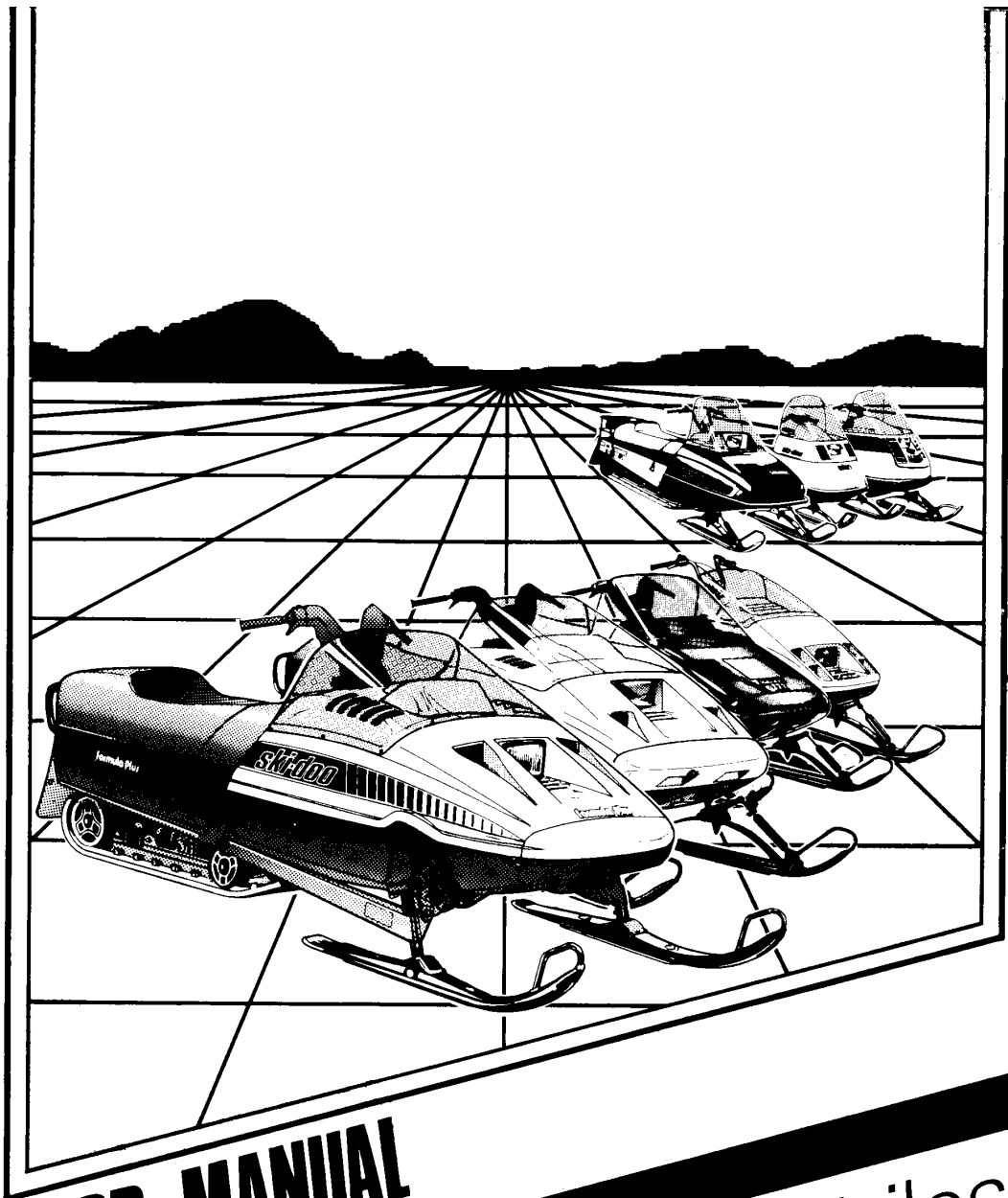


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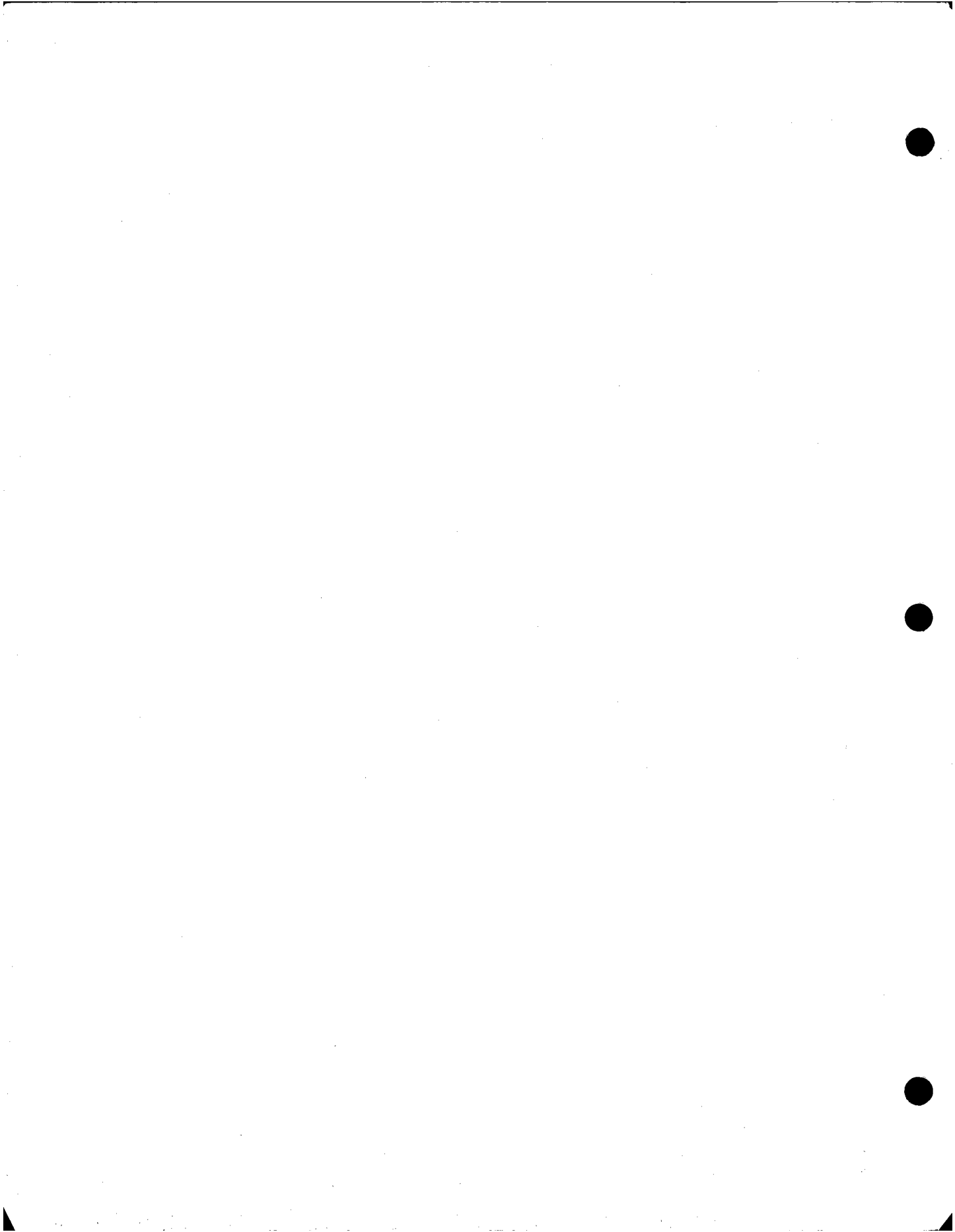


SHOP MANUAL

Bombardier Snowmobiles

484 0503 00





1985

SHOP MANUEL

Bombardier Snowmobiles





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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair the Bombardier 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 catalogue.

The content of Bombardier Inc. Recreational Product Shop Manual 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 by. Locking devices (ex.: tab lock, nylon lock) must be installed or replaced by 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 and instruction which, if not followed, could cause personal injury.

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

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

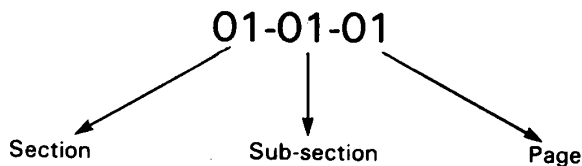
Although the mere reading of such information does not eliminate the hazard, your understanding of the information will promote its correct use.

◆ **WARNING:** 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.

1985 BOMBARDIER SNOWMOBILES SHOP MANUAL

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 ten (10) major sections:

- 01 Tools
- 02 Engine
- 03 Transmission
- 04 Electrical
- 05 Suspension
- 06 Steering and skis
- 07 Hood and frame
- 08 Fuel line, wiring harness and cable routing
- 09 Technical data
- 10 Warranty

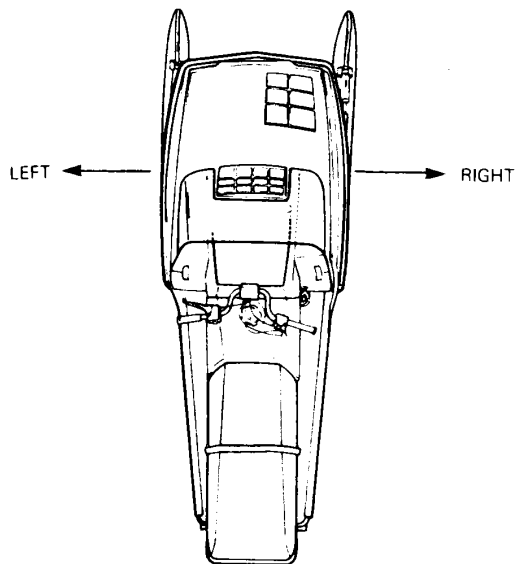
Each section is divided in various sub-sections, and again, each sub-section has one or more division.

EX.: 02 ENGINE

04 Engine type 447

- Cooling system
- Magneto

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



A000000002

GENERAL

The information, illustrations 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 catalogue.

When ordering parts always refer to the parts catalogue.

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, etc.), bold numbers are used for specific parts and referred to in the text.

1985 BOMBARDIER SNOWMOBILES SHOP MANUAL

Pay attention to torque specifications. Some of these are in lbf•in instead of lbf•ft.

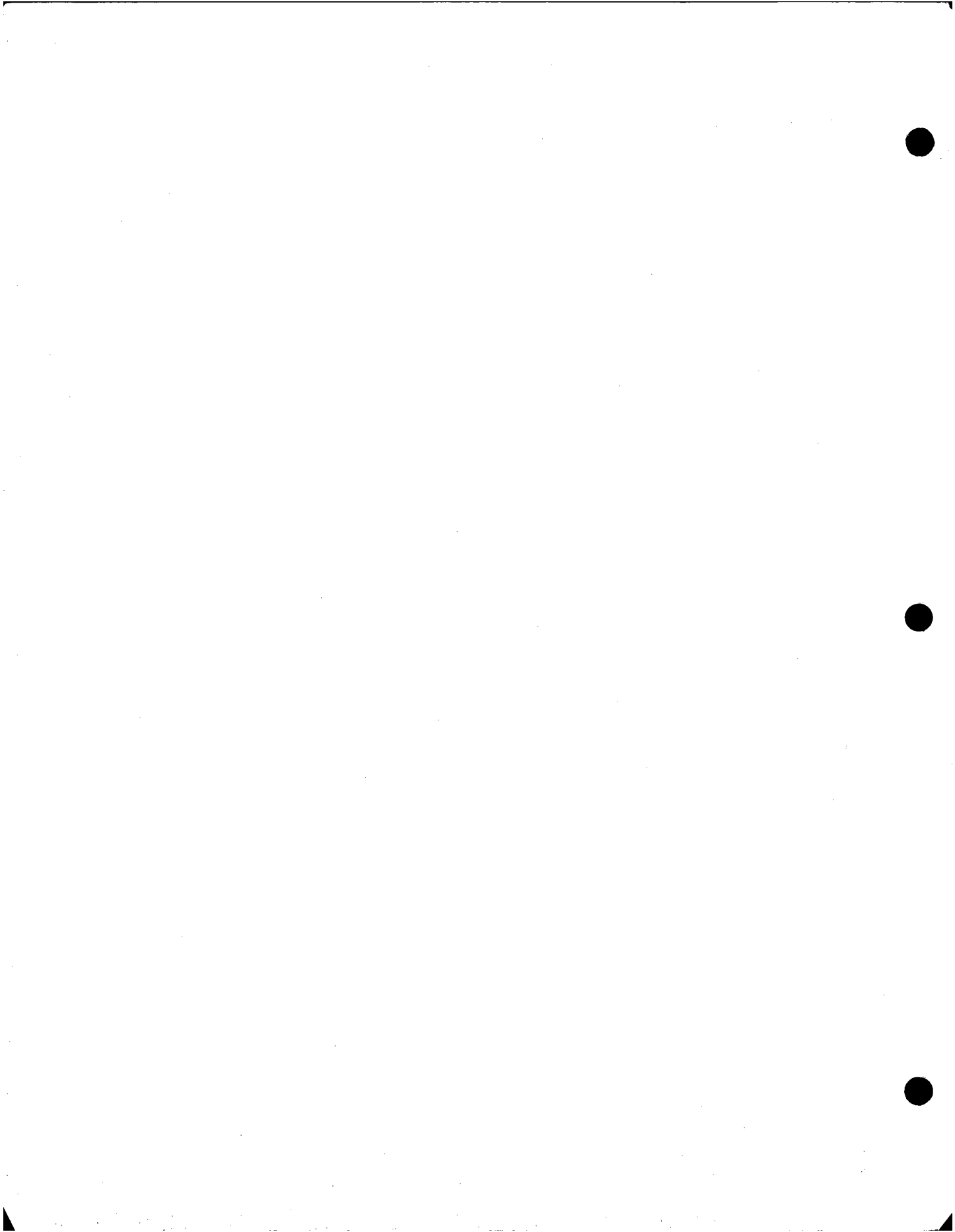
As many of the procedures in this manual are interrelated, **we suggest, that before undertaking any task, you read and thoroughly understand the entire section or sub-section in which the procedure is contained.**

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.

This manual is published by the
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Valcourt, Quebec, Canada

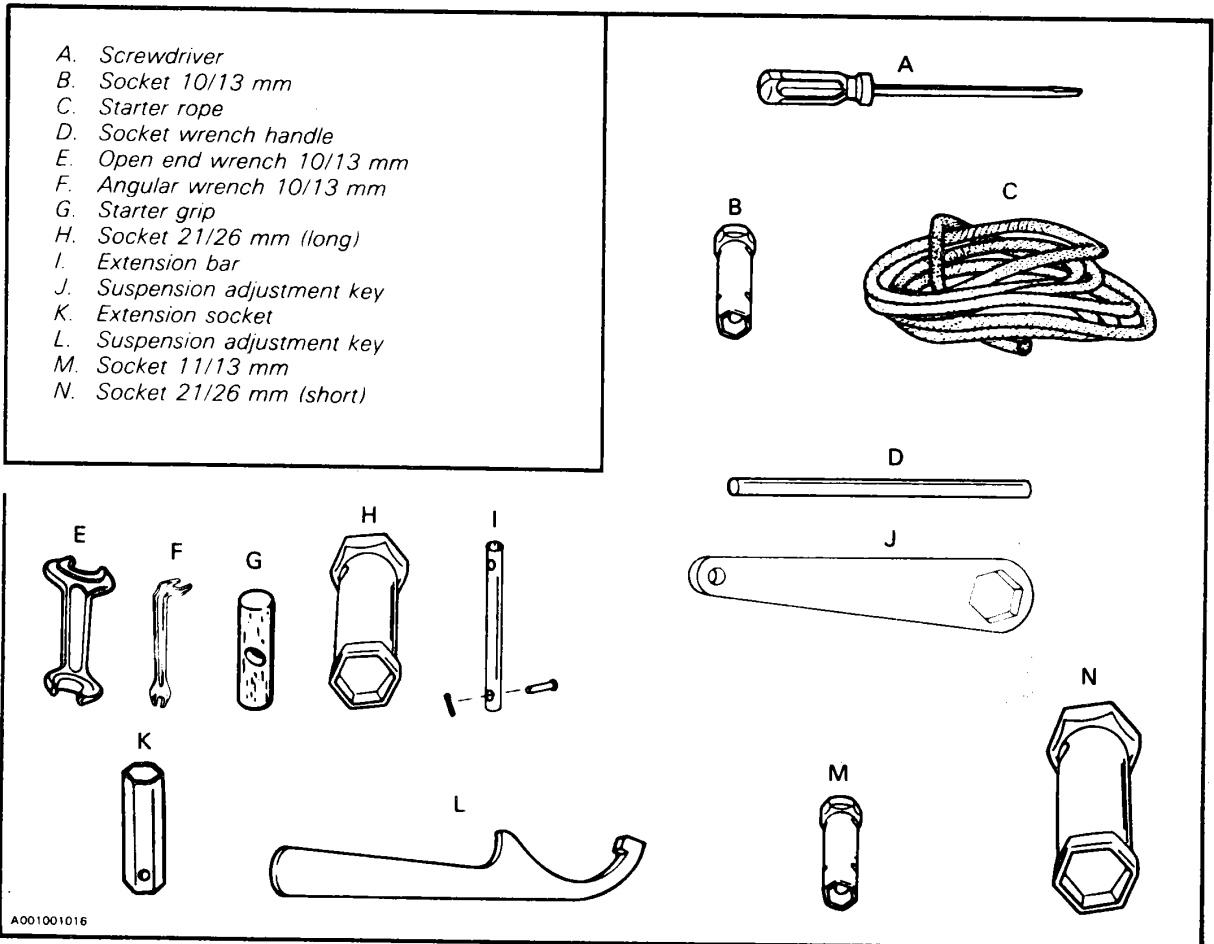
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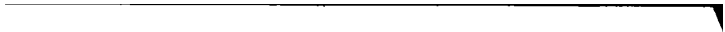


Section 01 TOOLS
Sub-section 01 (BASIC TOOLS)

BASIC TOOLS

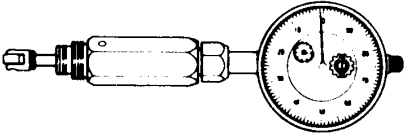
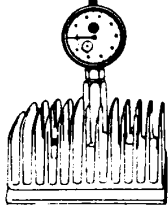
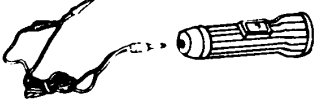
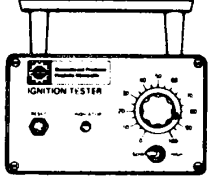

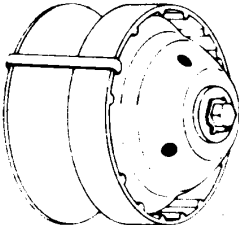



1985 MODELS	APPLICABLE TOOLS
Elan Citation LS/E Tundra/LT, Skandic 377/R Safari 377/E, 447, Mirage III Safari GL, Formula SS Formula SP Formula MX, Plus Alpine	A, B, C, D, F, H. A, B, C, D, E, G, H. A, B, C, D, E, G, H, J. A, B, C, D, E, G, H, J. A, B, C, D, E, G, J, N. A, B, C, D, E, G, J, L, N. A, B, C, D, E, H. A, B, C, D, E, H, I, K, M.



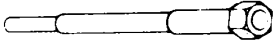

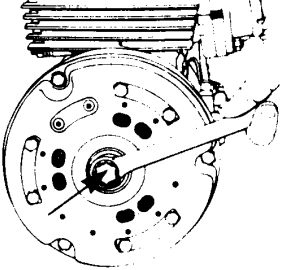
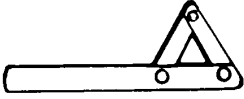
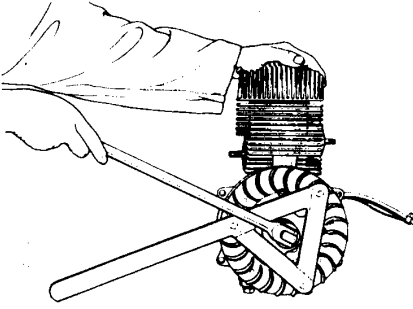

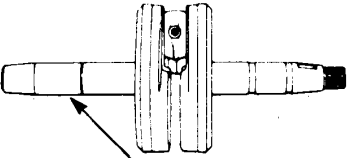

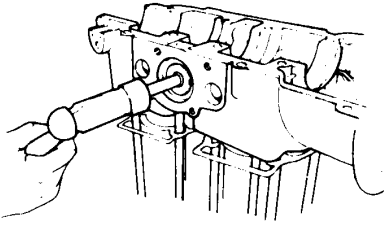
Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

SERVICE TOOLS

ITEM	USE	APPLICABLE TO
<p>Dial indicator (T.D.C. gauge) 414 1047 00</p>  <p>A000002001</p>	<p>Engine timing, to determine T.D.C.</p>  <p>A000002002</p>	<p>All engine types</p>
<p>Circuit tester (continuity light) 414 0122 00</p>  <p>A000002003</p>	<p>Engine timing (static) Continuity tests</p>	<p>All engine types</p>
<p>Bombardier ignition tester 419 0033 00</p>  <p>A000002004</p>	<p>Engine electrical components tests</p>	<p>All engine types</p>
<p>Drive pulley retainer 529 0017 00</p>  <p>A000002005</p>	<p>For indexation of governor cup</p>  <p>A000002006</p>	<p>Square shaft drive pulley</p>
<p>Belt tension tester 414 3482 00</p>  <p>A000002007</p>	<p>To adjust belt deflection and tension to specifications</p>	<p>All models</p>

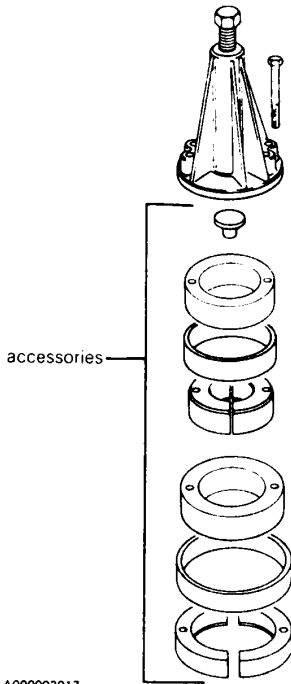
Section 01 TOOLS

Sub-section 02 (SERVICE TOOLS)

