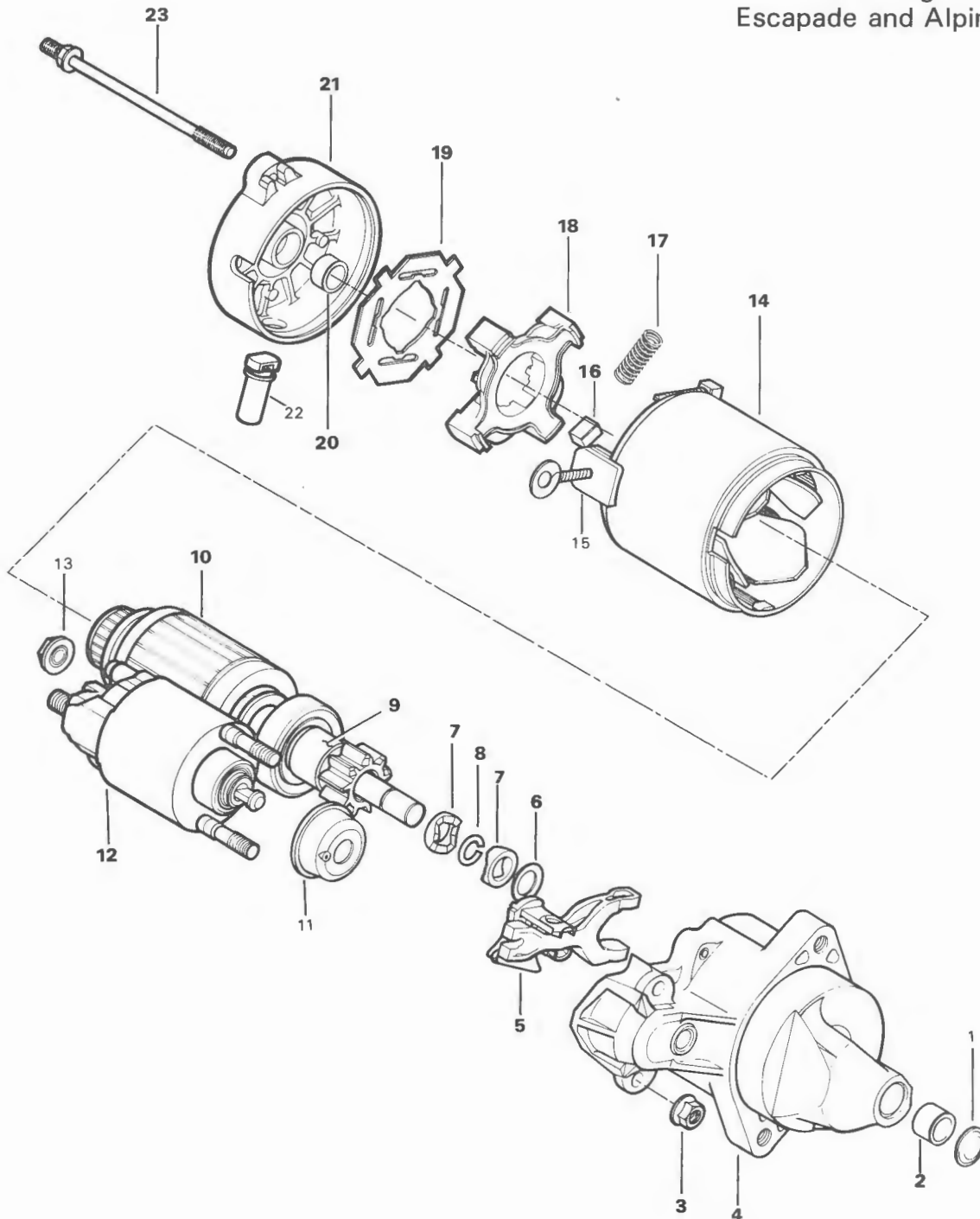
| Symptom | Cause | Remedy |
|----------------------------|--|---|
| Discharged or weak battery | 1. Battery posts and/or cable terminal oxidized | Clean |
| | 2. Loose or bad connections | Check wiring and connectors: cleanliness, damaged or short circuit |
| | 3. Faulty battery (sulfated, doesn't keep a full charge, damaged casing, loose post) | Replace |
| | *4. Faulty rectifier | First check charging coil. If it is in good condition replace rectifier |
| | **5. Faulty charging coil | Replace |

- * To test charging system, disconnect positive cable from battery and connect an ammeter between cable and battery post. Depending on battery charge, current draw will be about 0.5 A with a fully charged battery and 4 A for a discharged one.
- ** To test charging coil, refer to testing procedure section 04-06 and see "lighting coil".

ELECTRIC STARTER

OVERHAUL

Safari Scout E/Saga/Voyageur/
Escapade and Alpine II 503



Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

- | | |
|----------------------------------|-------------------------|
| 1. Bushing cover (drive housing) | 13. Nut |
| 2. Bushing (drive housing) | 14. Yoke |
| 3. Nut (2) | 15. Rubber insulator |
| 4. Drive housing | 16. Brush (4) |
| 5. Drive lever | 17. Brush holder |
| 6. Thrust washer | 18. Spring (4) |
| 7. Stop collar (2) | 19. Insulator |
| 8. Circlip | 20. Bushing (end frame) |
| 9. Overrunning clutch | 21. End frame |
| 10. Armature | 22. Air vent |
| 11. Solenoid boot | 23. Screw (2) |
| 12. Solenoid switch | |
-

REMOVAL

Disconnect black cable (ground connection) from battery. Disconnect the red battery cable and the red / green wire from the solenoid switch. Remove starter from engine.

◆ **WARNING :** Always disconnect ground cable first and connect last.

DISASSEMBLY

▼ **CAUTION :** To carry out some of the following procedures, it is necessary that special equipment be available. If such equipment is not on hand, either replace the damaged components or have the parts overhauled in a workshop equipped with proper tooling.

Disconnect ground wire (bare) linking starter and solenoid switch.

3,5,12, Nut, drive lever & solenoid switch

Remove nuts then solenoid switch by lifting and pulling to disengage from drive lever.

4,14,21,23, Drive housing, yoke, end frame & screw

Unscrew starter longer screws then pull yoke with end frame to separate from drive housing.

5,6,10, Drive lever, thrust washer & armature

Pull armature with drive lever being careful not to lose thrust washer at shaft end.

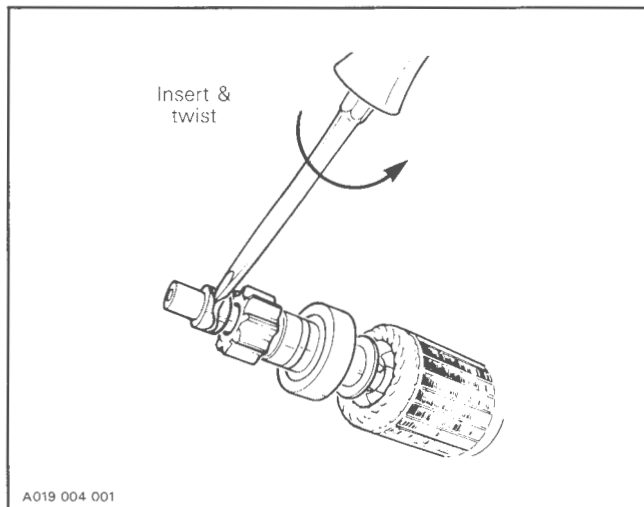
17,18,19, Brush holder, spring & insulator

Remove insulator then brush springs being careful not to lose them since they will be projected out.

Pull brush holder from yoke.

7,8,9, Stop collar, circlip & overrunning clutch

Insert blade of a small screwdriver between stop collars.



Twist screwdriver to separate stop collars thus giving access to circlip.

Remove outer collar, circlip then inner collar.

Remove overrunning clutch.

2, Bushing (drive housing)

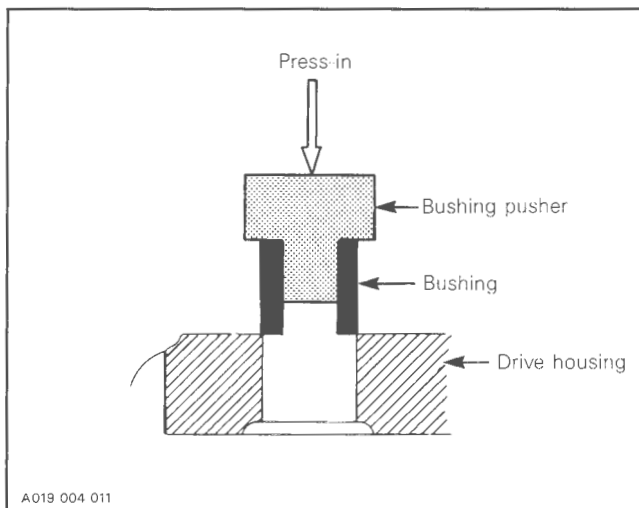
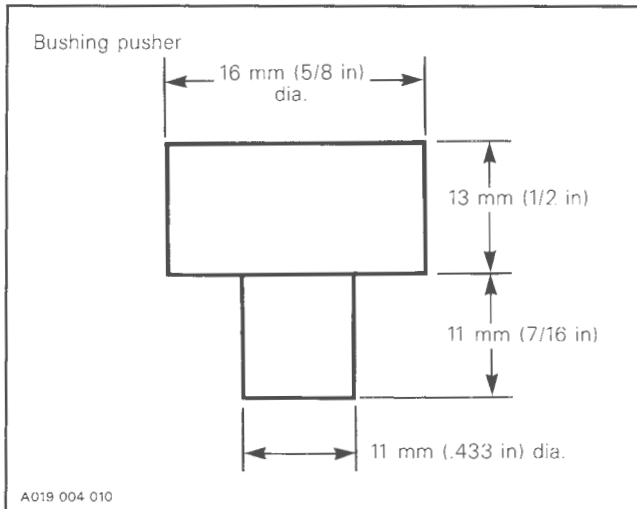
Check the wear on bushing by measuring the amount of radial play between the armature shaft and the bushing.

The radial play should not exceed 0.20 mm (0.008 in). If greater, replace the bushing. To replace, press out the old one toward bushing cover and press in a new one with a bushing pusher. The correct size of the bushing pusher to use is given on next illustration.

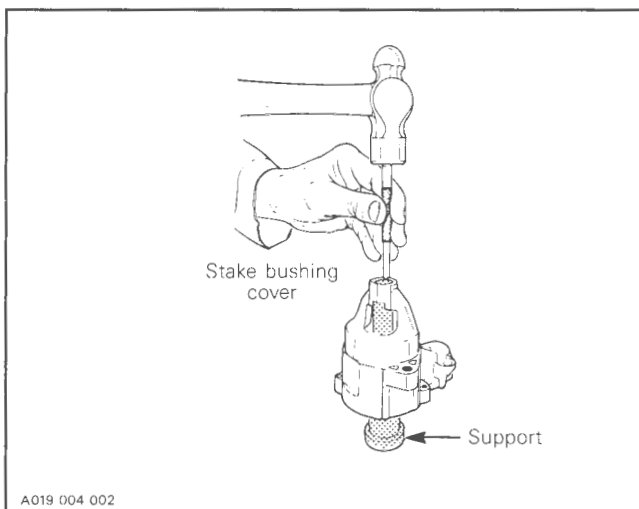
▼ **CAUTION :** Support drive housing adequately to prevent damage when pressing bushing.

Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)



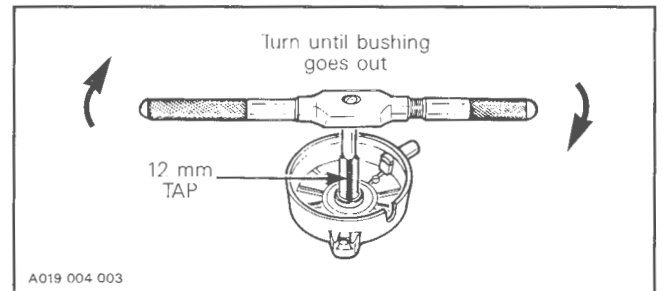
Install bushing cover then, using a punch, stake bushing cover in place.



20, Bushing (end frame)

Check the wear on bushing by measuring the amount of radial play between the armature shaft and the bushing. The radial play should not exceed 0.20 mm (.008 in). If greater, replace bushing as follows:

Using a 12 mm tap, cut threads into bushing so that the tap contacts the end frame. Continue to rotate tap until the bushing comes free.

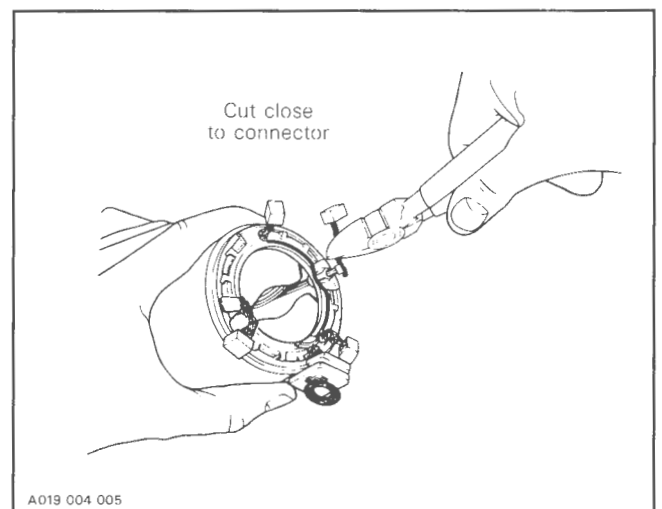


To install new bushing, use the same bushing pusher as for drive housing bushing installation.

16, Brush

To replace, proceed as follows:

Cut brush wire close to connector at the welded portion.



Section 04 ELECTRICAL

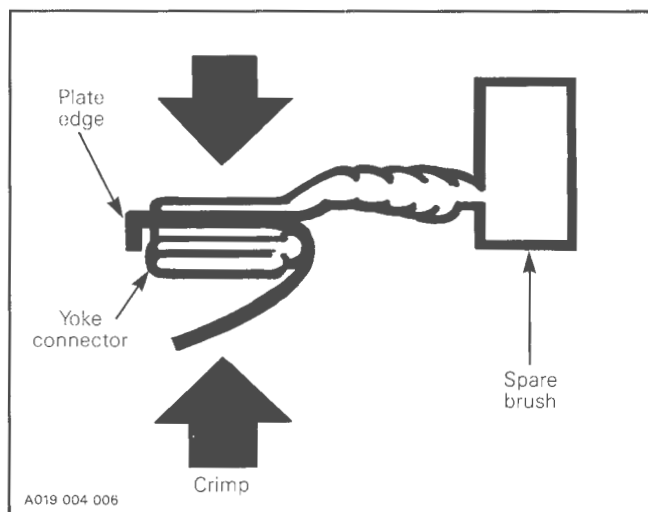
Sub-section 05 (ELECTRIC STARTER)

Remove burrs with a file on the remaining welded portion.

▼ **CAUTION :** Be careful not to damage plastic portion of yoke.

Place spare brush plate edge against yoke connector edge (welded portion).

Crimp plate over yoke connector with a pair of pliers.



Solder the crimped portion.

▼ **CAUTION :** Do not overheat and quickly perform soldering to prevent solder from flowing to the brush through the wire. Preferably use a heat sink.

CLEANING, INSPECTION & TROUBLESHOOTING

Refer to the end of this sub-section.

ASSEMBLY

Prior to assembling, coat sliding surfaces and moving parts on armature shaft splines, overrunning clutch, solenoid switch plunger, drive lever and bushings with G.E. Versilube G 341 M (P/N 413 7040 00) lubricant.

Proceed as follow for assembling.

Secure drive housing in a vise.

▼ **CAUTION :** Do not overtighten since housing might be damaged.

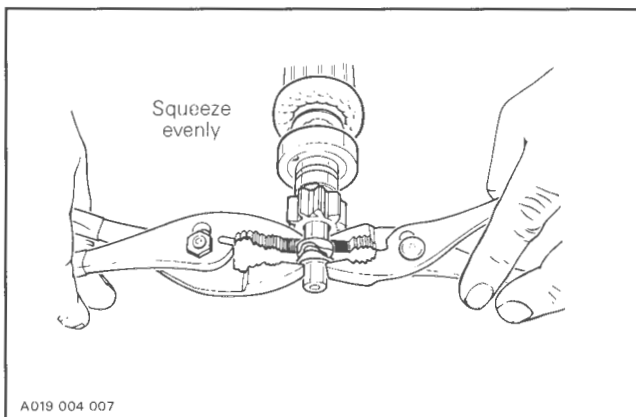
7,8, Stop collar & circlip

Install overrunning clutch onto armature shaft. Insert **inner** collar onto shaft. Install a new circlip.

▼ **CAUTION :** Always install a new circlip when servicing.

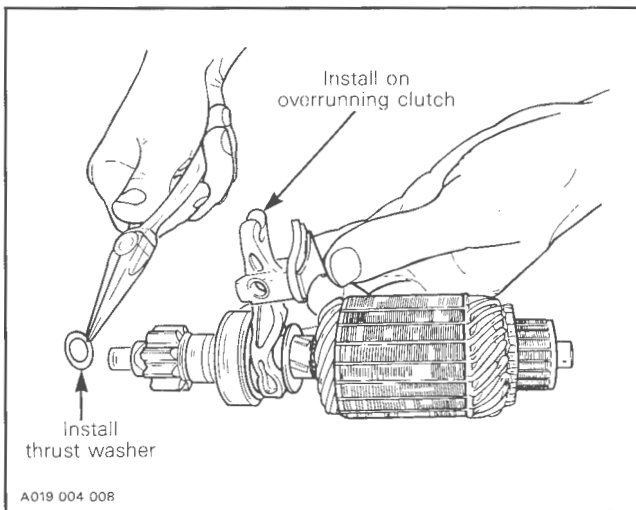
Insert **outer** collar being careful to match protrusions with notches of collars.

Using a pair of pliers on each side of stop collars, squeeze evenly until collars sit over circlip.



4,5,6,7, Drive housing, drive lever, thrust washer & stop collar

Install thrust washer against outer stop collar. Place drive lever onto overrunning clutch then insert into drive housing.



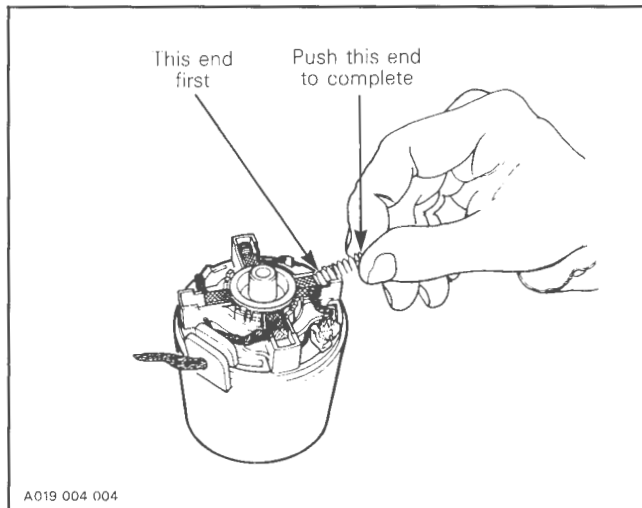
Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

10,14,16,17,18, Armature, yoke, brush, brush holder & spring

Slide yoke over armature.

Install brush holder then brushes in their housings. Insert springs as follows : place one end of spring against brush, compress, then push the other end of spring into its housing. Repeat for remaining springs.



19,21,23, Insulator, end frame & screw

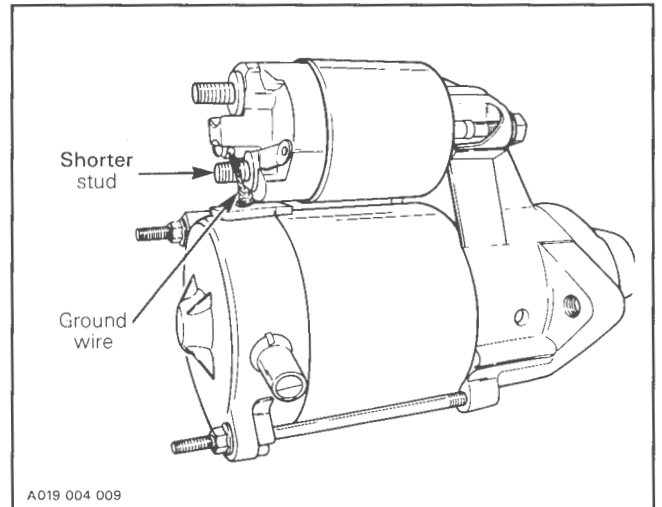
Secure insulator over brushes and springs. Properly install end frame and tighten screws.

4,5,12, Drive housing, drive lever & solenoid

Insert solenoid plunger inside of drive lever fork and secure to drive housing.

Connect starter ground wire (bare) to solenoid.

○ **NOTE :** Connect this wire on the **shorter** solenoid stud.



INSTALLATION

Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Install starter.

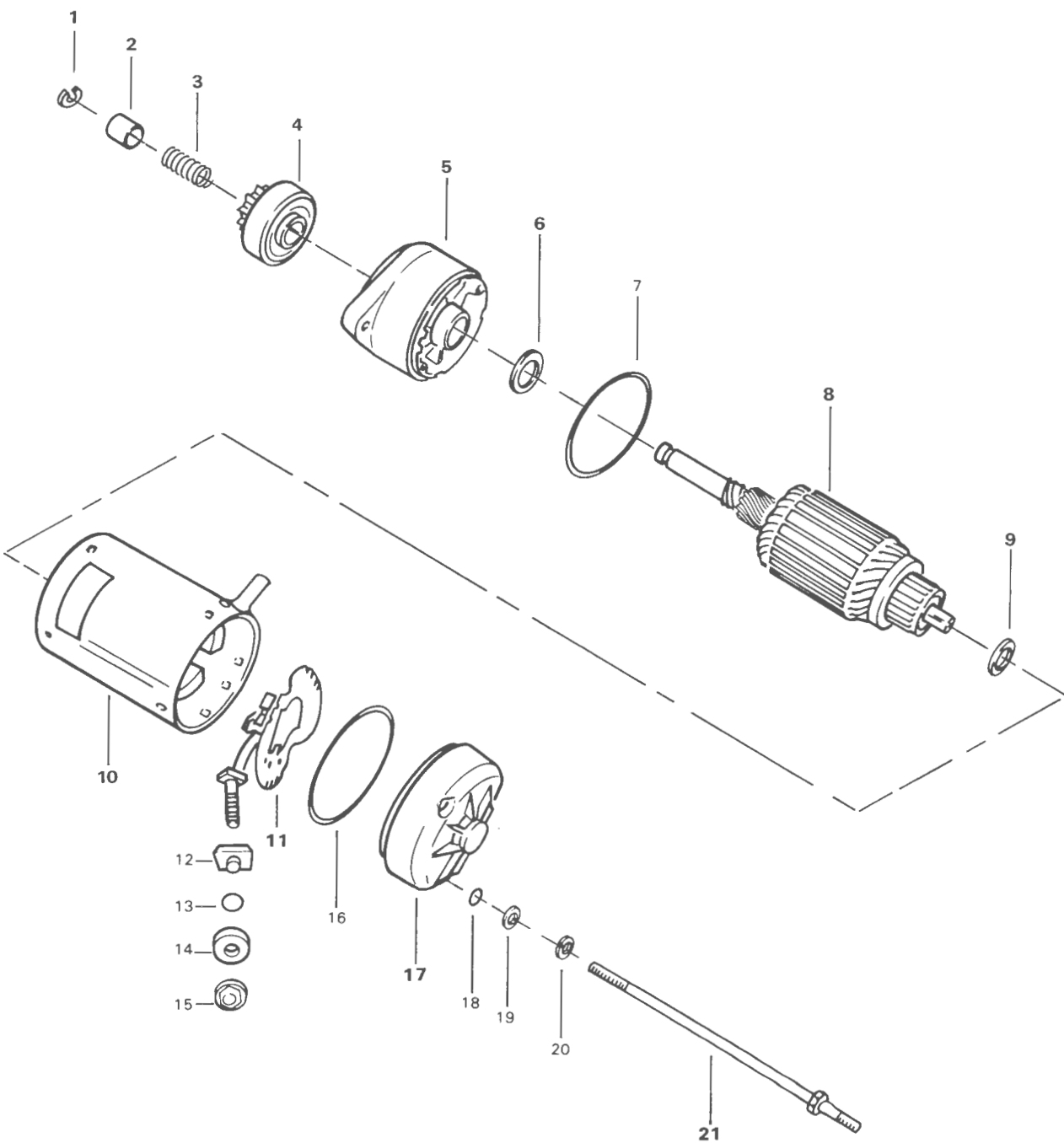
Connect the red battery cable and the red wire to the large terminal of the solenoid. Connect red/green wire to small terminal of solenoid.

Connect black cable to battery.

◆ **WARNING :** Always disconnect ground cable first and connect last.

Section 04 ELECTRICAL
Sub-section 05 (ELECTRIC STARTER)

Safari Citation E



Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

1. Snap ring
2. Pinion stop collar
3. Compression coil spring
4. Clutch assembly
5. Housing assembly
6. Shim
7. O-ring
8. Armature assembly
9. Washer
10. Yoke assembly
11. Brushes holder with brushes

12. Internal insulator
13. O-ring
14. External insulator
15. Nut
16. O-ring
17. End frame
18. O-ring
19. Washer
20. Wave washer
21. Through bolt

REMOVAL

Disconnect black cable ground connection from battery.

Disconnect red starter cable from starter.

Remove starter from engine.

◆ **WARNING :** Always disconnect ground cable first and connect last.

DISASSEMBLY

▼ **CAUTION :** To carry out some of the following procedures, it is necessary that special equipment be available. If such equipment is not on hand, either replace the damaged components or have the parts overhauled in a workshop equipped with proper tooling.

10,11,17,21, Yoke, brush holder, end frame & through bolt

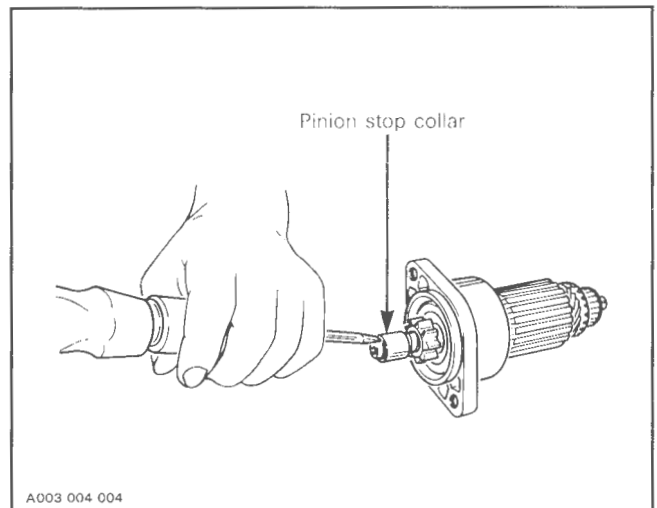
Remove the two through bolts by unscrewing the nut then separate end frame from yoke assembly. Remove armature assembly from yoke assembly.

Brush holder can be removed from end frame by unscrewing nut retaining terminal.

Check that the radial play between the armature shaft and end frame is not greater than 0.20 mm (.008 in). Replace end frame if so.

1,2,3, Snap ring, pinion stop collar & spring

Tap the pinion stop collar using a screwdriver. Remove snap ring. Disassemble pinion stop collar and spring.



4,5,6,8, Clutch ass'y, housing, shim and armature

Turn assembly counterclockwise to remove it from armature assembly.

Pull housing assembly from armature.

CLEANING, INSPECTION & TROUBLE-SHOOTING

Refer to end of this sub-section.

SOLENOID SWITCH

Mounted on left side footrest, the solenoid switch is sealed. Only its connections can be cleaned.

Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

ASSEMBLY

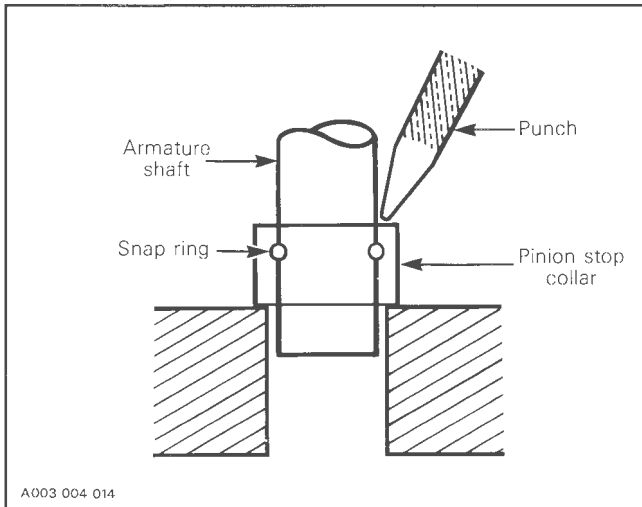
Reverse the order of disassembly to reassemble the starter. However, attention should be paid to the following operations.

Prior to assembling, coat sliding surfaces on armature shaft splines, overrunning clutch and bushing with G.E. Versilube G 314 M (P/N 413 7040 00) lubricant.

1,2, Snap ring & pinion stop collar

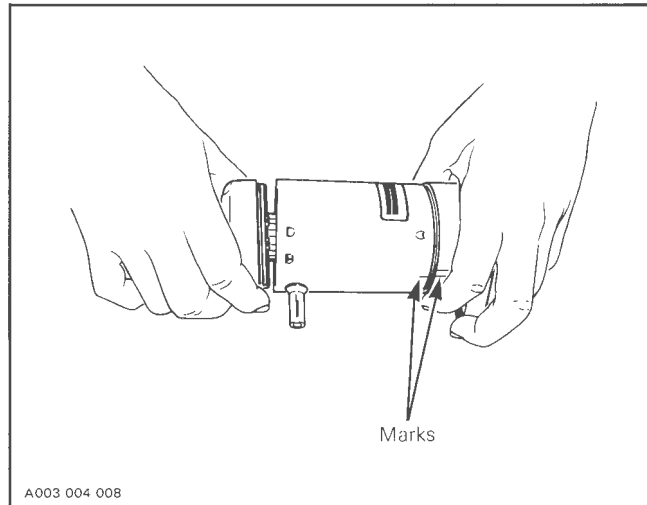
After placing the stop collar on the armature shaft, fit the snap ring into the armature shaft, then make sure that snap ring fits correctly.

Slide stop collar over snap ring and secure in place by punching it in two or three places.



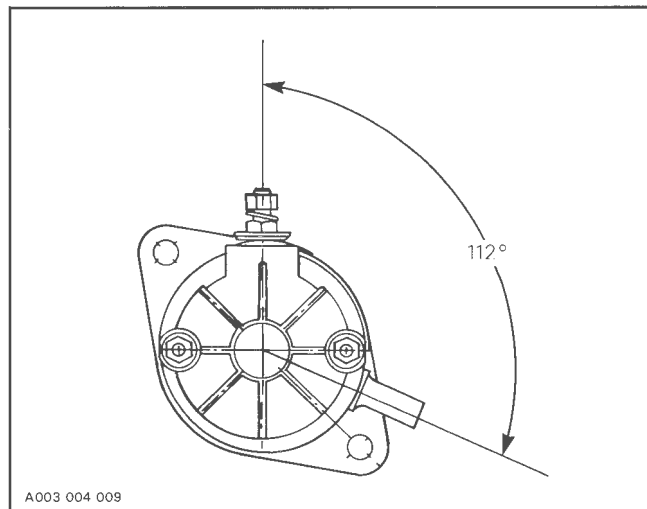
5,10, Housing & yoke ass'y

Align the marks.



10,17, Yoke ass'y & end frame

The vent tube must make an angle of 112° with the electric connector.



INSTALLATION

Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Install starter.

Connect the red battery cable to the starter.

Connect black cable to battery.

◆ **WARNING :** Always disconnect ground cable first and connect last.

CLEANING, INSPECTION & TROUBLESHOOTING

CLEANING

▼ **CAUTION :** Armature starter yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Clean brushes and holders with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holders clean using compressed air.

◆ **WARNING :** Always wear safety goggles when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth.

Clean engine starter gear teeth and drive unit (clutch).

○ **NOTE :** Bushings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

INSPECTION

Armature

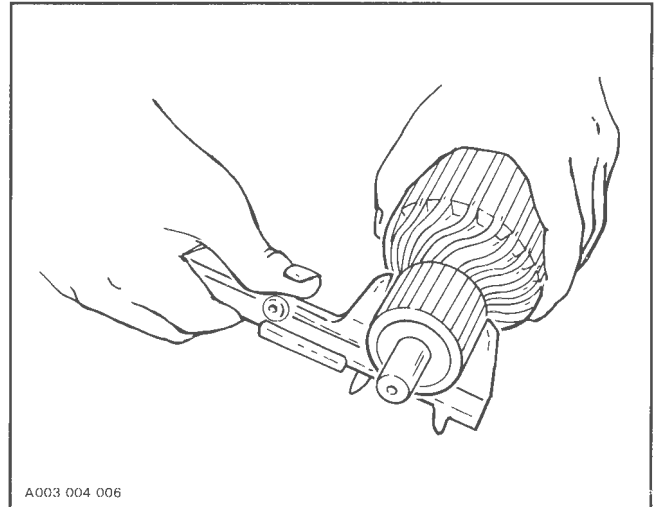
○ **NOTE :** An ohmmeter may be used for the following testing procedures, except for the one concerning the shorted windings in the armature.

Check the commutator for roughness, burnt or scored surface. If necessary, turn the commutator in a lathe, enough to remove grime only.

Check the commutator for mica depth. If the depth is less than 0.20 mm (0.008 in), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.

Check the commutator out-of-round condition with V Blocks and an indicator. If the commutator out-of-round is more than 0.40 mm (.016 in), the commutator should be turned on a lathe.

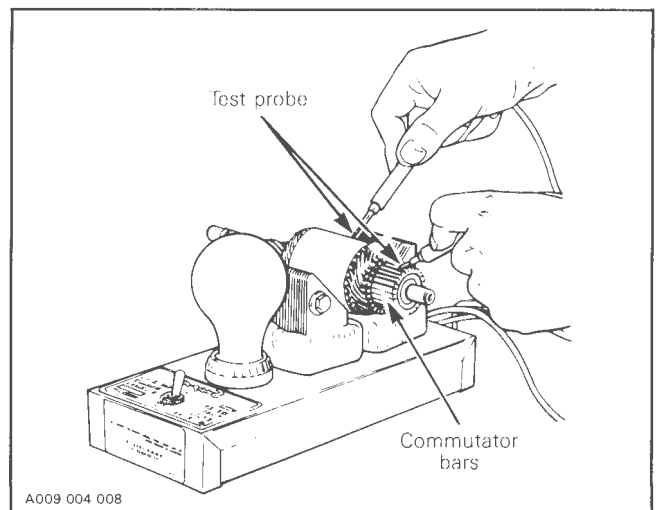
Check commutator outer diameter. If less than specified value, replace.



| MODEL | WEAR LIMIT |
|---|--------------------|
| Safari Scout E / Saga/Voyageur/ Escapade, Alpine II 503 | 27 mm (1.063 in) |
| Safari Citation E | 30.7 mm (1.209 in) |

Test for ground circuit in the armature :

Use growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded.

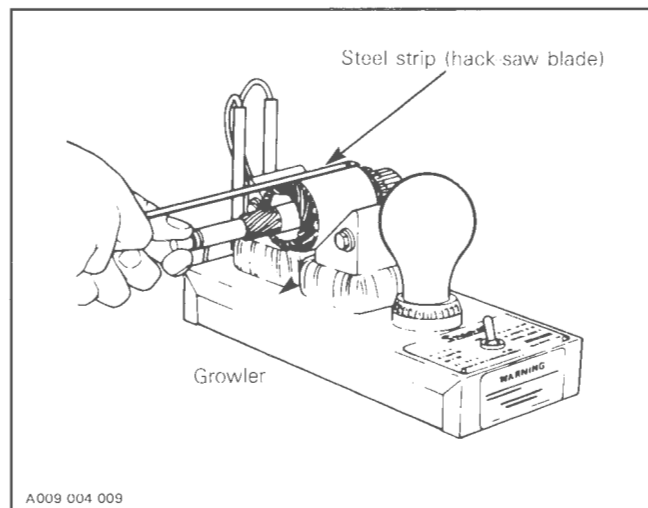


Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

Test armature for shorted winding :

When the armature is rotated in the growler with a steel strip (hack-saw blade) held above it, the strip will vibrate over that area of the armature which has short circuited.



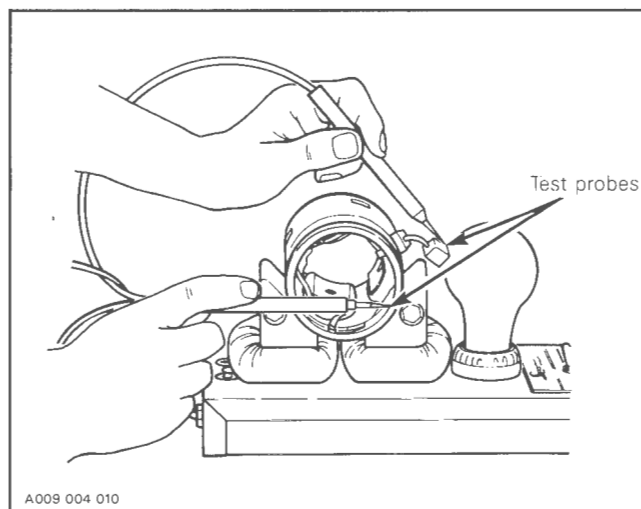
Test the armature for open circuit :

Use growler test probes. Place one test probe on a commutator bar and the other test probe on the neighboring bar. Repeat this operation for all bars, moving one test probe at a time. If the growler lamp does not turn on, the armature circuit between these two (2) bars has an open circuit. The armature should be replaced or repaired ; open circuits most often occur at the commutator riser where coils are soldered. (Burnt commutator bars are usually an indication of an open-circuited armature coil.)

Field windings and brushes

Test the field winding for open circuit (not applicable to Safari Citation E) :

Use growler test probes. Place one test probe on the negative brush and the other test probe on the yoke. If growler lamp does not turn on, the field winding has an open-circuit. The yoke has to be repaired or replaced.



Check the dynamic brake winding for open circuit by placing one test probe on the positive brush and the other probe on the negative brush.

If growler lamp does not turn on, the winding circuit is open-circuit and the yoke has to be repaired or replaced.

Brush holder

Check the brush holder for insulation using growler test probes. Place one test probe on the insulated brush holder and the other test probe on the brush holder plate. If the growler lamp turns on, the brush holder has to be repaired or replaced.

Safari Citation E only :

Check the brush spring tension with a spring scale. Place the brush holder into position in the armature with brushes resting on the commutator. The tension reading should be made when the spring has just come off the brush.

The spring tension should be from 850.5 — 1162.3 grams (30-41 oz).

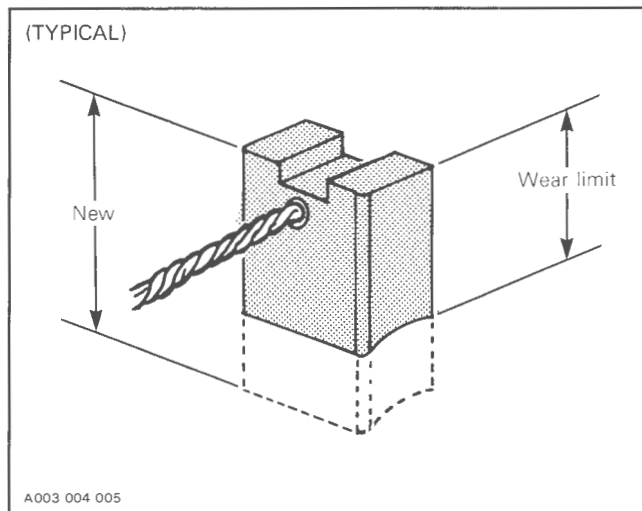
Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

Brush length

Measure brush length. If less than the specified value, replace them.

| MODEL | LENGTH | |
|--|----------------|-----------------|
| | New | Wear limit |
| Safari Scout E/ Saga/Voyageur/ Escapade Alpine II 503 | 10 mm (.400'') | 6 mm (.236'') |
| Safari Citation E | 12 mm (.472'') | 8.5 mm (.335'') |



Overrunning clutch

The pinion of the overrunning clutch should turn smoothly in the clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

Check the pinion teeth for wear and damage. If defective, replace.

TROUBLESHOOTING

Causes of troubles are not necessarily related to the starter but may be due to a faulty battery, switches, electrical cables and/or connections. Consult the following troubleshooting table.

◆ **WARNING :** Short circuiting the electric starter is always a danger, therefore disconnect the ground cable at the battery before carrying out any kind of maintenance on the starting system. Do not place tools on battery.

Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

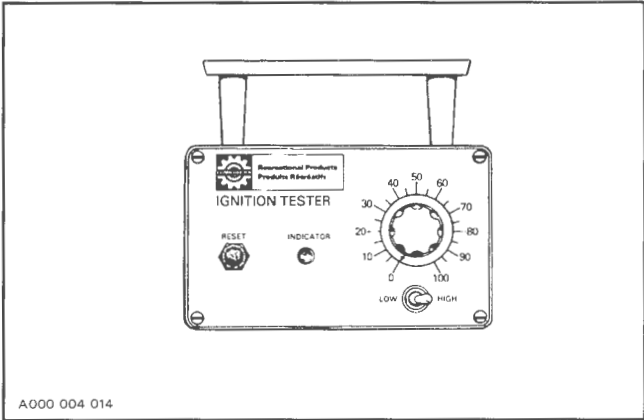
STARTING SYSTEM TROUBLESHOOTING TABLE

| SYMPTOM | CAUSE | REMEDY |
|--|---|--|
| Starter does not turn. | Poor contact of starter switch contact points. | Repair or replace switch. |
| Starter turns ; but does not crank the engine. | Burnt or poor contact of solenoid switch contact disc. Open circuit of solenoid switch pull-in winding. (Not applicable to Safari Citation E) Open circuit of solenoid switch hold-in winding. (Not applicable to Safari Citation E) Poor contact of brush. Burnt commutator. Commutator mica too high. Shorted field coil (Not applicable to Safari Citation E) Shorted armature. Weak brush spring tension. Weak magnet (Safari Citation E only) Worn bushings. Weak battery. Shorted battery cell(s). Poor contact of battery terminal(s). Open circuit between starter switch and solenoid switch. Poor battery ground cable connection. | Replace solenoid switch Replace solenoid switch. Replace solenoid switch. Straighten commutator and brush. Turn commutator in lathe. Undercut mica. Repair or replace yoke. Repair or replace armature. Replace spring. Replace yoke assembly. Replace bushings. Recharge battery. Replace battery. Clean and tighten terminal(s). Repair. Clean and tighten. |
| Starter turns, but overrunning clutch pinion does not mesh with ring gear. | Worn clutch pinion gear. Defective clutch. Poor movement of clutch on splines. Worn clutch bushing. Worn starter bushing(s). Worn ring gear. | Replace clutch. Replace clutch. Clean and correct. Replace clutch. Replace bushing(s). Replace ring gear. |
| Starter motor keeps running. | Shorted solenoid switch winding(s). Melted solenoid switch contacts. Starter switch returns poorly. | Replace solenoid switch. Replace solenoid switch. Replace ignition switch. |

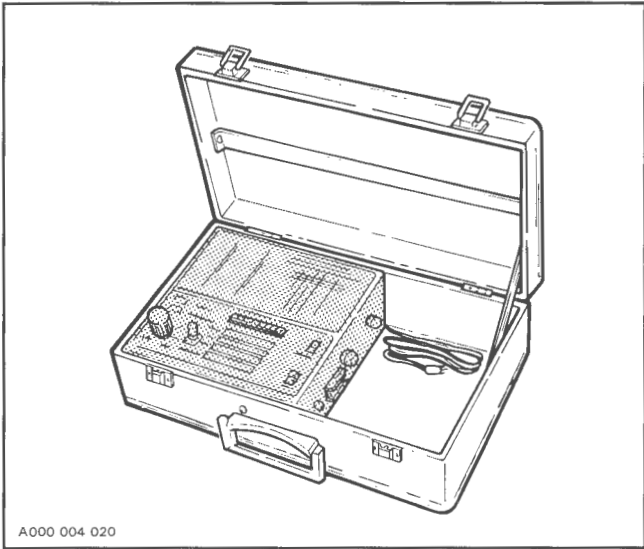
TESTING PROCEDURE

Two instruments are available to perform electrical test on magneto system :

Bombardier ignition tester (P/N 419 0033 00)



Nippondenso CDI checker (P/N 419 0084 00)

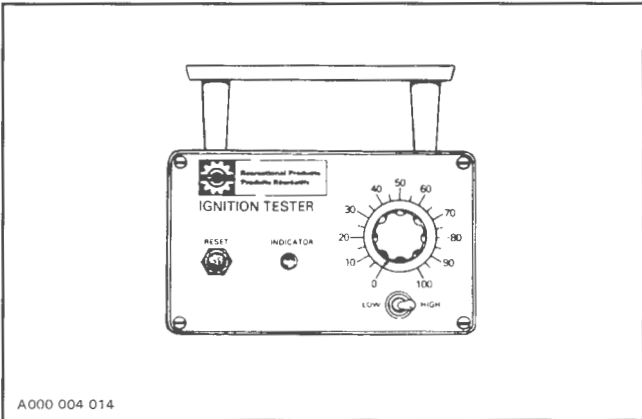


The test to perform establishes the instrument to use as follows :

| TEST TO BE PERFORMED | INSTRUMENT TO USE |
|------------------------------|----------------------------|
| Spark test | Nippondenso CDI checker |
| Generating coil (low speed) | Either |
| Generating coil (high speed) | Either |
| Ignition module | Nippondenso CDI checker |
| Ignition module diode | Nippondenso CDI checker |
| Lighting coil(s) | Bombardier ignition tester |

For more information about operating and maintenance of the testers, refer to their respective instruction manuals.

USE OF BOMBARDIER IGNITION TESTER



NOTE : This tester can verify generating coil (low, high speed), lighting coil and ignition coil.

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

TEST CONDITION

All tests are performed on the vehicle at cranking speed.

Vigorous cranking against compression causes the fly-wheel to snap over, raising the output higher than by cranking without compression, therefore, do not remove spark plug.

Test values listed are taken against compression.

Always crank vigorously as in actual starting.

Always proceed in the following order :

1. Connect tester P and N clip leads as illustrated for each specific test.
2. Follow test procedure sequence.
3. After every test that lights the indicator lamp, **reset** the indicator circuit by depressing the reset button.

ANALYSIS OF TEST RESULTS

Indicator lamp lights at specific setting

Output is as specified. Test results should repeat three times. If readings do not repeat, output is erratic and cause should be investigated (loose connections or components, etc.).

Indicator lamp lights at lower setting

This indicates that the output is less than that designed to operate in a satisfactory manner. However, before coming to the conclusion of a faulty condition be certain that correct engine cranking conditions were met before condemning the tested part.

Indicator lamp does not light

One component is defective. Proceed as instructed to find defective component.

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 can solve the problem as most of these failures return to normal when engine is not running.

Multiple problems

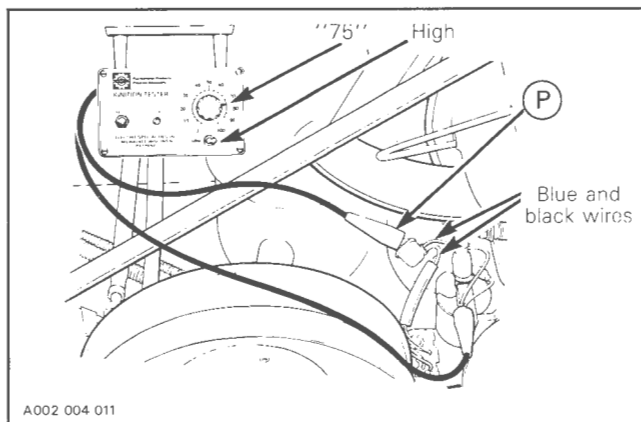
There is always the possibility of more than one faulty part. If after a component has been replaced, the problem still persists, carefully repeat the complete test procedure to find the other faulty part.

TEST

Breaker point ignition system (247 engine type)

1. Generator coil output

- 1) Disconnect blue and black wires from terminal (15) of ignition coil.
- 2) Attach tester P lead to **blue** and **black** wires previously disconnected. Connect tester N lead to a good engine ground.



- 3) Set tester dial and switch as follows :

| ENGINE TYPE | SWITCH POSITION | DIAL |
|-------------|-----------------|------|
| 247 | «HIGH» | 75 |

- 4) Turn ignition key to ON position, disable emergency cut-out button circuit and tether cut-out switch and then crank engine.

Results :

- a) **Indicator lamp lights** : Generating coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

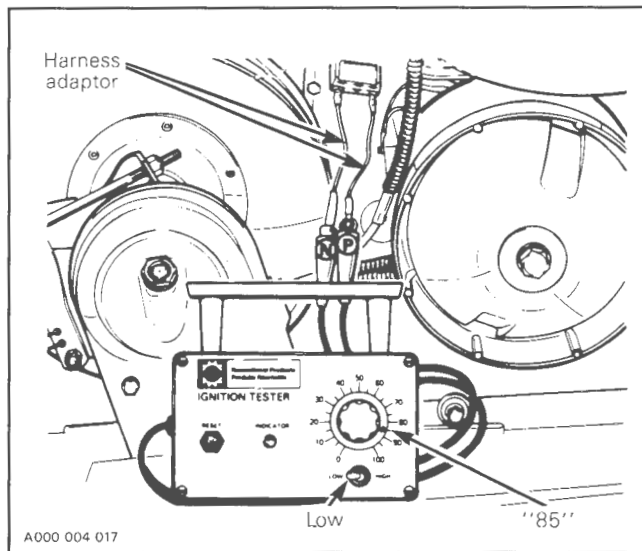
- b) **Indicator lamp does not light** : Generating coil output is below specifications. This could be caused by a faulty generating coil or breaker points. Check breaker points condition and adjustment, and correct as necessary. Repeat test. If lamp still does not light the coil is defective and should be replaced.

2. Lighting coils output (247 engine type)

NOTE : There are two independent lighting coils ; main (large) coil wires are yellow and yellow / black while brake lighting coil (small) wires are green and green / black.

- 1) Disconnect wiring harness junction block at engine.
- 2) Connect tester leads as illustrated using two (2) harness adaptors.

Large lighting coil : yellow and yellow / black wires
Small lighting coil : green and green / black (or ground) wires



- 3) Set tester dial and switch as follows :

| ENGINE TYPE | SWITCH POSITION | DIAL |
|-------------|-----------------|------|
| 247 | «LOW» | 85 |

- 4) Crank engine.

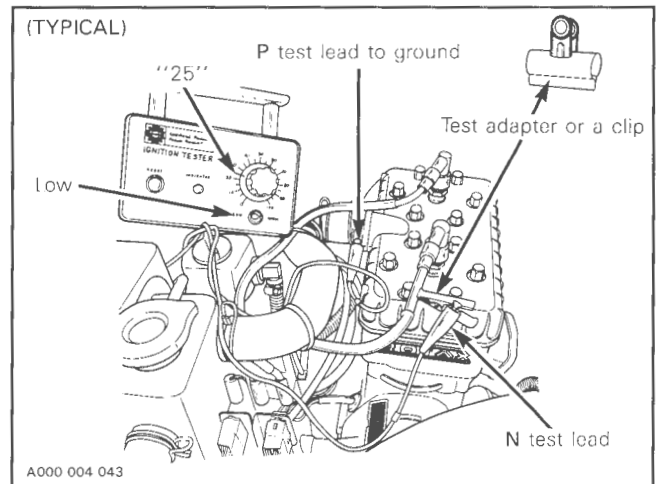
Results :

- a) **Indicator lamp lights** : Lighting coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.
- b) **Indicator lamp does not light** : Lighting coil is faulty.

CDI systems, coils output verification (253, 377, 467, 503, 536, 583 engine types)

1. Ignition coil output

- 1) Connect test adapter (clip) to spark plug cable (close to plug).
- 2) Connect tester N test lead to test adapter (clip).
- 3) Connect tester P test lead to ground.



- 4) Set tester switch and dial as follows :

| TYPE | SWITCH POSITION | DIAL |
|------------------------------|-----------------|------|
| 253, 377, 467, 503, 536, 583 | «LOW» | 25 |

- 5) Turn ignition switch to ON position, set cut-out switch and tether cut-out switch to ON position and then using starter rope crank engine.

WARNING : To prevent powerful electric shocks while cranking engine do not touch any electronic ignition components (ignition coil, high tension wire, wire harness, etc.).

NOTE : If engine starts, allow it to idle while observing indicator. Then, shut engine off.

- 6) Push reset button and repeat step 5 twice.

Section 04 ELECTRICAL

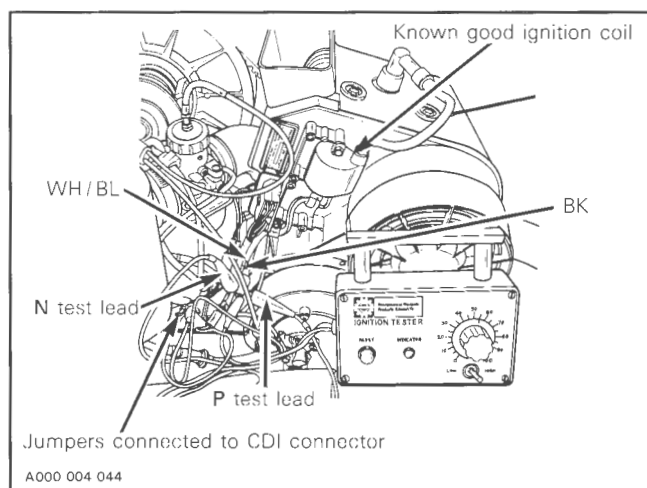
Sous-section 06 (TESTING PROCEDURE)

Results :

- a) **Indicator lamp lights** : Ignition system is OK.
- b) **Indicator lamp does not light on one or both cylinder** : Proceed to test no. 2.

2. CDI unit control

- 1) Separate two-wire connector between CDI unit and coil.
- 2) Connect an ignition coil (known as being in good condition) to the spark plug(s).
- 3) Connect ignition coil to CDI unit using jumper wires.
- 4) Connect tester **P** test lead to CDI unit **black** wire.
- 5) Connect tester **N** test lead to CDI unit **white/blue** wire.



- 6) Set tester switch and dial as follows :

| ENGINE TYPE | SWITCH POSITION | DIAL |
|---------------------------------|-----------------|------|
| 253, 377, 467, 503, 536, 583 | «HIGH» | 55 |

- 7) Turn ignition switch to ON position, set cut-out switch and tether cut-out switch to ON position and then using starter rope crank engine and observe indicator lamp.

WARNING : To prevent powerful electric shocks while cranking engine do not touch any electronic ignition components (ignition coil, high tension wire, wire harness, etc.).

NOTE : If engine starts, allows it to idle while observing indicator. Then, shut engine off.

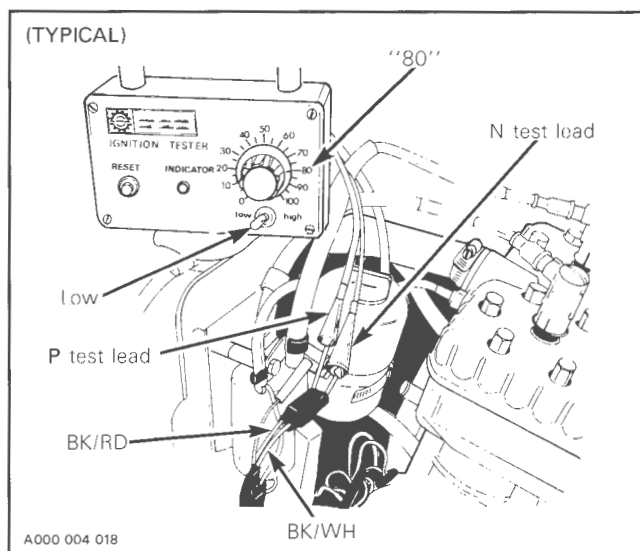
- 8) Push reset button and repeat step 7 twice.

Results :

- a) **indicator lamp lights** : CDI unit is in good condition ; ignition coil is faulty.
- b) **Indicator lamp does not light** : Reconnect ignition coil and proceed to test no. 3.

3. High speed generator coil

- 1) Disconnect wires connectors from ignition module harness at engine.
- 2) Connect tester **P** test lead to **black/white** wire and connect tester **N** test lead to **black/red** wire at the magneto harness.



- 3) Set tester switch and dial as follows :

| ENGINE TYPE | SWITCH POSITION | DIAL |
|----------------------------------|-----------------|------|
| 253, 377, 467, 503, 536, 583, | «LOW» | 70 |

- 4) Turn ignition key to ON position, set cut-out switch and tether cut-out switch to OFF position and then crank engine.

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

◆ **WARNING :** To prevent powerful electric shocks while cranking engine do not touch any component related to electronic ignition system (ignition coil, high tension wire, wire harness, etc.).

Results :

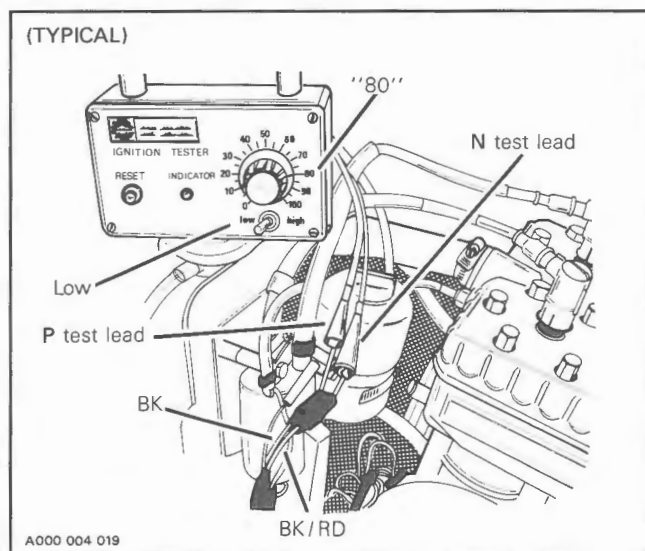
a) **Indicator lamp lights :** High speed generating coil output is up to specifications. Repeat at least three (3) times to verify reading and consistency.

b) **Indicator lamp does not light :** The problem is a faulty high speed generating coil.

◆ **WARNING :** Do not touch tester P lead clip while cranking the engine. Also make sure that tester leads do not touch any metallic object.

4. Low speed generator coil

- 1) Disconnect wire connectors from ignition module harness at engine.
- 2) Connect tester P test lead to **black** wire and connect tester N test lead to **black/red** wire at the magneto harness.



- 3) Set tester switch and dial as follows :

| ENGINE TYPE | SWITCH POSITION | DIAL |
|----------------------------------|-----------------|------|
| 253, 377, 467, 503, 536, 583, | «LOW» | 80 |

- 4) Turn ignition switch to ON position, set cut-out switch and tether cut-out switch to OFF position and then crank engine.

◆ **WARNING :** To prevent powerful electric shocks while cranking engine do not touch any electronic ignition components (ignition coil, high tension wire, wire harness, etc.).

Results :

a) **Indicator lamp lights :** Low speed generating coil is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.

b) **Indicator lamp does not light :** Low speed generating coil is faulty.

5. Lighting coil

- 1) Disconnect wiring harness junction block at engine.
- 2) Connect tester P test lead to **yellow/black** wire and connect N test lead to **yellow** wire.
- 3) Set tester and dial as follows :

| ENGINE TYPE | SWITCH POSITION | DIAL |
|-----------------------------|-----------------|------|
| 253,377,467, 503,536,583 | «LOW» | 70 |

- 4) Crank engine.

Results :

a) **Indicator lamp lights :** Lighting coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.

b) **Indicator lamp does not light :** Lighting coil is faulty.

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

IGNITION COMPONENTS RESISTANCE TEST

Disconnect the connectors of the ignition module (not applicable to 247 engine type), ignition coil and junction block(s) at engine. Check the resistance or continuity between each terminals with a high sensitivity ohmmeter and refer to the following :

| PART NAME | | WIRE COLOR* | RESISTANCE OHM | 1989 ENGINE TYPE | REMARKS |
|---------------------|--|-------------------------------|----------------|-------------------------------|---|
| MAGNETO | Generating coil | BL with BR | 3 - 3.07 | 247 | If the reading is: 0 Ω : short circuit ∞ Ω : open circuit |
| | High speed generating coil | BK/WH with BK/RD | 2.8 - 4.2 | 253, 377, 467, 503, 536, 583, | |
| | Low speed generating coil | BK with BK/RD | 120 - 180 | 253, 377, 467, 503, 536, 583, | |
| | Large lighting coil | YL/BK with YL | 0.38 - 0.58 | 247 | |
| | | | 0.21 - 0.31 | 253, 377, 467, 503, 536, 583, | |
| Small lighting coil | GN with GN/BK | 1.85 - 2.35 | 247 | | |
| IGNITION COIL | Primary | BL #14 with BL #15 | 1.80 - 2.00 | 247 | |
| | | BK with WH/BL | 0.23 - 0.43 | 253, 377, 467, 503, 536, 583, | |
| | Secondary winding (spark plug cap removed) | BL #15 with high tension wire | 3 - 5.6K | 247 | |
| | | BR with high tension wire | 3 - 5.6K | 253 | |
| | | End of each high tension wire | 3.85 - 7.15K | 377, 467, 503, 536, 583, | |
| | Insulation | WH/BL with core | ∞ Ω | 253, 377, 467, 503, 536, 583, | |
| | | WH/BL with high tension wire | | | |

*

| COLOR CODE | | | |
|------------|--------|----|--------|
| BK | BLACK | GN | GREEN |
| WH | WHITE | GY | GREY |
| RD | RED | VI | VIOLET |
| BL | BLUE | OR | ORANGE |
| YL | YELLOW | BR | BROWN |

USE OF NIPPONDENSO CDI CHECKER



○ **NOTE :** This checker can test generating coil (high, low speed), ignition module (including diode test) and spark test. Lighting coil cannot be checked with this instrument.

TEST CONDITION

Generating coil test (HI and LO)

This test is performed on the vehicle at cranking speed. The two generating coils are called high and low speed generating coils. The checker indicates the output of these coils by switching HI and LO positions as follows.

HI : Output of high speed generating coil.

LO : Output of high and low speed generating coil.

Analysis of this test is diagnosed by the number of LEDs lit on the indicator.

CDI module test

The CDI checker bypasses the generating coil by sending its own alternating current to the ignition module.

The output of the ignition module will be indicated on the LED level indicator. Analysis of this test is diagnosed by the LED level indicator.

CDI module diode test (253,377,467,503,536,583 engine type)

The ignition module includes the diode which controls the output of the generating coil according to the engine speed. This checker can diagnose this diode. The result will be indicated on the LED level indicator.

Spark test

Uses the ignition coil on vehicle to test the high tension circuit.

○ **NOTE :** This checker cannot check the lighting coil output.

For lighting coil test, refer to the Bombardier ignition tester procedure.

BEFORE TESTING

To prevent engine from starting and erroneous indication on the LED level indicator, remove the spark plug(s).

▼ **CAUTION :** To prevent dust or foreign matter from being introduced inside the cylinder(s) when cranking the engine, install a clean rag over the cylinder head.

Connect the power cord to the power source (115 volts AC/60Hz).

▼ **CAUTION :** To prevent any damage to the checker, do not try other power source than the above mentioned one and ensure that the checker is installed on a plane surface, away from vehicle vibrations.

CONNECTION OF TEST WIRE HARNESS

○ **NOTE :** A few terms found on the function selector of the nippondenso CDI checker are different from the ones used in this section. Control unit and control unit diode will be described as ignition module and ignition module diode respectively, generator coil will be generating coil.

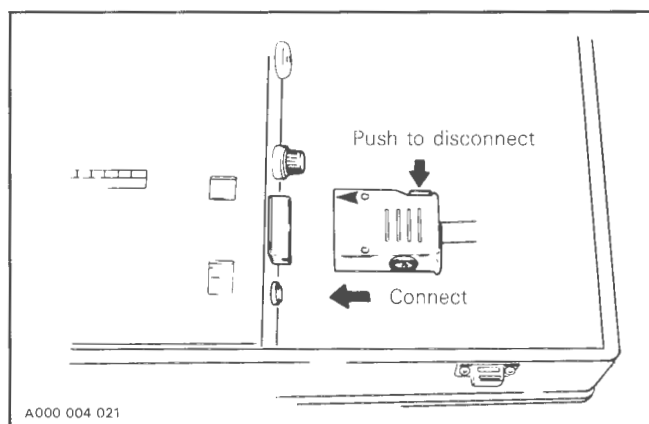
All 1989 CDI systems are designated as 4-5P ignition type. Therefore harness "B" from CDI checker kit must be used to perform all test (it matches with code N° 2 from CDI checker chart).

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

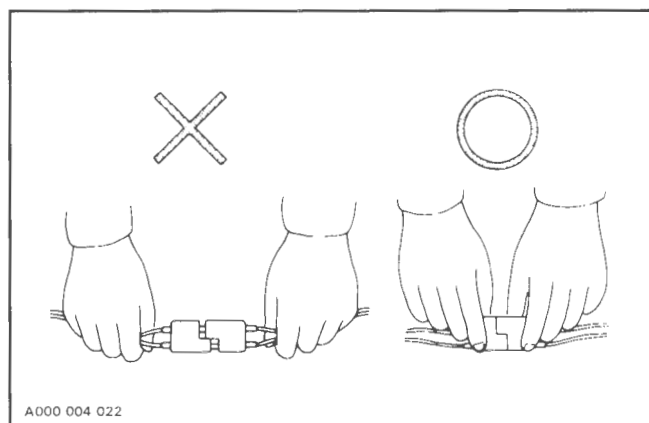
| CODE NO | IGNITION TYPE | ENGINE TYPE | TEST WIRE HARNESS |
|---------|---------------|----------------------------------|-------------------|
| 2 | 4-5P | 253, 377, 467, 503, 536, 583, | B |

- a) Connect the test wire harness to the checker aligning the arrow marks.



- b) Disconnect the connectors between magneto and ignition module.

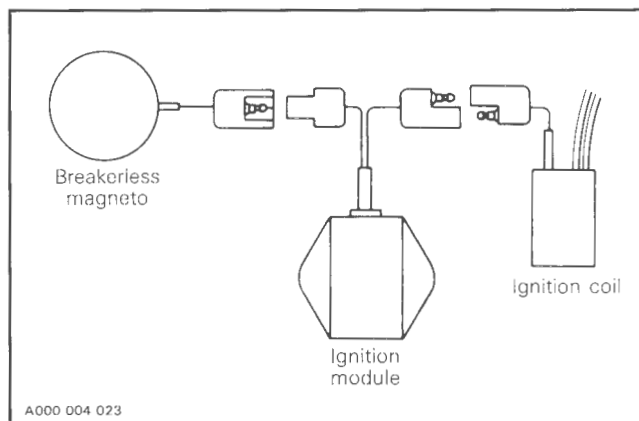
CAUTION : Never pull the wire harness to disconnect.



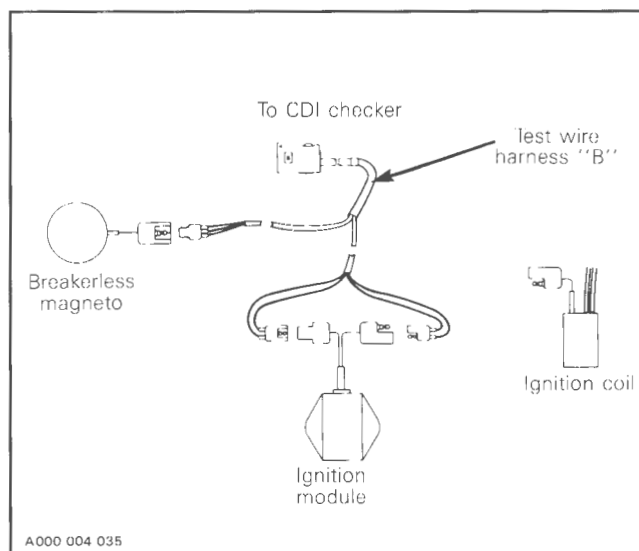
- c) Securely connect the connectors of test wire harness "B" according to the following figures.

CAUTION : When connecting, be sure that the test wire harness does not interfere with moving part of engine.

Vehicle wiring



Test wire harness linked with vehicle wiring



TEST

- a) Turn the power switch on. Then one LED or two LEDs will light to indicate the checker is operating. Reset the indication circuit by depressing the reset switch. One LED will remain to indicate the checker is operating.

NOTE : After every test when the LED level indicator holds its indication a few minutes, reset the indication circuit by depressing the reset switch.

- b) Set the selector to the desired position.

- c) Perform each test.

NOTE : When cranking the manual starter type engine, perform it repeatedly.

Section 04 ELECTRICAL

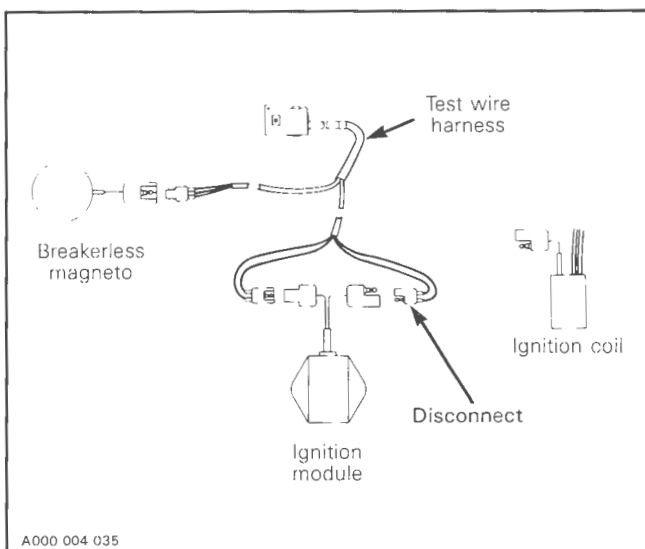
Sub-section 06 (TESTING PROCEDURE)

d) If the test results are over or lower than the limit, see "Analysis of test".

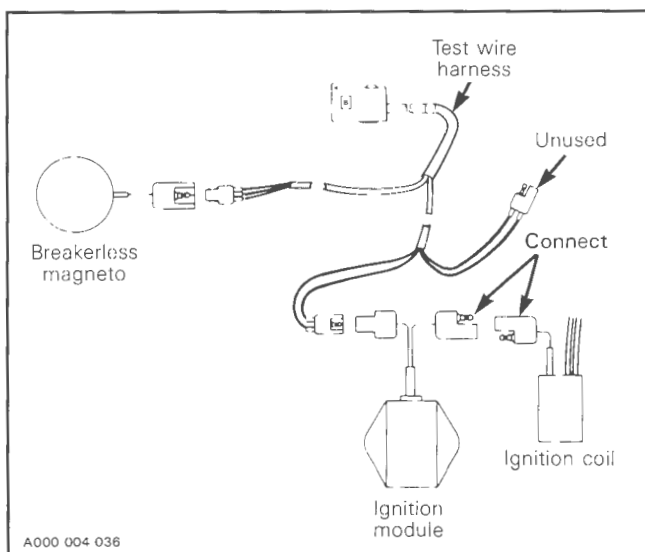
NOTE : Test should be repeated two or three times. If reading does not repeat, output is erratic and cause should be investigated. (Loose connection of components, etc.).

Spark test

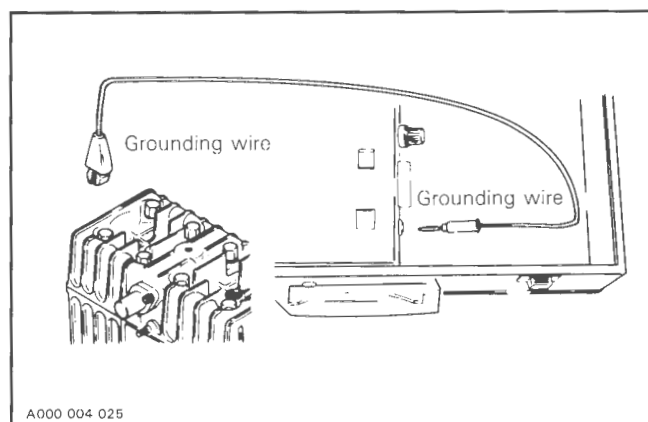
- a) Before performing this test, ensure that the ignition module and its diode have been checked.
- b) Disconnect the checker test wire harness from the ignition module output side.



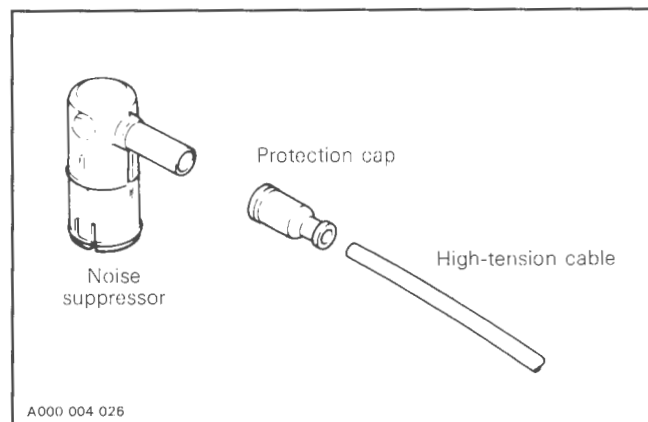
c) Connect the ignition coil connector to the ignition module connector.



d) Connect the grounding wire to the CDI checker and to a bare surface of the engine.



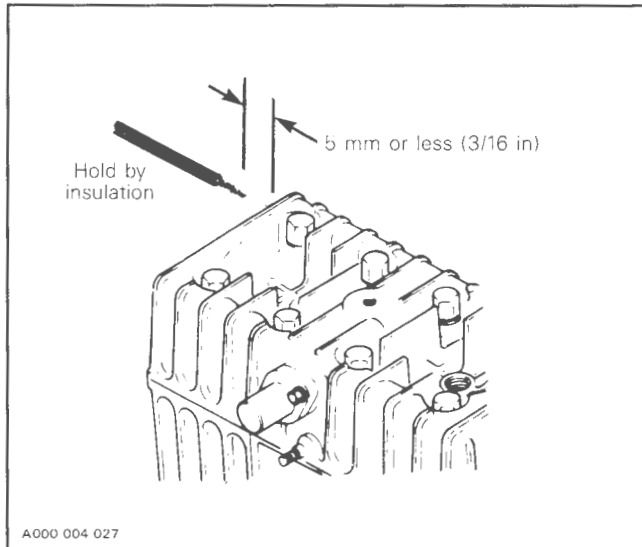
- e) Set the selector to CONTROL UNIT position.
- f) Remove the noise suppressor and the protection cap from the end of high-tension wire.



g) Keep a distance of 5 mm (3/16 in) or less between bare surface of the engine and end of high-tension cable and depress the START SWITCH. Then spark will take place between them.

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)



◆ **WARNING :** Do not touch the high tension wire while doing the procedure. Hold high tension wire with an insulator.

Generating coil test

- This test should be performed at both HI & LO switch positions. Switch LO position and set the selector to GENERATOR COIL position.
- Crank the engine and read the LED level indicator. Reading should be from **2** to **8**.
- Switch to HI position and repeat procedure. Reading should be from **2** to **8**.

Ignition module test

- To perform this test, switch can be at LO or HI position.
- Set the selector to CONTROL UNIT position.
- Depress START switch for **5 seconds** minimum and read LED level indicator. Reading should be from **4** to **5**.

Ignition module diode test

- Set the selector to CONTROL UNIT DIODE position. Then, four or five LEDs will light. If four or five LEDs do not light, check the power source and that the selector and switches are positioned correctly.
- Depress the START switch and read LED level indicator. Reading should be from **6** to **8**.

Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)

ANALYSIS OF TEST RESULT

After every test, perform the diagnosis comparing with the diagnostic chart as shown below (as found on CDI checker).

| CODE NO | IGNITION TYPE | CHECK PART | | LEVEL INDICATOR | | | | | | | NG* | | OK | HARNESS | ENGINE TYPE |
|---------|---------------|--------------------|----|-----------------|---|---|---|---|---|---|-----|---|----|---------|--------------------------------|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 2 | 4-5P | Generator coil | HI | | | | | | | | | | | B | 253, 377, 467 503, 536, 583 |
| | | | LO | | | | | | | | | | | | |
| | | Control unit | | | | | | | | | | | | | |
| | | Control unit diode | | | | | | | | | | | | | |
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |

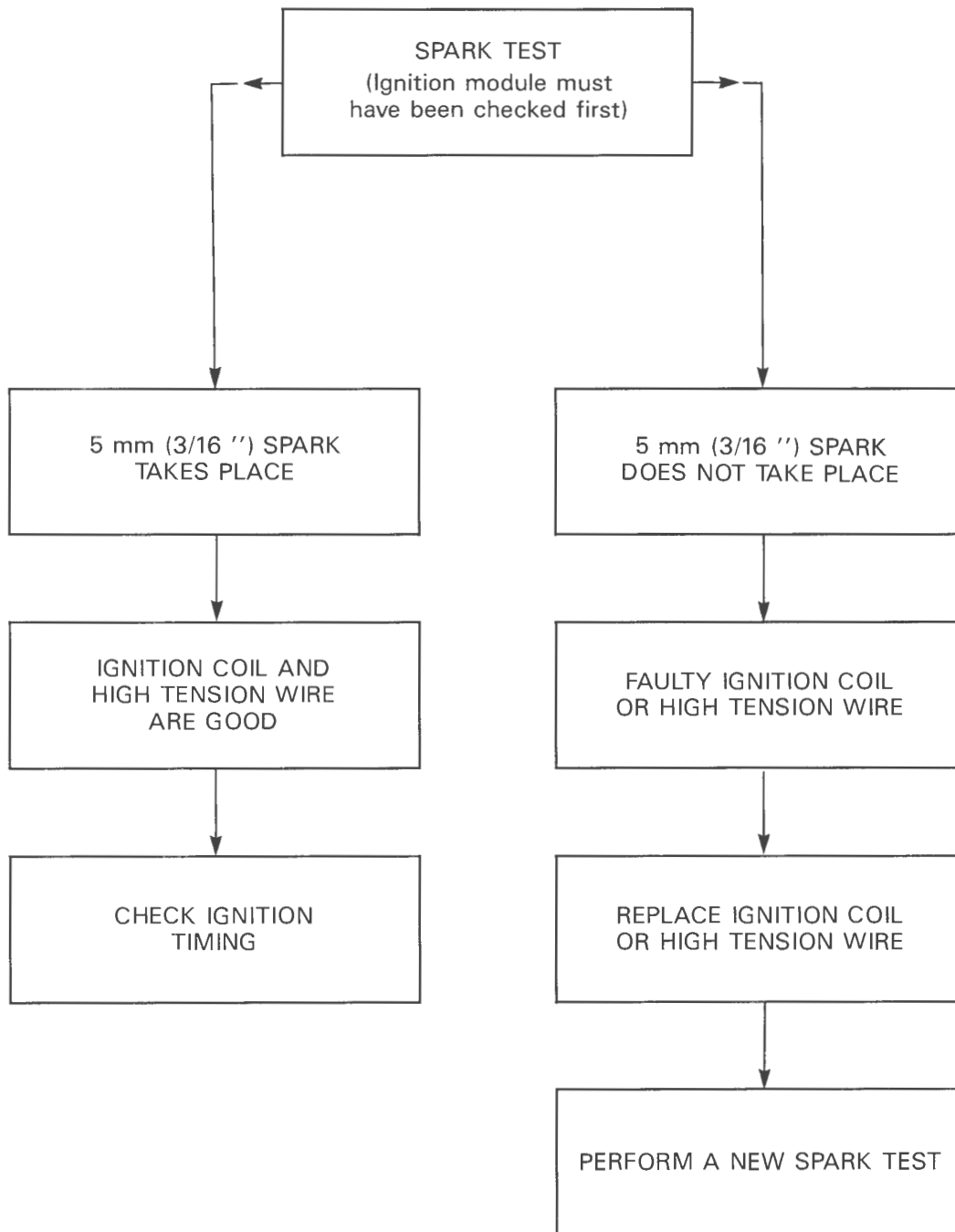
*NG = Not good

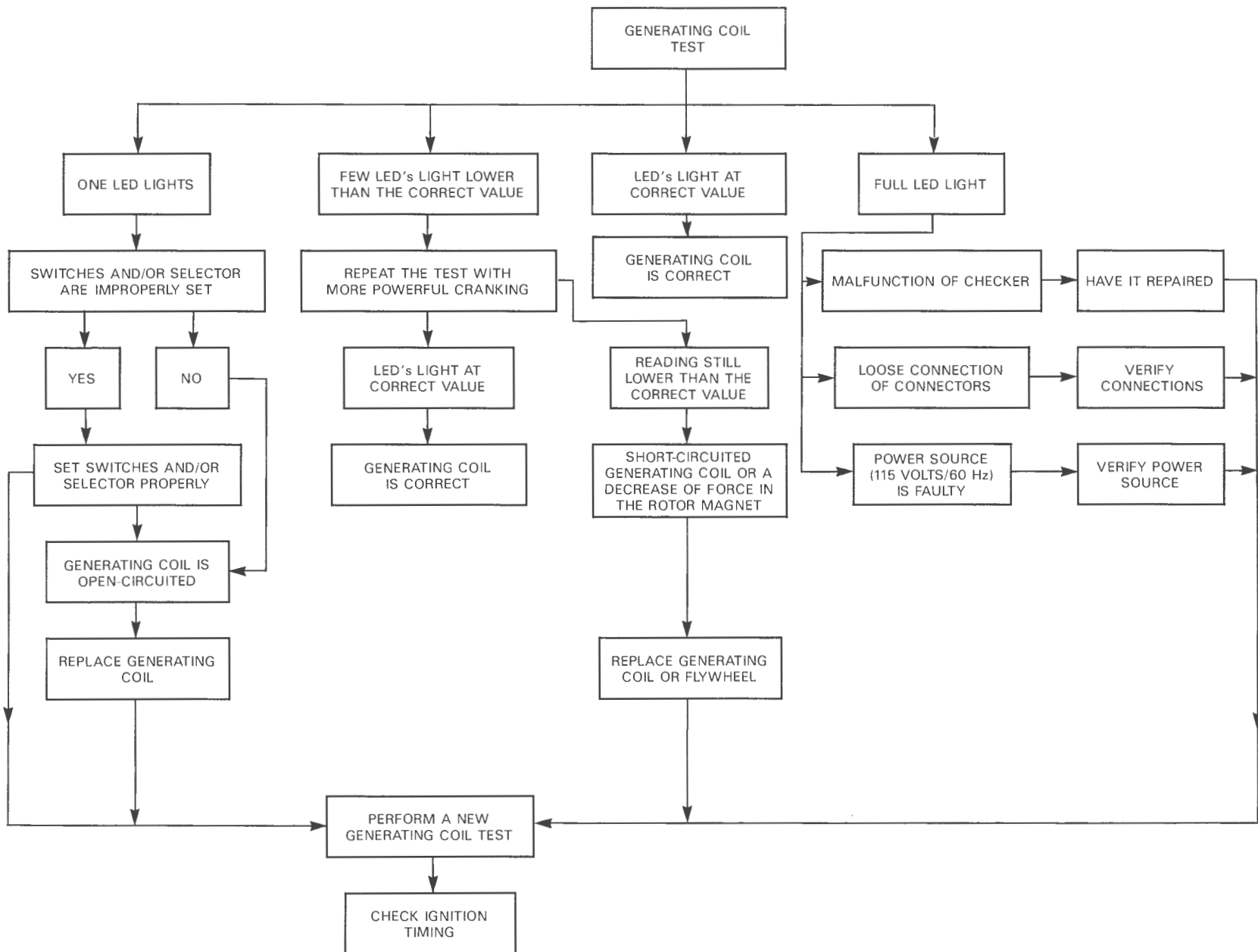
If the reading of the LED level indicator is outside of the shaded "OK" range, refer to "Analysis of test result" as described hereafter.