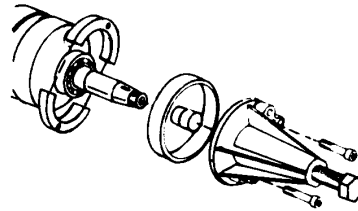
<p>Drive pulley puller 529 0021 00</p>  <p>A000002008</p> <p>860 4142 00 (metric)</p>  <p>(529 003 000) (529 002 800)</p> <p>A000002009</p>	<p>To remove drive pulley from crankshaft</p>  <p>A000002010</p>	<p>Taper shaft engines</p>
<p>Magneto housing holder 420 976 550</p>  <p>A000002011</p>	 <p>A000002012</p>	<p>247 engine type</p>
<p>Seal sleeve 247 engines PTO 420 977 910 MAG 420 276 900</p>  <p>Water pump seal sleeve 462, 467, 532, 537 water pump 420 876 490 rotary valve 420 876 495</p> <p>A000002013</p>	<p>To avoid seal damage during crankshaft installation</p>  <p>Seal sleeve (on crankshaft)</p> <p>A000002014</p>	<p>All engine types except 253, 377, 447 & 503</p>
<p>Rotary valve shaft pusher 420 876 610</p>  <p>A000002015</p>	 <p>A000002016</p>	<p>Liquid cooled rotary valve engines</p>

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

Puller assembly
420 876 296
With 145 mm screw



A000002017



A000002018

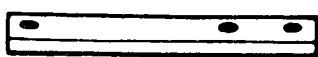

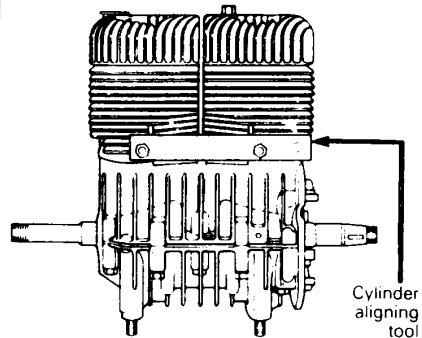
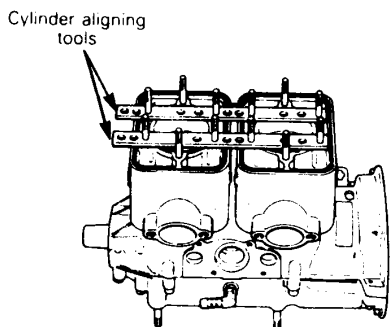
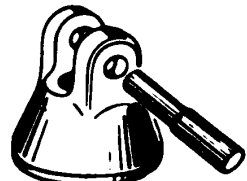
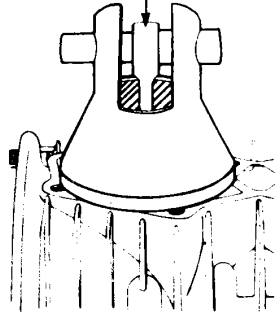
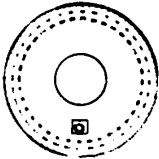
All engine types

Section 01 TOOLS

Sub-section 02 (SERVICE TOOLS)


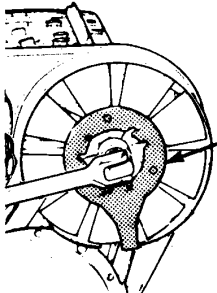

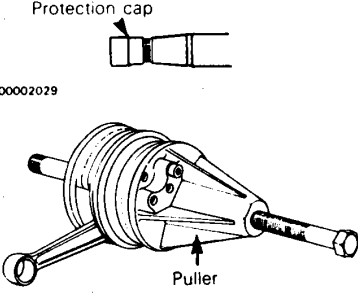

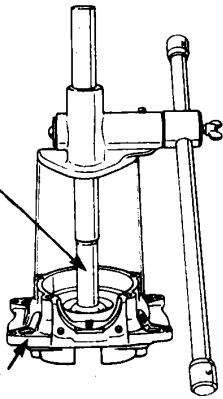

PULLER ASSEMBLY COMPONENT	P/N	APPLICABLE TO ENGINE TYPES								
		247	253	377	447	462	467	503	532	537
Screw M16 x 1.45	420 940 755	x	x	x	x	x	x	x	x	x
PULLER ASSEMBLY ACCESSORIES	P/N									
Screw M8 x 70 (2)	420 841 200		x	x	x	x	x	x	x	x
Screw M8 x 40 (2)	420 840 680	x				x	x		x	x
Crankshaft protector PTO	420 876 550		x	x	x	x	x	x	x	x
Crankshaft protector MAG	420 876 557		x				x		x	x
Crankshaft protector MAG	420 876 555			x	x			x		
Distance ring	420 876 560		x	x	x	x	x	x	x	x
Distance ring	420 876 565			x	x			x		
Distance ring	420 876 567						x		x	x
Puller ring	420 977 480	x	x	x	x	x	x	x	x	x
Puller ring	420 977 490			x	x		x	x	x	x
Half ring ass'y	420 276 020	x	x	x	x	x	x	x	x	x
Half ring ass'y	420 977 470			x	x		x	x	x	x

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)


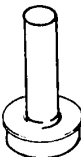
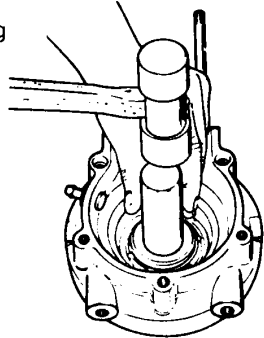

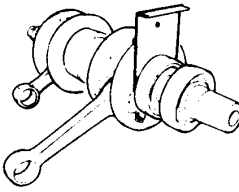
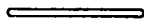
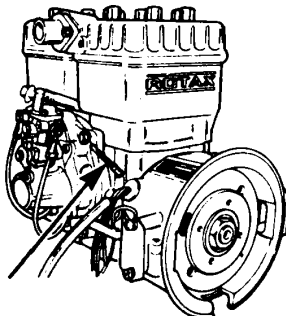
<p>Cylinder aligning tools 377,447,503 engines 420 876 171 462 engine 420 876 175 467,532,537 engines 420 876 570</p>  <p>A000002019</p> <p>377,503 engines 420 240 275</p>  <p>A000002020</p>	 <p>Cylinder aligning tool</p> <p>A000002021</p>  <p>Cylinder aligning tools</p> <p>A000002022</p>	<p>Twin cylinder engines</p>
<p>Connecting rod holder 420 977 900</p>  <p>A000002023</p>	<p>Connecting rod</p>  <p>A000002024</p>	<p>247 engine</p>
<p>Degree wheel 414 352 900</p>  <p>A000002025</p>	<p>To mark timing position of rotary valve</p>	<p>462, 467, 532 & 537 engines</p>

Section 01 TOOLS

Sub-section 02 (SERVICE TOOLS)


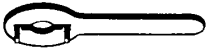
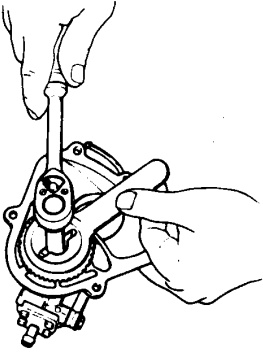
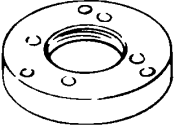
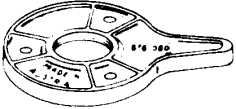
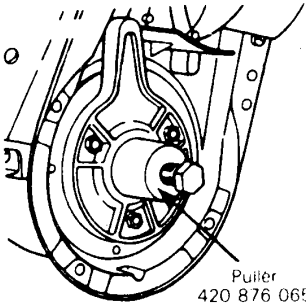

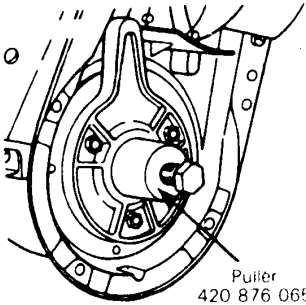
<p>Fan holder 503 engine 420 876 355 253, 377 & 447 engines 420 876 357</p>  <p>A000002026</p>	 <p>Fan holder</p> <p>A000002027</p>	<p>Axial fan cooled engine types</p>
<p>Protection cap</p>  <p>247 engine 18 mm 420 976 890 377, 447, 462, 503 22 mm 420 876 402</p> <p>A000002028</p>	<p>Protect crankshaft end, when using bearing puller</p>  <p>Protection cap</p> <p>Puller</p> <p>A000002029</p> <p>A000002030</p>	<p>247, 377, 447, 462 & 503 engine types</p>
<p>Engine seal pusher 420 977 920</p>  <p>A000002031</p>	 <p>Seal pusher</p> <p>Crankcase half</p> <p>A000002032</p>	<p>247 engine type</p>
<p>Seal pusher 420 876 510 Bearing pusher 420 876 500</p>  <p>A000002033</p>	<p>To install water pump bearing and seal</p>	<p>462, 467, 532 & 537 engine types</p>

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

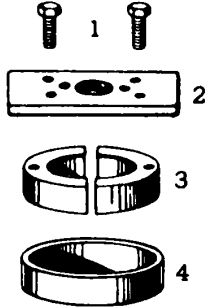
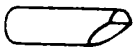
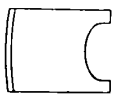
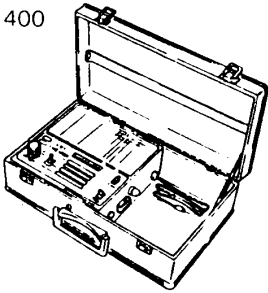
<p>Rotary valve seal pusher 420 876 605</p>  <p>A000002034</p>	<p>To install rotary valve shaft seal</p>	<p>462, 467, 532 and 537 engine types</p>
<p>Polyamid ring pusher 420 276 930</p>  <p>A000002035</p>	<p>To install polyamid ring in crankcase</p>  <p>A000002036</p>	<p>247 engine</p>
<p>Crankshaft feeler gauge 377, 447 & 503 engines 420 876 620</p>  <p>AS000002037</p>	<p>On PTO side</p>  <p>A000002038</p>	<p>PTO: 377, 447 & 503 engines</p>
<p>Crankshaft locking tool 420 876 640</p>  <p>A000002039</p>	<p>To lock crankshaft</p>  <p>A000002040</p>	<p>253, 377, 447, 462, 467, 503, 532 & 537 engines</p>

Section 01 TOOLS

Sub-section 02 (SERVICE TOOLS)

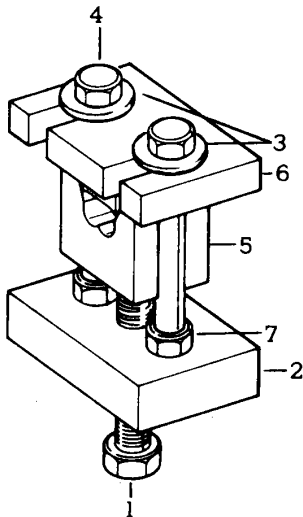


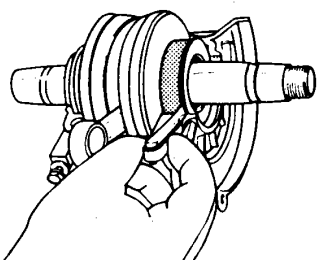
<p>Injection pump gear holder</p> <p>253, 377, 447 & 503 engines 420 876 690</p>  <p>A000002041</p> <p>462, 467, 532 & 537 engines 420 277 900</p>  <p>A000002042</p>	 <p>A000002043</p>	<p>All injection engines</p>
<p>Magneto puller ring</p> <p>All engine types except 247 420 876 080</p>   <p>A000002044</p>	<p>To remove magneto</p> 	<p>All engine types except 247</p>
<p>Magneto puller</p> <p>247 engine 420 976 235 253,377,447,462 467,503,532,537 420 876 065 engines</p>  <p>A000002046</p>	 <p>Puller 420 876 065</p> <p>A000002045</p>	<p>All engine types</p>

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

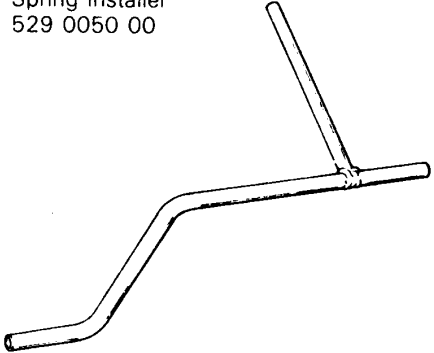
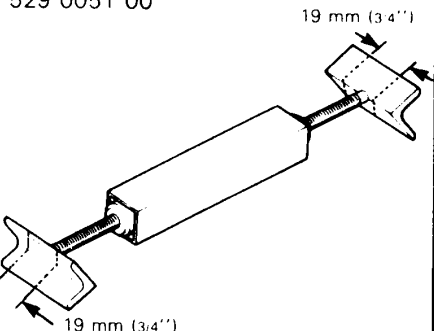
<p>3 speeds transmission bearings extractor</p>  <p>A000002047</p>	<p>To remove the bearings from the drive shaft and the lay shaft</p> <p>1- screw M8 x 25 (2) 420 240 275</p> <p>2- plate 420 977 700</p> <p>3- half ring (2) 420 876 330</p> <p>4- ring 420 977 480</p>	<p>Alpine 3 speeds transmission</p>
<p>Transmission ball mounting bolt 420 476 020</p>  <p>A000002048</p>	<p>Transmission cover index rod ball installation</p>	<p>Alpine 3 speeds transmission</p>
<p>Alignment tool 420 476 010</p>  <p>A000002049</p>	<p>Drive shaft and layshaft sprocket alignment</p>	<p>Alpine 3 speeds transmission</p>
<p>Nippondenso electronic ignition tester 419 008 400</p>  <p>A000002050</p>	<p>Engine ignition system components tests</p>	<ul style="list-style-type: none"> - All Nippondenso electronic ignition systems - (All engine types except 247)

Section 01 TOOLS

Sub-section 02 (SERVICE TOOLS)

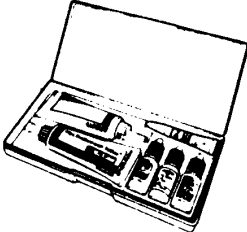

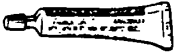
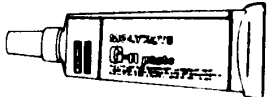
<p>Clip-O-Matic 529 004 500</p>  <p>A000002051</p>	<p>For track inserts installation</p> <p>1- screw 5/16 - 11 x 6'' 529 003 900</p> <p>2- pressure plate 529 004 400</p> <p>3- washer (2) 391 302 900</p> <p>4- hexagonal screw (2) 1/2 - 20 x 6'' 391 717 200</p> <p>5- bending block no. 1 (wide cleats) 529 004 100 bending block no. 2 (narrow cleats) 529 004 200 bending block no. 3 (Moto-Ski cleats up to 1975) 520 004 300</p> <p>6- male block 529 004 000</p> <p>7- hexagonal nut (2) 389 804 000</p>	<p>All types of track</p>
<p>Distance gauge 420 876 820</p>  <p>A000002052</p>	<p>To position crankshaft bearings, P.T.O. side</p>	<p>462 engine</p>
<p>Bearing simulator 420 876 155</p>  <p>A000002053</p>	<p>To adjust crankshaft end-play</p> 	<p>253 engine only</p>

Section 01 TOOLS
Sub-section 02 (SERVICE TOOLS)

<p>Spring installer 529 0050 00</p>  <p>A000002054</p>	<p>To install suspension springs</p>	<p>All torque reaction slide suspensions except Citation LS/E and Formula MX-Plus</p>
<p>Drive axle holder 529 0051 00</p>  <p>000002055</p>	<p>To hold drive axle during installation or removal of chaincase and/or end bearing housing</p>	<p>All torque reaction slide suspensions except Formula MX-Plus</p> <p>○ NOTE: For proper fitting on Citation LS/E reduce ends width to 19 mm (3/4").</p>









SERVICE PRODUCTS

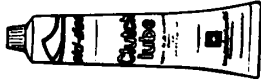





<p>LOCTITE SEALANT KIT 413 7026 00 contains: PST Pipe Sealant with Teflon (50 mL) 413 7023 00 Gasket Eliminator 515 (50 mL) 413 7027 00 Retaining Compound RC/601 (10 mL) 413 7031 00 Threadlocker 242 (10 mL) 413 7030 00 Threadlocker 271 (10 mL) 413 7029 00 Super Bonder 495 (3-gram tube) 413 7032 00</p>  <p>A000001061</p>	<p>For threadlocking, threadsealing, gasketing, bonding and retaining applications on engines, pulleys and fasteners etc.</p>	
<p>LOCK'N SEAL (242) BLUE MEDIUM STRENGTH 24 mL 413 7025 00</p>  <p>A000001062</p>	<p>A medium-strength adhesive for threadlocking and threadsealing. Vibration-proof nuts, bolts and screws.</p>	<p>General purpose, nuts, bolts screws. Magneto ring nut, crank-case studs, etc.</p>
<p>LOCK'N SEAL (271) RED HIGH STRENGTH 6 ml 747 020 000</p>  <p>A000001063</p>	<p>Hi-strength threadlocking threadsealing adhesive for large parts.</p>	<p>Fasteners and studs under 1" dia.</p>
<p>MOLYKOTE G-n paste 2.8 oz 413 7037 00</p>  <p>A000001064</p>	<p>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).</p>	<p>For rewind starter locking spring. (Not to be used on rewind springs as is does not stay on when dried.)</p>

Section 01 TOOLS

Sub-section 03 (SERVICE PRODUCTS)

<p>G.E. VERSILUBE G341 M 8 oz 413 7040 00</p>  <p>A000001065</p>	<p>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 such conditions. Lubricates under temperatures from -73°C to 240°C (-100°F à 400°F).</p>	<p>Used to lubricate manual starter rewind spring. (Not to be used on rewind starter locking spring as the vibration makes it run out).</p>
<p>PRIMER CRANKCASE SEALANT (SPRAY) 6 oz 413 7024 00</p>  <p>A000001066</p>	<p>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.</p>	<p>Mainly used when assembling engine crankcases.</p>
<p>CHISEL gasket remover (spray) 300g 413 7045 00</p>  <p>A000001067</p>	<p>Creates a foaming action that lifts gaskets off in minutes.</p>	<p>Mainly used to remove gasket residues from any metal surface.</p>
<p>ANTISEIZE LUBRICANT 413 7010 00</p>  <p>A000001068</p>	<p>Protects moving and stationay parts against high temperature seizing. Prevents rust and corrosion on parts exposed to high heat.</p>	<p>Unpainted surfaces of drive pulley countershaft.</p>
<p>SILICONE DIELECTRIC GREASE 3 oz. 413 7017 00</p>  <p>A000001069</p>	<p>Special dielectric grease that prevents moisture and corrosion build-up in electric connections.</p>	<p>On all electric connections. High tension coil. Spark plug connections. Connector housings, etc.</p>
<p>GREASE TUBE LMZ No 1 400 g 498 0281 00</p>  <p>A000001070</p>	<p>Multi purpose Lithium based grease containing zinc monoxide which makes it a good conductor for heat & electricity.</p>	<p>Mainly used between regulators or rectifiers and upper column to transfer the heat build-up and to assure a good ground.</p>

Section 01 TOOLS
Sub-section 03 (SERVICE PRODUCTS)

<p>CLUTCH LUBE 4 oz 413 8007 00</p>  <p>A000001071</p>	<p>Special low temperature metallic lubricant for clutch shafts only.</p>	<p>For roller round shaft drive pulleys.</p>
<p>Injection oil 413 8015 00</p>  <p>A000001072</p>	<p>High quality lubricant with good resistance to high operating temperatures. Low foaming action.</p>	<p>Rotary valve lubricant.</p>
<p>CHAINCASE OIL 200 ml 413 8019 00</p>  <p>A000001073</p>	<p>Specially formulated oil for chain and roller lubrication. Assures proper lubrication at low temperatures.</p>	<p>Chaincase lubricant on all models.</p>
<p>BLIZZARD OIL 496 0135 00 - 500 ml</p>  <p>A000001074</p>	<p>Specially formulated oil that meets lubrication requirements of the Bombardier-Rotax engine.</p>	<p>All models.</p>
<p>INJECTION OIL 496 013 300 - 1 litre 496 013 400 - 4 litres</p>  <p>A000001075</p>	<p>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 plugs fouling.</p> <p>Fully efficient for: INJECTION, PRE-MIX, ROTARY VALVE.</p>	<p>All engine types.</p>
<p>GREASE TUBE SPHEEROL MULTI EP 400g 413 7044 00</p>  <p>A000001076</p>	<p>Multi-purpose lithium based grease. It is an antifriction, anticorrosion and water resistant bearing grease for use through temperatures between -50°F to 225°F (-45°C à 107°C).</p>	<p>For idler bearings, ski legs, leaf spring cushion pads, seal interior lips, rear hub bearings, bogie wheels, countershaft bearings, etc...</p>

Section 01 TOOLS**Sub-section 03 (SERVICE PRODUCTS)**

Primer for gasket eliminator
413 7053 00

**General purpose primer.**

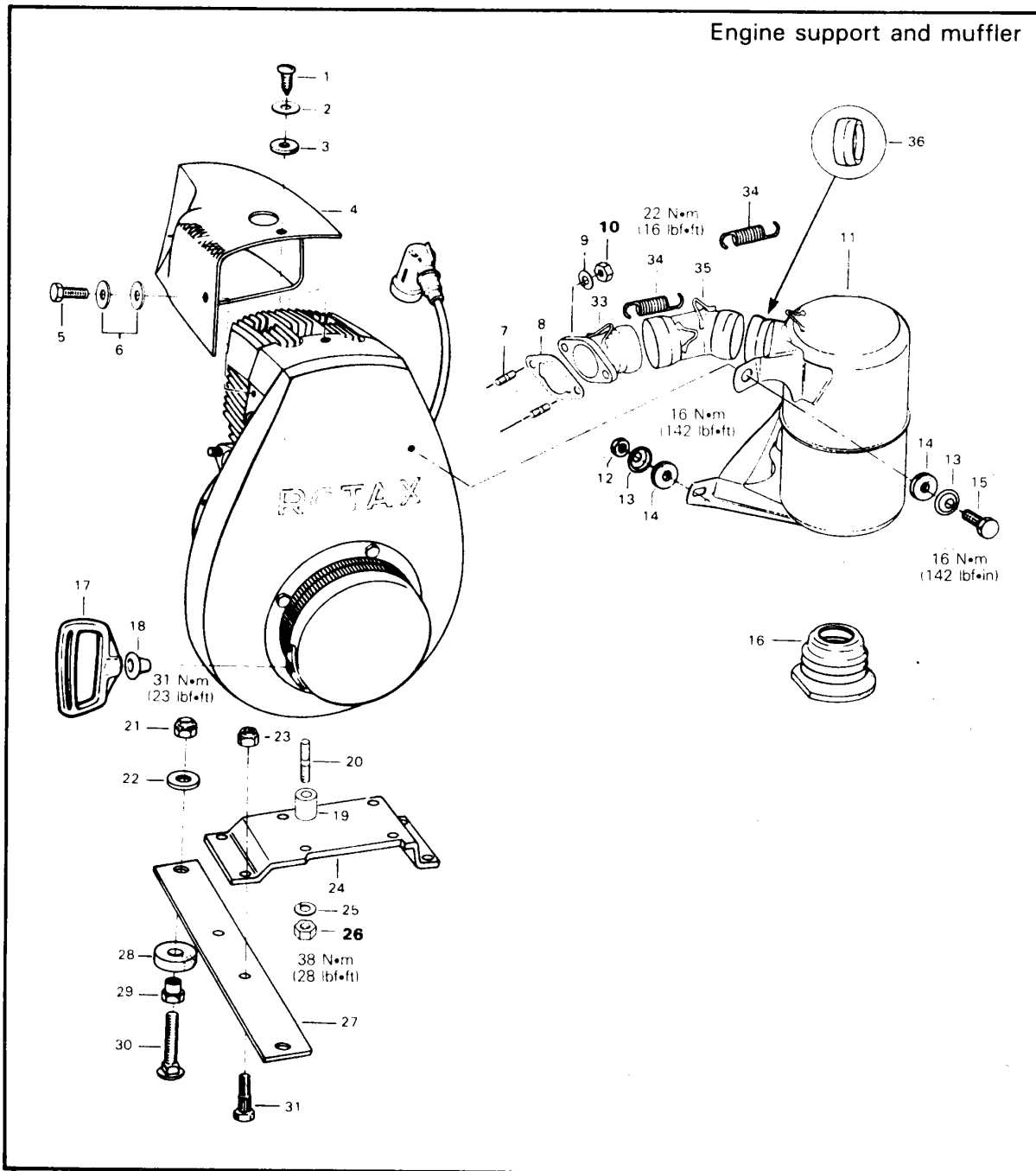
Primer N assures fixturing of parts in 15-30 minutes and full cure in 12 hours or less. On part life is 30 days, but it is recommended that parts be joined within 10 minutes after adhesive is applied over primer.

Mainly used when assembling engine and transmission crankcases.

A000001077

247 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION



Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

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

REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle.

- Console
- Pulley guard
- Drive belt
- Muffler
- Primer hose
- Decompressor cable
- Throttle cable
- Fuel lines
- Electrical connectors
- Separate steering column support at upper column
- Engine mount nuts

ENGINE SUPPORT AND MUFFLER DISASSEMBLY & ASSEMBLY

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

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).

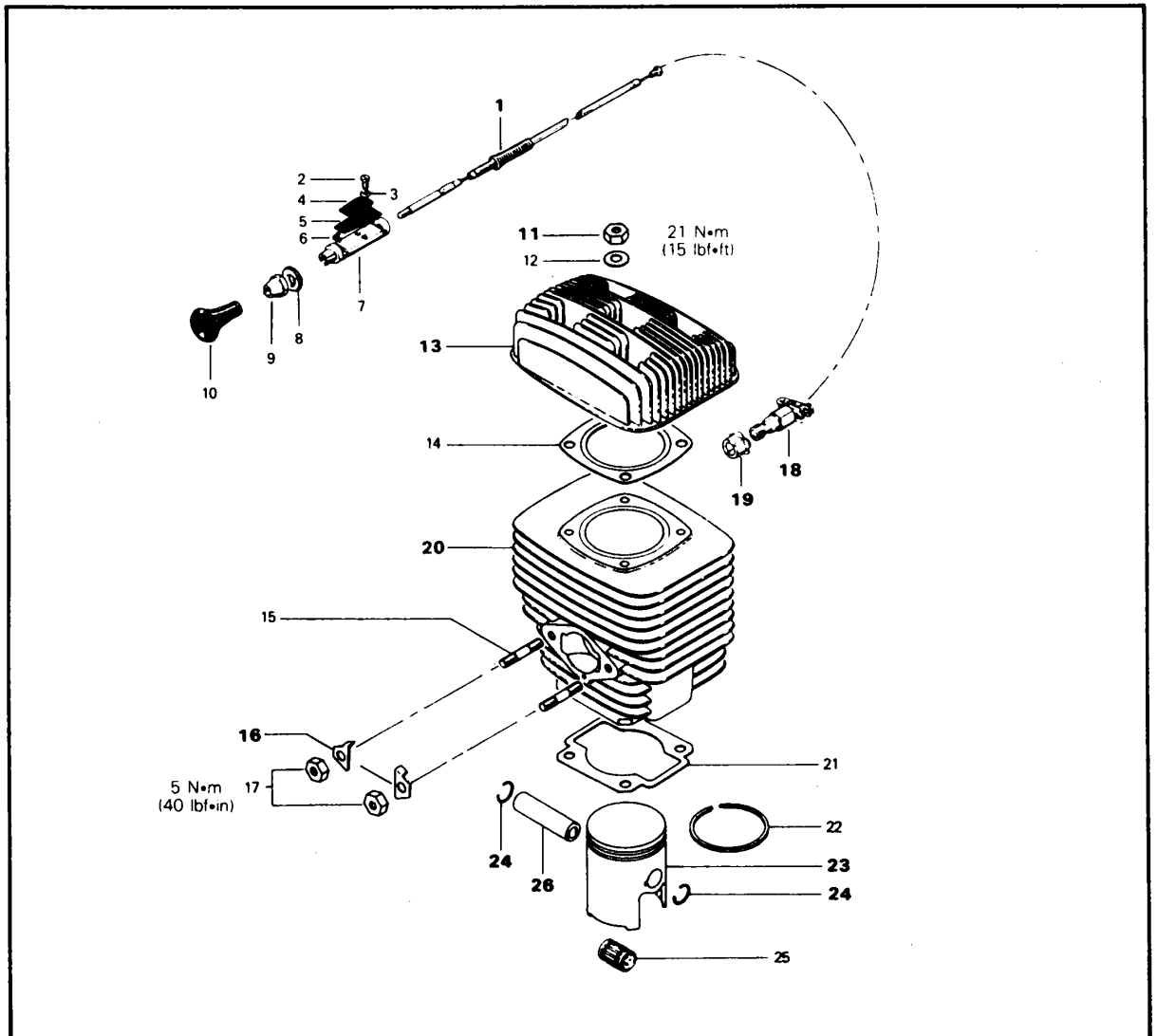
INSTALLATION ON VEHICLE

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

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

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

TOP END



- 1. Decompressor cable
- 2. Screw M4 x 7 (2)
- 3. Lock washer 4 mm (2)
- 4. Reinforcement spring (2)
- 5. Switch spring
- 6. Lock spring
- 7. Switch housing
- 8. Spacer
- 9. Cap nut M12
- 10. Decompressor knob
- 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
- 24. Circlip (2)
- 25. Needle bearing
- 26. Gudgeon pin

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

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

23,24,26, Piston, circlips & gudgeon pin

Place a clean cloth over crankcase, then with a pointed tool inserted in piston notch, remove circlip from piston. Drive the gudgeon pin out of piston using a suitable drive punch and hammer.

CAUTION: When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

INSPECTION

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

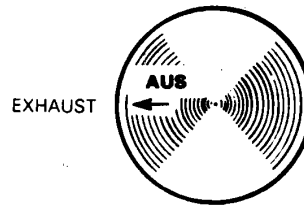
MEASUREMENTS	TOLERANCES		
	FITTING NEW PARTS (MIN.) (MAX.)		WEAR LIMIT
Cylinder taper	N.A.	N.A.	.08 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0020")
Cylinder/piston clearance	.065 mm (.0026")	.20 mm (.0079")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.002")	.20 mm (.008")	.20 mm (.008")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

NOTE: For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

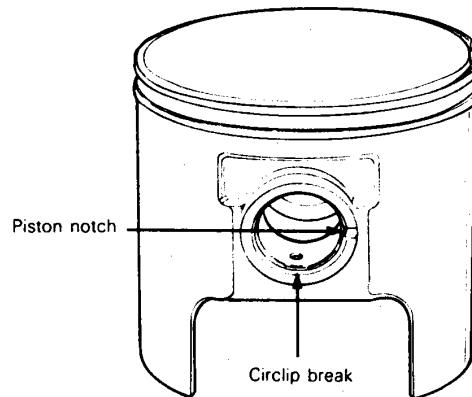
23,24, Piston & circlips

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.



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To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Remove any burrs on piston caused through circlip installation with very fine emery cloth.



A001002002

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.

11,13, Nuts & cylinder head

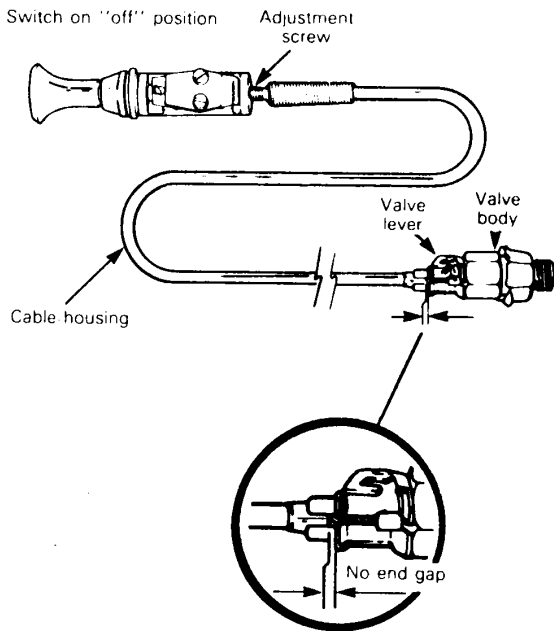
Position cylinder head on cylinder with fins in line with crankshaft center line. Cross torque retaining nuts to 21 N•m (15 lbf•ft).

16, Tab lock

Tab lock should be replaced if bent more than three (3) times. If in doubt replace.

1 to 10,18,19, Decompressor ass'y

To adjust the decompressor, put the decompressor switch on "off" position. If there is some end gap between cable housing and decompressor valve lever, turn the adjustment screw counterclockwise until you eliminate that end gap. Beware not to compress the valve lever.

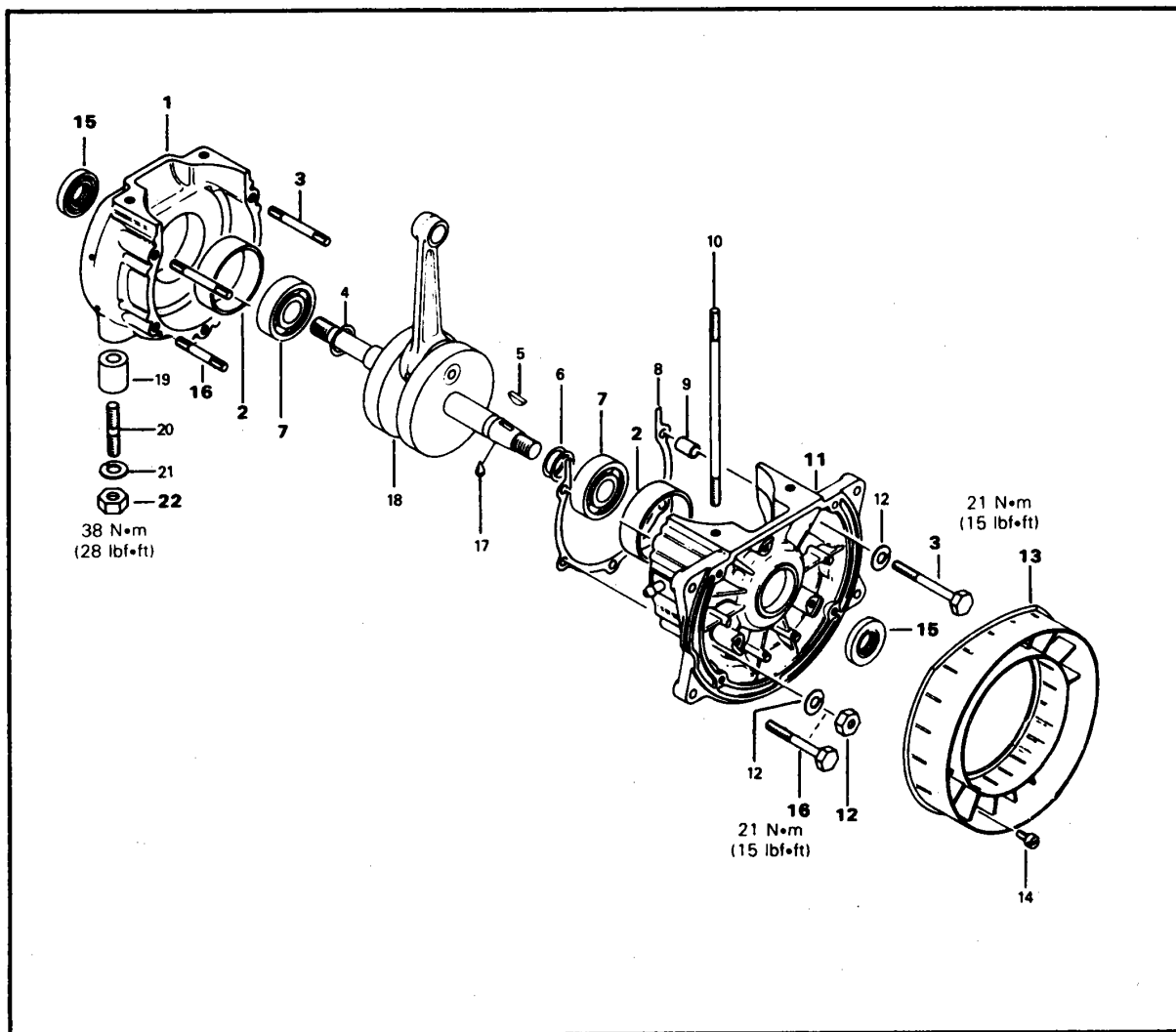


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Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

BOTTOM END



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

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

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, 11, Crankcase halves

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

2, Polyamid rings

Do not remove polyamid rings unless necessary.

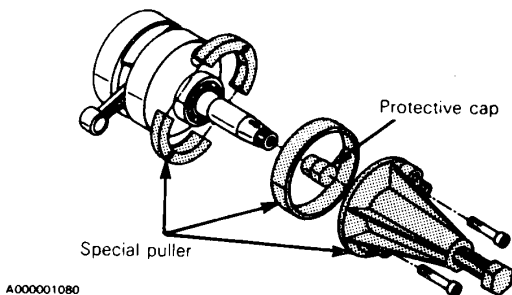
To remove, heat slightly with a butane torch then pry out using a screwdriver.

15, Seals

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

7, Ball bearings

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		WEAR LIMIT
	FITTING NEW PARTS (MIN.)	(MAX.)	
Crankshaft deflection	N.A.	N.A.	.10 mm (.0039")
Connecting rod big end axial play	.20 mm (.0079")	.53 mm (.0208")	1.0 mm (.0394")
Crankshaft end play	.20 mm (.0079")	.40 mm (.0158")	N.A.

NOTE: For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

7, Bearings

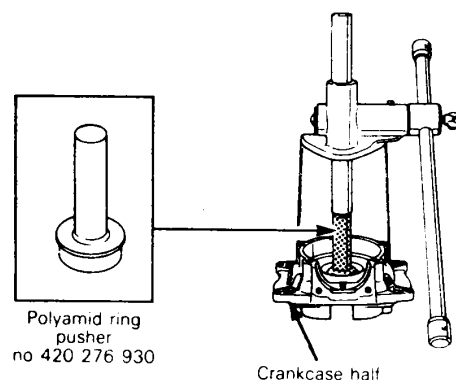
Prior to installation, place bearings into an oil container and heat the oil to 100°C (210°F) for 5 to 10 min. This will expand bearings and ease installation.

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 dimension measurement", section 02-10.

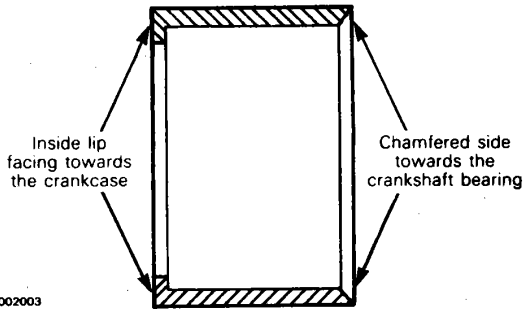
2, Polyamid rings

To install polyamid ring, apply oil on outside diameter then use a suitable pusher.



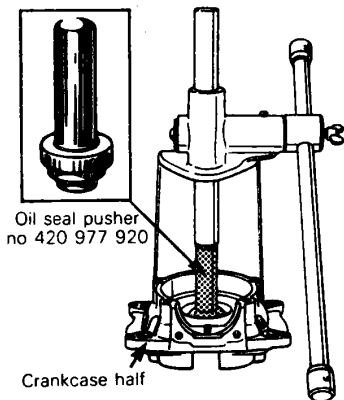
Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)



15, Seals

To install new seal into crankcase use an appropriate oil seal pusher as illustrated. (See Tools Section).

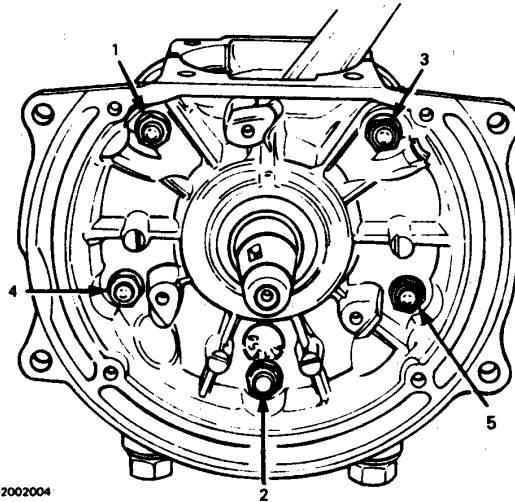


Also, prior to crankcase adjoining, install a protector sleeve on each crankshaft extension to prevent oil seal damage (See Tool Section). Apply a light coat of lithium grease on seal lip. Spray some new injection oil on all moving parts of the crankshaft.

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

3,12,16, Studs or bolts & nuts

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



22, Engine mount nuts

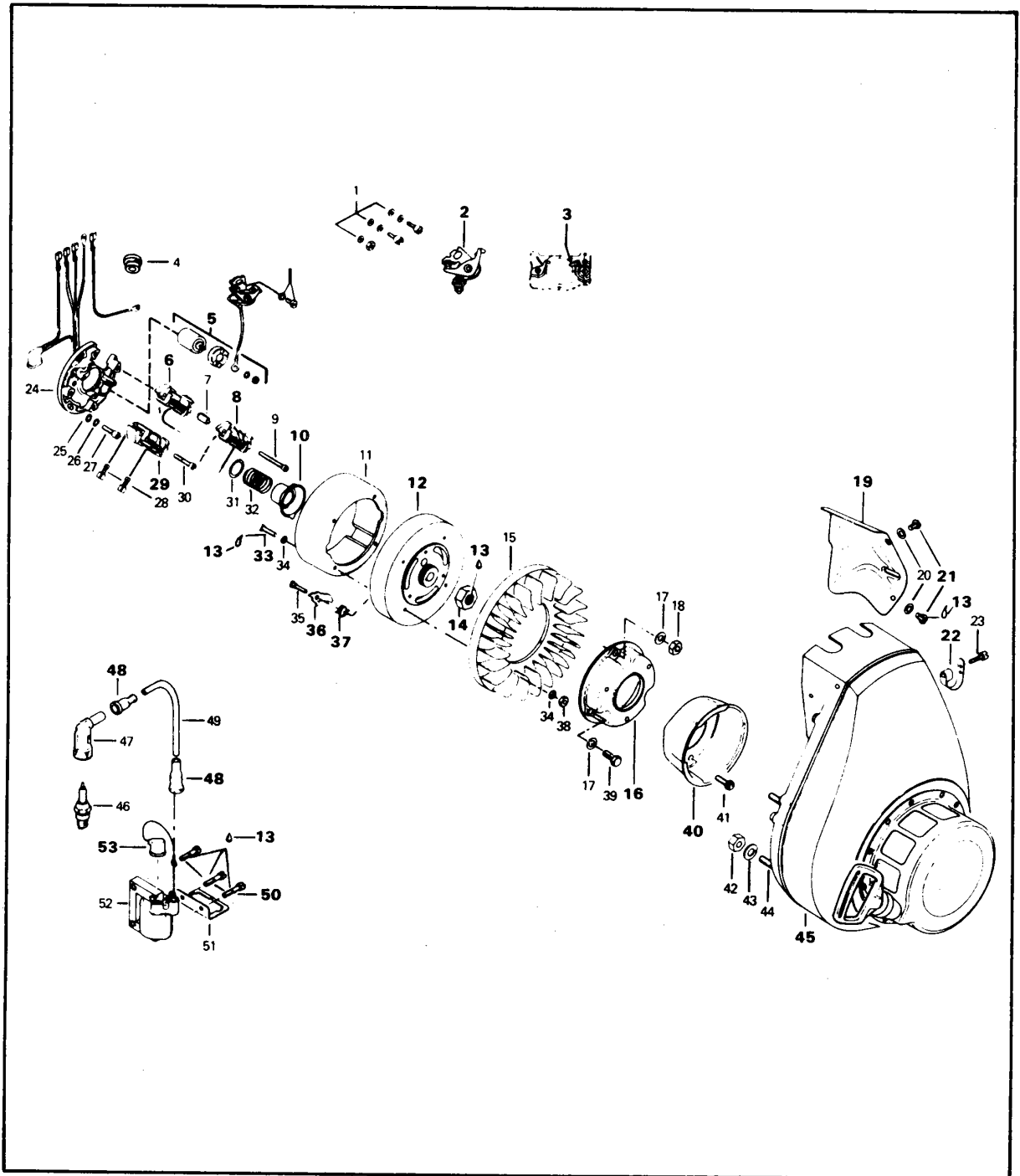
Torque the engine mount nuts to 38 N•m (28 lbf•ft).

13, Labyrinth ring

Position labyrinth ring with bevelled side on top.

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

MAGNETO & 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. Condensor assembly
6. Generator coil with cable
7. Distance sleeve 11 mm (2)
8. Brake light 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. Lock washer 6 mm (8)
35. Bearing screw M6
36. Centrifugal weight
37. Centrifugal weight 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 M175 T1 (M7A)
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

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:

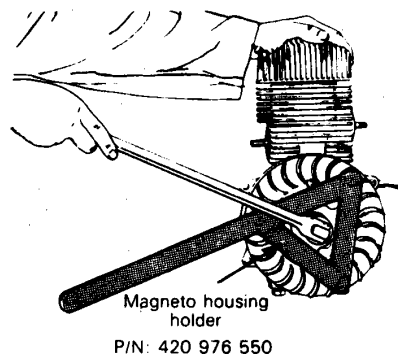
- muffler
- upper column
- air duct
- air deflector
- spark plug cable clamp
- fan cowl
- starting pulley
- pulley spacer

○ **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 (service 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 Loctite bond. This will eliminate the possibility of thread breakage.