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

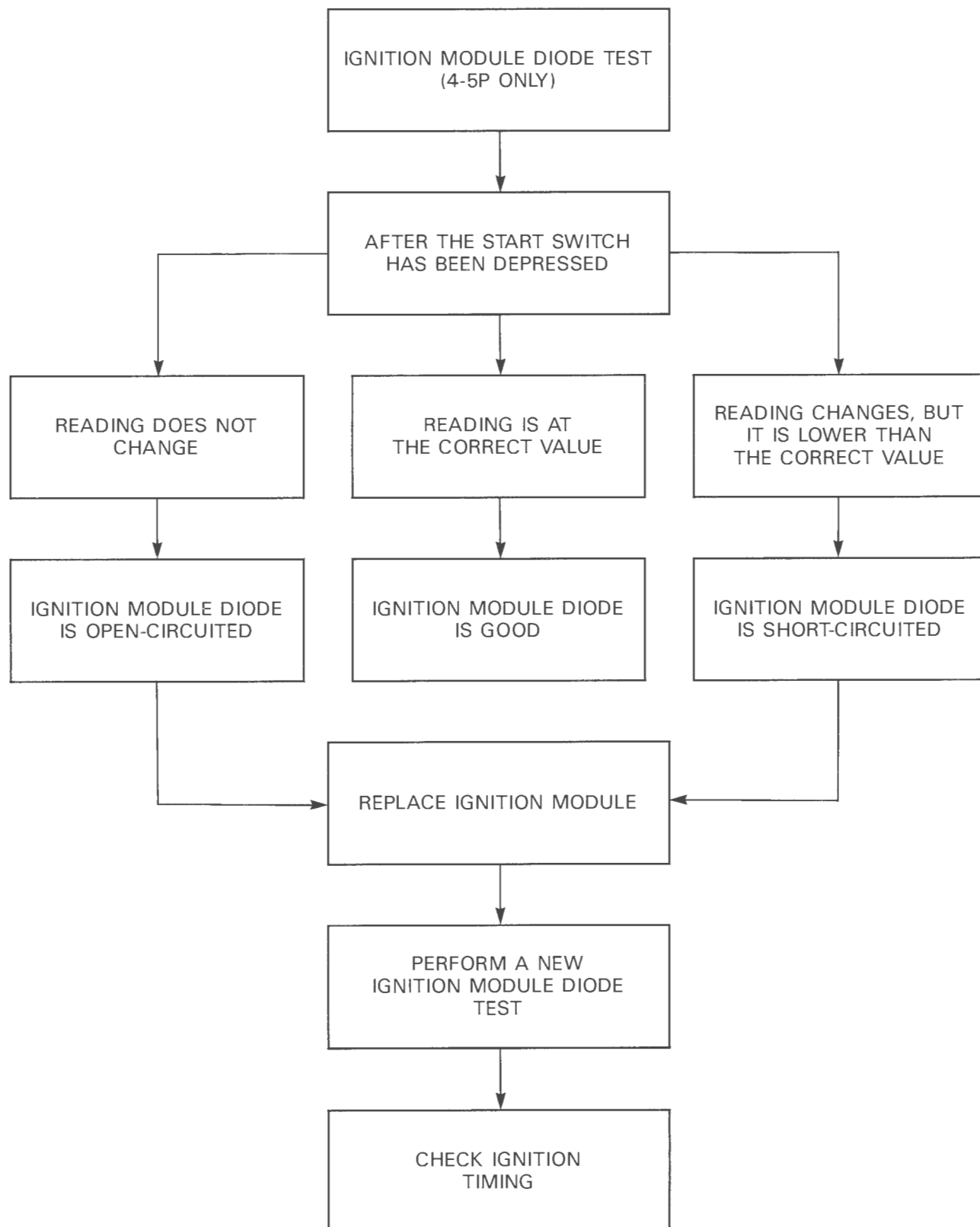
TROUBLE SHOOTING CHART — NIPPONDENSO CDI SYSTEMS





Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)



VOLTAGE REGULATOR INSPECTION

A faulty voltage regulator is often responsible of frequent burned bulbs.

TESTING PROCEDURE

The regulator ground must be checked to ensure the circuit is complete. If necessary, connect a good ground wire from the regulator to the engine.

A) Quick test without voltmeter

In case of a voltmeter is not on hand, a visual test can be performed with satisfactory result.

Disconnect **all** lights and electric equipment.

While engine is running, disconnect and connect regulator connector several times checking for a spark.

A spark on regulator terminal indicates a good and working regulator.

B) Voltmeter test

 **NOTE :** Use a voltmeter able to read alternating current (AC)


The lighting system must be turned on.

Connect the red wire of the voltmeter to the black/yellow wire at the bulb connector.

Connect the black wire of the voltmeter to a good ground.


Lift the rear of vehicle and support with a mechanical stand.


Start the engine at an idle without opening the throttle.

 **WARNING :** Ensure the track is free of particles which might be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no-one is standing in close proximity to the vehicle.

Slowly open the throttle and accelerate the engine to increase the RPM.

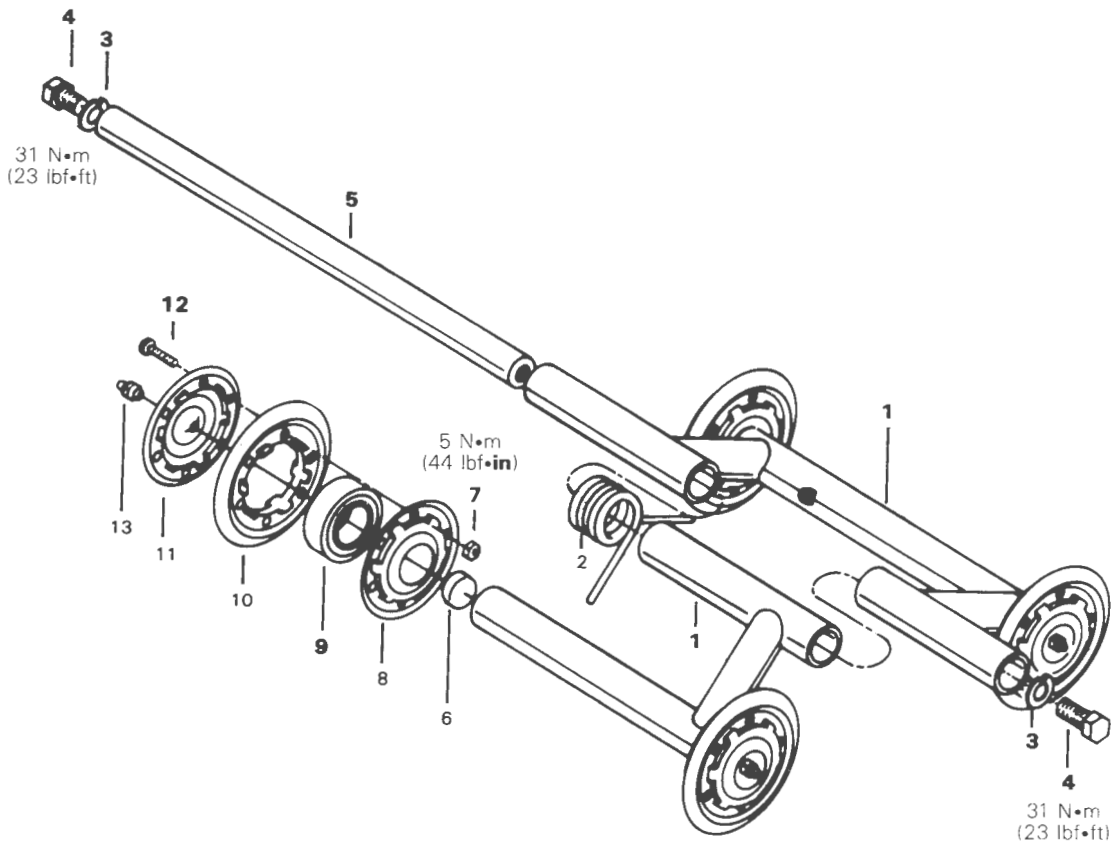
If the meter reads over 15 volts, the regulator is defective and must be replaced.

 **CAUTION :** Do not increase the RPM so the voltage exceeds 15 V as the bulb(s) will burn.

 **NOTE :** Whatever the voltmeter type used (peak voltage or RMS) the voltage must not exceed 15 V (a defective regulator will allow voltage to exceed 15 V as engine RPM is increased).

BOGIE WHEELS

Elan
4 Wheels, single spring



A002 005 026

- 1. Wheel support
- 2. Spring
- 3. Lock washer (cross shaft)
- 4. Cap screw (cross shaft)
- 5. Cross shaft
- 6. Grease cap
- 7. Nut (flange)

- 8. Inner flange
- 9. Bearing
- 10. Wheel tire
- 11. Outer flange
- 12. Bolt (flange)
- 13. Grease fitting

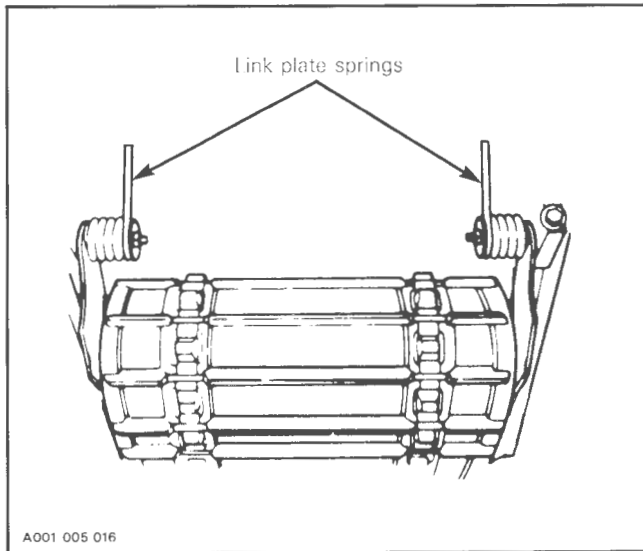
Section 05 SUSPENSION

Sub-section 01 (BOGIE WHEELS)

REMOVAL

Raise and block rear of vehicle off the ground.

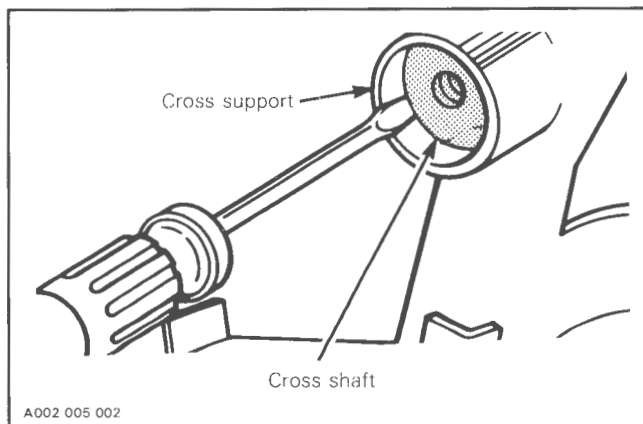
Release track tension by unlocking the link plate springs using an appropriate tool.



3,4,5, Lock washer, cap screw & cross shaft

Starting at center bogie wheel set, remove cap screws and lock washers securing cross shaft to frame.

NOTE : To prevent the cross shaft from rotating within the cross support, wedge a screwdriver blade between the cross shaft and cross support.



Remove bogie wheel set.

NOTE : Since spring diameter may vary depending on actual installation location, it is important to identify the installation of each bogie wheel set. Observe this position when reinstalling sets.

Repeat operation for remaining bogie wheel sets.

DISASSEMBLY & ASSEMBLY

1, Wheel support

Heat spring anchor on wheel support before attempting to open or close anchor.

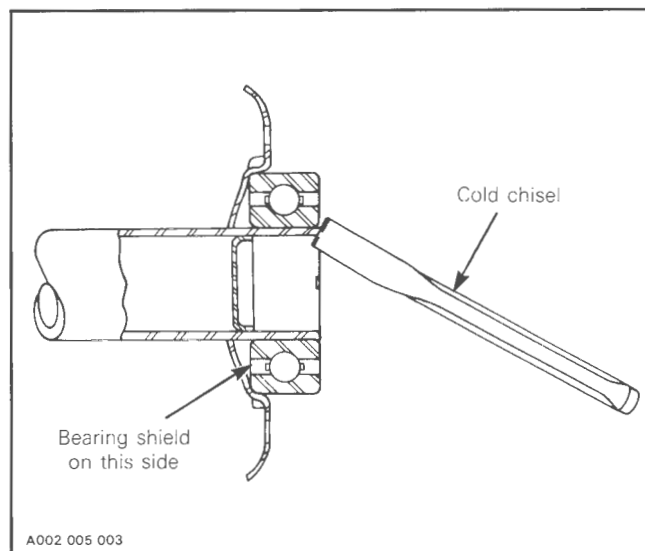
5, Cross shaft

Clean then lubricate cross shaft with low temperature grease (P/N 413 7061 00) before installation.

1,9, Wheel support & bearing

Always pull or push bearing by inner race. When installing bearing on wheel support, position bearing shield towards inner flange, then press down until bearing is sitting flush with support end.

Then notch (3 notches) wheel support with a cold chisel to secure the bearing in place.

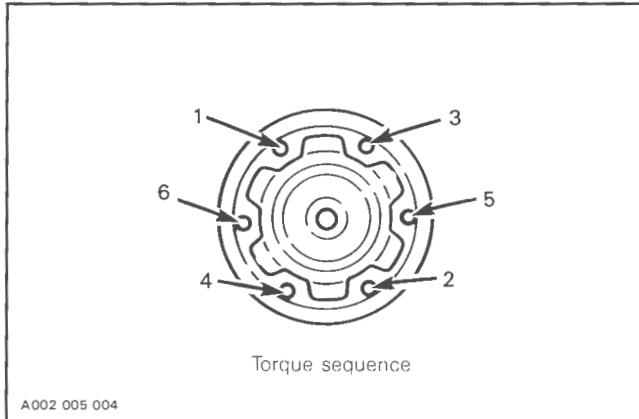


Section 05 SUSPENSION

Sub-section 01 (BOGIE WHEELS)

7,12, Flange nut & bolt

Bogie wheels are factory riveted. When separation is necessary, remove rivets securing wheel tire and flanges using a 3/16 in dia. drill. Secure flanges and tire using bolts (1/4-20 x 3/4 in) and nuts. Tighten in the following sequence to 5 N•m (44 lbf•in).

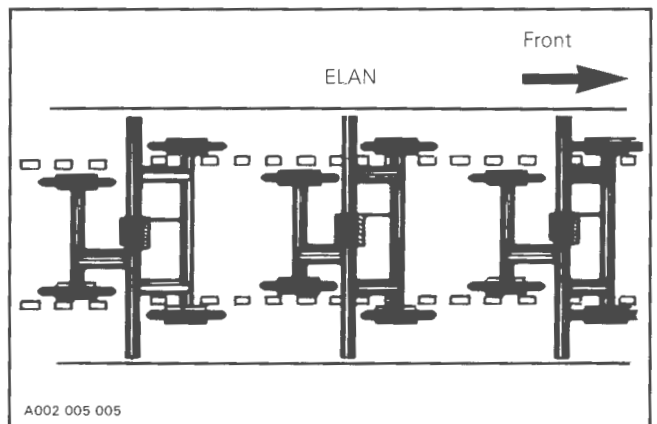


INSTALLATION

3,4,5, Lock washer, capscrew & cross shaft

With rear of vehicle supported off the ground, position front bogie wheel set and secure to frame using lock washers and capscrews. Secure rear set then remaining set to frame.

NOTE : The wider bogie wheels should be towards the front of the vehicle.



Using an appropriate tool, apply track tension by hooking the link plate springs into the anchors.

Lubricate each bogie wheel until new grease appears at joint. Wipe off excess grease (grease P/N 413 7061 00).

NOTE : To adjust the track tension and alignment refer to section 05-10.

"TORQUE REACTION" TYPE SUSPENSION


A005 005 005

Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

1. Rear axle
2. Spacer
3. Square nut (2)
4. Adjustment screw M10 x 75 mm (2)
5. Nut M10 (2)
6. Adjustment plate (2)
7. Rivet (20)
8. Spacer (2)
9. Idler wheel (2)
10. Washer (2)
11. Screw M10 x 35 (2)
12. Upper idler shaft (2 on LT model)
13. Idler wheel (2) (4 on LT model)
14. Spacer (2) (4 on LT model)
15. Lock washer (2) (4 on LT model)
16. Screw (2) (4 on LT model)
17. Loctite 242
18. Cross shaft (2)
19. Rear spring (2)
20. Bushing (4)
21. Rear arm
22. Clevis pin
23. Grease fitting
24. Cotter pin (9)
25. Adjustment cam (4)
26. Clevis pin (4)
27. Rubber stopper (2)
28. Rivet (8)
29. Lock washer 10 mm (8)
30. Screw M10 x 35 (2)
31. Sliding support (2)
32. Clevis pin (2)
33. Center idler shaft (LT model only)
34. Idler wheel (2) (4 on LT model)
35. Spacer (2) (4 on LT model)
36. Wheel support (2) (4 on LT model)
37. Lock washer 10 mm (2) (LT model only)
38. Screw M10 x 35 (2) (LT model only)
39. Tube (2)
40. Shock absorber
41. Bushing
42. Reinforcement strip
43. Screw M10 x 35 (6)
44. Spirol pin (2)
45. Slider pad (4)
46. Front idler shaft
47. Spacer tube
48. Spacer (2)
49. Front spring (2)
50. Bolt M5 x 20 (2)
51. Front arm
52. Clevis pin (2)
53. Front arm bracket (4)
54. Rubber stopper (2)
55. Spacer (2)
56. Slider shoe (2)
57. Lock washer 8 mm (2)
58. Screw M8 x 40
59. Stop nut M8 (2)
60. Washer (2)
61. Stopper strap
62. Screw M8 x 40
63. Stop nut M5 (2)
64. Runner (2)
65. Flat washer 12 mm (2)

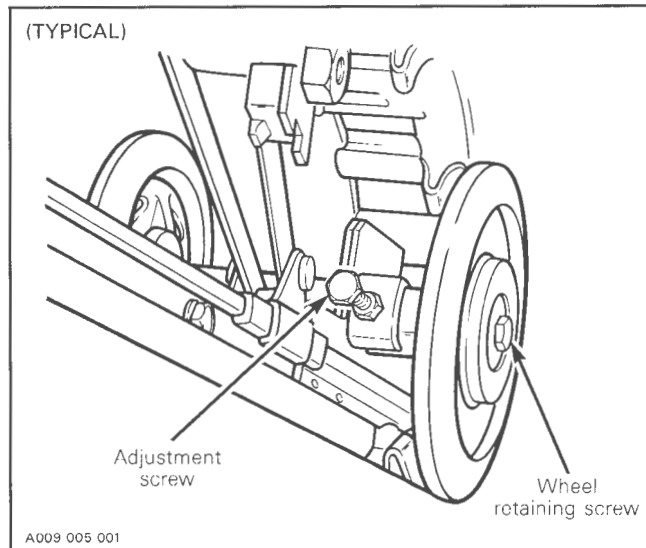
REMOVAL

 **NOTE :** To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

- Loosen one screw then retighten.
- Remove the other screw.
- Remove the first one.

4,11, Adjustment screw & screw

Release track tension by loosening wheel retaining screw and adjustment screw located on inner side of rear idler wheel.

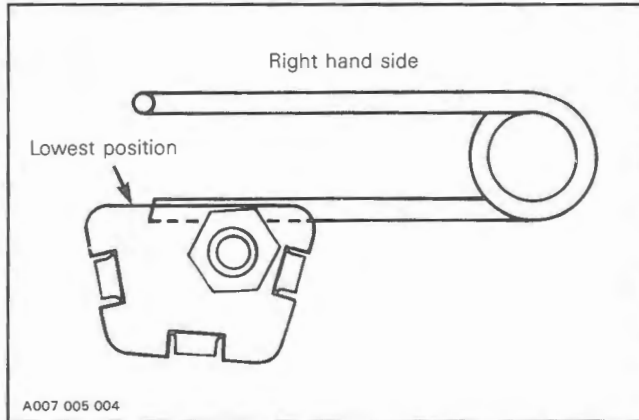


Section 05 SUSPENSION

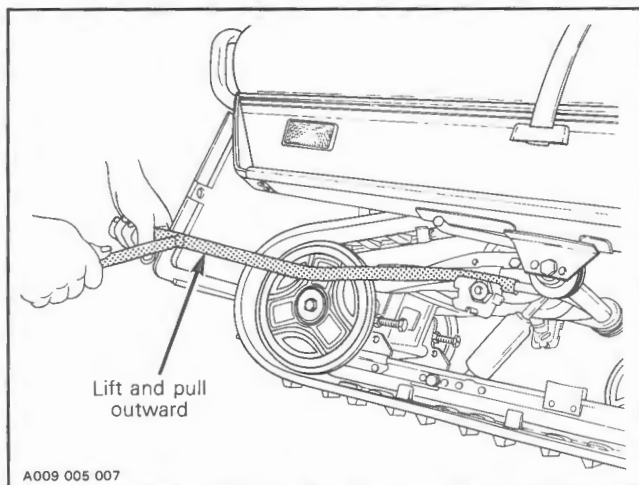
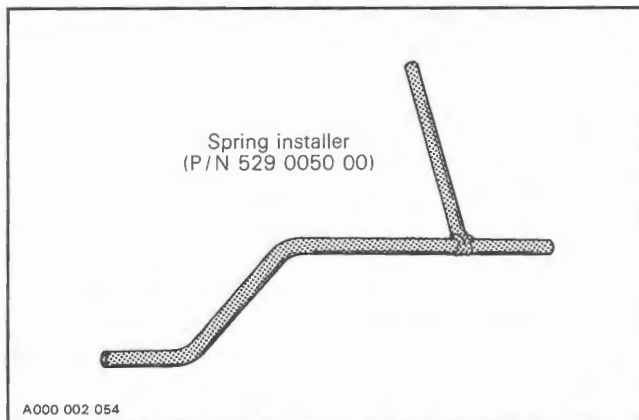
Sub-section 02 (SLIDE SUSPENSION)

25, Adjustment cam

Position the adjustment cams (front and rear) at the lowest position.



NOTE : Use spring installer (P/N 529 0050 00) to remove and install suspension springs.



19, Rear spring

Unhook rear springs.

13,16, Upper idler wheel & screw

Remove both screws then upper idler wheel set(s).

21,30, Rear arm & screw

Remove both screws securing rear arm to frame.

Plug vent holes in chaincase filler cap and oil injection reservoir cap to prevent leaks.

Using appropriate equipment, lift rear of vehicle.

49, Front spring

Unhook front springs.

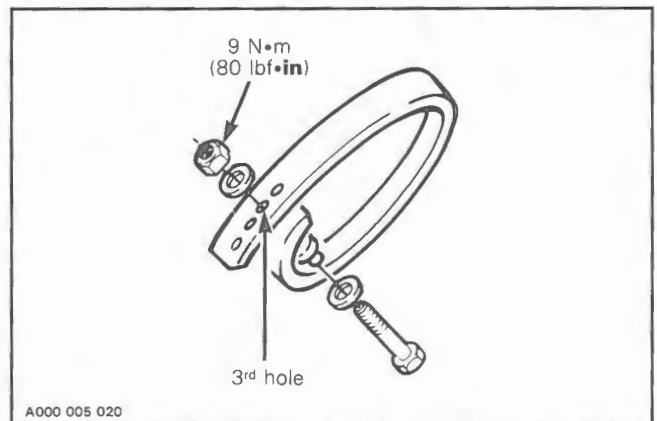
30,51, Screw & front arm

Remove both screws securing front arm to frame.

DISASSEMBLY & ASSEMBLY

61, Stopper strap

Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through the 3rd hole from the end. Torque nut to 9 N•m (80 lbf•in).



Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

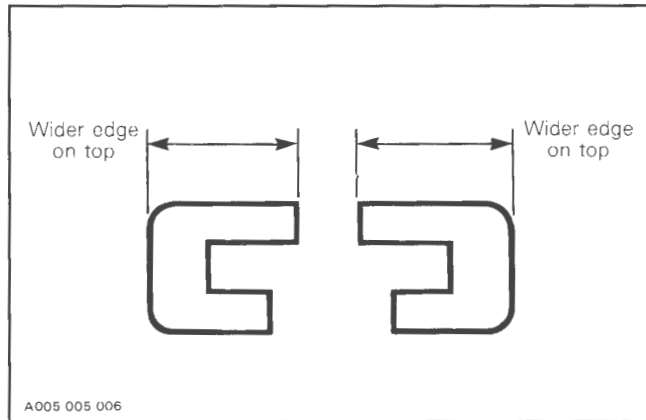
50,56,63,64, Bolt, slider shoe, Nut & runner

To replace a worn slider shoe, remove the front bolt and stop nut then slide the shoe rearwards out of the runner.

▼ **CAUTION :** Slider shoes must always be replaced in pairs.

45, Slider pad

Install the wider edge on top (each side of the runner).

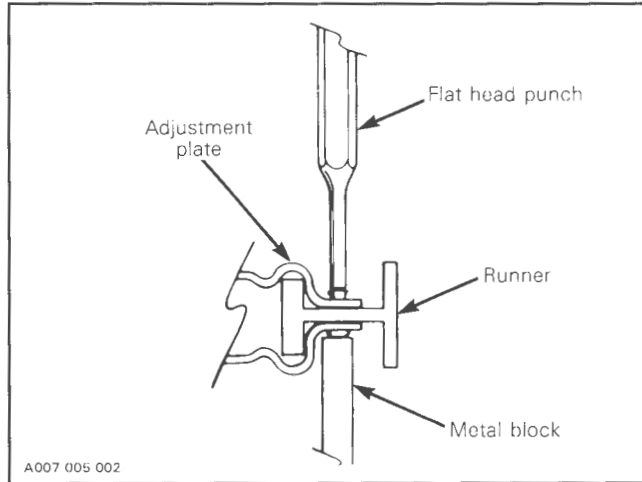


▼ **CAUTION :** Make sure slider pads are well installed. Check sliding action when sliding supports are installed.

6,7,42,53, Adjustment plate, rivet reinforcement strip & front arm bracket

To remove the rivets securing the reinforcement strip, the adjustment plate and the front arm bracket, cut rivet heads off using a chisel.

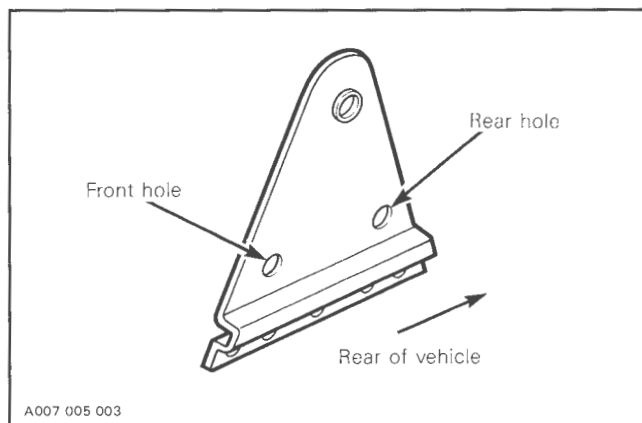
At assembly, position the rivet head toward the outside of the assembly. Support the rivet head against a metal block, as shown, and use a flat head punch to secure the rivet in place.



○ **NOTE :** Rivets can be substituted with 3/16 in x 3/4 in long screws and flanged elastic stop nuts. Always position screw head outside the assembly.

46,53, Front idler shaft & front arm bracket

The front idler shaft must be positioned in the front hole of the front arm bracket.

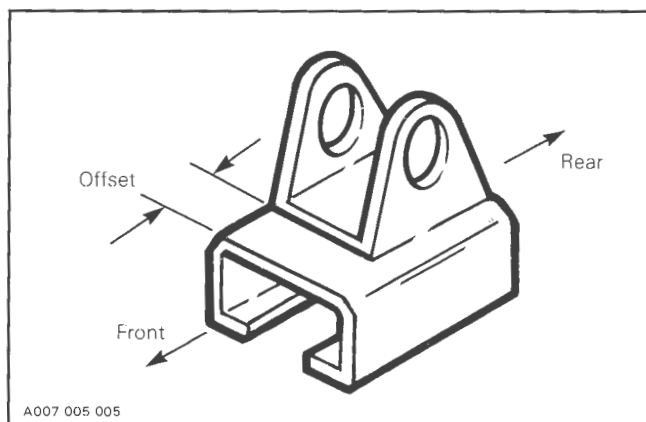


Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

31, Sliding support

Sliding support must be installed with offset toward front.



16,17,30,58, Screw & Loctite 242

Clean all screw threads. Prior to assembling, apply low temperature grease (P/N 413 7061 00) on cross shafts and Loctite 242 or equivalent on threads.

19,20,49, Bushing, front & rear springs

Prior to assembly, identify front and rear springs. Make sure to insert nylon bushings inside springs.

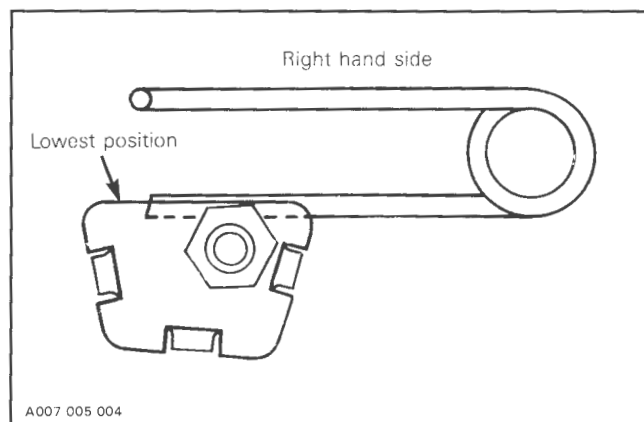
| SPRING LOCATION | MODEL | COLOR |
|-----------------|---------------------|------------------|
| Front | Tundra Tundra LT | Midnight blue |
| Rear | Tundra Tundra LT | Violet |

INSTALLATION

Preparation

25, Adjustment cam

At assembly, position the adjustment cams at the lowest position.



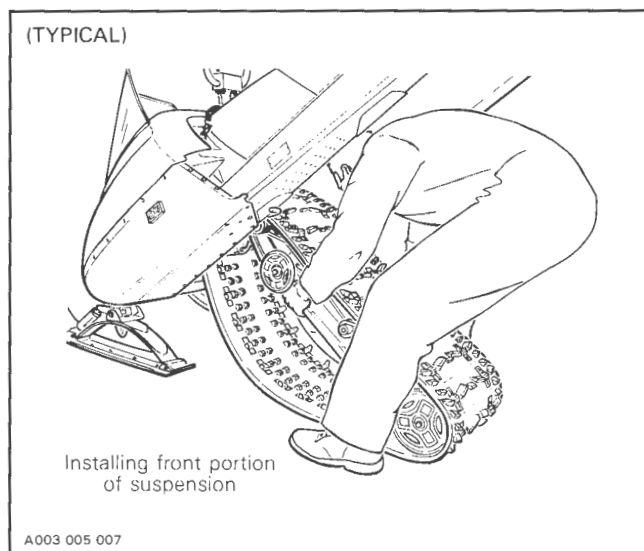
1,4,8, Rear axle, adjustment screw & spacer

Unscrew adjustment screws as far as possible to push the rear axle forward.

Make sure each adjustment screw is engaged in spacer and rear axle holes.

Installation

Lift the rear of vehicle, install front portion of suspension into frame.



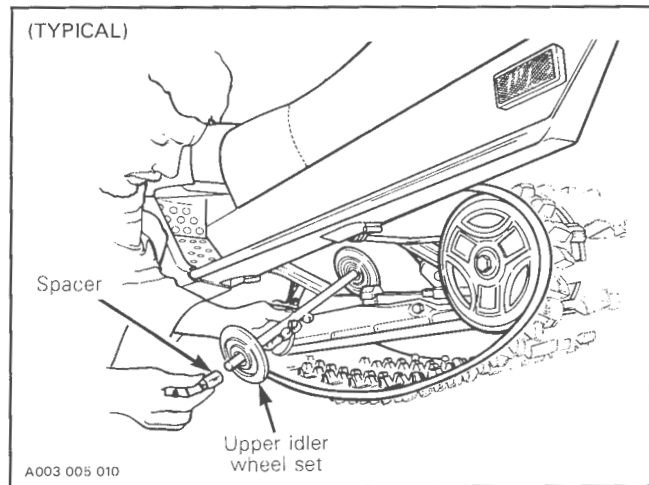
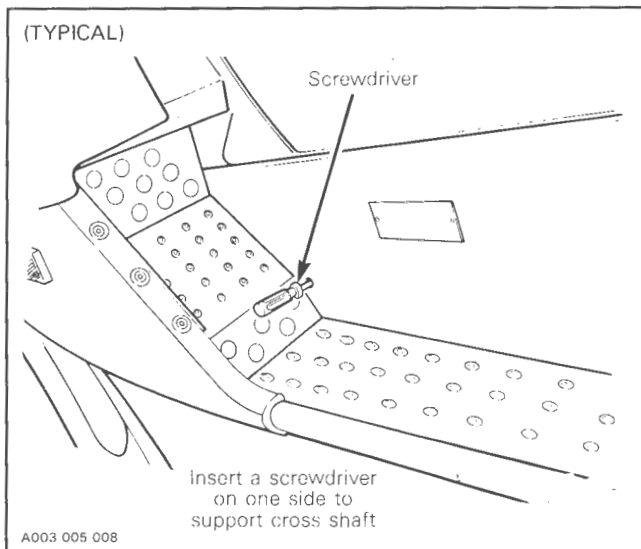
Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

18,29,43,51, Cross shaft, lock washer, screw & front arm

Insert a screwdriver into one side of frame to maintain cross shaft when installing screw into hole on other side. Do not tighten.

Remove the screwdriver and install screw.

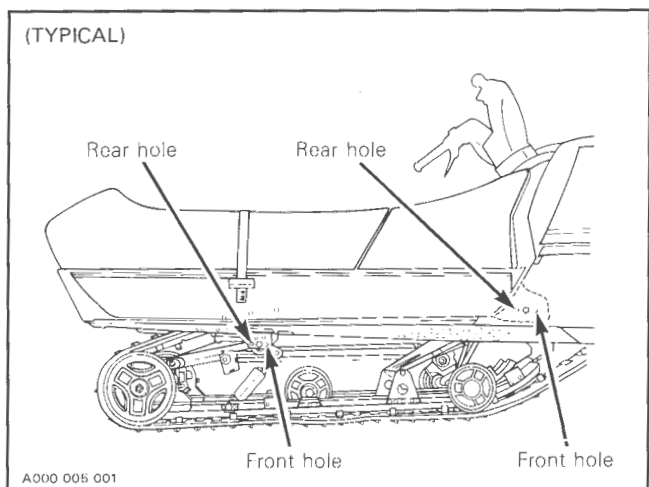


19,49, Front & rear springs

Make sure adjustment cams are at the lowest position, install springs.

NOTE: Holes in the frame provide the possibility of relocating the suspension arms for additional track tension adjustment. If the slide suspension adjustment screws are at maximum adjustment and the suspension arms are in the front holes of the frame, it is possible to move the suspension arms to the rear holes and obtain additional track tension adjustment.

CAUTION: Ensure that suspension arms are at the same position on each side of the frame at the front and at the rear, to avoid any damage to the suspension and the track.



NOTE: To adjust the track tension and alignment refer to section 05-10.

18,21,29,30, Cross shaft, rear arm, lock washer & screw

Lower the vehicle and install screws in rear cross shaft. Reposition vehicle on ground.

Remove chaincase and oil injection reservoir vent hole plugs.

30,43, Screw

Torque four suspension retaining screws to 43 N•m (32 lbf•ft).

12,14,15,16, Upper idler wheel shaft, spacer, lock washer & screw

Reinstall upper idler wheels set(s). Make sure to install spacers on shaft ends.

Section 05 SUSPENSION

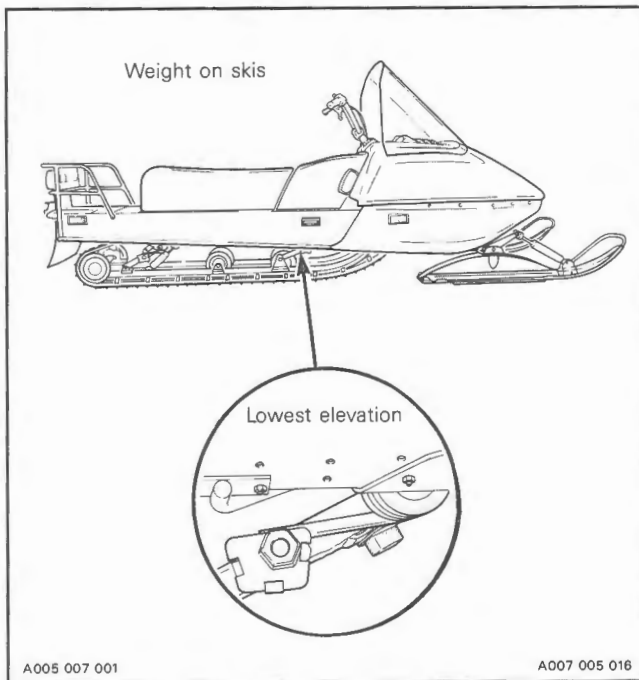
Sub-section 02 (SLIDE SUSPENSION)

RIDE ADJUSTMENT

25, Adjustment cam

The front adjustment cams are used for snow condition, and the rear for driver's weight. The front adjustment cams should be positioned at the lowest elevation for deep snow conditions. A higher elevation is preferred when negotiating icy snow.

The rear adjustment cams should be adjusted to rider preference.



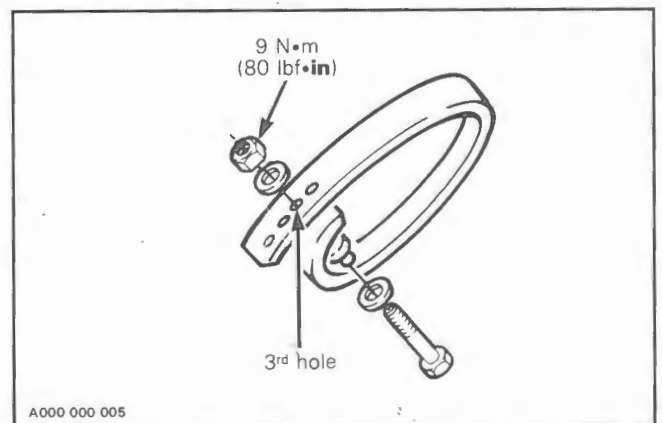
▼ **CAUTION:** Always turn left side adjustment cams in a clockwise direction and right side cams in a counterclockwise direction. Left and right adjustment cams at the front and at the rear must always be set at the same position.

61, Stopper strap

The function of the suspension stopper strap is to control the transfer of vehicle weight **during acceleration**. The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive steering. Holes in the stopper strap allow adjustment according to drivers' requirements, field and/or snow conditions.

For normal use locate bolt through 3rd hole from strap end. For deep snow use, set to its shortest length.

◆ **WARNING:** Always torque the nut to 9 N•m (80 lbf•in).



Sub-section 02 (SLIDE SUSPENSION)

Safari Citation/E




Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

1. Rear axle
2. Idler wheel 190 mm (2)
3. Flat washer 10 mm (4)
4. Lock washer 10 mm (4)
5. Screw (2)
6. Loctite 242
7. Upper cross shaft
8. Idler wheel (2)
9. Spacer (2)
10. Lock washer (2)
11. Screw M8 x 25 (2)
12. Lower cross shaft (3)
13. Screw M10 x 25 (10)
14. Rear arm
15. Clevis pin
16. Shock absorber
17. Cotter pin
18. Bushing
19. Shock absorber cross shaft
20. Upper cross shaft (2)
21. Bushing (4)
22. Rear spring (2)
23. Bushing (4)
24. Lock washer 10 mm (4)

25. Screw M10 x 35 (4)
26. Slider pad (2)
27. Sliding support (2)
28. Front arm
29. Stop nut M10 (2)
30. Adjustment screw M10 x 75 (2)
31. Square nut M10 (2)
32. Front idler shaft
33. Front spring (2)
34. Push nut (4)
35. Rubber stopper (4)
36. Rivet (4)
37. Stop nut M8
38. Flat washer (2)
39. Stopper strap
40. Screw M8 x 35
41. Lower front cross shaft
42. Stop nut M5 (2)
43. Runner (2)
44. Idler wheel shaft (2)
45. Idler wheel 135 mm (2)
46. Screw M10 x 90 (2)
47. Slider shoe (2)
48. Screw M5 x 20 (2)


REMOVAL

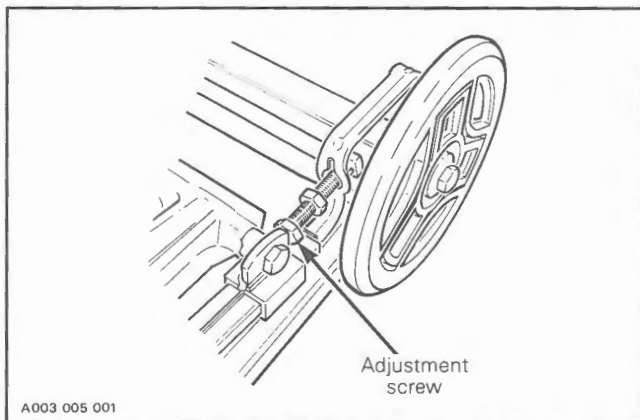
 **NOTE :** To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

- Loosen one screw then retighten.
- Remove the other screw.
- Remove the first one.

30, Adjustment screw

Release track tension by loosening adjustment screws located on inner side of rear idler wheels.

 **NOTE :** On this model, it is not required to loosen rear axle screws.



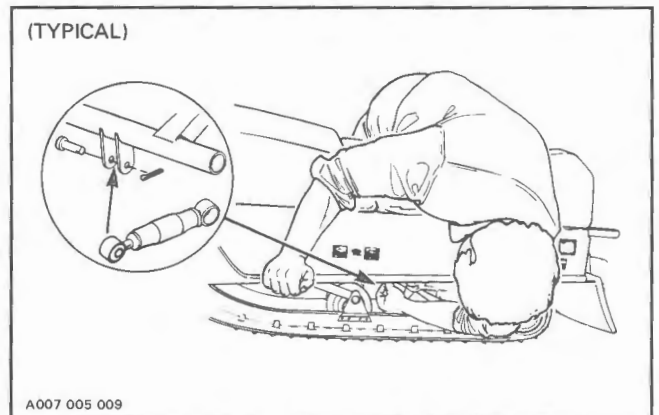
8,11, Upper idler wheel & upper idler wheel screw

Remove both screws then upper idler wheel set.

15,16,17, Clevis pin, shock absorber, & cotter pin

Apply downward pressure on the frame.

Remove the cotter pin locking the shock absorber clevis pin and detach the shock absorber by removing the clevis pin.



Section 05 SUSPENSION

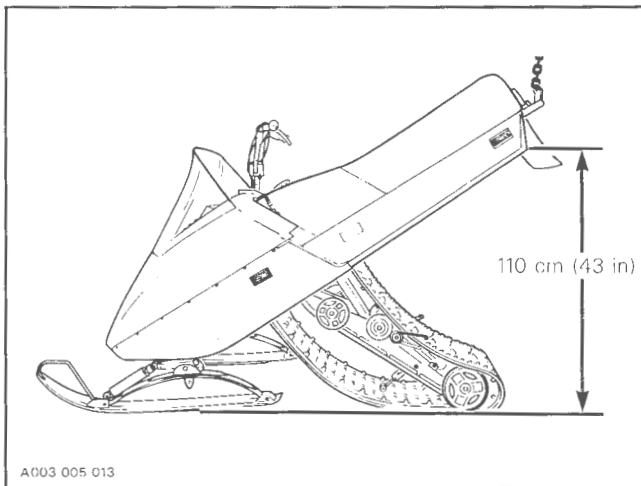
Sub-section 02 (SLIDE SUSPENSION)

14,25, Rear arm & screw

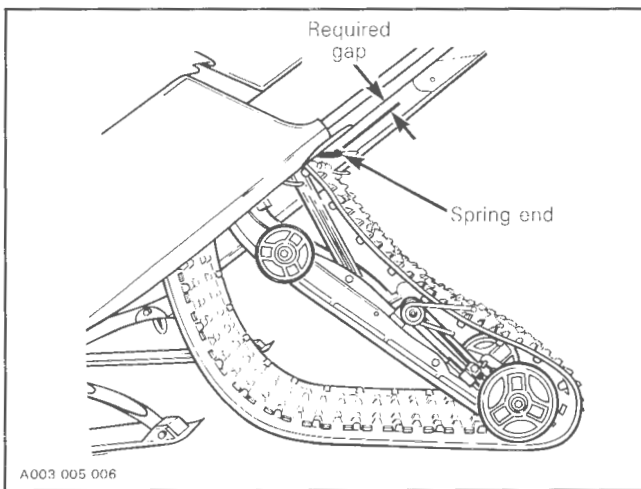
Remove both screws securing rear arm to frame.

Plug vent holes in chaincase filler cap and oil injection reservoir cap to prevent leaks.

Using appropriate equipment, lift rear of vehicle at least 110 cm (43 in).



Check that there is a gap between spring ends and frame so the springs do not exert any pressure on the suspension.

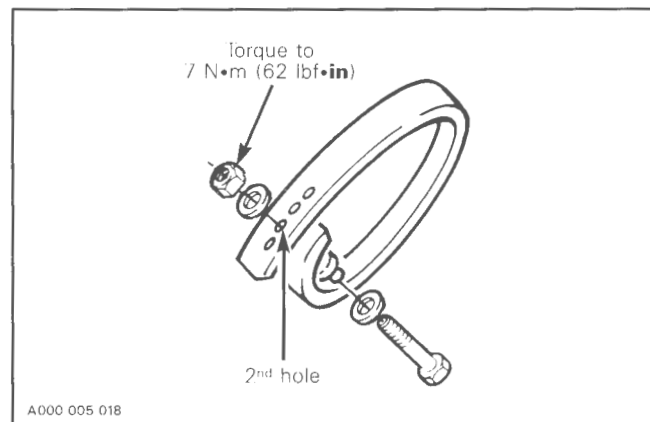


Remove both screws securing the front arm to frame.

DISASSEMBLY & ASSEMBLY

39, Stopper strap

Inspect strap for wear or cracks and bolt and nut for tightness. If loose, inspect hole for deformation. Replace stopper strap if required. Make sure it is attached through the 2nd hole from its end. Torque nut to 7 N•m (62 lbf•in).



42,43,47,48, Stop nut, runner, slider shoe, & screw

To replace a worn slider shoe, remove the front screw and stop nut then slide the shoe rearwards out of the runner.

▼ **CAUTION :** Slider shoes must always be replaced in pairs.

34,35,36, push nut, rubber stopper, & rivet

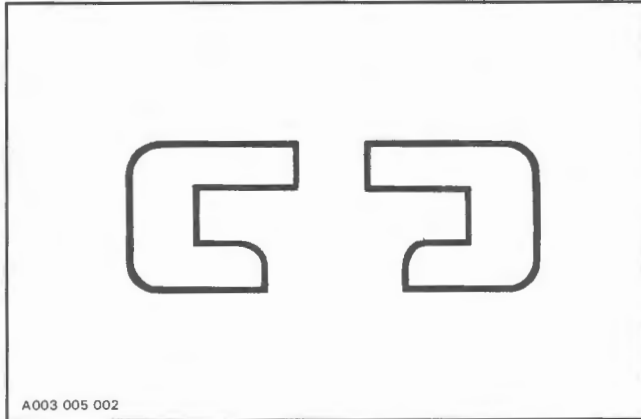
Pry off push nut with a screwdriver to remove. To install, press push nut while retaining rivet.

Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

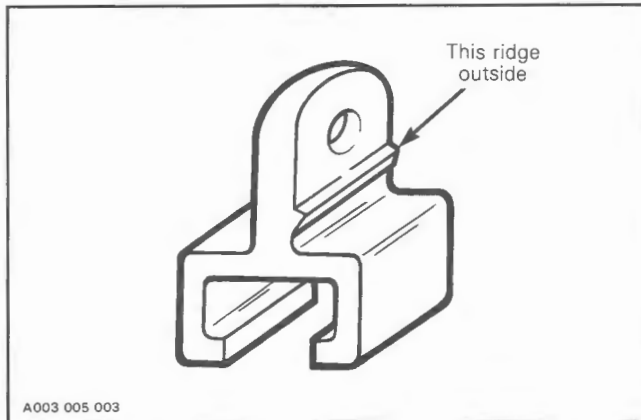
26, Slider pad

Install the rounded edge toward bottom (each side of the runner).



27, Sliding support

Must be installed with identification ridge outside.



5,6,11,13,25,46, Screw & Loctite 242

Clean all screw threads. Prior to assembling, apply low temperature grease (P/N 413 7061 00) on cross shafts and Loctite 242 or equivalent on threads.

22,23,33, Bushing, front & rear springs

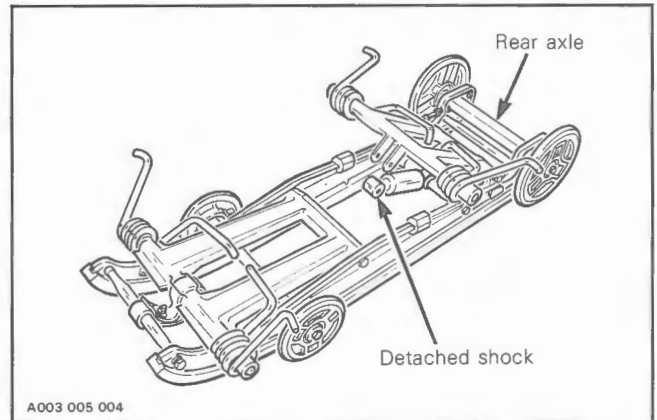
Prior to assembly, identify spring location. Make sure to insert nylon bushing inside springs.

Front springs: Midnight blue
Rear springs: Yellow

INSTALLATION

Preparation

Prepare the suspension ass'y as shown. Make sure the shock absorber is detached.



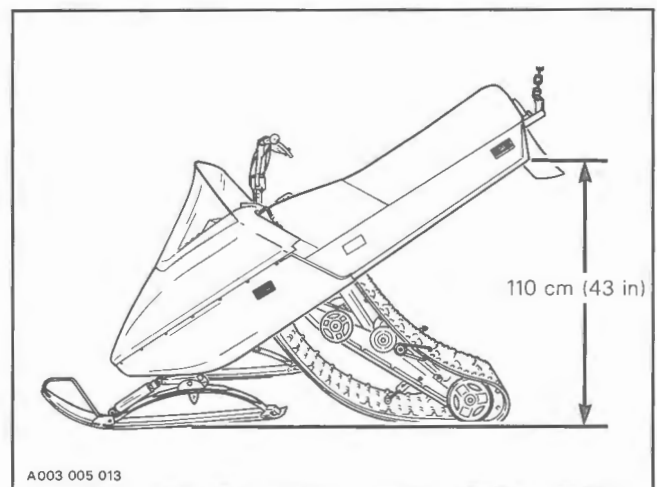
2, Rear idler wheel

Unscrew adjustment screws as far as possible and push the rear axle forward.

Make sure each adjustment screw is engaged in rear axle hole.

Installation

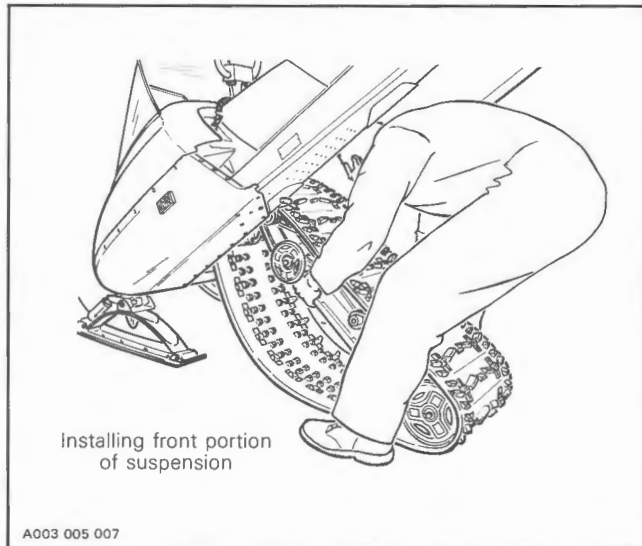
Lift the rear of vehicle at least 110 cm (43 in).



Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

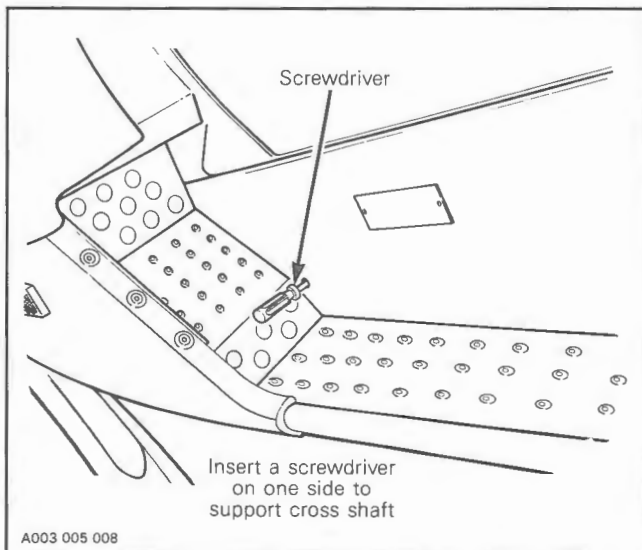
Install front portion of suspension into frame.



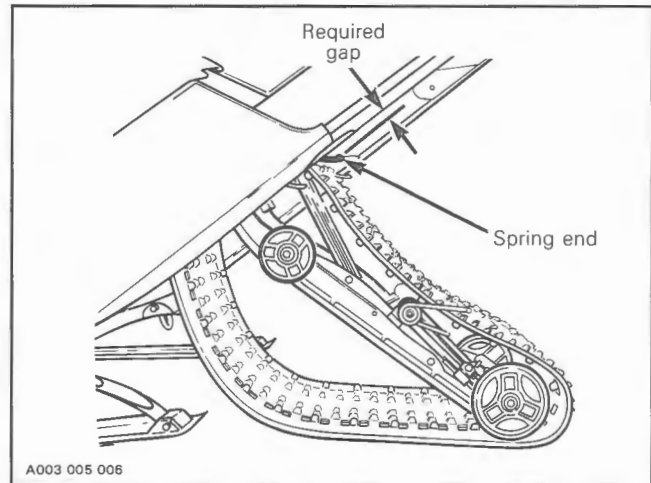
20,25,28, Cross shaft, screw & front arm

Insert a screwdriver into one side of frame to maintain cross shaft while installing screw into hole on other side. Do not tighten yet.

Remove the screwdriver and install screw.



NOTE : To ease installation, leave a gap between spring end and frame so that no pressure is exerted on the suspension.



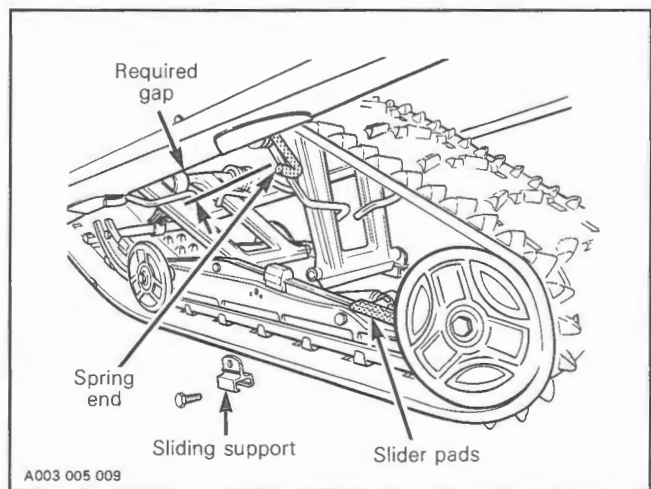
13,14,27, Screw, rear arm & sliding support

Remove screw and sliding support from one side only. Withdraw rear arm from runners.

14,20,25, Rear arm, cross shaft, & screw

Attach rear arm to frame. Do not tighten screws yet.

Let rear of vehicle down just enough to keep a gap between rear spring end and bottom of frame when rear arm is close to slider pads.



Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

13,27, Screw & sliding support

Slide rear arm over slider pads, as shown. Re-install sliding support and screw. Torque screw to 48 N•m (35 lbf•ft).

▼ **CAUTION :** Make sure slider pads **26** are well installed. Check sliding action when sliding supports are installed.

- Reposition vehicle on ground.
- Remove chaincase and oil injection reservoir vent hole plugs.

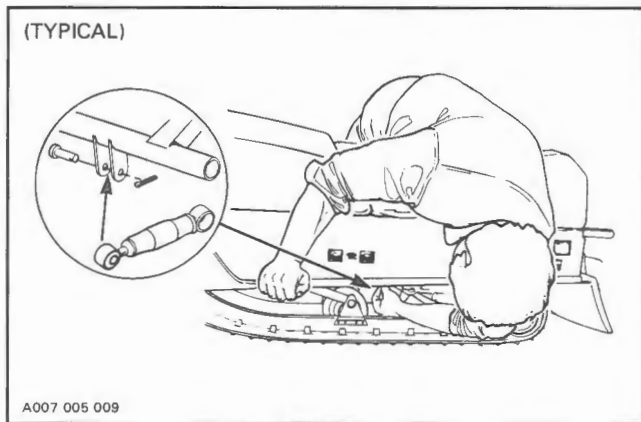
25, Screw

Torque four suspension retaining screws to 48 N•m (35 lbf•ft).

15,16,17, Clevis pin, shock absorber & cotter pin

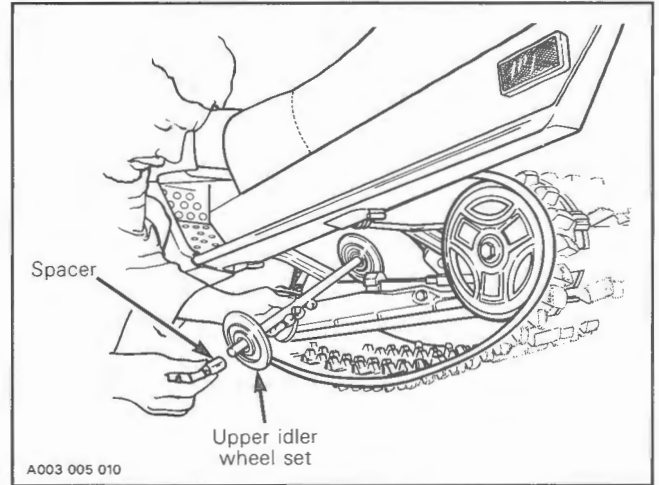
Apply downward pressure on the frame.

Secure the extended shock with clevis pin and a new cotter pin.



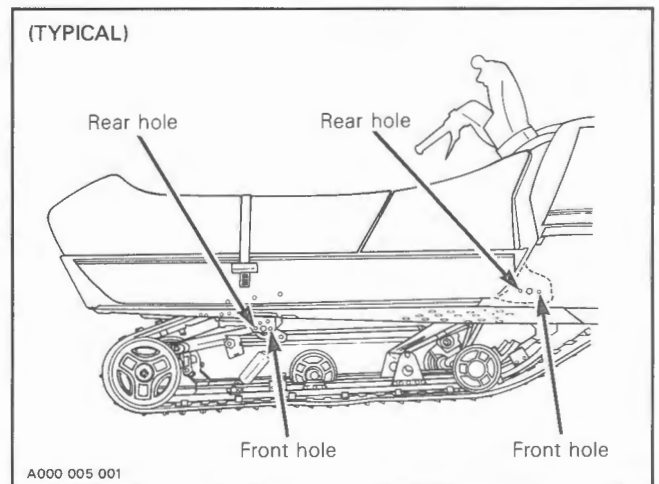
8,9,11, Upper idler wheel, spacer & screw

Reinstall upper idler wheel set. Make sure to install spacers on shaft ends.



○ **NOTE :** Holes in the frame provide the possibility of relocating the suspension arms for additional track tension adjustment. If the slide suspension adjustment screws are at maximum adjustment and the suspension arms are in the front holes of the frame, it is possible to move the suspension arms to the rear holes and obtain additional track tension adjustment.

▼ **CAUTION :** Ensure that suspension arms are at the same position on each side of the frame at the front and at the rear, to avoid any damage to the suspension and the track.



○ **NOTE :** To adjust the track tension and alignment, refer to section 05-10.

Section 05 SUSPENSION

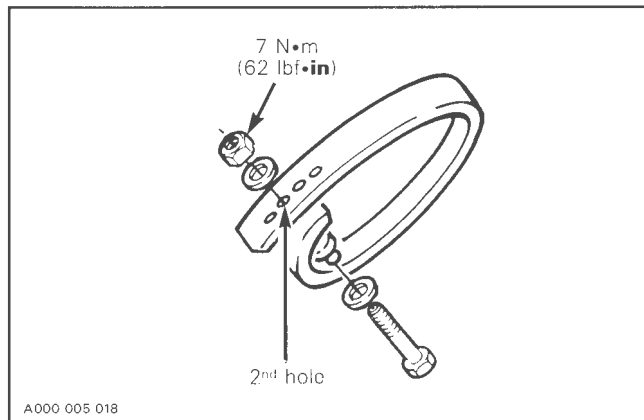
Sub-section 02 (SLIDE SUSPENSION)

39, Stopper strap

The function of the suspension stopper strap is to control the transfer of vehicle weight **during acceleration**. The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive direction. Adjusting holes on the stopper strap allow to adjust it according to drivers' requirements, field and/or snow conditions.

For normal use locate bolt through 2nd hole from strap end.

◆ **WARNING :** Always torque the nut to 7 N•m (62 lbf•in).



TRS 6 SUSPENSION



Section 05 SUSPENSION

Sub-section 03 (TRS 6 SUSPENSION)

1. Spacer tube
2. Rear axle
3. Hexagonal wrench (cam adjustment)
4. Pivot arm
5. Pivot shaft (2)
6. Hexagonal nut M10 (2)
7. Hexagonal adjustment screw M10 x 110 (2)
8. R.H. & L.H. adjustment plates
9. Rivet (36)
10. Square nut (2)
11. Lock washer 8 mm (4)
12. Hexagonal head cap screw M8 x 20 (4)
13. Loctite 242
14. Spacer tube
15. Idler wheel
16. Washer (2)
17. Hexagonal head cap screw M10 x 35 (2)
18. Idler shaft
19. Snap ring (2)
20. Ball bearing (2)
21. Idler wheel (2)
22. Spacer (2)
23. Rear arm
24. Clevis pin
25. Grease fitting (3)
26. Cotter pin
27. Rear cross shaft
28. Bushing (2)
29. Lock washer 8 mm (2)
30. Hexagonal head cap screw M8 x 25 (2)
31. R.H. & L.H. adjustment cams (4)
32. Flat washer (4)
33. Cotter pin (4)
34. Rear R.H. & L.H. springs
35. Bushing(4)
36. Lock washer 10 mm (4)
37. Hexagonal head cap screw M10 x 35 (4)
38. Swaged tube
39. Shock absorber
40. Auto-lock bushing
41. Reinforcement bracket (4)
42. Hexagonal head cap screw M10 x 35 (2)
43. Center axle
44. Idler wheel (2)
45. Washer (2)
46. Spacer tube (2)
47. Wheel support (2)
48. push nut (8)
49. Rubber stopper (4)
50. Hexagonal head cap screw M10 x 35 (2)
51. Rivet (8)
52. Upper front cross shaft
53. Front arm
54. Front R.H. & L.H. springs
55. Lower front cross shaft
56. Front arm support (2)
57. Hexagonal head cap screw M10 x 35 (2)
58. Hexagonal elastic stop nut M8
59. Washer (2)
60. Stopper strap
61. Hexagonal head cap screw M8 x 45
62. Cross shaft
63. Spacer tube
64. Front wheel support (2)
65. Reinforcement strip (2)
66. Idler wheel
67. Washer (2)
68. Hexagonal head cap screw M10 x 35 (2)
69. Hexagonal elastic stop nut M5 (2)
70. Runner (2)
71. Slider shoe (2)
72. Slotted head machine screw M5 x 20 (2)

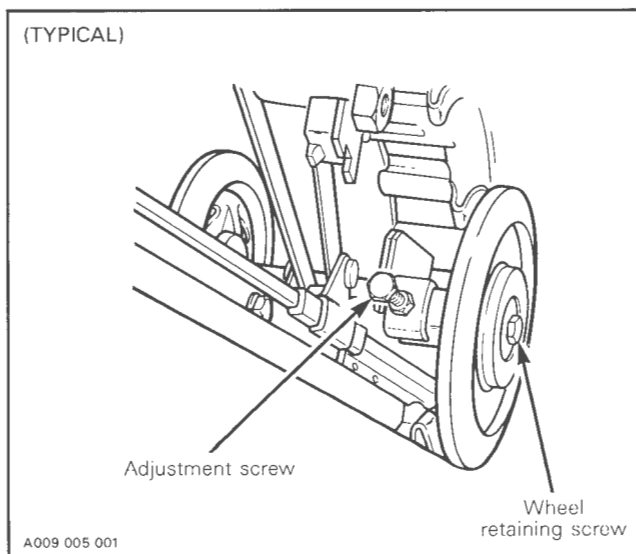
REMOVAL

NOTE : To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

- Loosen one screw then retighten.
- Remove the other screw.
- Remove the first one.

7,17, Adjustment screw & screw

Release track tension by loosening wheel retaining screws and adjustment screws located on inner side of rear idler wheels.

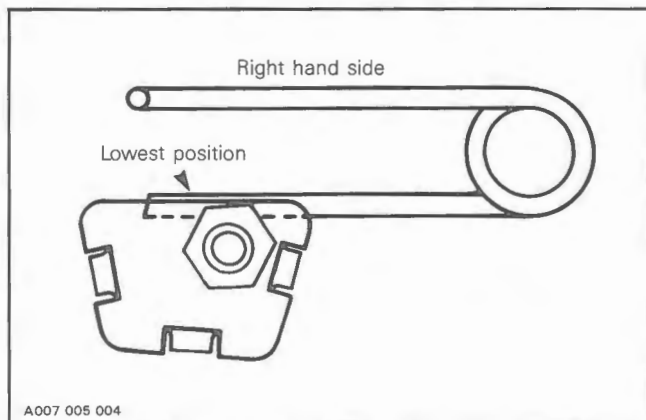


Section 05 SUSPENSION

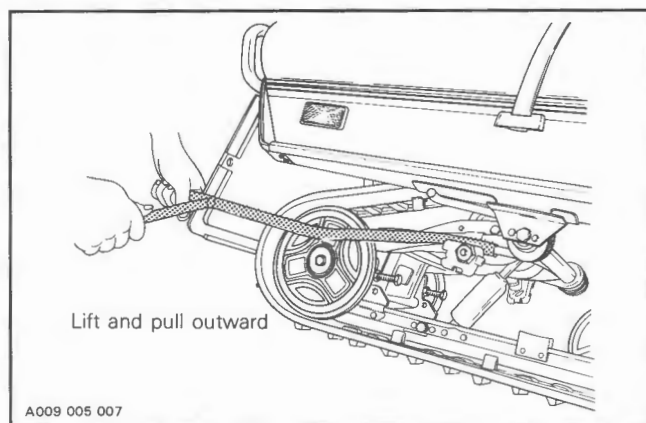
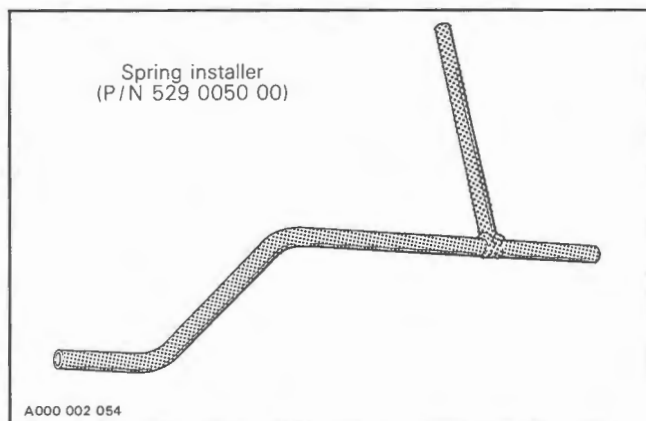
Sub-section 03 (TRS 6 SUSPENSION)

31, Adjustment cam

Position the adjustment cams (front and rear) at the lowest position.



○ **NOTE :** Use spring installer (P/N 529 0050 00) to remove and install suspension springs.



34, Rear spring

Unhook rear springs.

23,37, Rear arm & screw

Remove both screws securing rear arm to frame.

Plug vent holes in chaincase filler cap and injection oil reservoir cap to prevent leaks.

Using appropriate equipment, lift rear of vehicle.

54, Front spring

Unhook front springs.

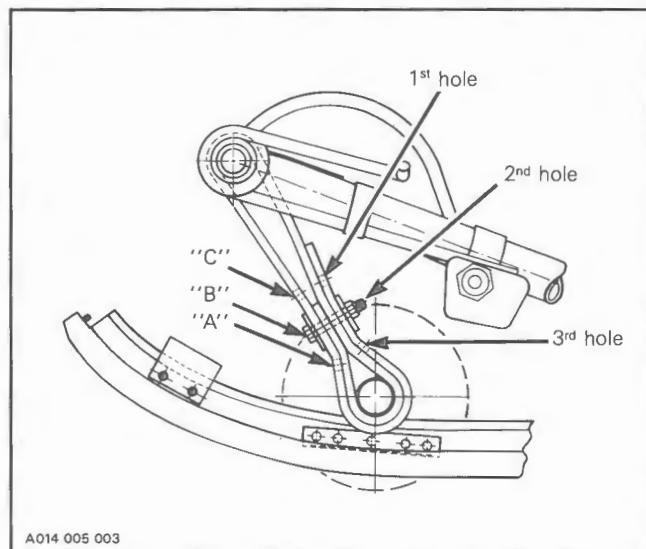
37,53, Screw & front arm

Remove both screws securing the front arm to frame.

DISASSEMBLY & ASSEMBLY

60, Stopper strap

Inspect strap for wear or cracks and bolt and nut for tightness. If loose, inspect hole for deformation. Replace stopper strap as required. Make sure it is attached through the 2nd hole from the end and in corresponding hole "B". Torque nut to 10 N•m (89 lbf•in).



69,70,71,72, Stop nut, runner, slider shoe & screw

To replace a worn slider shoe, remove the front screw and stop nut then slide the shoe rearwards out of the runner.

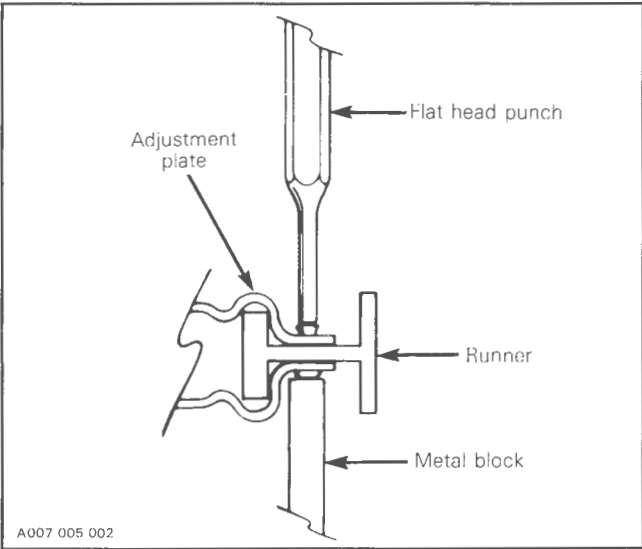
▼ **CAUTION :** Slider shoes must always be replaced in pairs.

Section 05 SUSPENSION
Sub-section 03 (TRS 6 SUSPENSION)

8,9,41,65, Adjustment plates, rivet, reinforcement bracket & reinforcement strip

To remove the rivets securing the reinforcement strip, the adjustment plate and the reinforcement bracket, cut rivet heads off using a chisel.

At assembly, position the rivet head toward the outside of the assembly. Support the rivet head against a metal block, as shown, and use a flat head punch to secure the rivet in place.



NOTE : Rivets can be substituted with 3/16 x 3/4 in long screws and flanged elastic stop nuts. Always position screw head outside the assembly.

24,26,39, Clevis pin, cotter pin & shock absorber

Install clevis pin head toward right hand side of vehicle.

12,13,30,37,42,50,57,68, Screw, & Loctite 242

Clean all screw threads. Prior to assembly, apply low temperature grease (P/N 413 7061 00) on cross shafts and Loctite 242 or equivalent on threads.

34,35,54, Bushing, front & rear springs

Prior to assembly, identify front and rear springs. Make sure to insert nylon bushings inside springs.

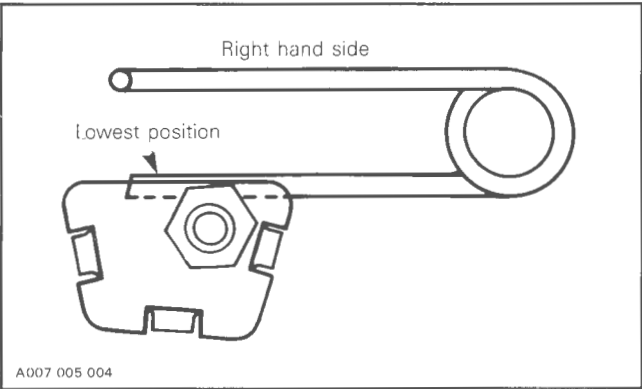
| Spring location | Model | Color |
|-----------------|----------------|--------|
| Front | Safari Scout/E | Orange |
| Rear | Safari Scout/E | Purple |

INSTALLATION

Preparation

31, Adjustment cam

-- At assembly, position the adjustment cams at the lowest position.

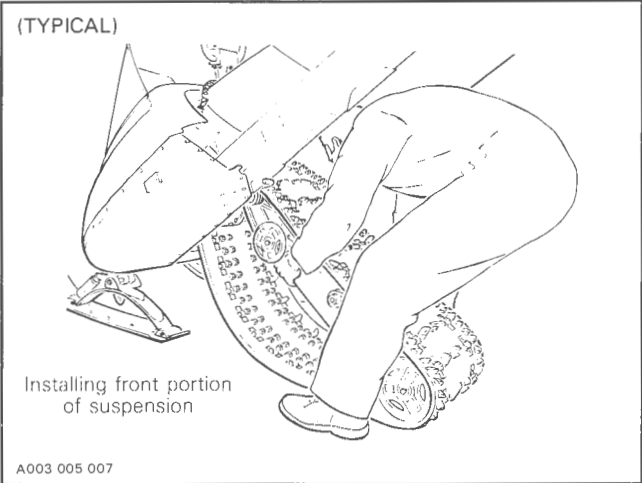


2, Rear axle

— Unscrew adjustment screws as far as possible and push the rear axle forward.

Installation

Lift rear of vehicle. Install front portion of suspension into frame, as shown.

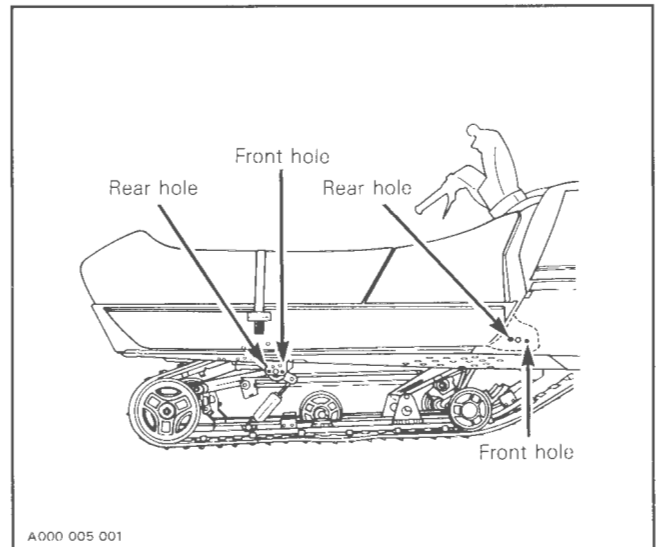
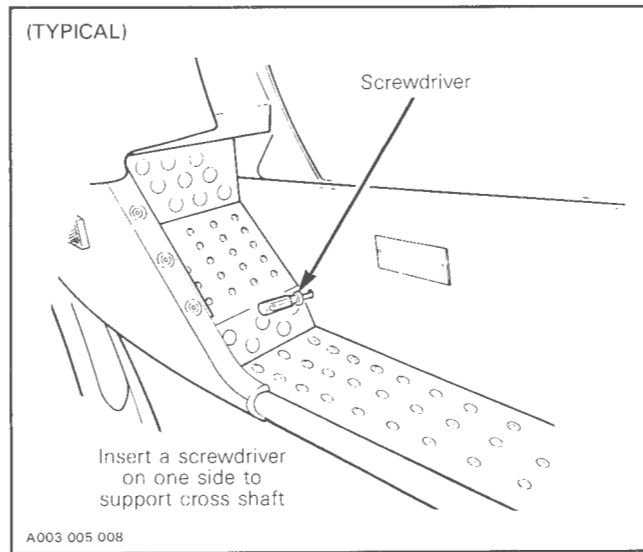


Section 05 SUSPENSION

Sub-section 03 (TRS 6 SUSPENSION)

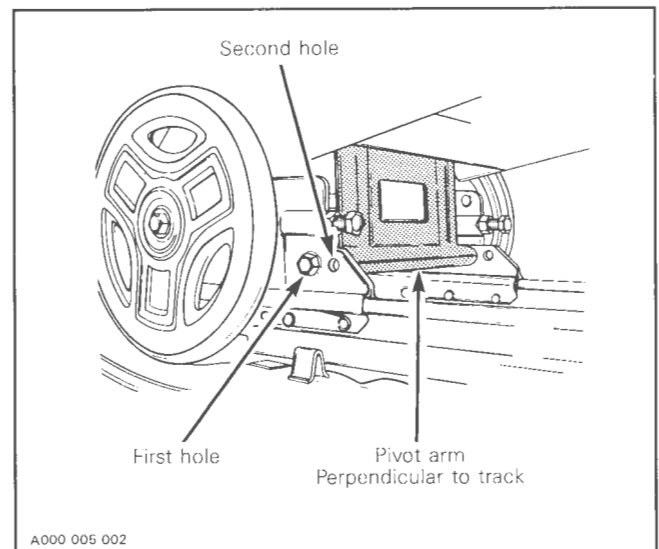
37,52,53, Cross shaft & front arm

- Insert a screwdriver into one side of frame to support cross shaft while installing screw in hole on other side. Do not tighten yet.



4,8, pivot arm & adjustment plate

When relocating front and rear suspension arms ensure that the pivot arm is as perpendicular to the track as possible by locating it in the first or second hole of each adjustment plate.



23,27,37, Rear arm, cross shaft & screw

- Lower the vehicle to install screws in rear cross shaft.
- Reposition vehicle on ground.
- Remove chaincase and oil injection reservoir vent hole plugs.

37, Screw

Torque four suspension retaining screws to 41 N•m (30 lbf•ft).

34,54, Front & rear springs

Make sure adjustment cams are at the lowest position. Install springs using tool P/N 529 0050 00.

NOTE : Holes in the frame provide the possibility of relocating the suspension arms for additional track tension adjustment. If the slide suspension adjustment screws are at maximum adjustment and the suspension arms are in the front holes of the frame, it is possible to move the suspension arms to the rear holes and obtain additional track tension adjustment.

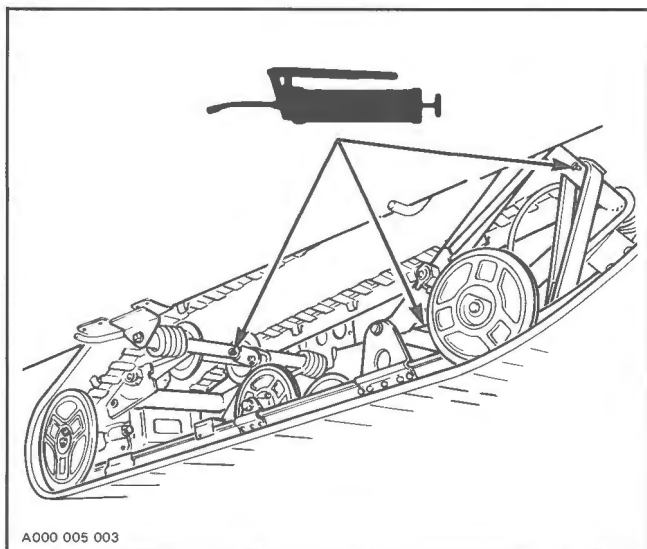
CAUTION : Ensure that suspension arms are at the same position on each side of the frame at the front and at the rear, to avoid any damage to the suspension and the track.

25, Grease fitting

Lubricate front and rear arms through grease fittings until grease appears at joints. Use low temperature grease only (P/N 413 7061 00).

Section 05 SUSPENSION

Sub-section 03 (TRS 6 SUSPENSION)



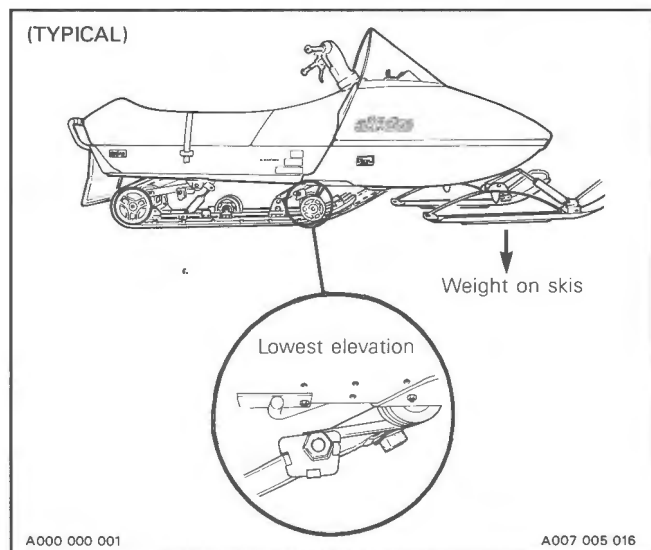
NOTE : To adjust track tension and alignment, refer to section 05-10.

RIDE ADJUSTMENT

31, Adjustment cam

The front adjustment cams are used for snow condition, and the rear for driver's weight. The front adjustment cams should be positioned at the lowest elevation for deep snow conditions. A higher elevation is preferred when negotiating icy snow.

The rear adjustment cams should be adjusted to rider preference.



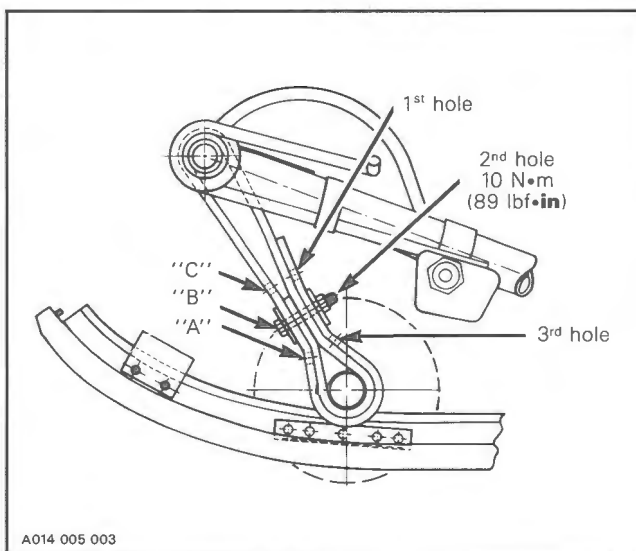
CAUTION : Always turn left side adjustment cams in a clockwise direction and right side cams in a counterclockwise direction. Left and right adjustment cams, at the front and at the rear, must always be set at the same position.