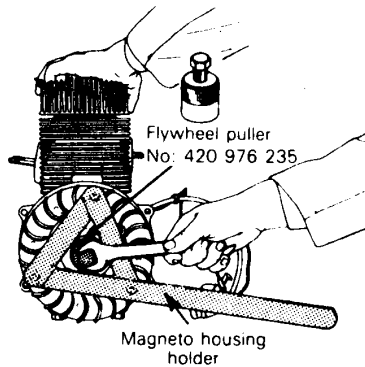
If magneto housing holder is not available, crankshaft can be locked with the following procedure:

- With engine cold, remove spark plug.
- Bring piston at top dead center position.
- Rotate magneto 45° counterclockwise.
- Insert enough starter rope into cylinder to fill it completely.
- Remove magneto retaining nut.

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

12, Magneto housing

To remove magneto housing (flywheel): use flywheel puller (service tool) and magneto housing holder (service tool) as illustrated.



A000001078

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

REPAIR

5, Condensor

To replace a condensor:

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

2,3, Contact breaker & lubricating wick

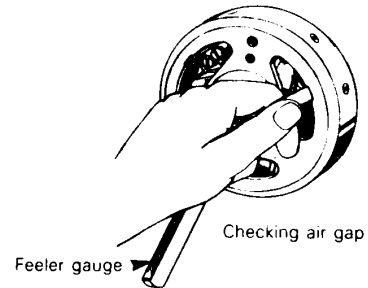
When replacing contact breaker,

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

6,8,29, Generator coil, brake light coil & lighting coil

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

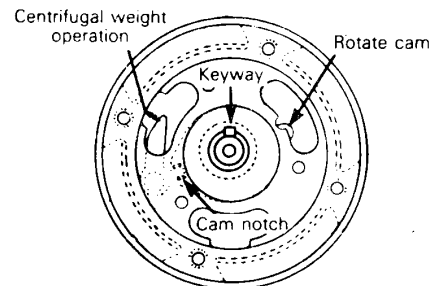
To check air gap, insert a feeler gauge of 0.25-0.38 mm (.010''-.015'') between magnet and coil ends. If necessary to adjust, slacken retaining screws and relocate coil.



A002002001

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:



A002002002

10,36, Breaker cam & centrifugal weight

Rotate breaker cam to check centrifugal weight operation.

37, Centrifugal weight spring

At assembly, apply a small amount of grease into spring seating.

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

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

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

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.

Section 02 ENGINE

Sub-section 01 (247 ENGINE TYPE)

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.

Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)


1. Rotax engine 253
2. Engine bracket
3. Lock washer 10 mm (3)
4. Hexagonal head cap screw M10 x 20 (3)
5. Hexagonal head cap screw M10 x 35 (2)
 - * Hexagonal head cap screw M10 x 45 (2)
- *6. Electric starter support
- *7. Spacer
8. Hexagonal elastic stop nut 10 mm (2)
9. Cup (2)
10. Retainer plate (3)
11. Mounting rubber (2)
12. Front support (2)
13. Washer (3)
14. Lock washer 10 mm (2)
15. Hexagonal head cap screw M10 x 40 (3)
16. Hexagonal head cap screw M10 x 25 (2)
17. Washer (2)
18. Internal tooth lock washer (2)
19. Hexagonal elastic stop nut 10 mm (3)
20. Rear support
21. Hexagonal head cap screw M8 x 20 (3)
22. Lock washer 8 mm (3)
23. Flat washer 8.4 mm (3)
24. Spring
25. Front shell
26. Female ball joint
27. Male ball joint
28. Spring (2)
29. Muffler
30. Female ball joint
31. Muffler support
32. Hexagonal head cap screw M6 x 45
33. Spring
34. Hexagonal flanged elastic stop nut 6 mm
35. Spring
36. Spring
37. Spring
38. Exhaust grommet
39. Rubber stopper
40. Starter grip
41. Loctite 222 (purple, low strength)

 **NOTE:** Parts marked with * are used on electric model 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)
- pulsation line
- starter cable (if applicable)

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

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

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).

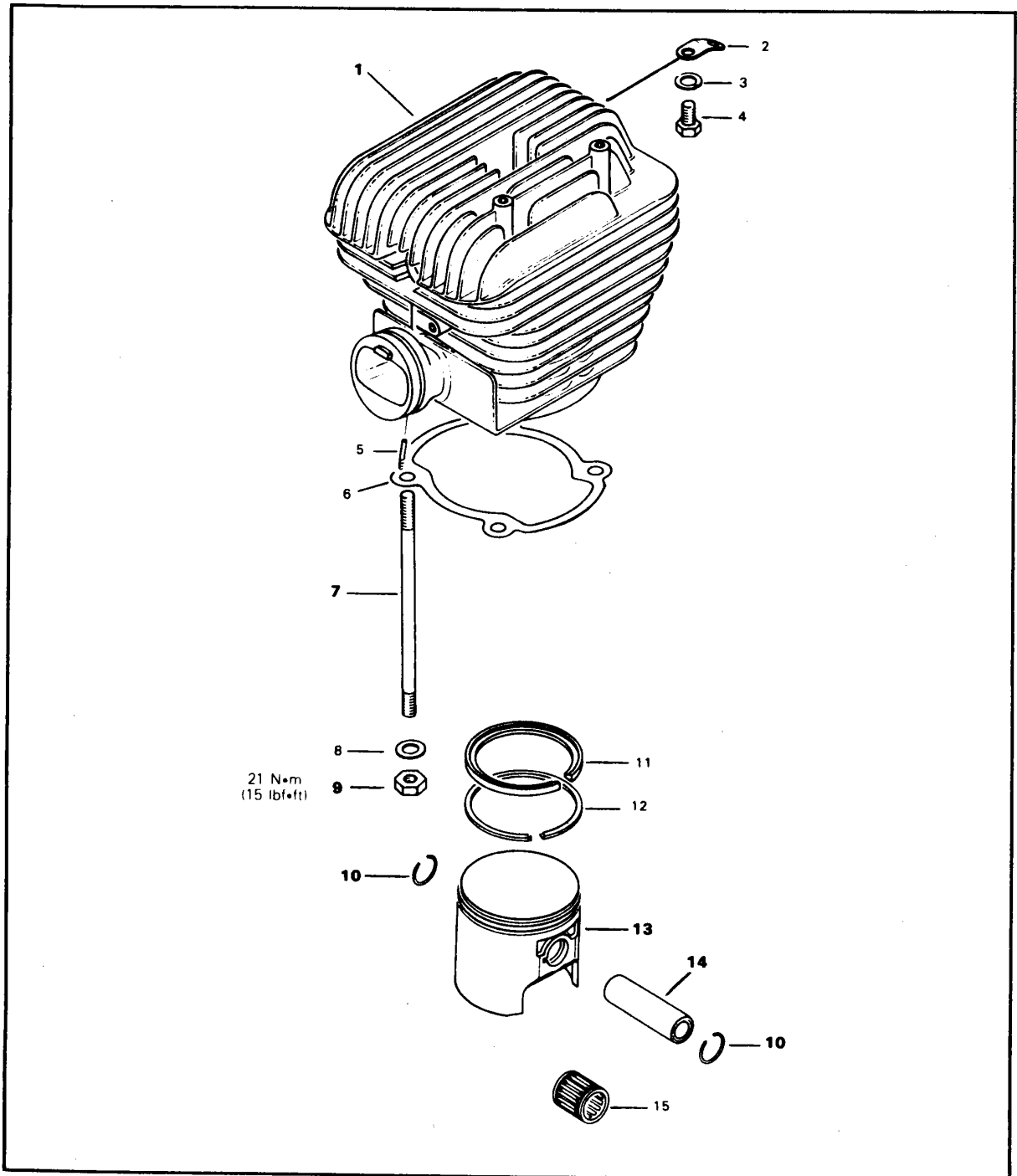
INSTALLATION ON VEHICLE

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

- Check tightness of engine mounting supports screws.
- Check pulley alignment and drive belt tension.
- Check throttle cable condition.

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

TOP END



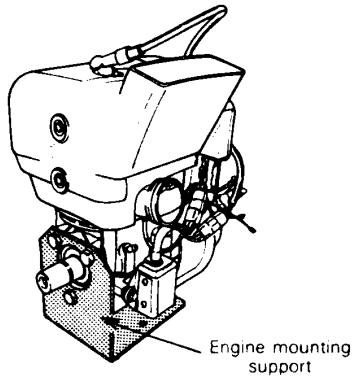
Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

1. Head cylinder
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

Use engine mounting support (P/N 420 876 640) to hold engine while working on.



A003002001

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, Piston, gudgeon pin & circlips

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.

Drive the gudgeon pin out of piston using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

INSPECTION

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

MEASUREMENTS	TOLERANCES		WEAR LIMIT
	FITTING NEW PARTS (MIN.)	(MAX.)	
Cylinder taper	.03 mm (.0012")	.07 mm (.0028")	N.A.
Cylinder out of round	N.A.	N.A.	.10 mm (.0039")
Cylinder/piston clearance	.08 mm (.0031")	.10 mm (.0039")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.0016")	.11 mm (.0043")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

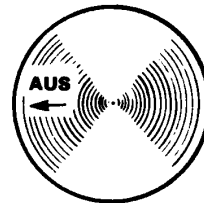
○ **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

10,13, Piston & circlips

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.

EXHAUST



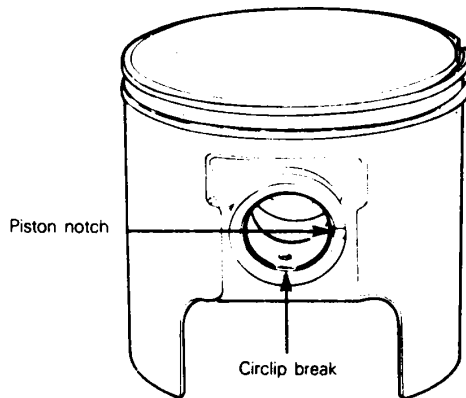
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Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

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 minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Remove any burrs on piston caused through circlip installation with very fine emery cloth.



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

1, Head cylinder

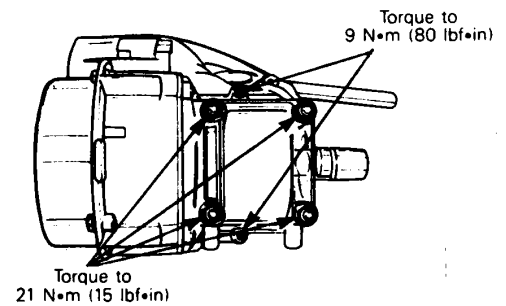
- Before inserting piston in head cylinder, lubricate it with new injection oil or equivalent.
- Remove spark plug.
- Install head cylinder, then rotate crankshaft to position head cylinder.

7, Studs

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

9, Nuts

- Cross torque head cylinder nuts to 21 N•m (15 lbf•ft).
- Retorque both crankcase screws to 9 N•m (80 lbf•in).

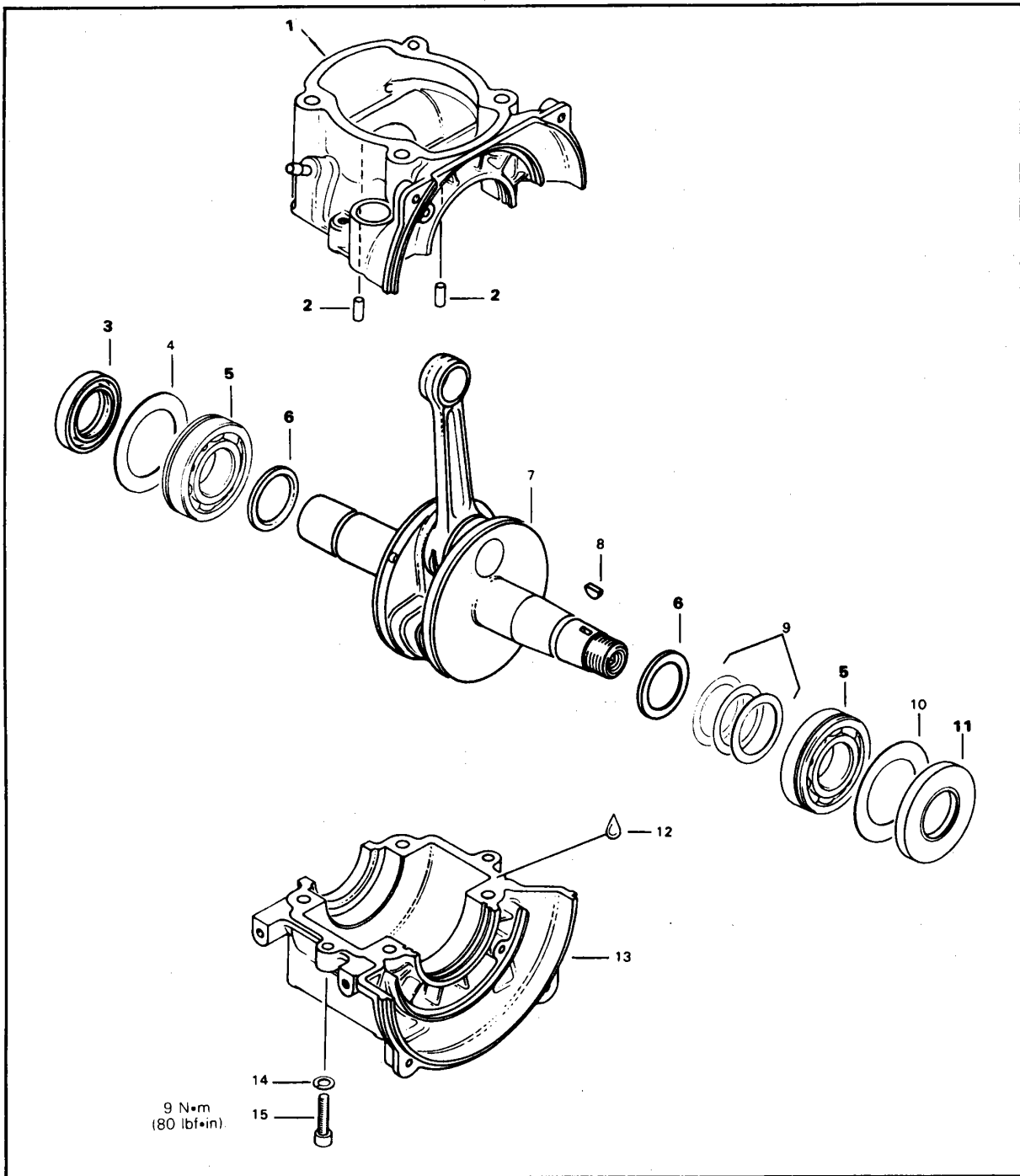


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Section 02 ENGINE

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 P.T.O. 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)

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.

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

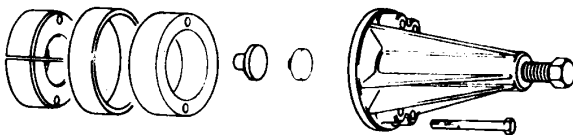
DISASSEMBLY

General

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

5, P.T.O. side bearing & MAG. side bearing

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



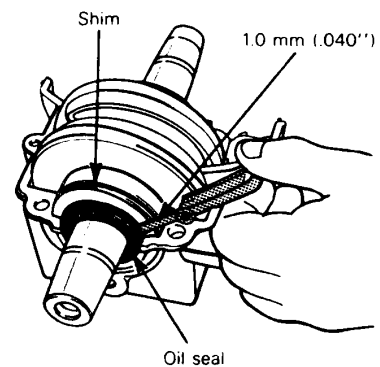
A000002059

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") 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.



A003002003

2, Rubber plug

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

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

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

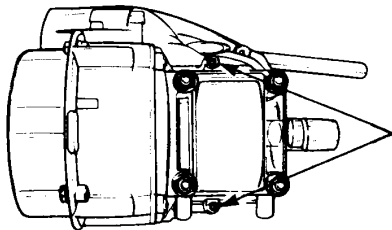
Prior to joining of crankcase halves, spray new injection oil on all the moving parts of the crankshaft.

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).

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



Torque to
 9 N•m (80 lbf•in)

A003002002

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

5, Crankshaft ball bearing

Prior to installation, place bearings into an oil container filled with oil heated to 100°C (210°F). This will expand bearings and ease installation. Install outer race groove outward.

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.	.08 mm (.0032")
Connecting rod big end axial play	.20 mm (.0078")	.53 mm (.0208")	1.0 mm (.0394")
Crankshaft end play	0.1 - 0.4 mm (.004" - .016")		

○ **NOTE:** For the measurement procedures refer to "Engine dimensions measurement" section 02-10.

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

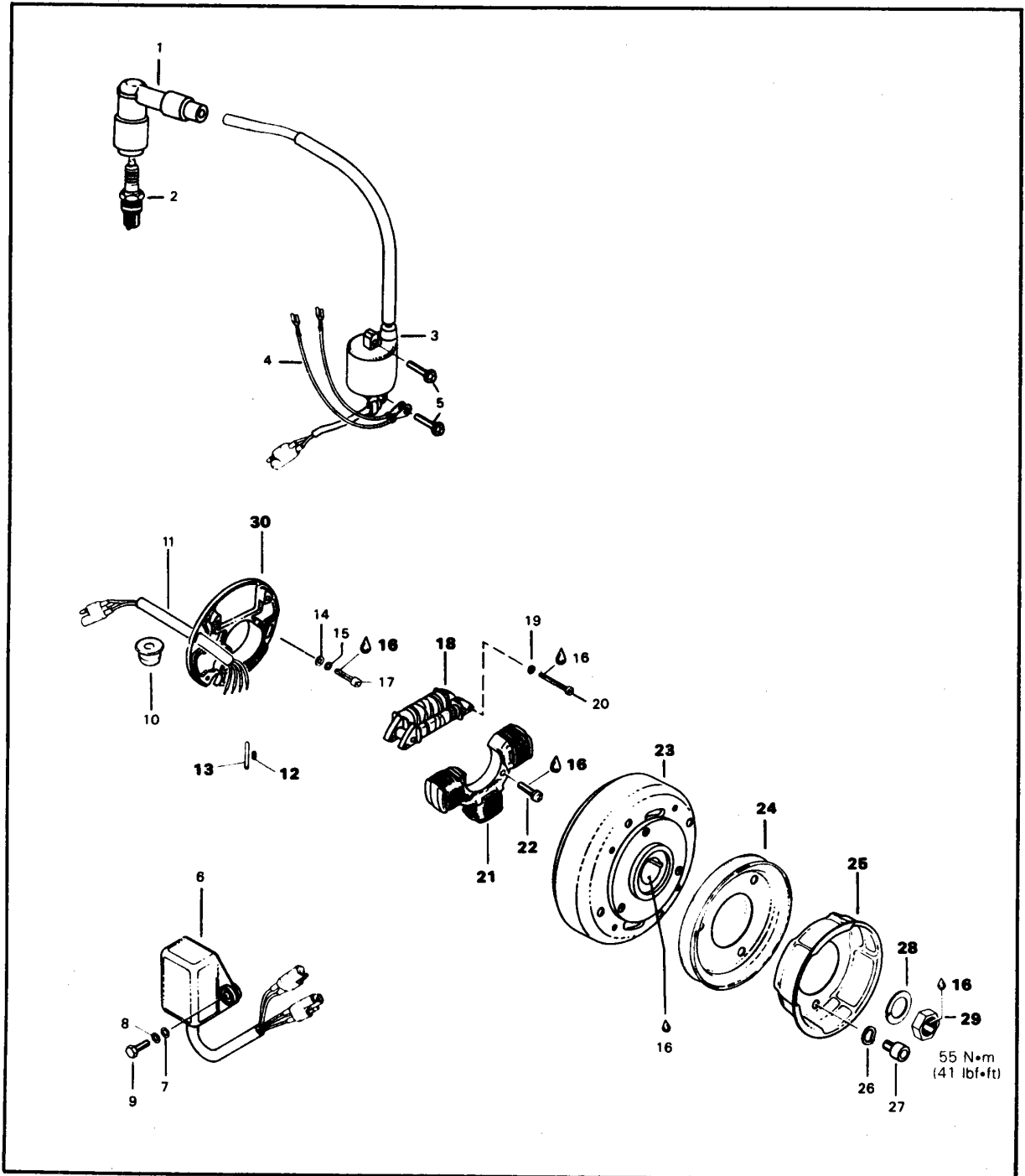
Refer to "Engine dimensions and measurement", section 02-10 for the procedures.

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.

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. Tapite 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 221 (violet)
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

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

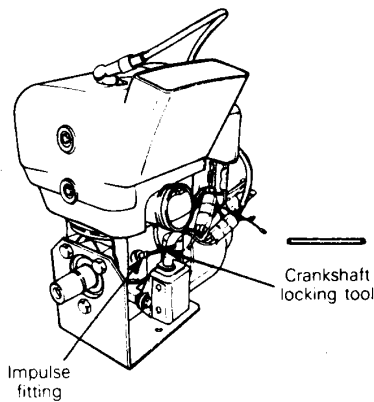
To gain access to magneto assembly, remove:

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

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

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (P/N 420 876 640).



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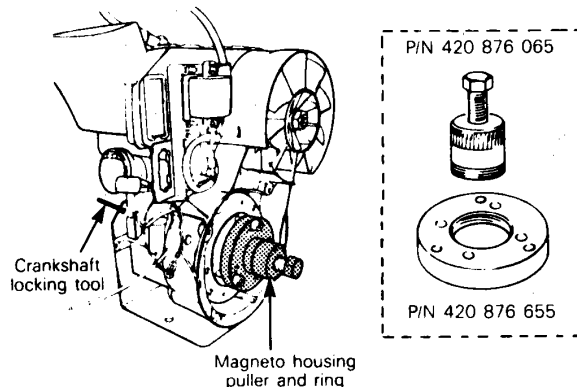
02-02-10

○ **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.

23, Magneto flywheel

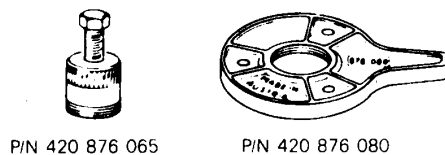
To remove:

- unscrew magneto retaining nut.



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



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

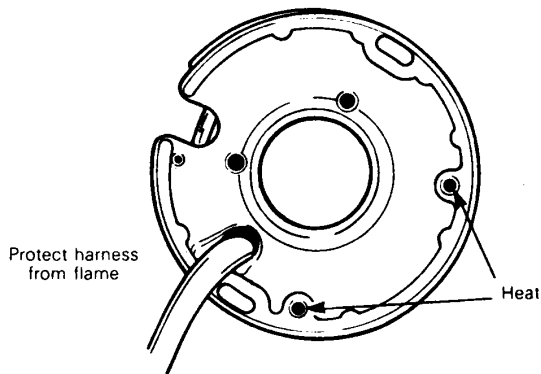
- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

18, Generating coil

To replace generating coil:

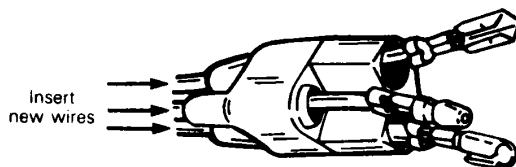
- Heat the armature plate to 93°C (200°F) around the screw holes to break the Loctite bond.



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CAUTION: Protect harness from flame.

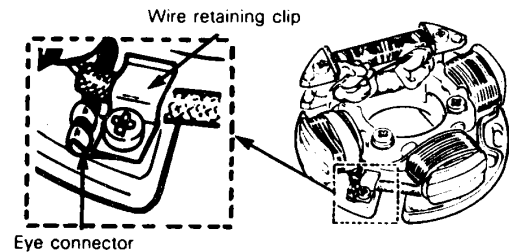
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector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



A001002004

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.



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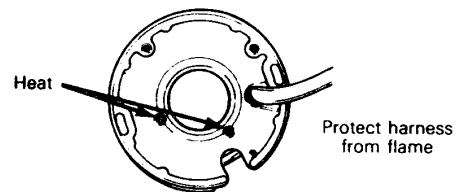
- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

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

12,13,21,22, Protector tubes, splice connectors, lighting coil & screws

To replace lighting coil:

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



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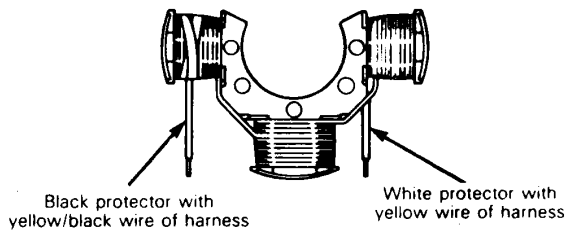
CAUTION: Protect harness from flame.

- Remove screws (use Phillips no. 3 screwdriver).
- Remove the wire retaining clip from armature plate.
- Pull out protector tubes and unsolder the splice connectors.

Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

- 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.



A001002006

- Position protector tubes over connections.
- Prior to assembly, apply Loctite 242 (blue, medium strength) on the lighting coil screws.
- Fasten retaining clip onto protector tubes.

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

ASSEMBLY

23,28,29,30, Armature plate, magneto flywheel, lock washer & 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.

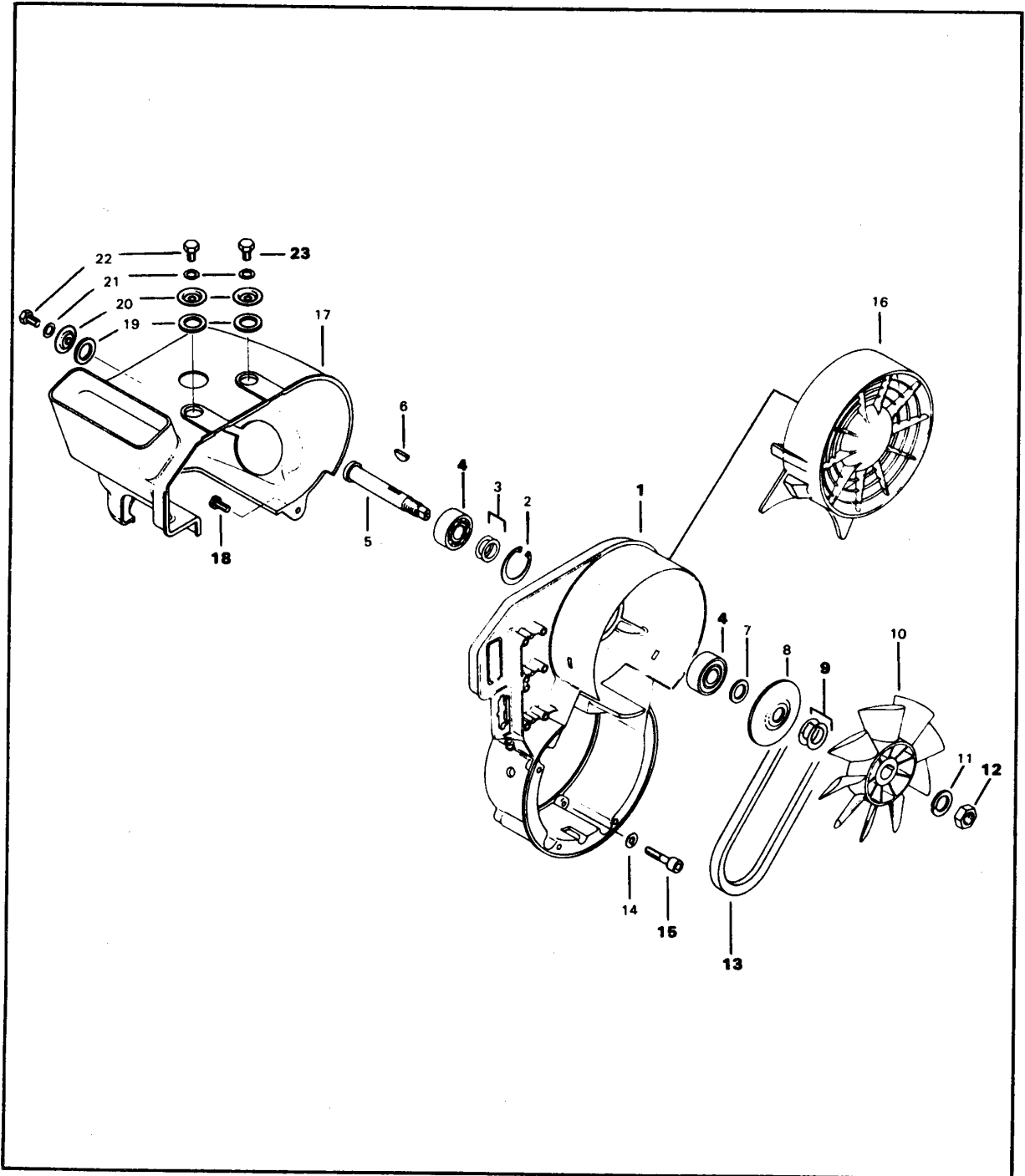
- Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 85 N•m (63 lbf•ft).
- At reassembly coat all electric connections with silicone dielectric grease P/N 413 7017 00 grease to prevent corrosion or moisture penetration.

▼ **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

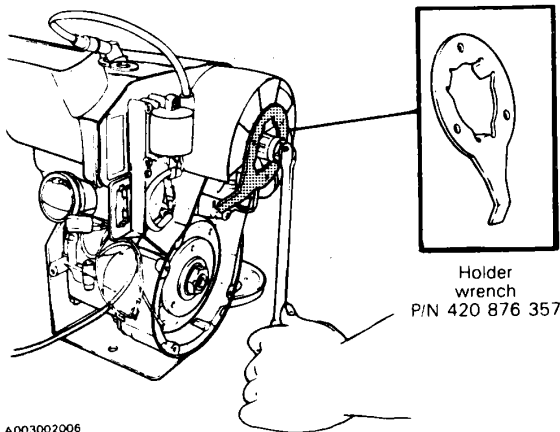
CLEANING

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 420 876 357. At assembly, torque nut to 55 N•m (41 lbf•ft).



9,13, Shims & V-belt

Fan belt deflection must be 9.5 mm (3/8") when applying a force of 50 N (11 lbf). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lock washer.

1,4, Ball bearing & fan housing

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

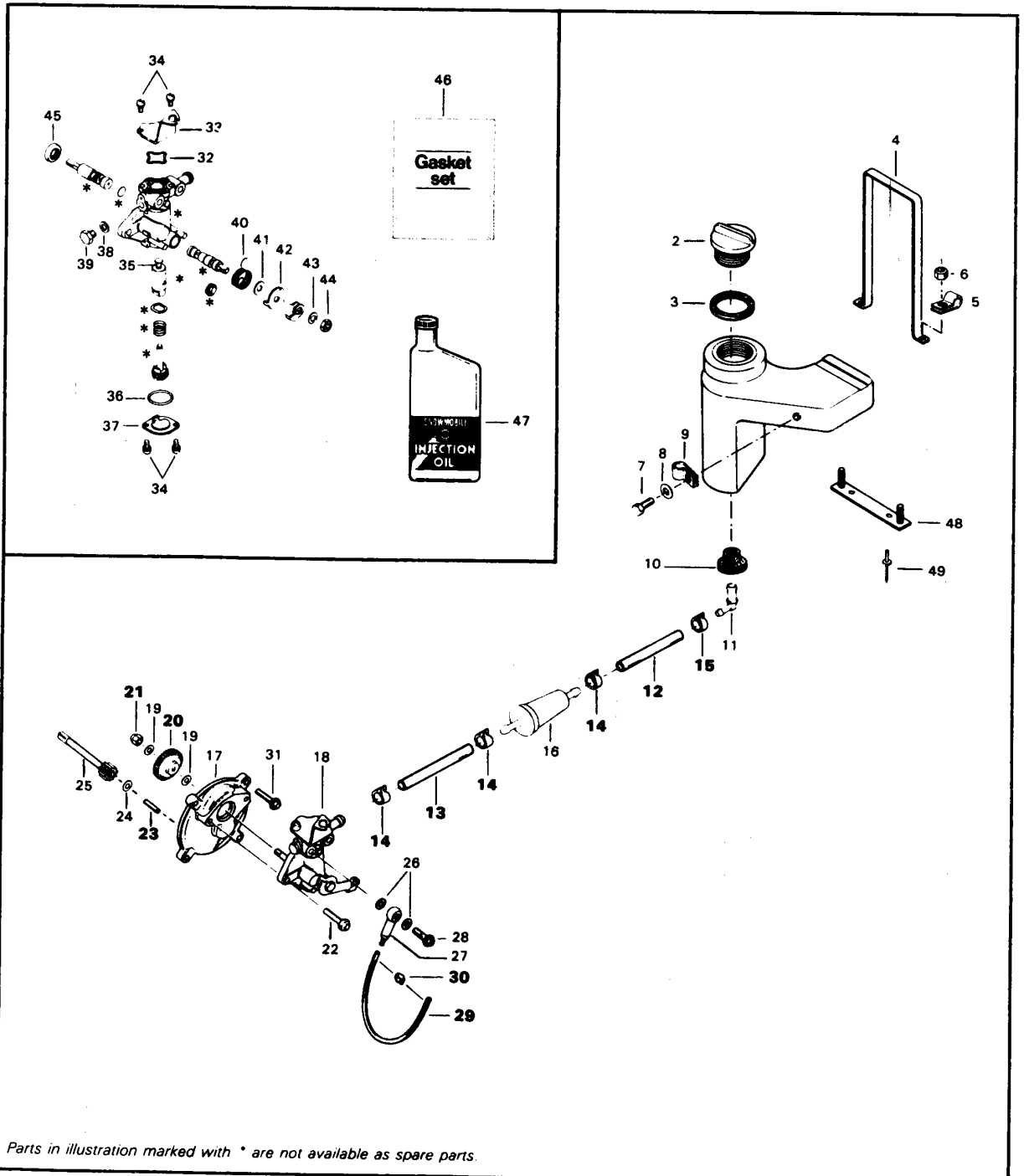
15,18,23, Upper fan cowl screws & fan housing screws

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.

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

OIL INJECTION PUMP & RESERVOIR



Parts in illustration marked with * are not available as spare parts.

Section 02 ENGINE

Sub-section 02 (253 ENGINE TYPE)

1. Injection oil tank
2. Oil tank cap
3. O-ring
4. Retainer clip
5. Clip (2)
6. Hexagonal flanged elastic stop nut 6 mm (2)
7. Screw
8. Washer
9. Clip
10. Grommet
11. Male connector
12. Oil line 2" (50 mm)
13. Oil line 3" (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" (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
44. Hexagonal nut 6 mm
45. Seal
46. Gasket set
47. Injection oil (1 liter)
48. Retainer plate (underneath frame)
49. Rivet (2)

CLEANING

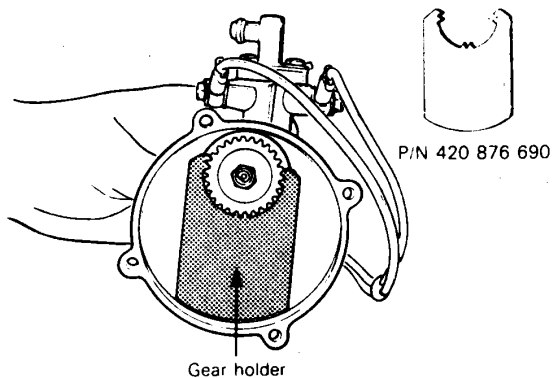
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

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

20,21, Gear retaining nut & oil pump gear

To remove gear retaining nut, first extract the needle roller with pliers then lock gear in place using no. 420 876 690 tool.



A003002010

02-02-16

ASSEMBLY

20, Oil pump gear

At gear assembly, apply a light coat of grease 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 clips & clamp

Always check for spring clip and clamp tightness.

12,13,29, Oil lines

▼ CAUTION: On electric start models, it is recommended to install black rubber oil lines (P/N 414 2867 00) that will not be altered by battery fumes.

ADJUSTMENT

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

Section 02 ENGINE

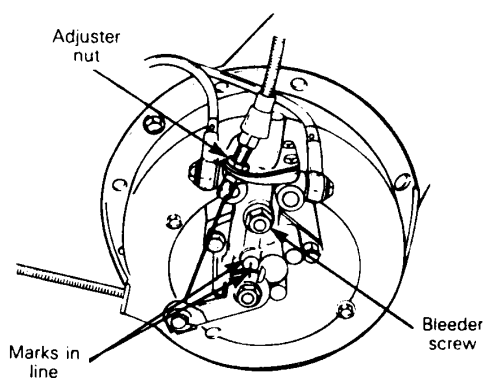
Sub-section 02 (253 ENGINE TYPE)

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.

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



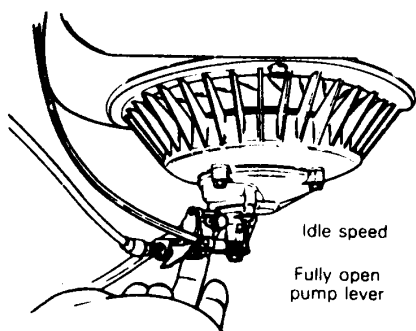
A001002008

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.

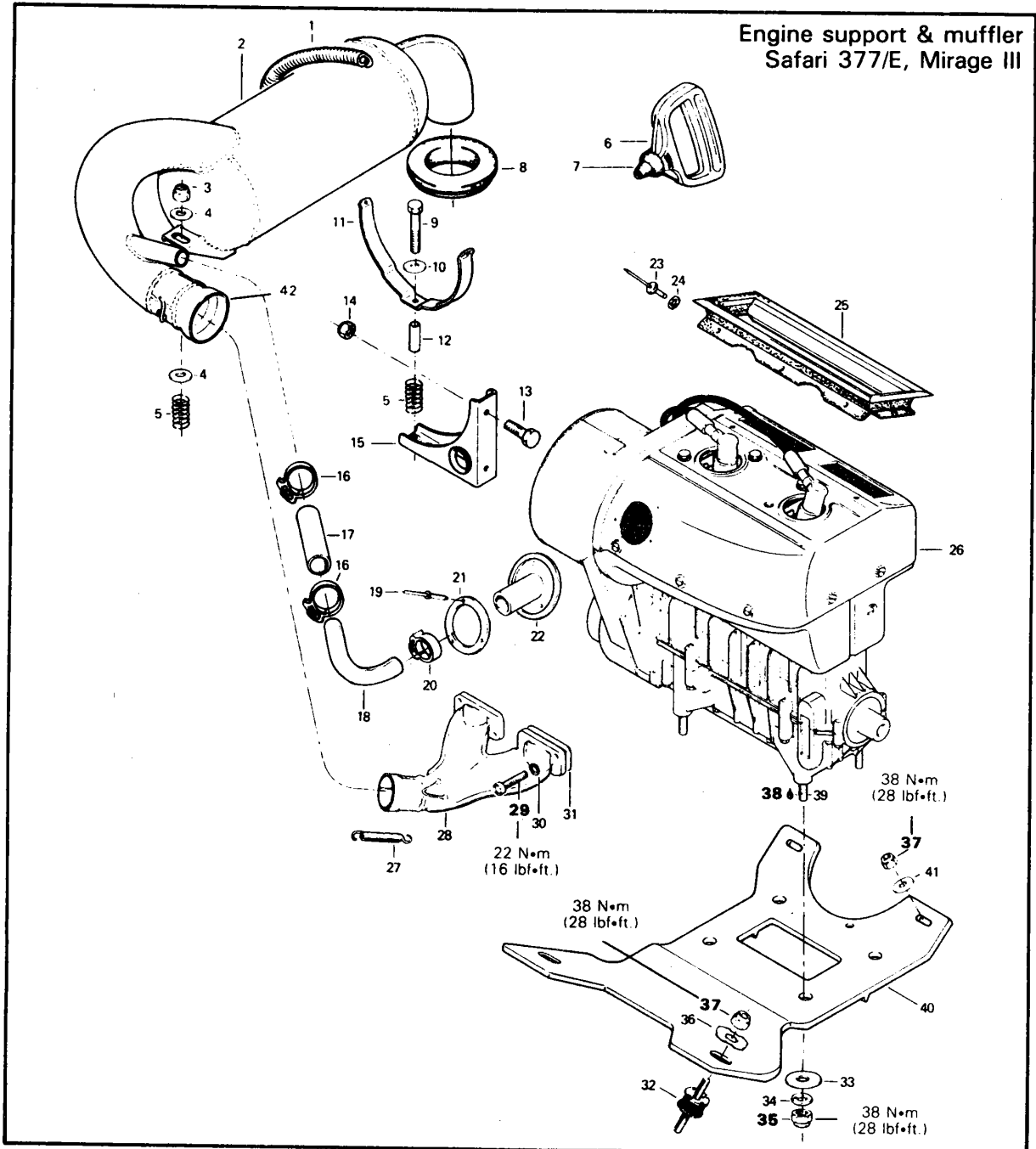


A001002009



377 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION



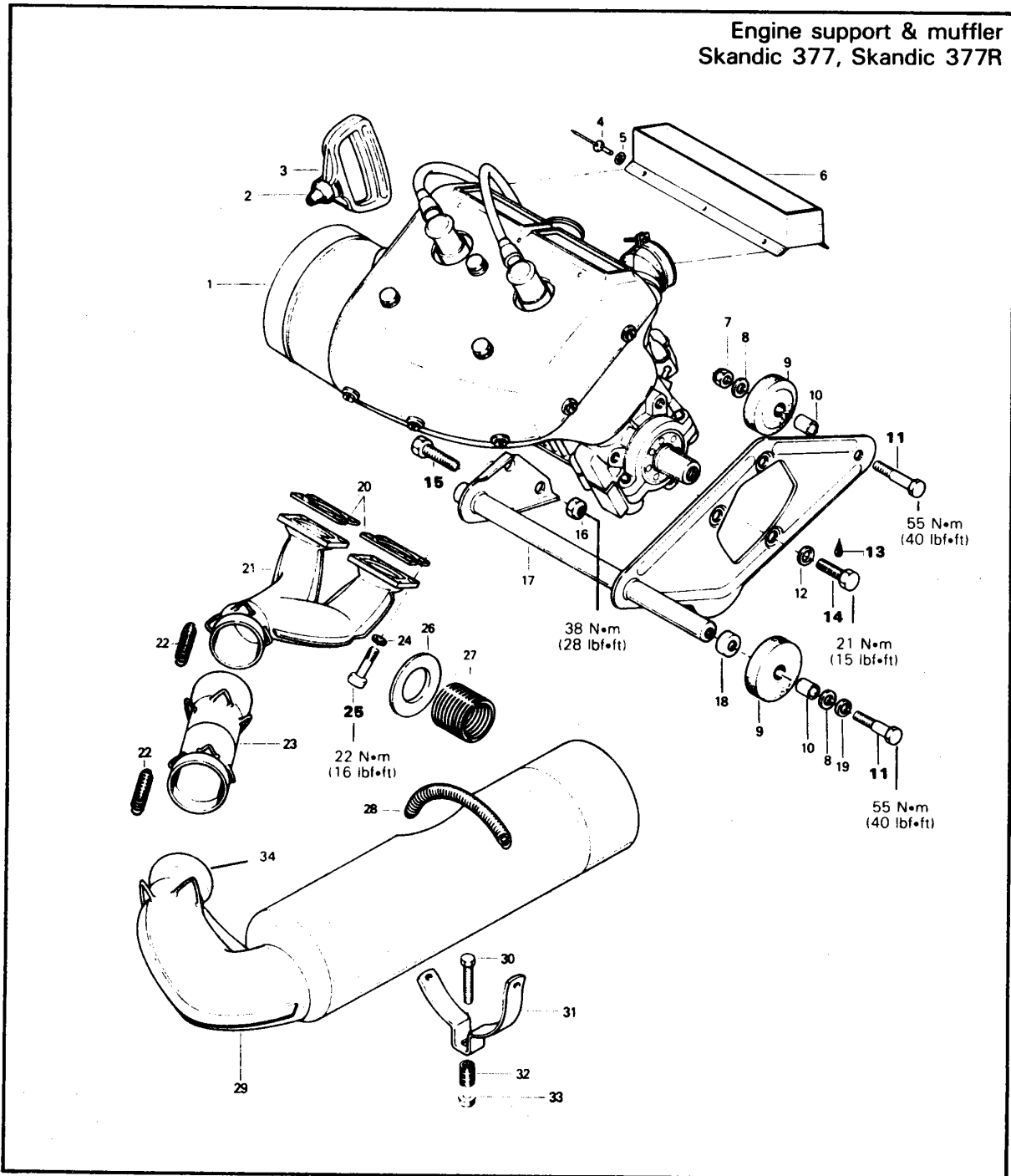
Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

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

ENGINE REMOVAL & INSTALLATION

Engine support & muffler
Skandic 377, Skandic 377R



Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

1. Engine Rotax 377
2. Rubber buffer
3. Starter grip
4. Rivet (6)
5. Washer (6)
6. Air duct
7. Elastic stop nut 10 mm
8. Washer 10.5 mm (3)
9. Rubber mount (3)
10. Bushing (3)
11. Cap screw M10 x 45 (3)
12. Lock washer 10 mm (3)
13. Loctite 242
14. Cap screw M10 x 25 (3)
15. Cap screw M10 x 35 (2)
16. Elastic stop nut 10 mm (2)
17. Engine bracket

18. Cup (2)
 19. Lock washer 10 mm (2)
 20. Gasket (4)
 21. Exhaust manifold
 22. Spring (6)
 23. Connector
 24. Lock washer 8 mm (4)
 25. Allen screw M8 x 30 (4)
 26. Exhaust washer
 27. Spring
 28. Spring (2)
 29. Muffler
 30. Cap screw M6 x 40
 31. Muffler support
 32. Spring
 33. Elastic stop nut 6 mm
 34. Female ball joint
-

REMOVAL FROM VEHICLE

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

Safari 377/E & Mirage III

- 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 battery cable.