60, Stopper strap

The function of the suspension stopper strap is to control the transfer of vehicle weight **during acceleration**. The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive steering. Holes in the stopper strap allow adjustment according to driver's requirements, field and/or snow conditions.

For normal use locate bolt through 2nd hole and its corresponding hole "B", as shown. For deep snow use, set to its shortest length.

| HOLE NO | CORRESPONDING HOLE |
|---------|--------------------|
| 1 | "A" |
| 2 | "B" |
| 3 | "C" |

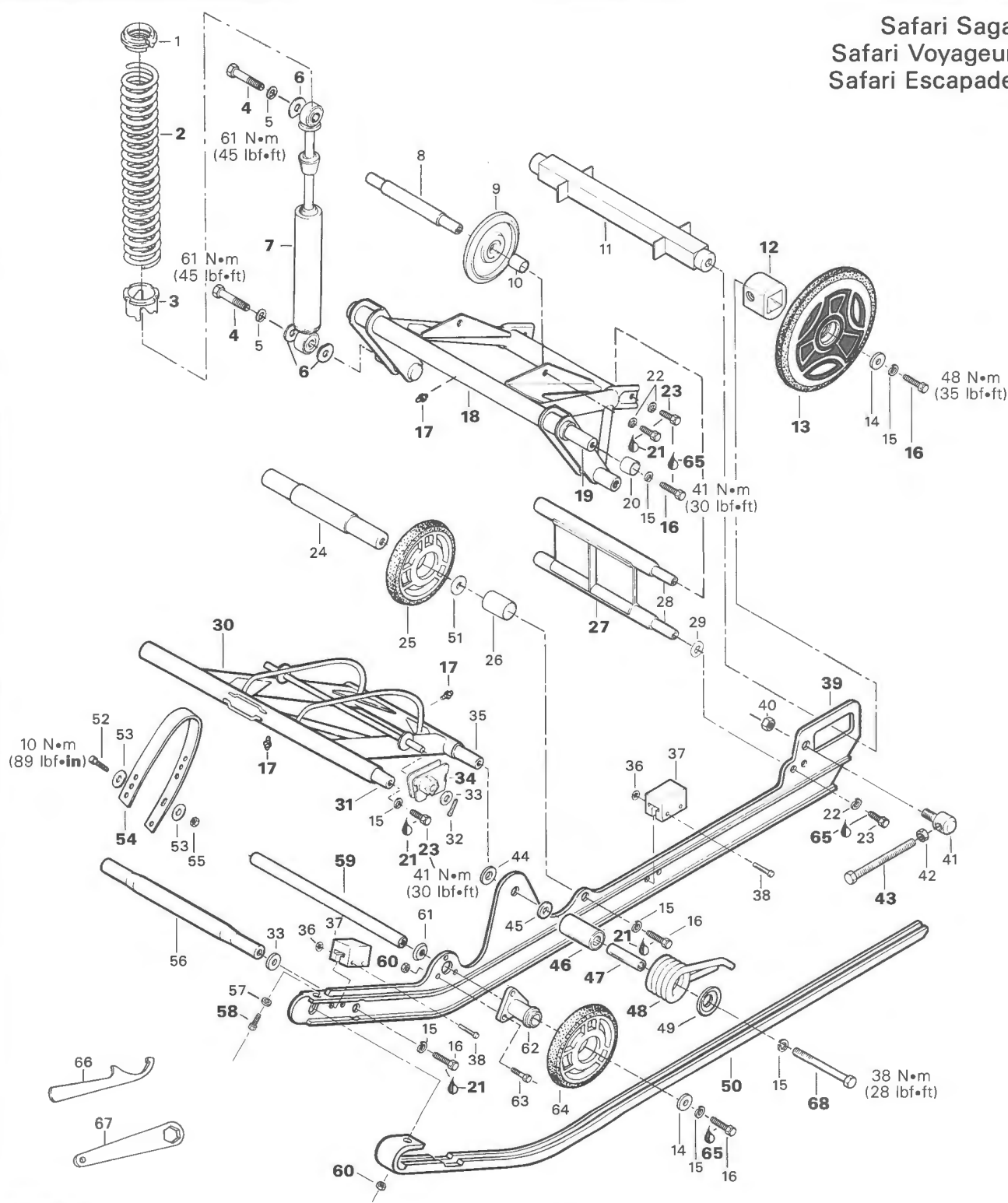


WARNING : Always torque the nut to 10 N•m (89 lbf•in).

Section 05 SUSPENSION
Sub-section 04 (SP SUSPENSION)

SP SUSPENSION

Safari Saga
Safari Voyageur
Safari Escapade



A020 005 003

Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

1. Spring collar (2)
2. Spring (2)
3. Adjuster ring (2)
4. Cap screw M10 x 45 (4)
5. Lock washer 10 mm (4)
6. Washer (6)
7. Shock absorber (2)
8. Axle
9. Idler wheel (2)
10. Spacer (2)
11. Rear axle
12. Spacer (2)
13. Idler wheel (2)
14. Washer (4)
15. Lock washer (14)
16. Cap screw M10 x 35 (10)
17. Grease fitting (3)
18. Rear arm
19. Rear cross shaft
20. Bushing (2)
21. Loctite 242
22. Lock washer 8 mm (6)
23. Cap screw M8 x 25 (6)
24. Center axle
25. Idler wheel (2)
26. Spacer (2)
27. Pivot arm
28. Pivot shaft (2)
29. Washer (2)
30. Front arm
31. Front cross shaft
32. Cotter pin (2)
33. Washer (4)
34. R.H. & L.H. adjuster cams
35. Axle (2)
36. Push nut (8)
37. Rubber stopper (4)
38. Rivet (8)
39. Runner (2)
40. Elastic stop nut (2)
41. Tension stopper (2)
42. Elastic stop nut M10 (2)
43. Cap screw M10 x 85 (2)
44. Washer (2)
45. Washer (2)
46. Nylon bushing (2)
47. Bushing (2)
48. R.H. & L.H. front springs
49. Washer (2)
50. Slider shoe (2)
51. Washer (2)
52. Cap screw M8 x 45
53. Washer (2)
54. Stopper strap
55. Elastic stop nut M8 (2)
56. Cross support
57. Washer (2)
58. Cap screw M6 x 25 (2)
59. Cross shaft
60. Elastic stop nut M6
61. Flat washer (2)
62. Housing (2)
63. Cap screw M6 x 20
64. Idler wheel (2)
65. Loctite 271
66. Suspension adjuster wrench (shock absorber)
67. Hexagonal wrench (cam adjustment)
68. Cap screw M10 x 90 mm (10)

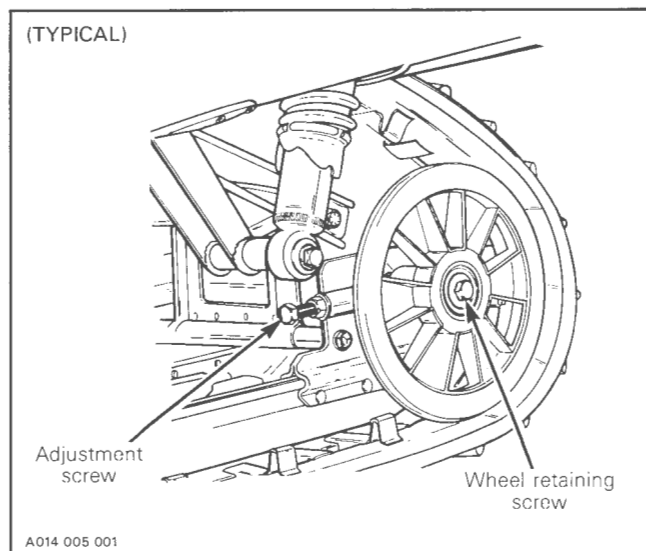
REMOVAL

○ **NOTE :** To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

- Loosen one screw then retighten.
- Remove the other one.
- Remove the first one.

16,43, Screw & adjustment screw

Release track tension by loosening wheel retaining screws and adjustment screws located on inner side of rear idler wheels.



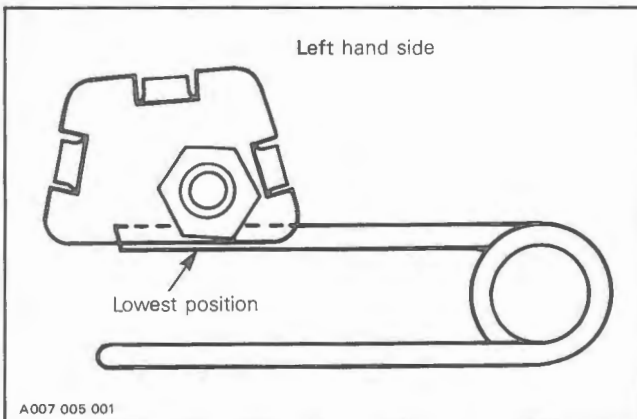
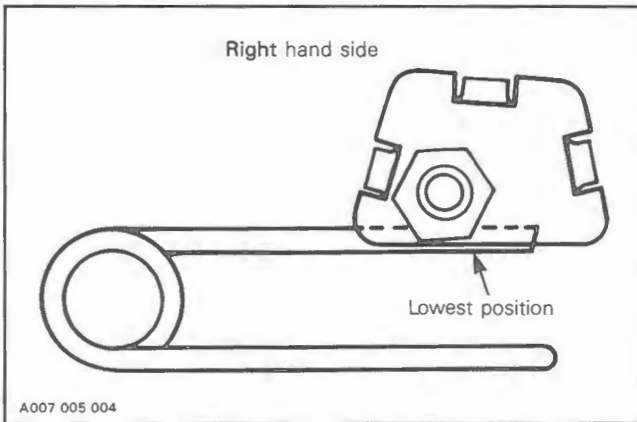
Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

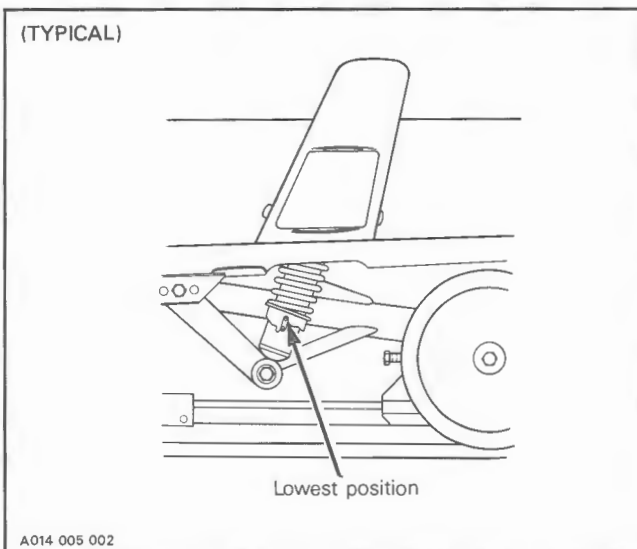
3,34, Adjuster ring & adjuster cam

Position at the lowest position.

Front adjustment



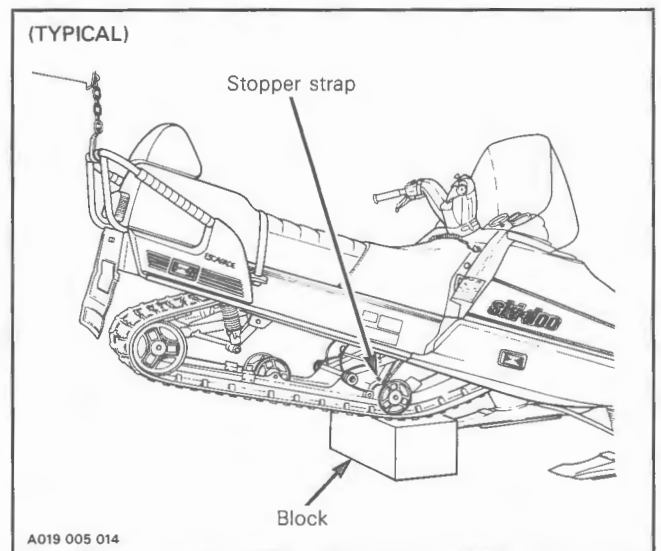
Rear adjustment



48, Front spring

To remove, undo stopper strap then raise rear of vehicle to release spring pressure.

To install, raise rear of vehicle enough to place a block under front portion of suspension. With stopper strap undone and springs in place, lower vehicle so front springs compress. Continue until the stopper strap can be tied up. Refer to stopper strap installation procedure for proper adjustment.



4, Shock absorber screw

Remove the two lower shock absorber screws.

16,18, Screw & rear arm

Remove both screws securing the rear arm to frame. Plug vent holes in chaincase filler cap and oil injection reservoir cap to prevent leaks.

Using appropriate equipment, lift rear of vehicle.

23,30, Screw & front arm

Remove both screws securing the front arm to frame.

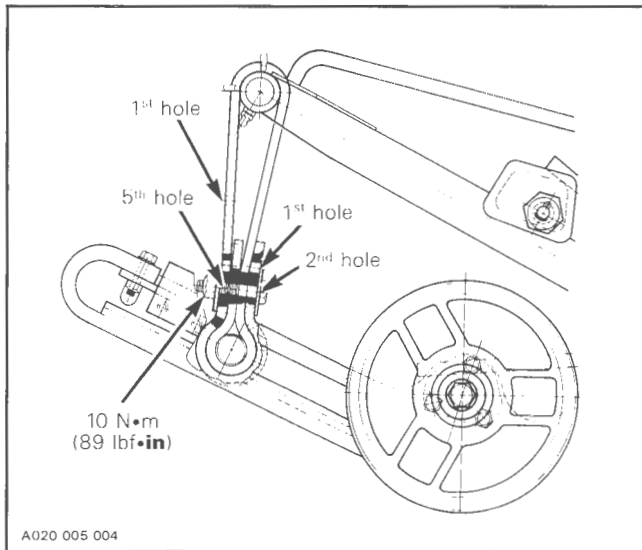
Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

DISASSEMBLY & ASSEMBLY

54, Stopper strap

Inspect strap for wear or cracks and bolt and nut for tightness. If loose, inspect hole for deformation. Replace stopper strap as required. For normal use, insert bolt through holes as shown. Torque nut to 10 N•m (89 lbf•in).



39,50,57,58,60, Runner, slider shoe, screw, washer & nut

To replace a worn slider shoe, remove the front screw and stop nut then slide the shoe rearwards out of the runner.

CAUTION: Slider shoes must always be replaced in pairs.

16,21,23,68, Screw & Loctite 242

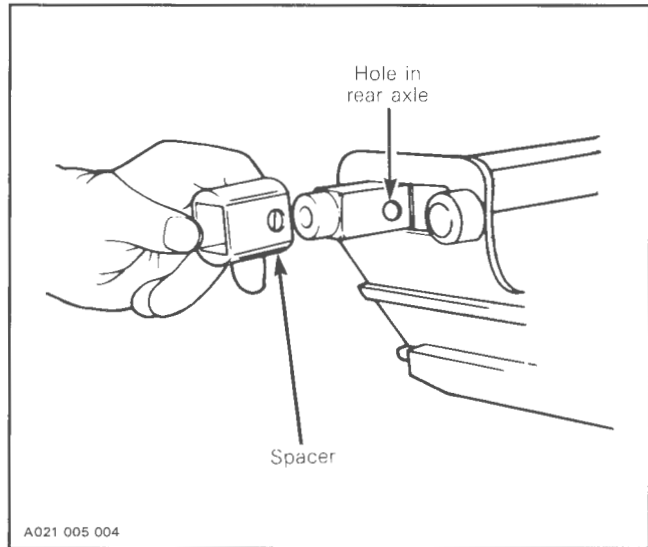
Clean all screw threads. Prior to assembly, apply low temperature grease (P/N 413 7061 00) on cross shafts and Loctite 242 or equivalent on threads.

46,47,68, Bushing, metal bushing & screw

Ensure bushing and metal bushing are in place inside front springs. Torque front spring retaining screw to 38 N•m (28 lbf•ft).

12, Spacer

Hole in rear axle must face forward. Hole in spacer must align with hole in rear axle.



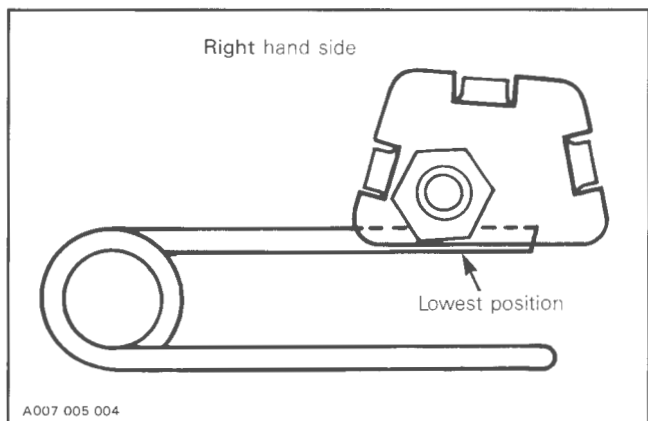
INSTALLATION

Preparation

3,34, Adjuster ring & adjustment cam

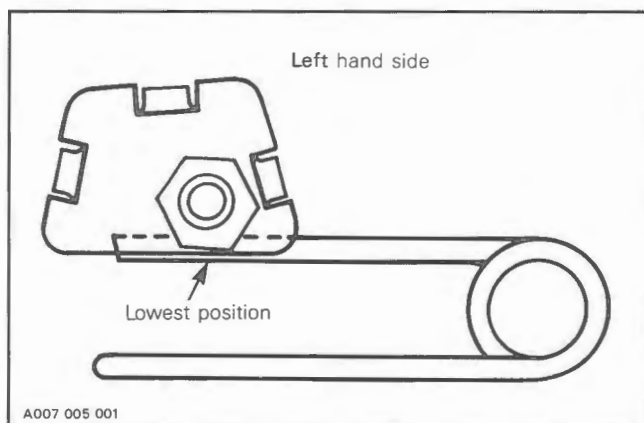
At assembly, position the adjustment cams at the lowest position.

Front adjustment cam

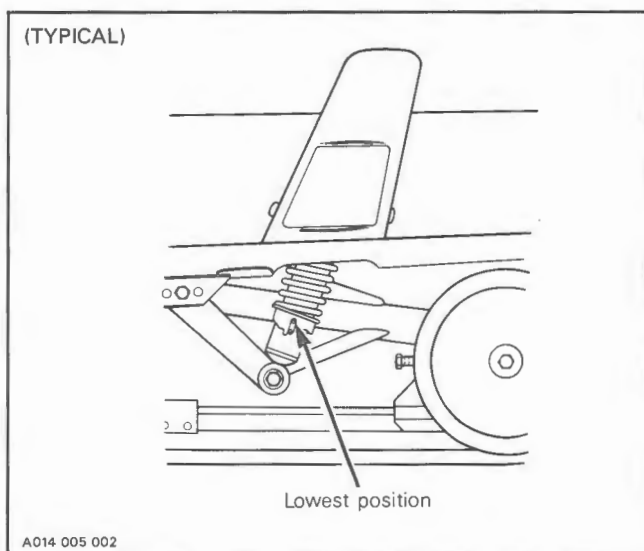


Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)



Rear adjustment ring

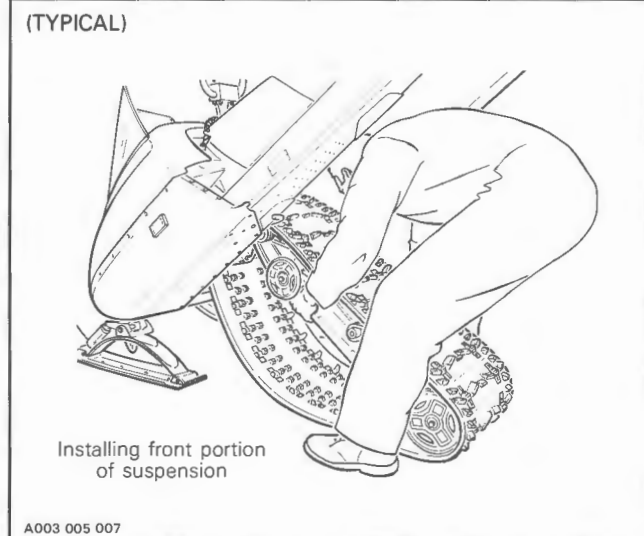


13, Rear idler wheel

Unscrew adjustment screws as far as possible to push the rear axle forward.

INSTALLATION

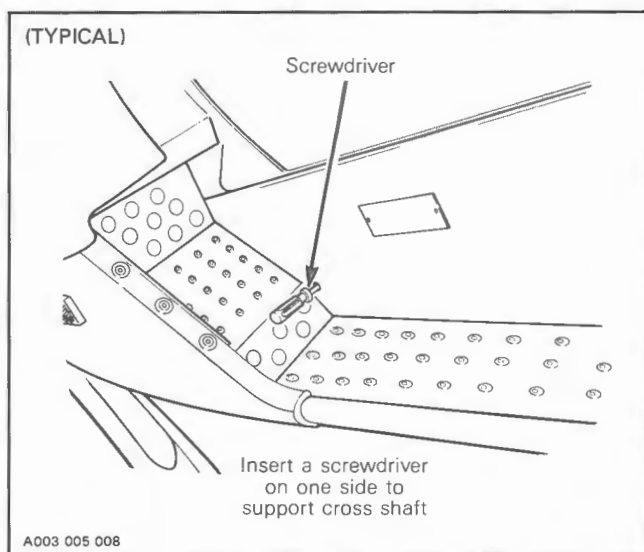
Lift rear of vehicle and install front portion of suspension into frame.



23,30,31, Screw, front arm & cross shaft

Insert a screwdriver into one side frame to support cross shaft while installing screw in hole on other side. Do not tighten yet.

Remove screwdriver and install cross shaft retaining screw.



16,18,19, Screw, rear arm & cross shaft

Lower the vehicle to install screws in rear cross shaft. Reposition vehicle on ground.

Remove chaincase and oil injection reservoir vent hole plugs.

Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

23, Screw

Torque four suspension retaining screws to 41 N•m (30 lbf•ft).

4,6,7,18, Screw, washer, shock absorber & rear arm

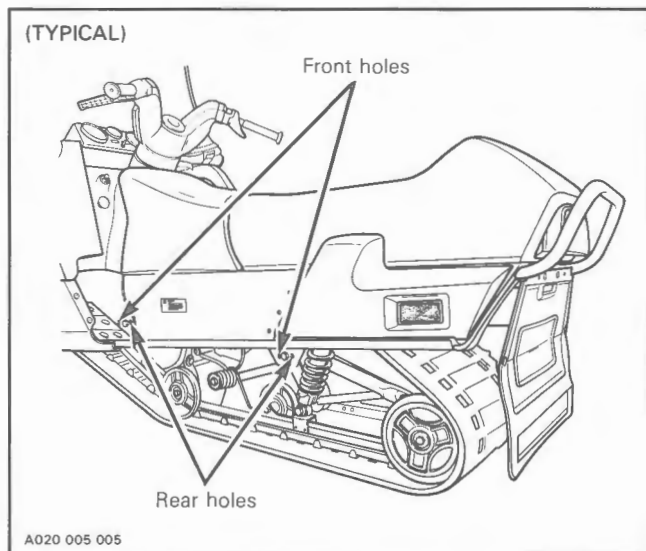
Secure shock absorbers to rear arm, torque screws to 61 N•m (45 lbf•ft).

48, Front spring

Make sure adjustment cams are at the lowest position.

○ **NOTE :** To adjust track tension and alignment, refer to section 05-10.

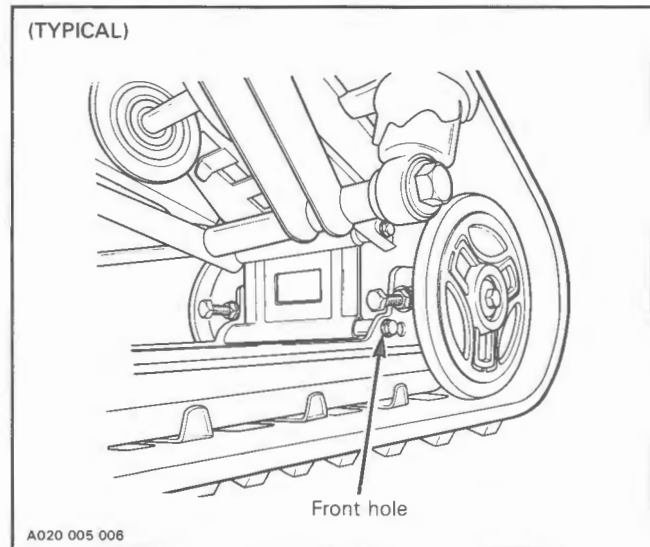
○ **NOTE :** Holes in the frame provide the possibility of relocating the suspension arms for additional track tension adjustment. If the slide suspension adjustment screws are at maximum adjustment and the suspension arms are in the front holes of the frame, it is possible to move the suspension arms to the rear holes and obtain additional track tension adjustment.



▼ **CAUTION :** Ensure that suspension arms are at the same position on each side of the frame at the front and at the rear, to avoid any damage to the suspension and the track.

27,39,65, Pivot arm, runner & Loctite 271

Ensure that the pivot arm is located in the front hole of the runner.

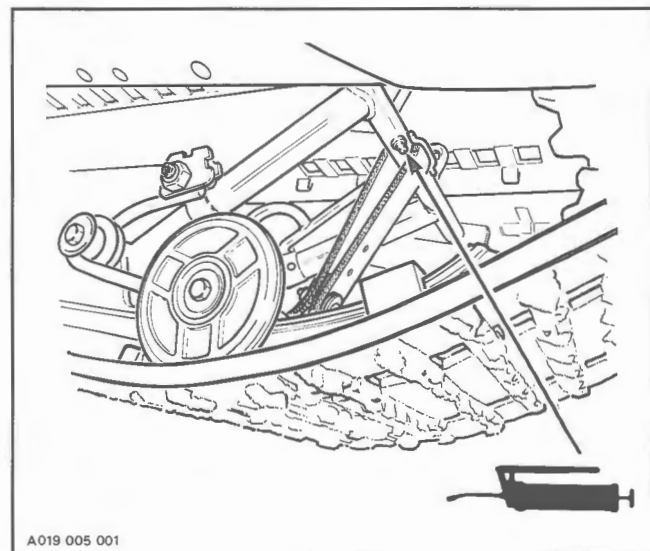


17, Grease fitting

Lubricate front and rear arms through grease fittings until grease appears at joints. Use low temperature grease only (P/N 413 7061 00).

Front section

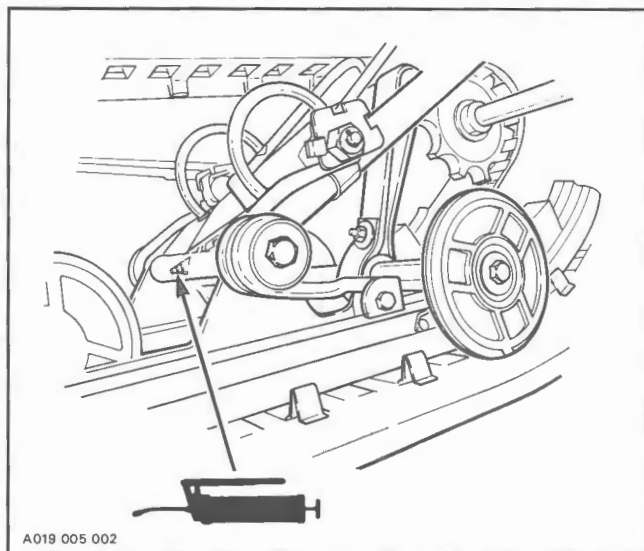
Upper cross shaft grease fitting location.



Section 05 SUSPENSION

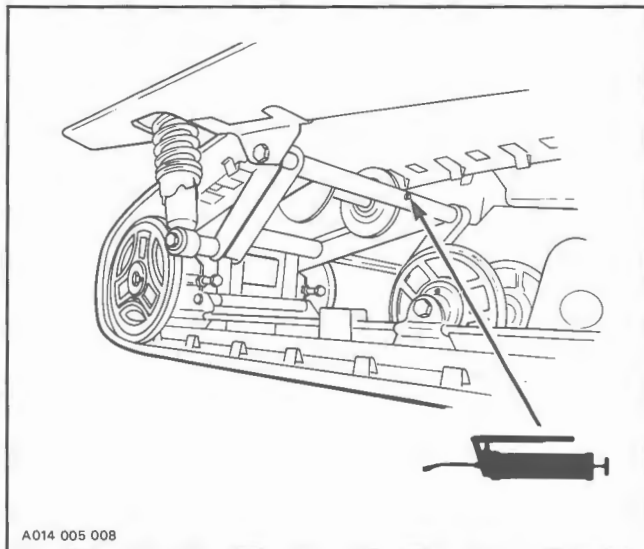
Sub-section 04 (SP SUSPENSION)

Lower cross shaft grease fitting location.



Rear section

Location of grease fitting on the rear arm.



2,7, Spring & shock absorber

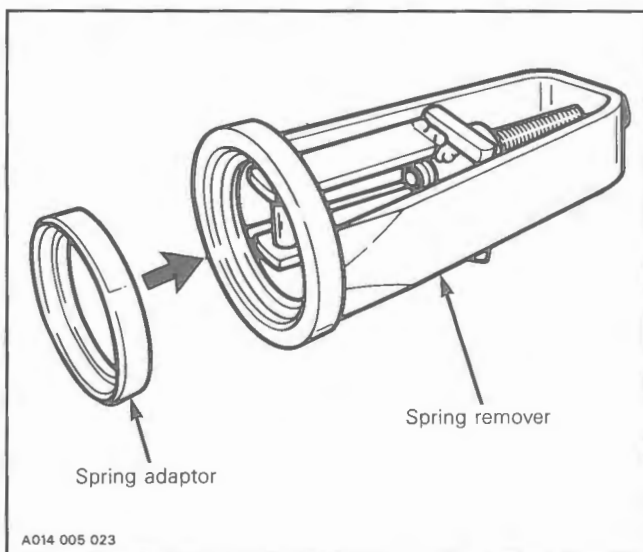
To replace a shock absorber or shock absorber spring proceed as follows :

- Lift rear of vehicle just enough to relieve spring tension.
- Remove the two screws holding shock cover and remove shock cover.
- Remove shock absorber bolts, noting the position of shock absorber washers.

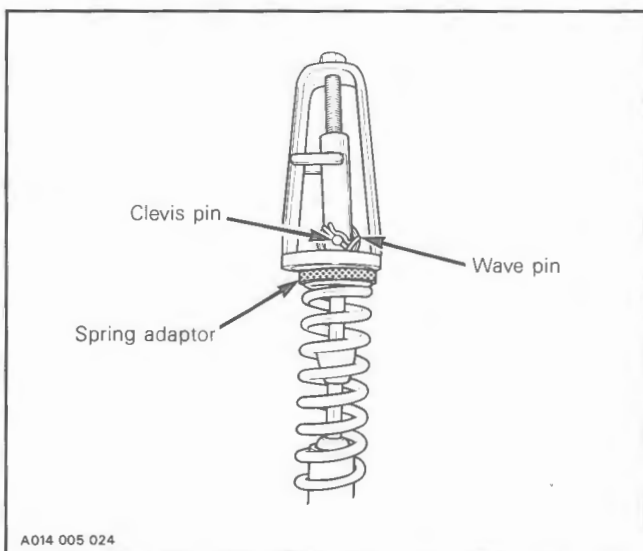
- Remove shock absorber assembly from vehicle.
- Secure shock absorber assembly upright in a vise using lower shock eye as clamping point.

▼ **CAUTION :** Do not clamp directly on shock body.

- Insert spring adaptor (P/N 529 0057 00) in the bottom of spring remover (P/N 414 5796 00) as shown.



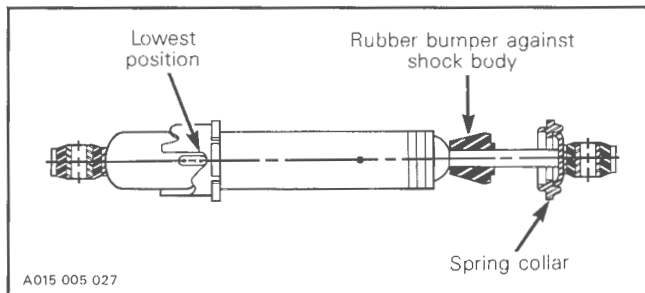
- Install spring remover and adaptor over spring and insert clevis pin through shock eye. Secure with wave pin as shown.



- Before compressing shock spring, push rubber bumper against shock body and set adjuster ring to the lowest position as shown.

Section 05 SUSPENSION

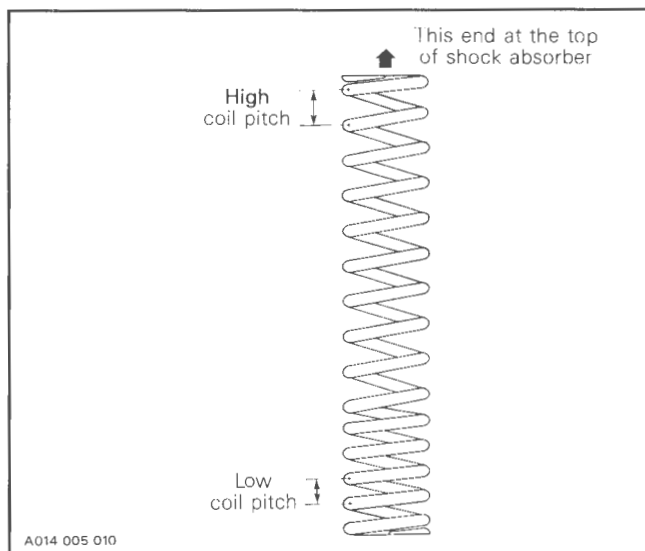
Sub-section 04 (SP SUSPENSION)



- Tighten spring remover screw until the spring collar can be removed.
- Unscrew spring remover screw until shock spring pressure is fully released and remove spring.
- Installation is the reverse procedure.

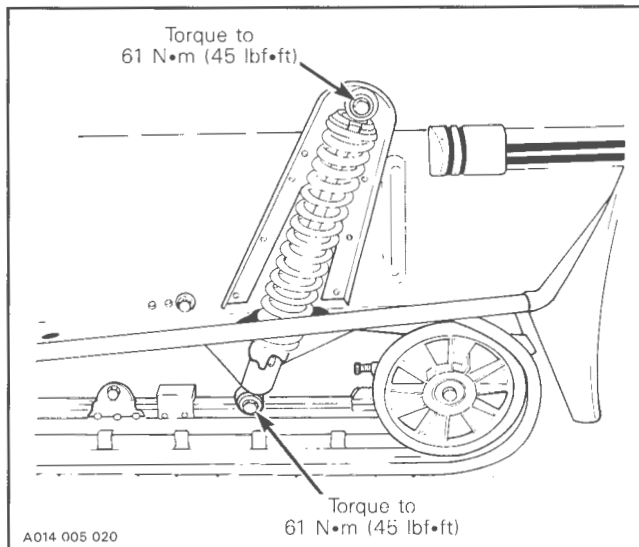
○ **NOTE** : Always set adjuster ring to the lowest position when dissassembling or assembling shock spring.

○ **NOTE** : The standard springs have a different coil pitch at each end. Position the **higher** coil pitch at the **top** of the shock absorber.

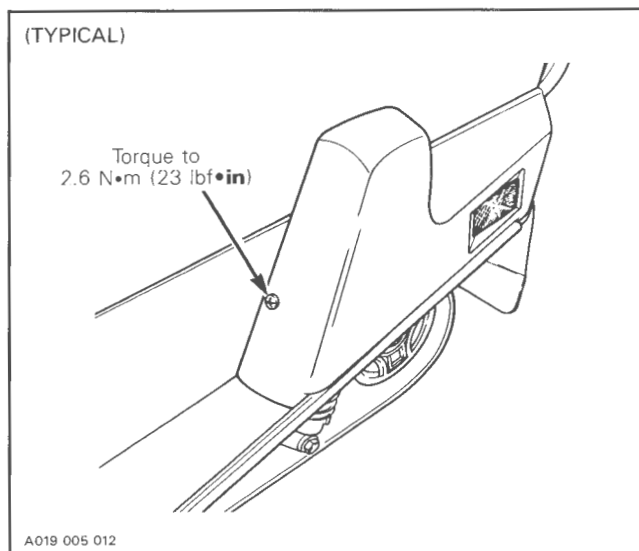


INSTALLATION

Install the shock assembly on vehicle and torque retaining bolts to 61 N•m (45 lbf•ft).



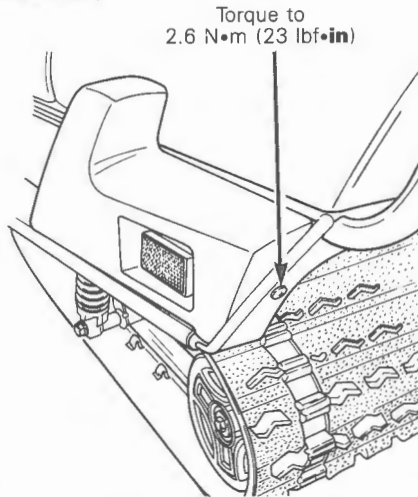
Install shock cover and torque retaining screws to 2.6 N•m (23 lbf•in).



Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

(EXCEPT FOR SAGA)



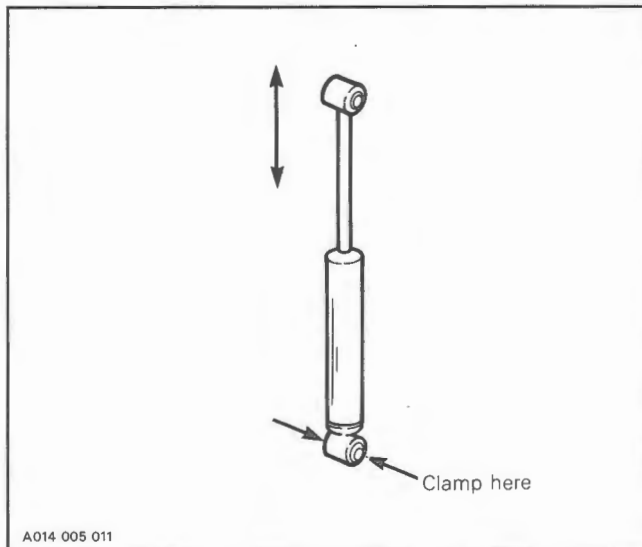
A019 005 013

NOTE : To adjust track tension and alignment, refer to section 05-10.

SHOCK ABSORBER SERVICING

The shocks may be checked as follows :

- Secure the proper shock end in a vise using the shock eye as a clamping point.



A014 005 011

CAUTION : Do not clamp directly on shock body.

- Compress and extend each shock by hand at various speeds and compare the resistance of one shock to the other.

NOTE : Obtain a known good shock for comparison purposes and keep in mind that the rebound resistance (extending the shock) is normally stronger than the compression resistance.

Pay attention to the following conditions that will denote a defective shock :

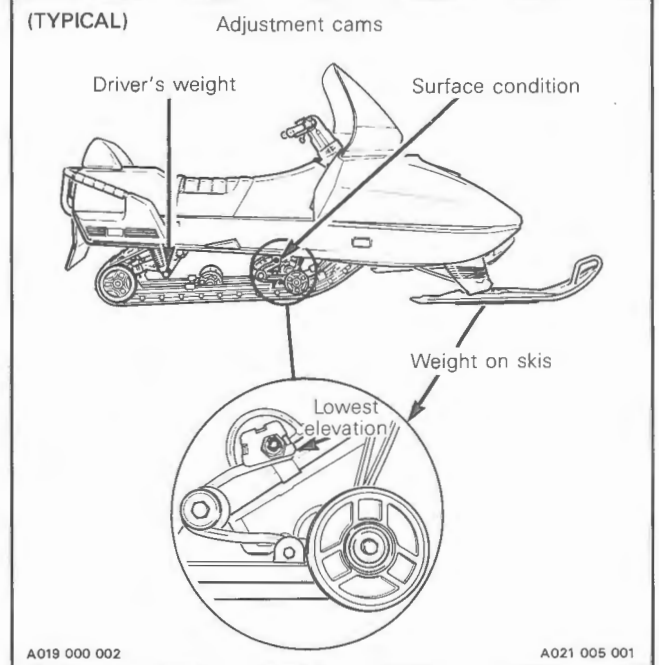
- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding, except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any of the above faults are found.

RIDE ADJUSTMENT

34, Front adjustment cam

The front adjustment cams are used for snow condition, and the rear for driver's weight. The front adjustment cams should be positioned at the highest elevation for deep snow conditions. A lower elevation is preferred when negotiating icy snow.



A019 000 002

A021 005 001

CAUTION : Always turn left side adjustment cams, in a clockwise direction and right side cams in a counterclockwise direction. Left and right adjustment cams at the front and at the rear must always be set at the same position.

Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

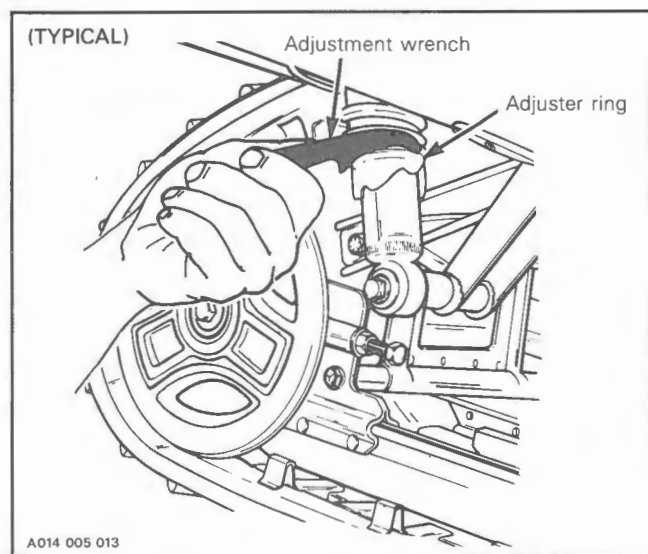
3, Rear adjuster ring

The rear adjuster ring should be adjusted to rider preference. The rear suspension may be adjusted by turning the shock absorber adjuster ring using the adjustment wrench.

Position the adjuster rings according to the following chart :

| RING POSITION | DRIVER'S WEIGHT Kg (lb) | |
|---------------|----------------------------|----------|
| | FROM | UP TO |
| Lowest | — | 68 (150) |
| Middle | 68 (150) | 82 (180) |
| Highest | 82 (180) | — |

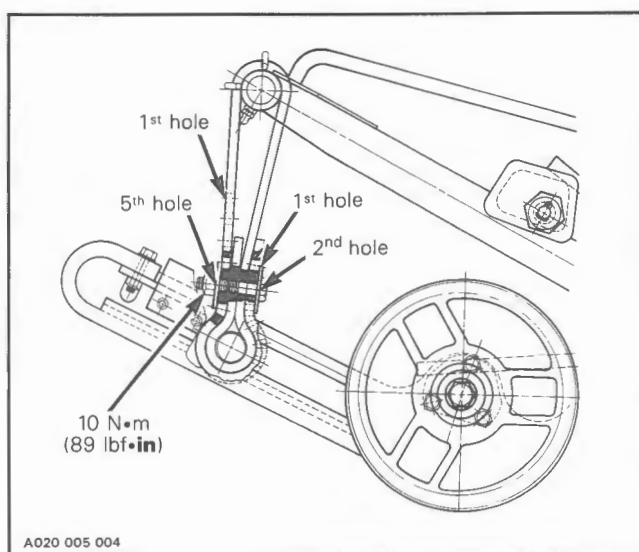
CAUTION : Left and right adjuster rings must always be set at the same position.



54, Stopper strap

The function of the suspension stopper strap is to control the transfer of vehicle weight **during acceleration**. The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the less the weight will be transferred to the track, thus obtaining a more positive steering. Adjusting holes on the stopper strap allow adjustment according to drivers' requirements, field and/or snow conditions.

For normal use locate bolt through 2nd holes and 5th hole as shown.



WARNING : Always torque the nut to 10 N•m (89 lbf•in).

Section 05 SUSPENSION

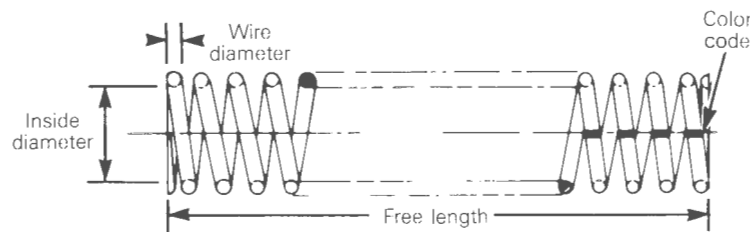
Sub-section 04 (SP SUSPENSION)

SPECIFICATIONS

Shock absorber springs

| PART NUMBER | COMPRES. STRENGTH | STANDARD ON | NUMBER OF COILS | FREE LENGTH ± 3 mm (.12'') | SPRING RATE ± 0.7 N/mm (41 lbf/in) | INSIDE DIAMETER | WIRE DIAMETER ± 0.05 mm (.002'') | COMPRES. LENGTH | COLOR CODE |
|-------------|---|-----------------------------------|-----------------|-------------------------------|--|---------------------|--|----------------------|----------------|
| 503 0694 00 | <div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 5px;">Soft</div> <div style="font-size: 2em; margin: 0 10px;">↓</div> <div style="margin-left: 5px;">Hard</div> </div> | — | 15.6 | 289 mm (11.39'') | 19.25 / 28.0 N/mm (110 / 160 lbf/in) | 38.4 mm (1.51'') | 7.14 mm (.281'') | 107.1 mm (4.22'') | Green / yellow |
| 503 1009 00 | | Safari Saga Safari Voyageur | 15.2 | 288 mm (11.34'') | 21.9 / 31.5 N/mm (125 / 180 lbf/in) | 38.1 mm (1.50'') | 7.14 mm (.281'') | 108.5 mm (4.27'') | Yellow / red |
| 503 1008 00 | | Safari Escapade | 20.5 | 292 mm (11.50'') | 21.9 / 36.8 N/mm (125 / 210 lbf/in) | 38.1 mm (1.50'') | 7.9 mm (.311'') | 167 mm (6.38'') | Blue / blue |
| 503 0988 00 | | — | 19.5 | 286.3 mm (11.27'') | 21.0 / 47.3 N/mm (120 / 270 lbf/in) | 38.1 mm (1.50'') | 7.9 mm (.311'') | 154 mm (6.06'') | Orange / blue |

Spring description

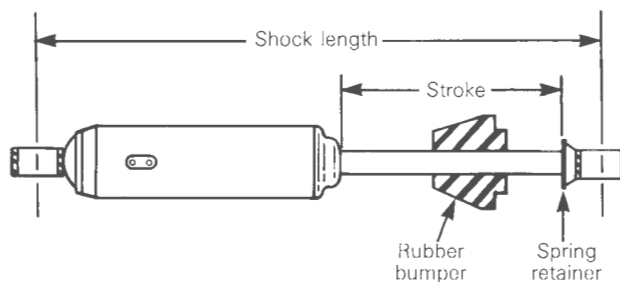


A014 005 014

Shock absorbers

| PART NUMBER | FULL STROKE | LENGTH COLLAPSED | | LENGTH (EXTENDED) |
|-------------|--------------------|--------------------|----------------------------|-----------------------|
| | | AT BUMPER CONTACT | AT SPRING RETAINER CONTACT | |
| 414 5999 00 | 119 mm (4.69'') | 248 mm (9.76'') | 225 mm (8.86'') | 344.4 mm (13.56'') |

Shock description

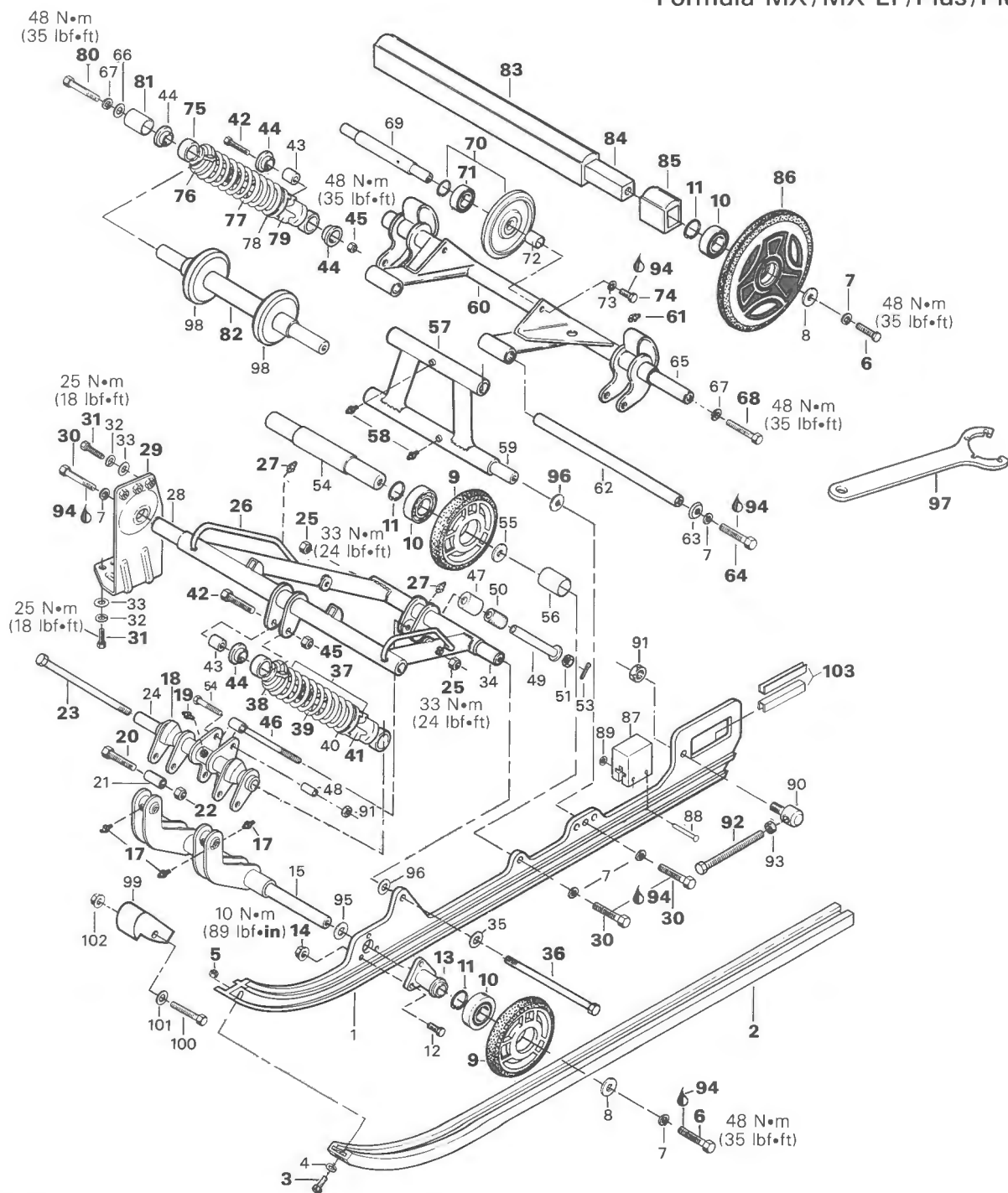


A015 005 048

PRS SUSPENSION

REAR PRS SUSPENSION*

Formula MX/MX LT/Plus/Plus LT



Section 05 SUSPENSION


Sub-section 05 (PRS SUSPENSION)

- | | |
|---|--|
| 1. Runner (2) | 52. Bolt M10 x 45 |
| 2. Slider shoe (2) | 53. Cotter pin |
| 3. Hexagonal head cap screw M6 x 20 (2) | 54. Center axle |
| 4. Flat washer (2) | 55. Washer (2) |
| 5. Hexagonal elastic stop nut M6 (2) | 56. Spacer (2) |
| 6. Hexagonal head cap screw (4) | 57. Rear shackle |
| 7. Spring lock washer 10 mm (12) | 58. Grease fitting (2) |
| 8. Washer (4) | 59. Rear shackle lower axle |
| 9. Idler wheel (4) | 60. Rear arm |
| 10. Ball bearing 6205 (6) | 61. Grease fitting |
| 11. Retaining ring (6) | 62. Rear shackle upper axle |
| 12. Hexagonal head cap screw M6 x 20 (6) | 63. Cup (2) |
| 13. Housing (2) | 64. Hexagonal head cap screw M10 x 25 (2) |
| 14. Hexagonal flanged elastic stop nut M6 (6) | 65. Cross pivot |
| 15. Front axle | 66. Flat washer 10.5 mm (4) |
| 16. Front shackle | 67. Spring lock washer 10 mm (4) |
| 17. Grease fitting (3) | 68. Hexagonal head cap screw M10 x 35 (2) |
| 18. Front swing arm | 69. Axle |
| 19. Grease fitting | 70. Idler wheel and circlip (2) |
| 20. Hexagonal head cap screw M8 x 55 (2) | 71. Ball bearing (2) |
| 21. Spacer (2) | 72. Spacer (2) |
| 22. Hexagonal elastic stop nut M8 (2) | 73. Lock washer 8 mm (2) |
| 23. Long welded screw | 74. Hexagonal head cap screw M8 x 25 (2) |
| 24. Front swing arm axle | 75. Rear shock body (2) |
| 25. Hexagonal elastic stop nut M10 (2) | 76. Spring stopper (2) |
| 26. Front arm | 77. Rear shock spring (2) |
| 27. Grease fitting (2) | 78. Thrust washer (4) |
| 28. Front arm upper axle | 79. Adjuster ring (2) |
| 29. R.H. retainer plate | 80. Hexagonal head cap screw M10 x 25 (2) |
| L.H. retainer plate | 81. Spacer (2) |
| 30. Hexagonal head cap screw M10 x 35 (6) | 82. Rear shock pivot |
| 31. Hexagonal head cap screw M8 x 16 (4) | 83. Inner spacer |
| 32. Spring lock washer M8 (4) | 84. Rear axle |
| 33. Flat washer 8.4 mm (4) | 85. Outer spacer (2) |
| 34. Front arm lower axle | 86. Idler wheel (2) |
| 35. Flat washer 10.5 mm | 87. Rubber stopper (2) |
| 36. Short welded screw | 88. Rivet (4) |
| 37. Center shock body | 89. Push nut (4) |
| 38. Spring stopper | 90. Tensioner stopper (2) |
| 39. Shock spring | 91. Hexagonal elastic stop nut M10 (3) |
| 40. Thrust washer (2) | 92. Hexagonal adjustment screw M10 x 85 (2) |
| 41. Adjuster ring | 93. Hexagonal nut M10 (2) |
| 42. Hexagonal head bolt M10 x 45 (4) | 94. Loctite 271 (red, high strength) |
| 43. Spacer (4) | 95. Washer (2) |
| 44. Bushing (12) | 96. Washer (2) |
| 45. Hexagonal elastic stop nut M10 (4) | 97. Adjustment key |
| 46. Limiter screw | 98. Protector (2) |
| 47. Cup | 99. Protector (2) |
| 48. Spacer | 100. Hexagonal cap screw M5 x 25 (2) |
| 49. Bushing | 101. Washer (2) |
| 50. Stopper | 102. Flanged hexagonal elastic stop nut M5 (2) |
| 51. Hexagonal elastic stop nut M12 | 103. Rear protector (2) |

 **NOTE :** Most components may be replaced without entirely removing suspension system such as :

- idler wheels
- shock absorbers
- runner & runner shoe
- rear arm

REMOVAL

 **NOTE :** To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

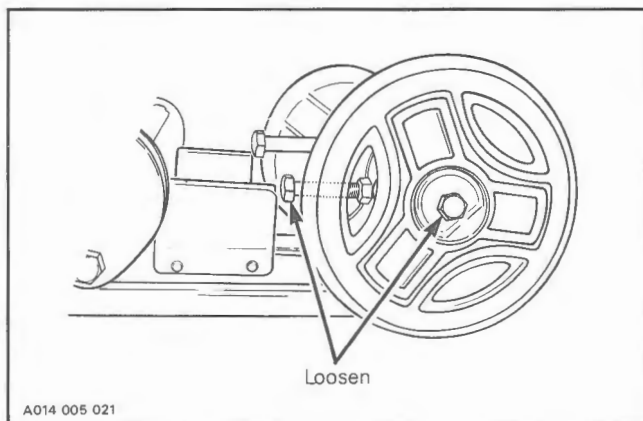
- - Loosen one screw then retighten.
- Remove the other screw.
- - Remove the first one.

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

6,92, Adjustment screw

Release track tension by loosening wheel retaining screws and adjustment screws on inner side of rear idler wheels.

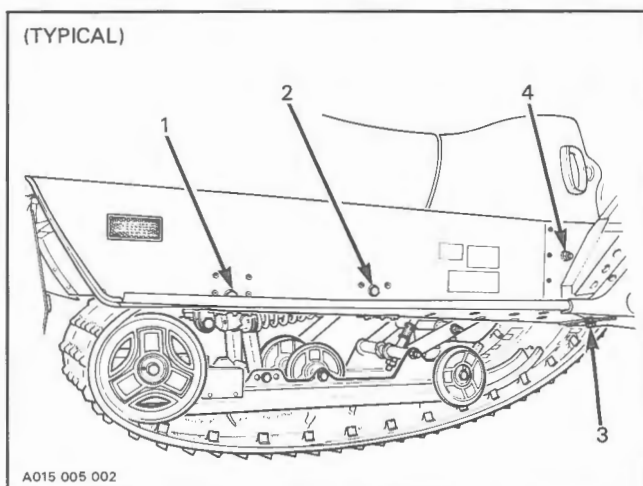


29,31,60,68,80,82, Screws, retainer plate, rear arm & rear shock pivot

— Plug vent holes in chaincase filler cap and oil injection reservoir cap with a wire to prevent leaks.

▼ **CAUTION :** Close fuel shut-off valve.

- Using the appropriate equipment, lift the rear of vehicle.
- Remove screws (4 on each side) following this sequence.



- Remove suspension system from vehicle.

DISASSEMBLY & ASSEMBLY

2,3,5, Slider shoe, screw & nut

To replace a worn slider shoe, remove the screw and nut. Slide the shoe rearward out of the runner.

▼ **CAUTION :** Slider shoes must always be replaced in pair.

37,42,44,45,46,51,53, Center shock, screw, bushing, nut, limiter screw, nut & cotter pin

To remove shock :

- Remove cotter pin **#53**, loosen nut **#51** from limiter screw **#46** until free-play is felt.
- Unscrew shock screws and nuts.
- Inspect shock nylon bushings **#44** condition.

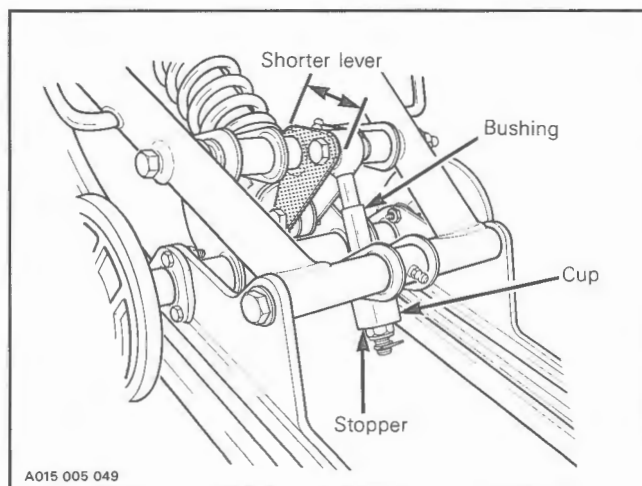
16,18,20,22,23,25,26,36,51, Front shackle, front swing arm, screw, nut & front arm

To remove :

- Unscrew screws **#20** and nuts **#22** from both shackles.
- Remove nut **#51** from limiter screw.
- Unscrew front swing arm nut **#25** then pull the bolt **#23** out.
- Unscrew front arm nut **#25** then pull the bolt **#36** out.

At assembly, reverse the procedure. However, pay attention to the following :

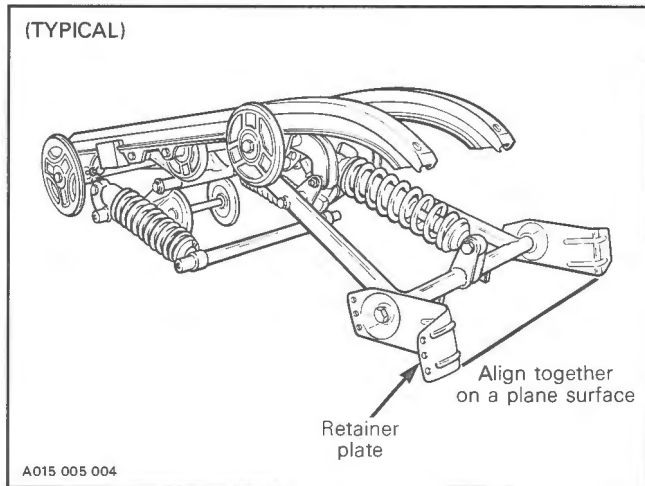
- Correctly position the longer bolt at the front arm pivot point and bolt into the shorter lever hole. Install cup, stopper and bushing as shown.



Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

- Position both retainer plates at the same angle to fit properly in the frame.



13,14, Housing & nut

Always torque nuts to 10 N•m (89 lbf•in).

6,9,10,11,30,70,71,74,86, Screw, idler wheel, bearing & snap ring

To remove a bearing from an idler wheel :

- Unscrew retaining screw.
- Pull the idler wheel outward using a puller or by striking with a piece of wood and a hammer.
- Remove the snap ring then the bearing.

At assembly reverse the procedure.

NOTE : To remove the front idler wheels cross shaft, the runner must be removed (the cross shaft is shouldered).

42,44,45,57,69,75,80,81, Bolt, bushing, nut, rear shackle, rear arm, rear shock & spacer

To remove rear shock :

- Withdraw spacer from shock pivot.
- Unscrew bolt and nut.
- Inspect shock nylon bushings #44 condition.

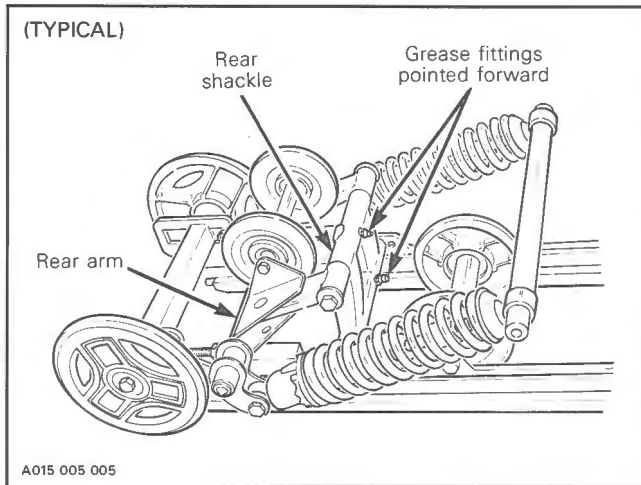
At assembly reverse the procedure.

If rear arm and/or rear shackle have been removed, make sure to reposition them properly :

- Position the grease fittings pointed forward on the rear shackle.

- See illustration to properly position the rear arm.

CAUTION : Make sure installing washer #96 each end of the rear shackle lower axle.



6,83,84,85,103, Screw, inner spacer, rear axle, outer spacer & rear protector

To remove :

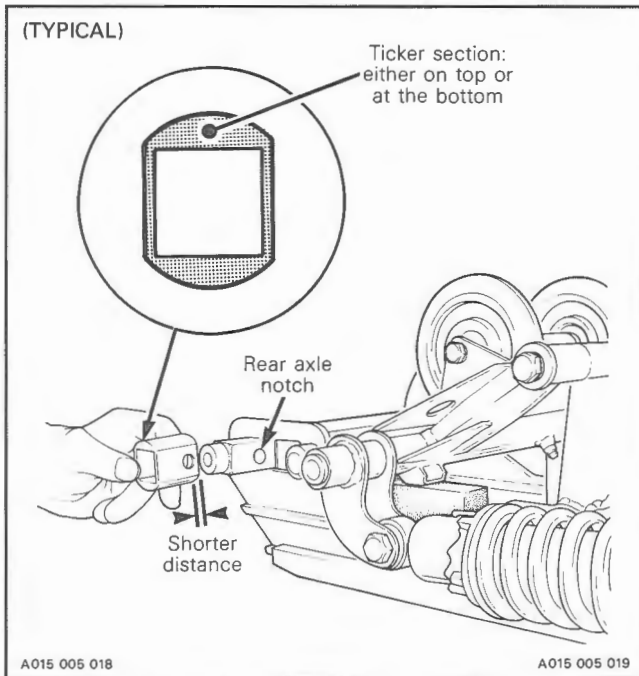
- Unscrew retaining screw.
- Pull idler wheel.
- Remove the runner to take the rear axle off.
- Remove rear protector and replace if worn.

At assembly, reverse the procedure. However pay attention to the following :

Section 05 SUSPENSION

Sub-section 05 (536 PRS SUSPENSION)

— Position inner and outer spacer as shown.



CAUTION : It is important to properly position the inner and outer spacers. Disregarding this notice might cause rear axle failure.

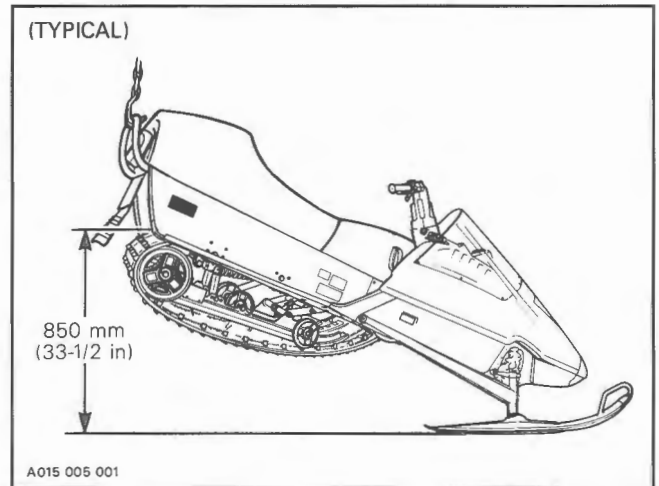
- Position notch on rear axle forward.
- Position hole in outer spacer forward and inward onto the rear axle.

6,30,64,68,74,80,94, Screw & Loctite 271

Clean all screw threads. Prior to assembly, apply low temperature grease (P/N 413 7061 00) on cross shafts and Loctite 271 or equivalent on threads.

INSTALLATION

- Lift the rear of vehicle off the ground about 850 mm (33-1/2 in).



46,51, Limiter screw & nut

The function of the suspension limiter screw is to control the transfer of vehicle weight **during acceleration**. The closer the nut is to the cotter pin, the more the weight will be transferred to the track to provide better traction.

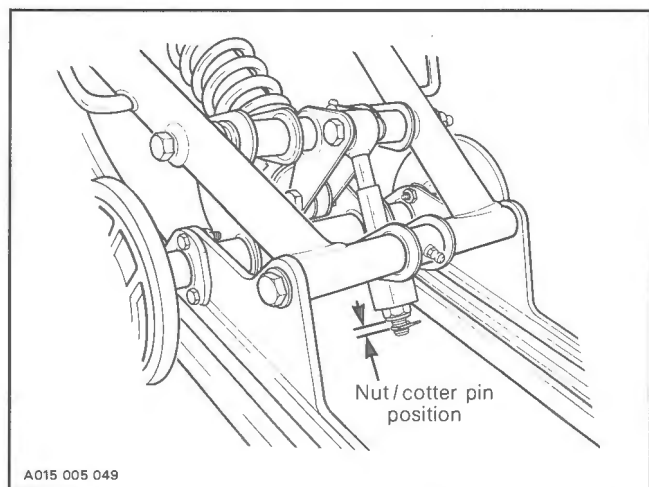
The farther the nut is from the cotter pin, the less weight will be transferred to the track, maintaining a more positive steering. Limiter screw allows weight transfer adjustment according to driver's requirement, field and/or snow conditions.

The following table is a general guideline only :

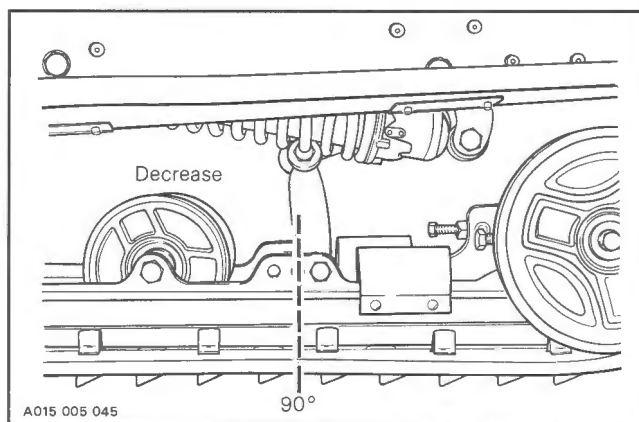
| SNOW CONDITION | NUT/COTTER PIN POSITION |
|-------------------|----------------------------|
| Hill climbing | Close |
| Hard surface | Far |

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)



With rear shackle set in rear hole of rail : decrease suspension rate leading to a smoother suspension.

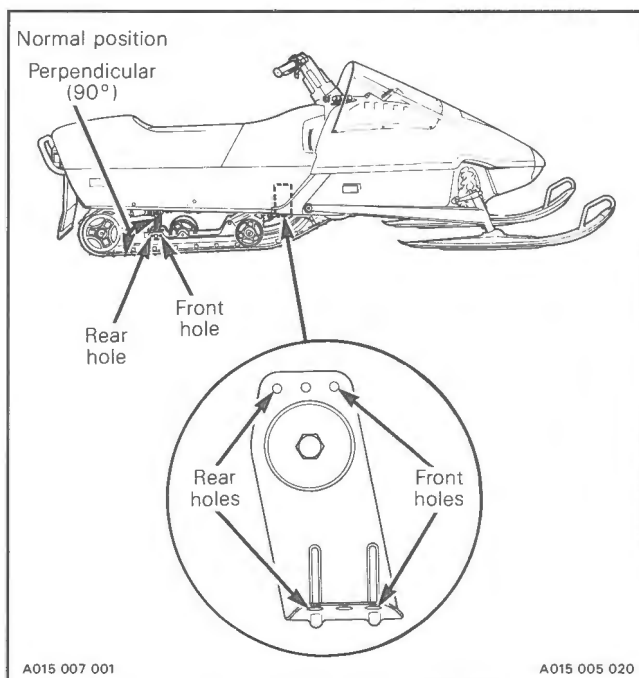
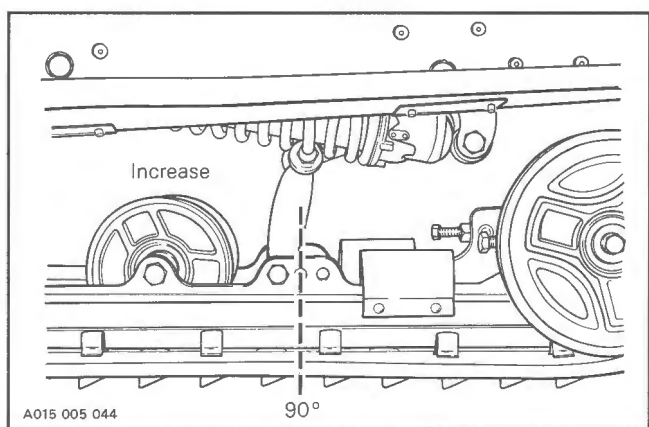


84, Rear axle

- Unscrew track tension adjustment screws allowing the rear axle to be placed in its most forward position.
- The retainer plate has 3 holes on the side and 3 other underneath to secure to the frame.
- There are 3 holes to secure rear shackle to runner.

Usually the suspension is secured on the vehicle at the center hole (rear shackle & retainer plate). Select the proper hole to compensate track length variation or to influence the suspension rate as follows :

With rear shackle set in front hole of rail : increase suspension rate leading to a harder suspension.



To move suspension backward : Secure screws into **front** holes of the retainer plate (on side & underneath) and **front** hole of the runner. To move forward ; move them into rear holes.

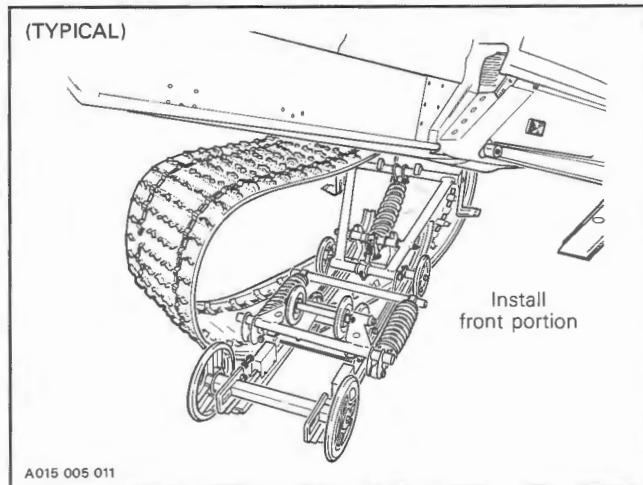
CAUTION : Make sure the retainer plate is secured at the same position on side and underneath retainer plate holes, also on each side of the frame. In addition, rear shackle must be at the same position on each side of the runner.

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

INSTALLATION INTO FRAME

- Enter the front portion of the suspension into front portion of track, raise it to its highest position under drive axle.



- Slide the rear portion of suspension into rear portion of track.

29,31, Retainer plate & screw

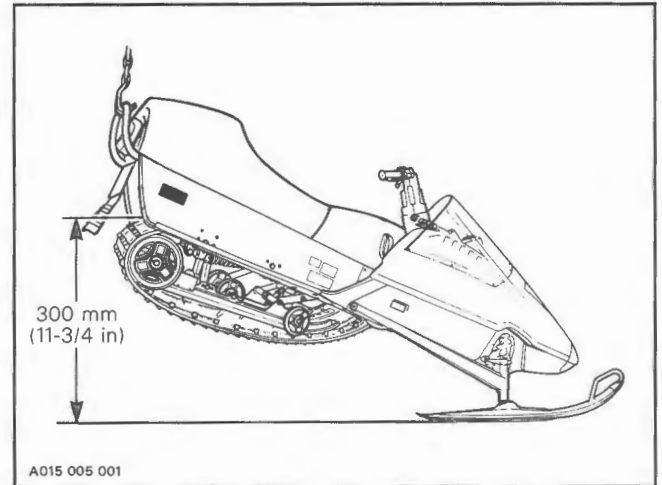
Refer to the illustration to see screw installation sequence. Raise front arm and align retainer plate holes with ones in frame. Install screws and washers, do not tighten.

80,81,82, Screw, spacer & rear shock pivot

Install a spacer at each end of the shock pivot then lower the vehicle just enough to align the shock pivot with holes in frame. Install the shorter screws (M10 x 25 mm) and washers. Do not tighten.

60,68, Rear arm & screw

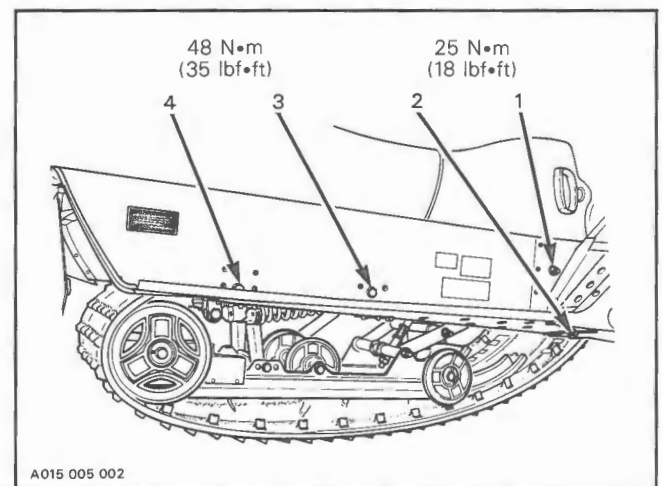
Lower the rear of vehicle to approximately 300 mm (11-3/4 in) allowing the rear arm to swing into the frame and aligning holes. Install screws and washers.



Torque screws to these values (see illustration).

| SCREW LOCATION | DESCRIPTION | TORQUE TO |
|--------------------------------------|-------------|--------------------|
| Retainer plate (side and underneath) | M8 x 25 mm | 25 N•m (18 lbf•ft) |
| Shock pivot | M10 x 25 mm | 48 N•m (35 lbf•ft) |
| Rear arm | M10 x 35 mm | 48 N•m (35 lbf•ft) |

Suspension system installation sequence :



Section 05 SUSPENSION

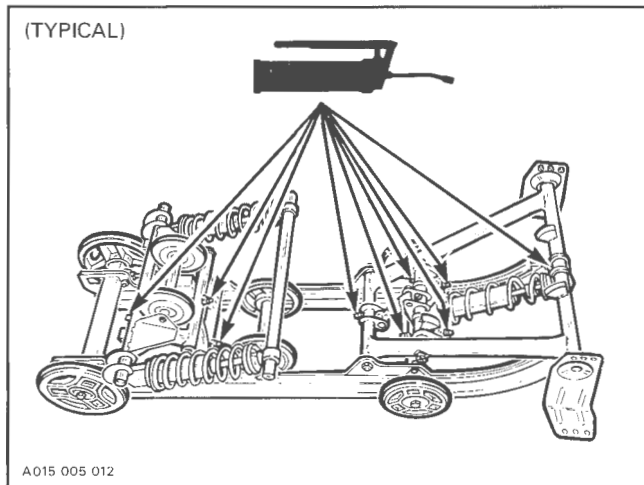
Sub-section 05 (536 PRS SUSPENSION)

17,19,27,58,61, Grease fitting

Lubricate until grease appears at joint using low temperature grease (P/N 413 7061 00) :

- Front arm : upper and lower axle.
- Front swing arm : upper and lower axle.
- Front shackles.
- Rear arm : upper and lower axle.
- Rear shackle.

○ **NOTE** : There are 9 lubrication points.



○ **NOTE** : To adjust the track tension and alignment, refer to section 05-10.

6,84, Screw & rear axle

After track adjustment, torque rear axle screws to 48 N•m (35 lbf•ft).

Reposition vehicle on ground.

Remove chaincase and oil injection reservoir vent hole wires.

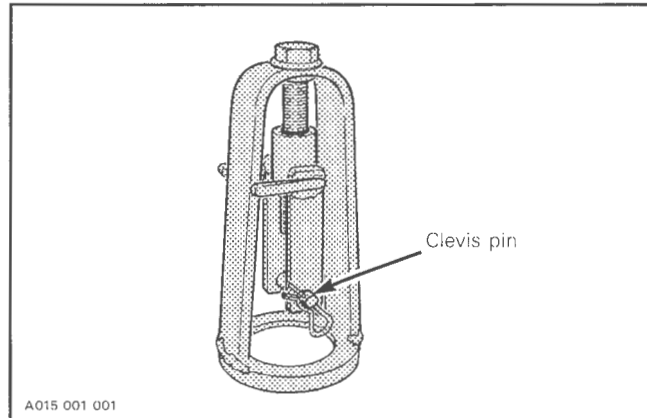
Open fuel shut-off valve.

SHOCK ABSORBER SPRING REPLACEMENT

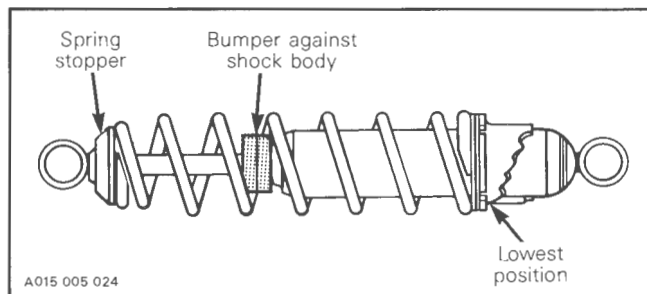
◆ **WARNING** : Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

38,39,76,77, Spring stopper & spring

Use spring compressor (P/N 414 5796 00).



○ **NOTE** : Before attempting to compress the shock spring, push the rubber bumper on the piston shaft against the shock body and place the adjuster ring at its lowest position.



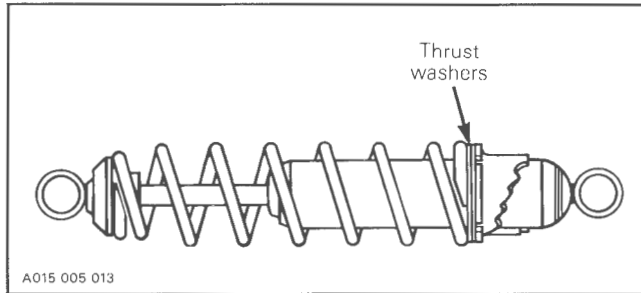
Install the shock spring remover over the spring. Insert clevis pin through the shock eye and secure it with the hair pin.

Tighten the bolt until the spring stopper can be removed.

○ **NOTE** : When reinstalling a spring, make sure both thrust washers are between the spring and the adjuster ring. They are required to ease cam twisting. Apply a light coat of grease between them. Place the adjuster ring at its lowest position.

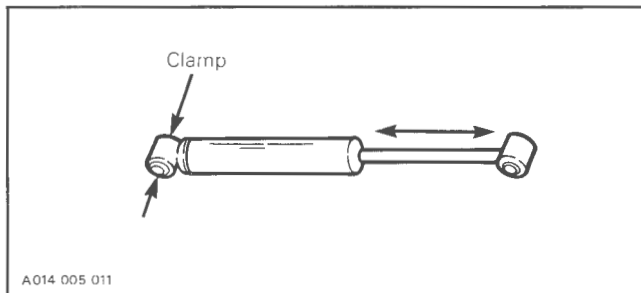
Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)



SHOCK ABSORBER SERVICING

Secure the shock body end in a vise.



▼ **CAUTION :** Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke checking that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a faulty shock :

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

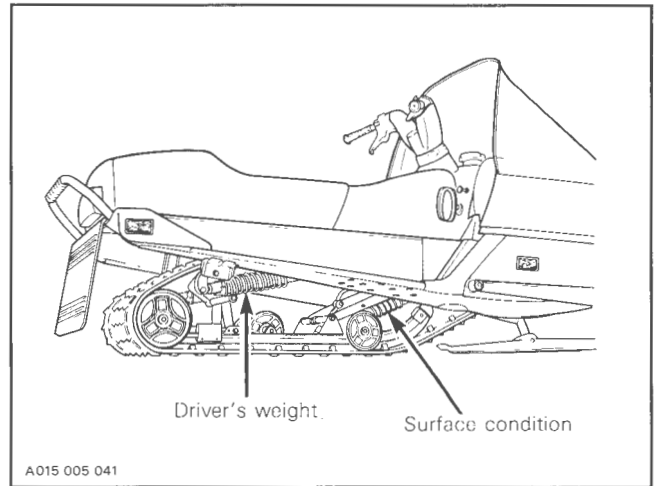
Renew if any fault is present.

REAR SUSPENSION ADJUSTMENT

41,79, Adjuster ring

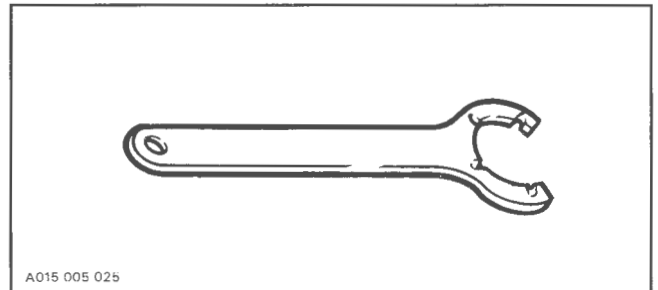
The rear suspension has 2 preload adjustments :

- The front shock spring for surface condition.
- The rear shock springs (twin shocks) for driver's weight.