- Wiring harness
- Engine stud nuts (under engine support)

Skandic 377 & Skandic 377R

- Pulley guard, drive belt, drive pulley
- Exhaust manifold
- Clamp between carburetor and intake manifold
- Pulsation line
- Rewind starter cable
- Wiring harness
- Hood retaining cable
- Engine support bolts

ENGINE SUPPORT & MUFFLER ASSEMBLY

Safari 377/E & Mirage III

29,35,37,38, 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).

Skandic 377 & Skandic 377R

11,13,14,15,25, Engine support bolts, Loctite, engine to engine support bolts & exhaust manifold bolts

Apply Loctite 242 on the engine to engine support screw then torque to 21 N•m (15 lbf•in).

Torque the engine to engine support, bolts and nuts to 38 N•m (28 lbf•ft).

Torque the engine support bolts to 55 N•m (40 lbf•ft).

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

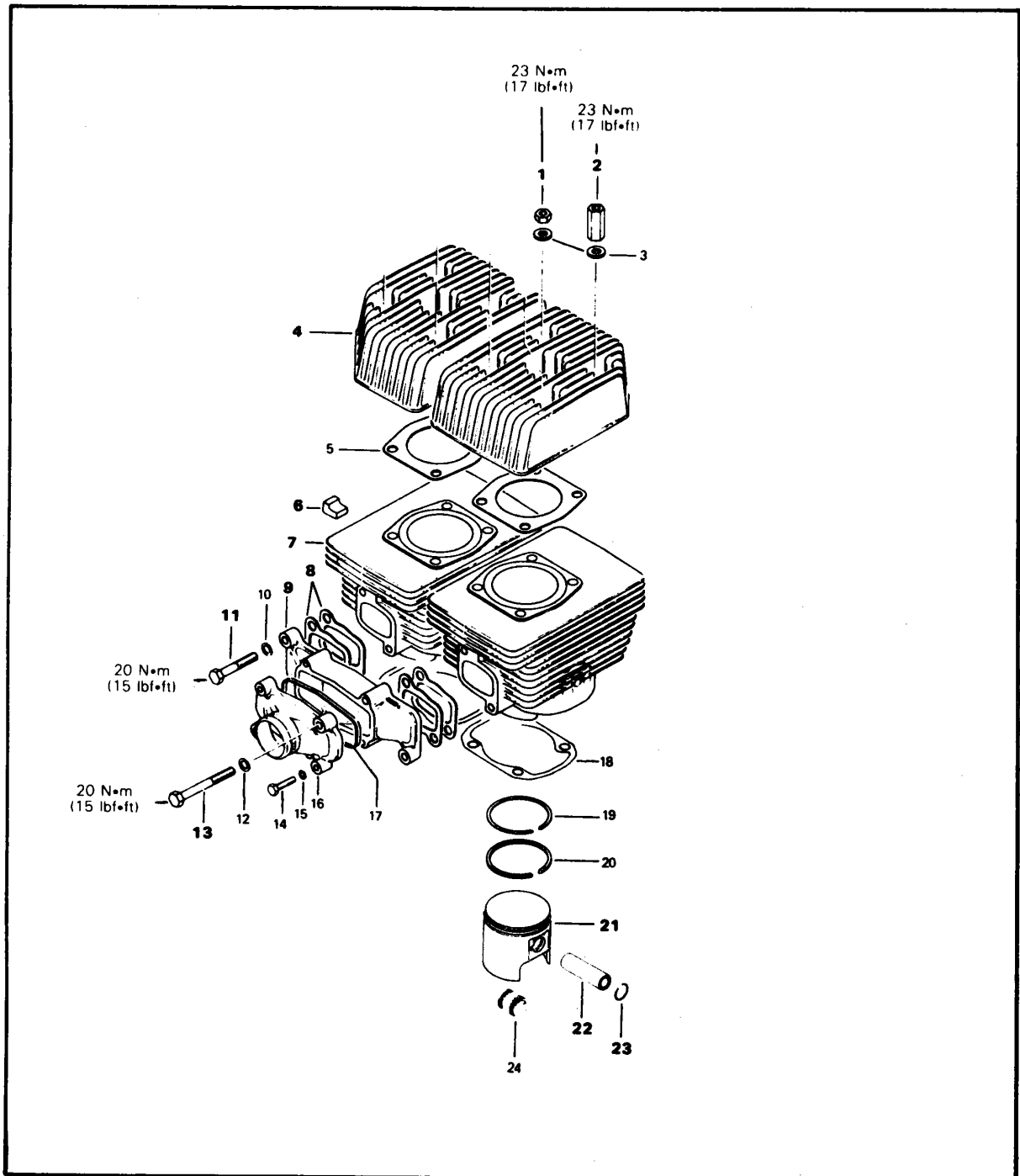
INSTALLATION ON VEHICLE

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.

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

TOP END



Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

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


13. Hex. screw M8 x 74 (2)
14. Hex. 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. Gudgeon pin (2)
23. Circlip (4)
24. Needle cage (2)

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 and 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, gudgeon 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.


Drive the gudgeon pin out of piston using a suitable drive punch and hammer.

 **CAUTION:** When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

INSPECTION

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

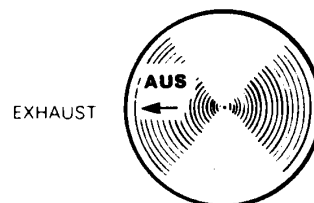
MEASUREMENTS	TOLERANCES		WEAR LIMIT D'USURE
	FITTING NEW PARTS (MIN.)	(MAX.)	
Cylinder taper	N A.	N A.	.08 mm (.0031")
Cylinder out of round	N A.	N A.	.05 mm (.0020")
Cylinder/piston clearance	.08 mm (.0031")	.10 mm (.0039")	.20 mm (.0079")
Ring/Piston groove clearance	.04 mm (.0016")	.11 mm (.0043")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

 **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

21,23, Pistons & circlips

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.



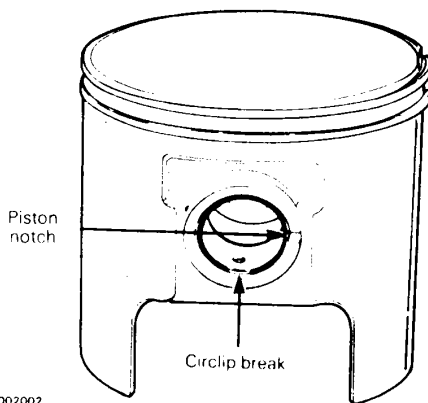
A001002001

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

Remove any burrs on piston caused through circlip installation using very fine emery cloth.



A001002002

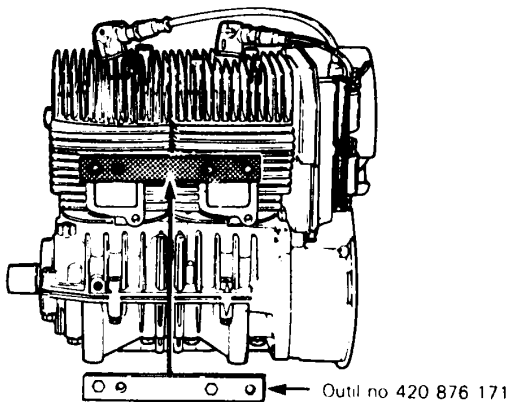
CAUTION: Circlips must not move freely in the groove after installation. If so, replace them.

7, Cylinder

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

4,7, Cylinder heads & cylinders

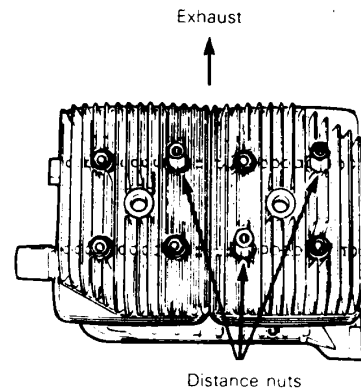
At cylinder and/or cylinder head installation, use (P/N 420 876 171) aligning tool to secure sealing of intake manifold and exhaust (see Tools section), before tightening cylinder head nuts.



A009002001

1,2, Nuts & distance nuts

Position nuts and distance nuts as illustrated.

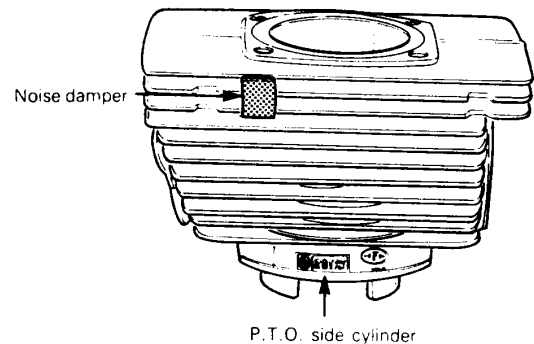


A009002002

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

6, Dampers

Position noise damper as per following illustration.



A009002003

Install armature plate, fan housing and then air deflector.

8, gasket

Install a gasket on each side of the air deflector.

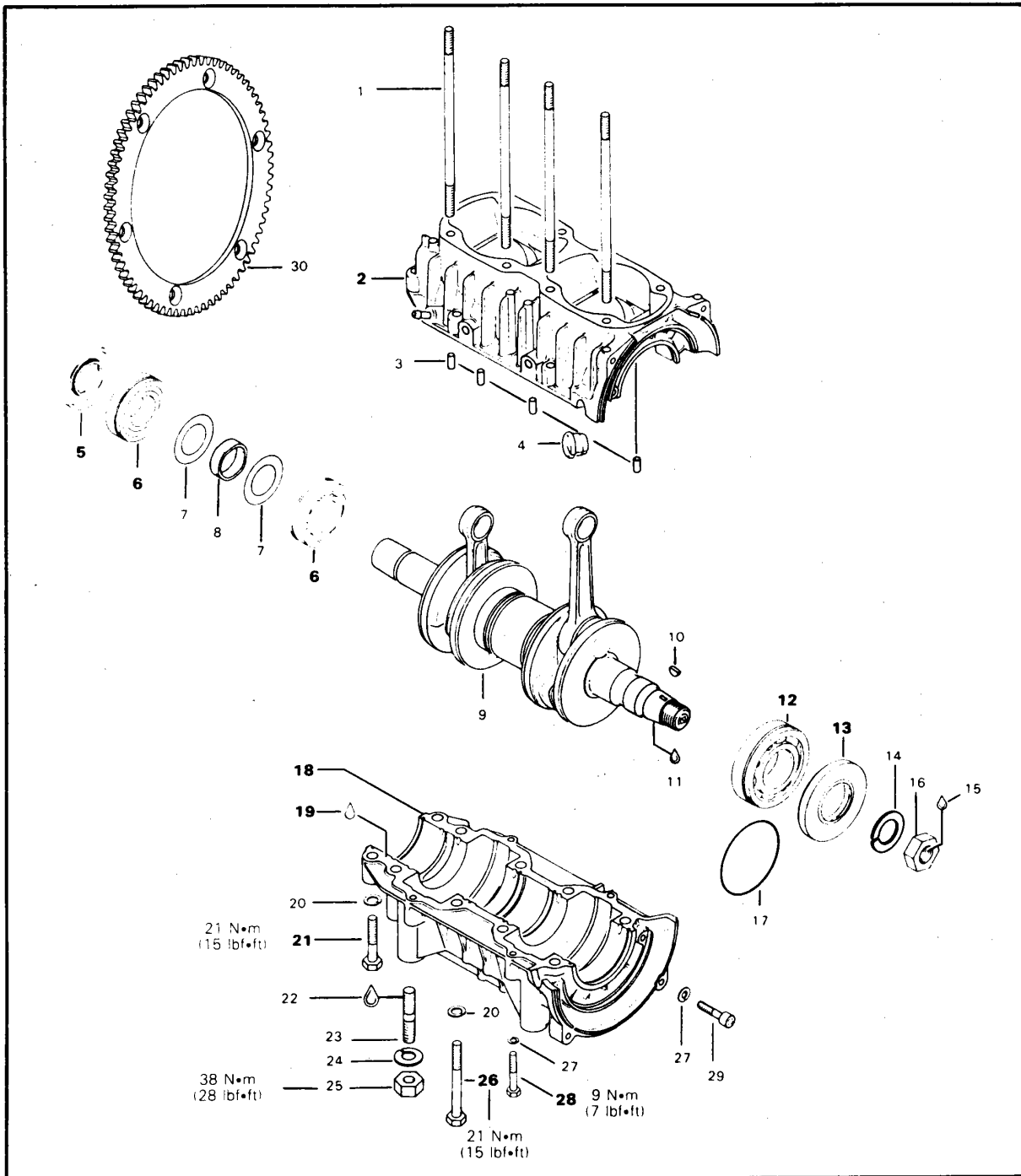
9,11,13, Intake manifold & screws

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 P.T.O. 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. Hex. Nut 22 x 1,5
17. O-ring
18. Lower crankcase
19. Loctite 515
20. Lock washer 8 mm (10)
21. Hex. screw M8 x 45 (2)
22. Loctite 242
23. Stud M10 x 25 (4)
24. Lock washer 10 mm (4)
25. Hex. nut M10 (4)
26. Hex. screw M8 x 70 (8)
27. Lock washer 6 mm (8)
28. Hex. screw M6 x 40 (4)
29. Allen screw M6 x 30 (4)
30. Ring gear

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 tripper.

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

DISASSEMBLY

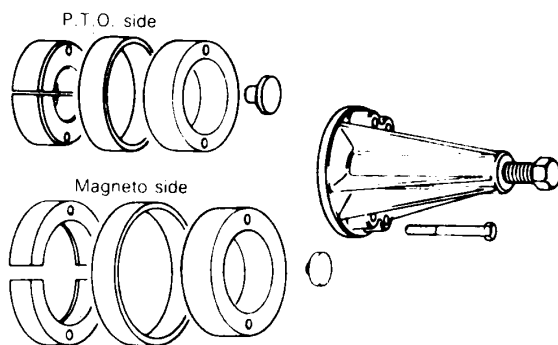
General

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

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

6,12, P.T.O. side bearing & mag. side bearing

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



A000002017

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.	.08 mm (.0031")
Connecting rod big end axial play	20 mm (.0079")	53 mm (.0208")	1.0 mm (.0394")

NOTE: For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

6,12, P.T.O. side bearing & mag. side bearing

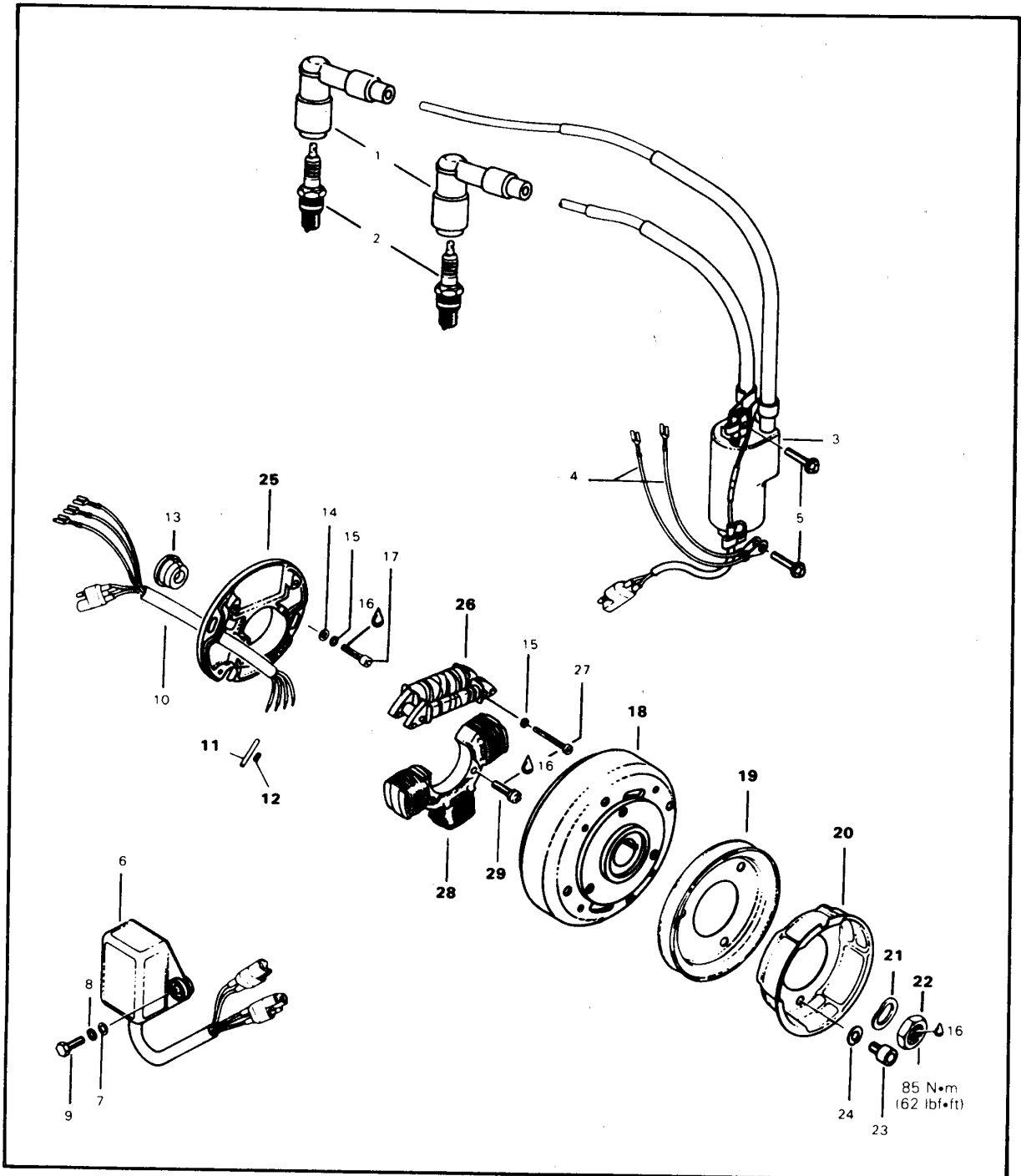
Prior to installation, place bearings into an oil container heated to 100° C (210° F).

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. This radius maintains the gap needed for bearing lubrication.

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. Tapite screw M6 x 25 (2)
6. Amplifier box
7. Washer 6,4 mm (2)
8. Lock washer 6 mm (2)
9. Hex. screw M6 x 20 (2)
10. Wire ass'y
11. Protection hose (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. Hex. nut 22 x 1,5
23. Screw M8 x 12 (3)
24. Lock washer 8 mm (3)
25. Armature plate
26. Coil kit, primary
27. Combined screw M5 x 35 (2)
28. Lighting coil
29. Phillips screw M6 x 25 (2)

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 (safari)
- rewind starter
- starting and V-belt pulleys

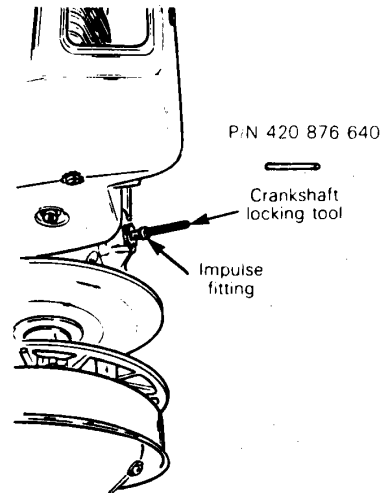
○ **NOTE:** Before disassembling magneto plate, indexing marks should be located to facilitate reassembly.

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (P/N 420 876 640) 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.



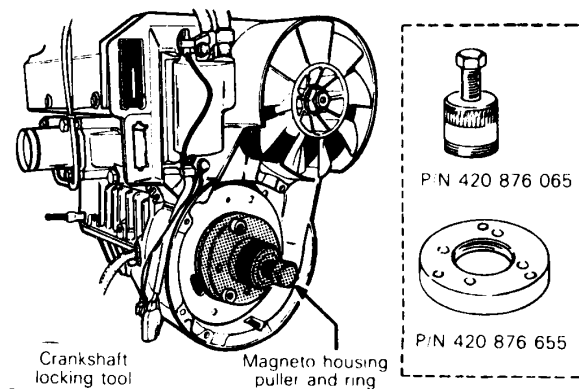
A009002006

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

18, Magneto flywheel

To remove magneto housing (flywheel):

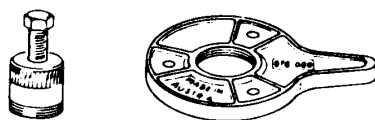
- lock crankshaft with crankshaft locking tool (service tool) and adjust magneto housing puller and puller ring (service tool) as illustrated.



A009002007

- 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 can be used without crankshaft locking tool.



P/N 420 876 065

P/N 420 876 080

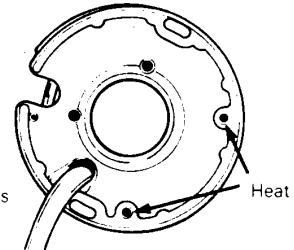
A009002083

REPAIR

26, Generating coil

To replace generating coil:

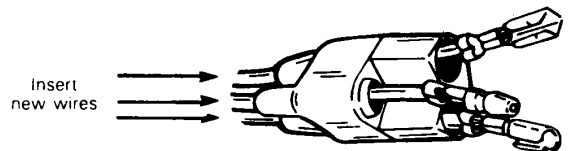
- Heat the armature plate to 93° C (200° F) around the screw holes to break the Loctite bond.



A001002003

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.



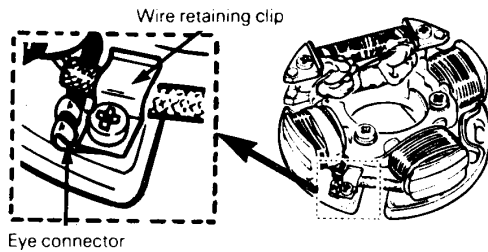
A001002004

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

▼ **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 oil wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.



A001002005

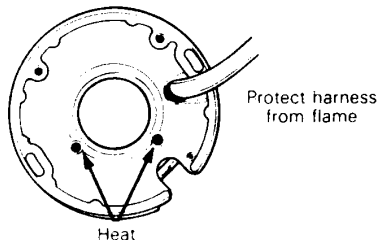
- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

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

11,12,28,29, Protector tubes, splice connectors, lighting coil & screws

To replace lighting coil:

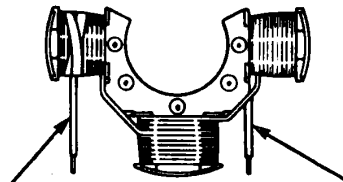
- Heat the armature plate to 93° C (200° F) around the screw holes to break the Loctite bond.