The shock absorber preload is adjusted by turning the adjuster ring.

97, Adjustment key



Use adjustment key to adjust shock spring preload.

Spray some WD 40 between spring and adjuster ring.

▼ **CAUTION :** There must be two thrust washers between spring and adjuster ring. If missing, install thrust washers (P/N 503 0887 00) before attempting to adjust.

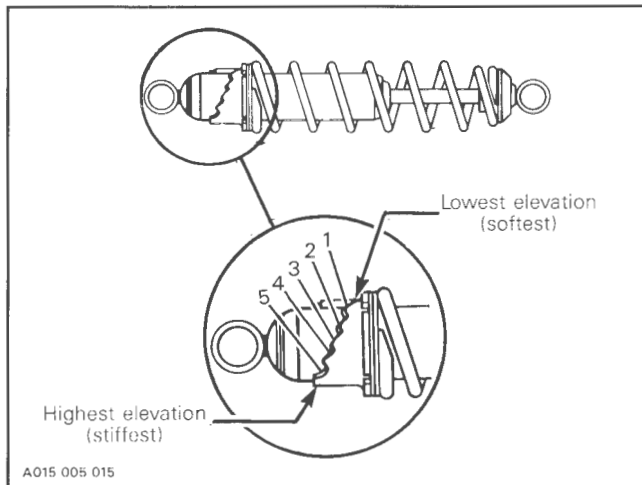
The front shock of the rear suspension should be removed for adjustment.

Each shock absorber has a 5 position ring located at the bottom of the shock. Spring preload may be increased or decreased by turning the ring.

Fit the key on the shock adjuster ring and turn clockwise for stiffest or counterclockwise for softest.

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)



Front shock absorber spring

When the front spring ring is at the lowest elevation more weight is distributed on the skis.

At the highest position the weight is transferred from the skis to the track.

Depending on the snow condition these positions are recommended :

| SNOW CONDITION | CAM POSITION |
|----------------------------|--------------|
| Deep snow or hill climbing | 1-2-3 |
| Hard surface | 4-5 |

Rear shock absorber springs

| Driver's weight kg (lb) | | Cam position |
|-------------------------|----------|--------------|
| FROM | UP TO | |
| — | 64 (140) | 1 |
| 69 (140) | 73 (160) | 2 |
| 73 (160) | 82 (180) | 3 |
| 82 (180) | — | 4-5 |

CAUTION : Left and right adjuster ring must always be set at the same position.

NOTE : Shock absorber springs with different stiffness are available. See shock absorber spring table.

The choice of a different cam position on rear springs and spring itself depends on operator's weight, riding speed and terrain conditions.

With rider sitting on the vehicle, the suspension should collapse by 38 mm (1-1/2 in). Adjust as necessary.

| Operator's weight | Riding speed | Field condition | Spring rate | Cam position |
|-------------------|--------------|-----------------|----------------------|-----------------------|
| Light | Low | Flat | 28 N/mm (160 lbf/in) | 1 2 3 4 5 |
| Heavy | High | Bumpy | 35 N/mm (200 lbf/in) | 1 2 3 4 5 |

A slight bottoming of the suspension during severe riding conditions indicates a good choice of spring rate and preload.

46, Limiter screw

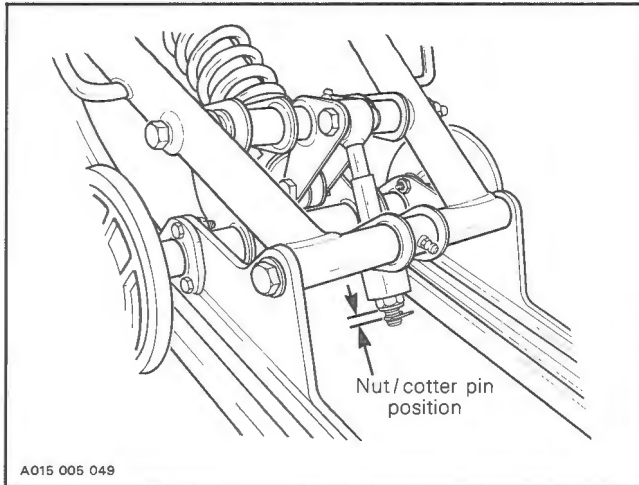
The function of the suspension limiter screw is to control the transfer of vehicle weight **during acceleration**. The closer the nut is to cotter pin, the more the weight will be transferred to the track to provide better traction. The farther the nut is from the cotter pin, the less weight will be transferred to the track, maintaining a more positive steering. Limiter screw allows weight transfer adjustment according to driver's requirement, field and/or snow conditions.

The following table is general guideline only :

| SNOW CONDITION | NUT/COTTER PIN POSITION |
|----------------|-------------------------|
| Hill climbing | Close |
| Hard surface | Far |

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)



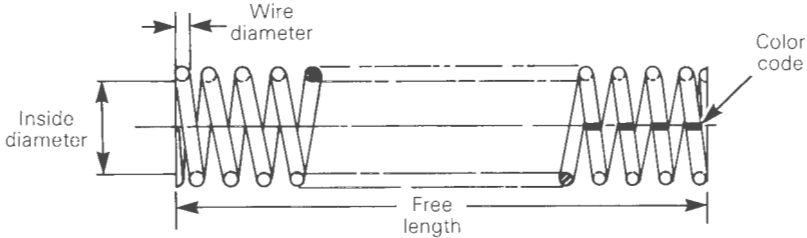
▼ **CAUTION :** Optional parts are calibrated to operate together. Failure to follow this recommendation may affect handling of the vehicle.

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

SPECIFICATIONS

Shock absorber spring specifications*

| Location | Front (standard) | Front (optional) | Rear (standard) | Rear (optional) |
|--|--|---------------------------|---------------------------|---------------------------|
| Part number | 414 5591 00 | 503 0904 00 | 503 0903 00 | 503 0804 00 |
| Number of coils | 12.6 | 15 | 15.6 | 15.3 |
| Free length $\pm 3 \text{ mm } (\pm .12'')$ | 241.3 mm (9.50'') | 241.3 mm (9.50'') | 247.6 mm (9.75'') | 241.3 mm (9.50'') |
| Spring rate $\pm 1.8 \text{ N/mm } (\pm 10 \text{ lbf/in})$ | 45.5 N/mm (260 lbf/in) | 24.5 N/mm (140 lbf/in) | 28.0 N/mm (160 lbf/in) | 35.0 N/mm (200 lbf/in) |
| Inside diameter (big end) | $46.7 \begin{smallmatrix} + 0.8 \\ - 0 \end{smallmatrix} \text{ mm}$ $(1.84 \begin{smallmatrix} + .03'' \\ - 0 \end{smallmatrix})$ | | | |
| Wire diameter $\pm 0.05 \text{ mm } (\pm .002'')$ | 9.19 mm (.362'') | 8.25 mm (.325'') | 8.71 mm (.343'') | 9.19 mm (.362'') |
| Compressed length | 116.4 mm (4.58'') | 124.5 mm (4.90'') | 136.7 mm (5.38'') | 141.4 mm (5.57'') |
| Color code | Blue-blue | Orange-orange | Yellow-yellow | Green-green |
| Spring description |  <p>The diagram illustrates a coiled spring with various dimensions and labels. 'Wire diameter' is indicated by a horizontal arrow pointing to the thickness of the wire. 'Inside diameter' is shown with a vertical double-headed arrow across the center of the coils. 'Free length' is marked with a horizontal double-headed arrow along the bottom of the spring. 'Color code' is labeled with an arrow pointing to a colored band on the spring. The part number 'A014 005 014' is printed at the bottom left of the diagram area.</p> | | | |

* For front shock springs specifications, refer to section 06-02.



NOTE : Lower rate springs will result in a smoother ride at moderate speeds or with lighter riders.

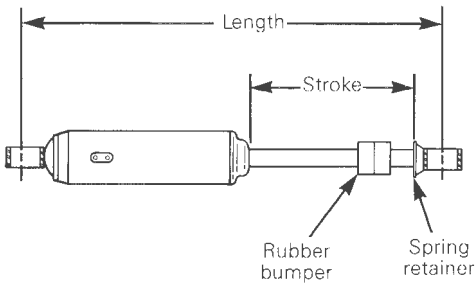


CAUTION : High speed riding with lower spring rate may affect handling and allow suspension to bottom out.

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

Shock absorber specifications*

| Location | | Front | Rear |
|----------------------------|----------------------------|---|----------------------|
| Part number | | 414 5570 00 | 414 5356 00 |
| Full stroke | | 91.4 mm (3.60'') | 113.4 mm (4.46'') |
| Length collapsed | At bumper contact | 248 mm (9.76'') | 238 mm (9.37'') |
| | At spring retainer contact | 222.6 mm (8.76'') | 212.6 mm (8.37'') |
| Length extended | | 314 mm (12.36'') | 326 mm (12.83'') |
| Shock absorber description | |  <p style="text-align: center;">A015 005 017</p> | |

*For front shock absorber specifications, refer to section 06-02.

CAUTION : The front shock is different from the rear ones and must not be interchanged. Make sure they are properly positioned. Refer to the length, the rear one is longer (about 12 mm (15/32 in) when fully extended. Also note that the part number for each shock is stamped on shock body.

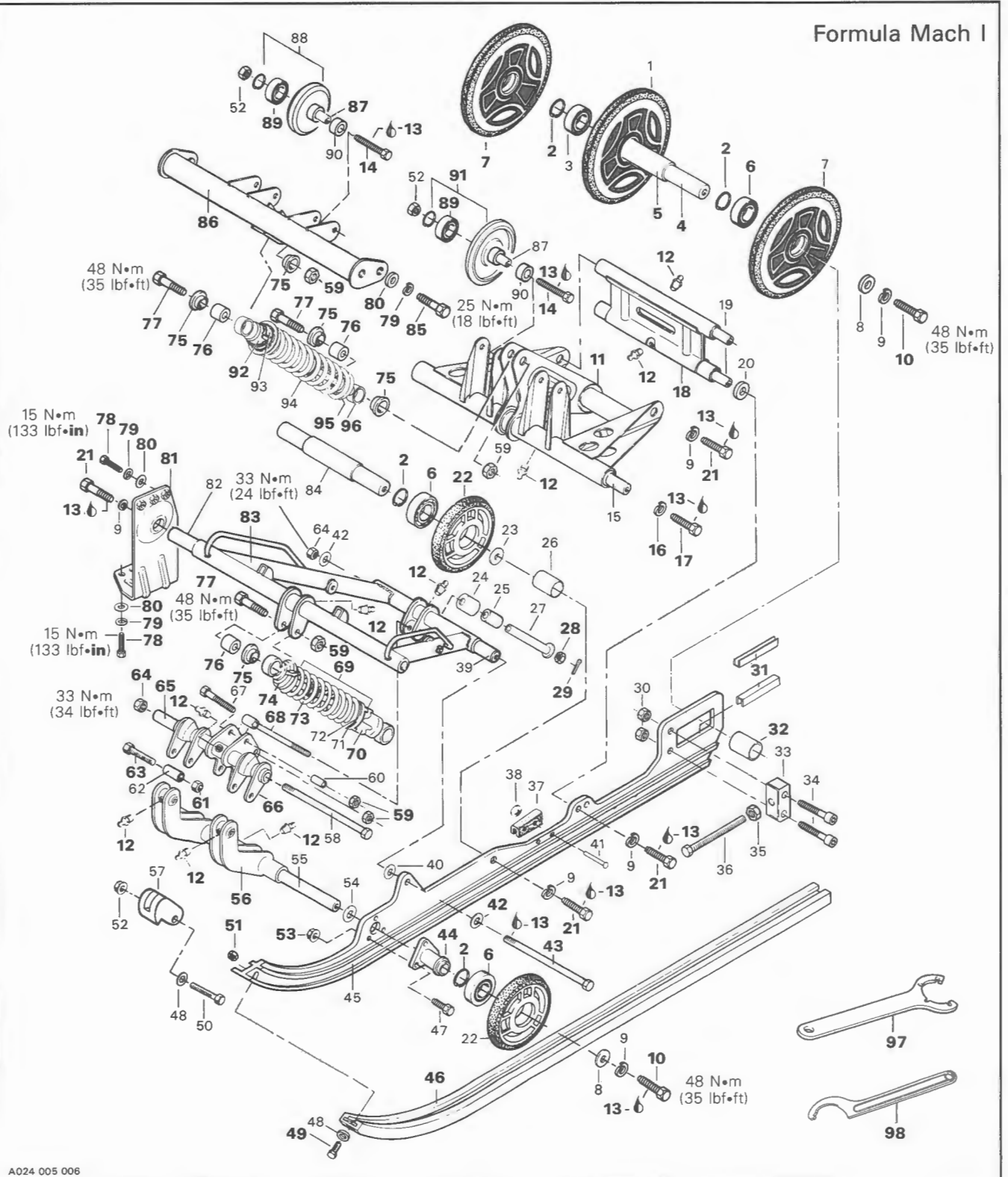


Section 05 SUSPENSION

Sub-section 06 (MONOSHOCK PRS SUSPENSION)

MONOSHOCK PRS SUSPENSION

Formula Mach I



A024 005 006

Section 05 SUSPENSION

Sub-section 06 (PRS SUSPENSION)

1. Rear center idler wheel
2. Retaining ring (7)
3. Ball bearing
4. Rear axle (2)
5. Inner spacer (2)
6. Ball bearing 6205 (6)
7. Idler wheel (2)
8. Washer (4)
9. Spring lock washer 10 mm (12)
10. Hexagonal head cap screw (2)
11. Rear arm
12. Grease fitting (9)
13. Loctite 271 (red high strength)
14. Hexagonal head cap screw M6 x 55 (4)
15. Cross pivot
16. Spring lock washer 10 mm (2)
17. Hexagonal head cap screw M10 x 35 (2)
18. Rear shackle
19. Rear shackle axle (2)
20. Washer (2)
21. Hexagonal head cap screw M10 x 35 (10)
22. Idler wheel (4)
23. Washer (2)
24. Cup
25. Stopper
26. Spacer (2)
27. Bushing
28. Hexagonal elastic stop nut M12
29. Cotter pin
30. Hexagonal elastic stop nut M8 (4)
31. Protector (4)
32. Outer spacer (2)
33. Stopper (2)
34. Hexagonal socket head bolt M8 x 25 (4)
35. Hexagonal nut M10 (2)
36. Hexagonal adjustment screw M10 x 85 (2)
37. Rubber stopper (2)
38. Push nut (4)
39. Front arm lower axle
40. Washer (2)
41. Rivet (4)
42. Flat washer 10.5 mm (2)
43. Short welded screw
44. Housing (2)
45. Runner (2)
46. Slider shoe (2)
47. Hexagonal head cap screw M6 x 25 (6)
48. Flat washer (4)
49. Hexagonal head cap screw M6 x 20 (2)
50. Hexagonal head cap screw M6 x 30 (2)
51. Hexagonal elastic stop nut M6 (2)
52. Flanged hexagonal elastic stop nut M6 (6)
53. Flanged hexagonal elastic stop nut M6 (6)
54. Washer (2)
55. Front axle
56. Front shackle
57. Protector (2)
58. Long welded screw
59. Hexagonal elastic stop nut M10 (5)
60. Spacer
61. Hexagonal elastic stop nut M8 (2)
62. Spacer (2)
63. Hexagonal head cap screw M8 x 55 (2)
64. Hexagonal elastic stop nut M10 x 1.25 (2)
65. Front swing arm axle
66. Front swing arm
67. Hexagonal head screw M10 x 1.50 x 45
68. Welded stopper
69. Front shock
70. Adjuster ring
71. Thrust washer (2)
72. Guide
73. Shock spring
74. Spring stopper
75. Cushion (8)
76. Spacer (4)
77. Hexagonal head cap bolt M10 x 45 (4)
78. Hexagonal head cap screw M8 x 16 (4)
79. Spring lock washer M8 (8)
80. Flat washer 8.4 mm (8)
81. Retainer plate (R.H. & L.H.) (2)
82. Front arm upper axle
83. Front arm
84. Center axle
85. Pilot screw M8 (4)
86. Shock pivot
87. Axle (4)
88. Wheel support (2)
89. Ball bearing (4)
90. Spacer (4)
91. Idler wheel and circlip (2)
92. Adjuster ring
93. Spring retainer
94. Rear shock spring
95. Spring stopper
96. Rear shock (gas pressurized)
97. Adjustment key (front spring)
98. Adjustment key (rear spring)

▼ **CAUTION** : Close fuel valve before lifting vehicle.

◆ **WARNING** : Do not apply heat or flame to the rear gas pressurized shock.

○ **NOTE** : Most components may be replaced without entirely removing suspension system such as :

— idler wheels

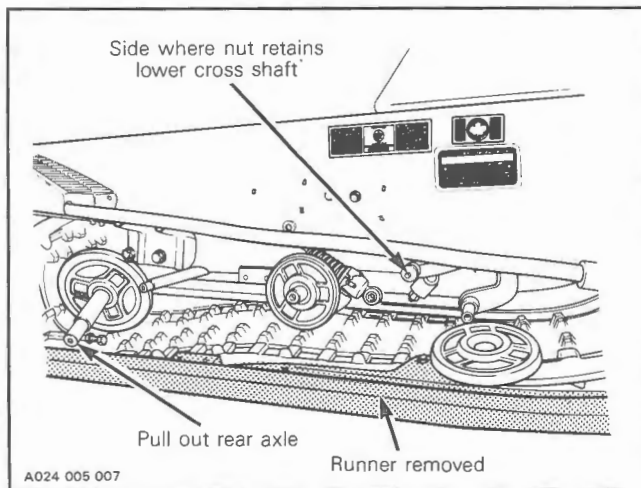
- **96, Rear shock** : Lift rear of vehicle off the ground then remove bolt securing front portion of shock. Raise rear portion of suspension to release track tension. Remove **#91** idler wheel on side where bolt securing rear portion of shock is removed.

— **11, Rear arm** : remove rear shock then screws retaining rear arm to rear shackle. Remove two screws securing rear arm to frame.

Section 05 SUSPENSION

Sub-section 06 (MONOSHOCK PRS SUSPENSION)

- **18, Rear shackle :** Lift rear of vehicle then removed four screws. At installation, lower grease fitting must face forward.
- **86, Shock pivot :** Unbolt rear shock front portion. Lower vehicle then remove four screws retaining pivot arm to frame.
- **1, Rear center idler wheel :** Completely release track tension. Unbolt front portion of rear shock. Remove rear and front idlers then runner on side where nut retains lower cross shaft of front arm. Pull out rear axle, remove spacers and press out center idler.



When reinstalling, make sure that holes in spacer and rear axle align with adjustment screw.

REMOVAL

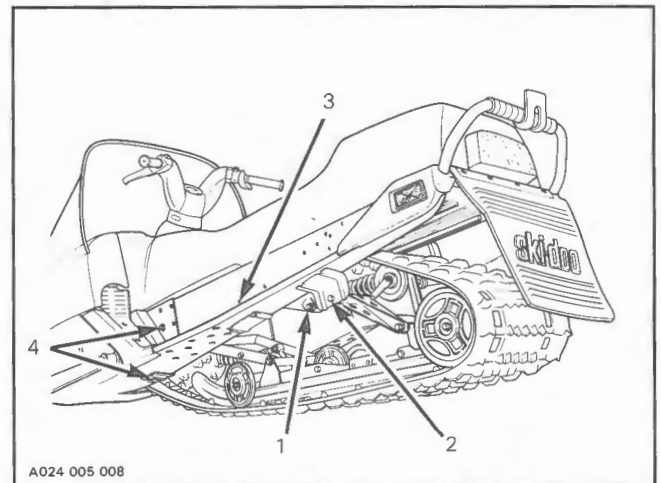
NOTE : To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

- Loosen one screw then retighten.
- Remove the other screw.
- Remove the first one.

11,81,86, Rear arm, retainer plate & shock pivot

- Plug vent holes in chaincase filler cap and oil injection reservoir cap with a wire to prevent leaks.
- Lift rear of vehicle off the ground.
- 1. Unbolt rear shock front portion from pivot arm.

- 2. Lower vehicle and remove rear arm from frame.
- 3. Remove shock pivot from frame.
- 4. Lift rear of vehicle and remove retainer plates from frame.



DISASSEMBLY & ASSEMBLY

46,49,51, Slider shoe, screw & nut

To replace a worn slider shoe, remove the screw and nut. Slide the shoe rearward out of the runner.

CAUTION : Slider shoes must always be replaced in pair.

28,29,59,68,69,75,77, Nut, cotter pin, limiter screw, front shock, bushing & bolt

To remove shock :

- Remove cotter pin, loosen nut from limiter screw until free-play is felt.
- Unscrew shock bolts and nuts.
- Inspect shock nylon bushings condition.

28,42,43,56,59,61,63,64,65,66,83, Nut, flat washer, bolt, front shackle, front swing arm, & front arm

To remove :

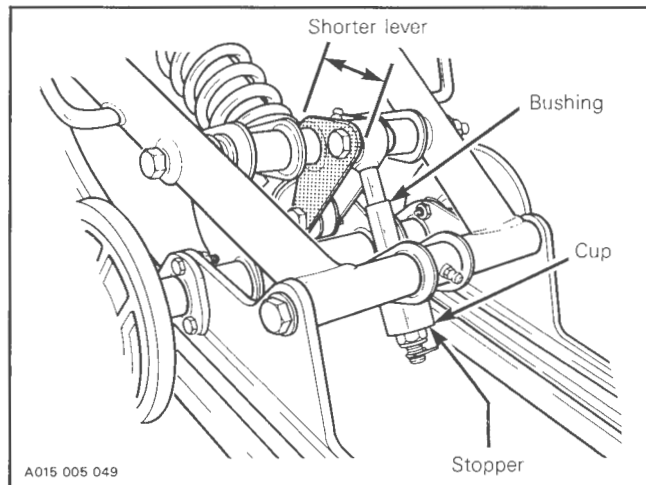
- Unscrew screws and nuts from both shackles.
- Remove nut from limiter screw.
- Unscrew front swing arm nut then pull the bolt out.
- Unscrew front arm nut then pull the bolt out.

Section 05 SUSPENSION

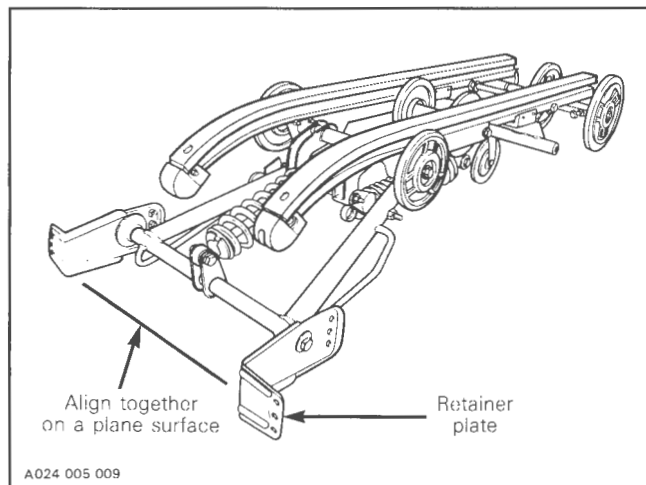
Sub-section 06 (MONOSHOCK PRS SUSPENSION)

At assembly, reverse the procedure. However, pay attention to the following :

- Correctly position the longer bolt at the front arm pivot point and bolt into the shorter lever hole. Install cup, stopper and bushing as shown.



- Position both retainer plates at the same angle to fit properly in the frame.



44,53, Housing & nut

Always torque nuts to 10 N•m (89 lbf•in).

2,6,7,10,14,21,22,89,91, Retaining ring, ball bearing, idler wheel & screw

To remove a bearing from an idler wheel :

- Unscrew retaining screw.

- Pull the idler wheel outward using a puller or by striking with a piece of wood and a hammer.

- Remove the snap ring then the bearing.

At assembly reverse the procedure.

NOTE : To remove the front idler wheels cross shaft, the runner must be removed (the cross shaft is shouldered).

18,59,75,76,77,87,96, Rear shackle, nut, cushion, spacer, bolt, axle & rear shock

- Withdraw spacer from shock pivot.

- Unscrew bolt and nut.

- Inspect shock nylon cushions.

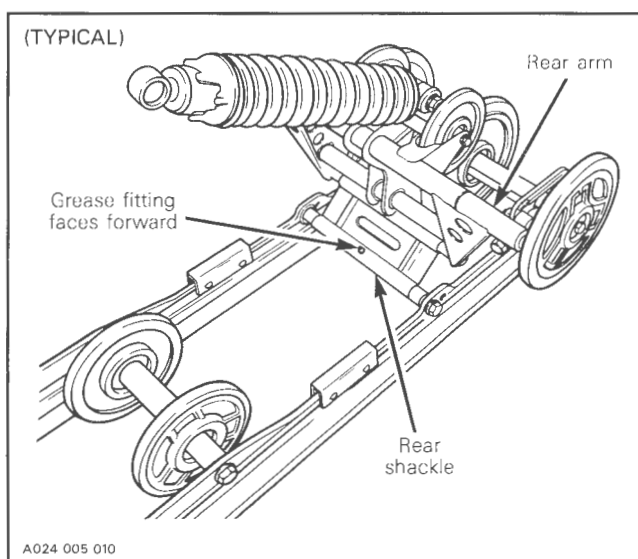
At assembly reverse the procedure.

If rear arm and/or rear shackle have been removed, make sure to reposition them properly :

- Position the grease fitting pointed forward on the rear shackle.

- See illustration to properly position the rear arm.

CAUTION : Make sure installing washer #20 each end of the rear shackle lower axle.



Section 05 SUSPENSION

Sub-section 06 (MONOSHOCK PRS SUSPENSION)

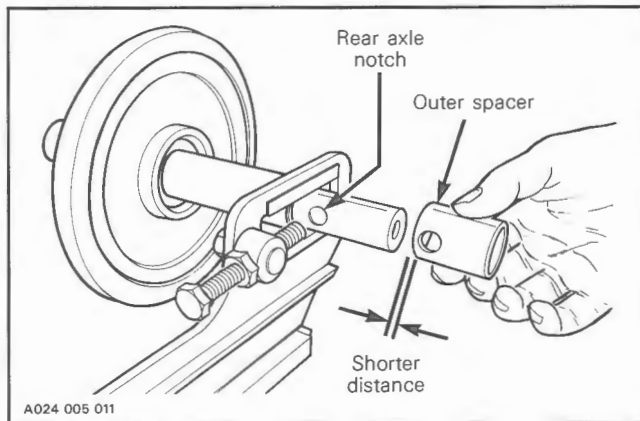
4,5,10,31,32, Rear axle, inner spacer, screw, protector & outer spacer

To remove :

- Unscrew retaining screw.
- Pull idler wheel.
- Remove the runner to take the rear axle off.
- Remove rear protector and replace if worn.

At assembly, reverse the procedure. However pay attention to the following :

- Position outer spacer as shown.



CAUTION : It is important to properly position the outer spacer. Disregarding this notice might cause rear axle failure.

- Position notch on rear axle forward.
- Position hole in outer spacer forward and inward onto the rear axle.

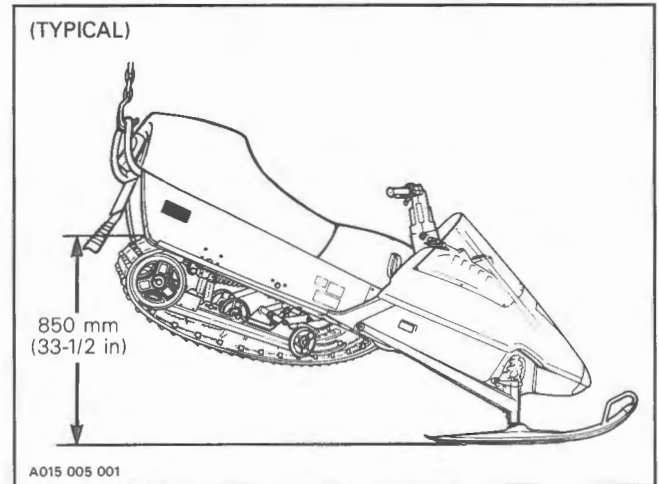
10,13,14,17,21, Screw & Loctite 271

Clean all screw threads. Prior to assembly, apply low temperature grease (P/N 413 7061 00) on cross shafts and Loctite 271 or equivalent on threads.

INSTALLATION

CAUTION : Close fuel valve before lifting vehicle.

- Lift the rear of vehicle off the ground about 850 mm (33-1/2 in).



28,68, Nut & limiter screw

The function of the suspension limiter screw is to control the transfer of vehicle weight **during acceleration**. The closer the nut is to the cotter pin, the more weight will be transferred to the track to provide better traction.

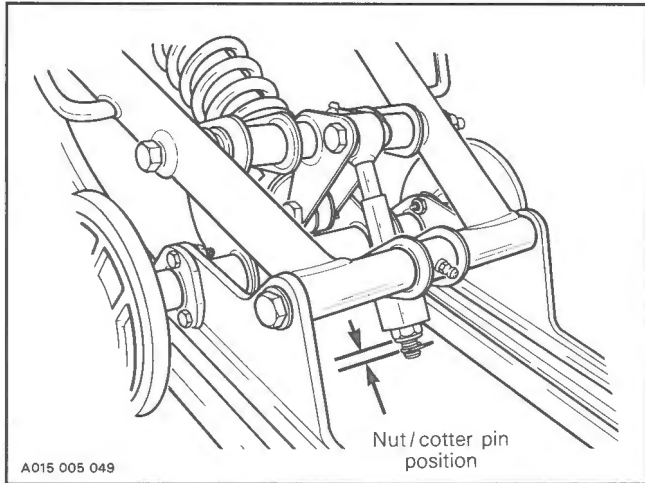
The farther the nut is from the cotter pin, the less weight will be transferred to the track, maintaining a more positive steering. Limiter screw allows weight transfer adjustment according to driver's requirement, field and/or snow conditions.

The following table is a general guideline only :

| SNOW CONDITION | NUT/COTTER PIN POSITION |
|----------------|-------------------------|
| Hill climbing | Close |
| Hard surface | Far |

Section 05 SUSPENSION

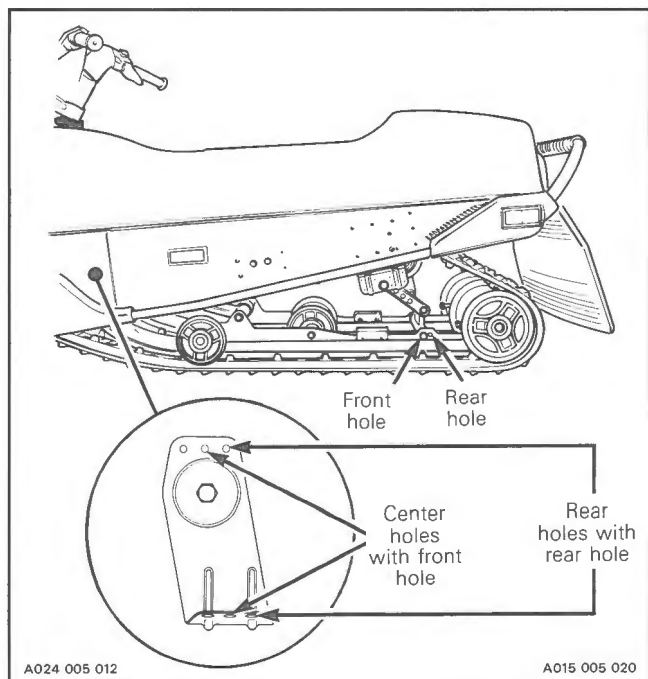
Sub-section 06 (MONOSHOCK PRS SUSPENSION)



4, Rear axle

- Unscrew track tension adjustment screws allowing the rear axle to be placed in its most forward position.
- The retainer plate has 3 holes on the side and 3 other underneath to secure to the frame.
- There are 2 holes to secure rear shackle to runner.

Usually the suspension is secured on the vehicle at the center hole at retainer plate and front hole at rear shackle. Select the proper hole to compensate track length variation.

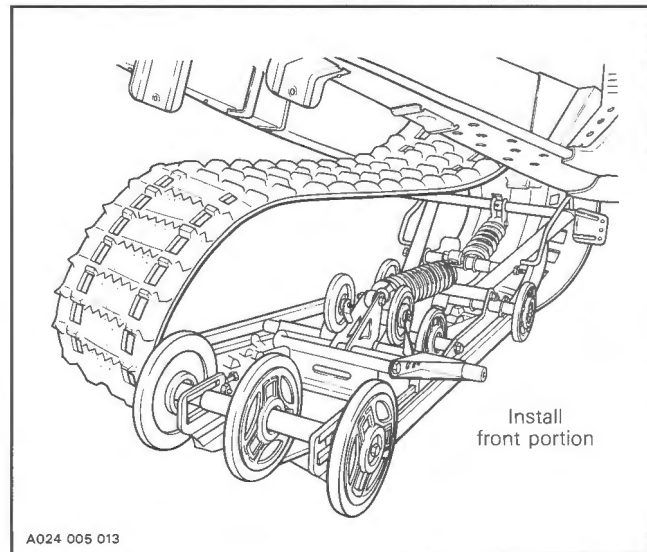


To move suspension backward: Secure screws into center holes of the retainer plate (on side & underneath) and front hole of the runner. To move forward; move them into rear holes.

▼ **CAUTION:** Make sure the retainer plate is secured at the same position on side and underneath retainer plate holes, also on each side of the frame. In addition, rear shackle must be at the same position on each side of the runner.

INSTALLATION INTO FRAME

- Enter the front portion of the suspension into front portion of track, raise it to its highest position under drive axle.



- Slide the rear portion of suspension into rear portion of track.

78,81, Screw & retainer plate

Raise front arm and align retainer plate holes with ones in frame. Install screws and washers, do not tighten.

11,16,17, Rear arm, spring lock washer & screw

Lower vehicle, align hole in rear arm with hole in frame and loosely install screws and spring lock washers.

79,80,85,86, Spring lock washer, flat washer, screw & shock pivot

Install shock pivot and secure.

Section 05 SUSPENSION

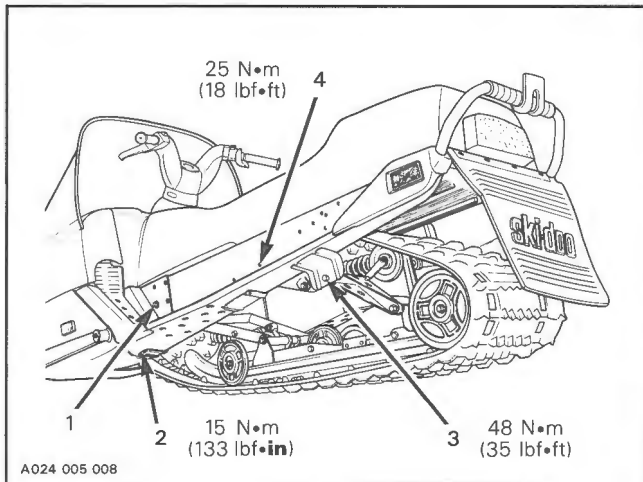
Sub-section 06 (MONOSHOCK PRS SUSPENSION)

59,77,95, Nut, bolt & rear shock

Secure front portion of rear shock to its pivot.
Torque screws to these values (see illustration).

| SCREW LOCATION | DESCRIPTION | TORQUE TO |
|---|-------------|---------------------|
| Retainer plate (side and underneath) | M8 x 25 mm | 15 N•m (133 lbf•in) |
| Shock pivot | M8 | 25 N•m (18 lbf•ft) |
| Rear arm | M10 x 35 mm | 48 N•m (35 lbf•ft) |

Suspension system installation sequence :

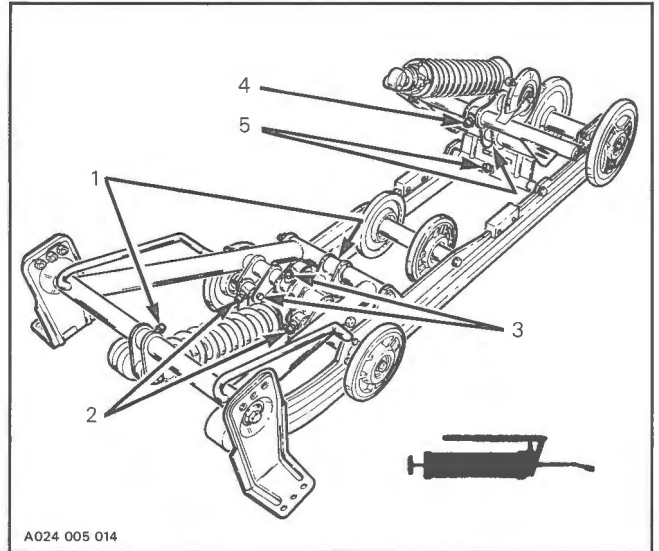


12, Grease fitting

Lubricate until grease appears at joint using low temperature grease (P/N 413 7061 00) :

1. Front arm : upper and lower axle.
2. Front swing arm : upper and lower axle.
3. Front shackles.
4. Rear arm : upper axle.
5. Rear shackle : upper and lower axle.

NOTE : There are 9 lubrication points.



NOTE : To adjust the track tension and alignment, refer to section 05-10.

4,10, Rear axle & screw

After track adjustment, torque rear axle screws to 48 N•m (35 lbf•ft).

Remove chaincase and oil injection reservoir vent hole wires.

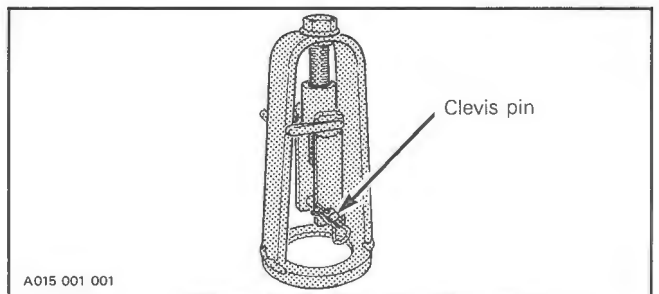
Open fuel shut-off valve.

SHOCK ABSORBER SPRING REPLACEMENT

WARNING : Do not apply heat or flame to the rear gas pressurized shock. Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

73,74, Spring & spring stopper

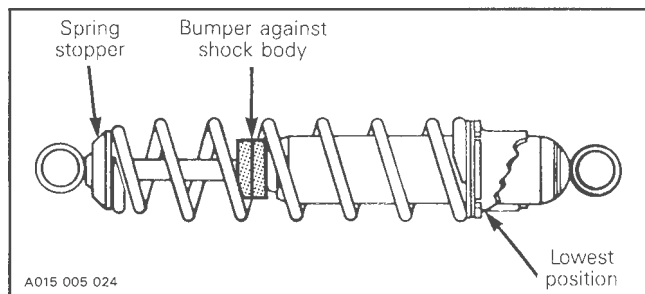
Use spring compressor (P/N 414 5796 00).



Section 05 SUSPENSION

Sub-section 06 (MONOSHOCK PRS SUSPENSION)

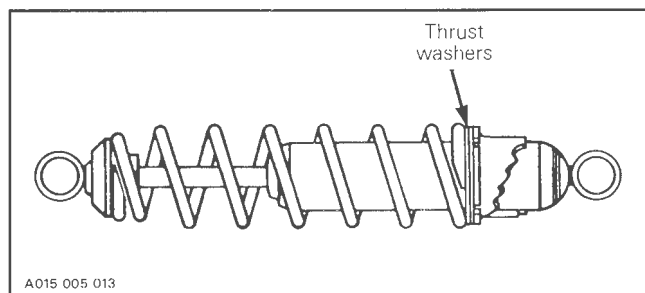
○ **NOTE :** Before attempting to compress the shock spring, push the rubber bumper on the piston shaft against the shock body and place the adjuster ring at its lowest position.



Install the shock spring remover over the spring. Insert clevis pin through the shock eye and secure it with the hair pin.

Tighten the bolt until the spring stopper can be removed.

○ **NOTE :** When reinstalling a spring, make sure both thrust washers are between the spring and the adjuster ring. They are required to ease cam twisting. Apply a light coat of grease between them. Place the adjuster ring at its lowest position.



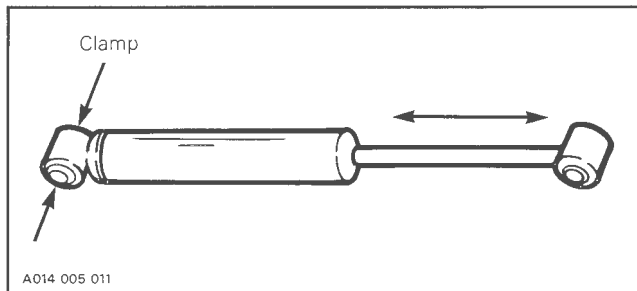
SHOCK ABSORBER SERVICING

96, Rear shock

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. Renew as required.

69, Front shock

Secure the shock body end in a vise.



▼ **CAUTION :** Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke checking that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a faulty shock :

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any fault is present.

REAR SUSPENSION ADJUSTMENT

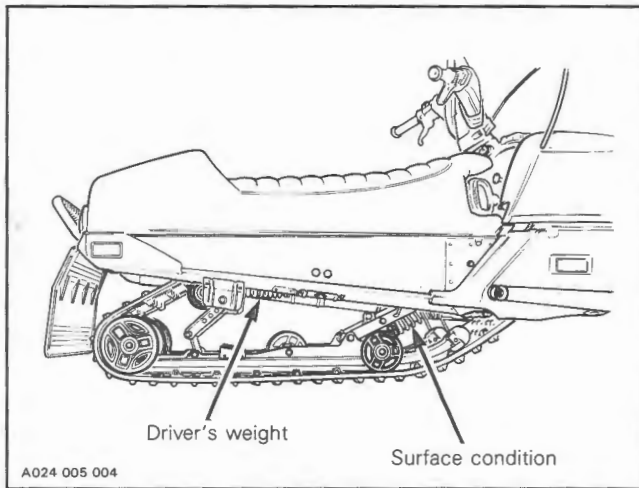
70,92, Adjuster ring

The rear suspension has 2 preload adjustments :

- The front shock spring for surface condition.
- The rear shock spring for driver's weight.

Section 05 SUSPENSION

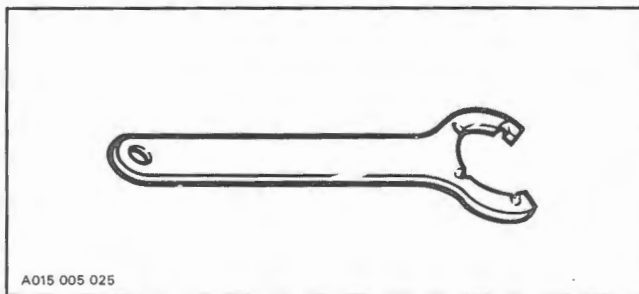
Sub-section 06 (MONOSHOCK PRS SUSPENSION)



The shock absorber preload is adjusted by turning the adjuster ring.

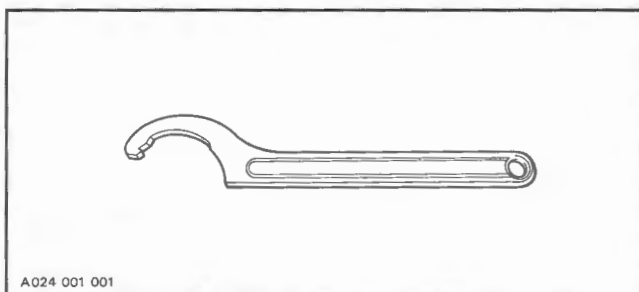
FRONT SHOCK SPRING

97, Adjustment key



REAR SHOCK SPRING

98, Adjustment key



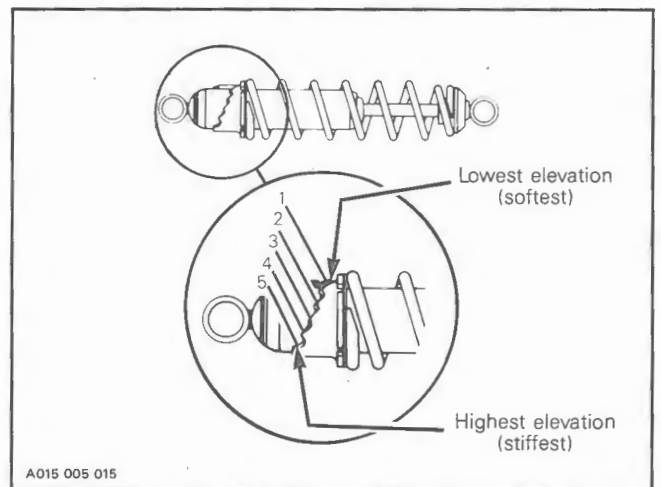
Use adjustment key to adjust shock spring preload.
Spray some WD 40 between spring and adjuster ring.

CAUTION: There must be two thrust washers between spring and adjuster ring on front shock. If missing, install thrust washers (P/N 503 0887 00) before attempting to adjust.

The front shock of the rear suspension should be removed for adjustment.

Front shock absorber has a 5 position ring located at the bottom of the shock. Rear shock has a 6 position ring. Spring preload may be increased or decreased by turning the ring.

Fit the key on the shock adjuster ring and turn clockwise for stiffest or counterclockwise for softest.



Front shock absorber spring

When the front spring ring is at the lowest elevation more weight is distributed on the skis.

At the highest position the weight is transferred from the skis to the track.


Depending the snow condition these positions are recommended :

| SNOW CONDITION | CAM POSITION |
|----------------------------|--------------|
| Deep snow or hill climbing | 1-2-3 |
| Hard surface | 4-5 |

Section 05 SUSPENSION

Sub-section 06 (MONOSHOCK PRS SUSPENSION)

Rear shock absorber spring

 **NOTE :** Shock absorber springs with different stiffness are available. See shock absorber spring table.

The choice of a different cam position on rear spring and spring itself depends on operator's weight, riding speed and terrain conditions.

With rider sitting on the vehicle, the suspension should collapse by 38 mm (1-1/2 in). Adjust as necessary.

| Operator's weight | Riding speed | Field condition | Spring rate | Cam position |
|--------------------------|-----------------------|-------------------------|---------------------------|----------------------------|
| Light ↑ ↓ Heavy | Low ↑ ↓ High | Flat ↑ ↓ Bumpy | 28.9 N/mm (165 lbf/in) | 1 2 3 4 5 6 |
| | | | 33.3 N/mm (190 lbf/in) | 1 2 3 4 5 6 |

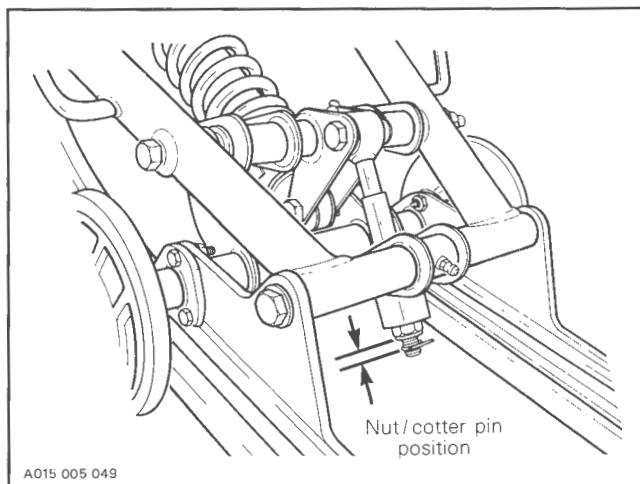
A slight bottoming of the suspension during severe riding conditions indicates a good choice of spring rate and preload.


68, Limiter screw

The function of the suspension limiter screw is to control the transfer of vehicle weight **during acceleration**. The closer the nut is to cotter pin, the more the weight will be transferred to the track to provide better traction. The farther the nut is from the cotter pin, the less weight will be transferred to the track, maintaining a more positive steering. Limiter screw allows weight transfer adjustment according to driver's requirement, field and/or snow conditions.

The following table is general guideline only :

| SNOW CONDITION | NUT/COTTER PIN POSITION |
|----------------|-------------------------|
| Hill climbing | Close |
| Hard surface | Far |

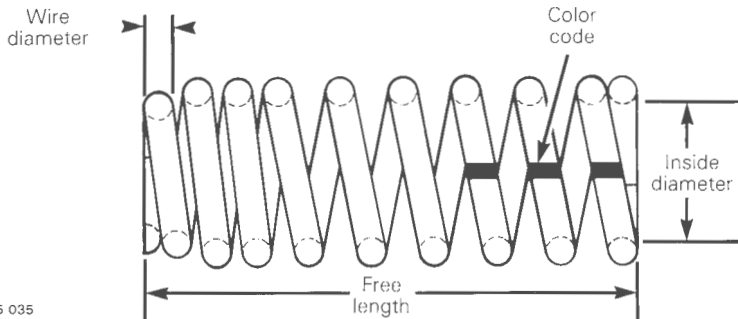


 **CAUTION :** Optional parts are calibrated to operate together. Failure to follow this recommendation may affect handling of the vehicle.

Section 05 SUSPENSION
Sub-section 06 (MONOSHOCK PRS SUSPENSION)

SPECIFICATIONS

Shock absorber spring specifications*

| Location | Front (standard) | Rear (standard) | Rear (optional) |
|--|---|---------------------------|---------------------------|
| Part number | 414 6757 00 | 503 1243 00 | 414 67/1 00 |
| Number of coils | 13.3 | 14.9 | 15.1 |
| Free length $\pm 3 \text{ mm } (\pm .12'')$ | 254 mm (10'') | 294 mm (11.58'') | 302 mm (11.87'') |
| Spring rate $\pm 1.8 \text{ N/mm } (\pm 10 \text{ lbf/in})$ | 29.8 N/mm (170 lbf/in) | 33.3 N/mm (190 lbf/in) | 28.9 N/mm (165 lbf/in) |
| Inside diameter (big end) | 46.7 ± 0.8 mm (1.90 $\pm .03''$) | | |
| Wire diameter $\pm 0.05 \text{ mm } (\pm .002'')$ | 8.71 mm (.343'') | 9.5 mm (.375'') | 9.2 mm (.362'') |
| Compressed length | 115.8 mm (4.56'') | 141.6 mm (5.59'') | 138.9 mm (5.47'') |
| Color code | Yellow-orange | Yellow-green | Black-white |
| Spring description |  <p>The diagram illustrates a coiled spring with several dimensions and labels. A vertical line on the left indicates the 'Wire diameter'. A horizontal line at the bottom indicates the 'Free length'. A vertical line on the right indicates the 'Inside diameter'. A label 'Color code' points to a specific coil. The part number 'A017 005 035' is printed at the bottom left of the diagram area.</p> | | |

*For front shock springs specifications, refer to section 06-02.

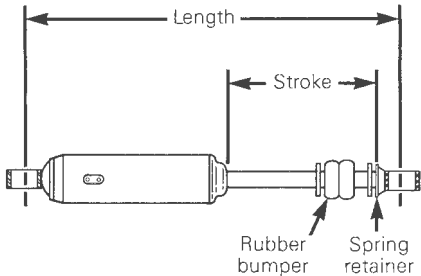
○ **NOTE :** Lower rate springs will result in a smoother ride at moderate speeds or with lighter riders.

▼ **CAUTION :** High speed riding with lower spring rate may affect handling and allow suspension to bottom out.

Section 05 SUSPENSION

Sub-section 06 (MONOSHOCK PRS SUSPENSION)

Shock absorber specifications*

| Location | | Front | Rear |
|----------------------------|----------------------------|--|----------------------|
| Part number | | 414 6772 00 | 414 6739 00 |
| Full stroke | | 86.7 mm (3.41'') | 104 mm (4.09'') |
| Length collapsed | At bumper contact | 267.7 mm (10.54'') | 301 mm (11.85'') |
| | At spring retainer contact | 239.2 mm (9.42'') | 261 mm (10.28'') |
| Length extended | | 325.9 mm (12.83'') | 36.5 mm (1.437'') |
| Shock absorber description | |  <p>The diagram illustrates a shock absorber with two main dimensions: 'Length' and 'Stroke'. The 'Length' is the total length of the shock body. The 'Stroke' is the distance between the 'Rubber bumper' and the 'Spring retainer'. The shock absorber is shown in a horizontal orientation with the rubber bumper on the left and the spring retainer on the right. The diagram is labeled with the code 'A015 005 057'.</p> | |

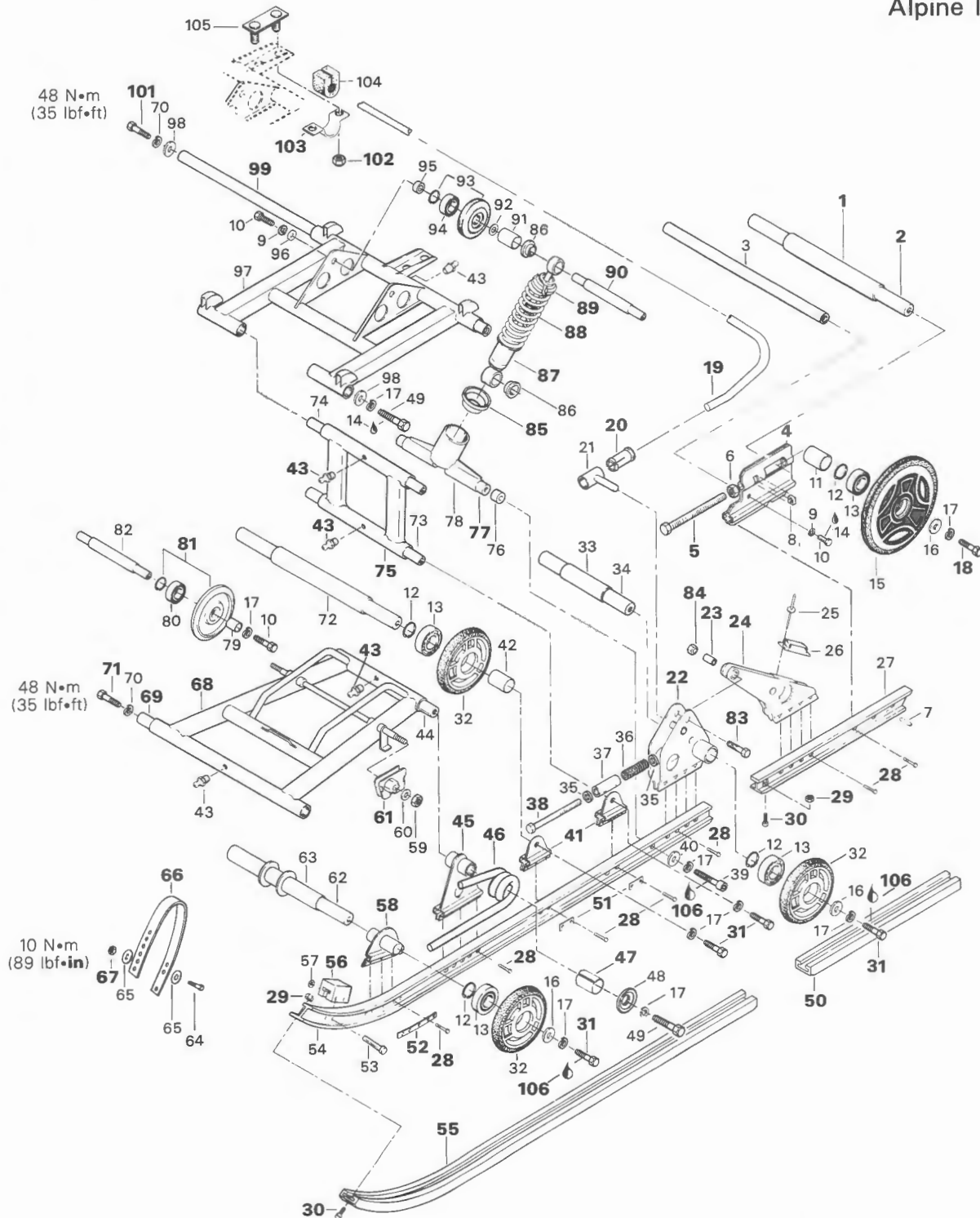
*For front shock absorber specifications, refer to section 06-02.

▼ **CAUTION :** Shocks must not be interchanged. The rear gas pressurized shock extends unassisted. Make sure they are properly positioned. Shock part number is stamped on shock body.

Section 05 SUSPENSION
Sub-section 07 (HINGED SUSPENSION)


HINGED SUSPENSION

Alpine II 503



Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

 **NOTE :** Given part quantity includes both suspension.

- | | |
|--|--|
| 1. Spacer tube (long) (2) | 54. Front runner (4) |
| 2. Rear axle (2) | 55. Front slider shoe (4) |
| 3. Rear shackle axle (2) | 56. Rubber stopper (4) |
| 4. R.H. adjustment plate (2) | 57. Push nut (8) |
| L.H. adjustment plate (2) | 58. Front wheel support (4) |
| 5. Hexagonal adjustment screw M10 x 1.5 x 110 (4) | 59. Hexagonal elastic stop nut M6 (4) |
| 6. Hexagonal nut M10 x 1.50 (4) | 60. Washer (4) |
| 7. Spring pin (4) | 61. R.H. adjustment cam (2) |
| 8. Square nut M10 x 1.5 x 17 x 8 (4) | L.H. adjustment cam (2) |
| 9. Lock washer (8) | 62. Cross shaft (2) |
| 10. Hexagonal head screw M8 x 1.25 x 25 (12) | 63. Spacer tube (2) |
| 11. Spacer tube (short) (4) | 64. Hexagonal head screw M8 x 1.25 x 40 (2) |
| 12. Circlip (8) | 65. Washer (4) |
| 13. Ball bearing (16) | 66. Stopper strap (2) |
| 14. Loctite 242 blue (medium strength) | 67. Hexagonal elastic stop nut M8 (2) |
| 15. Idler wheel (4) | 68. Front arm (2) |
| 16. Washer (12) | 69. Front cross shaft (2) |
| 17. Lock washer (32) | 70. Lock washer (4) |
| 18. Hexagonal head screw M10 x 35 (4) | 71. Hexagonal head screw M10 x 1.50 x 35 (4) |
| 19. Stabilizer bar | 72. Center axle (2) |
| 20. Bushing (2) | 73. Axle (2) |
| 21. Bushing (2) | 74. Axle (2) |
| 22. Pivot support (4) | 75. Pivot arm (2) |
| 23. Bushing (4) | 76. Spacer (4) |
| 24. Pivot plate (4) | 77. Axle (2) |
| 25. Rivet (8) | 78. Tube welded (2) |
| 26. Rubber stopper (4) | 79. Spacer tube (4) |
| 27. Rear runner (4) | 80. Ball bearing (4) |
| 28. Rivet (84) | 81. Idler wheel (with snap ring) (4) |
| 29. Hexagonal elastic stop nut M5 (8) | 82. Cross shaft assembly (2) |
| 30. Cylindrical phillips head screw M5 x .80 x 16 (8) | 83. Hexagonal head screw |
| 31. Hexagonal head screw M10 x 1.5 x 35 (16) | 84. Elastic stop nut M8 (4) |
| 32. Idler (12) | 85. Ring (2) |
| 33. Spacer (2) | 86. Bushing (8) |
| 34. Rear axle (2) | 87. Shock absorber (2) |
| 35. Washer (4) | 88. Spring (2) |
| 36. Spring (4) | 89. Spring stopper (2) |
| 37. Bushing (4) | 90. Axle (2) |
| 38. Hexagonal head screw M8 x 1.25 x 150 (4) | 91. Spacer (4) |
| 39. Hexagonal socket head cap screw M10 x 1.5 x 40 (4) | 92. Washer (4) |
| 40. Spacer (4) | 93. Idle wheel (with snap ring) (4) |
| 41. Support (8) | 94. Ball bearing (4) |
| 42. Spacer (4) | 95. Spacer (4) |
| 43. Grease fitting (10) | 96. Washer (4) |
| 44. Front axle (2) | 97. Rear arm |
| 45. Pivot support (4) | 98. Washer (4) |
| 46. Right spring (2) | 99. Rear cross shaft |
| Left spring (2) | 100. Washer (4) |
| 47. Bushing (4) | 101. Hexagonal head screw M10 x 1.5 x 25 (4) |
| 48. Washer (4) | 102. Hexagonal elastic stop nut M8 (8) |
| 49. Hexagonal head cap screw M10 x 1.5 x 25 (4) | 103. Clamp (4) |
| 50. Rear slider shoe (4) | 104. Rubber clamp |
| 51. Reinforcement strip (8) | 105. Welded plate (2) |
| 52. Reinforcement strip (4) | 106. Loctite 271 red (high strength) |
| 53. Rivet (8) | |

The following components can be replaced without removal of the suspension system from vehicle :

- outer suspension spring
- outer idler wheels
- upper idler wheels

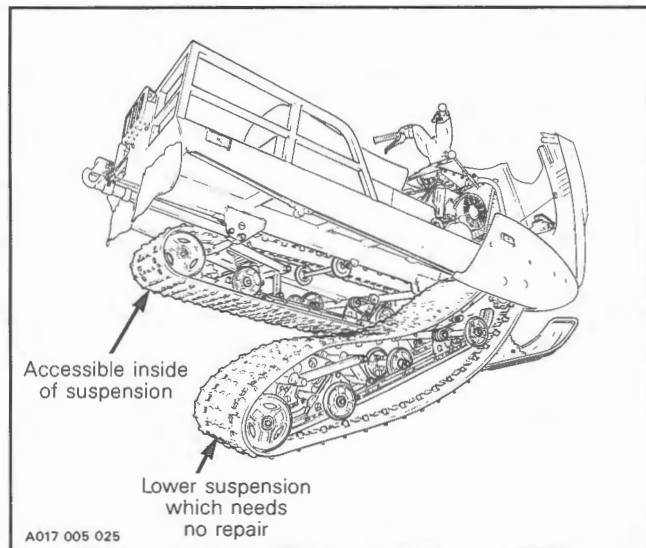
- stabilizer bar
- pivot arm (remove top screws first)
- shock absorber
- hinged portion of suspension

Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

○ **NOTE :** On this particular vehicle, the rear cross shaft holds **both** suspensions. To work inside one suspension, lower the other suspension as follows :

- Lift rear of vehicle.
- Release track tension.
- Remove upper idler wheel set.
- Remove stabilizer bar.
- Lower vehicle until it slightly contact the ground so that no pressure or vehicle weight acts on cross shaft.
- Withdraw rear cross shaft just enough to allow one suspension to be detached and thus, giving access to the inside of the **other** suspension.



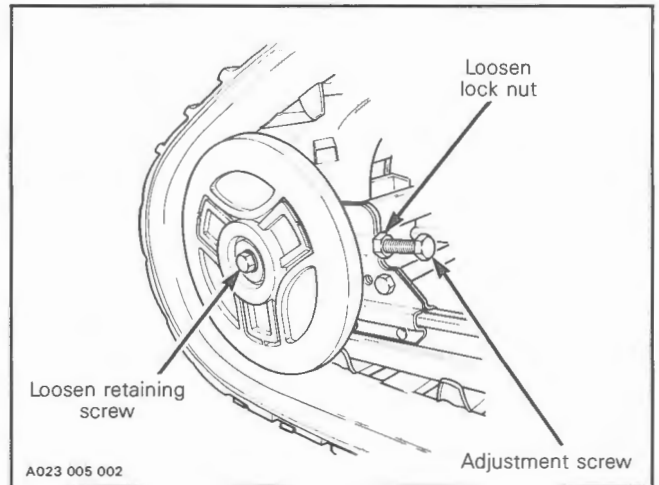
REMOVAL

○ **NOTE :** To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

- Loosen one screw then retighten.
- Remove the other screw.
- Remove the first one.

5,18, Adjustment screw

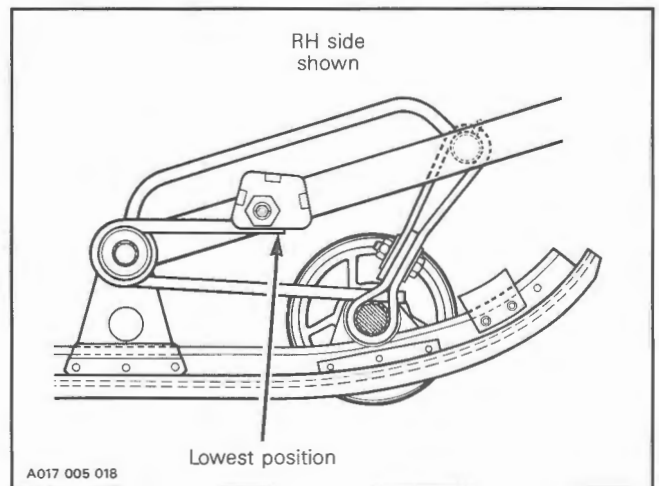
Using the appropriate equipment, lift the rear of vehicle. Release both track tension by loosening rear axle retaining screws and adjustment screws on inner side of rear idler wheels.



61, Adjustment cam

Position the adjustment cams of both suspensions at the lowest position.

○ **NOTE :** When turning the external adjuster block from one suspension, the internal one of the same suspension will automatically turn at the same time because they are linked together by a cross shaft.



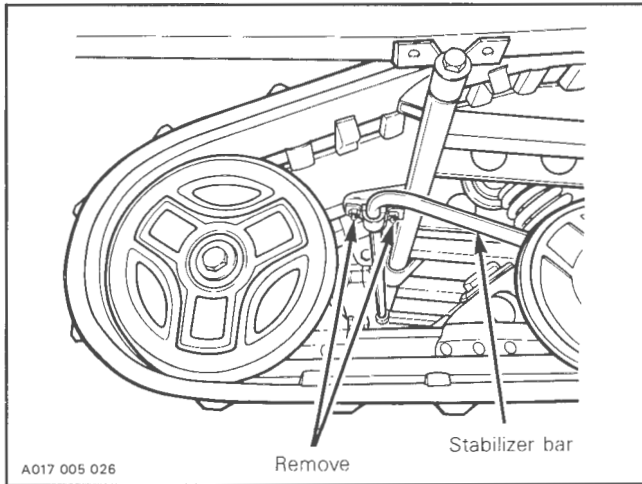
Using a large screwdriver, pry springs out.

19,20,102, Stabilizer bar, bushing & nut

Remove nuts then take stabilizer bar off. Inspect plastic bushing for wear, replace as required.

Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)



10,81, Screw & idler wheel

Remove screws and upper idler wheel set.

Lower vehicle until it slightly contact the ground so no pressure or vehicle weight acts on cross shaft.

99,101, Rear cross shaft & screw

Remove retaining screw(s).

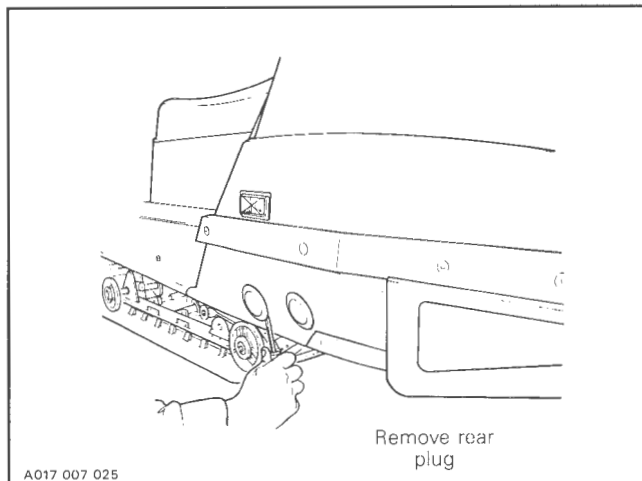
NOTE : On this particular vehicle, the rear cross shaft holds **both** suspensions.

To remove **both** suspensions, fully pull cross shaft out.

To remove **one** suspension, pull cross shaft just enough to free the desired suspension.

69,71, Front cross shaft & screw

In order to remove front cross shaft retaining screws, remove rear access plug from fender(s).



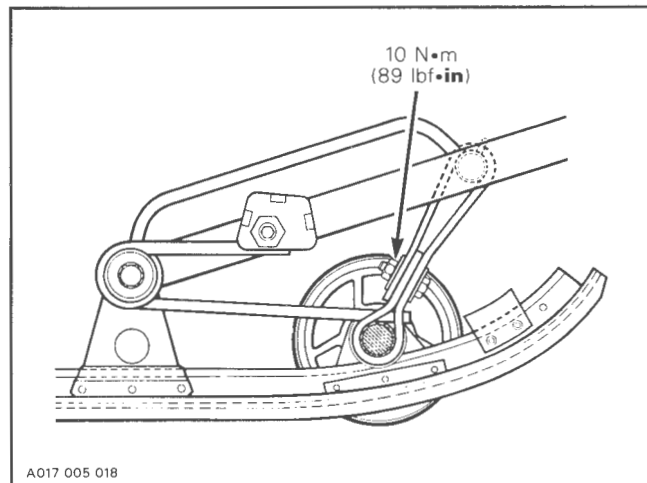
Lift rear of vehicle. Remove retaining screws and cross shaft(s).

Take suspension off.

DISASSEMBLY & ASSEMBLY

66,67, Stopper strap & nut

Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect holes for deformation. Replace stopper strap as required. Make sure it is attached to obtain its longest length. Torque nut to 10 N•m (89 lbf•in).



29,30,50, Nut, screw & rear slider shoe

To replace a worn slider shoe, remove nut, screw and spirol pin then slide the shoe rearward out of the runner.

CAUTION : Slider shoes must always be replaced in pairs.

29,30,55, Nut, screw & front slider shoe

To replace a worn slider shoe, remove nut, screw and spirol pin. Release tension on the hinged portion then lift to allow shoe removal. Slide the shoe rearward out of the runner.

CAUTION : Slider shoes must always be replaced in pairs.

23,38,83,84, Bushing, screw & nut

Remove adjustment screw then screw and nut at pivot. Check bushings for rust and wear. Replace as required.

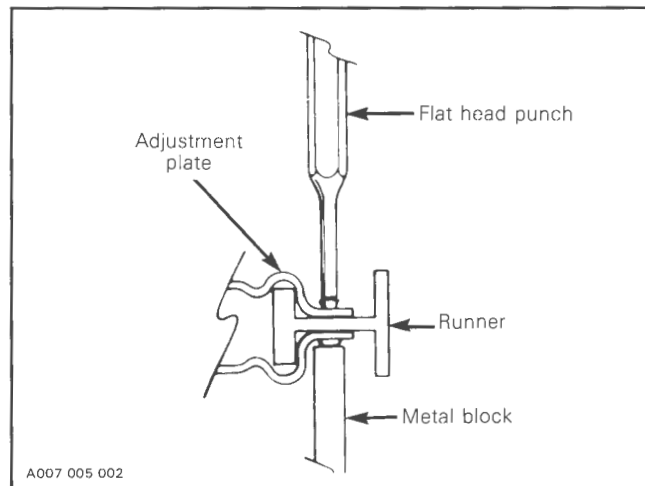
Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

4,22,24,28,41,45,51,52,58, Adjustment plate, pivot support, pivot plate, rivet, support, pivot support, reinforcement strip & front wheel support

To remove plate, support and reinforcement strips from runners, cut off the rivet heads with a cold chisel;

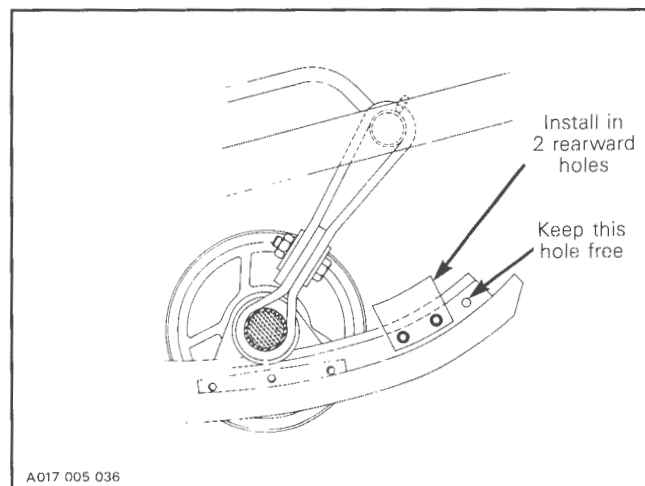
At assembly, position the rivet head outside of the runner then on a suitable metal block and hold the assembly firmly in place. With a flat head punch and a hammer, secure the rivet in place.



NOTE : Rivets can be substituted with 3/16 x 3/4 in screws and flanged elastic stop nuts. Position screw head outside of the runner.

56, Rubber stopper

When installing to runner, always position in the 2 rearward holes.



61,68, Adjustment cam & front arm

Check free movement of adjustment cams, slightly rusted cross shaft can generously be lubricated by removing nuts and cams. Seized cross shaft requires front arm replacement.

46,47, Spring & bushing

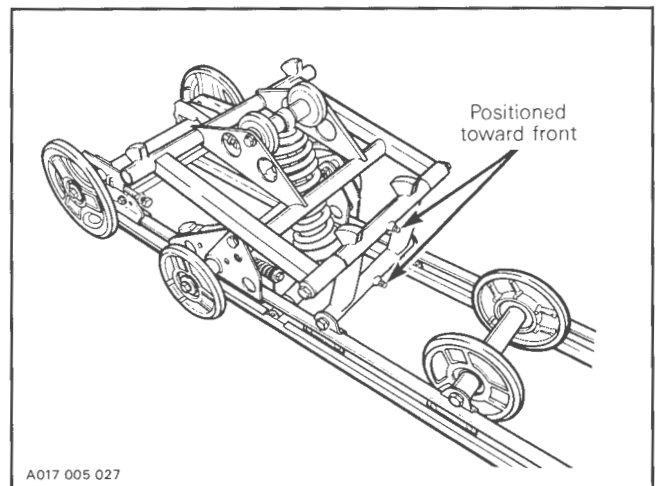
Make sure to insert nylon bushings inside springs.

31,106, Screw & Loctite 271

Clean screw threads. Prior to assembling, apply low temperature grease (P/N 413 7061 00) on cross shaft and Loctite 271 or equivalent on threads.

75, Pivot arm

When assembling, position pivot arm so that grease fittings aim toward front.

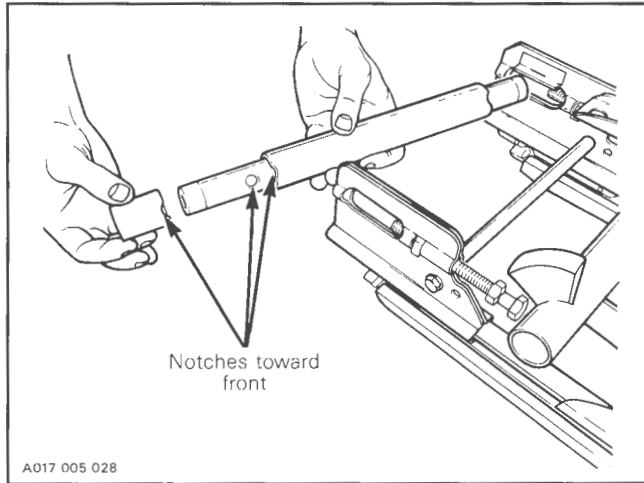


1,2,5,11, Spacer tube (long), rear axle, adjustment screw & spacer tube (short)

When assembling, position long spacer tube and rear axle so that their notches aim toward front. Position short spacer tube so that its notch aims inside of suspension and toward front. Notches positioning is important to allow effective fit with adjustment screw.

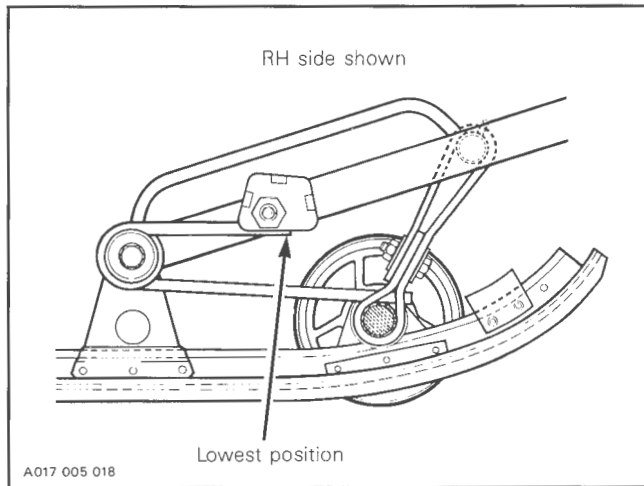
Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)



61, Adjustment cam

Position at the lowest position.



46, Spring

Install bottom of spring onto front lower spacer tube then, using a large screwdriver, pry top of spring onto cam.

INSTALLATION

Preparation

1,5, Rear axle & adjustment screw

Loosen adjustment screws as far as possible to push rear axle forward.

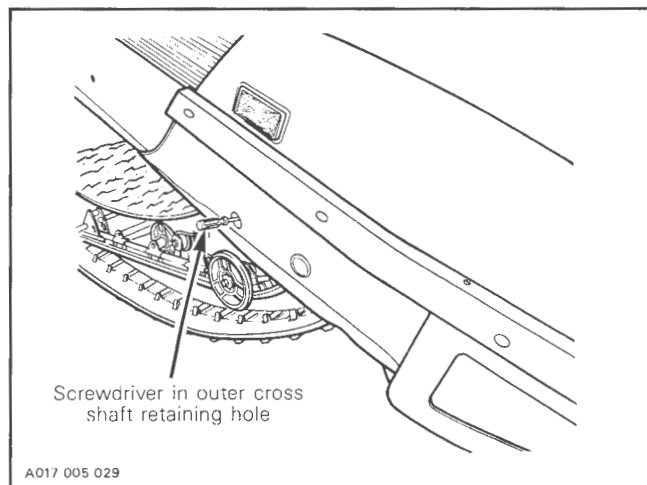
Installation

Using appropriate equipment, lift rear of vehicle. Install suspension into track beginning with rear portion.

68,69,71, Front arm, cross shaft & screw

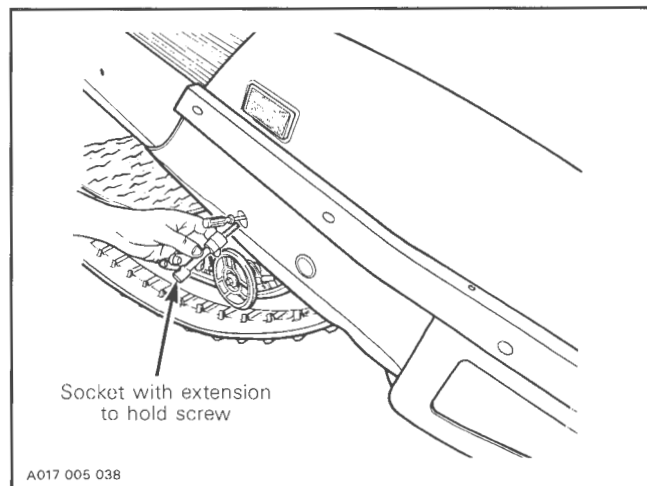
Raise front portion of suspension aligning cross shaft with retaining screw holes.

Insert a small screwdriver through outer side of retaining screw hole and cross shaft. This will hold cross shaft while installing the other screw.



Install **inner** cross shaft screw. Finged tighten only.

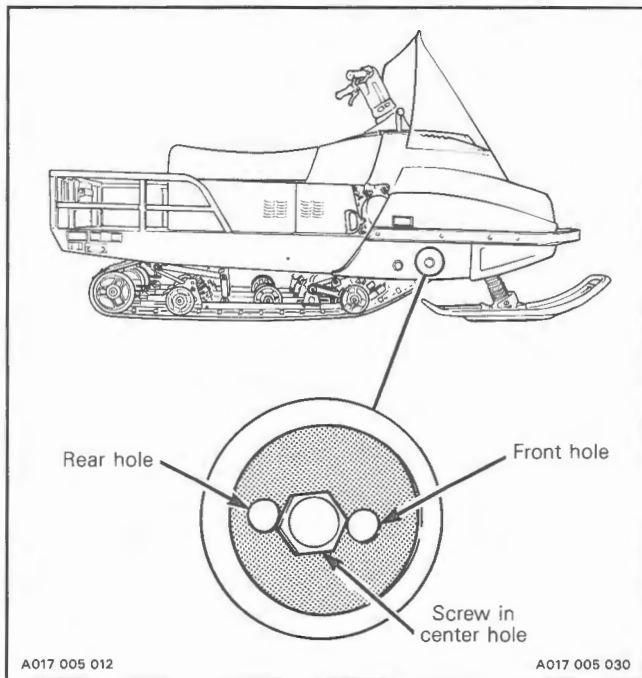
Use a socket with a short extension to hold screw for installation. Remove previously installed screwdriver while holding cross shaft, then install **outer** cross shaft screw through fender hole.



Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

NOTE : The holes in the frame provide the possibility of relocating the front suspension arm to recover track tension adjustment. It means that if the slide suspension adjustment screws are fully tightened and the arm is in the center holes in frame, it is possible to move the arm in the rear holes to obtain track tension adjustment.



CAUTION : Ensure that front suspension arms are at the same position each side of the arm to avoid any damage to the suspension system and to the track.

NOTE : Both front suspension arms should be positioned in the same holes in frame.

Torque cross shaft screws to 48 N•m (35 lbf•ft).

99,101, Rear cross shaft & screw

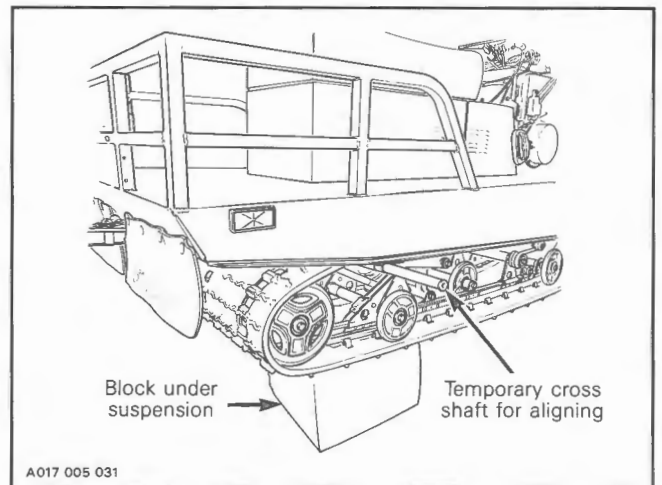
Lower vehicle so that rear arm aligns with cross shaft retaining holes.

Insert cross shaft in one suspension and stop just before reaching the other one.

Lift rear of vehicle and place a block under the last suspension to be installed.

Lower the rear of vehicle so that **outer** side of the rear arm aligns with cross shaft retaining hole.

Insert a temporary cross shaft from outer side of vehicle to help aligning rear arm in center of vehicle.



NOTE : Be careful not to drive the vehicle long cross shaft (on the other suspension) out of the rear arm while inserting the temporary shaft.

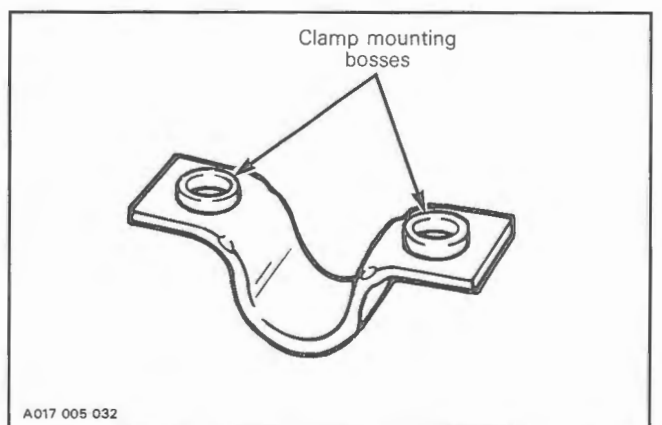
Align rear arm with cross shaft retaining hole, between both suspensions, then at the same time, push vehicle long cross shaft through the remaining rear arm. This way the temporary cross shaft will be driven out.

Install cross shaft screws and torque to 48 N•m (35 lbf•ft).

19,20,102,103, Stabilizer bar, bushing, nut & clamp

Apply low temperature grease (P/N 413 7061 00) each end of stabilizer bar.

Install stabilizer bar into plastic bushings then secure to suspension. Make sure to install stabilizer clamps so that their mounting bosses properly center into suspension bracket holes.



Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

10,81, Screw & idler wheel

Install upper idler wheel set making sure to insert spacer at each end.

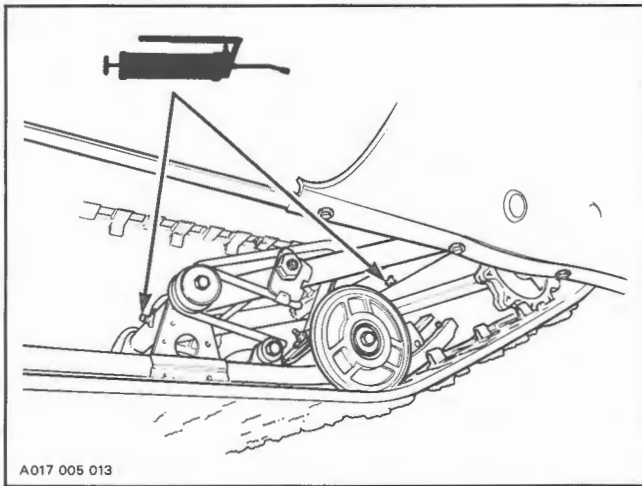
Reinstall rear access plug(s) on fender(s).

43, Grease fitting

Lubricate the following parts at grease fittings until grease appears at joints. Use low temperature grease only.

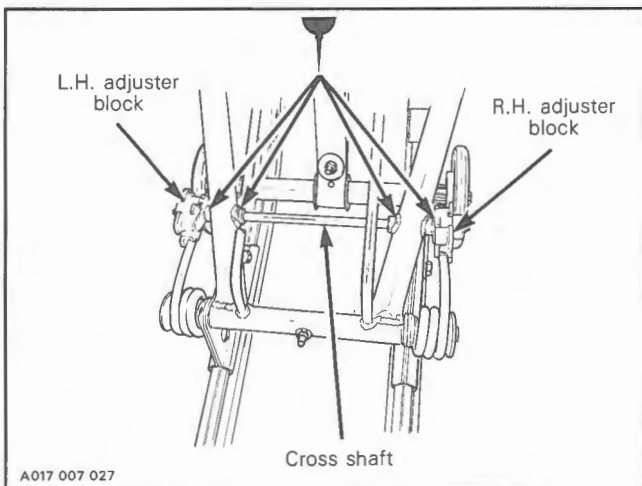
▼ **CAUTION :** Ensure to lubricate both suspension systems.

— Front upper and lower cross shafts.

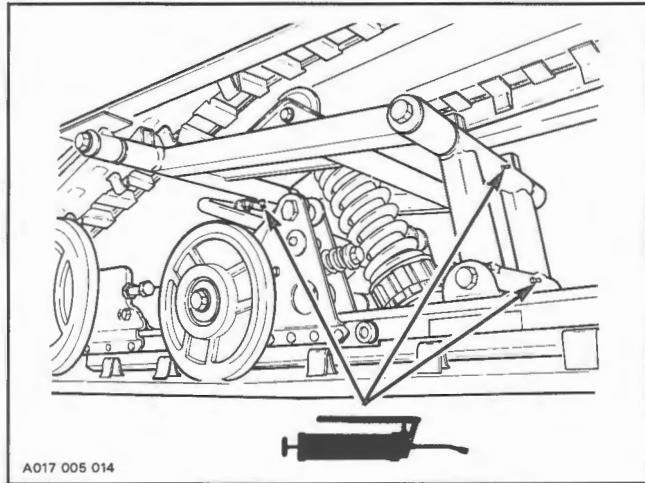


Oil adjuster blocks cross shaft.

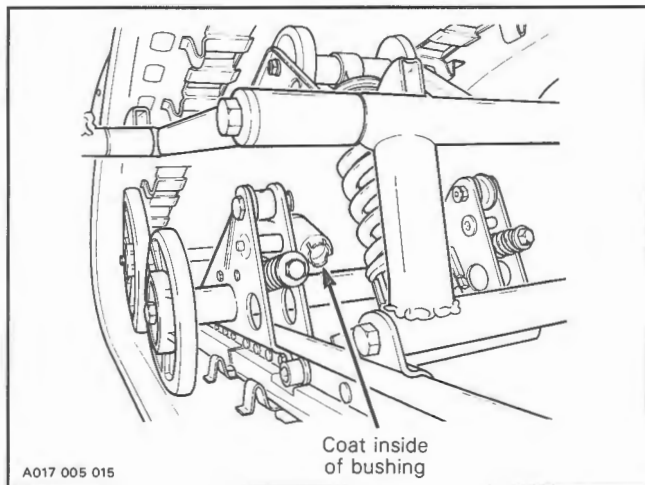
▼ **CAUTION :** Lubricate every week.



— Rear cross shaft and both shafts of shackle.



— Coat inside of stabilizer bar bushing of rear suspension with grease.



○ **NOTE :** To adjust the track tension and alignment, refer to section 05-10.

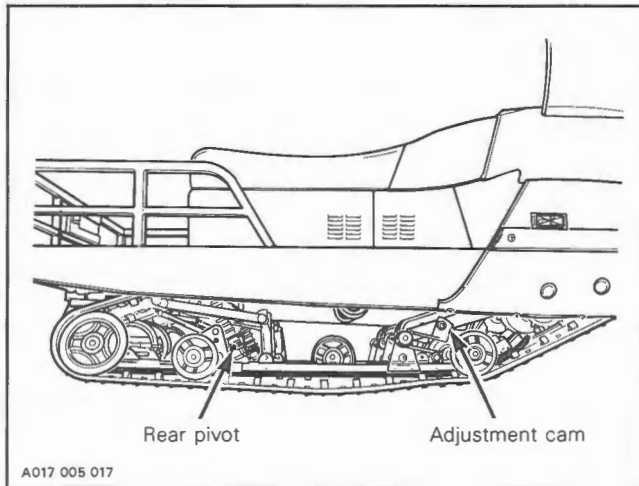
RIDE ADJUSTMENT

◆ **WARNING :** Since this vehicle is equipped with a twin suspension system, always ensure to perform the same adjustments on each rear suspension.

The rear suspension is adjustable for surface condition and steering effects. Besides the suspension rear pivot may be adjusted depending the operator requirement.

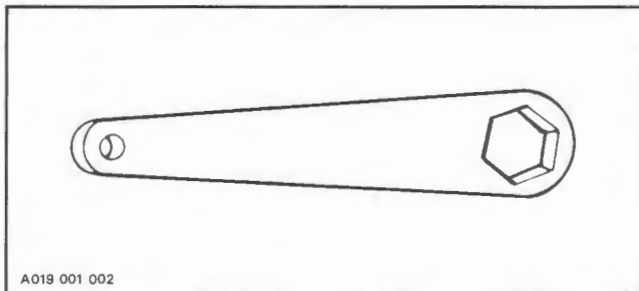
Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

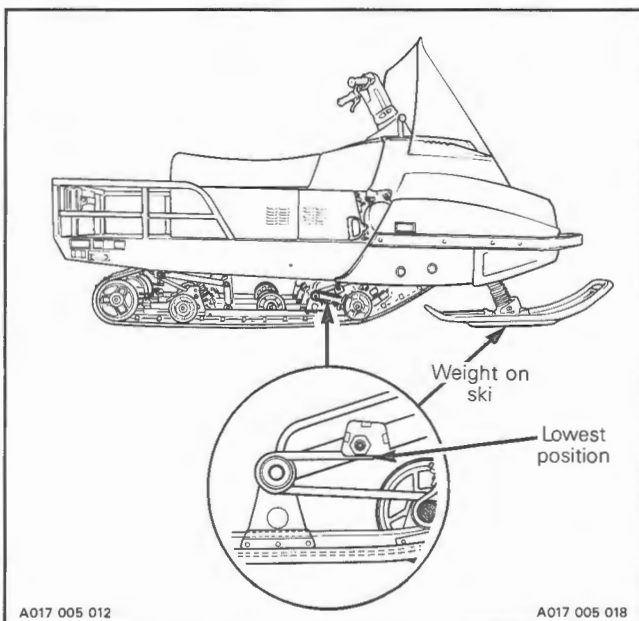


Adjustment cam

Use the key supplied in the seat compartment.



When the front adjustment cam are at the lowest elevation more weight is distributed to the ski thus giving a more positive steering.



At the highest position, the weight is transferred to the track thus giving a better traction to pull a load.

NOTE : When turning the external adjustment cam from one suspension, the internal one of the same suspension will automatically turn at the same time because they are linked together by a cross shaft.

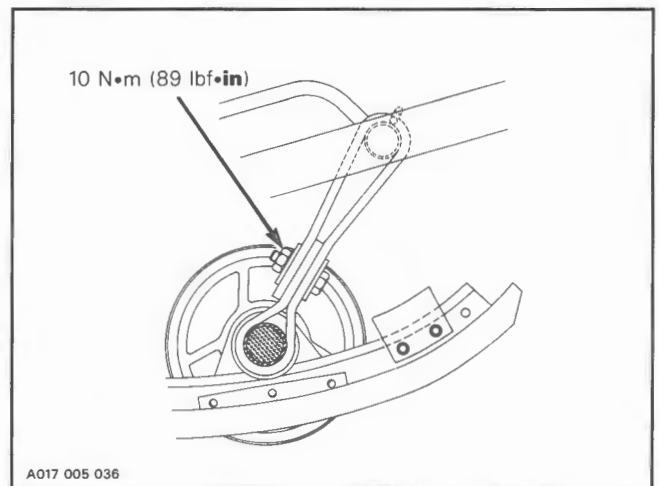
CAUTION : Always turn adjustment cam of the R.H. suspension in a counter clockwise direction and the one of the L.H. suspension, clockwise. Both suspension must always be set at the same elevation.

Stopper strap

The function of the suspension stopper strap is to control the transfer of vehicle weight **during acceleration**. The longer the belt, the more the weight will be transferred to the track, thus providing a better traction. Adjusting holes in the stopper strap allow to adjust to driver's requirement, field and/or snow conditions.

For normal use, adjust the stopper to its longest length.

WARNING : Always torque the nut to 10 N•m (89 lbf•in).



NOTE : For deep snow or hill climbing, it is recommended to place the front adjuster blocks on the lowest position and set stopper strap to the shortest position.

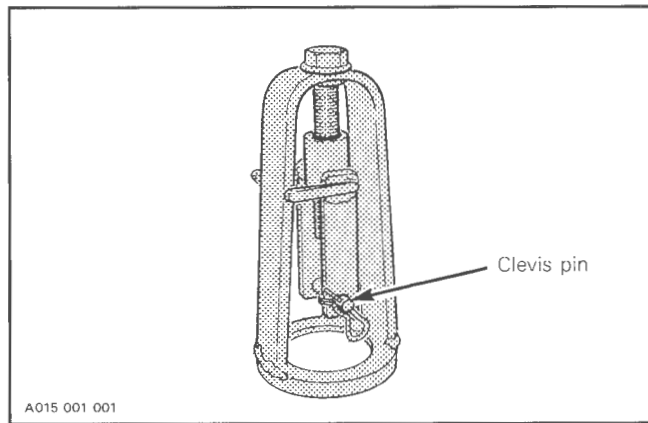
Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

SHOCK ABSORBER SPRING REPLACEMENT

◆ **WARNING :** Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

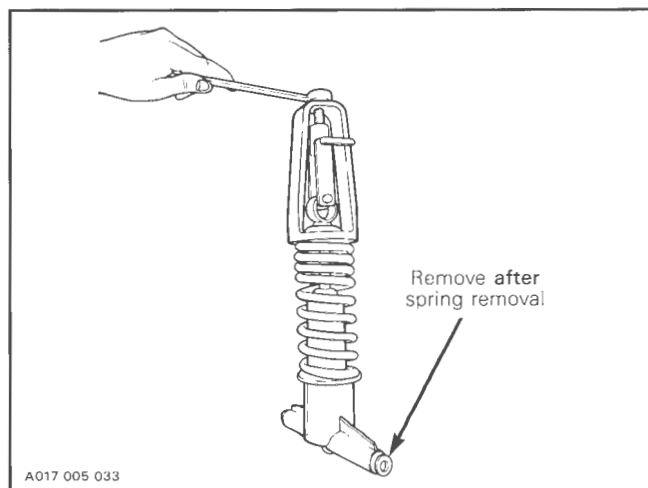
Use spring remover (P/N 414 5796 00).



77,85,86,87,88,89,90,93, Axle, ring, bushing, shock absorber, spring, spring stopper & idler wheel

Remove idler wheels, axle and shock absorber plastic bushings.

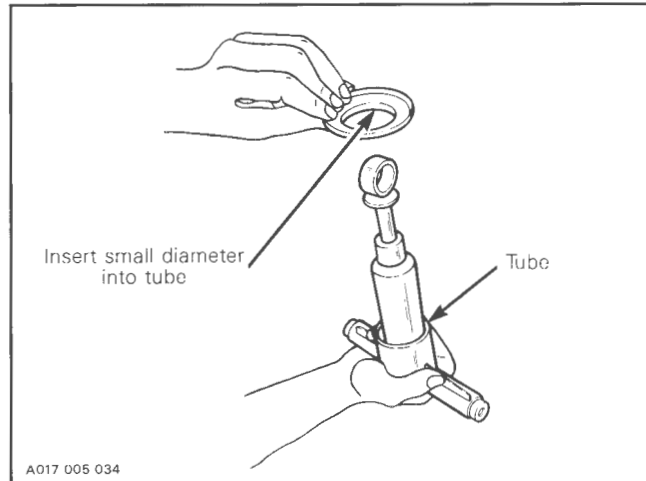
◆ **WARNING :** Do not remove bottom axle of shock absorber. Only take off **after** spring removal.



Install the shock spring remover over the spring. Insert clevis pin through the shock eye and secure it with the cotter pin.

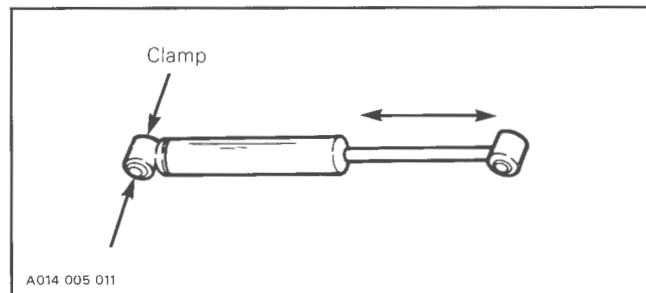
Tighten the bolt until the spring stopper can be removed. Remove lower axle.

○ **NOTE :** Prior to installing spring, make sure to properly install ring #85 under spring. Refer to illustration for ring position.



SHOCK ABSORBER SERVICING

Secure the shock body end in a vise.



▼ **CAUTION :** Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke checking that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a faulty shock :

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme ends of stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any fault is present.

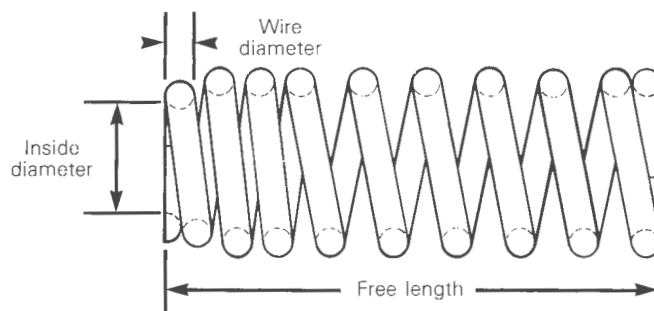
Section 05 SUSPENSION
Sub-section 07 (HINGED SUSPENSION)

SPECIFICATIONS

Shock absorber spring

| PART NUMBER | TOTAL NUMBER OF COILS | FREE LENGTH <small>± 2 mm (.12'')</small> | SPRING RATE <small>± 0.7 N/mm (41 lbf/in)</small> | INSIDE DIAMETER | WIRE DIAMETER <small>± 0.05 mm (.002'')</small> | COMPRESSED LENGTH |
|-------------|-----------------------|--|--|------------------|--|-------------------|
| 414 6078 00 | 10 | 180 mm (7.1'') | 70.7 N/mm (404 lbf/in) | 38.1 mm (1.50'') | 10.3 mm (.406'') | 103 mm (4.06'') |

Spring description

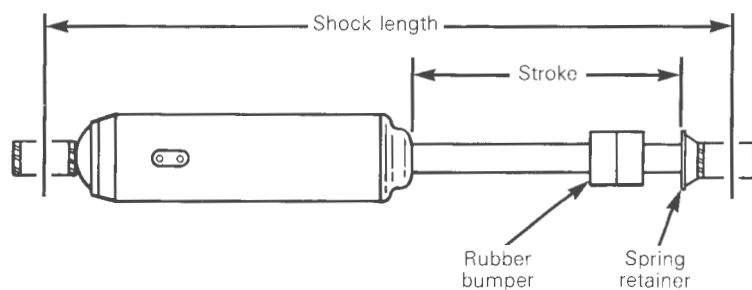


A017 005 040

Shock absorber

| PART NUMBER | FULL STROKE | LENGTH COLLAPSED | | LENGTH (EXTENDED) |
|-------------|----------------|-------------------|----------------------------|-------------------|
| | | AT BUMPER CONTACT | AT SPRING RETAINER CONTACT | |
| 414 6077 00 | 68 mm (2.68'') | 213 mm (8.39'') | 194 mm (7.64'') | 262 mm (10.31'') |

Shock description

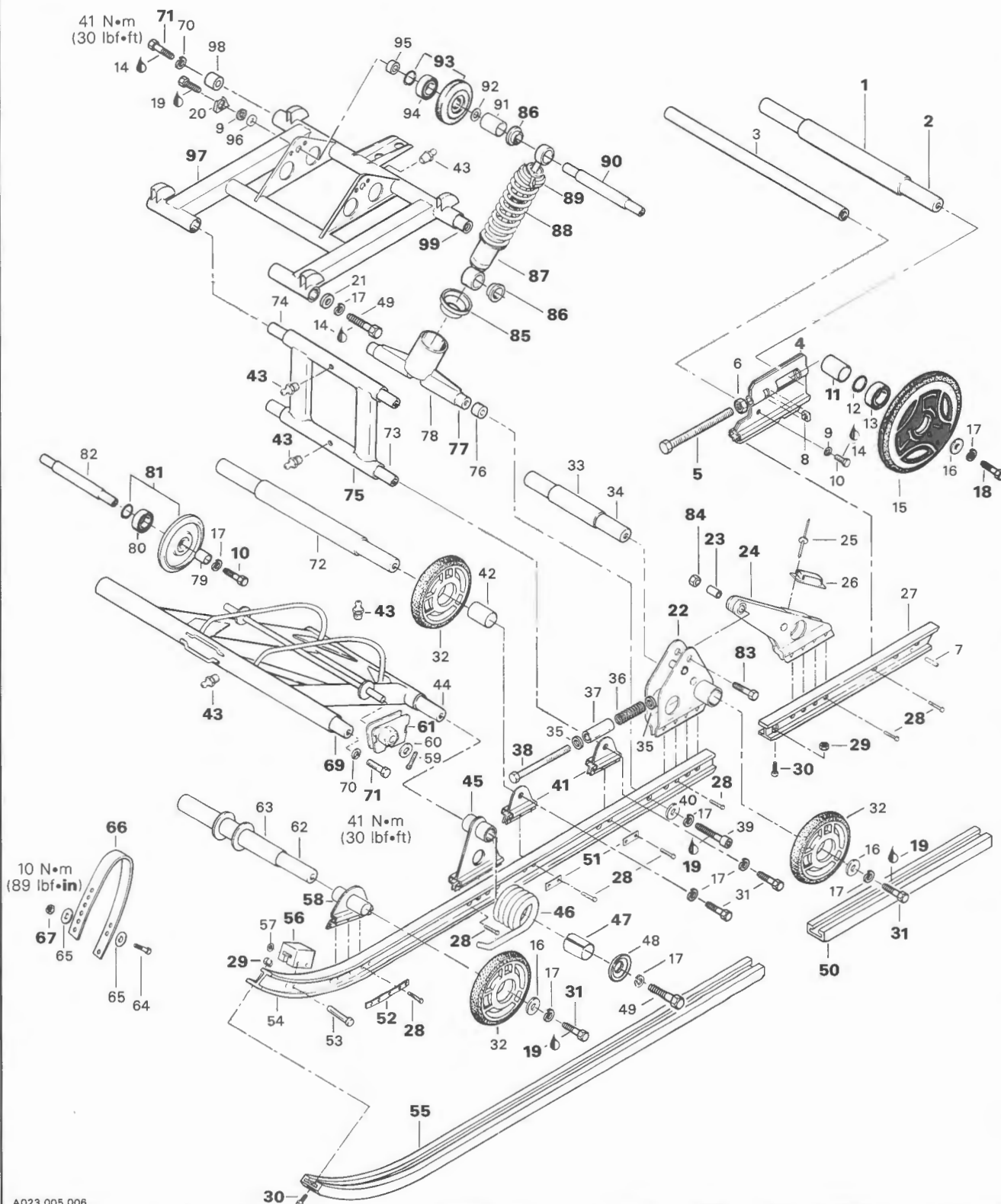


A015 005 017

Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

Safari Cheyenne



A023 005 006

Section 05 SUSPENSION


Sub-section 07 (HINGED SUSPENSION)

1. Spacer tube (long)
2. Rear axle
3. Rear shackle axle
4. R.H. adjustment plate
L.H. adjustment plate
5. Hexagonal adjustment screw M10 x 1.5 x 110 (2)
6. Hexagonal nut M10 x 1.50 (2)
7. Spring pin (2)
8. Square nut M10 x 1.5 x 17 x 8 (2)
9. Lock washer (4)
10. Hexagonal head screw M8 x 1.25 x 25 (6)
11. Spacer tube (short) (2)
12. Circlip (8)
13. Ball bearing (8)
14. Loctite 242 (blue, medium strength)
15. Idler (2)
16. Washer (6)
17. Lock washer (16)
18. Hexagonal head screw M10 x 35 (2)
19. Loctite 271 red (high strength)
20. Lock tab (2)
21. Flat washer (2)
22. Pivot support (2)
23. Bushing (2)
24. Pivot plate (2)
25. Rivet (4)
26. Rubber stopper (2)
27. Rear runner (2)
28. Rivet (42)
29. Hexagonal elastic stop nut M5 (4)
30. Cylindrical phillips head screw M5 x .80 x 16 (4)
31. Hexagonal head screw M10 x 1.50 x 35 (6)
32. Idler (6)
33. Spacer
34. Rear axle
35. Washer (2)
36. Spring (2)
37. Bushing (2)
38. Hexagonal head screw M8 x 1.25 x 150 (2)
39. Hexagonal socket head cap screw M10 x 1.5 x 40 (2)
40. Washer (2)
41. Support (4)
42. Spacer (2)
43. Grease fitting (5)
44. Front axle
45. Support (2)
46. Right spring
Left spring
47. Bushing (2)
48. Washer (2)
49. Hexagonal head cap screw M10 x 1.50 x 25 (4)
50. Rear slider shoe (2)
51. Reinforcement strip (6)
52. Reinforcement strip (2)
53. Rivet (4)
54. Front runner (2)
55. Front slider shoe (2)
56. Rubber stopper (2)
57. Push nut (4)
58. Front wheel support (2)
59. Cotter pin (2)
60. Washer (2)
61. R.H. adjustment cam
L.H. adjustment cam
62. Cross shaft
63. Spacer tube
64. Hexagonal head screw M8 x 1.25 x 40
65. Washer (2)
66. Stopper strap
67. Hexagonal elastic stop nut M8
68. Front arm
69. Front cross shaft
70. Lock washer (4)
71. Hexagonal head screw M10 x 1.50 x 35 (4)
72. Center axle
73. Axle
74. Axle
75. Rear snackle
76. Spacer (2)
77. Axle
78. Tube welded
79. Spacer tube (2)
80. Ball bearing (2)
81. Idler wheel (with snap ring) (2)
82. Cross shaft assembly
83. Hexagonal head screw M8 x 1.25 x 45 (2)
84. Elastic stop nut M8 (2)
85. Ring
86. Bushing (4)
87. Shock absorber
88. (White) spring
89. Spring stopper
90. Axle
91. Spacer (2)
92. Washer (2)
93. Idler wheel (with snap ring) (2)
94. Ball bearing (2)
95. Spacer (2)
96. Washer (2)
97. Rear arm
98. Spacer (2)
99. Rear cross shaft

The following suspension components can be replaced without removal of the suspension system from vehicle :

- suspension springs
- idler wheels
- upper idler wheels
- pivot arm (remove top screws first)
- shock absorber
- hinged portion of suspension

REMOVAL

 **NOTE :** To prevent cross shaft from turning when unscrewing screws assembled with Loctite, proceed as follows :

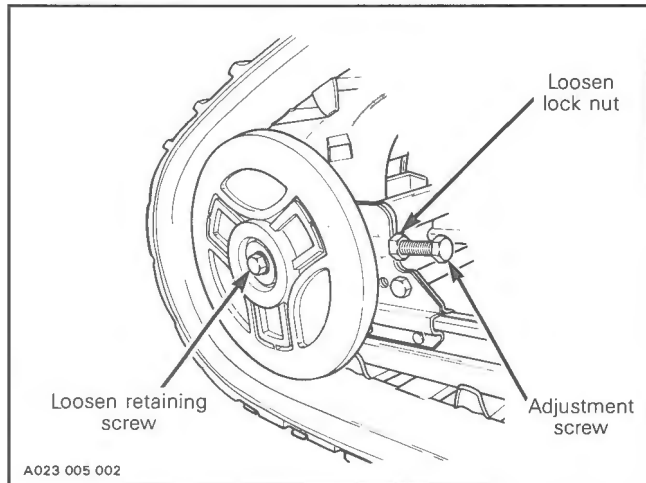
- Loosen one screw then retighten.
- Remove the other screw.
- Remove the first one.

Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

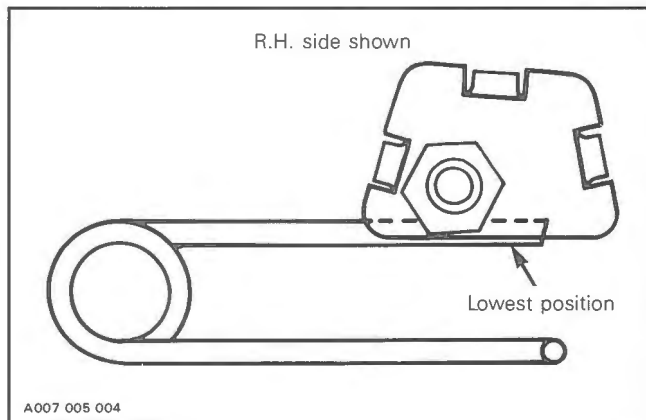
5,18, Adjustment screw

Using the appropriate equipment, lift the rear of vehicle. Release track tension by loosening rear axle retaining screws and adjustment screws on inner side of rear idler wheels.



61, Adjustment cam

Position the adjustment cam, both side of suspension, at the lowest position.



Using a large screwdriver, pry springs out.

10,81, Screw & idler wheel

Remove screws and upper idler wheel set.

99,101, Rear cross shaft & screw

Remove both screws securing rear arm to frame. Using appropriate equipment, lift rear of vehicle.

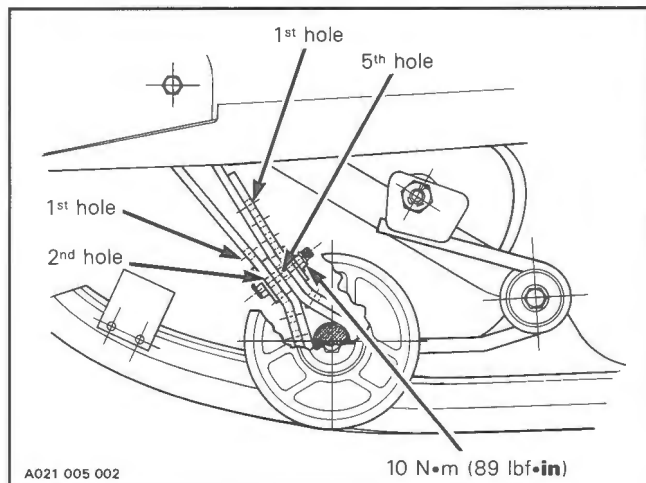
69,71, Front cross shaft & screw

Remove both screws securing the front arm to frame. Take suspension off.

DISASSEMBLY & ASSEMBLY

66,67, Stopper strap & nut

Inspect strap for wear or cracks and bolt and nut for tightness. If loose, inspect hole for deformation. Replace stopper strap as required. Make sure it is attached through proper holes as shown. Torque nut to 10 N•m (89 lbf•in).



29,30,50, Nut, screw & rear slider shoe

To replace a worn slider shoe, remove nut, screw and spirol pin then slide the shoe rearward out of the runner.

▼ **CAUTION** : Slider shoes must always be replaced in pairs.

29,30,55, Nut, screw & front slider shoe

To replace a worn slider shoe, remove nut, screw and spirol pin. Release tension on the hinged portion then lift to allow shoe removal. Slide the shoe rearward out of the runner.

▼ **CAUTION** : Slider shoes must always be replaced in pairs.

23,38,83,84, Bushing, screw & nut

Remove adjustment screw then screw and nut at pivot. Check bushings for rust and wear. Replace as required.

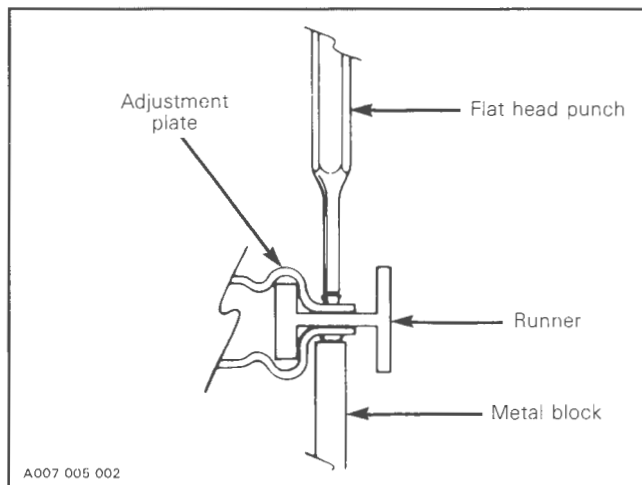
Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

4,22,24,28,41,45,51,52,58, Adjustment plate, pivot support, pivot plate, rivet, support, pivot support, reinforcement strip & front wheel support

To remove plate, support and reinforcement strips from runners, cut off the rivet heads with a cold chisel.

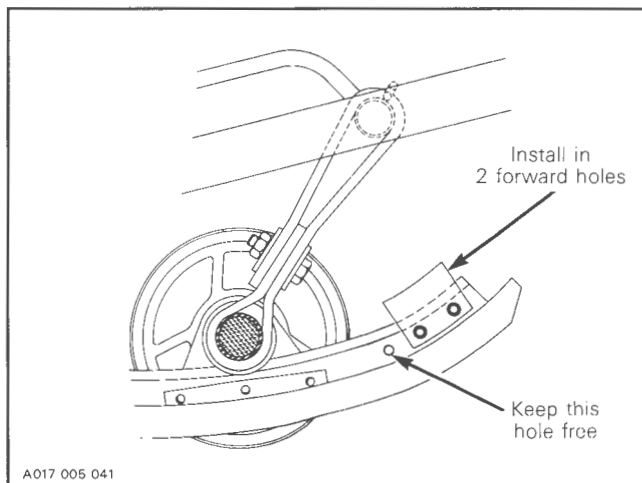
At assembly, position the rivet head outside of the runner then on a suitable metal block and hold the assembly firmly in place. With a flat head punch and a hammer, secure the rivet in place.



NOTE : Rivets can be substituted with 3/16 x 3/4 in screws and flanged elastic stop nuts. Position screw head outside of the runner.

56, Rubber stopper

When installing to runner, always position in the 2 forward holes.



46,47, Spring & bushing

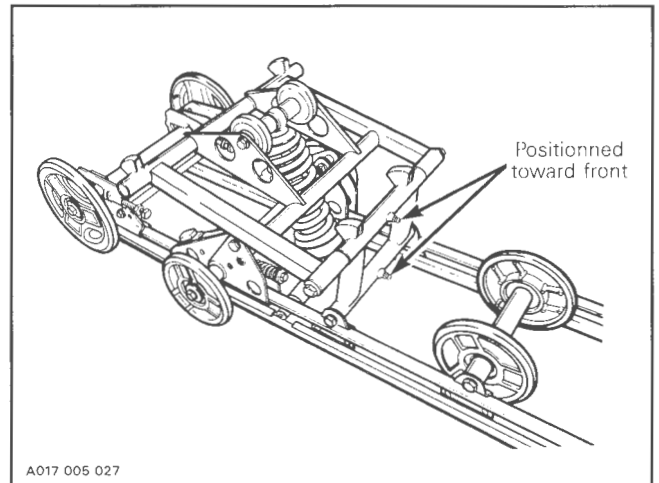
Make sure to insert nylon bushings inside springs.

19,31, Loctite & screw

Clean screw threads. Prior to assembling, apply low temperature grease (P/N 413 7061 00) on cross shaft and Loctite 271 or equivalent on threads.

75, Pivot arm

When assembling, position pivot arm so that grease fittings aim toward front.

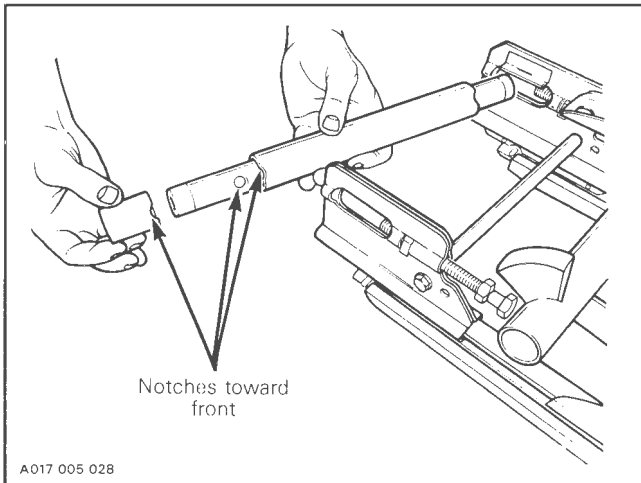


1,2,5,11, Spacer tube (long), rear axle, adjustment screw & spacer tube (short)

When assembling, position long spacer tube and rear axle so that their notches aim toward front. Position short spacer tube so that its notch aims inside of suspension and toward front. Notches positioning is important to allow effective fit with adjustment screw.

Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)



INSTALLATION

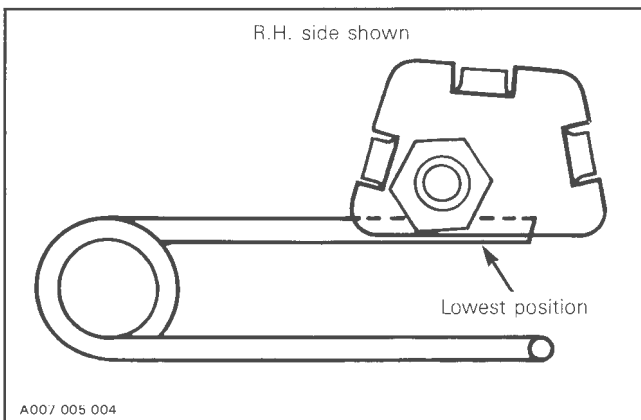
Preparation

1,5, Rear axle & adjustment screw

Loosen adjustment screws as far as possible to push rear axle forward.

61, Adjustment cam

Position at the lowest position.



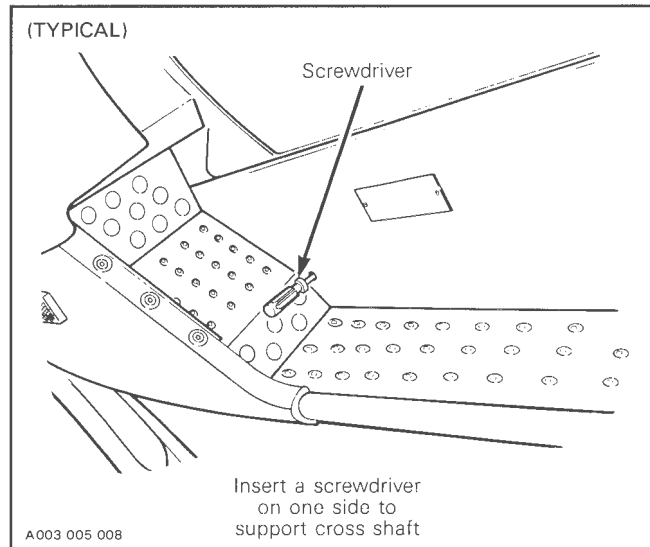
Installation

Using appropriate equipment, lift rear of vehicle. Install suspension into track beginning with rear portion.

68,69,71, Front arm, cross shaft & screw

Raise front portion of suspension aligning cross shaft with retaining screw holes.

— Insert a screwdriver into one side of frame to support cross shaft while installing screw in hole on other side. Do not tighten yet.

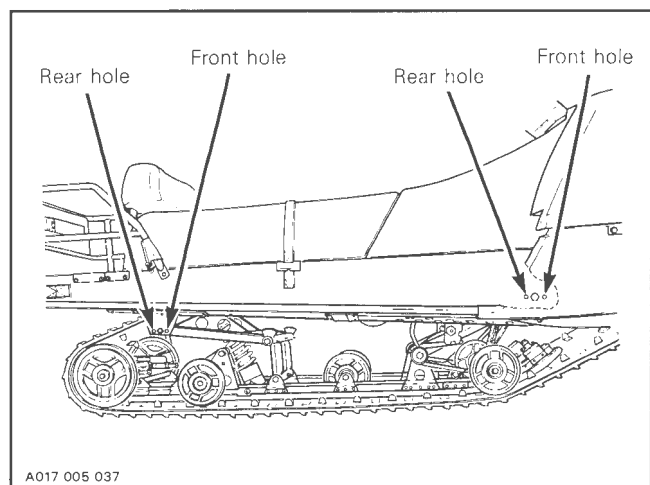


69,71,97,99, Cross shaft, screw & rear arm

- Lower the vehicle to install screws in the rear cross shaft.
- Reposition vehicle on ground.

NOTE : The holes in the frame provide the possibility of relocating the front and rear suspension arms to recover track tension adjustment. It means that if the slide suspension adjustment screws are fully tightened and the arms are the center holes in frame, it is possible to move the arms in the rear holes to obtain track tension adjustment.

Rear arm retaining screws should be located at the same hole position that front arm.



Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

CAUTION : Ensure that suspension arms are at the same position on each side of the frame at the front and at the rear, to avoid any damage to the suspension and the track.

71, Screw

Torque four suspension retaining screws to 41 N•m (30 lbf•ft).

32,46, Idler & front spring

Remove idler, install top of spring on adjustment cam. Using a large screwdriver, pry bottom of spring onto front wheel support.

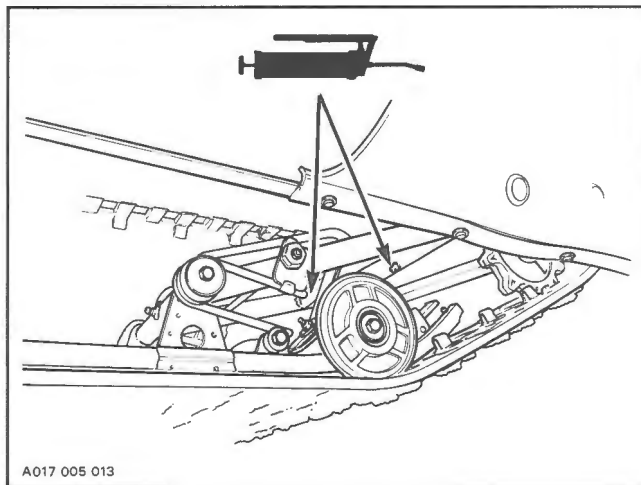
10,81, Screw & idler wheel

Install upper idler wheel set making sure to insert spacer at each end.

43, Grease fitting

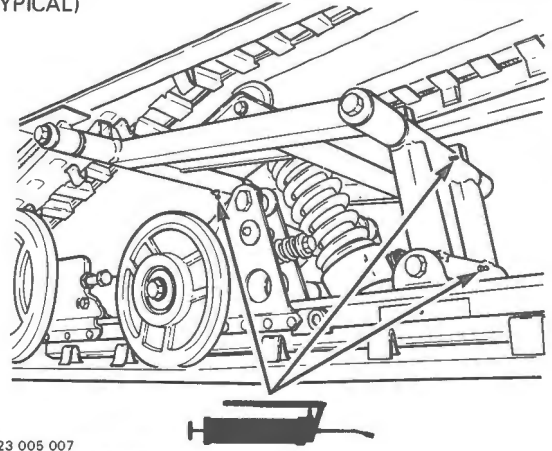
Lubricate the following parts at grease fittings until grease appears at joints. Use low temperature grease only.

— Front upper and lower cross shafts.



— Rear cross shaft and both shafts of shackle.

(TYPICAL)

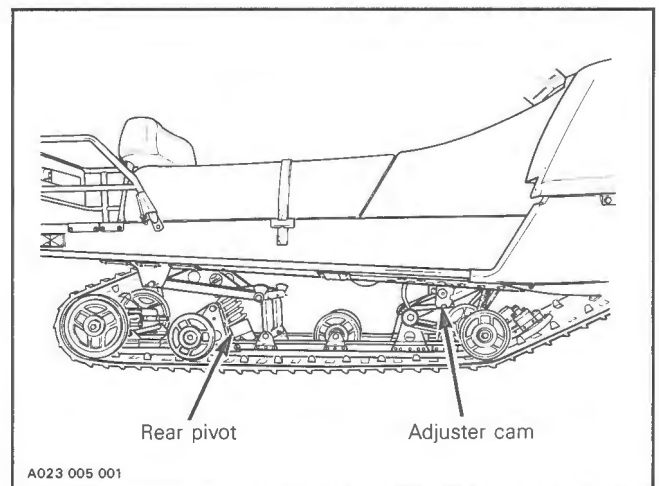


NOTE : To adjust track tension and alignment, refer to section 05-10.

RIDE ADJUSTMENT

Adjustment cam & rear pivot

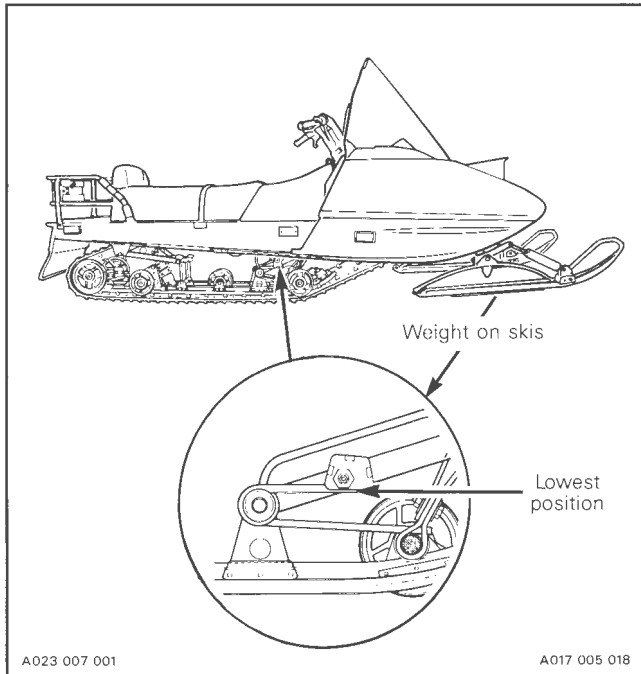
The front portion of the rear suspension is adjustable for surface condition and steering effects. Besides, the suspension rear pivot is adjustable depending the operator requirement.



When the front adjuster cams are at the lowest position, more weight is distributed to the skis thus giving a more positive steering.

Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)



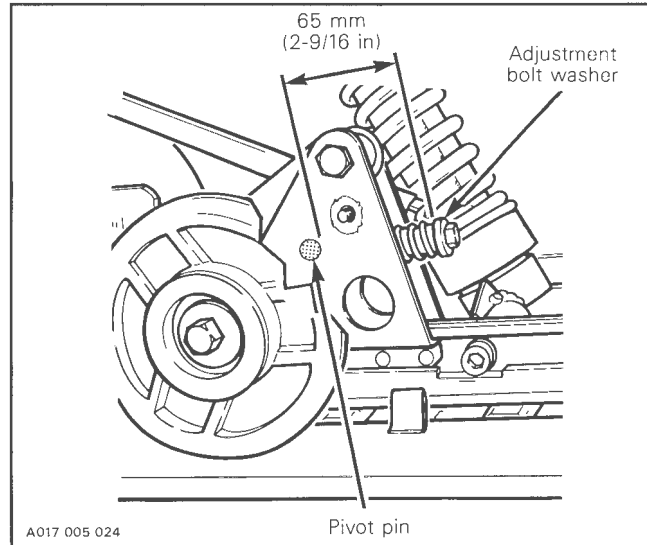
At the highest position, the weight is transferred to the track thus giving a better traction.

○ **NOTE :** For deep snow condition or hill climbing, it is recommended to place the front adjuster cams on the lowest position and set stopper strap to the shortest position.

▼ **CAUTION :** Always turn the left side adjuster cam in a clockwise direction, the right side cam in a counterclockwise direction. Left and right adjuster cams must always be set at the same position.

Suspension rear pivot

To prevent the rear portion of the track from digging in the snow when in reverse, the slide is hinged and spring loaded at the rear. To check for correct preload, measure the distance from the outer edge of the pivot pin to inner edge of the adjustment bolt washer. The distance should be 65 mm (2-9/16 in).



○ **NOTE :** This adjustment can be customized to meet particular need. For instance should one is most of the time pulling a load and use rarely the reverse, the rear pivot could be "locked" by fully tighten the adjustment bolt thus getting a better traction and a more positive steering.

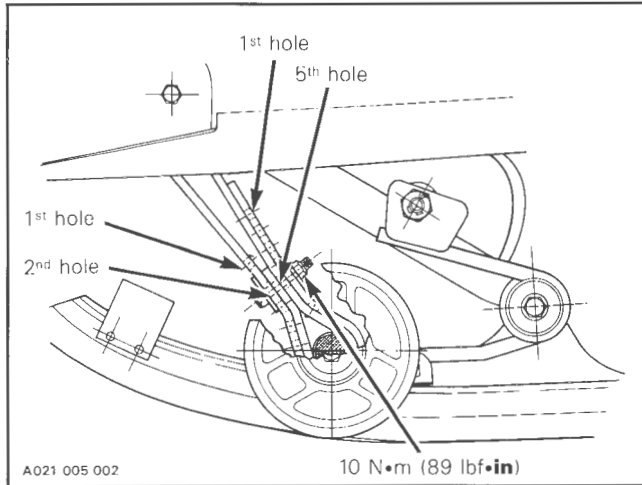
Stopper strap

The function of the suspension stopper strap is to control the transfer of vehicle weight **during acceleration**. The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive steering. Holes in the stopper strap allow adjustment according to driver's requirement, field and/or snow conditions.

For normal use locate bolt through 2nd hole and its corresponding hole #5 (as shown). For deep snow use, set to its shortest length.

Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

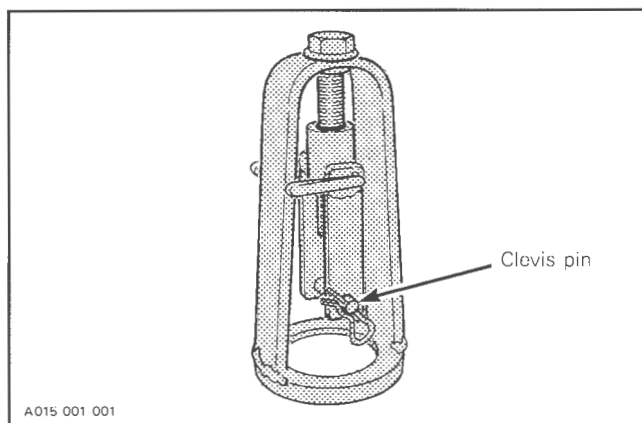


◆ **WARNING :** Always torque the nut to 10 N•m (89 lbf•in).

SHOCK ABSORBER SPRING REPLACEMENT

◆ **WARNING :** Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

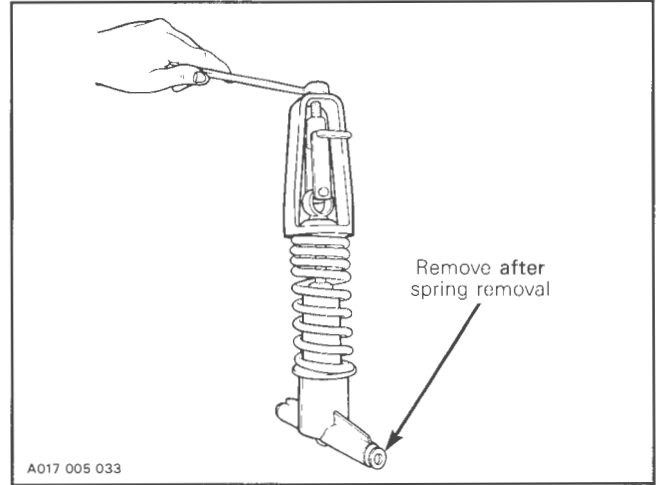
Use spring remover (P/N 414 5796 00).



77,85,86,87,88,89,90,93, Axle, ring, bushing, shock absorber, spring, spring stopper & idler wheel

Remove idler wheels, axle and shock absorber plastic bushings.

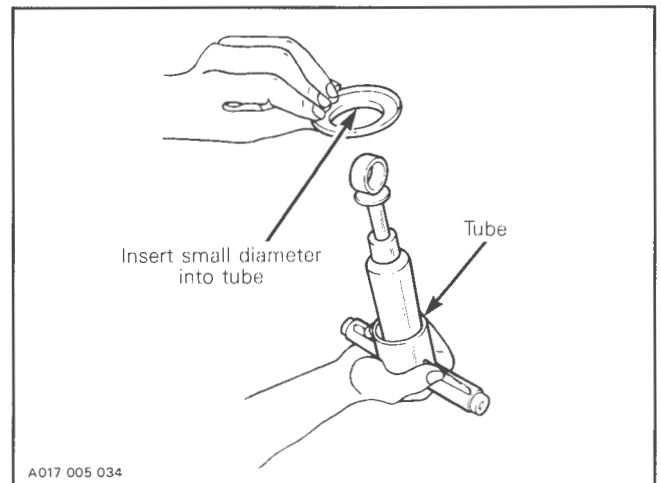
◆ **WARNING :** Do not remove bottom axle of shock absorber. Only take off **after** spring removal.



Install the shock spring remover over the spring. Insert clevis pin through the shock eye and secure it with the hair pin.

Tighten the bolt until the spring stopper can be removed. Remove lower axle.

○ **NOTE :** Prior to installing spring, make sure to properly install ring #85 under spring. Refer to illustration for ring position.

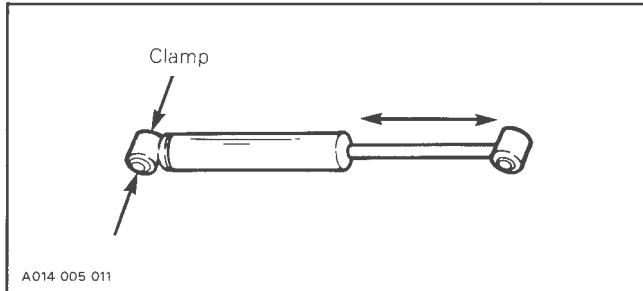


Section 05 SUSPENSION

Sub-section 07 (HINGED SUSPENSION)

SHOCK ABSORBER SERVICING

Secure the shock body end in a vise.



▼ **CAUTION :** Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke checking that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a faulty shock :

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme ends of stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any fault is present.

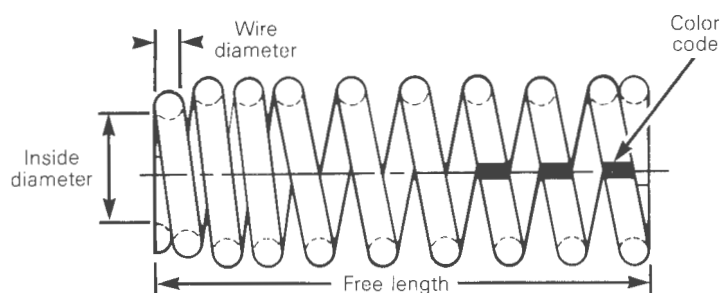
Section 05 SUSPENSION
Sub-section 07 (HINGED SUSPENSION)

SPECIFICATIONS

Shock absorber spring

| PART NUMBER | TOTAL NUMBER OF COILS | FREE LENGTH $\pm 2 \text{ mm}$ (.12") | SPRING RATE $\pm 0.7 \text{ N/mm}$ (41 lbf/in) | INSIDE DIAMETER | WIRE DIAMETER $\pm 0.05 \text{ mm}$ (.002") | COMPRESSED LENGTH | COLOR CODE |
|-------------|-----------------------|--|---|-----------------|--|-------------------|------------|
| 414 6663 00 | 10 | 180 mm (7.1") | 51/82 N/mm (291/468 lbf/po) | 38 mm (1.50") | 9.5 mm (.375") | 95 mm (3.75") | Yellow |

Spring description

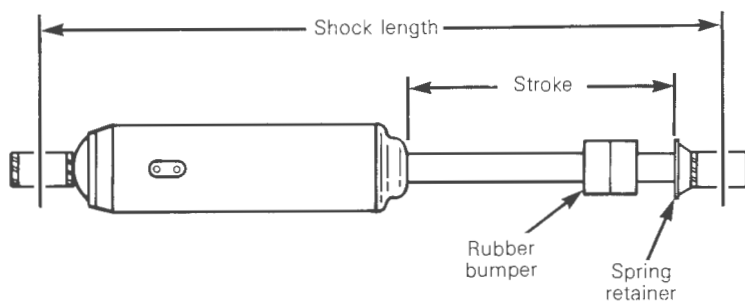


A017 005 035

Shock absorber

| PART NUMBER | FULL STROKE | LENGTH COLLAPSED | | LENGTH (EXTENDED) |
|-------------|---------------|-------------------|----------------------------|-------------------|
| | | AT BUMPER CONTACT | AT SPRING RETAINER CONTACT | |
| 414 6458 00 | 72 mm (2.83") | 193 mm (7.60") | 183.5 mm (7.22") | 355.5 mm (10.06") |

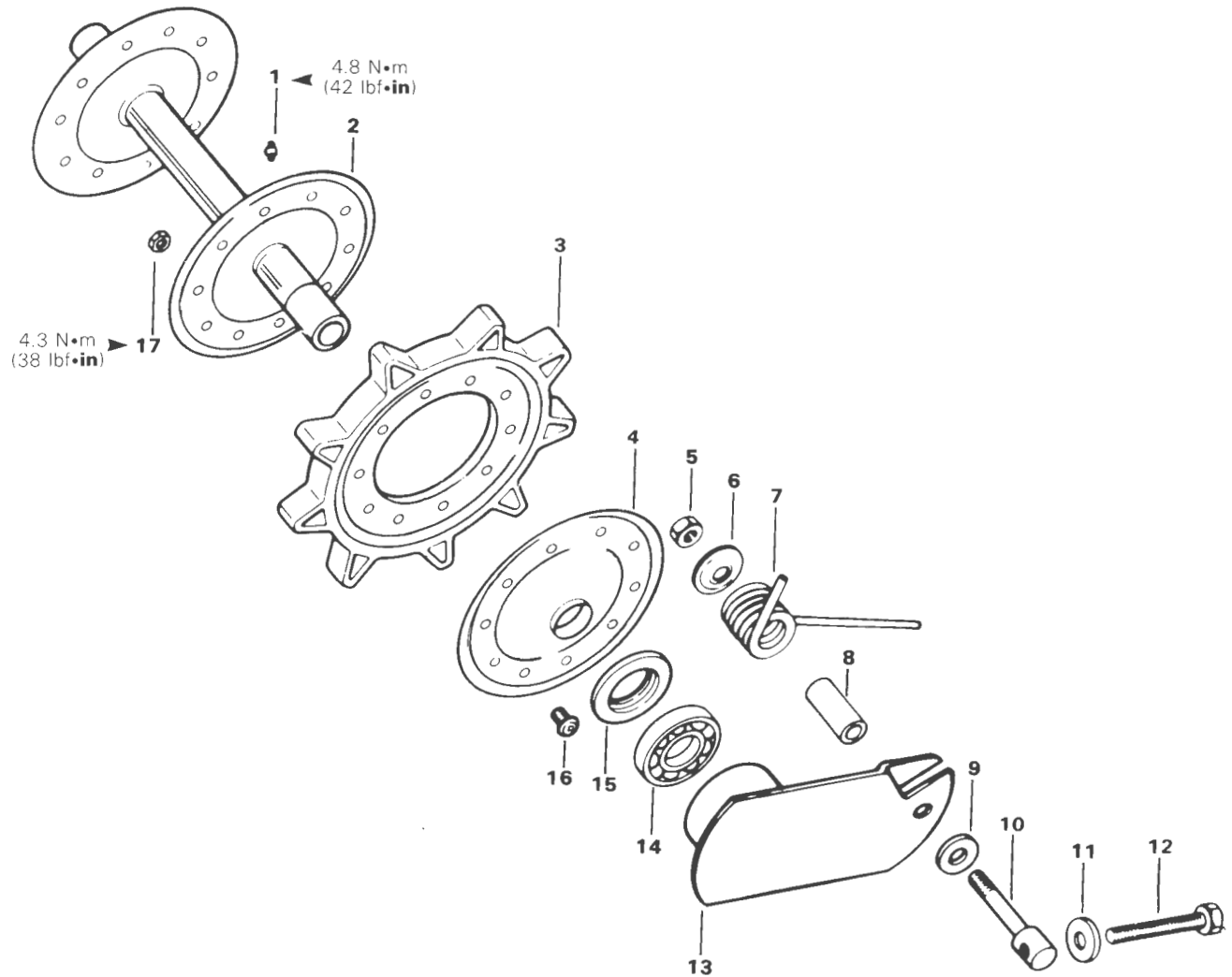
Shock description



A015 005 017

REAR AXLE

Elan



A002 005 025

1. Grease fitting
2. Rear axle
3. Sprocket (2)
4. Flange (2)
5. Lock nut 5/16-24 (2)
6. Retainer washer (2)
7. Link plate spring (RH & LH)
8. Sleeve (2)
9. Hardened washer (2)

10. Eye bolt (2)
11. Washer (2)
12. Adjuster bolt (2)
13. Link plate (RH & LH)
14. Bearing 6205 (2)
15. Seal (2)
16. Bolt (flange) 1/4-20 x 3/4 (18)
17. Nut (flange) 1/4-20 (18)

Section 05 SUSPENSION

Sub-section 08 (REAR AXLE)

REMOVAL

Lift and block rear of vehicle off the ground.

7, Link plate spring

Using an appropriate tool, unlock link plate springs.

5,6, Retainer washer & lock nut

Remove spring lock nut and retainer washer from both link plates.

8,9,10,11,12, Eye bolt, hardened washer, adjuster bolt, washer & sleeve

Remove track adjuster bolts, eye bolts, hardened washers and adjuster sleeves.

Withdraw rear axle from vehicle.

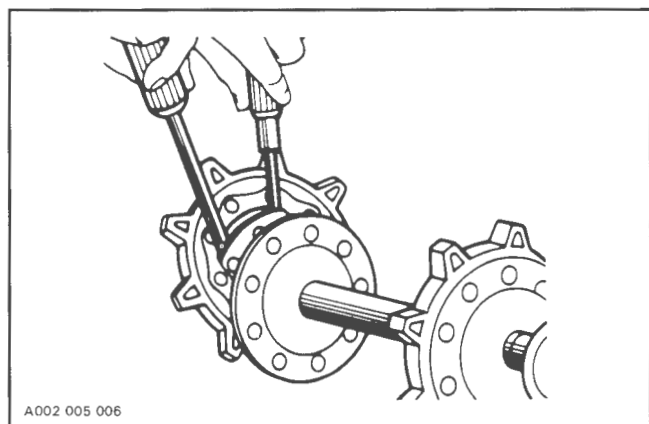
DISASSEMBLY & ASSEMBLY

3, Sprocket

Sprockets are factory riveted. When separation is necessary, remove rivets securing sprocket with a 1/4 in dia. drill bit.

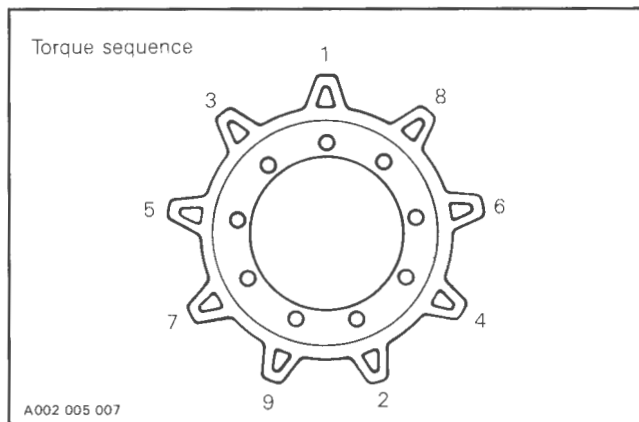
To remove sprocket without removing bearing, apply liquid soap or petroleum jelly on sprocket bead and flange. Using two screwdrivers or tire irons, carefully pry sprocket over the flange as shown.

Reverse procedure to install sprocket.



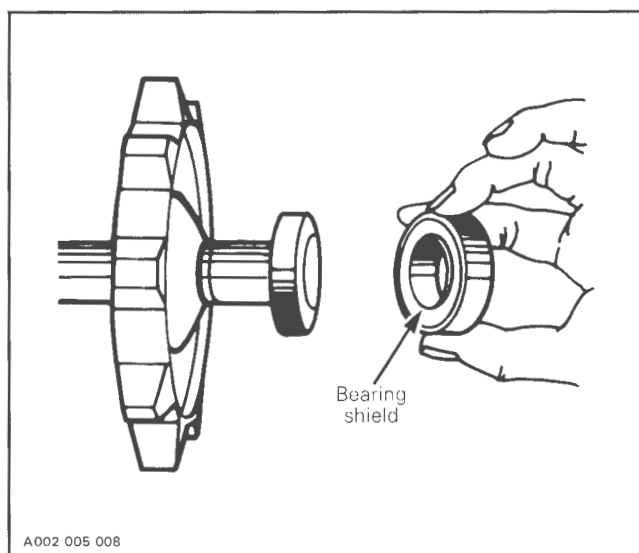
2,3,4,16,17, Rear axle, sprocket, flange, bolt & nut

At assembly, replace the rivets securing flange to sprocket with 1/4-20 x 3/4 in long screws and elastic stop nuts. Torque to 4.3 N•m (38 lbf•in) in the following sequence.



14, Bearing

Always pull or push the bearing by the inner race. Install bearing with shield facing the sprocket.



13,15, Link plate & seal

When reassembling, always use a new seal. When inserting seal into link plate ensure that seal lip sits correctly in link plate groove. After lubricating the rear axle, ensure that seal lip remains in position.

INSTALLATION

2, Rear axle

With rear of vehicle off the ground, position the rear axle within the track.

8,9,10, Sleeve, hardened washer & eye bolt

Install sleeves, hardened washers and eye bolts.


12, Adjuster bolt

Partially screw-in the track adjuster bolts.

5,6, Lock nut & retainer washer

Install retainer washers and partially tighten the link plate spring lock nuts.

Carry out track tension and alignment.


 **NOTE :** To adjust track tension and alignment, refer to section 05-10.

7, Link plate spring

Using a suitable tool hook up link plate springs.

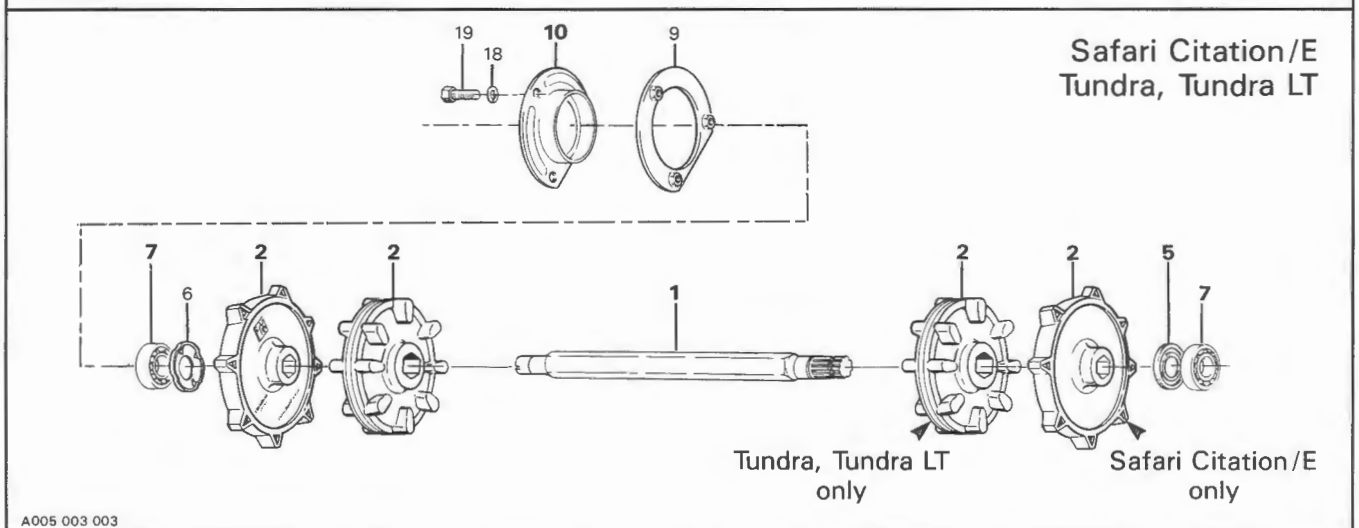
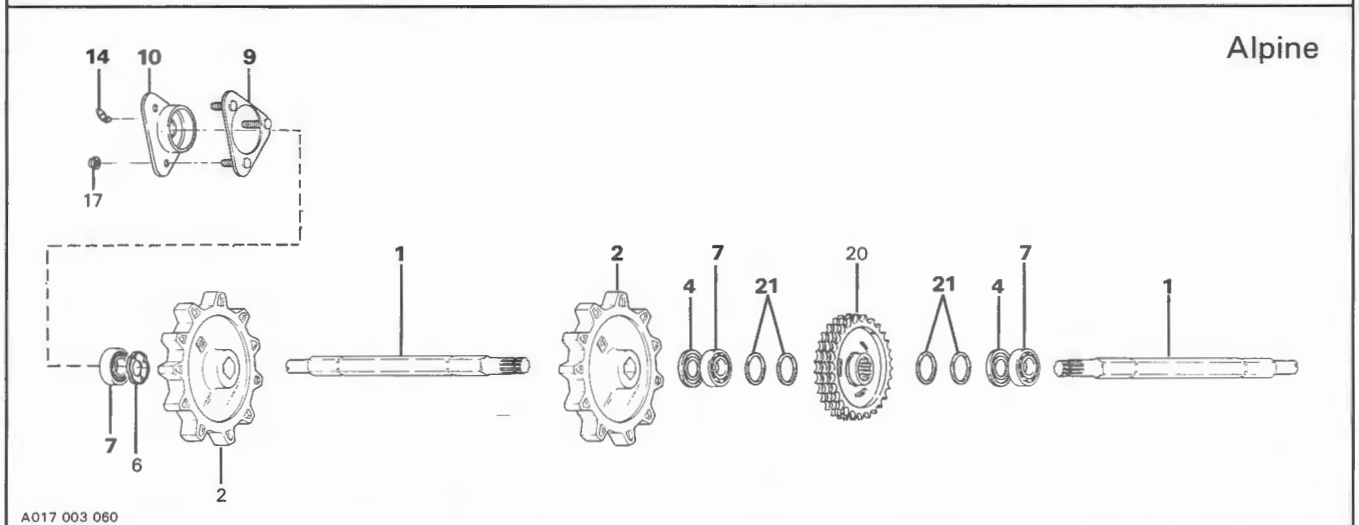
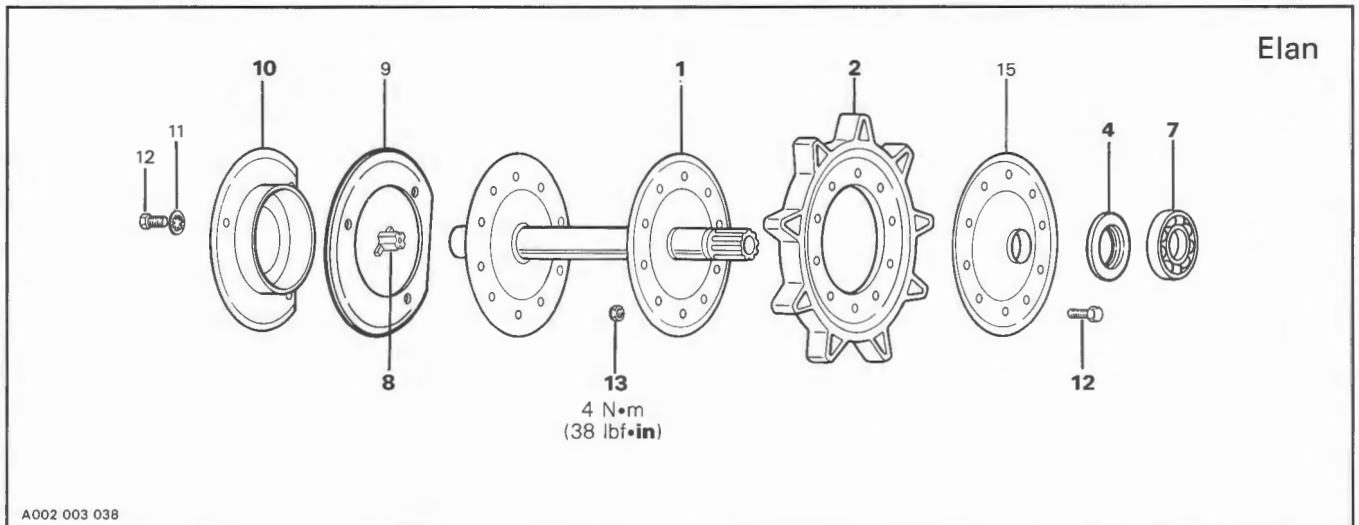
1, Grease fitting

If necessary, lubricate idler wheels through grease fittings until grease appears at joints. Use low temperature grease only (P/N 413 7061 00).

 **CAUTION :** After lubricating rear axle, always check that seal lip is in position in link plate groove.

Section 05 SUSPENSION
Sub-section 09 (DRIVE AXLE)

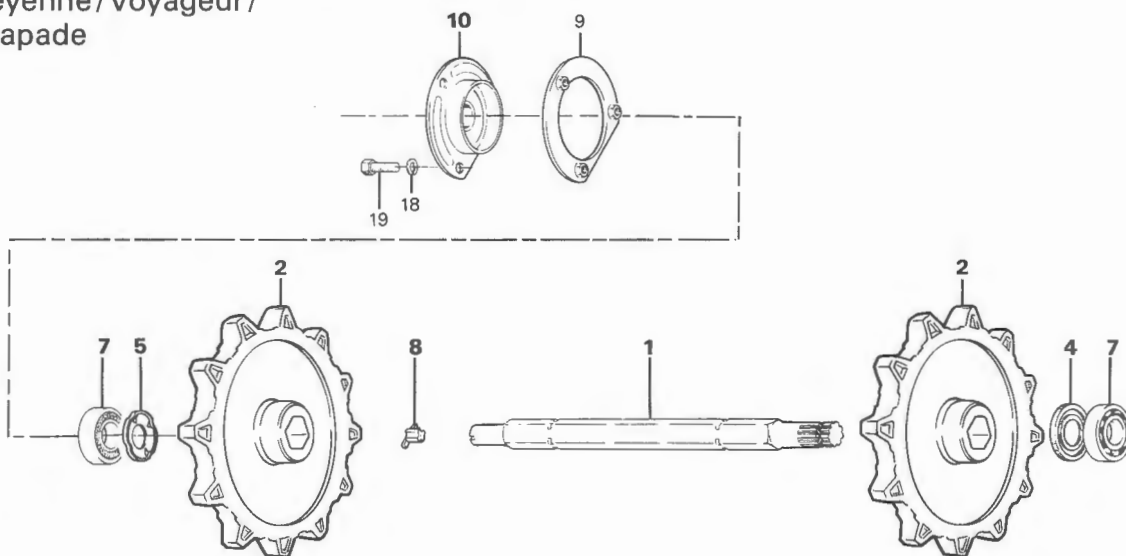
DRIVE AXLE



Section 05 SUSPENSION

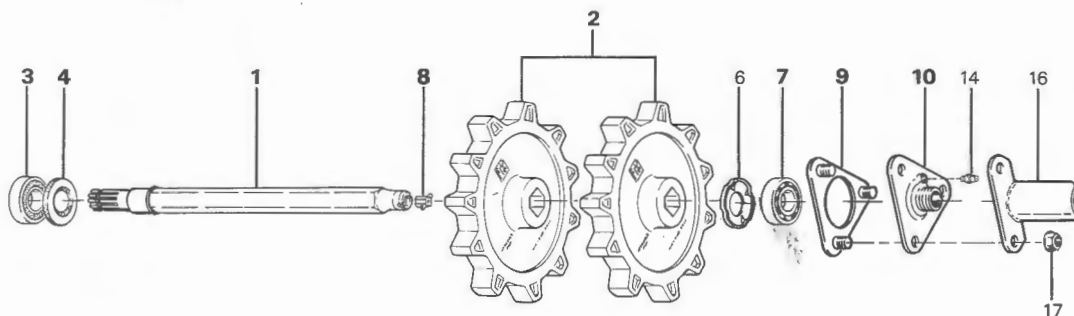
Sub-section 09 (DRIVE AXLE)

Safari Scout/Scout E/Saga/
Cheyenne/Voyageur/
Escapade



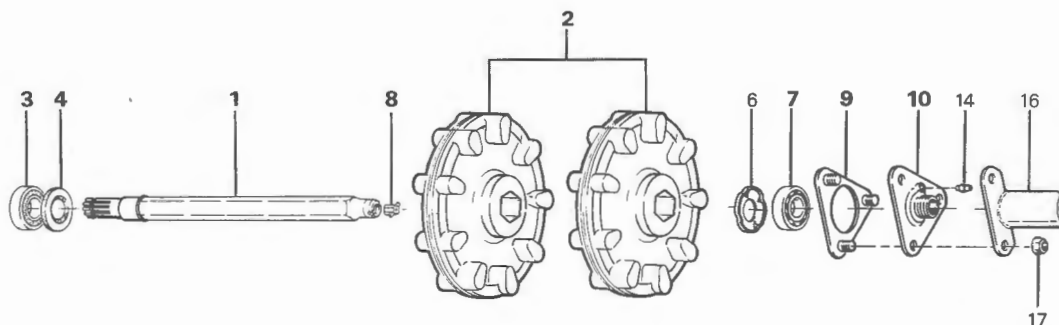
A009 003 022

Formula MX/MX LT/Plus/Plus LT



A016 003 029

Formula Mach I



A024 003 002

Section 05 SUSPENSION

Sub-section 09 (DRIVE AXLE)

1. Drive axle
2. Sprocket
3. Bearing 6206
4. Seal
5. Seal
6. Seal retainer
7. Bearing 6205
8. Speedometer drive insert
9. Retainer ring
10. End bearing housing
11. Lock washer 5/16 in

12. Hexagonal head cap screw 1/4-20 x 3/4
13. Hexagonal flanged elastic stop nut 1/4-20
14. Grease fitting
15. Mobile flange
16. Cable protector
17. Hexagonal flanged elastic stop nut M8
18. Lock washer 6 mm
19. Hexagonal head cap screw M6 x 16
20. Sprocket
21. Spacer

REMOVAL

Drain oil from chaincase or gear box (not necessary for Alpine II 503). Remove chaincase cover and release drive chain tension (if applicable).

Raise and block rear of vehicle off the ground.

Remove suspension. (See section 05).

4,5,10, Seal & bearing housing

NOTE : If applicable, remove muffler, battery and its support. If vehicle is equipped with a speedometer, remove angle drive unit and coupling cable if necessary.

Pry oil seals from chaincase and end bearing housing (if applicable).

Unlock sprocket from drive axle and remove with its spacer (if applicable).

NOTE : On Alpine II 503, pay attention to spacers #21, at the end of drive axle, to prevent falling into gearbox.

1,2, Drive axle & sprocket

Release drive axle sprocket from track and at the same time, pulling the drive axle towards the end bearing housing side.

Remove drive axle from vehicle.

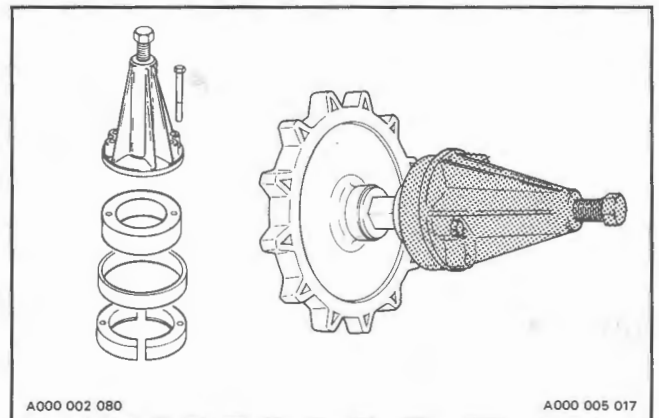
DISASSEMBLY

8, Speedometer drive insert

Remove speedometer drive insert (if applicable).

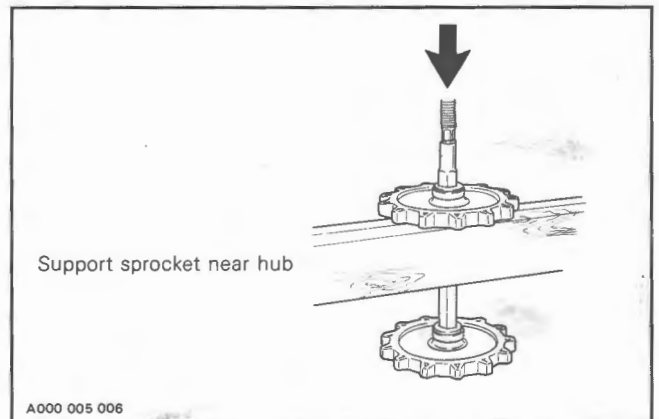
3,7, Bearing

To remove bearings, use puller assembly, ring and half rings as illustrated. (Refer to tools section).



2, Sprocket

To remove press fit sprockets (except Elan), use a press and a suitable support as illustrated.



NOTE : Two different sprocket press fit type can be found. Ensure to replace ring reinforced sprockets with the same type.

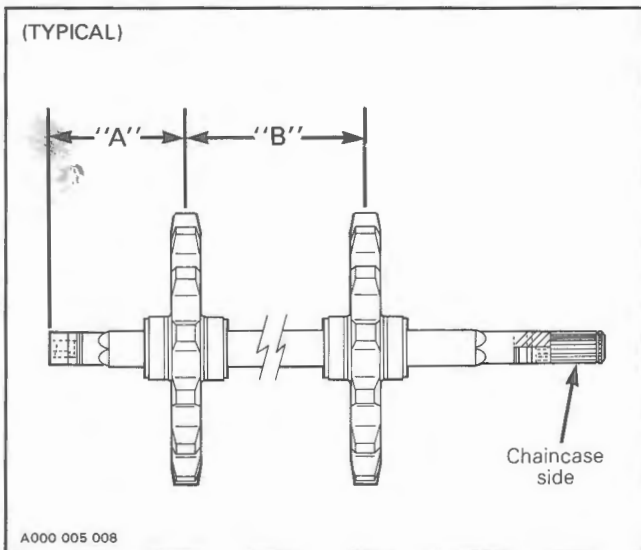
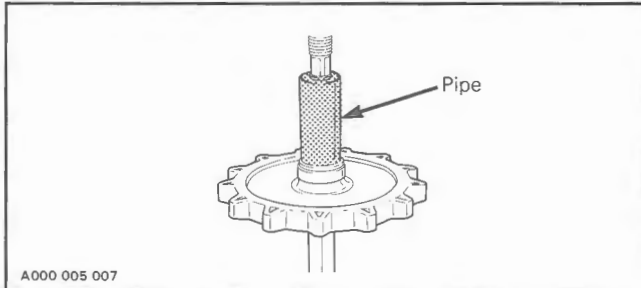
Section 05 SUSPENSION

Sub-section 09 (DRIVE AXLE)

ASSEMBLY

1,2, Drive axle & sprocket

To assemble press fit sprockets, use a press and a suitable pipe as illustrated. Sprockets must be assembled according to the following dimensions.

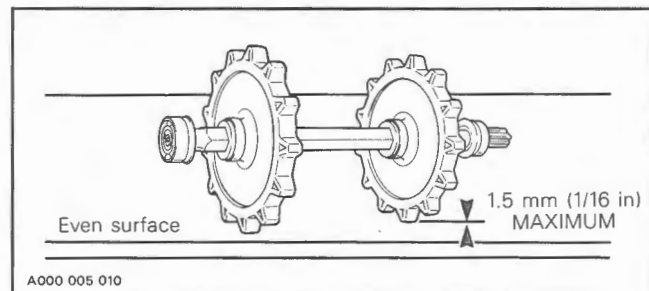


| APPLICABLE MODELS | "A" mm (in) | "B" mm (in) |
|--|----------------|---------------|
| Alpine II 503 | 106 (4-11/64) | 242 (9-17/32) |
| Safari Citation / E | 135 (5-5/16) | 138 (5-7/16) |
| Tundra, Tundra LT | 83 (3-17/64) | 242 (9-17/32) |
| Safari Scout / Scout E / Saga / Cheyenne / Voyageur / Escapade | 104.5 (4-7/64) | 242 (9-17/32) |
| Formula MX | 114.5 (4-1/2) | 226 (8-57/64) |
| Formula MX LT / Plus / Plus LT | 106.5 (4-3/16) | 242 (9-17/32) |
| Formula Mach I | 166 (6-17/32) | 123 (4-27/32) |

Ensure to align indexing marks on each sprocket before assembling the second sprocket.

The maximum desynchronization tolerance for the sprockets is 1.5 mm (1/16 in).

To check this tolerance, place axle assembly on a plane surface and measure the gap between sprocket teeth and surface.

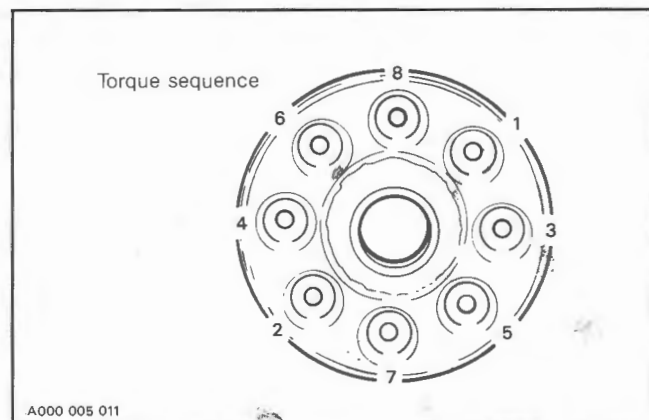


CAUTION : The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

12,13, Cap screw & elastic stop nut

On Elan, torque nuts of axle flanges to 4 N•m (38 lbf•in).

When reassembling, install a new nut or apply Loctite (or equivalent) on old threads. Tighten in the following sequence.