A001002003

▼ **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.



Black protector with yellow/black wire of harness

White protector with yellow wire of harness

A001002006

- Position protector tubes over connections.
- Prior to assembly, apply Loctite 242 (blue, medium strength) on the lighting coil screws.
- Fasten retaining clip onto protector tubes.

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

ASSEMBLY

18,21,22,25, Armature plate, magneto flywheel, lock washer & 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 lockwasher 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 grease to prevent corrosion or moisture penetration.

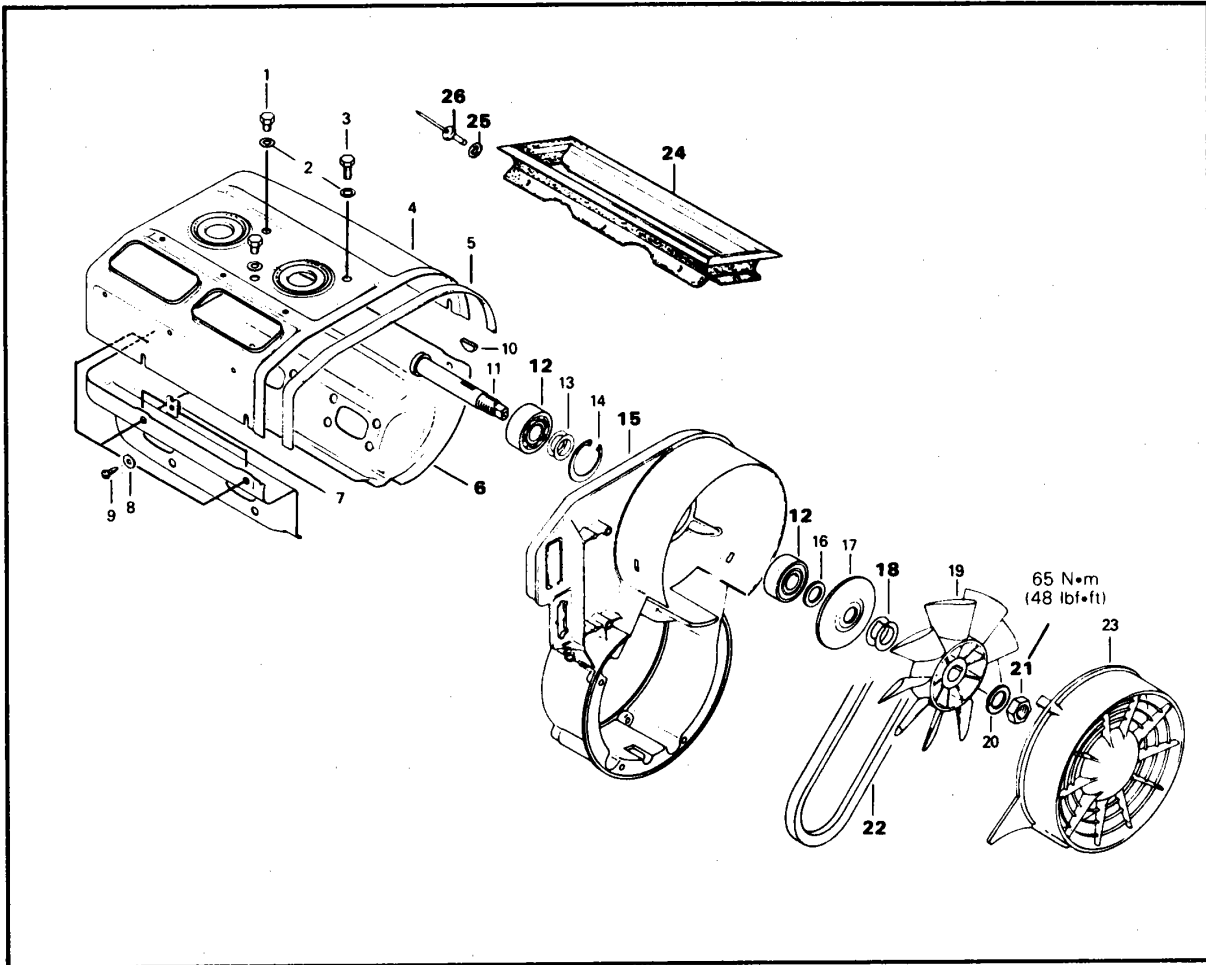
▼ **CAUTION:** Do not use silicone "sealant", this product will corrode contacts.

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

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

COOLING SYSTEM



1. Hex. screw M8 × 9 (2)
2. Lock washer 8 mm (3)
3. Hex. screw M8 × 16
4. Cylinder head cowl
5. Sealing strip
6. Cylinder cowl
7. Spring nut 4,8 (6)
8. Washer (6)
9. Screw 8 × 16 (6)
10. Woodruff key 3 × 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. Hex. nut M16 × 1,5
22. V-belt
23. Fan cover
24. Air duct
25. Washer
26. Rivet (closed end)

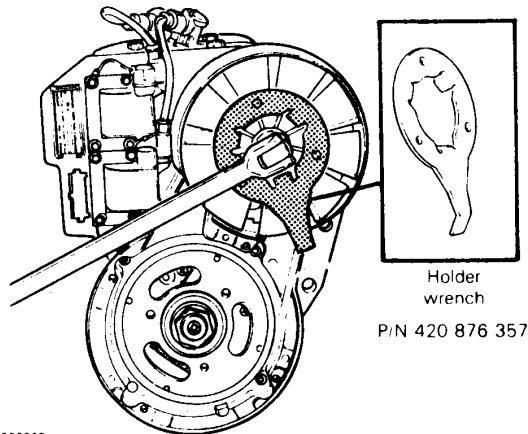
CLEANING

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

DISASSEMBLY & ASSEMBLY

21, Fan nut

To remove or install fan pulley retaining nut, lock fan pulley with special holder wrench P/N 420 876 357. At assembly, torque nut to 65 N•m (48 lbf•ft).



A009002008

18,22, Shims & V-belt

Fan belt deflection must be 9.5 mm (3/8") when applying a force of 50 N (11 lbf). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lock washer.

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 magne-to.

6, Cylinder cowl

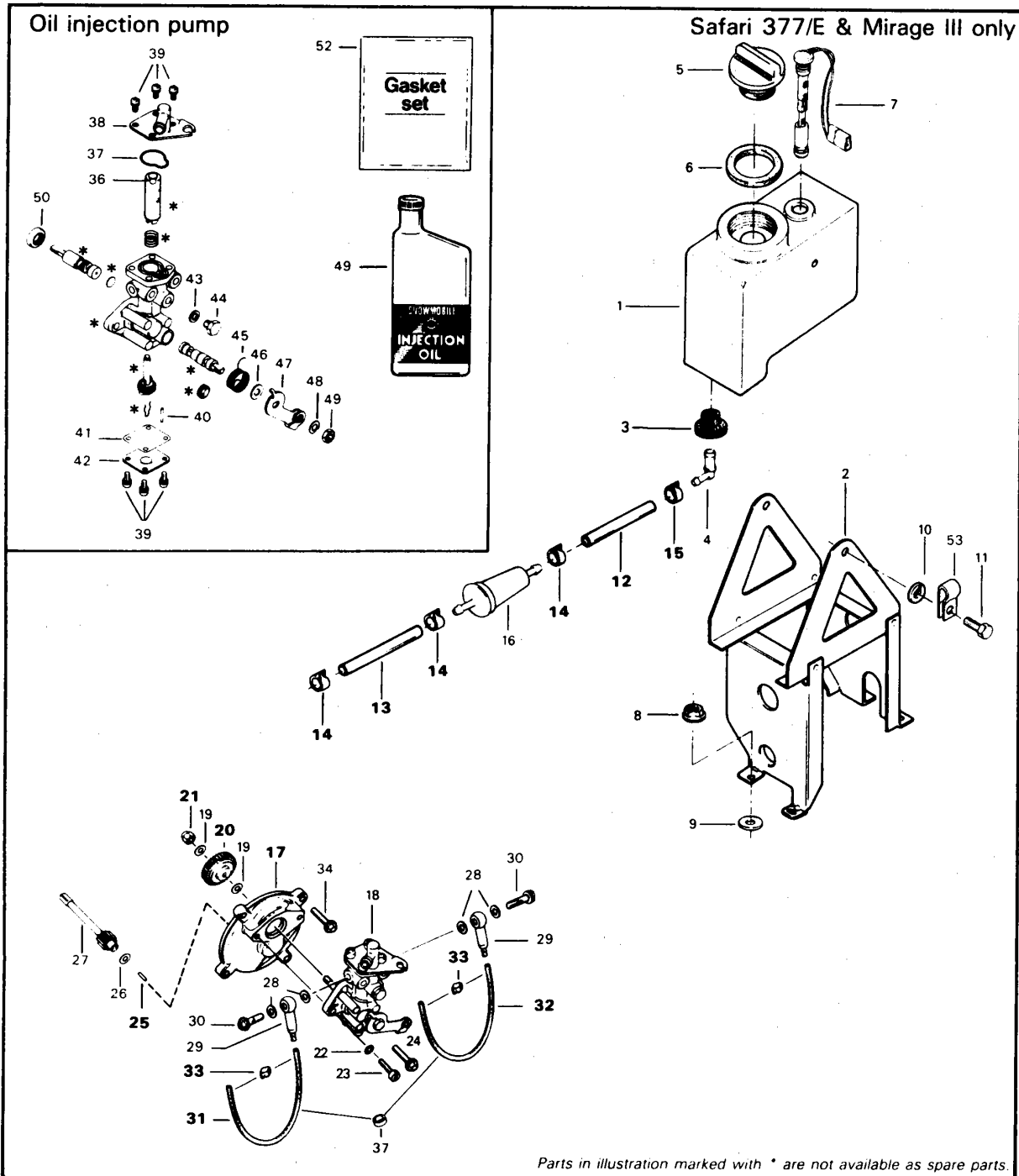
A gasket must be placed on both sides (inner and outer) of intake and exhaust holes on cylinder cowl.

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

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE


Sub-section 03 (377 ENGINE TYPE)

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Injection oil tank 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 6 mm 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 | <ol style="list-style-type: none"> 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. Hex. screw M6 x 7 45. Spring 46. Washer 47. Lever 48. Lock washer 6 mm 49. Nut 6 mm 50. Seal 51. Gasket set 52. Injection oil 53. Clip |
|--|---|

CLEANING

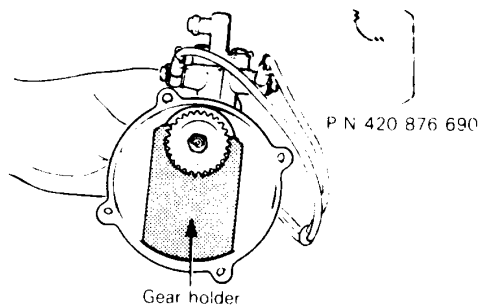
Clean all metal components in a non-ferrous metal cleaner.

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 no 420 876 690 tool.



A003002009

ASSEMBLY

20, Oil pump gear

At gear assembly, apply a light coat of grease 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 clips & clamps

Always check for spring clips and clamps tightness.

12,13,31,32, Oil lines

 **CAUTION:** On electric start models, it is recommended to install black rubber oil lines (P/N 414 2867 00) that will not be altered by battery fumes.

Section 02 ENGINE

Sub-section 03 (377 ENGINE TYPE)

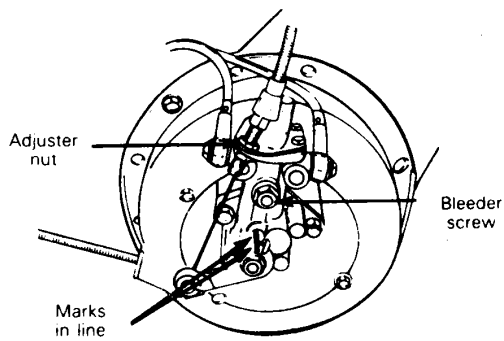
ADJUSTMENT

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.



A001002008

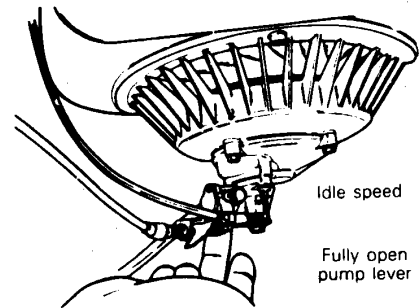
To bleed oil lines:

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.

(TYPICAL)

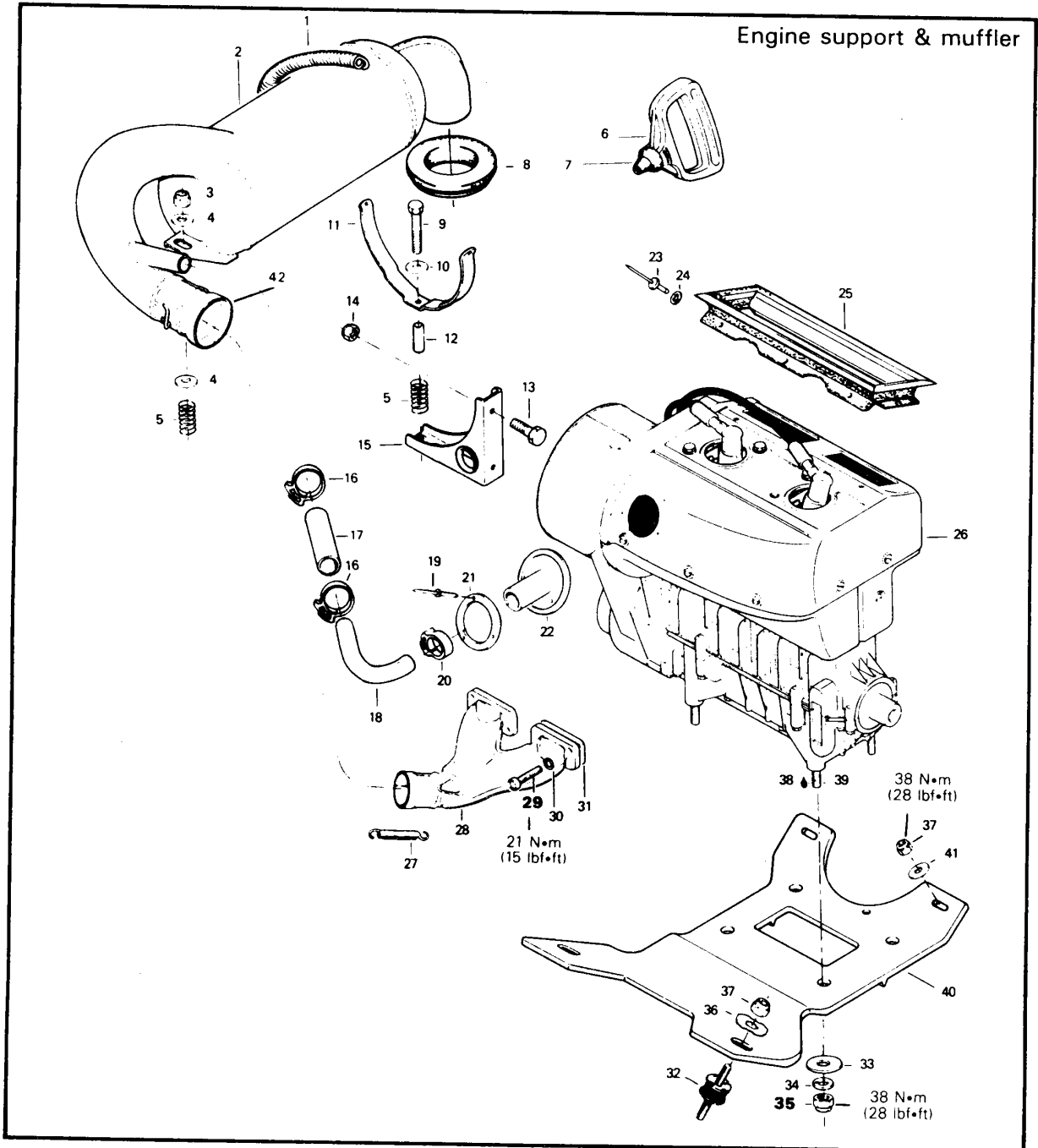


A001002009

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

447 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION



Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

1. Spring
2. Muffler
3. Elastic stop nut M8
4. Washer 8.4 mm (2)
5. Spring (2)
6. Starter grip
7. Rubber buffer
8. Exhaust washer
9. Cap screw M6 x 20
10. Washer 6 mm
11. Muffler attachment
12. Bushing
13. Cap screw M6 x 16 (2)
14. Elastic stop nut (2)
15. Muffler support
16. Plastic clamp (2)
17. Hose
18. Elbow
19. Rivet (3)
20. Plastic clamp
21. Connector ring

22. Connector
23. Rivet (6)
24. Washer (6)
25. Air duct
26. Motor ass'y
27. Spring (2)
28. Exhaust manifold
29. Allen screw M8 x 30 (4)
30. Lock washer 8 mm (4)
31. Gasket (4)
32. Rubber mount (4)
33. Washer 10.5 mm (4)
34. Lock washer 10 mm (4)
35. Hexagonal nut 10 mm (4)
36. Internal tooth cup washer (2)
37. Elastic stop nut M10 (4)
38. Loctite 242
39. Stud M10 x 25 (4)
40. Engine support
41. Washer (2)
42. Female ball joint

REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine out of vehicle.

- Pulley guard, drive belt, drive pulley.
- Exhaust manifold.
- Elbow tube on cylinder head cowl.
- Clamp between carburetor and intake manifold.
- Oil injection pump cable.
- Oil lines.
- Pulsation line.
- Hood retaining cable.
- Rewind starter cable.
- Wiring harness.
- Engine support nuts under engine support.

29,35, Engine support nuts & manifold bolts

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

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

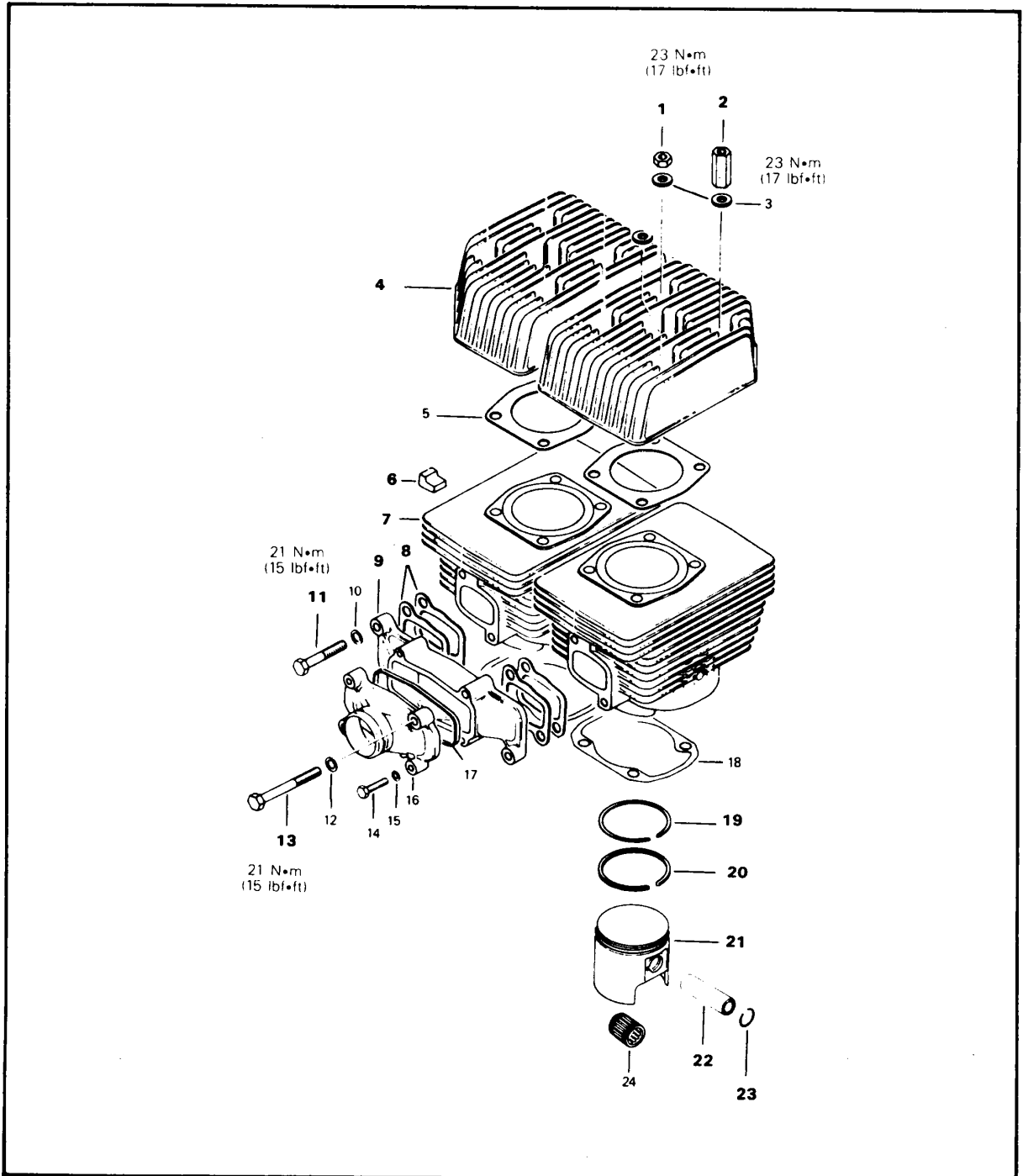
INSTALLATION ON VEHICLE

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 maximum throttle slide opening.
- Check pulley alignment and drive belt tension.

Section 02 ENGINE
Sub-section 04 (447 ENGINE TYPE)

TOP END



Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

1. Hexagonal nut M8 (5)
2. Distance nut M8 x 27.5 (3)
3. Cone sleeve (8)
4. Cylinder head (2)
5. Gasket, cylinder head (2)
6. Support damper (1)
7. Cylinder with sleeve (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
17. Rubber ring
18. Gasket, cylinder flange (2)
19. Semi-trapez ring (2)
20. Rectangular ring (2)
21. Piston (2)
22. Gudgeon pin (2)
23. Circlip (4)
24. Needle cage (2)

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, circlip & gudgeon pin

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.


Drive the gudgeon pin out of piston using a suitable drive punch and hammer.