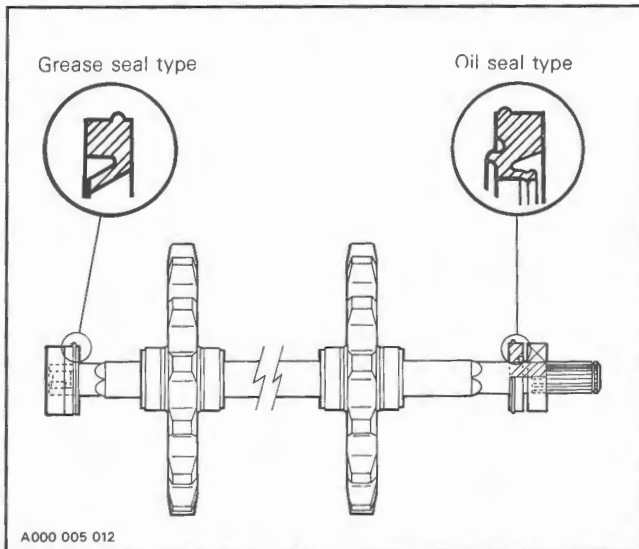


1,4,5, Drive axle & seal

When assembling drive axle, always position a new seal on each end of drive axle (if applicable). Locate seal lip as illustrated.

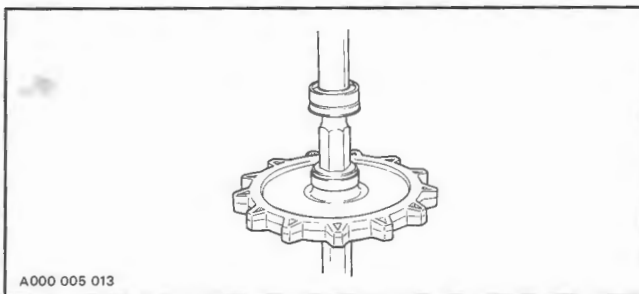
Section 05 SUSPENSION

Sub-section 09 (DRIVE AXLE)

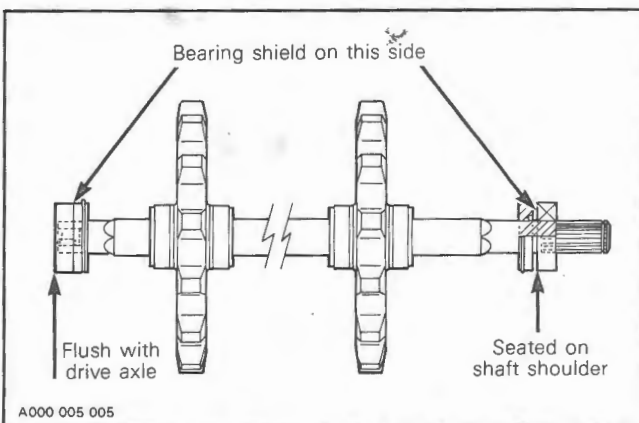


3,7, Bearing

Always push bearing by inner race.



The bearing on the splined side of axle must be pushed until it is seated on shaft shoulder. The end bearing housing bearing must be flush with end of drive axle. Each bearing must have its shield facing the sprocket.



AXIAL PLAY

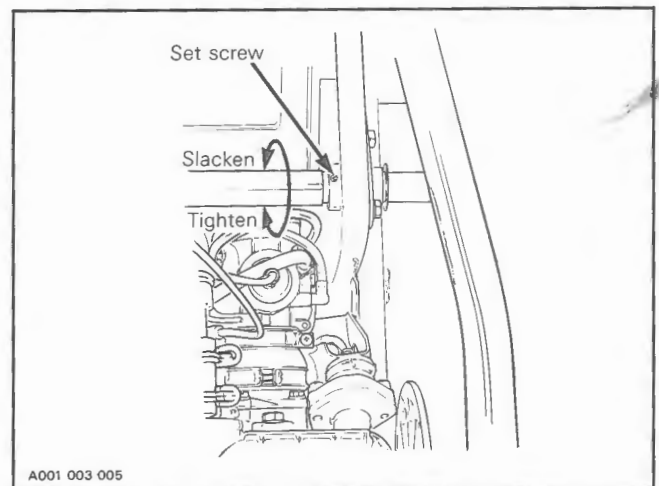
Formula models

Ensure there is no deformation of the sheet metal around the end bearing housing. Straighten as required.

Before attempting to adjust the drive axle axial play, check the chaincase perpendicularity as follows :

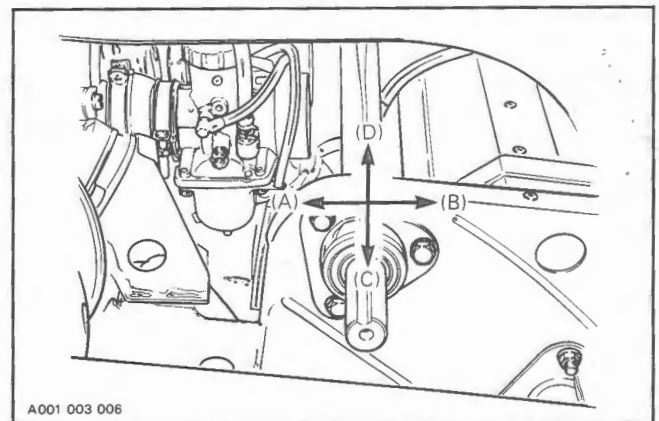
CHAINCASE PERPENDICULARITY ADJUSTMENT

- Remove driven pulley.
- Slacken bearing collar set screw and working from the driven pulley side, turn bearing collar clockwise (countershaft normal rotating direction).



- Extract ball bearing from its support.

Wrong chaincase perpendicularity will make it difficult to correctly install the ball bearing in its support due to the countershaft and support misalignment.



Section 05 SUSPENSION

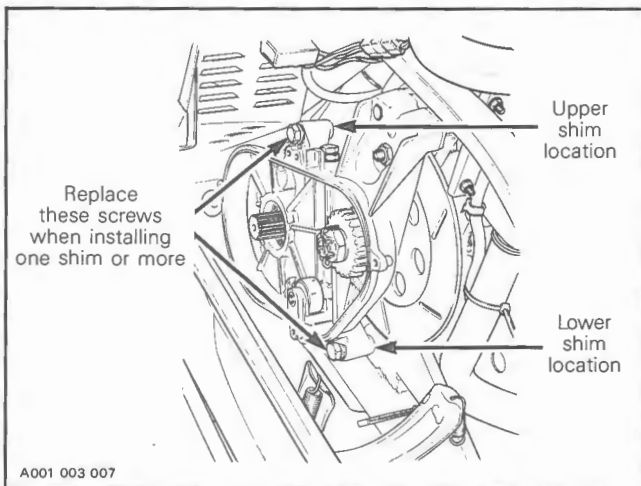
Sub-section 09 (DRIVE AXLE)

— Add shim(s) between chaincase and frame to obtain easy ball bearing installation.

CAUTION : When installing one shim ore more between chaincase and frame, replace screws with longer ones (50 mm long).

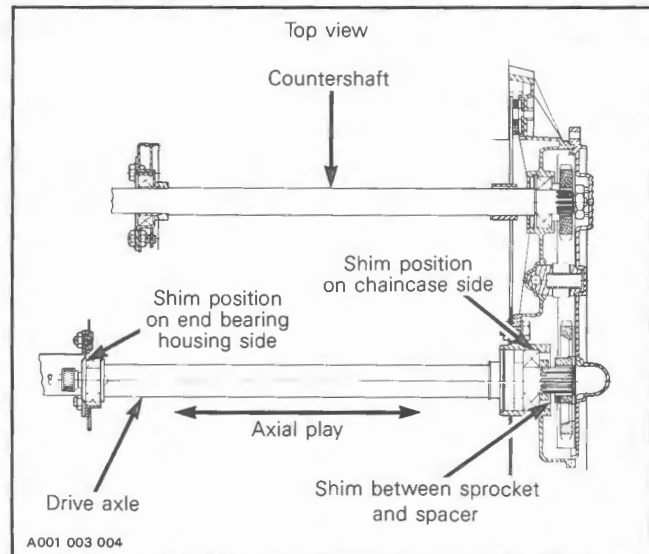
| DIRECTION OF RESISTANCE AGAINST BALL BEARING INSTALLATION | | | | |
|---|--------------------------------------|-------------------------------------|---------------------------------------|------------------------------------|
| | (A) TOWARD FRONT OF VEHICLE | (B) TOWARD REAR OF VEHICLE | (C) TOWARD BOTTOM OF VEHICLE | (D) TOWARD TOP OF VEHICLE |
| SHIM LOCATION | LOWER | UPPER | LOWER | UPPER |

This chart can be use as a "starting point" to correct the chaincase perpendicularity.

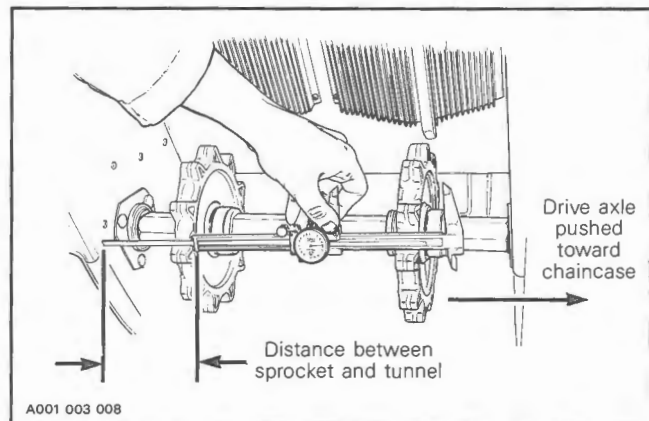


— Do not reinstall the driven pulley at this time.

AXIAL PLAY ADJUSTMENT



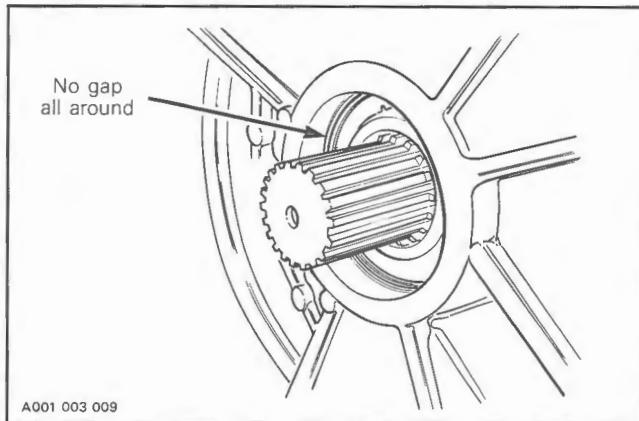
— Push the drive axle toward chaincase and take note of the distance between the sprocket and tunnel.



Section 05 SUSPENSION

Sub-section 09 (DRIVE AXLE)

CAUTION : Be sure drive axle bearing makes full contact all around the shoulder of the bearing bore.



— Pull drive axle toward the end bearing housing and take note of the measurement between sprocket and tunnel. The drive axle axial play is the difference between these two measurements.

— Repeat this procedure two or three times to obtain an accurate measurement.

The allowable drive axle axial play is 0 to 1.5 mm (0 to .060 in).

The drive axle axial play, as calculated above, should be within the allowable axial play, add shim(s) accordingly.

— Remove drive axle, install required shim(s) as per the "SHIM POSITION" chart, reinstall drive axle without the suspension and track.

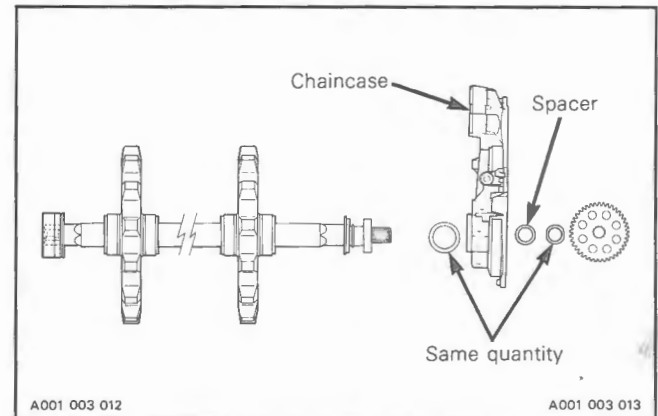
SHIM POSITION

Shim position is important to maintain proper sprocket alignment.

CAUTION : Install shim(s) following the pattern shown in the chart.

| SHIM(S) REQUIRED | SHIM POSITION AND QUANTITY | |
|---------------------|-----------------------------|-------------------|
| | END BEARING HOUSING SIDE | CHAINCASE SIDE |
| 1 | 1 | |
| 2 | 1 | 1 |
| 3 | 2 | 1 |

When installing shims between the chaincase and the drive axle bearing, there must be same quantity of shims between the drive chain sprocket and spacer.



— Doublecheck drive axle axial play as described above.

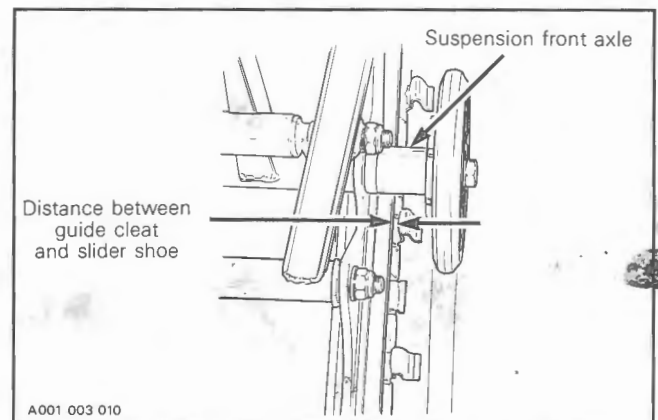
— Modify total shim thickness as required.

— Reinstall track and suspension. Adjust track tension and alignment.

NOTE : Center the track suspension to ensure that the alignment check made in the next step is accurate.

— To center, grasp the track suspension and move it sideways, left and right. Position the track suspension at the midpoint of its sideways movement.

— Check track front alignment by measuring the gap, on each side between guide cleat and the slider shoe, behind the suspension front axle as shown.



Section 05 SUSPENSION
Sub-section 09 (DRIVE AXLE)

If the difference between each side exceeds 3 mm (1/8 in), redistribute drive axle shims as follows :

| DIFFERENCE BETWEEN EACH SIDE | 3 to 4.5 mm (1/8 to 3/16 in) | 4.5 to 6 mm (3/16 to 1/4 in) |
|---|--|--|
| DRIVE AXLE SHIM REDIS- TRIBUTION | Remove one shim from larger gap side Add one shim on smaller gap side | Remove two shims from larger gap side Add two shims on smaller gap side |

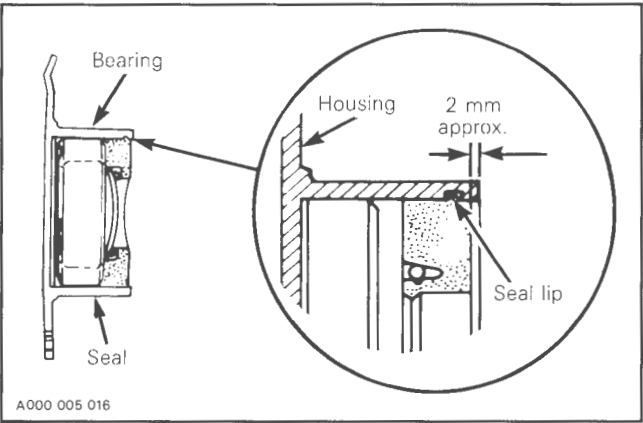
INSTALLATION

8, Speedometer drive insert

If the drive axle to be installed is a new part and the vehicle is equipped with a speedometer, a correct size speedometer drive insert must be installed into the axle end. Ensure that insert is flush with end of axle (not applicable to Alpine II 503).

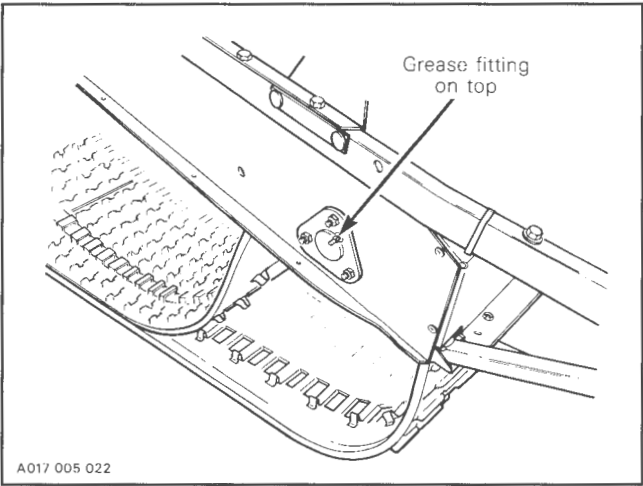
Position drive axle assembly into location. Install end bearing housing. Install spacer (if applicable) between bearing and lower chaincase sprocket (on Alpine II 503, place spacers prior to installing drive axle).

Install chaincase and position seals (if applicable), making sure that a gap of approximately 2 mm (1/16 in) exists between end of bearing housing and each seal.



Alpine II 503

When installing end bearing housing, ensure to position grease fitting on top. This is required to have proper alignment with access hole.



All models

Lock drive axle sprocket with a circlip (use new cotter pin on Elan).

Reinstall the chaincase cover (if applicable).

Refill with chaincase oil. (See technical data, section 08).

Install the suspension. Adjust track tension and carry out track alignment procedure. (See section 05-10).

LUBRICATION

14, Grease fitting

Lubricate end housing bearing with low temperature grease (N/P 413 7061 00).

TRACK

TRACK TYPE APPLICATION

Refer to the "Technical data" section 08.

GENERAL


This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

INSPECTION

Visually inspect track for :

- cuts and abnormal wear
- broken rods
- broken or missing track cleats

If track is damaged or rods are broken, replace track. For damaged or missing cleats, replace by new ones, using cleat remover (P/N 529 0082 00) and large-cleat installer (P/N 529 0077 00) or small-cleat installer (P/N 529 0085 00).

 **WARNING : Do not operate a snowmobile with a cut, torn or damaged track.**

REMOVAL

Elan

Remove the following items :

- tool box
- chaincase access plug
- drive axle cotter pin and washer
- suspension
- rear axle
- both drive axle seals
- end bearing housing
- drive axle
- track

Alpine II 503

Remove the following items :

- stabilizer bar
- upper center idler wheel ass'y
- rear suspension(s)
- end bearing housing(s)

- drive axle(s) (through end bearing housing hole then, take off toward center of vehicle)
- track(s)

Safari Citation/E, Tundra, Tundra LT

Remove the following items :

- battery (if so equipped)
- chaincase cover, sprockets, chain
- muffler
- upper center idler ass'y
- suspension
- end bearing housing
- drive axle seal
- drive axle (outwards from end bearing housing)
- track

Safari Scout/E, Safari Saga, Safari Cheyenne, Safari Voyageur, Safari Escapade

Remove the following items :

- battery and battery support (if so equipped) (except Safari Cheyenne)
- chaincase cover, to drain oil
- upper center idler ass'y (Safari Cheyenne only)
- rear suspension
- drive axle seal on chaincase side
- speedometer cable and end bearing housing
- sprockets and chain
- drive axle (outwards from end bearing housing)
- track

Formula MX/MX LT/PLUS

Remove the following items :

- speedometer cable
- muffler
- chaincase cover to drain oil
- suspension
- drive axle seal
- end bearing housing
- Sprockets and chain
- drive axle (toward end bearing housing)
- track

Section 05 SUSPENSION

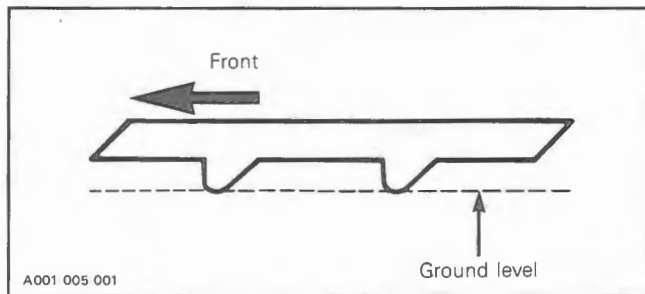
Sub-section 10 (TRACK)

INSTALLATION

All models

Reverse the removal procedure.

NOTE : When installing the track, ensure the right angle of bearing surface of the track rib is facing the front of vehicle.



Track tension & alignment

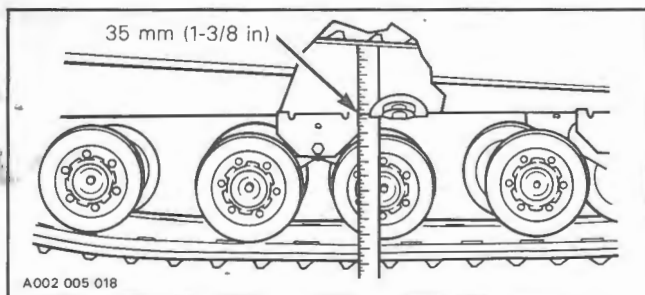
Track tension and alignment are inter-related. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Tension (bogie wheel)

Elan

With rear of vehicle blocked off the ground, check the track tension at middle set of bogie wheels.

35 mm (1-3/8 in) between top inside edge of track and bottom of foot board as shown.



To correct track tension, loosen link plate spring lock nuts on inner side of link plate springs. Turn adjuster bolts clockwise to tighten track or counter-clockwise to slacken.

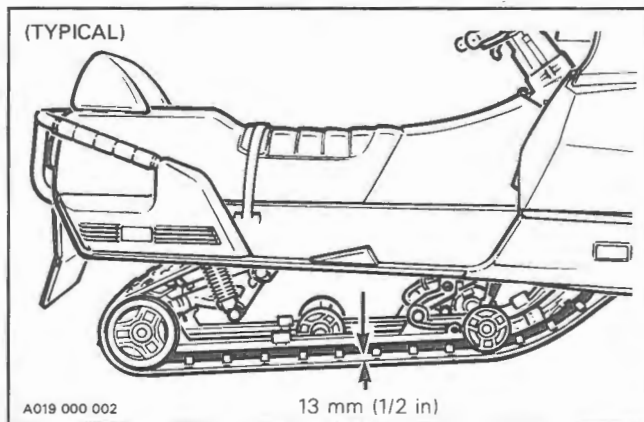
Tighten link plate spring lock nuts.

CAUTION : Too much tension will result in power loss and excessive stress on suspension components. If too loose, the track will have a tendency to thump.

Tension (slide suspension)

Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap half-way between front and rear idler wheels. Measure between slider shoe and bottom inside of track.

Safari Citation/E, Tundra, Tundra LT, Safari Scout/E, Safari Saga, Safari Voyageur, Safari Escapade



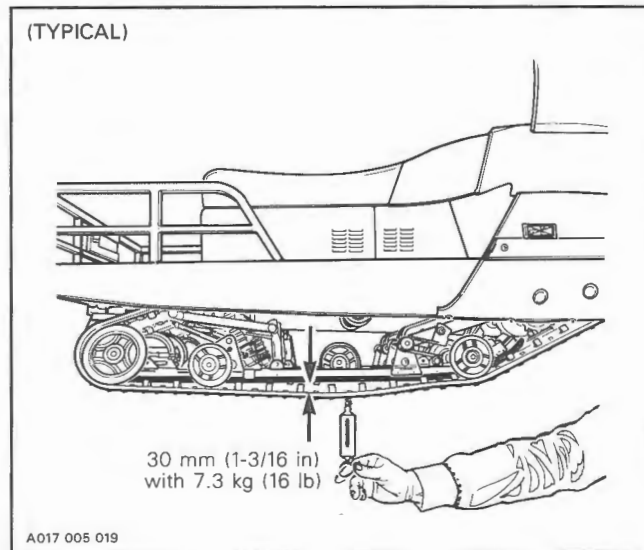
Alpine II 503, Safari Cheyenne
Formula MX/MX LT/PLUS/PLUS LT/MACH 1

WARNING : Since Alpine II 503 is equipped with a twin suspension system, always ensure to perform the same adjustments on each rear suspension.

Section 05 SUSPENSION

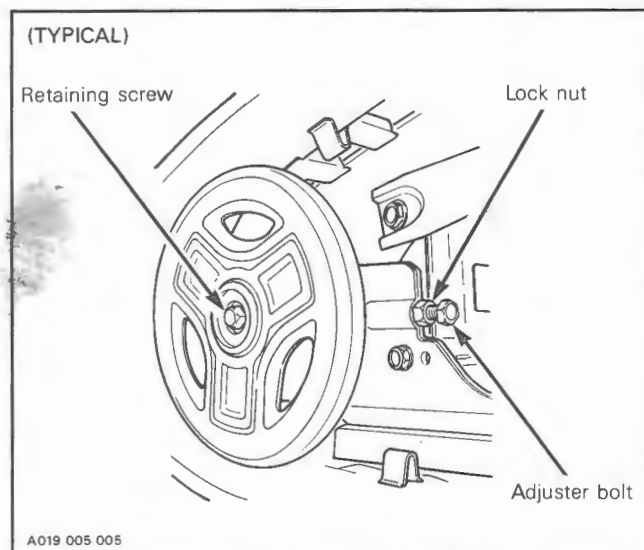
Sub-section 10 (TRACK)

30 mm (1-3/16 in) when exerting a downward pull of 7.3 kg (16 lb).



CAUTION : Too much tension will result in power loss and excessive stress on suspension components. If too loose, the track will have a tendency to thump.

To adjust loosen the rear idler wheel retaining screw (not required on Safari Citation/E, models) and the adjuster bolt lock nut; then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



Alignment (bogie wheel)

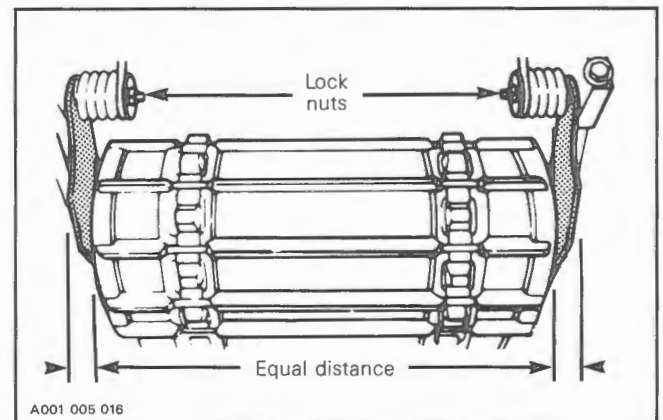
Elan

With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Check if track is well centered and turns evenly on rear sprockets. Distance between edge of track and link plate must be equal on both sides.

NOTE : Sometimes, after reinstalling, sprocket teeth seem to skip out of track notches. Apply liquid soap on sprocket teeth to correct.

WARNING : Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, feet, tools and clothing clear of track.



Rotate track slowly and recheck alignment and tension.

To correct alignment, loosen link plate spring lock nut on side where track is closest to the link plate.

Turn track adjuster bolt on same side, clockwise until track re-aligns.

Tighten link plate spring lock nut.

Alignment (slide suspension)

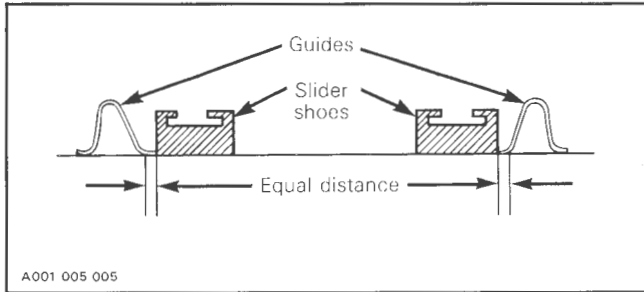
WARNING : Since Alpine II 503 is equipped with a twin suspension system, always ensure to perform the same adjustments on each rear suspension.

With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Section 05 SUSPENSION

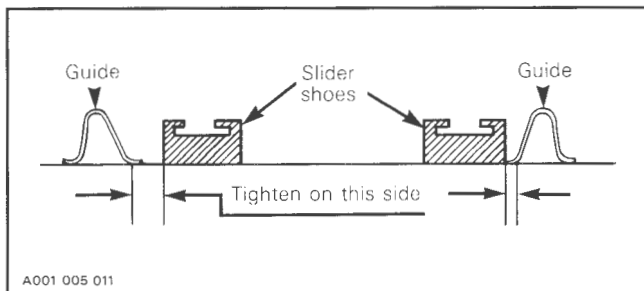
Sub-section 10 (TRACK)

Check that the track is well centered ; equal distance on both sides between edges of track guides and slider shoes.



WARNING : Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track.

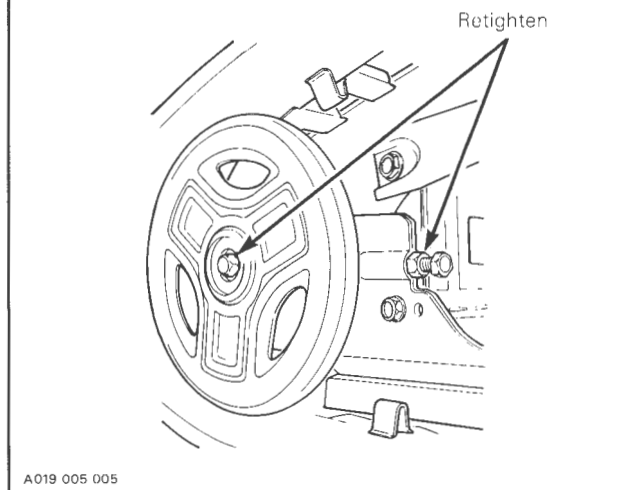
To correct, stop engine then loosen the lock nuts and tighten the adjuster bolt on side where guides are farthest to slide. Tighten lock nuts and recheck alignment.



NOTE : On the Formula MX/MX LT/PLUS/PLUS LT/MACH 1, torque retaining screw to 48 N•m (35 lbf•ft) after adjustment.

Tighten lock nuts and the idler wheel retaining screws.

(TYPICAL)

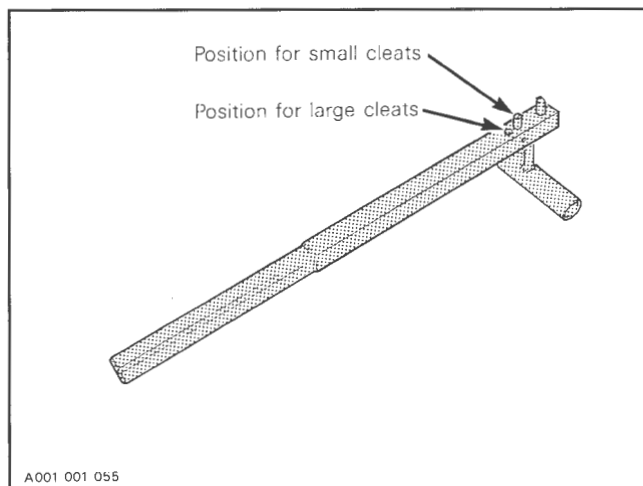


Restart engine, rotate track **slowly** and recheck alignment.

TRACK CLEAT

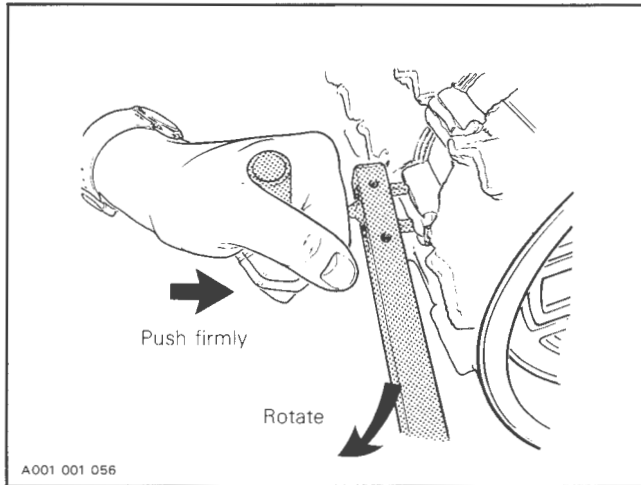
Removal

- Raise rear of vehicle off the ground and lift snow guard then rotate track to expose a cleat to be replaced.
- Using track cleat remover (P/N 529 0082 00) with its pin properly positioned, remove the cleat.



Section 05 SUSPENSION

Sub-section 10 (TRACK)

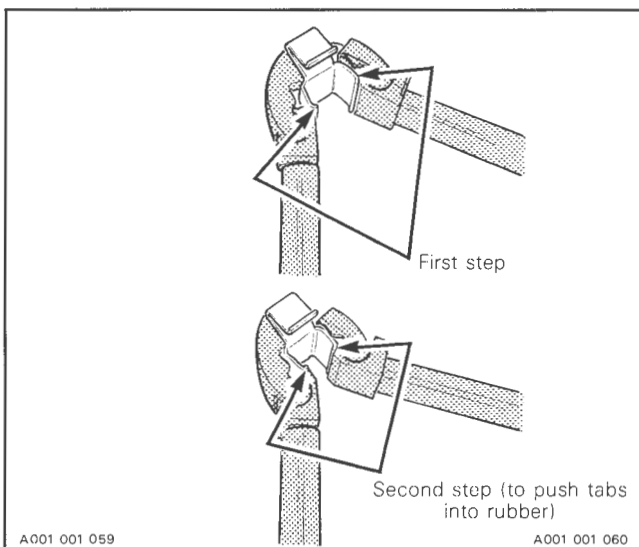


○ **NOTE :** Pins can be rotated 180° depending on whether the tool is used by a left-hander or a right-hander.

Installation

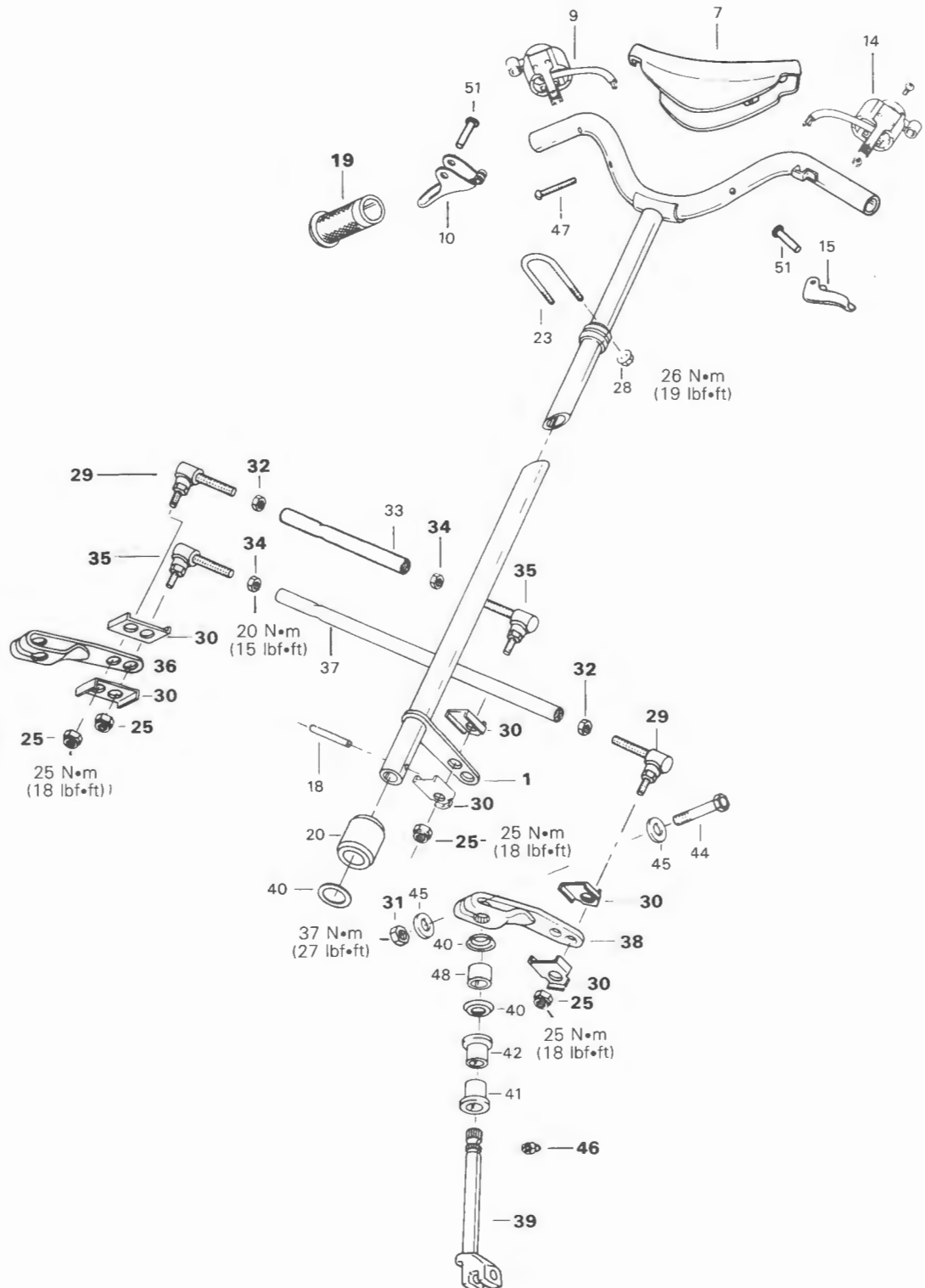
○ **NOTE :** Keep the same pitch between cleats.

--- Place new cleat in position and using small track cleat installer (P/N 529 0085 00) or large cleat installer (P/N 529 0077 00) bend cleat then push tabs into rubber.



STEERING SYSTEM

Elan




Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

Elan

- | | |
|------------------------------------|---------------------------|
| 7. <i>Steering pad</i> | 32. <i>Jam nut LH</i> |
| 9. <i>Emergency cut-out switch</i> | 33. <i>Tie rod</i> |
| 10. <i>Throttle handle</i> | 34. <i>Jam nut RH</i> |
| 11. <i>Pin</i> | 35. <i>Ball joint RH</i> |
| 14. <i>Dimmer switch</i> | 36. <i>Steering arm</i> |
| 15. <i>Brake handle</i> | 37. <i>Tie rod</i> |
| 18. <i>Spirol pin</i> | 38. <i>Steering arm</i> |
| 19. <i>Grip</i> | 39. <i>Ski leg</i> |
| 20. <i>Bushing</i> | 40. <i>Washer</i> |
| 21. <i>Bushing</i> | 41. <i>Bushing</i> |
| 23. <i>U-clamp</i> | 42. <i>Bushing</i> |
| 25. <i>Elastic stop nut</i> | 44. <i>Cap screw</i> |
| 27. <i>Flat washer</i> | 45. <i>Flat washer</i> |
| 28. <i>Elastic stop nut</i> | 46. <i>Grease fitting</i> |
| 29. <i>Ball joint LH</i> | 47. <i>Screw</i> |
| 30. <i>Lock tab</i> | 48. <i>Rubber spacer</i> |
| 31. <i>Elastic stop nut</i> | 51. <i>Rivet</i> |
-

 **NOTE :** Some reference numbers are deliberately missing. Only numbers reporting to the above specified vehicle are listed.

Safari Citation/E
Tundra
Tundra LT

This diagram illustrates the assembly of a vehicle's rear suspension system. The main components shown include the upper control arm (1), lower control arm (3), and the rear axle (19). Various bolts, nuts, and washers are used to secure these components, with specific torque values provided for each. The diagram is labeled with part numbers and torque specifications in both N·m and lbf·ft.

Key torque specifications shown in the diagram:

- 26 N·m (19 lbf·ft)
- 22 N·m (16 lbf·ft)
- 9.5 N·m (85 lbf·in)
- 20 N·m (15 lbf·ft)
- 42 N·m (31 lbf·ft)


Part numbers visible in the diagram include: 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

Safari Citation/E, Tundra, Tundra LT

- | | |
|------------------------------------|-----------------------------|
| 1. <i>Steering column</i> | 30. <i>Lock tab</i> |
| 2. <i>Handlebar support</i> | 31. <i>Elastic stop nut</i> |
| 3. <i>Handlebar</i> | 32. <i>Jam nut LH</i> |
| 4. <i>Steering clamp</i> | 33. <i>Tie rod</i> |
| 5. <i>Cap screw</i> | 34. <i>Jam nut RH</i> |
| 6. <i>Elastic stop nut</i> | 35. <i>Ball joint RH</i> |
| 8. <i>Throttle handle housing</i> | 36. <i>Steering arm</i> |
| 9. <i>Emergency cut-out switch</i> | 37. <i>Tie rod</i> |
| 10. <i>Throttle handle</i> | 38. <i>Steering arm</i> |
| 12. <i>Retainer</i> | 39. <i>Ski leg</i> |
| 13. <i>Brake handle housing</i> | 40. <i>Washer</i> |
| 14. <i>Dimmer switch</i> | 41. <i>Bushing</i> |
| 15. <i>Brake handle</i> | 44. <i>Cap screw</i> |
| 16. <i>Pin</i> | 45. <i>Flat washer</i> |
| 17. <i>Push nut</i> | 46. <i>Grease fitting</i> |
| 19. <i>Grip</i> | 49. <i>Housing cap</i> |
| 20. <i>Bushing</i> | 50. <i>Screw</i> |
| 21. <i>Bushing</i> | 53. <i>Steering cover</i> |
| 22. <i>Retainer bracket</i> | 54. <i>Bushing</i> |
| 23. <i>U-clamp</i> | 75. <i>Plate</i> |
| 24. <i>Lock tab</i> | 76. <i>Retainer bracket</i> |
| 25. <i>Elastic stop nut</i> | 77. <i>Screw</i> |
| 27. <i>Flat washer</i> | 78. <i>Clip</i> |
| 28. <i>Elastic stop nut</i> | 84. <i>Snap ring</i> |
| 29. <i>Ball joint LH</i> | 85. <i>Lock tab</i> |
-

 **NOTE :** Some reference numbers are deliberately missing. Only numbers reporting to the above specified vehicles are listed.

Sub-section 01 (STEERING SYSTEM)




Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

Safari Scout/Scout E/Saga/Cheyenne

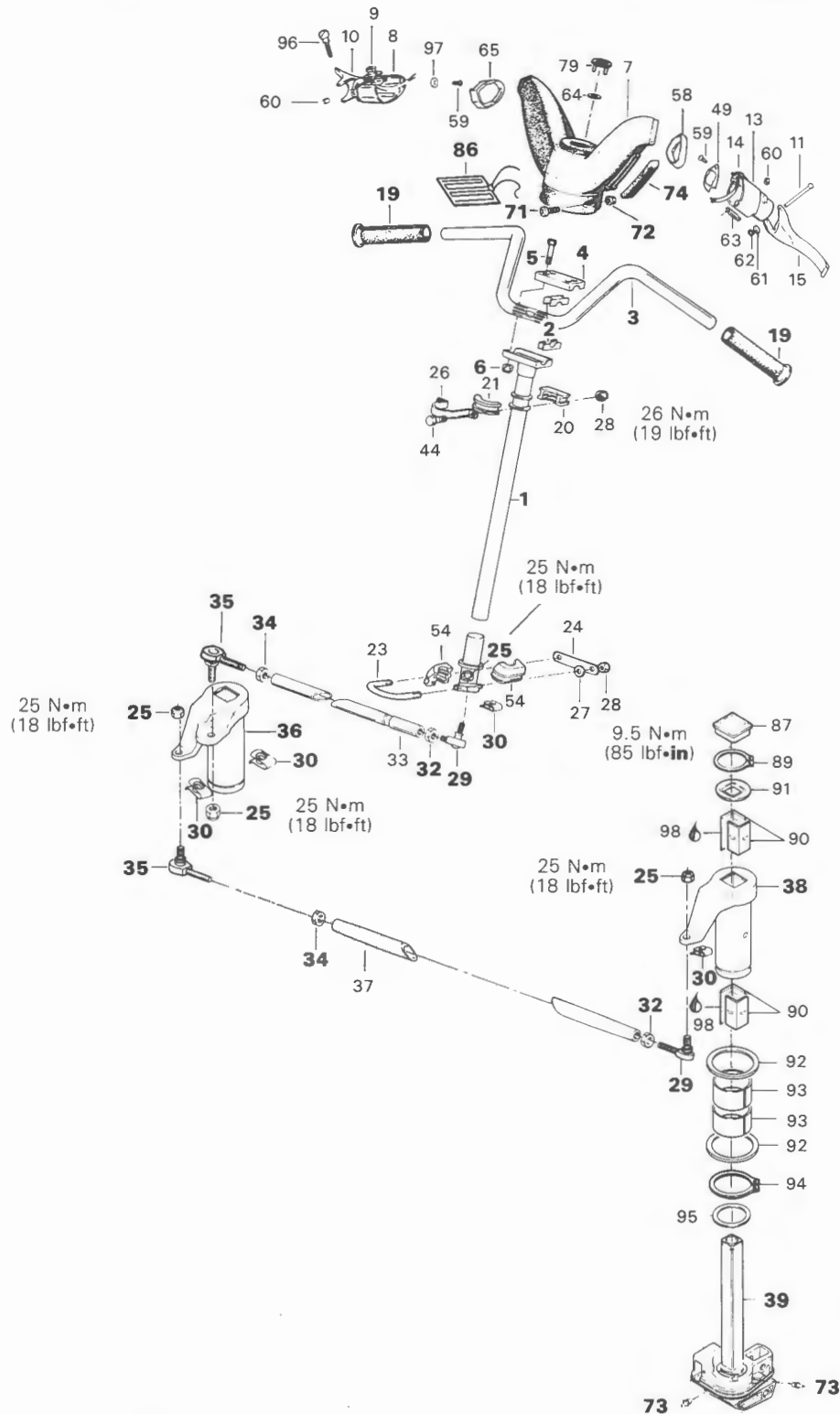
- | | |
|-----------------------------|------------------------|
| 1. Steering column | 33. Tie rod |
| 2. Handlebar support | 34. Jam nut RH |
| 3. Handlebar | 35. Ball joint RH |
| 4. Steering clamp | 36. Steering arm |
| 5. Cap screw | 37. Tie rod |
| 6. Elastic stop nut | 38. Steering arm |
| 7. Steering pad | 39. Ski leg |
| 8. Throttle handle housing | 40. Washer |
| 9. Emergency cut-out switch | 41. Bushing |
| 10. Throttle handle | 44. Cap screw |
| 11. Pin | 45. Flat washer |
| 12. Retainer | 46. Grease fitting |
| 13. Brake handle housing | 49. Housing cap |
| 14. Dimmer switch | 54. Bushing |
| 15. Brake handle | 57. Washer |
| 19. Grip | 58. Brake adaptor |
| 20. Bushing | 59. Self-tapping screw |
| 21. Bushing | 60. Set screw |
| 23. U clamp | 61. Washer |
| 24. Lock tab | 62. Circlip |
| 25. Elastic stop nut | 63. Brake light switch |
| 26. Retainer bracket | 65. Throttle adaptor |
| 27. Flat washer | 66. Throttle cover |
| 28. Elastic stop nut | 71. Bolt |
| 29. Ball joint LH | 72. Nut |
| 30. Lock tab | 74. Rubber attachment |
| 31. Elastic stop nut | 84. Snap ring |
| 32. Jam nut LH | |

 **NOTE :** Some reference numbers are deliberately missing. Only numbers reporting to the above specified vehicles are listed.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

Safari Voyageur/Escapade



Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

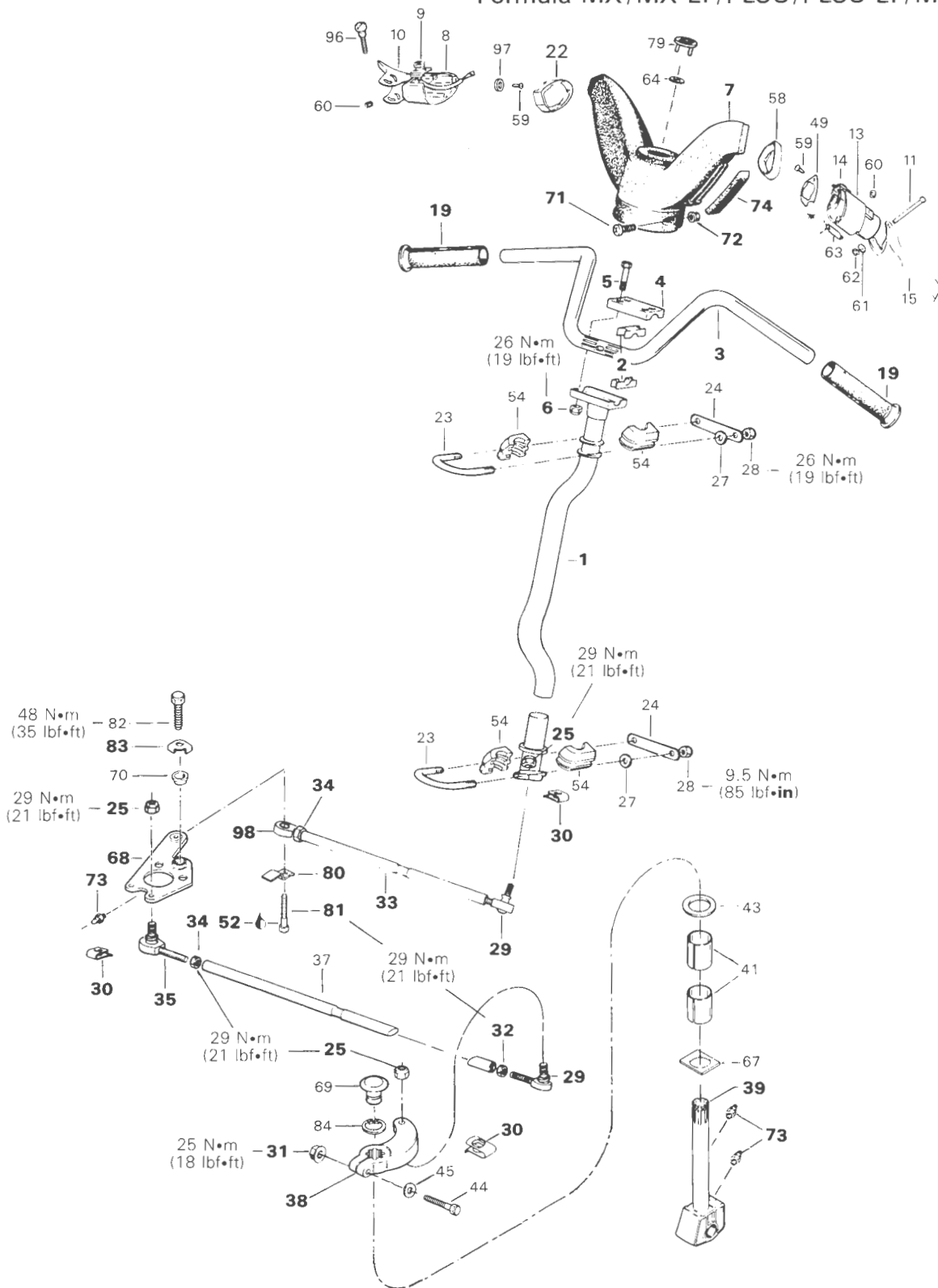
Safari Voyageur/Escapade

- | | |
|-----------------------------|----------------------------|
| 1. Steering column | 37. Tie rod |
| 2. Handlebar support | 38. Steering arm |
| 3. Handlebar | 39. Ski leg |
| 4. Steering clamp | 41. Bushing |
| 5. Cap screw | 49. Housing cap |
| 6. Elastic stop nut | 54. Bushing |
| 7. Steering pad | 58. Brake adaptor |
| 8. Throttle handle housing | 59. Self-tapping screw |
| 9. Emergency cut-out switch | 60. Set screw |
| 10. Throttle handle | 63. Brake light switch |
| 13. Brake handle housing | 64. Push nut |
| 14. Dimmer switch | 65. Throttle adaptor |
| 15. Brake handle | 71. Bolt |
| 19. Grip | 72. Nut |
| 20. Bushing | 73. Grease fitting |
| 21. Bushing | 74. Rubber attachment |
| 23. U-clamp | 79. Bombardier decal |
| 24. Lock tab | 86. Heating grip element |
| 25. Elastic stop nut | 87. Ski leg cap |
| 26. Retainer bracket | 88. Loctite (Super bonder) |
| 27. Flat washer | 89. Snap ring |
| 28. Elastic stop nut | 90. L-plate |
| 29. Ball joint LH | 91. Seal |
| 30. Lock tab | 92. Thrust washer |
| 32. Jam nut LH | 93. Bushing |
| 33. Tie rod | 94. Snap ring |
| 34. Jam nut RH | 95. Seal |
| 35. Ball joint RH | 96. Flanged head screw |
| 36. Steering arm | 97. Washer |
-

○ NOTE : Some reference numbers are deliberately missing. Only numbers reporting to the above specified vehicles are listed.

Sub-section 01 (STEERING SYSTEM)

Formula MX/MX LT/PLUS/PLUS LT/MACH I



Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

Formula MX/MX LT/PLUS/PLUS LT/MACH I

- | | |
|-----------------------------|------------------------|
| 1. Steering column | 39. Ski leg |
| 2. Handlebar support | 43. Shim |
| 3. Handlebar | 44. Cap screw |
| 4. Steering clamp | 45. Flat washer |
| 5. Cap screw | 49. Housing cap |
| 6. Elastic stop nut | 52. Loctite 271 (red) |
| 7. Steering pad | 54. Bushing |
| 8. Throttle handle housing | 58. Brake adaptor |
| 9. Emergency cut-out switch | 59. Self-tapping screw |
| 10. Throttle handle | 60. Set screw |
| 13. Brake handle housing | 63. Brake light switch |
| 14. Dimmer switch | 64. Push nut |
| 15. Brake handle | 65. Throttle adaptor |
| 19. Grip | 66. Throttle cover |
| 20. Bushing | 67. Brass washer |
| 21. Bushing | 68. Pivot arm |
| 23. U-clamp | 69. Cap |
| 24. Lock tab | 70. Flange |
| 25. Elastic stop nut | 71. Bolt |
| 27. Flat washer | 72. Nut |
| 28. Elastic stop nut | 73. Grease fitting |
| 29. Ball joint LH | 74. Rubber attachment |
| 30. Lock tab | 79. Bombardier decal |
| 31. Elastic stop nut | 80. Screw stopper |
| 32. Jam nut L.H | 81. Screw |
| 33. Tie rod | 82. Screw |
| 34. Jam nut RH | 83. Screw stopper |
| 35. Ball joint RH | 84. Snap ring |
| 36. Steering arm | 96. Flanged head screw |
| 37. Tie rod | 97. Washer |
| 38. Steering arm | 98. Ball joint |

INSPECTION

Check skis and runner shoes for wear, replace as necessary. (See section 06-02).

36,38,39, Steering arm & ski leg

Make sure steering arm and ski leg splines interlock (if applicable).

◆ **WARNING : All parts having worn splines have to be changed by new ones.**

Check general condition of steering system.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY & ASSEMBLY

19, Grip

Grips can be removed and installed without any damage by injecting compressed air into the handlebar.

◆ **WARNING : Never use lubricants (eg. soap, grease, etc.) to install handlebar grip.**

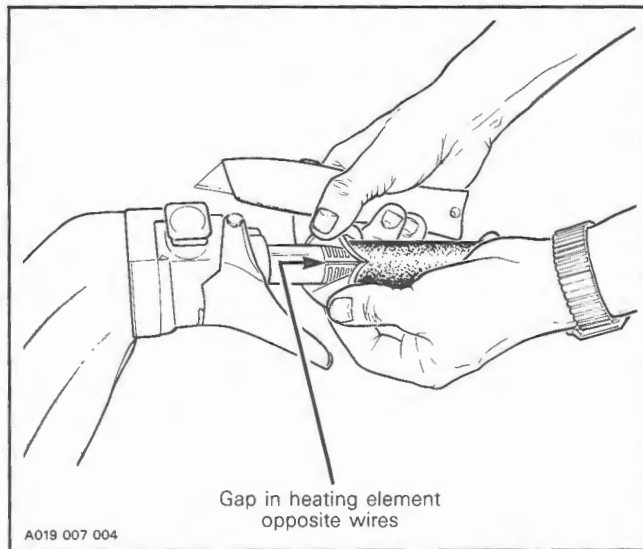
Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

86, Heating grip element

On vehicle equipped with heating grips, grips might be unremovable as explained above, in this case, carefully proceed as follows to prevent damaging heating elements.

Locate the grip heater wires on handlebar. Start cutting grip exactly opposite heater wires and immediately peel open to locate gap in heating element, as shown.



Continue cutting along gap and remove grip. If required, slowly peel heating element from handlebar and remove.

To install, stick heating element to handlebar making sure wires do not interfere with operation of accelerator or brake handle.

Insert new grip with a rubber mallet.

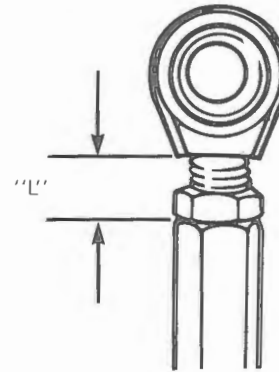
◆ **WARNING:** Never use lubricants (eg. soap, grease, etc.) to install handlebar grip.

29,35, Ball joint

Inspect ball joint ends for wear or looseness, if excessive, replace.

Screw threaded end of ball joint into tie rod. The maximum external threaded length not engaged in tie rod must not exceed the value "L" in the following chart:

(TYPICAL)



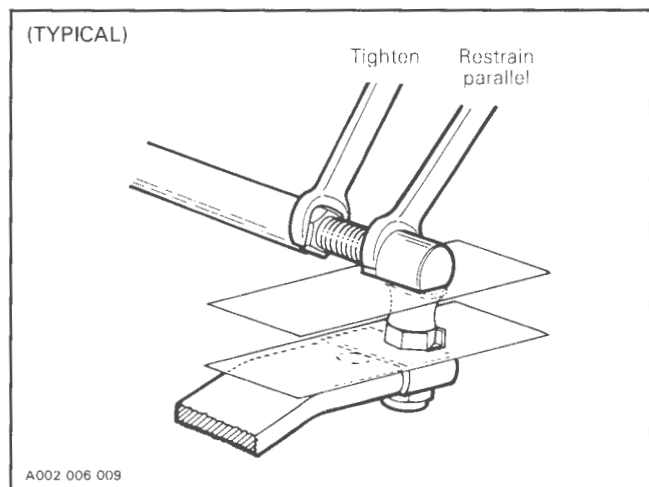
A001 006 007

| MODEL | "L" | |
|--|------|----------|
| | mm | (in) |
| Elan | 20.5 | (13/16) |
| Alpine II 503 | 12 | (15/32) |
| Safari Citation/E Tundra, Tundra LT | 28 | (1 7/64) |
| Safari Scout/Scout E/ Saga/Cheyenne/ Voyageur/Escapade | 17 | (43/64) |
| Formula MX/MX LT/ PLUS/PLUS/MACH I | 15 | (19/32) |

The cut-off section of the tie rod end must run parallel with the horizontal line of the steering arm when assembled on vehicle. The ball joint should be restrained when tightening tie rod end lock nut. For torque specifications see specific exploded view.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)



WARNING : The cut off section of the ball joint must run parallel with the steering arm. When tightening lock nuts, restrain ball joint with appropriate size wrench. Ensure not too many threads are kept outside of the tie rod according to the thread length chart.

30,80,83,85, Lock tab & screw stopper

When assembling components, always position new lock tabs and screw stoppers.

36,38, Steering arm

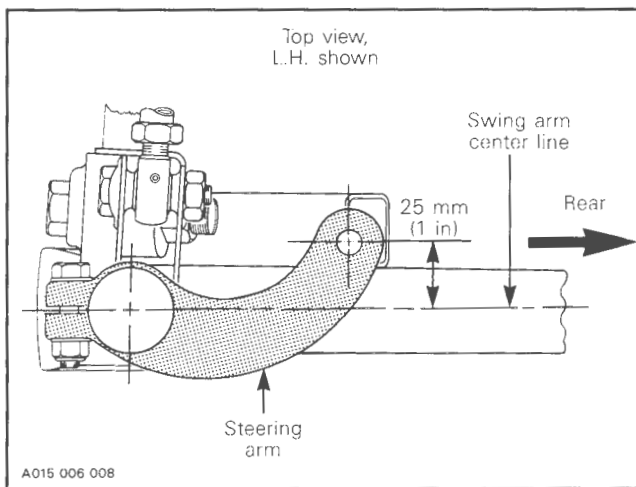
The steering arm angles should be equal on both sides when skis are parallel with vehicle.

Safari Voyageur, Escapade

For removal and installation procedures, refer to section 06-02.

Formula MX/MX LT/PLUS/PLUS LT/MACH I

The center of the hole where the ball joint is fixed should be 25 mm (1 in) inside of the swing arm center line.



25,30,80,85, Ball joint nut, lock tab & screw stopper

Tighten ball joint nuts to specified torque (see illustration) and bend lock tabs over nuts.

25,30,31, Steering arm nut & lock tab

Tighten steering arm nuts to specified torque (see illustration) and bend lock tabs over nuts.

52,80,81, Screw stopper, screw & Loctite 271

Formula MX/MX LT/PLUS/PLUS LT/MACH I

In order to remove the screw, heat to 93°C (200°F) to break the Loctite bond. At assembly, clean all threads and apply a drop of Loctite 271. Torque screw to 29 N•m (21 lbf•ft). Bend tab of screw stopper over a flat of screw head.

ADJUSTABLE HANDLEBAR

1,3, Steering column & handlebar

If applicable, remove the steering clamp and nuts holding the handlebar to the steering column. Tighten nuts to the specified torque (see illustration).

2,4,5,6, Handlebar support, steering clamp, bolt & nut

Install the four (4) handlebar support, steering clamp, the four (4) screws and nuts to the column, as illustrated.

Section 06 STEERING/ENGINE

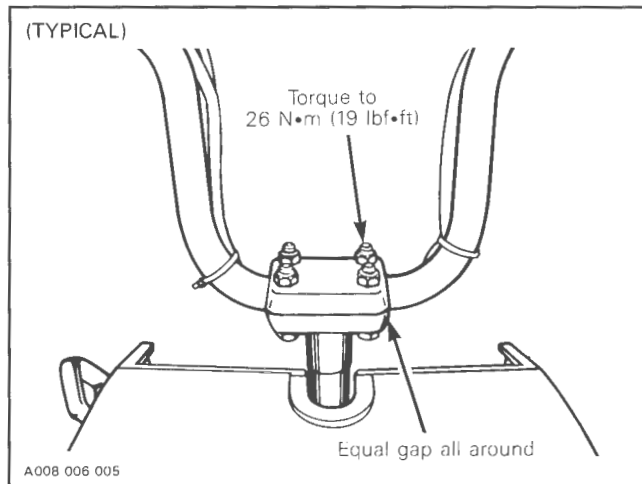
Sub-section 01 (STEERING SYSTEM)

See applicable exploded view for each model.

Adjust the steering handle to the desired position.

Lock the handle in place by tightening the four (4) nuts to 26 N•m (19 lbf•ft).

▼ **CAUTION :** Tighten the nuts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps.



◆ **WARNING :** Do not adjust the handlebar too high to avoid contact between the brake handle and windshield when turning.

◆ **WARNING :** Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

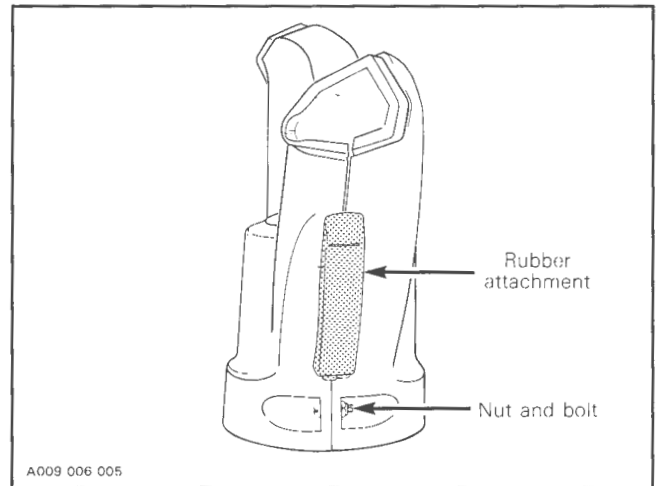
▼ **CAUTION :** Plastic alloy components such as fuel tank, windshield, controls, etc. can be cleaned using mild detergents or isopropyl alcohol and a soft clean cloth. Never clean plastic parts with strong detergent, degreasing agent, paint thinner, acetone, etc. Do not apply isopropyl alcohol directly on decals.

7,71,72,74, Steering pad, bolt, nut & rubber attachment

▼ **CAUTION :** Prior to installation, perform handlebar adjustment.

Properly fit the steering pad to the handlebar. Assemble using the two (2) rubber attachments nuts and bolts.

◆ **WARNING :** Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

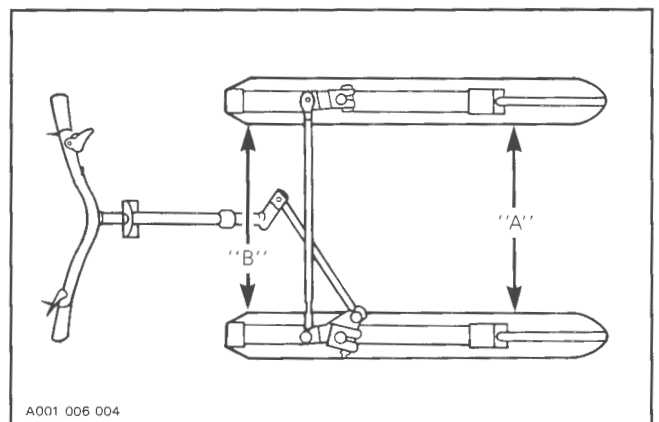


STEERING ADJUSTMENT (SKIS)

Definitions

Toe-out :

A difference measurement between front and rear edges of skis as viewed from top side of suspension system. It is adjustable.

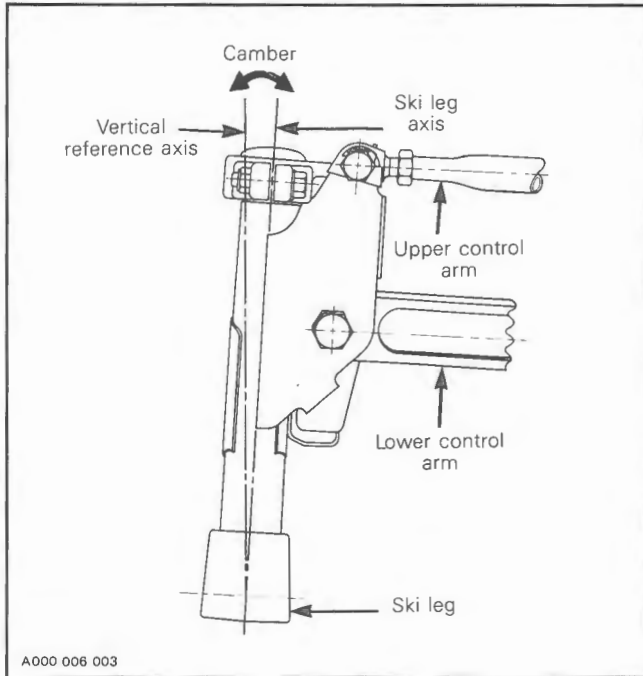


Camber :

A specific inward or outward tilt angle of ski leg compared to a vertical line when viewing vehicle from front. It is adjustable on the "PRS" suspension system only.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)



Adjustments

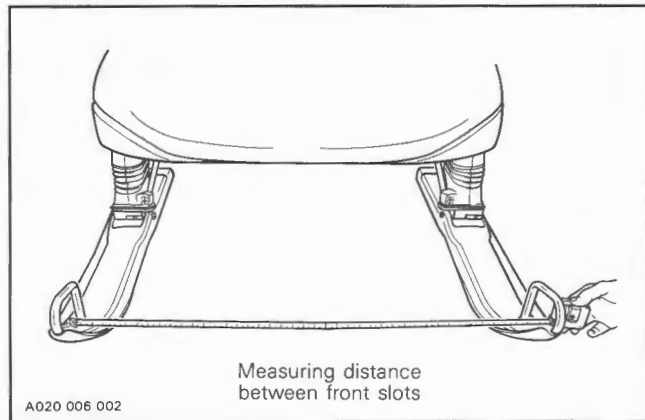
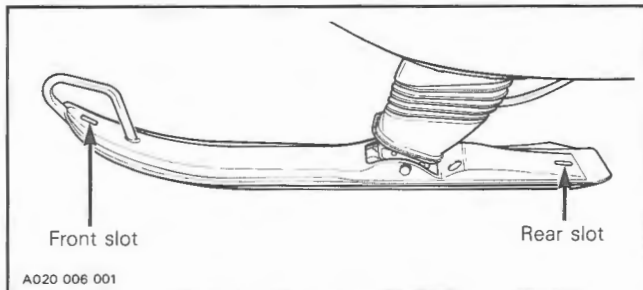
TOE-OUT

All except Formula models

Skis should have a toe-out of 3 mm (1/8 in). When they are in straight-ahead position. If adjustment is required, proceed as follows :

Safari Voyageur/Escapade

Each ski of these vehicles has two slots, one at the front and one at the rear. These slots are intended to give a measuring point at the ski center.



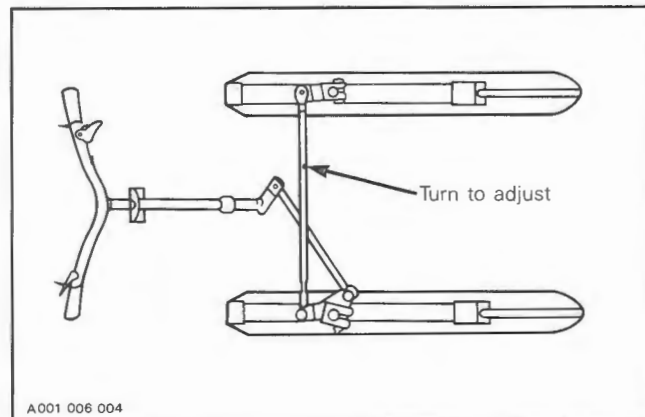
All except Formula models

32,34, Tie rod jam nut

Loosen the jam nuts locking the tie rod in place. Turn tie rod manually until alignment is correct. Torque jam nuts as specified in the applicable illustration.

IMPORTANT : Close front of skis manually to take all slack from steering mechanism.

NOTE : A rubber band can be hooked in front of skis to keep them closed.

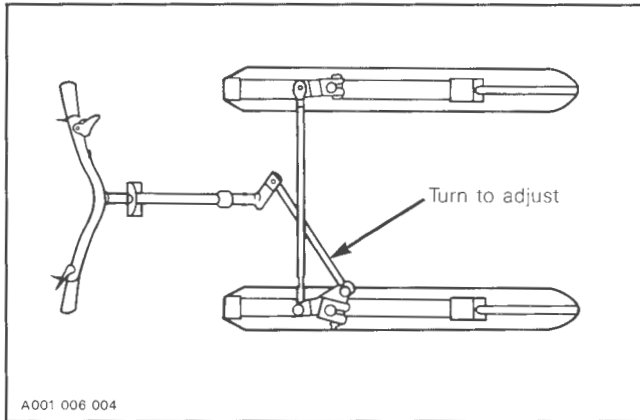


Check that handlebar is horizontal when skis are in straight ahead position. To adjust :

- Loosen shorter tie rod jam nuts.
- Turn tie rod manually until handlebar is horizontal.
- Torque jam nuts as specified in the applicable illustration.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)



Formula models only

Adjustments should be performed following this sequence :

- Pivot arm centering.
- Set camber angle.
- Check for horizontal handlebar.
- Set toe-out.

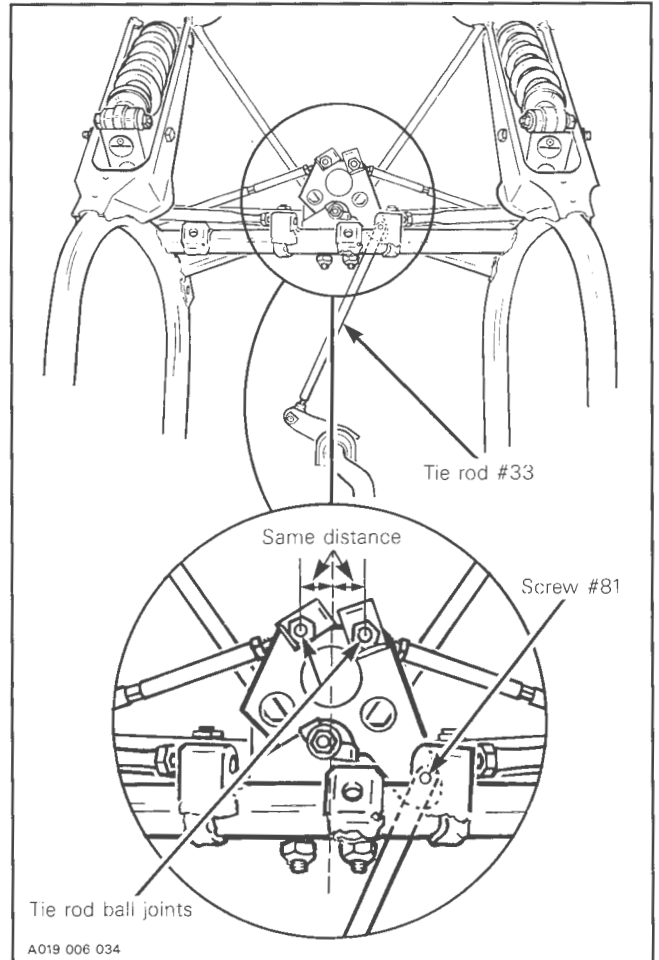
PIVOT ARM CENTERING

◆ **WARNING :** Do not attempt to adjust skis straight ahead position by turning ball joint on tie rod #33.

33,34,68,81,98, Tie rod, jam nut, pivot arm, screw & ball joint

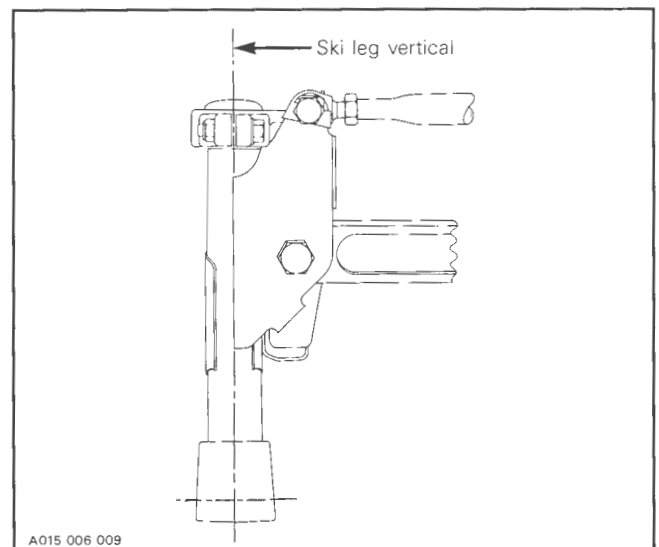
With handlebar in straight position, both tie rod ball joints on pivot arm should be at same distance from vehicle center. Loosen jam nut on tie rod #33 (turn steering left side to gain access), remove screw #81. Turn ball joint accordingly. This adjustment will provide same turning radius on both sides.

◆ **WARNING :** Never lengthen a tie rod so that threaded portion of ball joint exceeds 17 mm (11/16 in) outside tie rod.



CAMBER

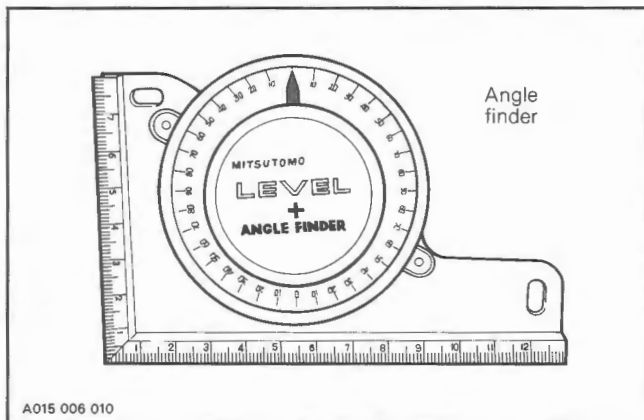
- Ski leg camber must be set to $0^\circ \pm 0.5^\circ$ (ski leg housing vertical).



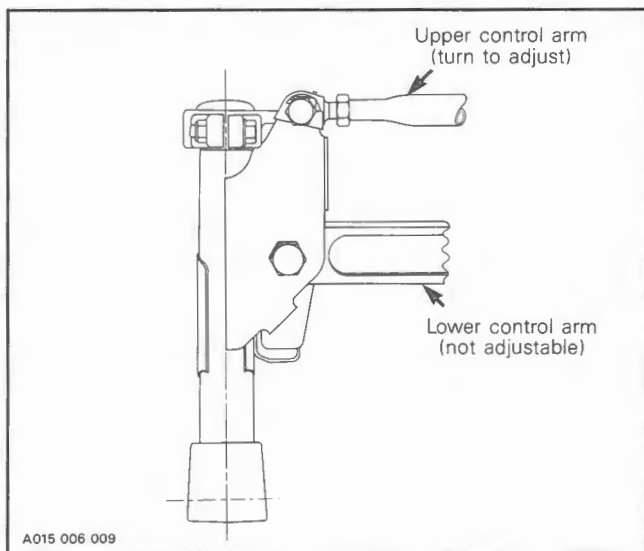
Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

- Camber angle is measured using an angle finder available from automotive parts supplier.



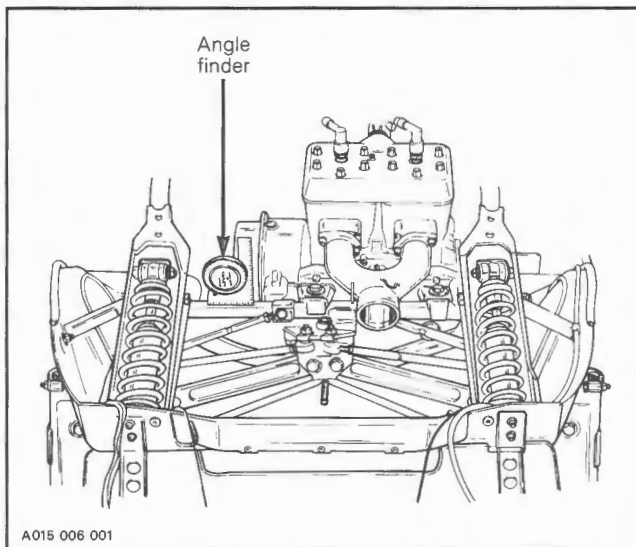
- Adjustment is performed by adjusting length of upper control arm.



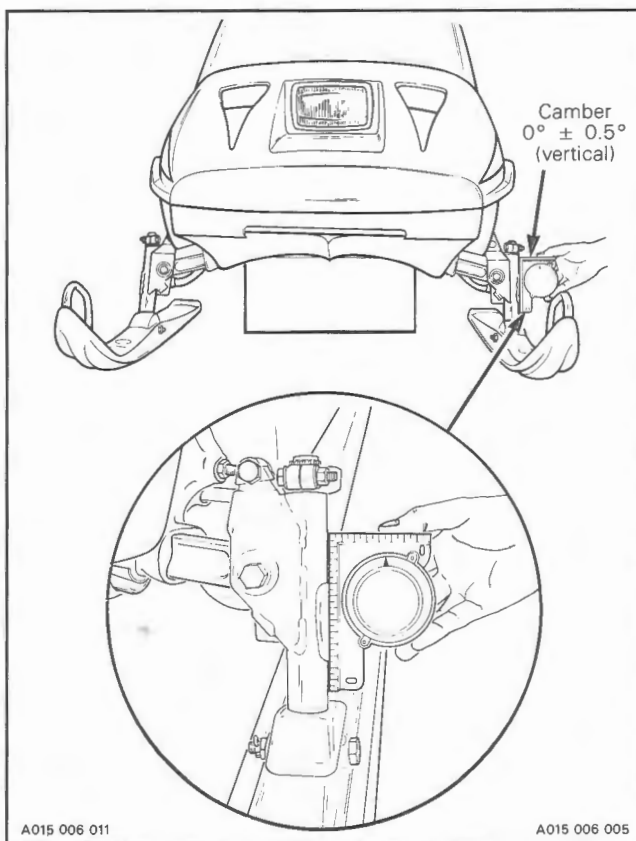
Procedure :

- **NOTE:** Same adjustments are required on both sides of vehicle.

- Using the appropriate equipment, raise and block the vehicle so that the skis are about 25 mm (1 in) from the ground. The camber angle must be measured when the suspension is fully extended.
- Make sure the vehicle is leveled by placing the angle finder on the main horizontal frame member in front of the engine.



- Place angle finder outside of ski leg housing.



Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

▼ **CAUTION** : Angle finder must sit square against swing arm. Positioning angle finder against weld bead or decal may result in false reading.

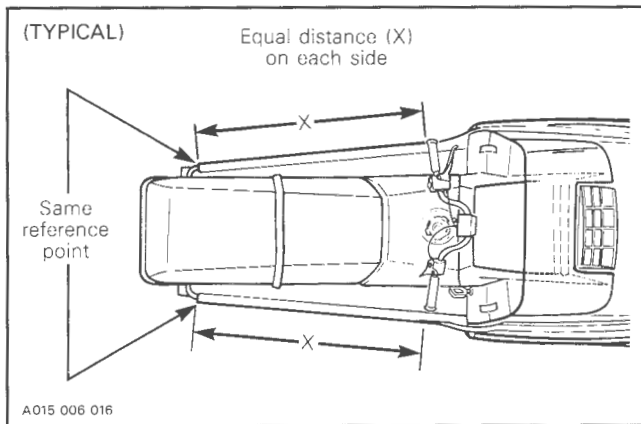
-- Loosen both upper control arm jam nuts and adjust its length to obtain a vertical ski leg ($0^\circ \pm 0.5^\circ$). Torque jam nuts to 29 N•m (21 lbf•ft).

-- Lower vehicle to ground and allow suspension to settle.

HANDLEBAR & TOE OUT

Check that handlebar is horizontal when skis are in straight ahead position by measuring from the extremities of the grips to the rearmost edge of the tunnel, as shown.

○ **NOTE** : The reference point must be the same relative to each side.



Adjustment is performed by adjusting length of left and right tie rods #37.

◆ **WARNING** : Do not attempt to adjust skis straight ahead position by turning ball joint on tie rod #33.

Procedure

- Loosen jam nuts #32 & #34 of both tie rods #37.
- Turn manually tie rod on one side to shorten its length.
- Lengthen the other one by turning exactly the same amount so that toe-out is not changed.

◆ **WARNING** : Never lengthen a tie rod so that threaded portion of ball joint exceeds 17 mm (11/16 in) outside tie rod. To avoid this, distribute adjustment requirements equally to both tie rods.

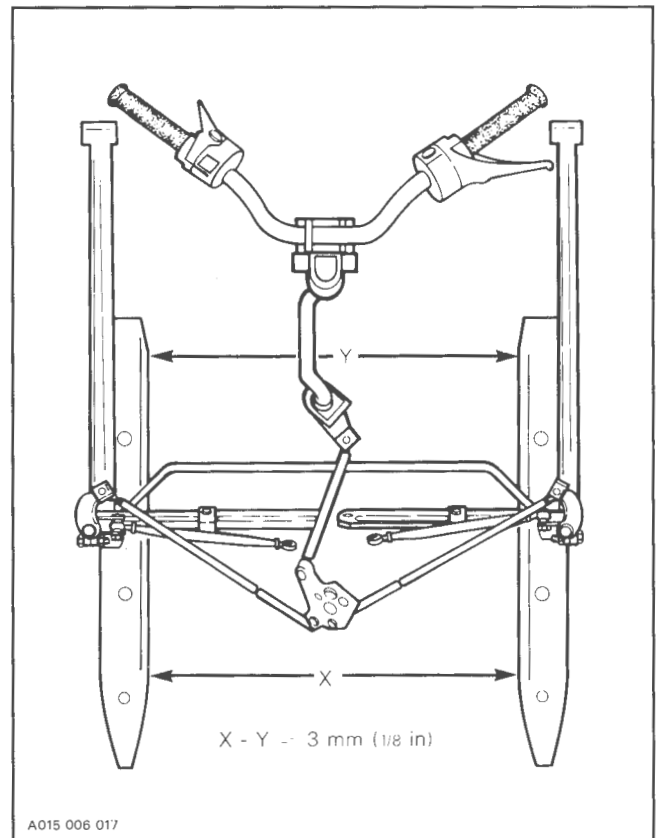
-- Close front of skis manually to take all slack from steering mechanism.

○ **NOTE** : A rubber band can be hooked in front of skis to keep them closed.

-- Skis should have a toe-out of 3 mm (1/8 in) when they are in straight-ahead position.

Measure distance between inner edge of skis as far **back** and as far **forward** as possible.

○ **NOTE** : To insure accuracy always use the same reference points.



Toe out is correct when forward measure **EXCEEDS** rear one by 3 mm (1/8 in).

Adjust as required.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

SKI ALIGNMENT TROUBLE SHOOTING CHART

| SYMPTOM | CAUSE | REMEDY |
|---|--|--|
| Aggressive steering in turns and dartiness | Excessive negative camber | Check and adjust camber |
| Reduced steering action and loss of precision | Excessive positive camber | Check and adjust camber |
| Vehicle darts left and right | Excessive toe adjustment ("in" or "out") | Check and adjust 3 mm (1/8 in) toe out |

LUBRICATION

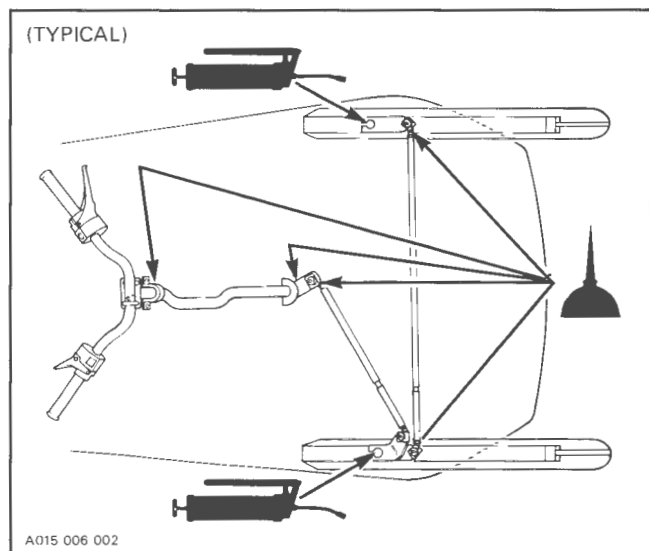
WARNING: Do not lubricate throttle and/or brake cable and housings, and spring coupler bolts.

46,73, Ski leg & grease fitting

Use low temperature grease only (P/N 413 7061 00).

All except Formula models and Safari
Voyageur/Escapade

Lubricate the ski legs at grease fittings until new grease appears at joints. Lubricate tie rod end ball joints and steering column bushings.



Safari Voyageur/Escapade

Refer to "ski" section 06-01.

Formula MX/MX LT/PLUS/PLUS LT/MACH I

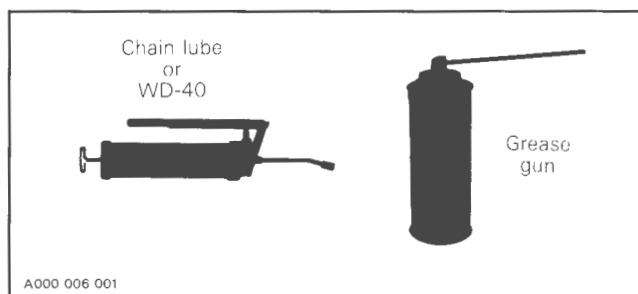
Penetrating lubricant is recommended on ball joints and moving parts.

Examples :

- chain lube from Bardahl (BCS 362 dry)
- WD-40

Other grease fittings require low temperature grease (P/N 413 7061 00) injected with a grease gun.

The following symbols will be used to show what type of lubricant should be used at the suitable locations.



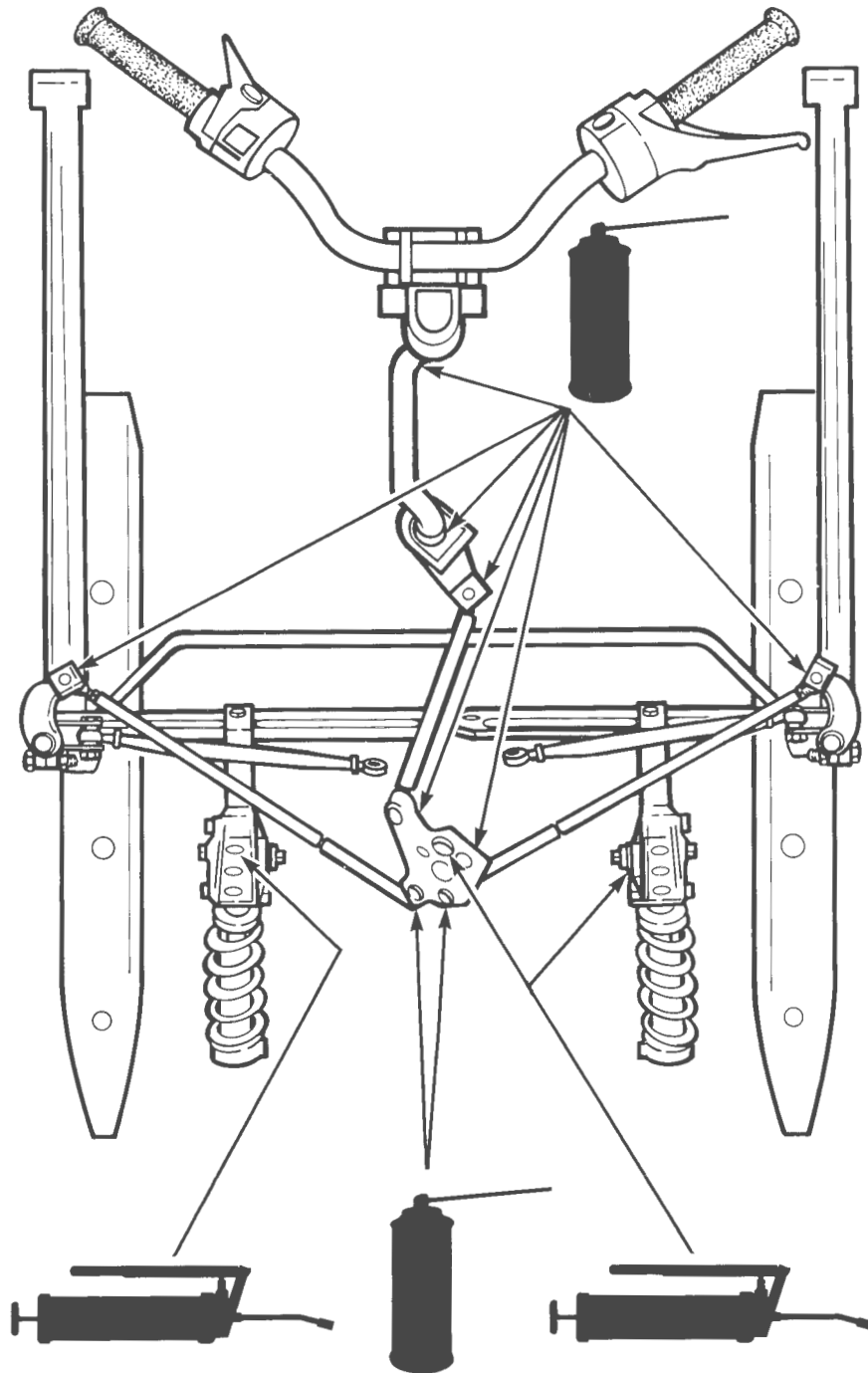
Lubricate :

- Steering column.
- Upper and lower control arms drop link and tie rod ends.
- Grease ski legs, ski pivots and idler arm.
- Coat stabilizer sliders with grease and oil their ball joints.



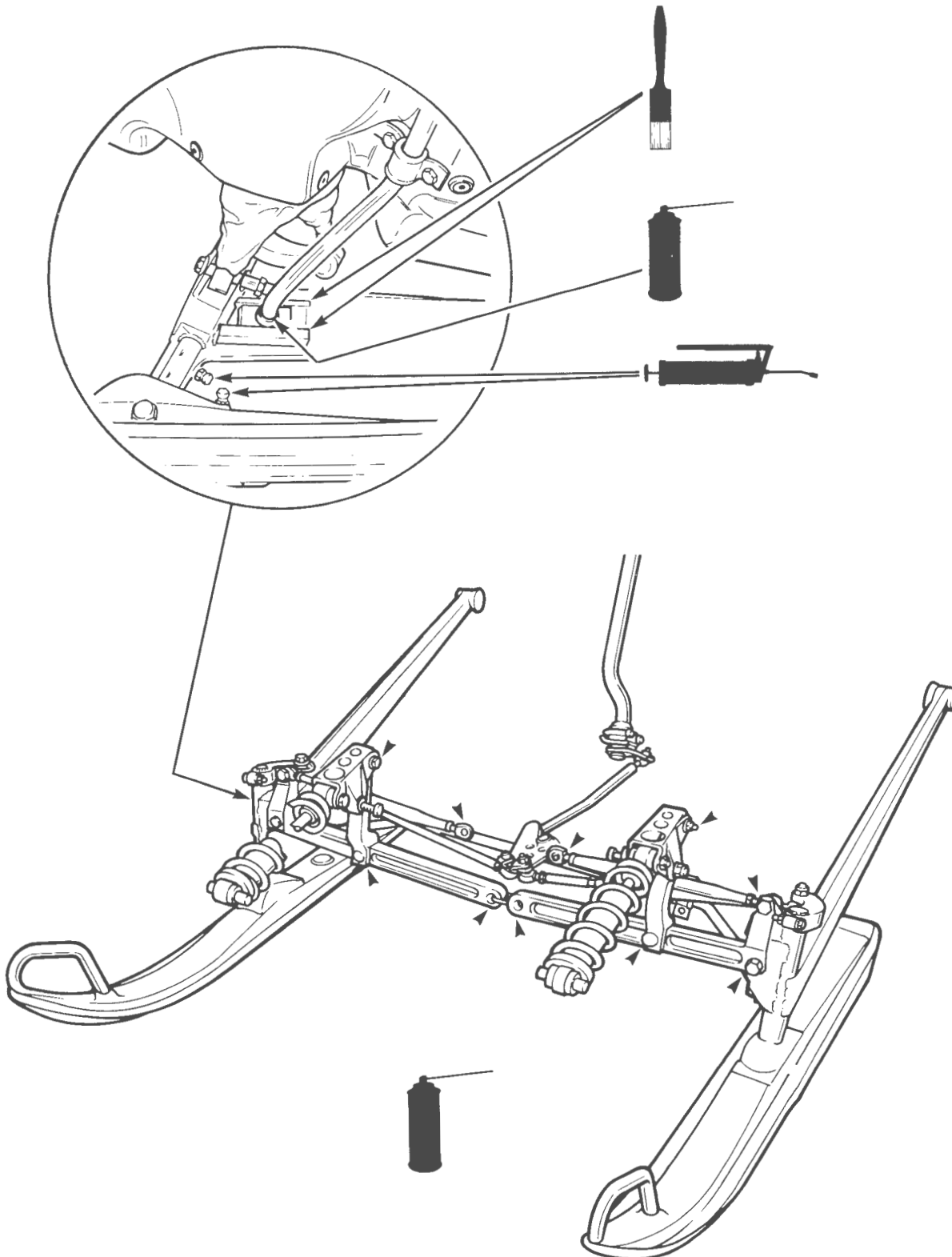
NOTE : There are 33 lubrication points.

Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)



Section 06 STEERING/SKIS

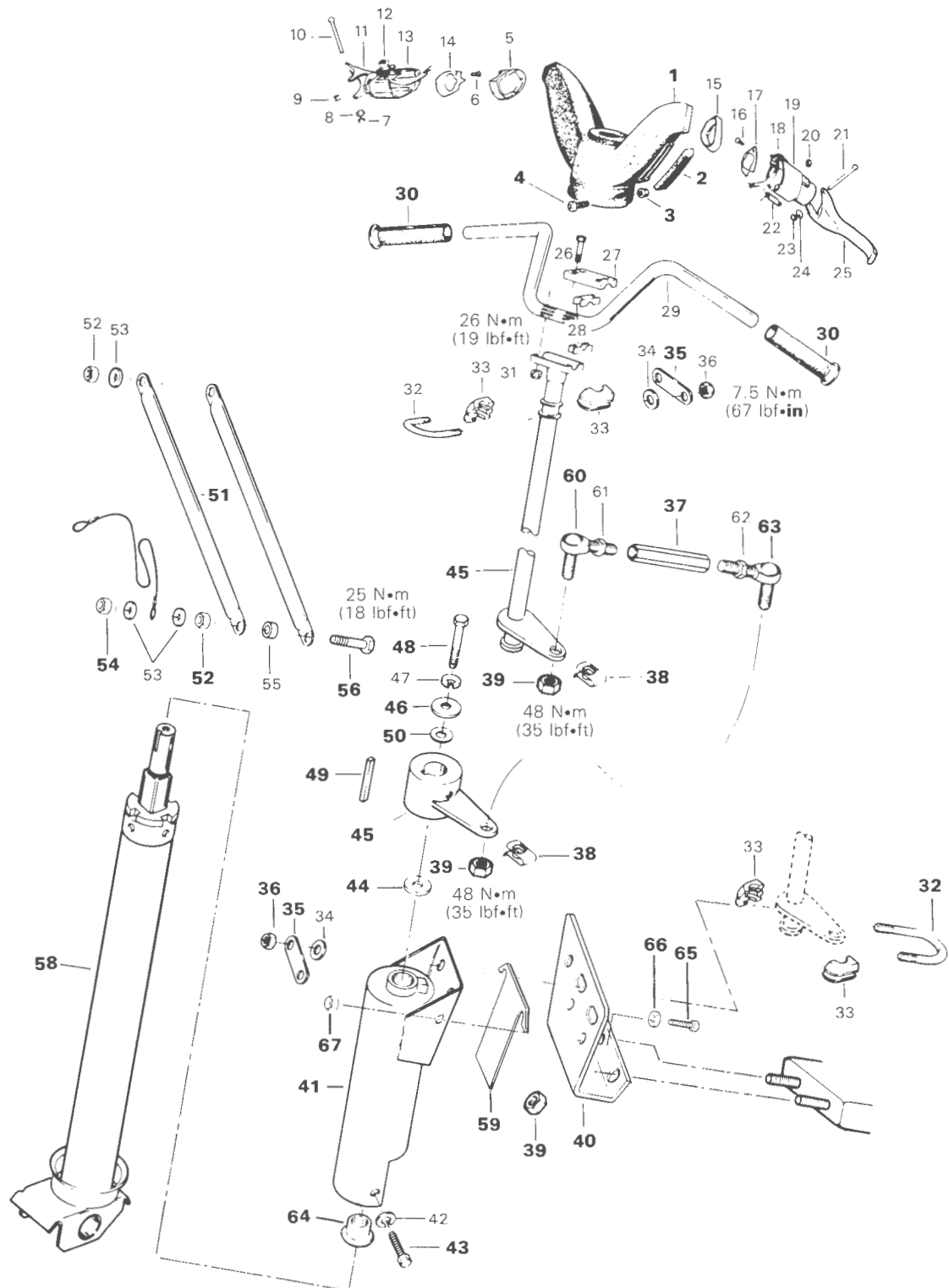
Sub-section 01 (STEERING SYSTEM)



Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

Alpine II



Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

1. Steering padding
2. Rubber attachment (2)
3. Hexagonal elastic flanged stop nut (2)
4. Phillips head bolt M5 x 20 (2)
5. Throttle adaptor
6. Self-tapping screw
7. Circlip
8. Washer
9. Set screw
10. Pin
11. Throttle handle
12. Emergency cut-out switch
13. Throttle handle housing
14. Cover
15. Brake adaptor
16. Self-tapping screw
17. Cover
18. Dimmer switch
19. Brake handle housing
20. Set screw
21. Pin
22. Brake light switch
23. Circlip
24. Washer
25. Brake handle
26. Hexagonal head cap screw M8 x 55 (4)
27. Steering clamp
28. Steering support (4)
29. Handlebar
30. Grip (2)
31. Hexagonal elastic stop nut 8 mm (4)
32. U clamp (2)
33. Haft bushing (4)
34. Flat washer 8.4 x 17 x 1.6 (4)
35. Lock tab (2)
36. Hexagonal elastic stop nut M8 x 1.25 (4)
37. Tie rod assembly
38. Lock tab (2)
39. Hexagonal elastic stop nut M10 (2)
40. Steering support
41. Cap
42. Lock washer (3)
43. Hexagonal head screw M6 x 1.00 x 10 (3)
44. Brass washer
45. Steering arm
46. Washer
47. Lock washer
48. Hexagonal head screw
49. Key
50. Shim
51. Retainer brace (2)
52. Hexagonal elastic stop nut M8 (3)
53. Washer (4)
54. Hexagonal nut M8
55. Spacer
56. Hexagonal head screw M8 x 1.25 x 40
57. Main tube
58. Ski leg ass'y
59. Shim
60. Ball joint RH thread
61. Nut RH thread 10 mm
62. Ball joint LH thread
63. Nut LH thread 10 mm
64. Flanged bushing
65. Hexagonal head screw M6 x 1.00 x 20 (2)
66. Washer (2)
67. Elastic stop nut M6 (2)

INSPECTION

45,58, Steering arm & ski leg ass'y

Make sure that steering arm square shaft of ski leg are properly locked by the key.

◆ **WARNING :** All parts having excessive play or wear must be replaced by new ones.

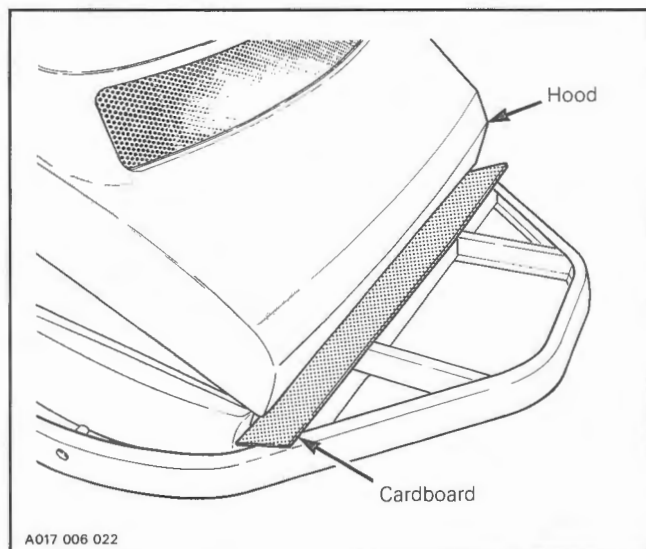
37,60,63, Tie rod & ball joint

Inspect ball joints for wear or looseness, if excessive, replace.

Check general condition of steering system and components for wear and replace if necessary.

DISASSEMBLY

Install a thin cardboard on front bumper, close to hood, to prevent scratches when its retaining cable will be removed.



Gently tip hood.

Remove muffler and fuel tank.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

51,52,54,56, Retainer brace, nut & screw

Detach hood retaining cable at the bottom by removing the nut.

Let the hood rest on the bumper.

Remove screw and nut holding retainer braces. Slightly pivot bottom of left retainer brace to allow suspension cap to be pulled.

32,35,36, U-clamp, lock tab, hexagonal elastic stop nut

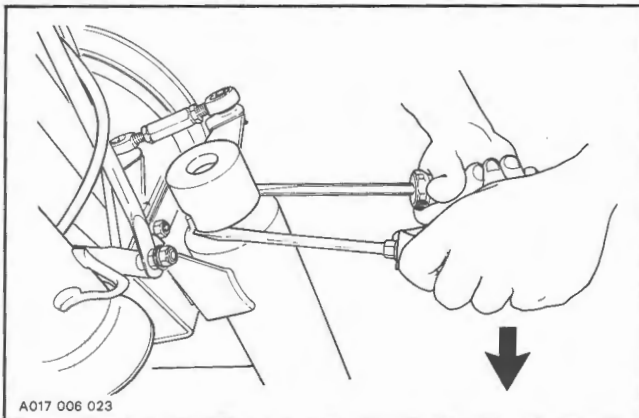
Unfold lock tab, remove both nuts and push U-clamp just enough to clear suspension cap holes.

65,66,67, Screw, washers & nuts

Remove two screws, washers and nuts.

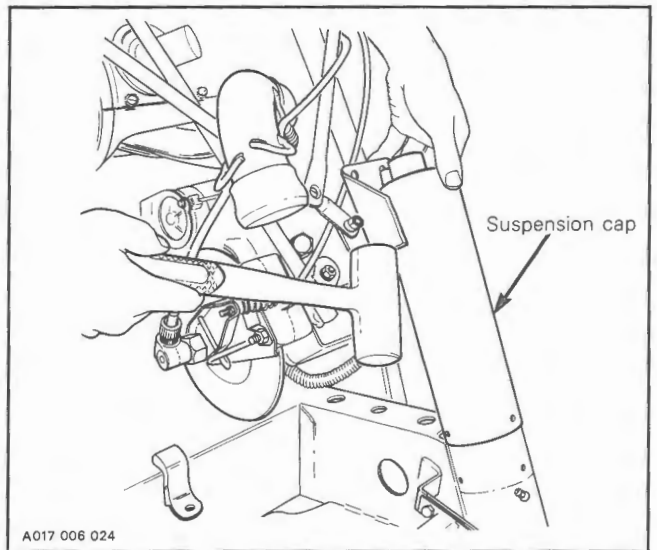
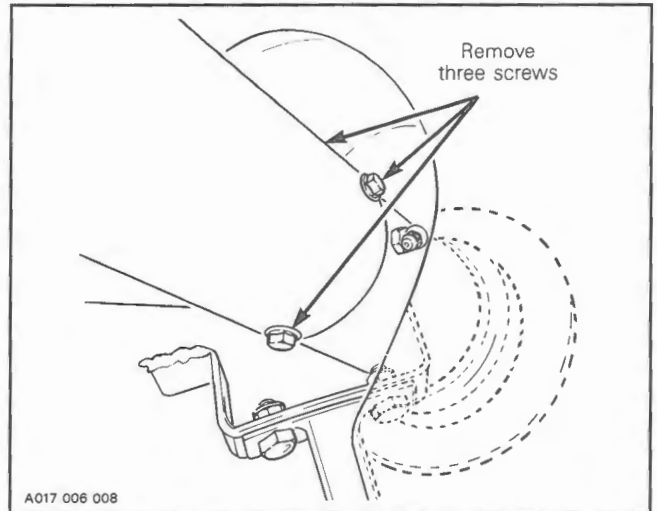
45,48, Steering arm & screw

Remove screw and keep shim (s) (if any) for later use. Using two screwdrivers, pry steering arm out.



41,43, Suspension cap & screw

Remove three screws then, using a plastic hammer, strike suspension cap to push it upward.



Keep shim (s) (if any) between steering support and suspension cap for later use.

30, Grip

For handle grips removal and installation (and heated grips, if applicable), refer to previous models in this section for detailed procedures.

35,38, Lock tab

When installing components, always install new lock tabs.

44, Brass washer

Inspect for wear, replace if required.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

41,64 Cap & flanged bushing

Inspect for wear. Replace if required using a suitable pusher and removing bushing toward bottom of suspension cap.

ASSEMBLY

For assembly, reverse disassembly procedures. However, pay attention to the following.

41,43,48, Cap & screw

Engage screw #48 a few threads in top of ski leg shaft. Fully pull the shaft upward. Slide suspension cap over the shaft while holding the screw to prevent shaft compression.

Install three retaining screws and torque to 10 N•m (89 lbf•in).

40,41,59, Steering support, cap & shim

After the three retaining screws of the cap have been loosely installed, it can be necessary to install shim (s) between steering support and suspension cap. It is important that no deflection of the suspension cap be created when tightening U-clamp nuts. Install the number of shim (s) required to fill the gap between steering support and suspension cap. Torque three retaining screws.

◆ **WARNING :** Filling the gap with shim is very important to prevent cap deflection and to allow a smooth and free operation of the front suspension.

○ **NOTE :** Shim thickness availability is 0.47 and 0.85 mm.

35,36, Lock tab & nut

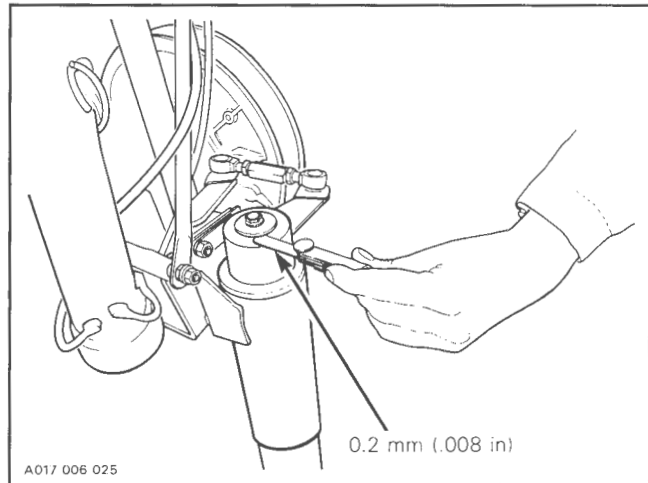
Install a new lock tab then nuts. Torque nuts to 25 N•m (18 lbf•ft).

44,45,48,49, Brass washer, steering arm, screw & key

Remove previously installed screw #48. Install brass washer then steering arm with its key. Engage screw and washers without shims. Fully tighten screw to completely engage steering arm on ski leg shaft. Remove screw.

48,50, Screw & shim

To allow easy rotation of the steering, a gap of 0.2 mm (.008 in) must be present between top of steering arm and the large washer #46.



Using a feeler gauge, measure the specified gap adding shim (s) as required. Then, torque the screw to 25 N•m (18 lbf•ft).

○ **NOTE :** Shim thickness availability is 0.13, 0.25 and 1.6 mm.

38,39, Lock tab & nut

Torque nuts to 48 N•m (35 lbf•ft) and bend lock tab over nuts.

ADJUSTABLE STEERING HANDLEBAR

Refer to previous models in this section for detailed procedures.

1,2,3,4, Steering padding, rubber attachment, nut & bolt

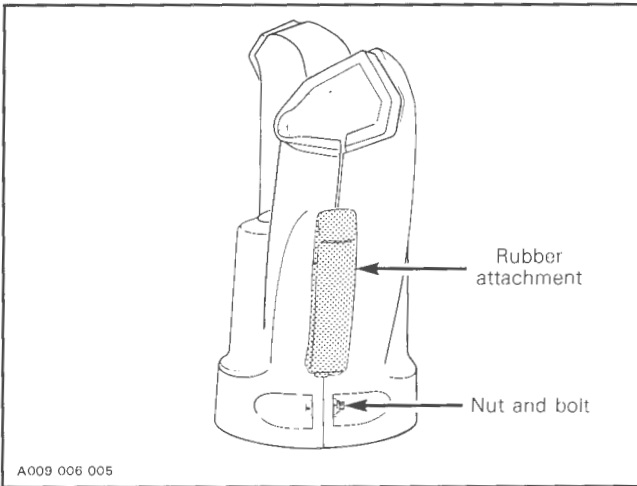
▼ **CAUTION :** Prior to installation, perform handlebar adjustment.

Properly fit the steering pad to the handlebar. Assemble using the two (2) rubber attachments, nuts and bolts.

◆ **WARNING :** Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)



LUBRICATION

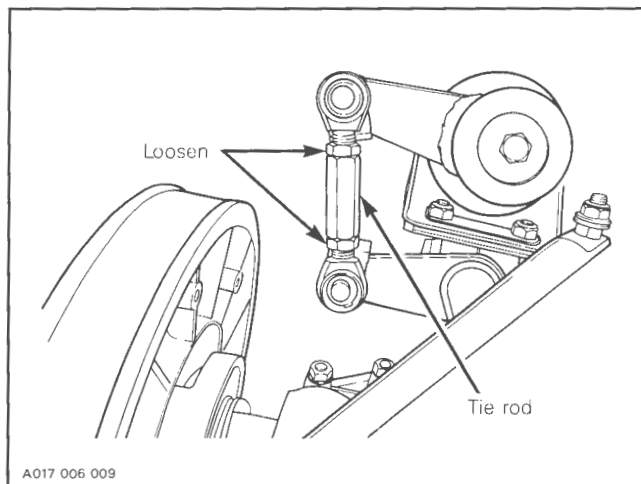
Refer to section 06-02, ski system, for lubrication.

STEERING ADJUSTMENT

37, Tie rod

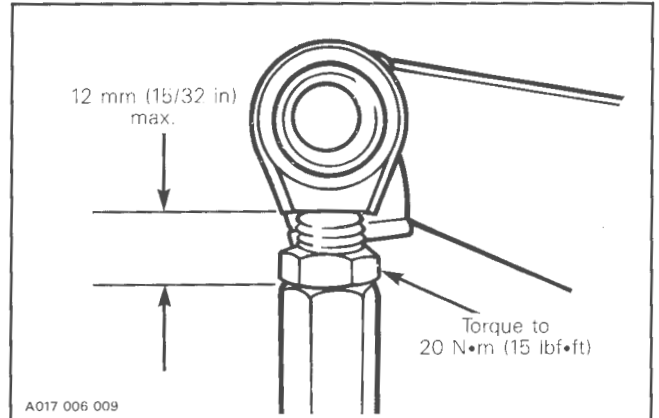
Ski should be perpendicular to handle bar. To align :

- Place ski parallel to vehicle.
- Loosen lock nuts of the tie rod.

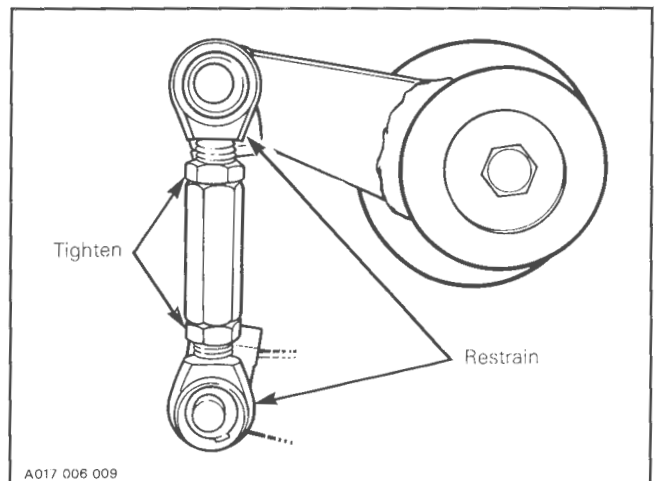
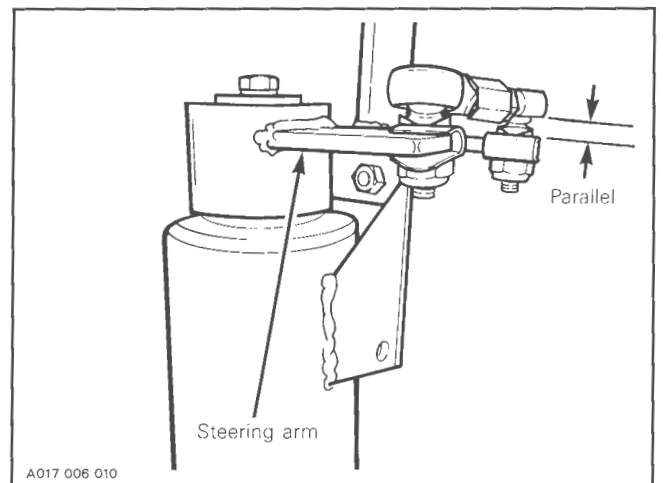


- Turn tie manually until the handlebar is horizontal.
- Firmly retighten the lock nuts.

WARNING : The maximum ball joint external threaded length not engaged in the tie rod must not exceed 12 mm (15/32 in). Torque lock nut to 20 N•m (15 lbf•ft).



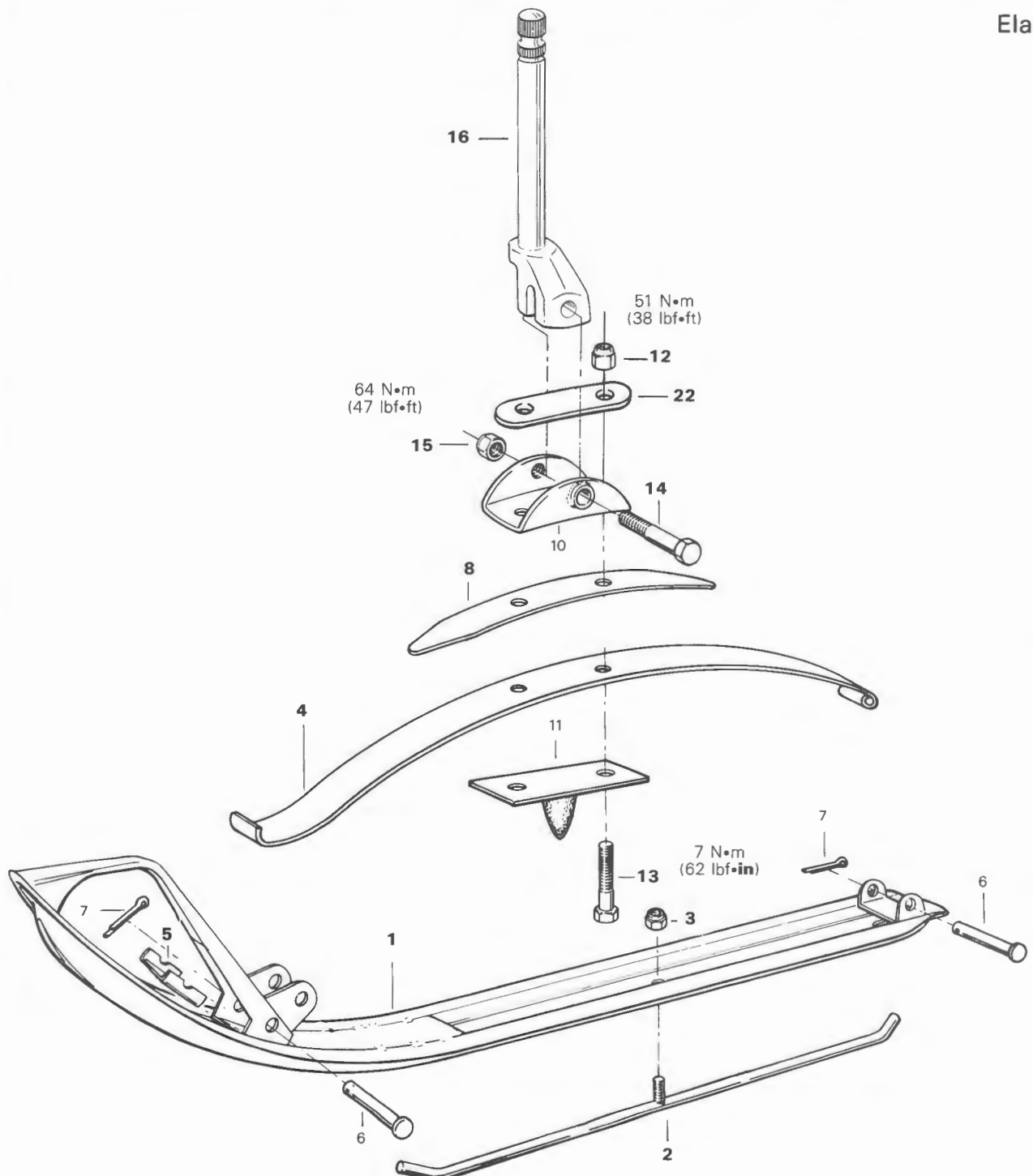
WARNING : The ball joint socket must run parallel with the steering arm and the other ball joint. The socket must be restrained when tightening the tie rod end lock nuts.



SKI SYSTEM

LEAF SPRING SUSPENSION

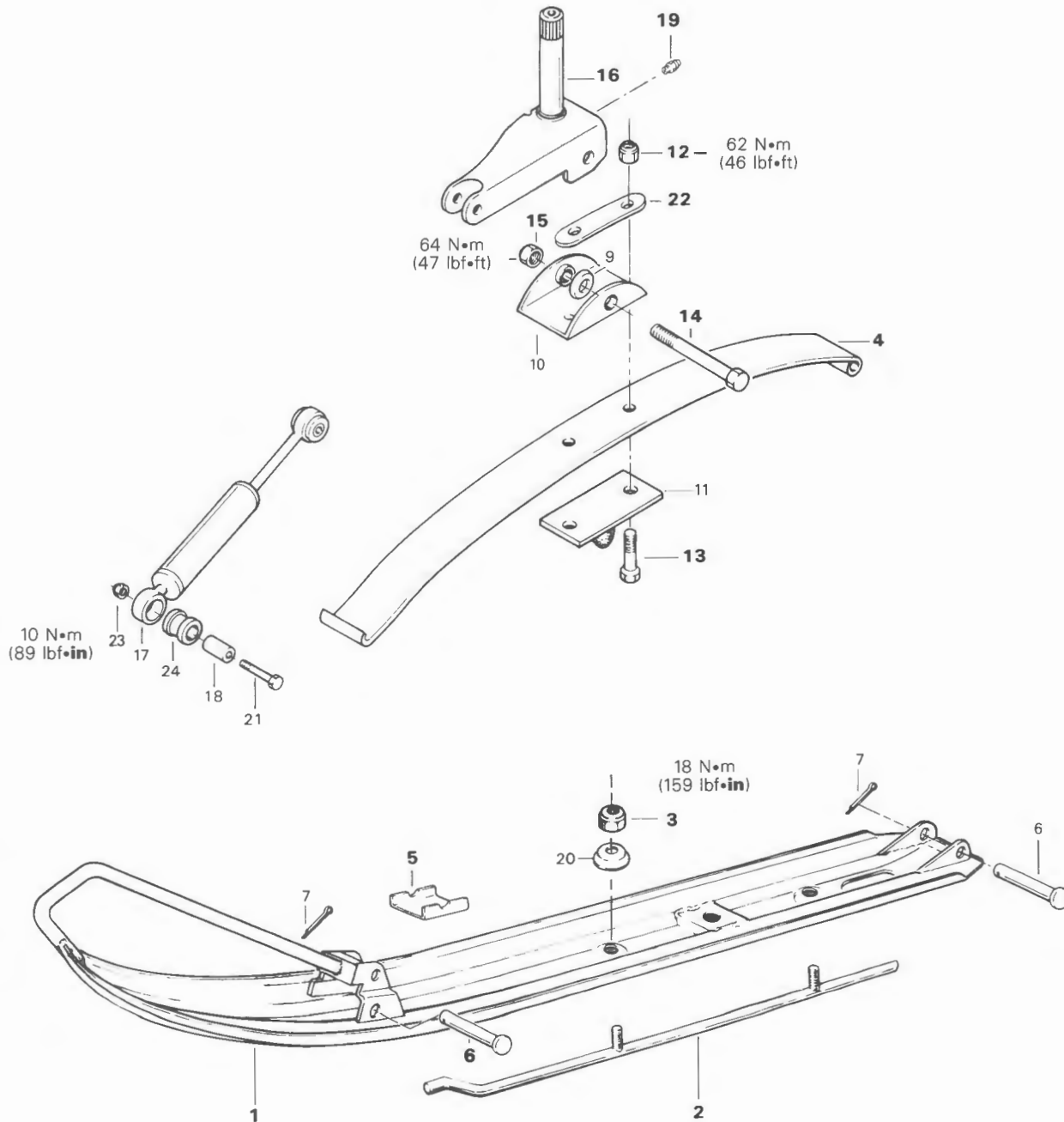
Elan



Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

Safari Citation/E
Safari Scout/Scout E/Saga/Cheyenne
Tundra, Tundra LT



Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

1. Ski
2. Runner shoe
3. Nut
4. Main spring leaf
5. Spring slider cushion (not applicable for Elan)
6. Retainer pin
7. Cotter pin
8. Auxiliary spring leaf (Elan only)
9. Friction cup (not applicable for Elan)
10. Spring leaf coupler
11. Rebound stopper
12. Nut

13. Bolt
14. Bolt
15. Nut
16. Ski leg
17. Shock (not applicable for Elan)
18. Spacer (not applicable for Elan)
19. Grease fitting (Safari Citation/E, Tundra/LT only)
20. Cup (not applicable for Elan)
21. Bolt (not applicable for Elan)
22. Lock tab
23. Nut (not applicable for Elan)
24. Rubber bushing (not applicable for Elan)

INSPECTION

1,2, Ski & runner shoe

Check skis and runner shoes for wear, replace as necessary.

16, Ski leg

Make sure steering arm and ski leg splines interlock.

◆ **WARNING :** All parts having worn splines have to be changed by new ones.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY & ASSEMBLY

2, Runner shoe

◆ **WARNING :** Observe caution while prying or removing steel runner shoes from ski slots as the shoes are under tension. Check that ski runner shoes are not worn more than half of their original thickness.

Replace runner shoes when half worn.

3, Runner shoe nut

On Elan vehicle, torque to 7 N•m (62 lbf•in). On other vehicles, torque to 18 N•m (159 lbf•in).

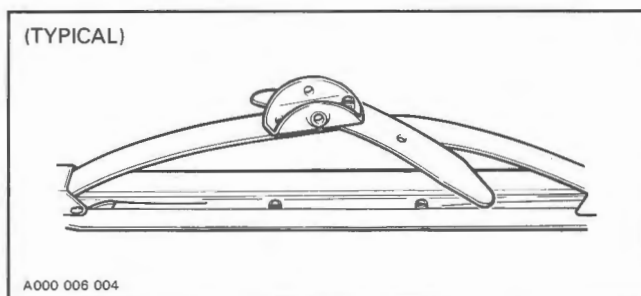
4,8, Main and auxiliary leaf spring

▼ **CAUTION :** When disassembling leaf coupler from spring leaves be careful of leaf tension.

12,13,22, Nut, bolt & tab lock

When assembling spring leaves, cross each and temporarily insert one (1) nut, tab lock and bolt. Position them parallel to each other and install the remaining bolt and nut. Tighten nuts to specified torque and bend tab from the tab lock, over the nuts.

◆ **WARNING :** Should removal of a nylon lock nut be required when undergoing repairs/disassembly, always replace by new ones. Tighten as specified.



5, Spring slider cushion

Apply lithium grease on spring slider cushions at least once a year.

Section 06 STEERING/SKIS

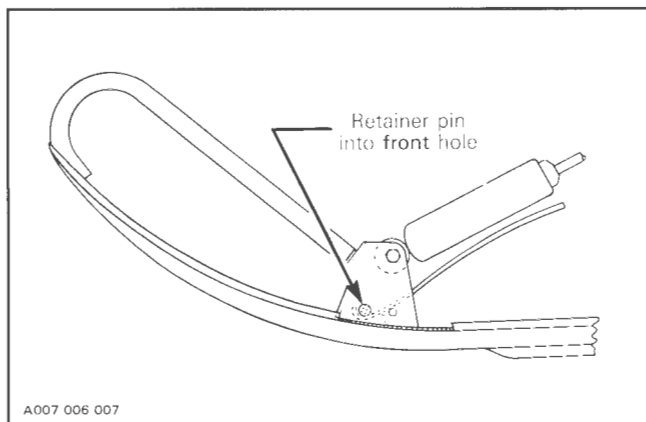
Sub-section 02 (SKI SYSTEM)

4,6, Main leaf spring & retainer pin

Front of single leaf spring must be fixed at the following position :

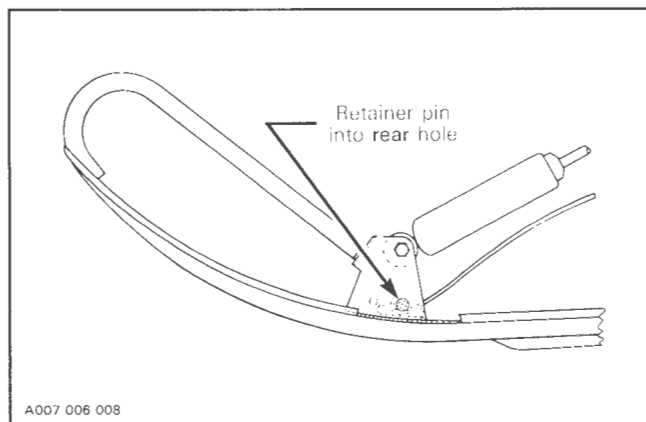
Safari Scout/Scout E/Saga/Cheyenne
Tundra, Tundra LT :

Front hole



Safari Citation/E

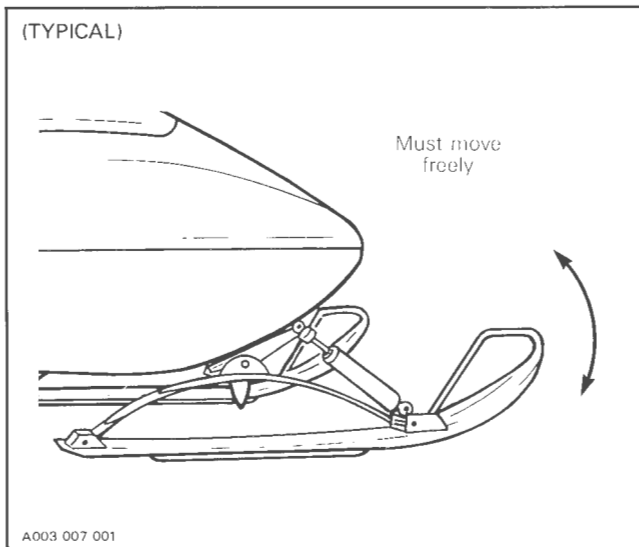
Rear hole



14,15, Spring coupler bolt & nut

Torque bolt and move ski by hand to check that it pivots on ski leg. Torque locking nut to 64 N•m (47 lbf•ft).

▼ CAUTION : Ski must move easily by hand.

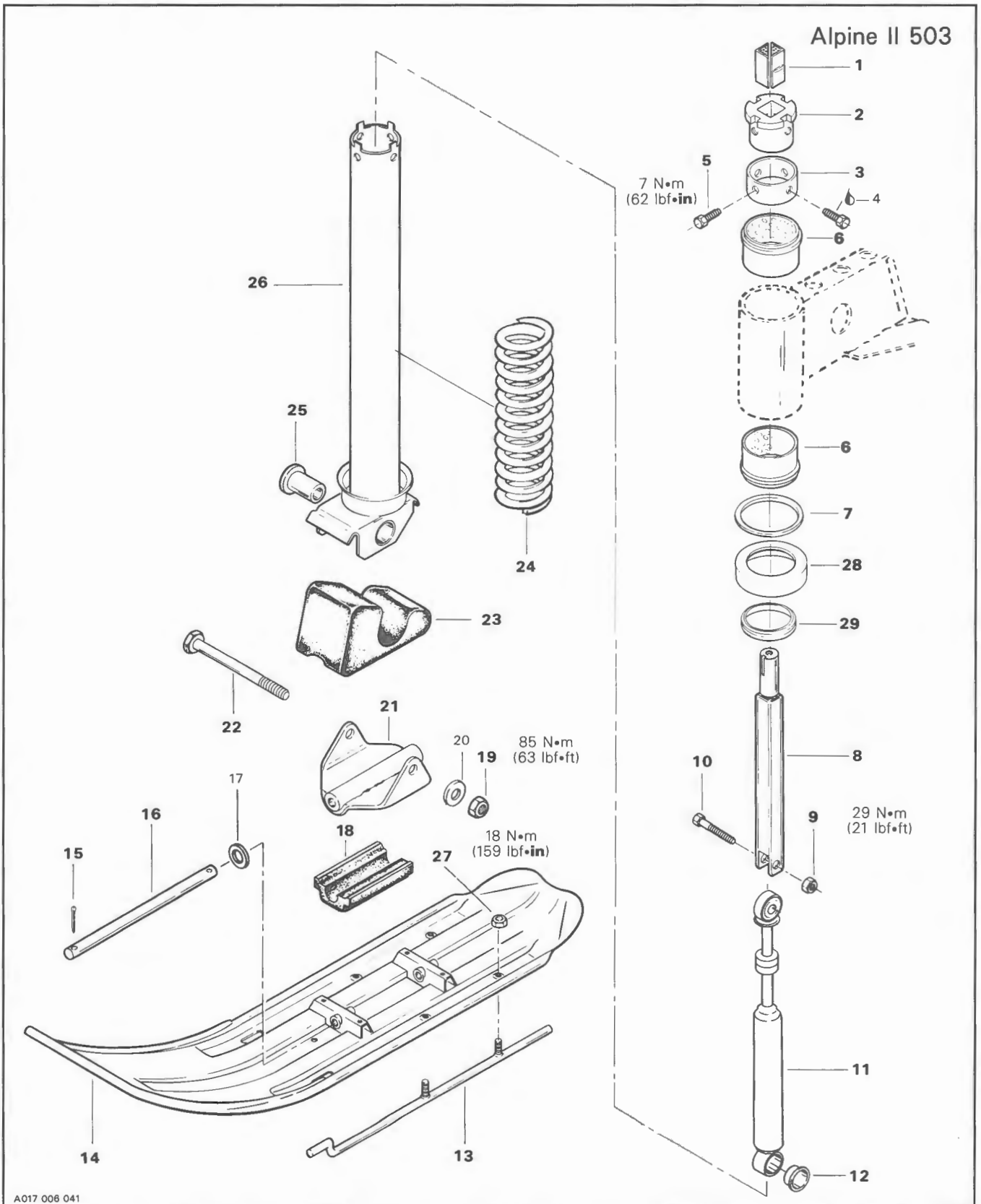


19, Grease fitting

Safari Citation/E, Tundra/LT only

Lubricate with low temperature grease (P/N 413 7061 00).

Section 06 STEERING/SKIS
Sub-section 02 (SKI SYSTEM)




Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

1. L Plate (2)
2. Housing
3. Ring
4. Loctite 242 (blue, medium strength)
5. Hexagonal head screw M6 x 1.00 x 12 (4)
6. Bushing (2)
7. Thrust washer
8. Shaft
9. Hexagonal spring nut M10 x 1.5 x 5
10. Hexagonal head screw M10 x 1.50 x 35
11. Shock absorber
12. Bushing (2)
13. Runner shoe (2)
14. Ski
15. Cotter pin (2)
16. Axle
17. Washer (2)
18. Stop pad
19. Hexagonal elastic stop nut M12
20. Washer
21. Coupler
22. Retaining screw
23. Stop pad
24. Spring
25. Bushing (2)
26. Ski leg
27. Hexagonal elastic stop nut M10 (4)
28. Spring seat
29. Wiper ring

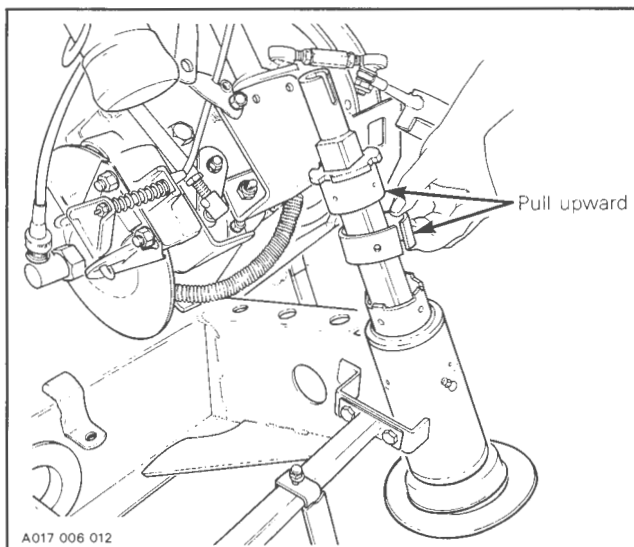
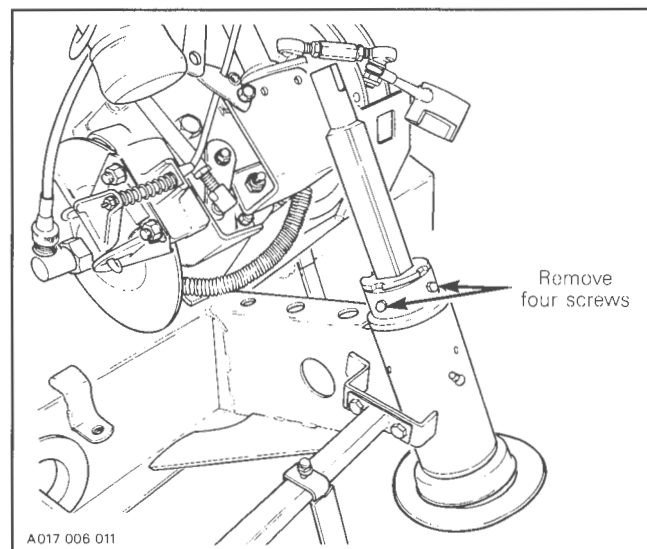
DISASSEMBLY

Refer to section 06-01, steering system, for removal of steering arm and suspension cap prior to disassembling ski leg.

 **NOTE :** To ease suspension removal, keep the vehicle on the ground so that its weight will compress the front suspension thus allowing suspension locking parts removal.

2,3,5,26, Housing, screw, ring & ski leg

Remove four screws, pull housing and ring upward.



Slowly lift front of vehicle until ski leg comes out.
Remove shock absorber spring.

14,19,22, Ski ass'y, nut & retaining screw

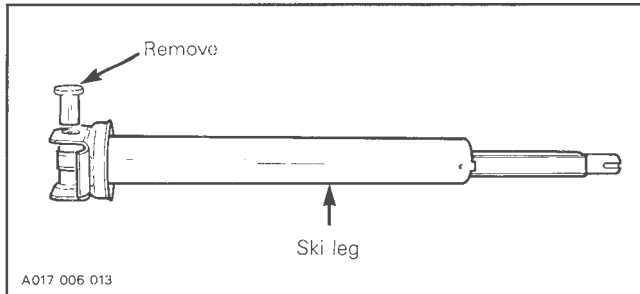
Remove nut and screw then pull ski away from ski leg.

8,9,10,11,12, Shaft, spring nut, screw, shock absorber & bushing

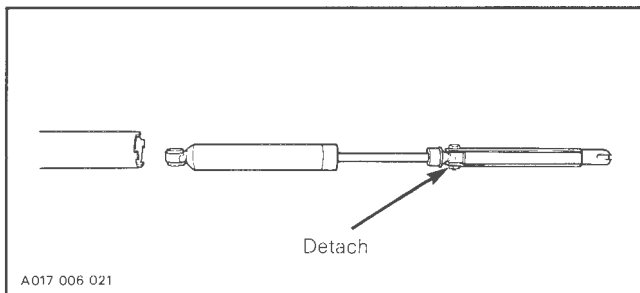
Remove both bushings from bottom of ski leg then pull shaft upward to gain access to shock absorber.

Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

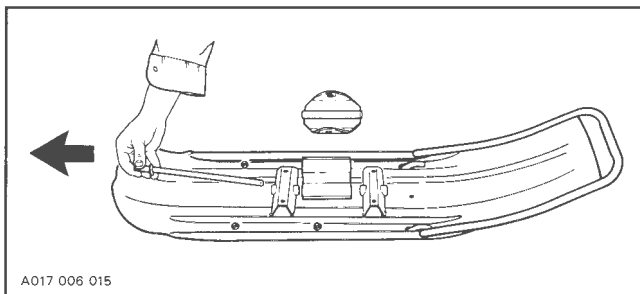


Detach shock absorber from the square shaft.



15,16,18,21, Cotter pin, axle, stop pad & ski coupler

Remove front cotter pin then take axle off rearward.



Remove ski coupler and stop pad.

CLEANING

Clean all metal components in a non ferrous metal cleaner.

INSPECTION

16,21, Axle & ski coupler

Inspect axle for rust, slightly rusted surface can be cleaned with a fine steel wool. Inspect axle for straightness and wear. Inspect ski coupler at pivot for wear.

Inspect both stop pads for damage.

Replace damaged parts as required.

6,12,25, Bushing

Inspect bushings for wear, replace as required.

1,8,26, L-plate, shaft & ski leg

Check ski leg and square shaft for straightness, notches and rust. Slightly rusted surface can be cleaned with a fine steel wool. Check L-plates plastic coating for wear.

13,14, Ski runner & ski

Check ski for damage, pivot points and ski runners for wear. Replace ski runners if worn more than half.

ASSEMBLY

For assembly, reverse disassembly procedure. However, pay attention to the following.

6, Bushing

Due to part tolerances, some sleeves may fit loosely in housing. In such cases, clean housing and sleeve mounting surfaces and apply Loctite RC 609 (P/N 413 7631 00) to secure sleeves to housing.

28,29, Spring seat & wiper ring

Coat wiper ring with low temperature grease (P/N 413 7061 00) and install it into the spring seat with its lip toward coil spring.

7, Thrust washer

Apply low temperature grease on thrust washer.

13,27, Runner shoe & nut

Torque nuts to 18 N•m (159 lbf•in).

Section 06 STEERING/SKIS

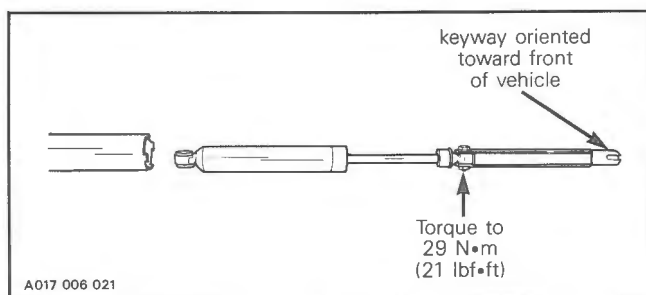
Sub-section 02 (SKI SYSTEM)

15,16, Cotter pin & axle

Apply low temperature grease (P/N 413 7061 00) on axle prior to installing. Install a new cotter pin.

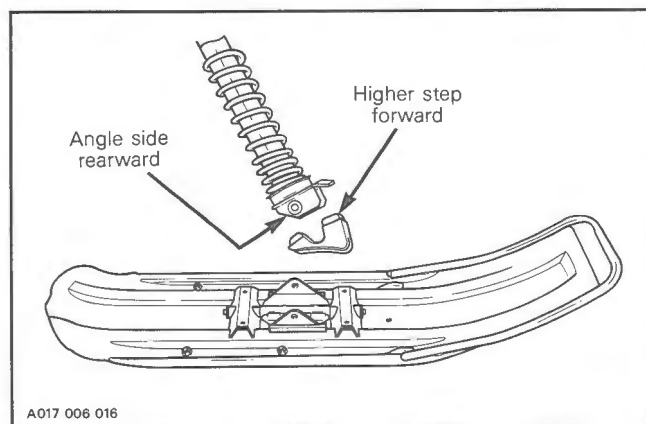
8,9,11, Shaft, nut & shock absorber

Torque spring nut to 29 N•m (21 lbf•ft). When inserting shock absorber and shaft into ski leg, position shaft so that the keyway on its top is oriented toward front of vehicle to properly match with steering arm.



19,22,23,26, Nut, screw, stop pad & ski leg

Install stop pad with its higher step aimed forward and ski leg with its angle side aimed rearward as shown.

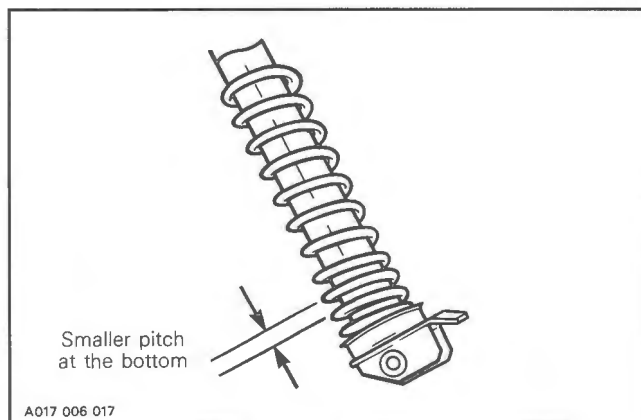


Apply low temperature grease (P/N 413 7061 00) on ski leg screw.

Assemble ski on ski leg then torque nut to 85 N•m (63 lbf•ft).

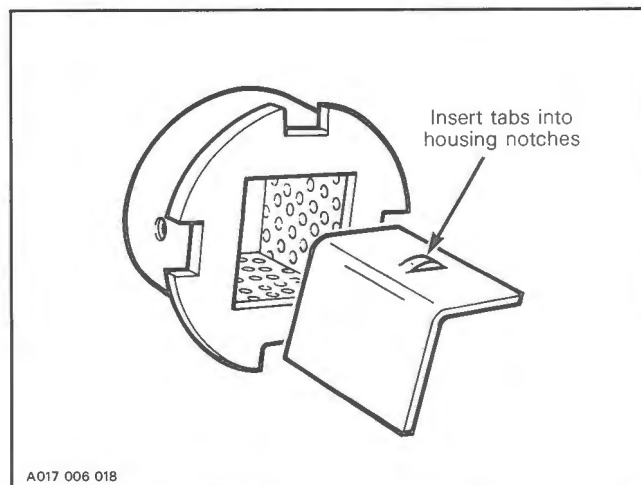
24, Spring

Install so that the coils with the smaller pitch are at the bottom.



1,2,3, L-plate, housing & ring

Install L-plates into housing making sure to insert plate tab into housing notch.



Apply low temperature grease (P/N 413 7061 00) on sliding parts then insert ski leg into its housing.

Slowly lower the vehicle so that its weight compress the front suspension thus allowing installation of ring and housing.

Slide ring then housing over top of ski leg. Install screws into ring and finger tighten only. Torque screws to 7 N•m (62 lbf•in) beginning from one side of the ring opening and carrying on one by one to the other side of the opening. This will "spread out" the ring.

Refer to section 06-01, steering system, for installation of suspension cap and steering arm.

Section 06 STEERING/SKIS

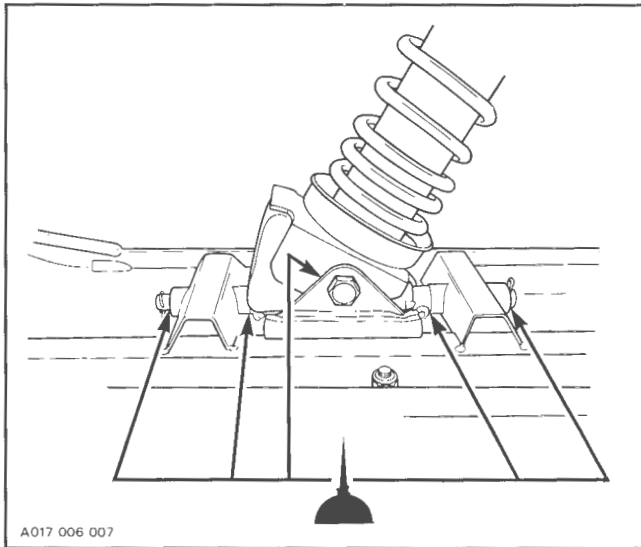
Sub-section 02 (SKI SYSTEM)

LUBRICATION

When lubricating grease fitting, always use low temperature grease (P/N 413 7061 00).

Steering mechanism

Using light machine oil, lubricate the longitudinal pivot of the ski and ski coupler bolt.

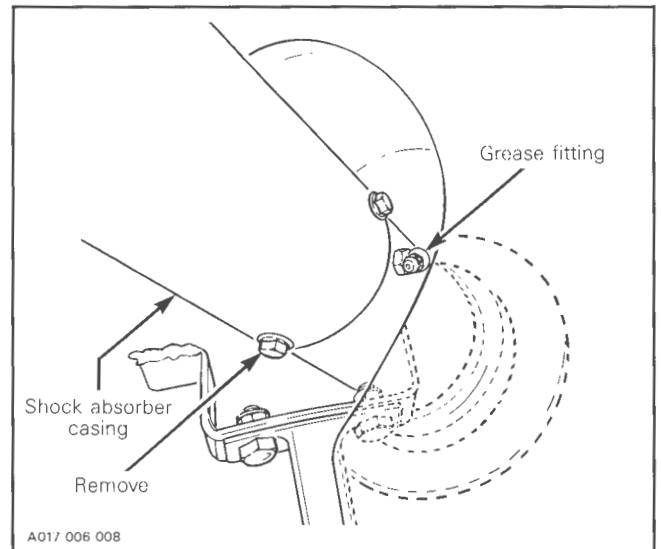


Allow the oil to run in and move ski several times to distribute lubricant.

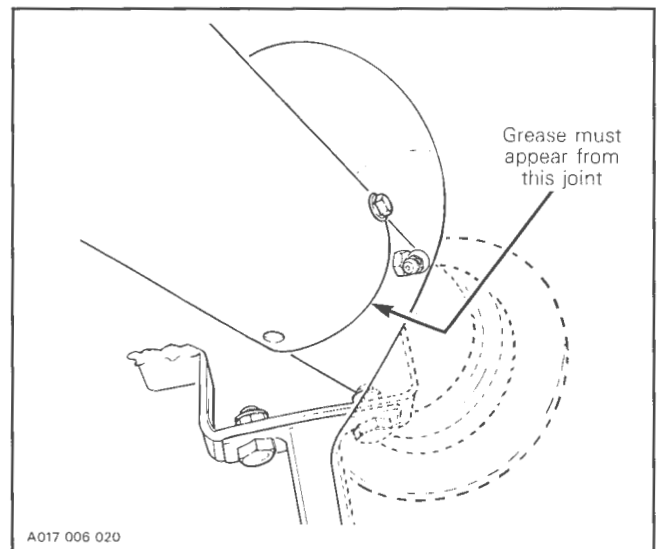
From inside of cab, lubricate front shock system as follows :

With this particular shock absorber system, a screw must be removed from the shock absorber casing to let escape the grease and thus indicate there is enough grease.

Remove the screw shown.



Lubricate until the grease appears from the hole, then, firmly plug the hole with a finger and slowly continue to lubricate until grease appears at the joint.



Oil tie rod ball joints and steering column upper and lower bushings.

Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

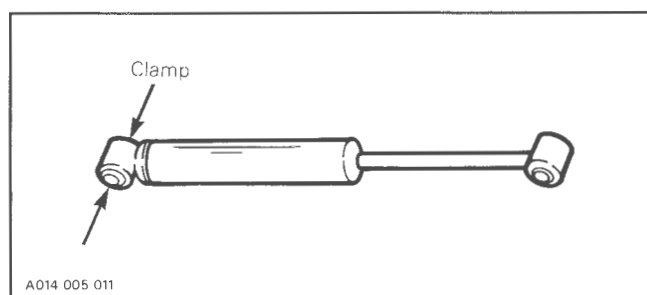
SHOCK ABSORBER SERVICING

Spring replacement

Ski leg must be removed from vehicle to get access to front suspension spring. No spring compressor is needed for servicing.

Shock absorber servicing

Secure the shock absorber body end in a vise.



▼ **CAUTION :** Do not clamp directly on shock body.

Examine shock absorber for leaks. Extend and compress the piston several times over its entire stroke checking that it moves smoothly and with uniform resistance.

Pay attention to following conditions that will denote a defective shock absorber.

- · A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any fault is present.

Section 06 STEERING/SKIS

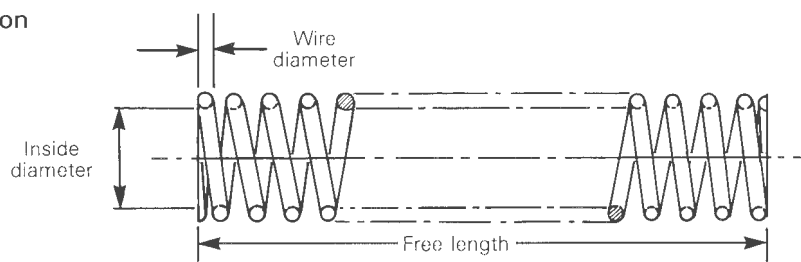
Sub-section 02 (SKI SYSTEM)

SPECIFICATIONS

Shock absorber spring

| PART NUMBER | NUMBER OF COILS | FREE LENGTH | SPRING RATE | INSIDE DIAMETER | WIRE DIAMETER | COMPRESSED LENGTH |
|-------------|-----------------|------------------|--------------------------|----------------------|--------------------|----------------------|
| 506 0949 00 | 13 | 330 mm (13'') | 14.7 N/mm (89 lbf/in) | 66.8 mm (2 5/8'') | 9.2 mm (.362'') | 119.6 mm (4.71'') |

Spring description

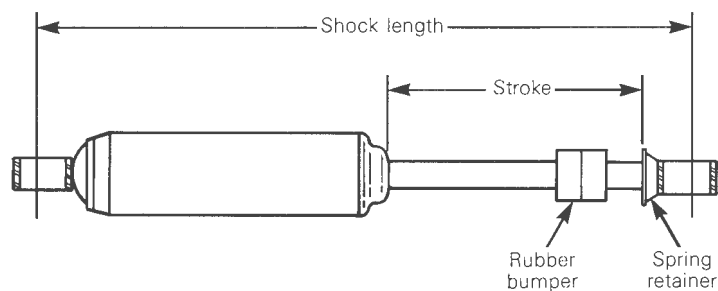


A014 005 014

Shock absorber

| PART NUMBER | FULL STROKE | LENGTH COLLAPSED | | LENGTH EXTENDED |
|-------------|-----------------|---------------------|----------------------------|---------------------|
| | | AT BUMPER CONTACT | AT SPRING RETAINER CONTACT | |
| 414 6081 00 | 177 mm (7'') | 306 mm (12.05'') | 287 mm (11.30'') | 464 mm (18.27'') |

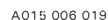
Shock description



A015 005 017

Sub-section 02 (SKI SYSTEM)

Formula MX/MX LT/PLUS/PLUS LT/MACH I




Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

- | | |
|---------------------------------------|---------------------------------------|
| 1. Swing arm | 40. L.H. Jam nut |
| 2. Rubber damper | 41. L.H. Ball joint |
| 3. Bowl | 42. R.H. Jam nut |
| 4. Spring lock washer M8 | 43. R.H. Ball joint |
| 5. Allen screw M8 x 25 | 44. Screw stopper |
| 6. Grease fitting | 45. Hexagonal head cap screw M10 x 45 |
| 7. Hexagonal screw M12 x 70 | 46. Stabilizer |
| 8. Stopper bushing | 47. Slider joint |
| 9. Lower control arm | 48. Slider |
| 10. Housing | 49. Flange |
| 11. Hexagonal elastic stop nut M12 | 50. Clamp |
| 12. Hexagonal screw M12 x 90 | 51. Lock washer 8 mm |
| 13. Circlip | 52. Hexagonal head cap screw M8 x 20 |
| 14. Radial ball joint | 53. Circlip |
| 15. Clevis pin | 54. Thrust washer |
| 16. Bell crank rod | 55. Housing |
| 17. Special washer | 56. Wear plate |
| 18. Cotter pin | 57. Ski leg |
| 19. Flanged screw | 58. Ski boot |
| 20. Shim | 59. Stop bounding |
| 21. Rocker arm | 60. Ski |
| 22. Grease fitting | 61. Carbide runner shoe |
| 23. Hexagonal elastic stop nut M10 | 62. Cup |
| 24. Hexagonal head screw M10 x 110 | 63. Hexagonal elastic stop nut M10 |
| 25. Housing | 64. Plug |
| 26. Hexagonal elastic stop nut M10 | 65. Bolt |
| 27. Hexagonal head cap screw M10 x 60 | 66. Slotted nut M12 |
| 28. Flat washer | 67. Cotter pin |
| 29. Bushing | 68. Slider cushion |
| 30. Housing | 69. "PRS" decal |
| 31. Hexagonal head cap screw M10 x 95 | 70. Loctite 271 |
| 32. Spacer | 71. Cap screw |
| 33. Front shock body | 72. Flat washer |
| 34. Front shock spring | 73. Steering arm |
| 35. Spring stopper ring | 74. Snap ring |
| 36. Spring stopper | 75. Cap |
| 37. Hexagonal head cap screw M10 x 45 | 76. Elastic stop nut |
| 38. Screw stopper | 77. Flat washer |
| 39. Upper control arm | |

DISASSEMBLY

 **WARNING:** Before removing any suspension components, always lift the vehicle off the ground to release load on suspension system.

Lift front end of vehicle off the ground and block on a stand. Remove muffler to gain access to linkage.

The following procedures are identical for each side of vehicle.

60,65,66,67, Ski, screw, slotted nut & cotter pin

To remove ski, take cotter pin off, unscrew slotted nut, remove bolt.

1,5,7,8,11,37,38,73, Swing arm, Allen screw, nut, screw, screw stopper, stopper bushing & steering arm

Detach steering arm **#73**, open screw stopper, remove nut, screws and stopper bushing then take swing arm off. While removing swing arm, detach stabilizer bar.

23,27, Screw & nut (shock ass'y)

Remove nuts and screws then take shock assembly off.

21,24,26, Rocker arm, screw & nut

To remove nut **#26** heat to 93°C (200°F) to break the Loctite bond. Remove screw and nut to slide the rocker arm.

15,16,18, Clevis pin, bell crank rod & cotter pin

Remove cotter pin and clevis pin then take off bell crank rod and rocker arm.

Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

39,44,45, Upper control arm, screw stopper & screw

Open screw stopper, remove screw then take upper control arm off.

8,9,11,12, Stopper bushing, lower control arm, nut & screw

Remove nut, screw and stopper bushing then lower control arm off.

46,52, Stabilizer & screw

Remove screws and take stabilizer off.

CLEANING

Clean all metal components in a non ferrous metal cleaner.

◆ **WARNING :** Perform cleaning in a well ventilated area.

INSPECTION

Inspect all ball joints, bushings and moving parts for wear, crushing or play, if excessive replace them.

60,61, Ski & runner shoe

Check skis and runner shoes for wear, replace as if necessary.

57, Ski leg

Make sure steering arm and ski leg splines interlock.

◆ **WARNING :** All parts having worn splines have to be changed by new ones.

Check general condition of steering system components for wear and replace if necessary.

ASSEMBLY

For assembly reverse the disassembly procedure. However, pay attention to the following.

▼ **CAUTION :** When tightening screw mounted with bushings, it is important to follow the next specified torques to avoid crushing them.

Always replace removed cotter pins, screw stoppers and hexagonal elastic stop nuts by new ones.

46,52, Stabilizer & screw

Torque screws to 15 N•m (133 lbf•in) then make sure the stabilizer move easily.

8,9,11,12,39,44,45, Stopper bushing, upper and lower control arms, stopper screw, screw & nut

To ease installation of control arms through tie rod cover, apply petroleum jelly into its opening lips. Install longer distance between bell crank rod and pivot point of lower control arm at inside of belly pan.

Torque screw **#12** to 52 N•m (38 lbf•ft).

Torque nut **#11** to 85 N•m (63 lbf•ft).

Torque screw **#45** to 48 N•m (35 lbf•ft).

Bend tab stopper screw **#44** over a flat of screw head.

21,26,70, Rocker arm nut & Loctite 271

Clean all threads then apply a drop of Loctite 271. Make sure bell crank rod is placed to allow required travelling space for tie rods. Make sure rocker arm pivots easily.

Torque nut **#26** to 48 N•m (35 lbf•ft).

23, Nut (shock absorber)

First install the screw at the bottom of the shock then the upper one. Torque them to 35 N•m (26 lbf•ft).

2,5, Rubber damper & Allen screw

Apply a light coat of petroleum jelly outside of rubber damper to ease its insertion into swing arm and inside to slide onto pivot. This will prevent rubber from sticking and steel from rusting. Torque Allen screw **#5** to 25 N•m (18 lbf•ft). Make sure swing arm pivots easily.

▼ **CAUTION :** Do not apply grease or oil on rubber damper.

7,11,37,38, Screw, screw stopper & nut (control arm)

Torque nut **#11** to 85 N•m (63 lbf•ft).

Torque screw **#7, 37** to 29 N•m (21 lbf•ft).

Bend tab of stopper screw **#38** over a flat of screw head.

For steering arm installation and tightening torque, refer to "Steering" section 06-01.

Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

59, Stop bounding

Install with the mold indication "front" forward.

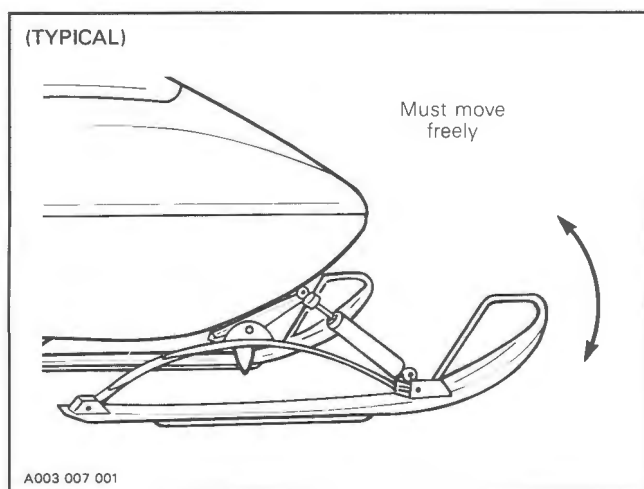
61,63, Nut & runner shoe

Torque nuts to 18 N•m (159 lbf•in).

60,66,67,77, Ski, slotted nut, cotter pin & washer

Torque nut to 40 N•m (30 lbf•ft). Make sure ski moves easily. Install washer and cotter pin.

▼ **CAUTION :** Ski must move easily by hand.



ALIGNMENT & CAMBER ADJUSTMENT

After assembly, always perform ski alignment and ski leg camber adjustment. Refer to "Steering" section 06-01.

LUBRICATION

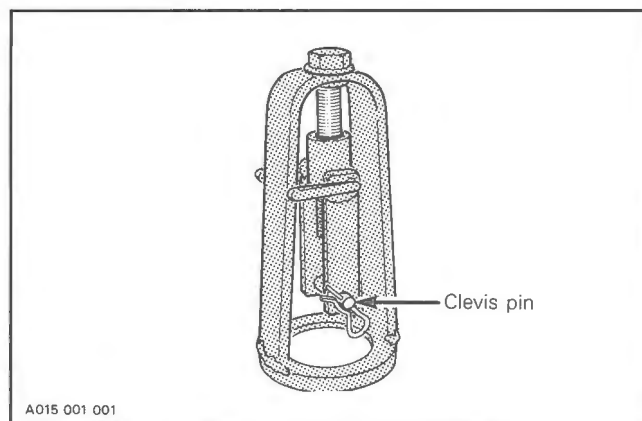
Refer to "Steering" section 06-01.

SHOCK ABSORBER SERVICING

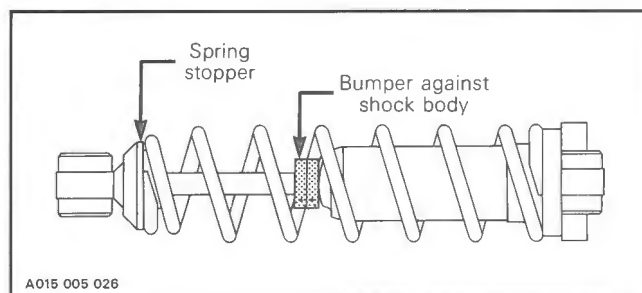
◆ **WARNING :** Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

Spring replacement

Use spring remover (P/N 414 5796 00).



○ **NOTE :** Before attempting to compress the shock spring, push the rubber bumper on the piston shaft against the shock body.



Install the shock spring remover over the spring. Insert clevis pin through the shock eye and secure it with the hair pin.

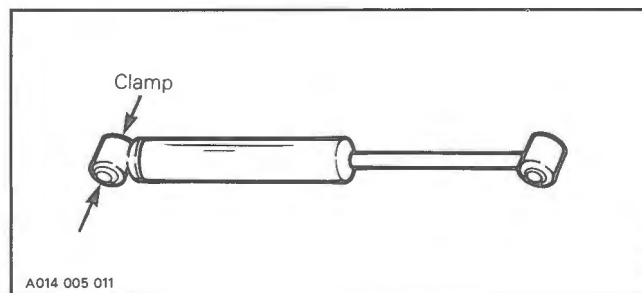
Tighten the bolt until the spring stopper can be removed.

To install the spring, reverse procedure.

Servicing

◆ **WARNING :** Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

Secure the shock body end in a vise.



Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

▼ **CAUTION** : Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke checking that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a defective shock :

— A skip or a hang back when reversing stroke at mid travel.

— Seizing or binding condition except at extreme end of either stroke.

— Oil leakage.

- - A gurgling noise, after completing one full compression and extension stroke.

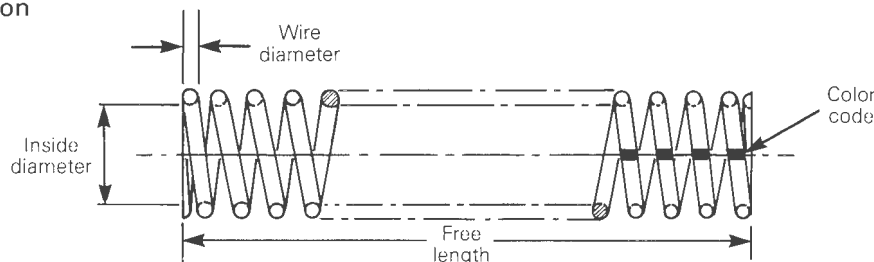
Renew if any faults are present.

SPECIFICATIONS

Shock absorber spring

| PART NUMBER | NUMBER OF COILS | FREE LENGTH ± 3 mm (.12") | SPRING RATE ± 1.8 N/mm (10 lbf/in) | INSIDE DIAMETER (big end) | WIRE DIAMETER ± 0.05 mm (.002") | COMPRESSED LENGTH | COLOR CODE |
|-------------|-----------------|------------------------------|---------------------------------------|--|------------------------------------|---------------------|---------------|
| 503 0804 00 | 15.3 | 241.3 mm (9.50") | 35 N/mm (200 lbf/in) | 46.7 mm + 0.75" - 0 (1.84 mm + .030" - 0) | 9.19 mm (.362") | 131.8 mm (5.19") | Green / green |

Spring description

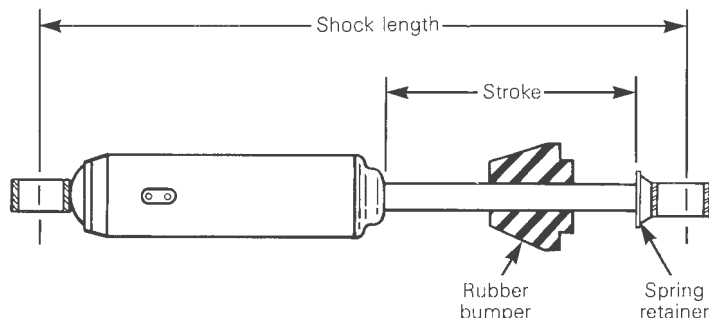


A014 005 014

Shock absorber

| PART NUMBER | FULL STROKE | LENGTH COLLAPSED | | LENGTH EXTENDED |
|-------------|--------------------|---------------------|----------------------------|----------------------|
| | | AT BUMPER CONTACT | AT SPRING RETAINER CONTACT | |
| 414 5859 00 | 62.9 mm (2.48") | 218.0 mm (8.58") | 192.6 mm (7.58") | 255.5 mm (10.06") |

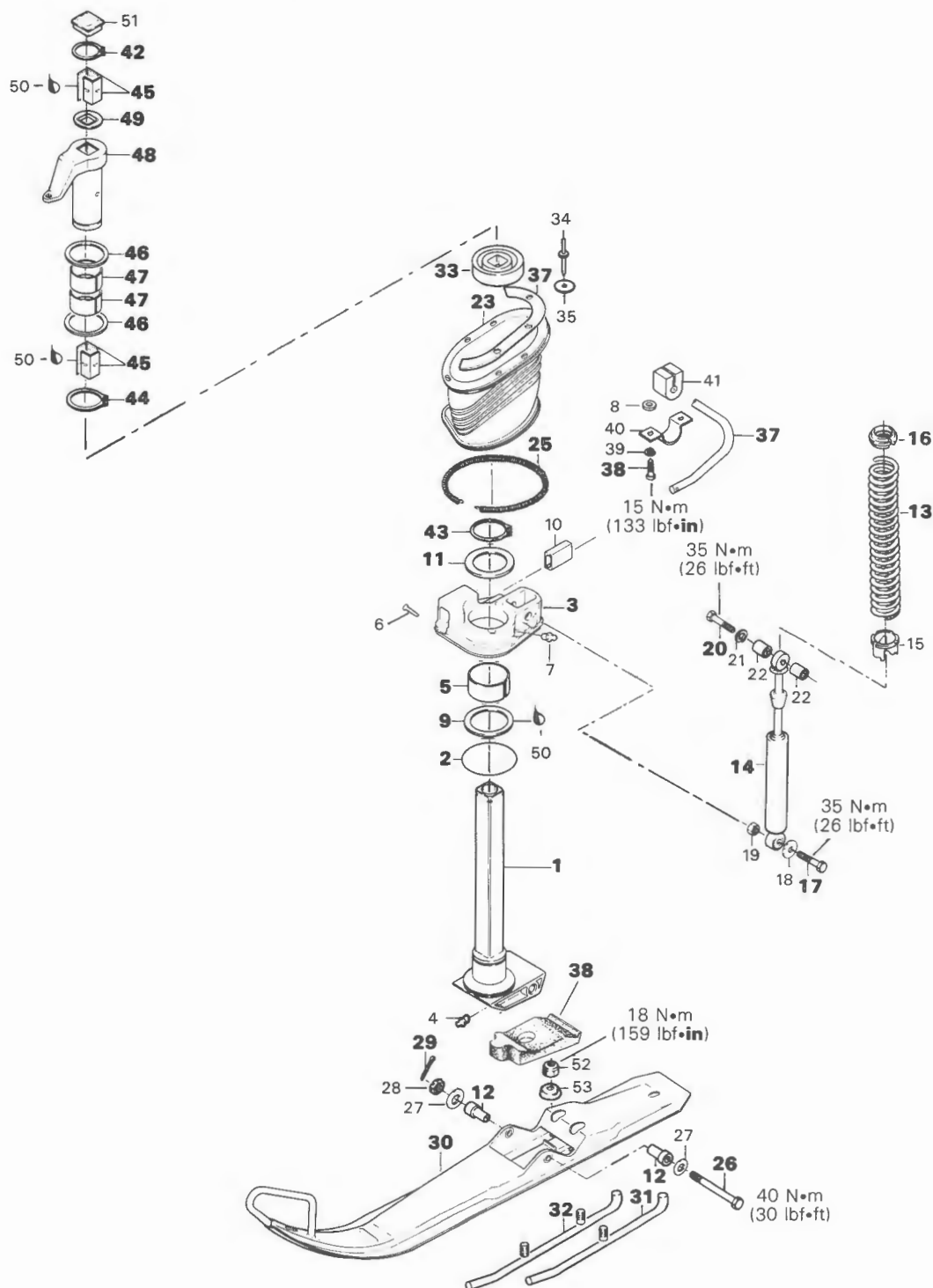
Shock description



A015 005 017

POSI-STEER SUSPENSION

Safari Voyageur/Escapade



Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

1. Ski leg (2)
2. O-ring (2)
3. Shock absorber adaptor R.H. & L.H.
4. Grease fitting
5. Bushing (2)
6. Metal screw 8 x 1/2
7. Grease fitting
8. Washer (2)
9. Thrust washer (2)
10. Stabilizer shoe (2)
11. Thrust washer (2)
12. Bushing (4)
13. Spring (2)
14. Shock absorber (2)
15. Adjuster ring (2)
16. Retainer ring (2)
17. Screw M10 x 55 mm (2)
18. Washer (2)
19. Nut M10 (2)
20. Screw M10 x 70 (2)
21. Washer (2)
22. Spacer (4)
23. Ski leg boot (2)
24. Strip (2)
25. Spring (2)
26. Screw (2)
27. Washer (4)
28. Nut (2)
29. Cotter pin (2)
30. Ski R.H. & L.H.
31. Runner (short) (2)
32. Runner (long) (2)
33. Seal (2)
34. Rivet (12)
35. Washer (6)
36. Ski stopper (2)
37. Stabilizer
38. Screw (4)
39. Washer (4)
40. Clamp (2)
41. Flange (2)
42. Snap ring
43. Snap ring
44. Snap ring
45. L-plate (8)
46. Thrust washer (4)
47. Bushing 58 mm (4)
48. Steering arm R.H. & L.H.
49. Seal (2)
50. Loctite (Super Bonder 495)
51. Ski leg cover (2)
52. Nut (6)
53. Cup (6)

DISASSEMBLY

WARNING: Before removing any suspension components, always lift the vehicle off the ground to release load on suspension system.

Lift front end of vehicle off the ground and block on a stand. Remove muffler to gain access to linkage.

The following procedures are identical for each side of vehicle.

26,28,29,30, Ski, screw, slotted nut & cotter pin

To remove ski, take cotter pin off, unscrew slotted nut, remove bolt.

23,25, Ski leg boot & spring

Unhook spring and raise boot to gain access.

37,38, Stabilizer & screw

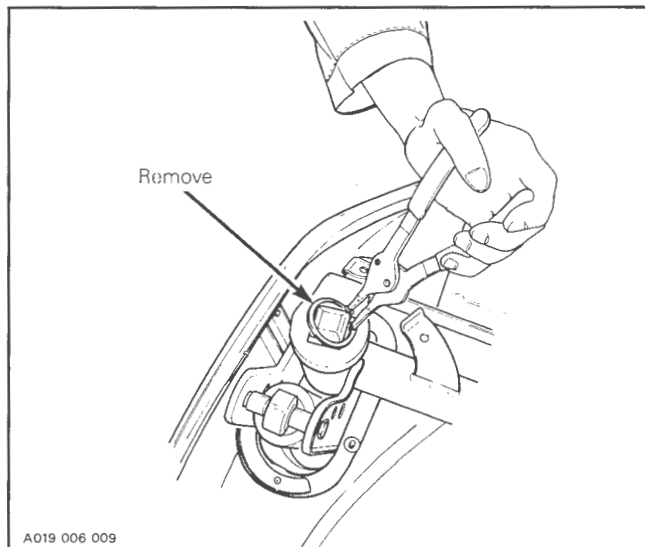
Remove screws (underneath bottom pan) and take stabilizer off.

14,17,20, Shock absorber & screw

Remove screws and take shock absorber off.

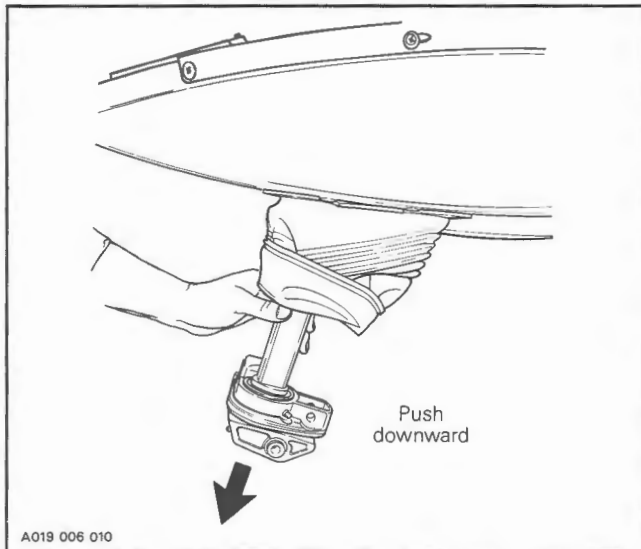
1,42, Ski leg & snap ring

Remove snap ring then push ski leg downward and remove from vehicle.



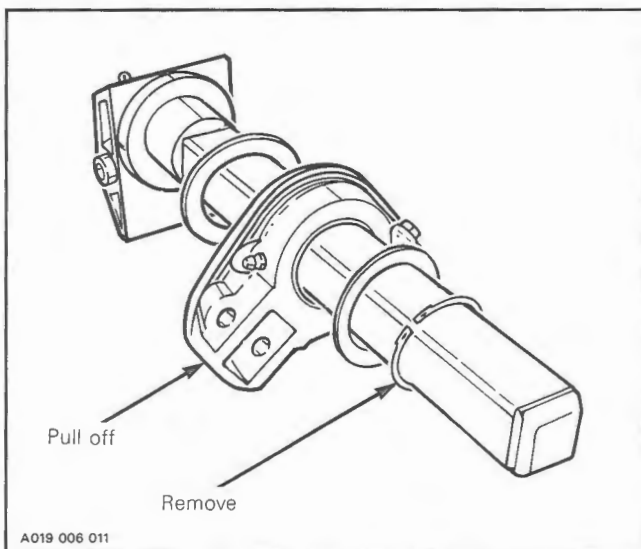
Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)



3,43, Shock absorber adaptor & snap ring

Remove snap ring and pull shock absorber adaptor off.

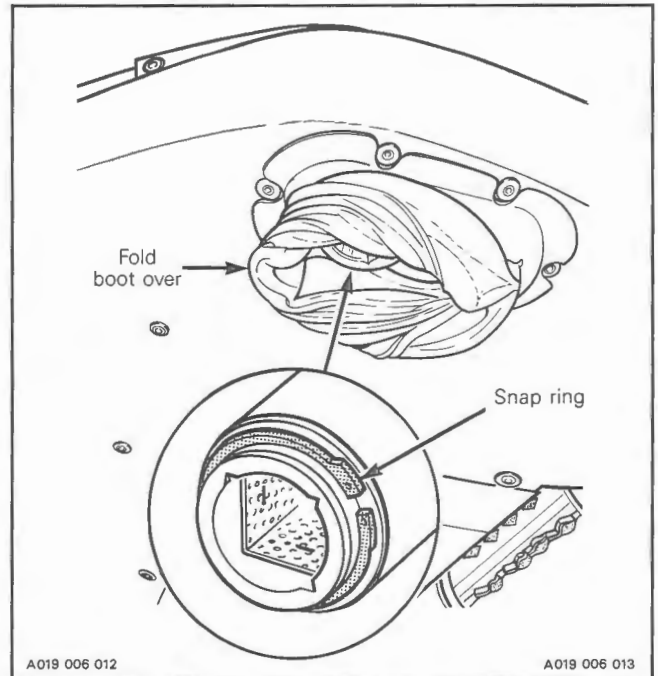


44,48, Snap ring, steering arm

Disconnect tie rod end from steering arm.

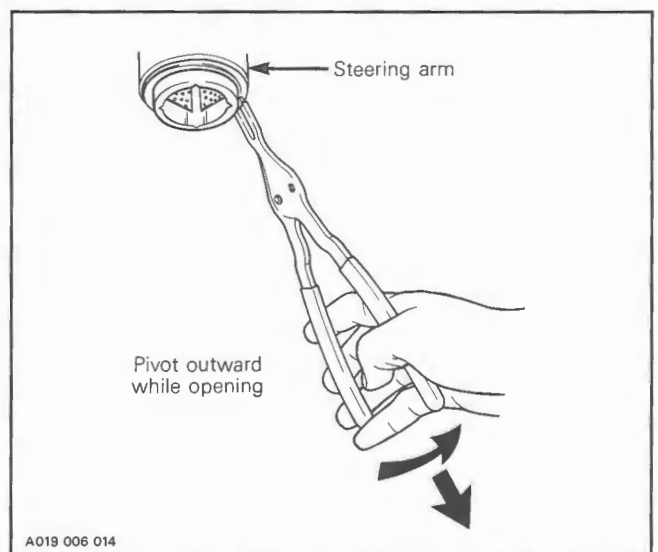
NOTE: To remove ball joint stud from steering arm, it may be required to fully turn steering.

Fold ski leg boot over to allow snap ring removal. From underneath, remove snap ring.



NOTE: To ease removal, first insert snap ring pliers into snap ring and firmly push tips against thrust washer. Pivot pliers outward while opening.

NOTE: For clarity, ski leg boot has been removed for the following illustration.



Pull steering arm upward.

CLEANING

Clean all metal components in a non ferrous metal cleaner.

Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

INSPECTION

23, Ski leg boot

Check for tears or cuts, replace if damaged.

12,30,31,32, Bushing, ski & runner

Check for wear. Runner should not be worn more than half. Replace parts as needed.

2, O-ring

Check for cuts. Presence of grease below indicates a leak so replace it.

33,49, Seal

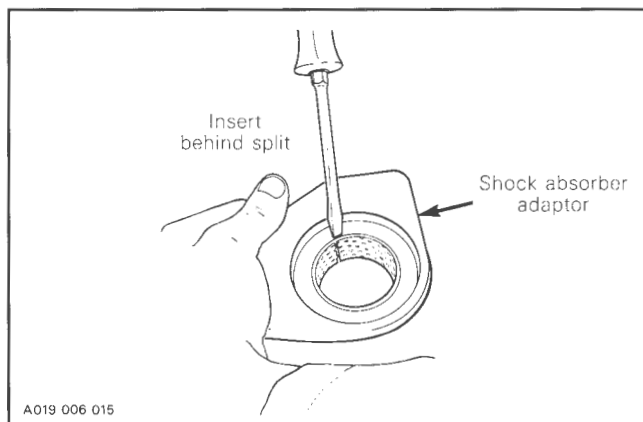
Check seal for cracks, tears or cuts. Replace as needed. Presence of grease on the upper end of steering arm indicates seal #49 malfunction.

5,9,11, Bushing & thrust washer

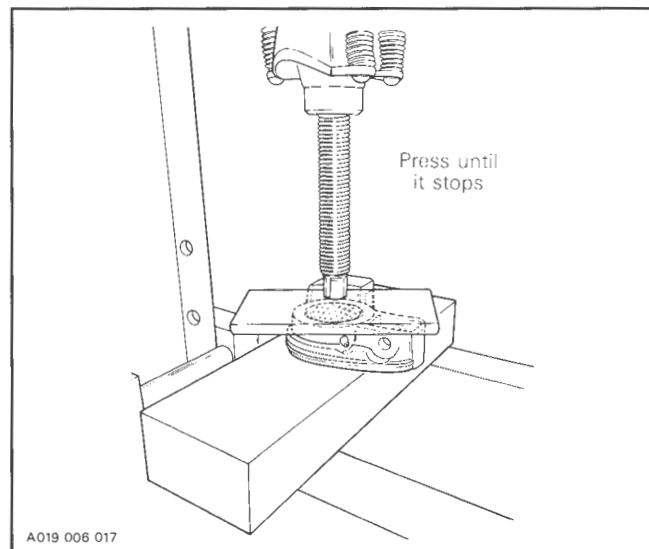
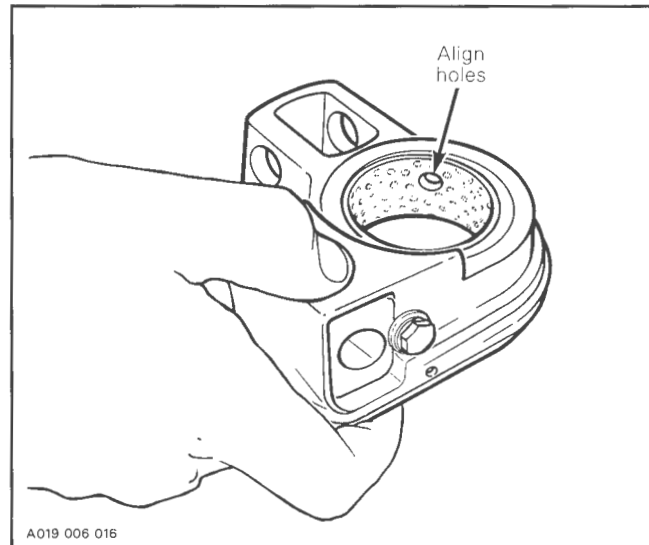
Check for wear. Pay attention to the plastic coating on bushing and bottom thrust washer. Replace if damaged or worn.

SHOCK ABSORBER ADAPTOR BUSHING REPLACEMENT

Insert a screwdriver blade behind the bushing split and remove it.



When installing new one, make sure to align bushing hole with grease fitting hole. Using a suitable thick plate or pusher, press bushing until it comes flush with top of shock absorber adaptor.

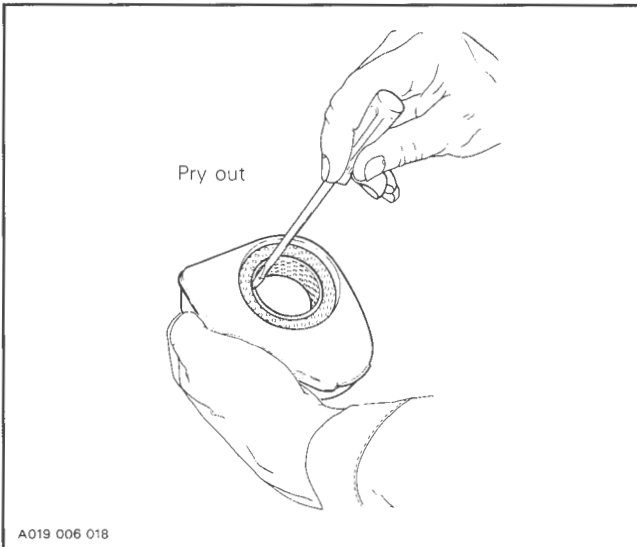


SHOCK ABSORBER ADAPTOR THRUST WASHER REPLACEMENT

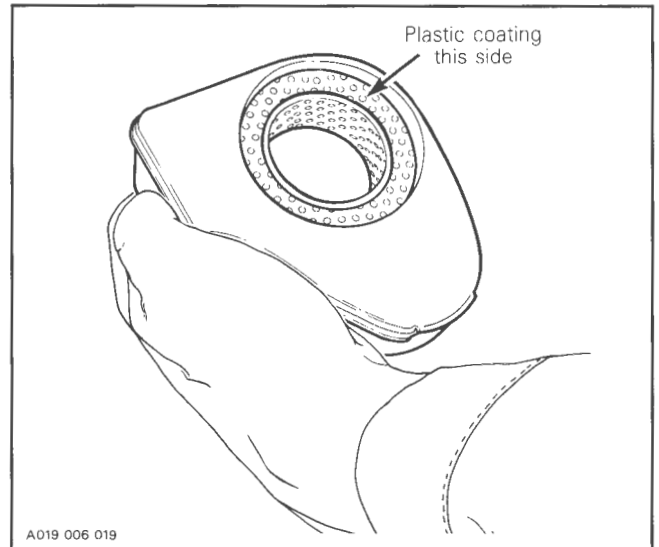
If bushing has not been removed, insert a small screwdriver blade between bushing and thrust washer and pry it out.

Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)



When installing, apply Loctite Super Bonder 495 on the face **without** plastic coating and install into shock absorber adaptor. This is important to prevent from rotating into its housing.

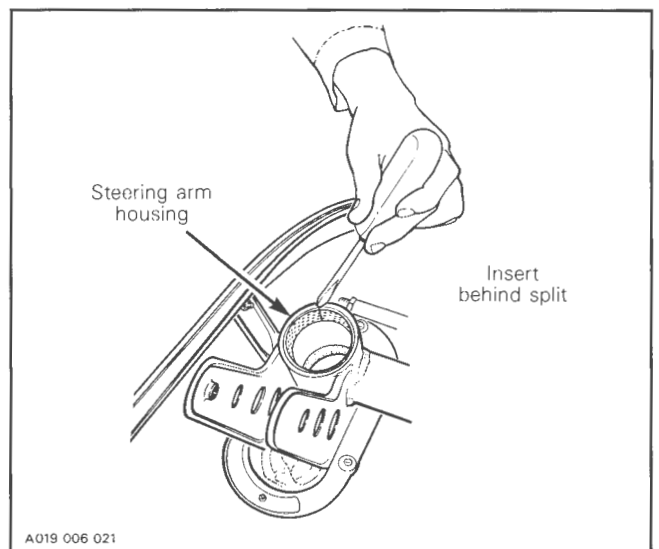
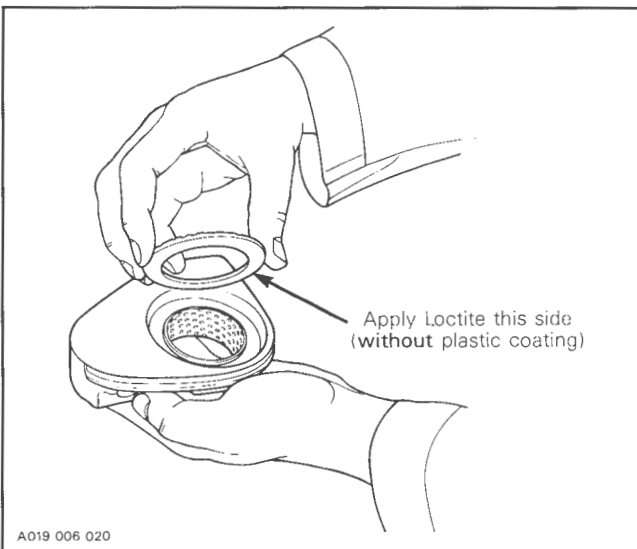


45,46,47, L-Plate, thrust washer & bushing

Check for wear. Pay attention to the plastic coating on L-plates and bushings. Replace if damaged or wear.

STEERING ARM BUSHING REPLACEMENT

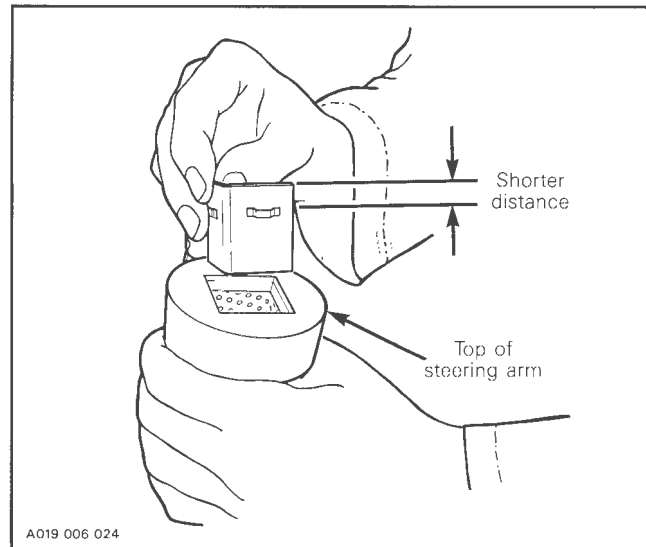
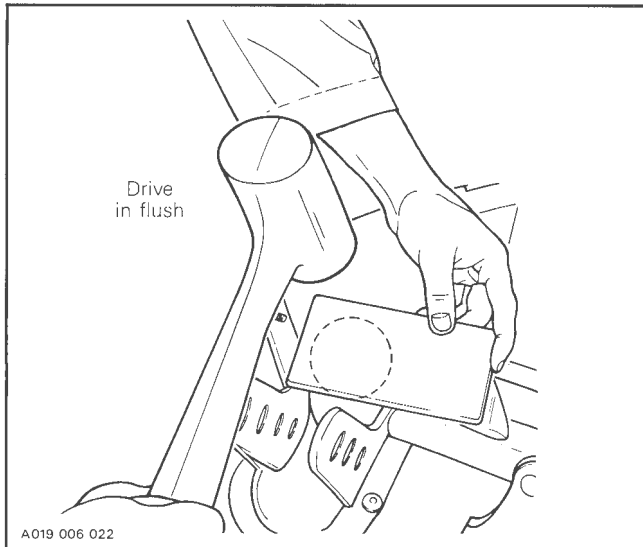
Insert a screwdriver blade behind the bushing split and remove it. Same procedure for bottom bushing.



Using a thick plate or a pusher, drive bushing in until it comes flush with its housing. Same procedure for bottom bushing.

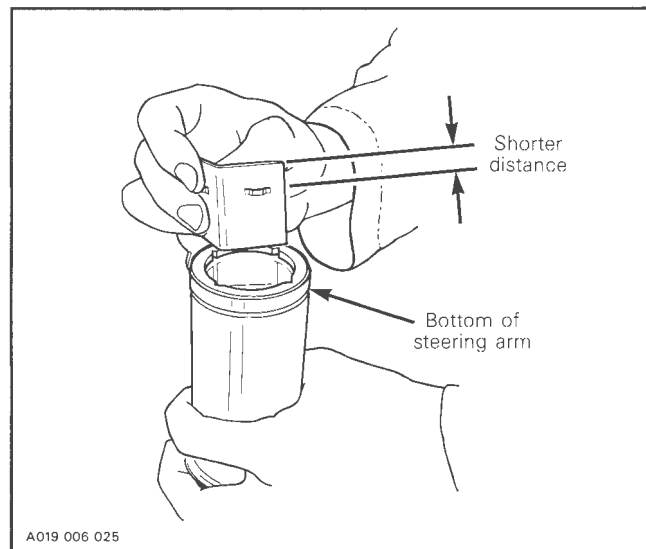
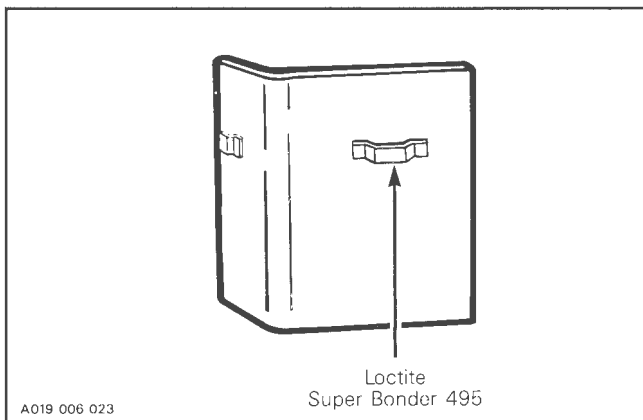
Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)



SKI LEG L-PLATE REPLACEMENT

Pry L-plates out with a screwdriver. At assembly, apply Loctite Super Bonder 495 on a tab of the L-plate to keep in place.



Make sure to install L-plate positioning the shorter distance of the plate tab toward the end of the steering arm and into steering arm notches.

1, Ski leg

Check sliding surfaces for straightness, notches or rust. Slightly rusted surfaces may be rubbed out with a very fine steel wool. Replace as needed.

Section 06 STEERING/SKIS

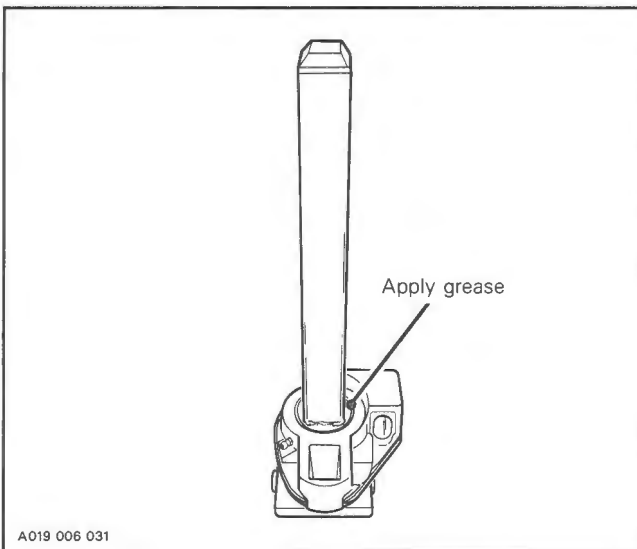
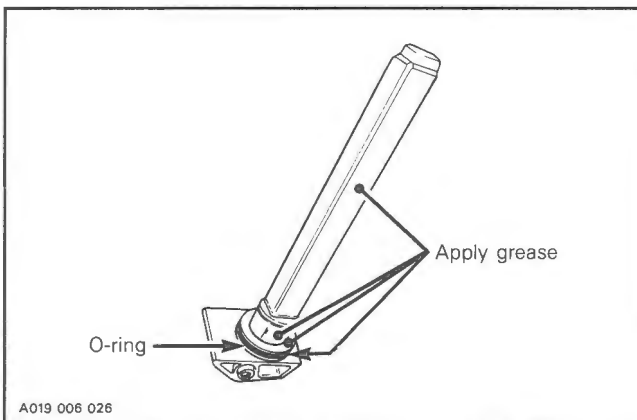
Sub-section 02 (SKI SYSTEM)

ASSEMBLY

For assembly, reverse disassembly procedure. However, pay attention to the following.

3,9,11, Shock absorber adaptor & thrust washer

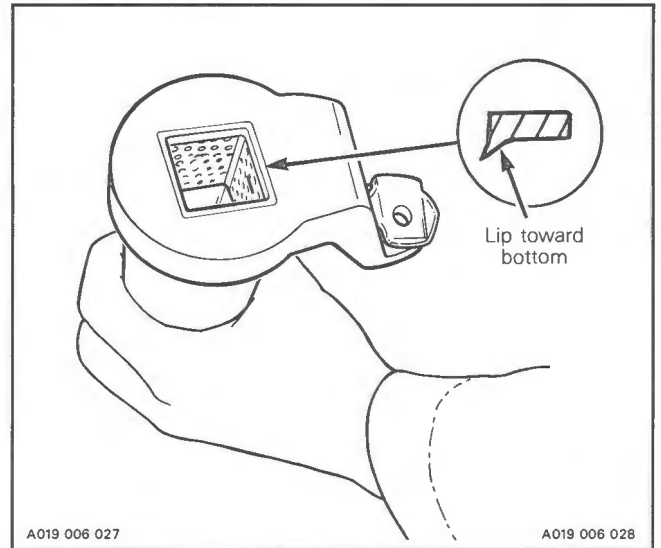
Apply low temperature grease (P/N 413 7061 00) all around O-ring, on thrust washer bearing surfaces and on square shaft.



Install shock absorber adaptor, locate upper thrust washer and secure snap ring with its sharp side on top.

48,49, Steering arm & seal

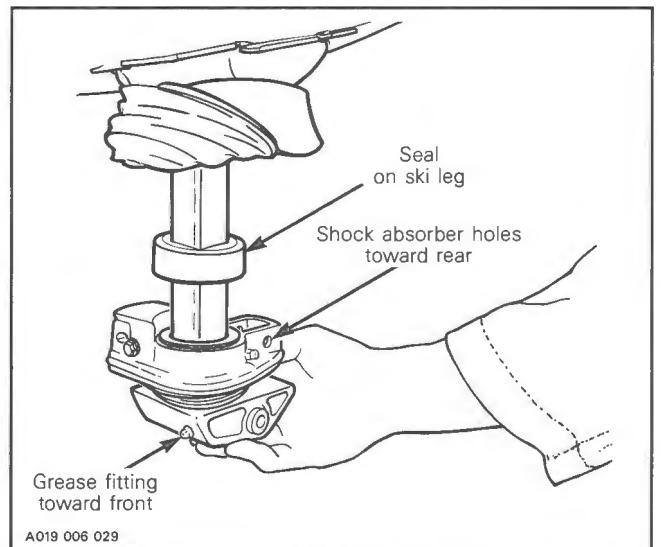
Position seal lip as shown.



1,33, Ski leg & seal

Install seal onto square shaft thus indexing it properly. Insert ski leg into steering arm. Secure seal into steering arm groove.

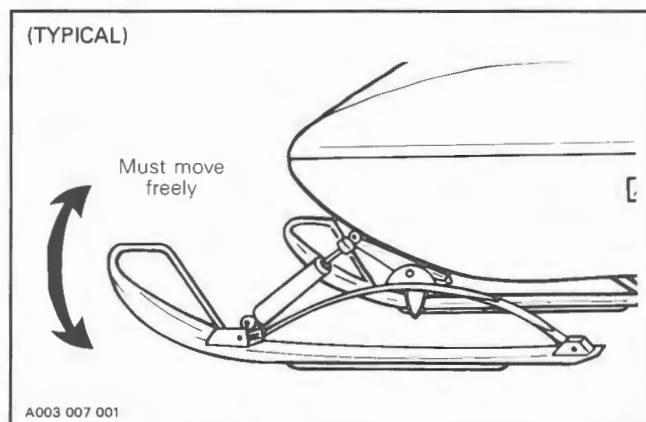
NOTE : Install ski leg so its grease fitting is pointing toward front.



NOTE : Carefully insert ski leg into steering arm checking that upper seal lip remains toward bottom and is not waved. Ensure "L" plates remain in position.

Section 06 STEERING/SKIS

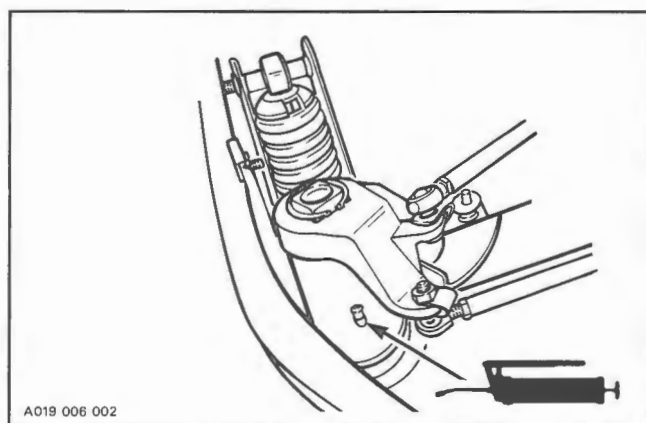
Sub-section 02 (SKI SYSTEM)



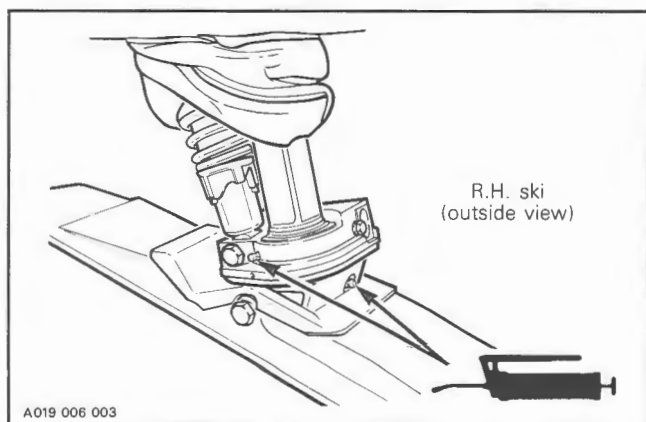
○ NOTE : Do not secure ski leg boot yet.

LUBRICATION

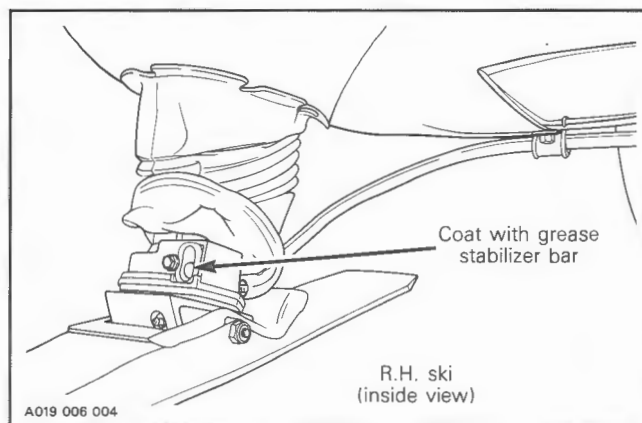
Use low temperature grease only (P/N 413 7061 00).
Lubricate ski leg shaft from inside of hood.



Lubricate ski pivot and ski leg lower bushing.



Coat stabilizer bar bushing with grease.



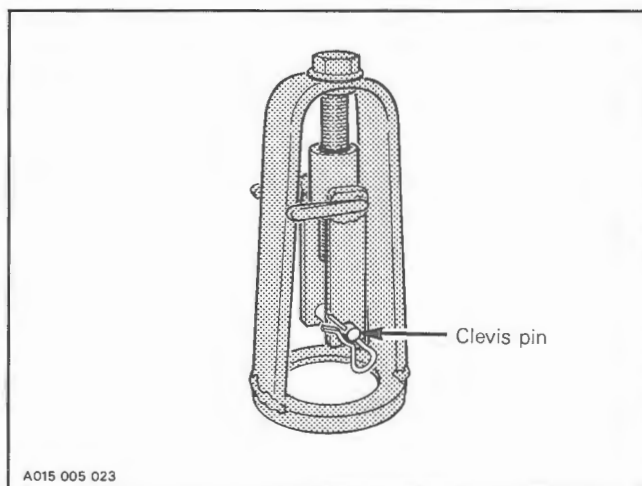
Put ski leg boot back and secure the spring.

SHOCK ABSORBER SERVICING

Spring replacement

◆ WARNING : Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

Use spring remover (P/N 414 5796 00).



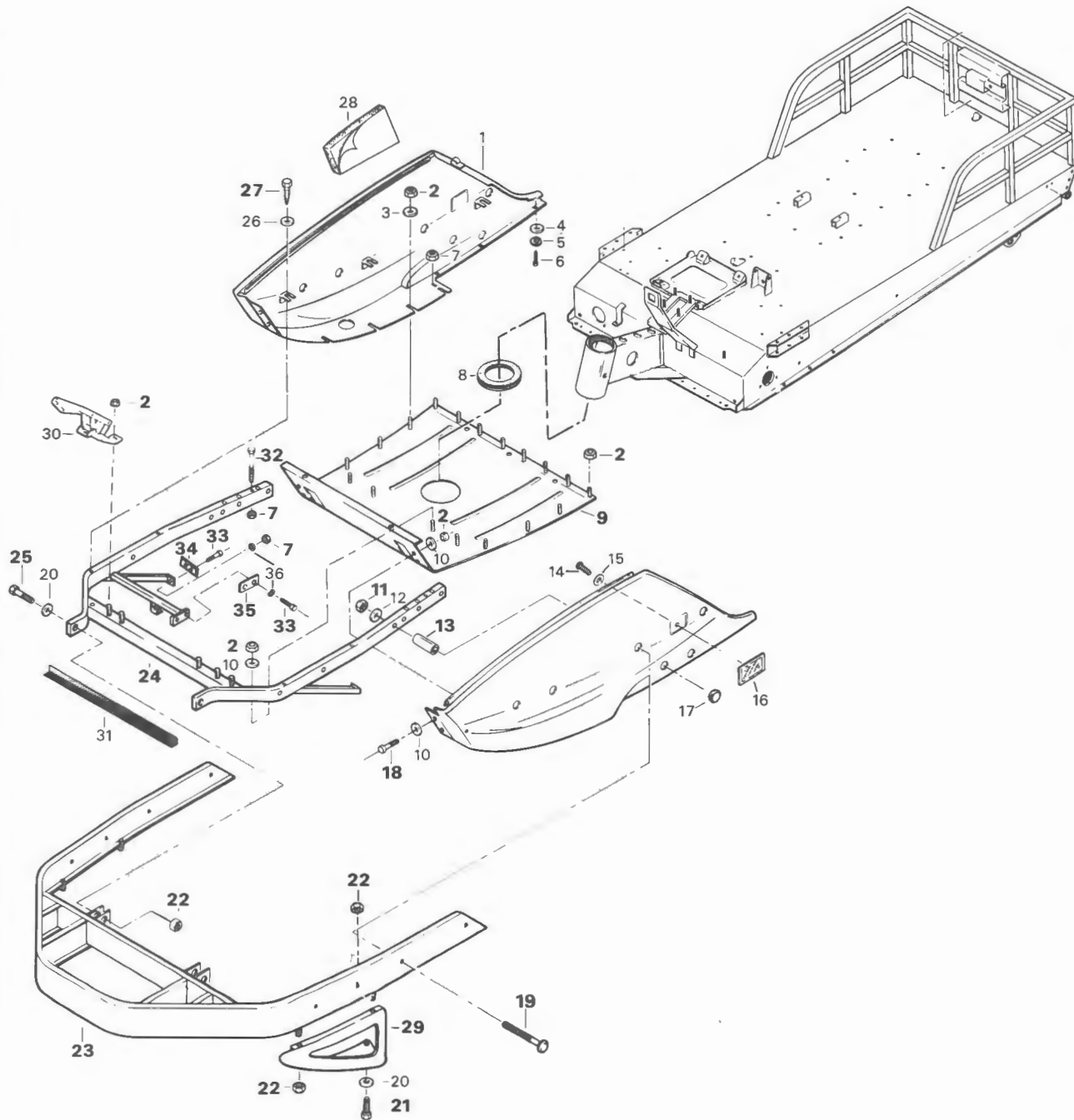
Use spring adaptor (P/N 529 0057 00).

Section 07 BODY/FRAME

Sub-section 01 (BODY)

FRONT PARTS OF THE BODY

Alpine II 503



A017 007 080

Section 07 BODY/FRAME

Sub-section 01 (BODY)

- | | |
|---|---|
| 1. R.H. & L.H. fender | 19. Carriage bolt 5/16-18 x 3-1/2 in (8) |
| 2. Flanged elastic stop nut M6 (28) | 20. Washer (4) |
| 3. Washer (8) | 21. Hexagonal head screw M8 x 1.25 x 20 (2) |
| 4. Washer (6) | 22. Elastic stop nut M8 (8) |
| 5. Lock washer (6) | 23. Front bumper |
| 6. Hexagonal head screw M6 x 1.00 x 16 (6) | 24. Inside bumper |
| 7. Hexagonal stop nut M8 (15) | 25. Hexagonal head screw M8 x 1.25 x 40 (2) |
| 8. Rubber ring | 26. Washer (6) |
| 9. Center pan | 27. Screw (6) |
| 10. Washer (12) | 28. R.H. & L.H. foam |
| 11. Elastic stop nut 5/16-18 (8) | 29. Right & left protector |
| 12. Washer (8) | 30. Hinge (2) |
| 13. Spacer (8) | 31. Snow deflector |
| 14. Cylindrical Phillips head screw (2) | 32. Hexagonal head screw M8 x 1.25 x 55 (6) |
| 15. Internal tooth lock washer M5 (2) | 33. Hexagonal head screw M8 x 1.25 x 16 (4) |
| 16. Amber reflector (2) | 34. Shim 0.85 mm |
| 17. Plug cap (4) | 35. Shim |
| 18. Hexagonal head screw M6 x 1.00 x 16 (4) | 36. Lock washer (2) |

FRONT PARTS OF THE BODY

Alpine II 503

Many parts in front of vehicle can be removed from frame. Some parts can be removed directly but some require other parts removal.

The following chart shows required additional parts removal needed to remove a given part.

| PART TO BE REMOVED | PARTS REMOVAL NEEDED | | | | | | |
|--------------------|----------------------|--------------|---------------------|--------|------------|------|-----|
| | SIDE PROTECTOR | FRONT BUMPER | FUEL TANK & MUFFLER | FENDER | CENTER PAN | HOOD | SKI |
| SIDE PROTECTOR | | | | | | | |
| FRONT BUMPER | | | | | | | |
| FENDER | | | | | | | |
| CENTER PAN | | | | | | | |
| INSIDE BUMPER | | | | | | | |

Following are guidelines for removal sequence.



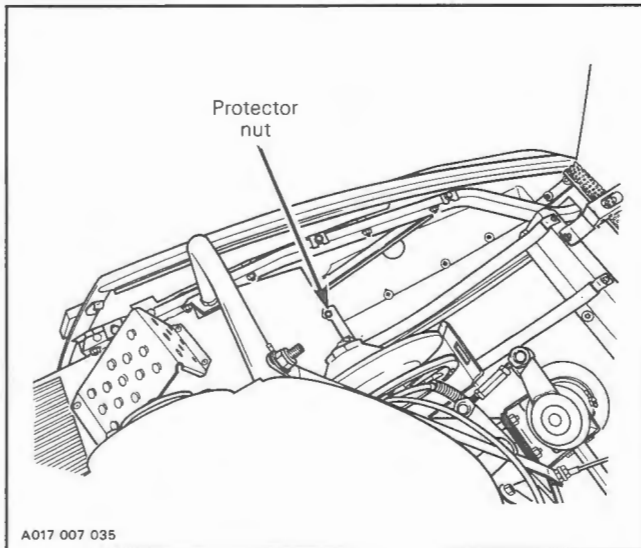
NOTE : Given procedures report for one side only, the other one is usually symmetrical and is the same procedure except if otherwise specified.

Section 07 BODY/FRAME

Sub-section 01 (BODY)

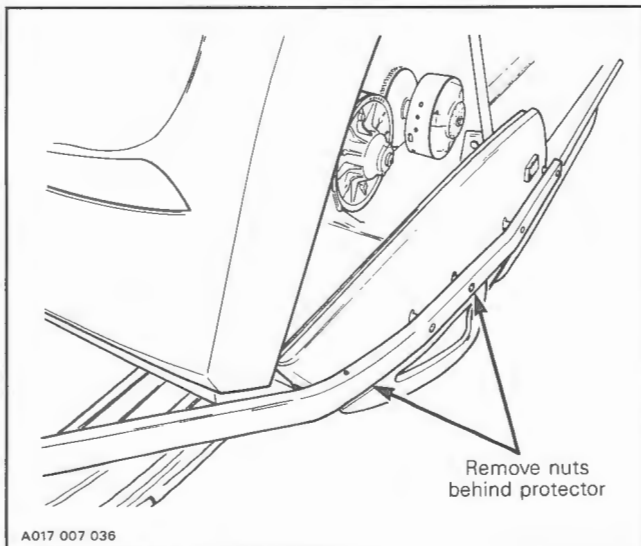
21,22,29, Screw, nut & protector

Remove nut and screw of protector from center pan.



Remove both nuts behind protector (at the front bumper and protector joint).

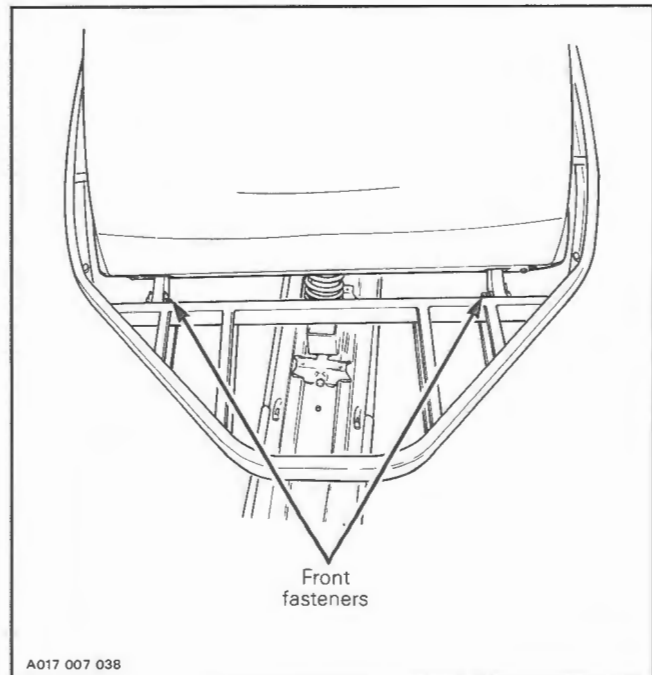
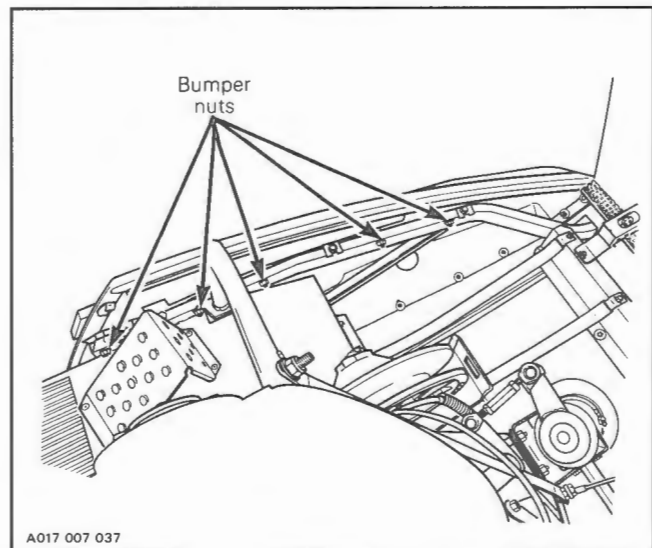
○ **NOTE :** Fuel tank has been removed from the previous illustration for clarity, removal is not required for protector disassembly.



2,11,13,19,22,23,25, Nut, spacer, screw & front bumper

Side protector removal is not required to remove front bumper. In this case, simply remove fastener from center pan.

First remove side fasteners then front ones. Take front bumper off.

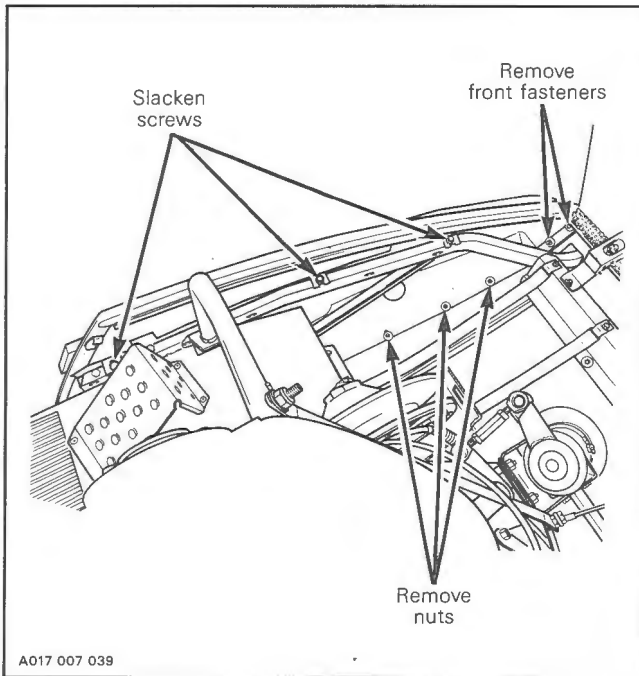


Section 07 BODY/FRAME

Sub-section 01 (BODY)

1,2,6,27, Fender, nut & screw

First remove fuel tank and muffler. Remove fender front fasteners, nuts in center pan then, slacken screws on top of inside bumper and take fender off.

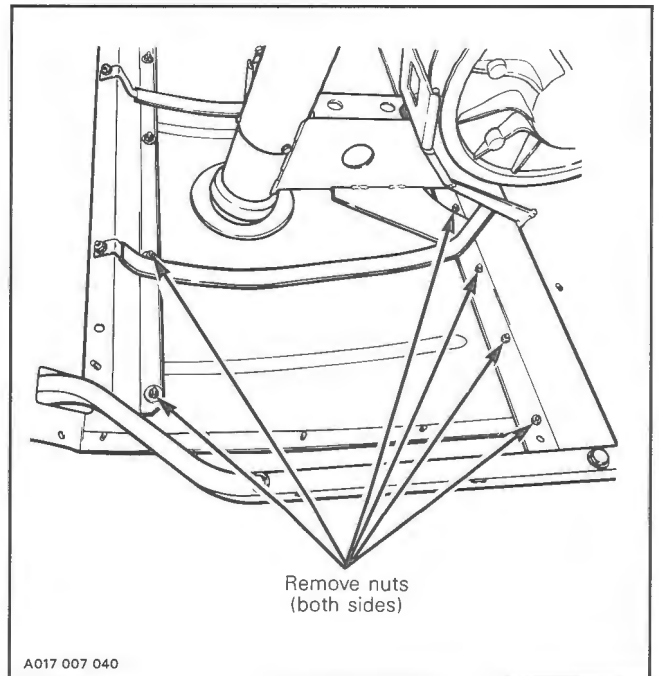


2,8,9, Nut, rubber ring & center pan

Remove cab and ski from vehicle.

Remove center pan nuts and rubber ring from center pan. Lean center pan in order to slip over ski leg. Take center pan off.

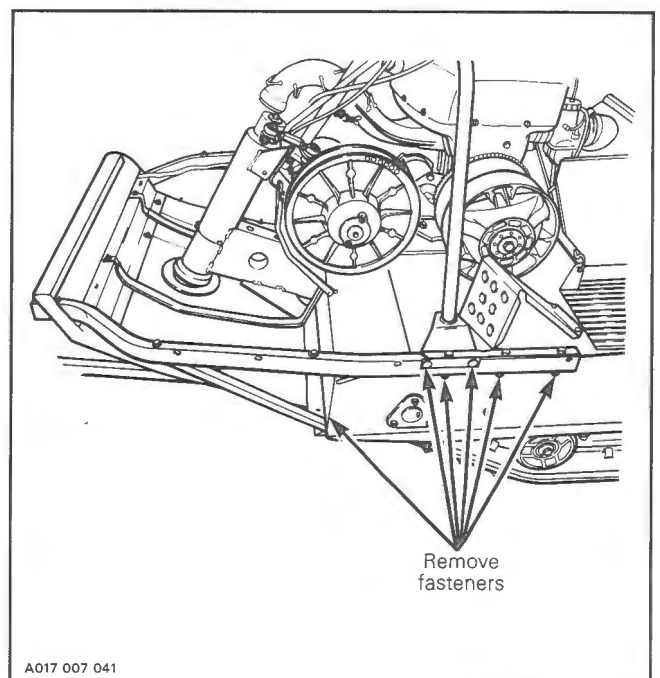
○ **NOTE :** To help further assembly of hood, trace reference marks on hinge and frame.



7,24,32,33, Nut, inside bumper & screw

Remove upper column support fasteners at the bottom, screws close to footrest and fasteners at the end of the bumper brace.

○ **NOTE :** Pay attention to the possible presence of shims at the end of the bumper brace. If any, keep for installation.



Section 07 BODY/FRAME

Sub-section 01 (BODY)

On right hand side, remove fasteners from brace connecting to ski leg housing.

○ **NOTE** : Pay attention to the possible presence of shims at the end of the bumper brace. If any, keep for installation.

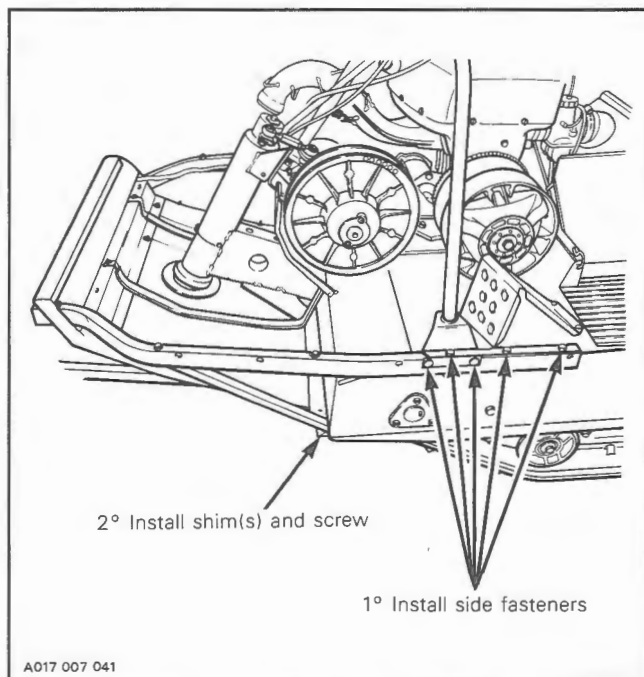
○ **NOTE** : Center pan needs not to be disassembled prior to removing inside bumper. In this case, remove nuts in front of center pan first.

ASSEMBLY

Assembly is essentially the reverse of disassembly procedures except that inside bumper, fenders and hood have to be adjusted to obtain a proper fit.

Inside bumper

Install fasteners close to upper column bracket and tighten, proceed each side of vehicle.



Should a gap be present between frame and brace of inside bumper, install shim(s) #34 (0.85 mm thick) as required. Proceed each side of vehicle.

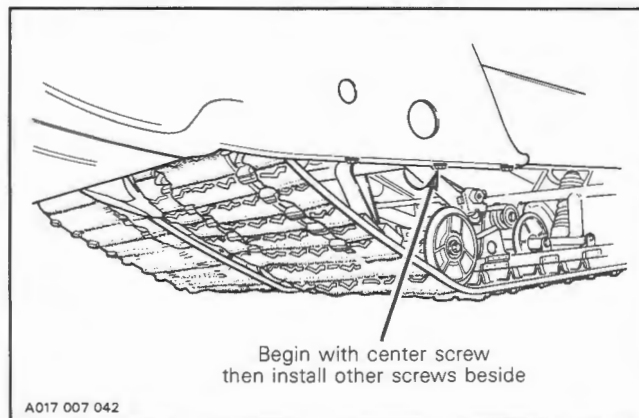
Proceed the same way with the brace connecting to the ski leg housing. Install shim(s) #34 as required. Tighten all fasteners of inside bumper.

Center pan

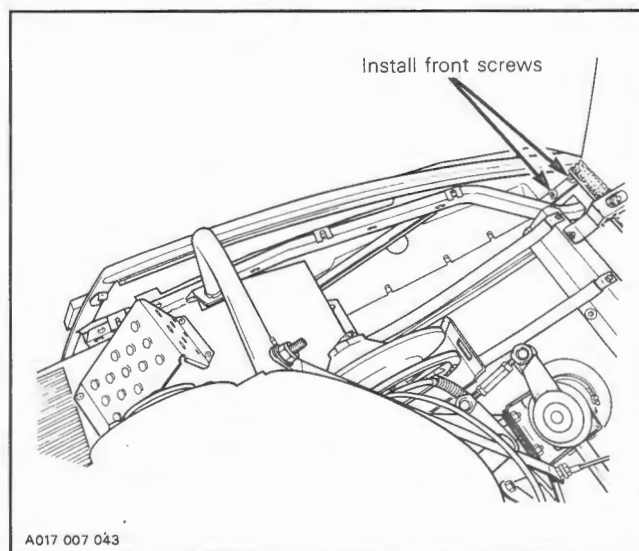
Secure to inside bumper and frame. Should proper fit be difficult, shim(s) #35 can be added or removed to brace of inside bumper connecting to ski leg housing.

Fender

Install fenders to vehicle. First install the center screw at the rear of the fender. Install other screws beside, finger tighten only.



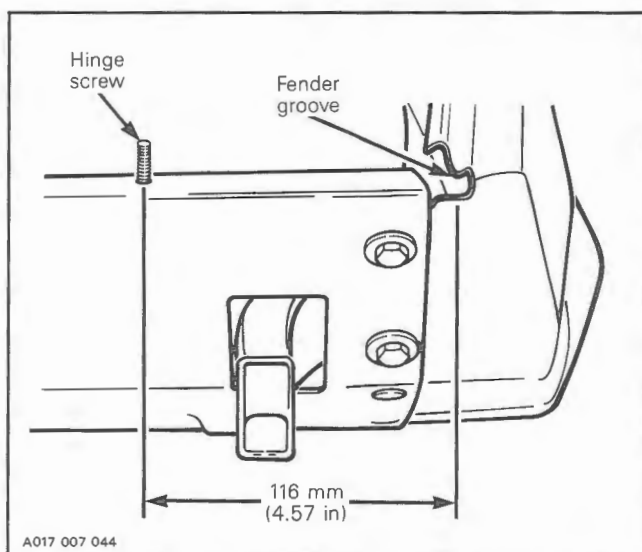
Install front screws of fender. Finger tighten only.



Section 07 BODY/FRAME

Sub-section 01 (BODY)

As a preliminary set-up, adjust fender to obtain a distance of about 116 mm (4.57 in) between hinge screw and bottom of fender groove.

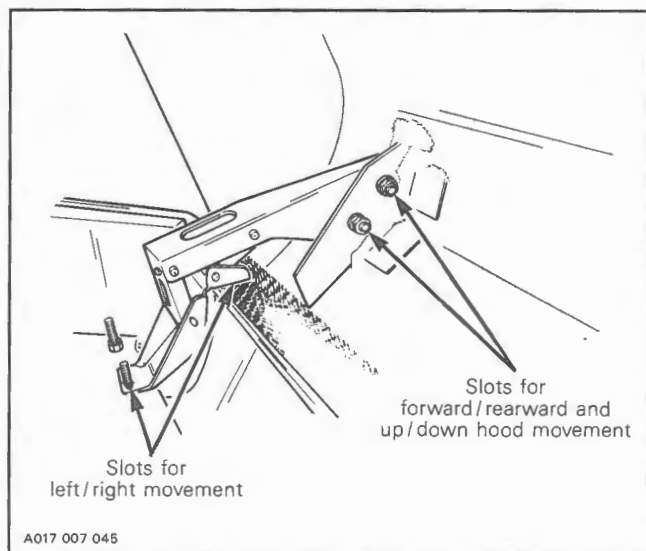


Tighten fender front screws and bottom ones on center pan.

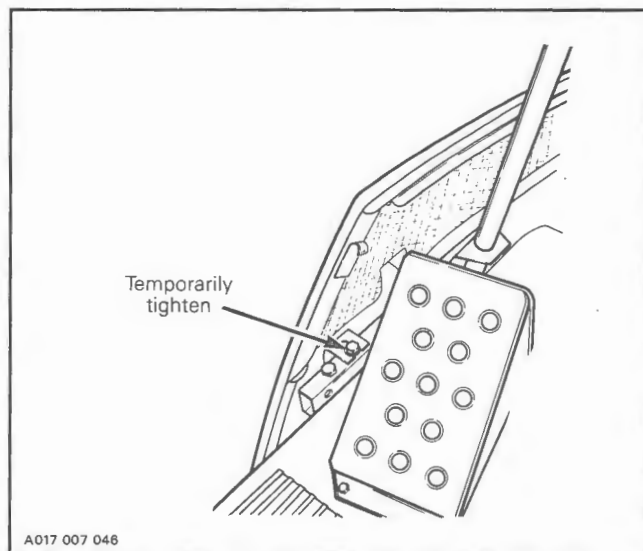
Install hood making sure to place snow deflector under cab hinges.

Hood hinges can be adjusted at the hood bracket. Two slots allow hood movement forward/rearward and up/down.

Besides, hood hinges are slotted to allow left/right movement.



Temporarily tighten fender rear screw on top of inside bumper.



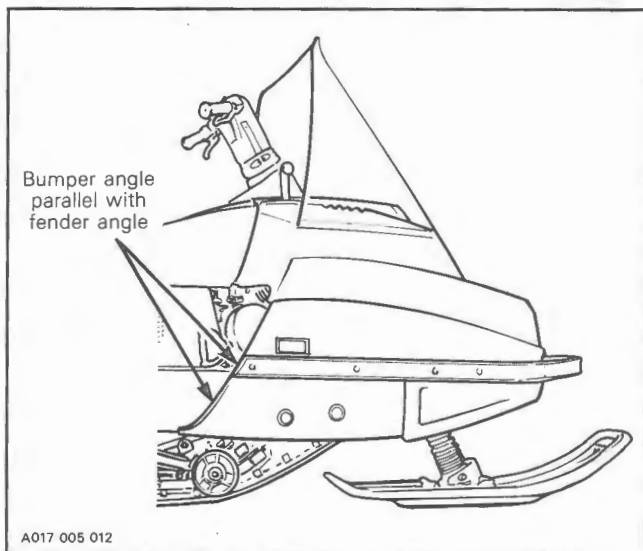
Adjust front portion of hood with fenders to obtain proper fit in fender groove and front of hood flush with front of fenders and center pan. Adjustment can be done either by hinge or fender movement.

Adjust rear portion of fender so that hood properly fit with console and fender grooves by slacking screw at rear of fender on top of inside bumper.

Recheck proper fit of components then tighten all hinges and fenders fasteners.

Front bumper

Install front bumper making sure that angle at the end of bumper is parallel with fender angle.



Reinstall fuel tank and muffler.

Section 07 BODY/FRAME

Sub-section 01 (BODY)

WIRING HARNESS

◆ **WARNING :** Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

CABLES

◆ **WARNING :** Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating, or vibrating parts.

PIPING

◆ **WARNING :** Always ensure that the fuel, vent, primer, impulse, injection oil and rotary valve oil lines are properly fixed to their connectors, that they are not perforated or kinked and that they are properly routed away from any rotating, moving, heating or vibrating parts. Also check for leaks. Replace if required.

○ **NOTE :** Refer to parts catalog to find suitable clip part numbers.

PLASTIC MAINTENANCE & REPAIR

MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

To clean use a soft clean cloth and either soapy water or isopropyl alcohol.

To remove grease, oil or glue use isopropyl alcohol.

▼ **CAUTION :** Do not apply isopropyl alcohol or acetone directly on decals.

▼ **CAUTION :** The following products **must not** be used to clean or wax any of the plastic components used on the vehicles :

- gasoline
- brake fluid
- kerosene
- diesel fuel
- lighter fluid
- varsol
- naphtha
- acetone
- strong detergents
- abrasive cleaners
- waxes containing an abrasive or a cleaning agent in their formula

▼ **CAUTION :** Clean RIM Metton™ with isopropyl alcohol **only**. **Never** use cleaners or products containing **chlorine**.

Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ **CAUTION :** If for some reason the snowmobile has to be stored outside it is preferable to cover it with an opaque tarpaulin. This will prevent the sun rays from affecting the plastic components and the vehicle finish.

REPAIR





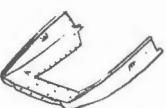
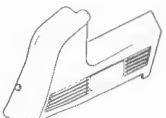
The very first step before repairing plastic materials is to find out exactly which type of material is involved. Refer to chart "Use of plastic material in 1989" on page 14.

▼ **CAUTION :** Consult chart carefully, some repair products are not compatible with certain types of plastics.

Section 07 BODY/FRAME

Sub-section 01 (BODY)

Use of plastic material in 1989

| PART | MODEL | REPARABLE | | | | | IRREPARABLE |
|--|--|------------|--------------|------------|---------------|--------------|-------------|
| | | FIBERGLASS | RIM URETHANE | RIM METTON | POLYCARBONATE | POLYETHYLENE | SURLYN |
| WINDSHIELD  | ALL MODELS | | | | | | |
| WINDSHIELD BASE  | SAFARI VOYAGEUR ESCAPADE | | | | | | |
| HOOD  | SAFARI CITATION, ALL TUNDRA, ALL | | | | | | |
| | ALPINE II 503 | | | | | | |
| | SAFARI VOYAGEUR ESCAPADE FORMULA, ALL | | | | | | |
| | ELAN SAFARI SCOUT/SCOUT E/SAGA/ CHEYENNE | | | | | | |
| NOSE PIECE  | SAFARI SCOUT/ SCOUT E/SAGA/ CHEYENNE | | | | | | |
| | FORMULA, ALL | | | | | | |
| BOTTOM PAN  | SAFARI CITATION, ALL TUNDRA, ALL SAFARI VOYAGEUR ESCAPADE | | | | | | |
| | SAFARI SCOUT/SCOUT E/SAGA/ CHEYENNE | | | | | | |
| | FORMULA, ALL | | | | | | |
| SIDE PANEL  | SAFARI VOYAGEUR ESCAPADE FORMULA, ALL | | | | | | |

Section 07 BODY/FRAME

Sub-section 01 (BODY)

Fiberglass

This material is repairable and repaintable, using any one of several kits available on the market.

RIM Urethane

RIM stands for Reaction Injection Molding. Until now two types of RIM plastics are in use on Bombardier snowmobiles. They are Urethane and Metton™.

RIM Urethane resists impacts to approximately -40°C (-40°F) and is repairable and repaintable with a flexible type paint that uses an acrylic or polyurethane base.

▼ **CAUTION:** Battery acid may slowly attack the plastic material. If some acid is spilled on the material, clean immediately with a solution of sodium bicarbonate and water then rinse with clean tap water.

▼ **CAUTION:** If welding is to be done near the RIM material, it is recommended to either remove the plastic part from the area or to protect it with aluminum foil to prevent damage.

REPAIR PROCEDURE :

Clean the damaged area with a general purpose adhesive cleaner and wax remover.

Two different 3M products are available from most automotive suppliers and may be used for repairs :

1. 3M structural adhesive tube kit no 8101.
2. 3M FPRM (Flexible parts repair material) no 05900.

Light scratches :

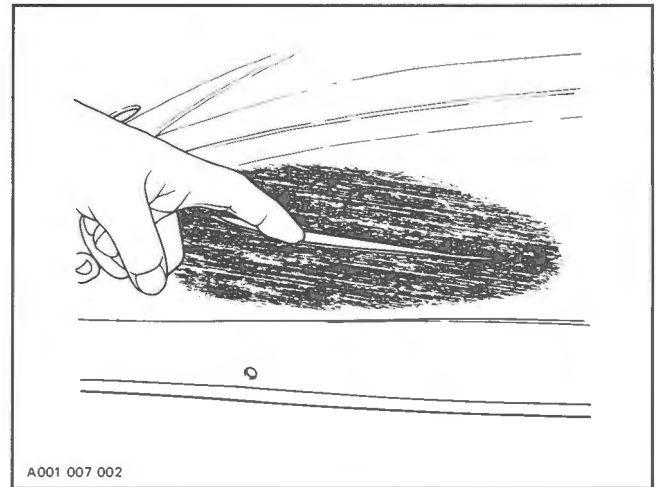
- Scuff surface area with medium to fine steel wool.
- Textured surface finish will be easily duplicated by applying satin finish acrylic lacquer.
- Coat with a flexible type paint.

Deep scratches :

- Sand with waterproof paper #600 and then with #800 or #1000.
- Coat with a flexible type paint.

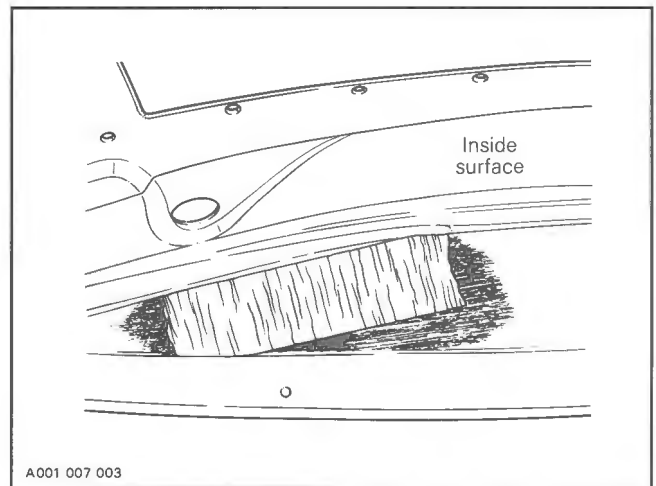
Large damaged areas :

- Such as a tear in the material 100 mm (4 in) long by 6 mm (1/4 in) wide.



A001 007 002

- Sand the damaged area, exceeding it by about 30 mm (1-1/4 in) all around, with #180 grit paper.
- Check surface for smoothness.
- Using chlorinated solvent, remove any dirt or grease from the inside area.
- Sand or scuff the inside of damaged area with #80 grit paper, exceeding it by at least 50 mm (2 in) all around.
- Apply 3M autobody repair tape.

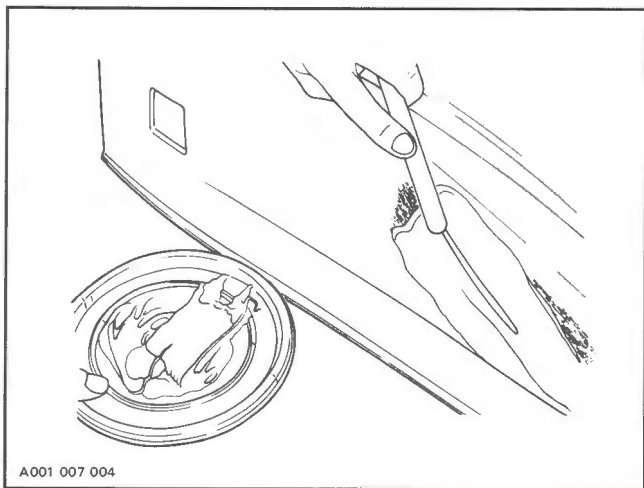


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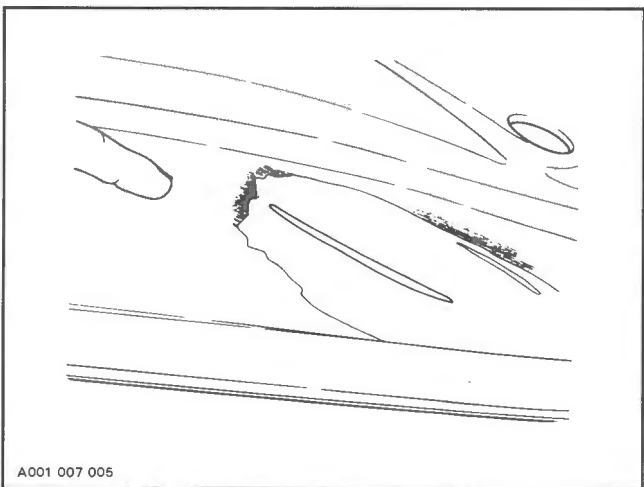
- Mix filler according to manufacturers instructions.
- Apply filler to damaged area (top side). Apply in light coats only.

Section 07 BODY/FRAME

Sub-section 01 (BODY)



- Let filler set at least 20 to 30 minutes.
- Lightly sand to blend filler with surrounding area.



- Using conventional spray equipment, apply finishing coat and allow to dry.
- After a 30 to 60 minutes drying period, use a suitable polishing compound to blend the outer edges of painted area.
- Use 3M pink Fill'n Glaze to fill swirls and produce a high luster finish.

RECOMMENDED PRODUCTS :

1. Dupont Lucite high gloss acrylic lacquer for all bright surfaces. This lacquer can also be purchased in a satin finish. Lucite plastic resin no 1555 can be added in amounts not exceeding 5% by volume.

2. Sico polyurethane no 585183 with Sico catalyst no 581004. Mix three parts of paint for one part of catalyst.

○ **NOTE :** When using Dupont Lucite high gloss acrylic lacquer, buff with CIL acrypol polishing compound only.

Dupont clear lacquer no 3005 may be used to blend Dupont Lucite high gloss acrylic lacquer to rest of surface.

RIM Metton™

RIM Metton™ looks like fiberglass but is more flexible. It is painted on the outside only.

◆ **WARNING :** Material should be repaired and repainted in a well ventilated area **only**.

▼ **CAUTION :** Clean RIM Metton™ with isopropyl alcohol **only**. **Never** use cleaners or products that contain **chlorine**.

REPAIR PROCEDURE

Small scratches :

- Sand and scuff area.
- Feather out edges.
- Paint with a matching acrylic auto touchup paint.

Small damaged areas :

- Sand and scuff area and fill with epoxy putty (two part).
- Sand smooth and paint following repainting procedure below.

Large damaged areas :

- Cut out damaged area.
- Sand and scuff surrounding area.
- Cover with a fiberglass/polyester resin patch from commercially available kits such as a Bondo kit.
- Apply epoxy primer with proper catalyst as a base coat. Available from Dupont or Sico (example : Sico epoxy primer #577602).
- Sand smooth and paint following repainting procedure below.

Section 07 BODY/FRAME

Sub-section 01 (BODY)

REPAINTING PROCEDURE :

- Sand down to primer, usually green or gray.
- Spray with two part acrylic urethane and air dry for about 72 hours.

○ **NOTE :** RIM Metton™ is a high static plastic, painting must be done in a dust free area such as a paint booth.

▼ **CAUTION :** RIM Metton™ should never be exposed to temperatures exceeding 93°C (200°F).

Surlyn

Surlyn has coloration from one side to the other and is also stiffer than RIM Metton™. It resists impacts to -40°C (-40°F) and is **not repairable** but may be painted with conventional paint.

▼ **CAUTION :** Battery acid may slowly attack the plastic material. If some acid is spilled on the material, clean immediately with a solution of sodium bicarbonate and water then rinse with clean tap water.

▼ **CAUTION :** If welding is to be done near the Surlyn material, it is recommended to either remove the plastic part from the area or to protect it with aluminum foil to prevent damage.

▼ **CAUTION :** Surlyn should never be exposed to temperatures exceeding 93°C (200°F).

Polycarbonate

Repairs on polycarbonate components can be performed by welding. This technique utilizes a special heat gun, model 30-10 or 30-102 available from Laramy Products Co. Inc., and polycarbonate welding rods of the appropriate color. Refer to supplier's instructions for operation and welding techniques.

▼ **CAUTION :** Plastic parts made of polycarbonate are not compatible with Loctite thread and bushing locking products and/or products containing hydrocarbons.

○ **NOTE :** Polycarbonate may be painted using a water base latex type paint (water base only).

▼ **CAUTION :** Solvents and acids will cause chemical deformation of polycarbonate.

Welded polycarbonate, when done properly, is nearly as strong as the original part however, the quality of the repair depends on the experience of the welder and the equipment used.

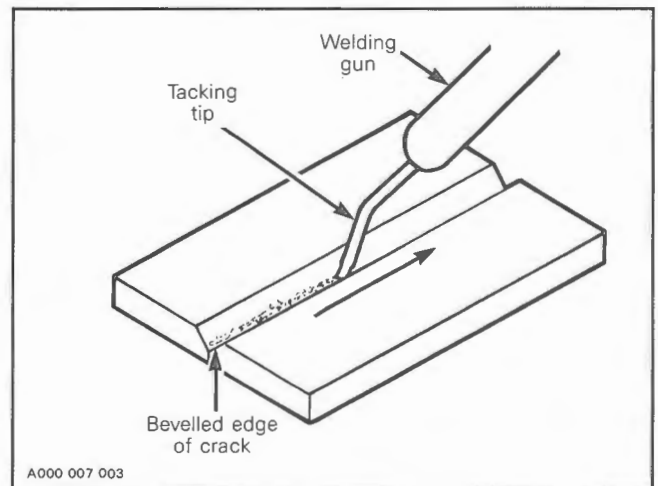
◆ **WARNING :** Polycarbonate windshields must **never** be repaired by welding or otherwise.

▼ **CAUTION :** Polycarbonate should never be exposed temperatures exceeding 157°C (315°F).

REPAIR PROCEDURE :

Cracks and broken pieces

- On the inside of the cab, clean the area surrounding the break.
- Use a small power grinder with a metal burr attachment to bevel the edges of the cracks to a 30° angle. The depth of the bevel should be about 2/3 the thickness of the cab material.
- Use adjustable pliers or C-clamps to hold the two edges of the break even with each other.
- Run the small spatula type tip down the crack to tack the two pieces together, see illustration. (This is not permanent and can be easily broken if the pieces do not fit together correctly). Check the matching between the two sides of the break. Re-break and re-tack if necessary. After using, clean tacking tip with a stiff wire brush.



Section 07 BODY/FRAME

Sub-section 01 (BODY)

Remove the C-clamps and run a bead of weld down the center of the crack. To assure a strong repair also run an overlapping bead of weld on each side of the first one. Be sure that the break is completely welded, especially at the ends.

It is also possible to repair a broken headlamp bracket, cab hinge supports and large breaks where pieces of the cab are missing.

For broken hinge supports, remove the hinge and cut a piece from a sheet of polycarbonate. Vee the bottom of the new hinge support and groove the cab in the position where the hinge seats. Insert the hinge, tack in place and weld several beads around the base of the hinge for strength.

In the case of large breaks where pieces are missing, cut a piece of polycarbonate sheet to replace the missing piece and weld it in place.

Method of finishing

- To finish a crack on the exterior of the cab, begin by running the tacking tip down the crack to make a shallow groove. (Do not use a grinder, only the tacking tip).
- Lay a single bead of weld down the groove made by the tacking tip.
- After the weld cools (approximately 15 minutes) use a body file to file the weld smooth with the cab material.
- Hand sand with fine grade paper to remove any scratches.
- Buff with rubbing compound then polish with polishing compound.

Welding hints

- Keep a continuous downward pressure on the rod for the whole weld. Relaxing the pressure while welding could result in a weak spot in the weld.

- Do not touch the welding rod or the base material while welding. Keep the tip between 13-25 mm (1/2-1 in) away at all times.
- Do not have the nozzle pointed at any one spot for a long period of time as this could result in charring of the plastic. Continue the fanning motion as long as welding is in progress.
- Be sure the area to be welded is free of grease, oil and foreign material. The weld will not hold if any of these impurities are present.
- More consistent results are obtained when using the same material as the part to be welded, e.g. scrapped components.
- Repairs should, whenever possible, be done on the underside or unexposed area of the damaged component.

Polyethylene

Polyethylene may be repaired by welding with appropriately colored polyethylene welding rods in much the same way as polycarbonate products.

Small repairs may be done using polyethylene adhesives.

○ **NOTE :** No commercially available paints adhere to polyethylene, the color being injected while moulding. Repairs should thus be considered carefully before attempting.

▼ **CAUTION :** Polyethylene will permanently deform when exposed to temperatures above 82°C (180°F).

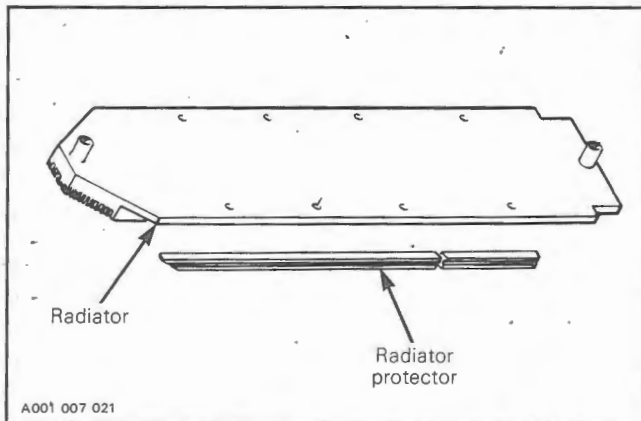
FRAME

FRAME CLEANING

○ **NOTE :** For aluminum frame use only "Aluminum cleaner" and follow instructions on container. (Dursol cleaner or equivalent).

Clean frame and track tunnel with appropriate cleaners and rinse with high pressure hose.

On liquid cooled models carefully clean radiators and check condition of radiator protectors. The protectors should extend far enough to keep the track from rubbing on the radiators.



Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

Seat cleaning

For all models, it is recommend to clean the seat with a solution of **soft soap/warm water** and a soft clean cloth.

▼ **CAUTION :** Avoid use of harsh detergent such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

FRAME WELDING

Steel frame :

- Electric welding
- Amperage : 70-110 Amp.
- Voltage : 20-24 volts
- Rod : E-7014 (3/32 in)

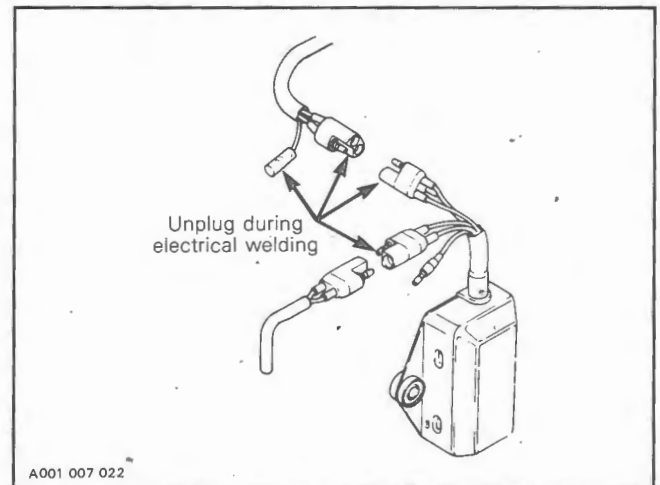
Aluminum frame

(refer to specialized welding shop)

- Argon-oxygen/acetylene welding
- Rod : ER-4043 (3/32 in)

▼ **CAUTION :** When electrical welding is to be performed anywhere on the vehicle, unplug the multiple connector at the electronic box prior to welding. This will protect the electronic box against damage caused by flowing current when welding.

○ **NOTE :** This procedure applies to all electronic ignition systems.



▼ **CAUTION :** If welding is to be done near plastic material, it is recommended to either remove the part from the area or to protect it with aluminum foil to prevent damage.