 **CAUTION:** When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

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.	.08 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0020")
Cylinder/piston clearance	.08 mm (.0031")	.10 mm (.0039")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.0016")	.11 mm (.0043")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

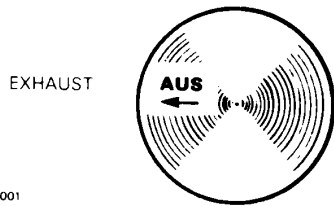
 **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

Section 02 ENGINE
Sub-section 04 (447 ENGINE TYPE)

ASSEMBLY

21,23, Pistons & circlips

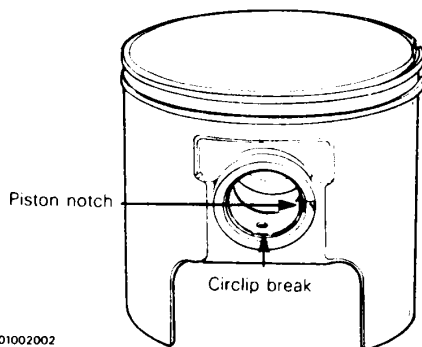
At assembly, place the piston over the connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.



A001002001

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

Remove any burrs on piston caused through circlip installation with very fine emery cloth.



A001002002

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

19,20, Semi-trapez & rectangular rings

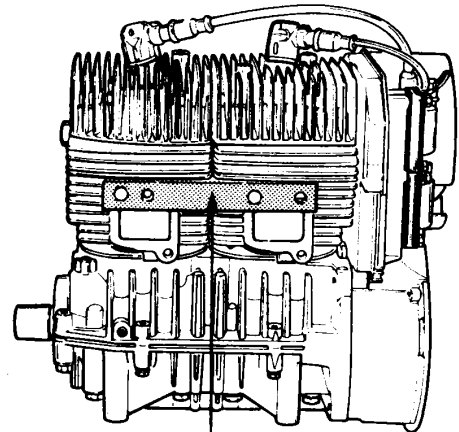
Check piston rings position.

7, Cylinder

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

4,7, Cylinder head & cylinder

At cylinder and/or cylinder head installation, use P/N 420 876 171 aligning tool to secure sealing of intake manifold and exhaust (See Tools section), before tightening cylinder head nuts.

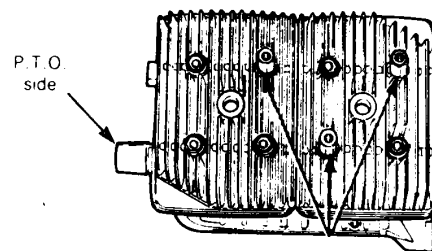


A009002010

← No. 420 876 171 tool

1,2, Nuts & distance nuts

Position nuts and distance nuts as illustrated.



A009002002

Distance nuts

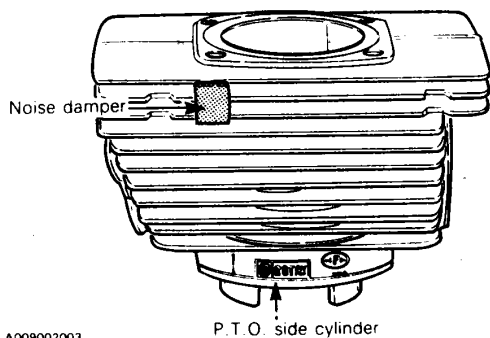
Cross torque cylinder head nuts to 23 N•m (17 lbf•ft), torque each cylinder head individually.

Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

6, Damper

Position noise damper as per following illustration.



Install armature plate, fan housing and then air deflector.

8, Gasket

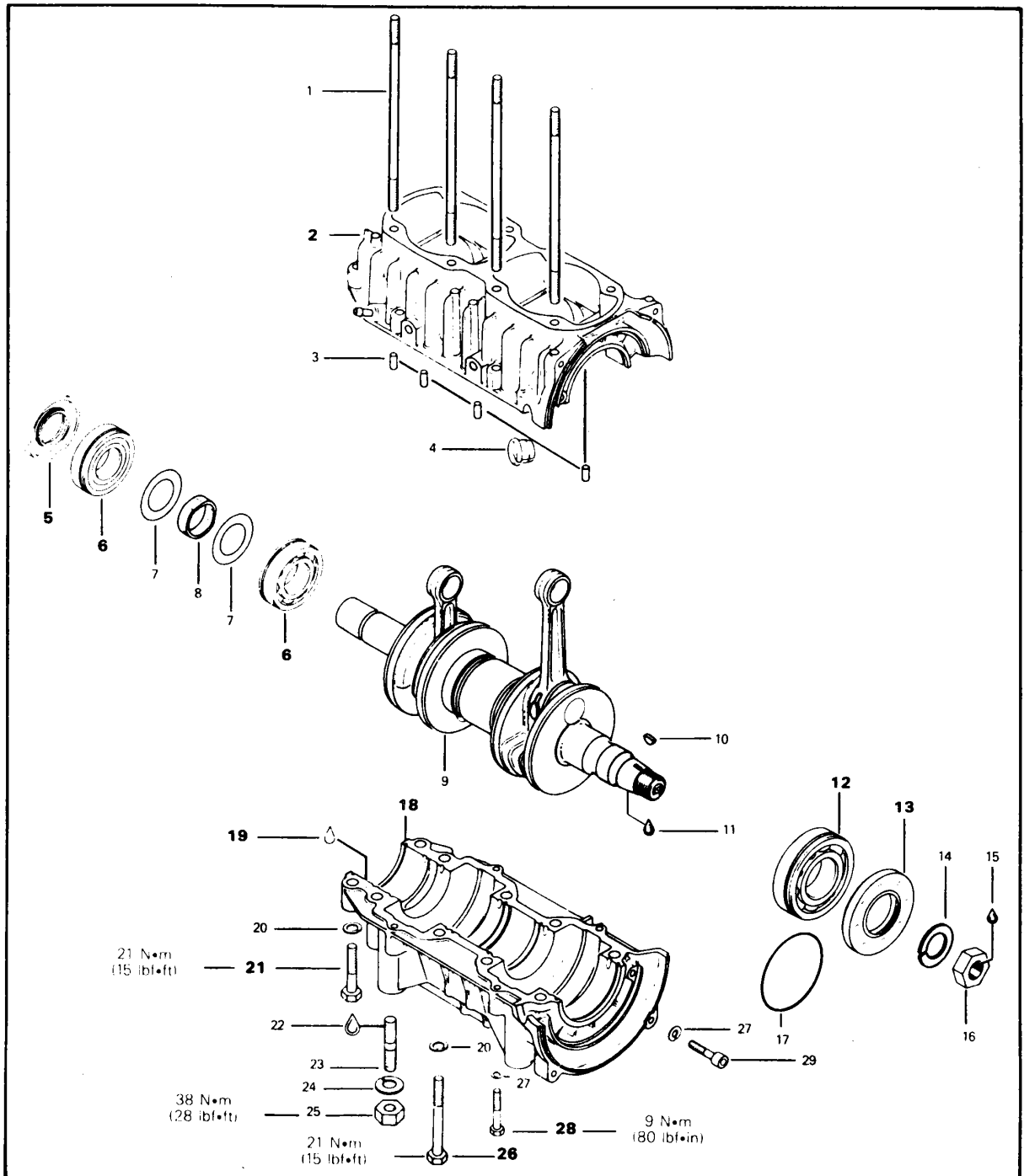
Install a gasket on each side of the air deflector.

9,11,13, Intake manifold, screws M8 x 40 & M8 x 74

Install intake manifold with identifications marks towards cylinder head and torque the four manifold screws to 21 N•m (15 lbf•ft).

Section 02 ENGINE
Sub-section 04 (447 ENGINE TYPE)

BOTTOM END



Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

1. Stud M8 x 173 (8)
2. Upper crankcase
3. Rubber plug (5)
4. Cable grommet
5. Oil seal P.T.O. 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. Hexagonal 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. Allen screw M6 x 30 (4)

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.

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

DISASSEMBLY

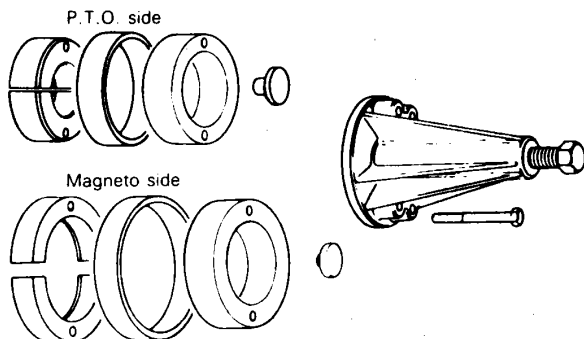
General

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

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

6,12, P.T.O. side bearing & mag side bearing

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



A000002017

02-04-8

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.	.08 mm (.0032")
Connecting rod big end axial play	.20 mm (.0079")	.53 mm (.0208")	1.0 mm (.0394")

NOTE: For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

6,12, Bearing P.T.O. side & bearing magneto side

Prior to installation, place bearings into an oil container and heat the oil to 100°C (210°F).

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

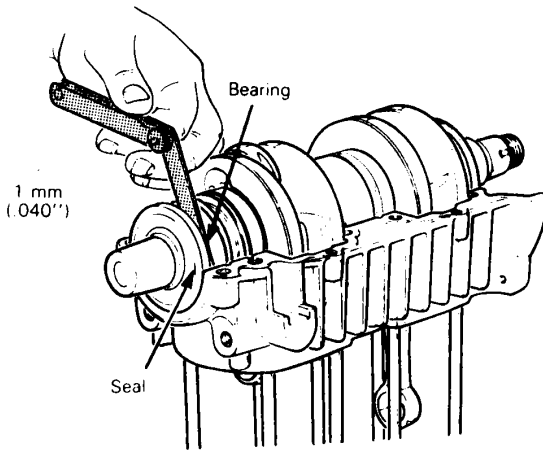
Bearings are pressed on crankshaft until they rest against radius. This radius maintains the gap needed for bearing lubrication.

Section 02 ENGINE
Sub-section 04 (447 ENGINE TYPE)

5,13, Oil seal P.T.O. side & oil seal magneto side

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

For bearings lubrication purpose, a gap of 1.0 mm (.040") 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.



A009002004

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

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

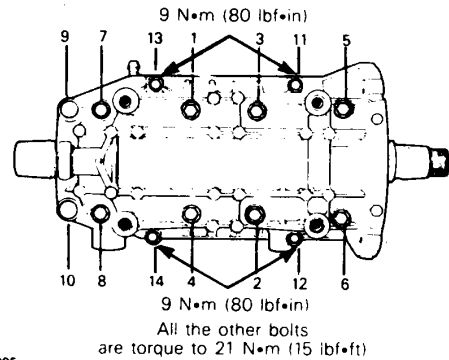
Prior to joining of crankcase halves, spray some new injection oil on all the moving parts of the crankshaft.

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 nuts (or bolts) by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Torque bolts to proper torque following illustrated sequence.

Follow sequence shown.



A009002005

21,26, Screw M8 x 45 & M8 x 70

The bigger screws have to be torque to 21 N•m (15 lbf•ft).

28, Screw M6 x 40

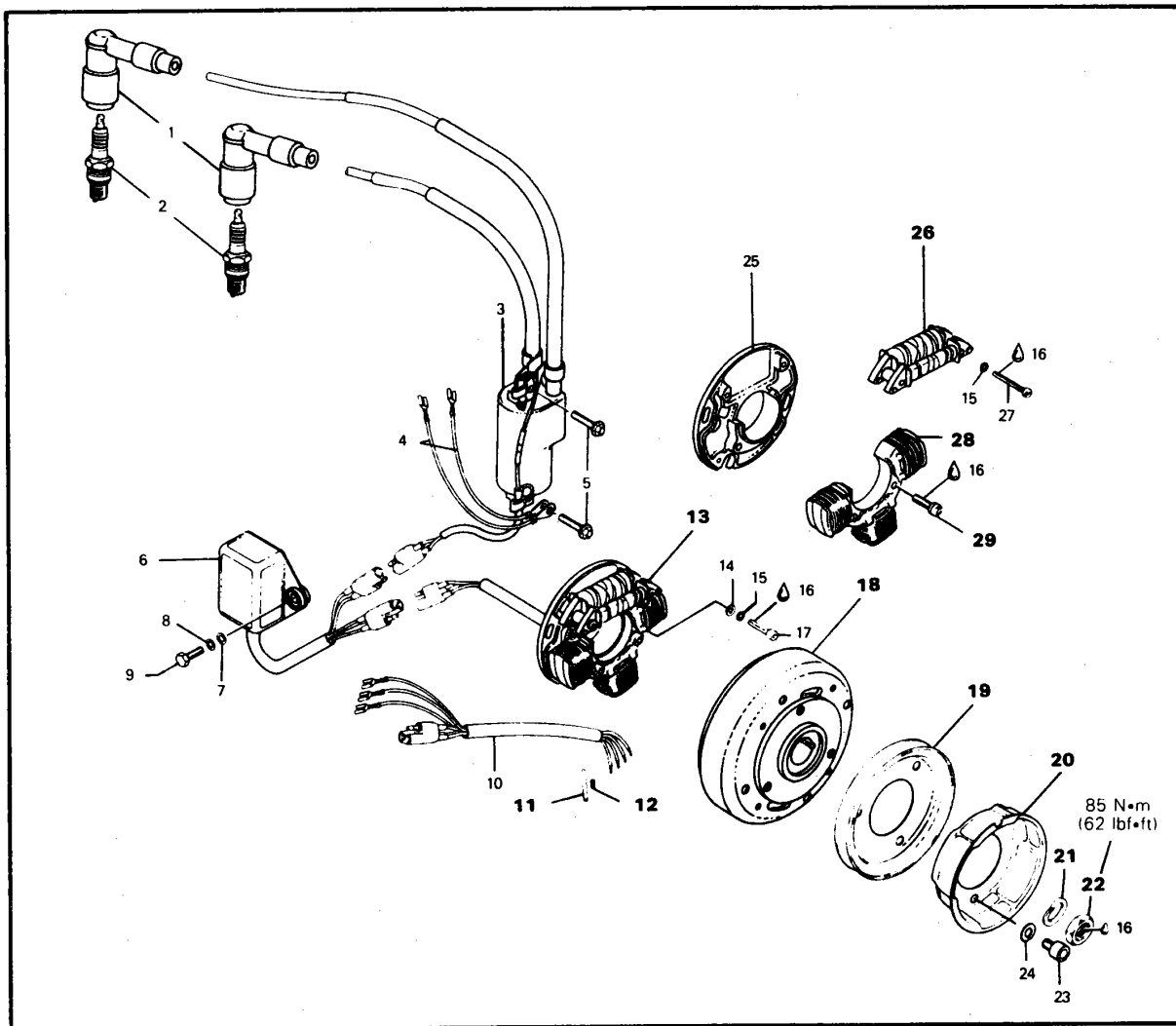
The smaller screws have to be torque to 9 N•m (80 lbf•in).

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

Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

MAGNETO



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 hose (6)
12. Splice connector (6)
13. Armature plate ass'y
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. Coil kit, primary
27. Combined screw M5 x 35 (2)
28. Lighting coil
29. Phillips screw M6 x 25 (2)

Section 02 ENGINE
Sub-section 04 (447 ENGINE TYPE)

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 pulley

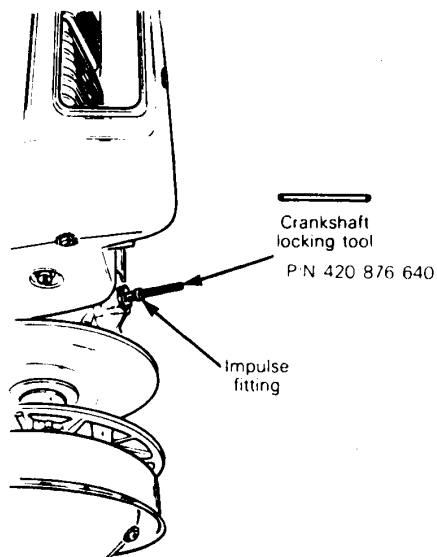
○ **NOTE:** Before disassembling magneto plate, indexing marks should be located to facilitate reassembly.

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (P/N 420 876 640) 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.

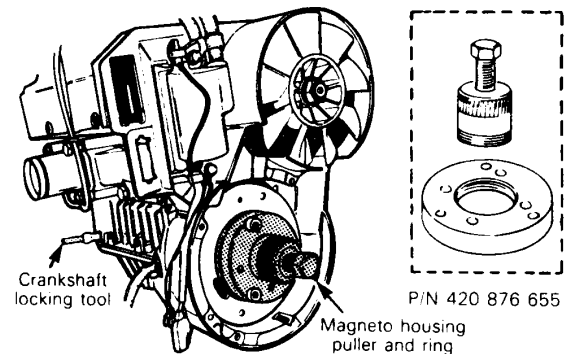


A009002011

18, Magneto flywheel

To remove magneto housing (flywheel):

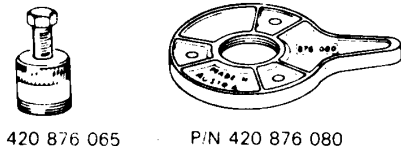
- lock crankshaft with crankshaft locking tool (service tool) and adjust magneto housing puller and puller ring (service tool) as illustrated.



A009002012

- 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 can be used without crankshaft locking tool.



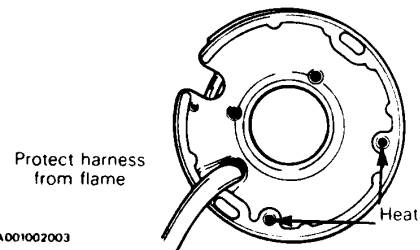
A009002083

REPAIR

26, Generating coil

To replace generating coil:

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



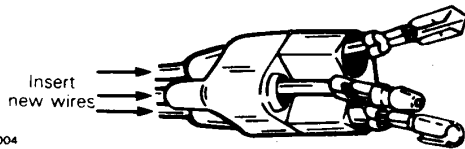
A001002003

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

Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

- 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.

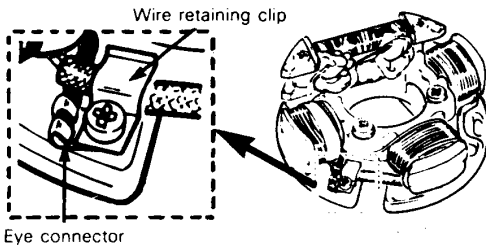


A001002004

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 and eye connector to the lead and fasten it under the wire retaining clip.



A001002005

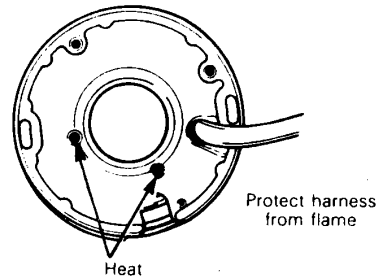
- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

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:

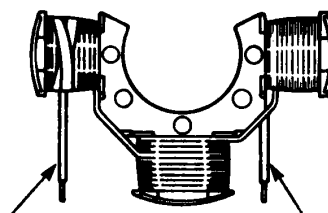
- Heat the armature plate around the screw holes to break the Loctite bond 93°C (200°F).



A001002003

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.



Black protector with yellow/black wire of harness

White protector with yellow wire of harness

A001002006

- Position protector tubes over connections.
- Prior to assembly, apply Loctite 242 (blue, medium strength) on the lighting coil screws.
- Fasten retaining clip onto protector tubes.

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

ASSEMBLY

13,18,21,22, Armature plate, magneto flywheel, lock washer & 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 to prevent corrosion or moisture penetration.

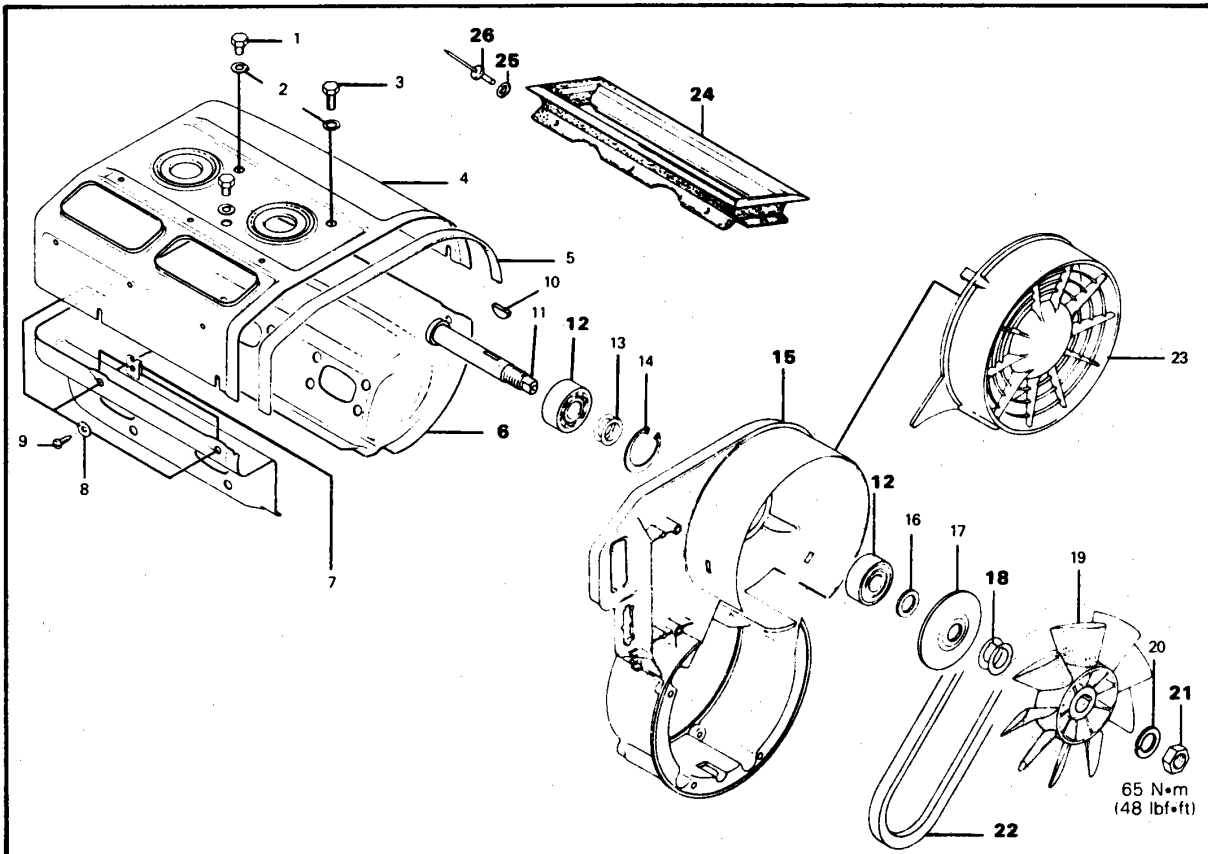
▼ **CAUTION:** Do not use silicone sealant, this product will corrode contacts.

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

Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

COOLING SYSTEM



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 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
22. V-belt
23. Fan cover
24. Air duct
25. Washer
26. Rivet (closed end)

Section 02 ENGINE
Sub-section 04 (447 ENGINE TYPE)

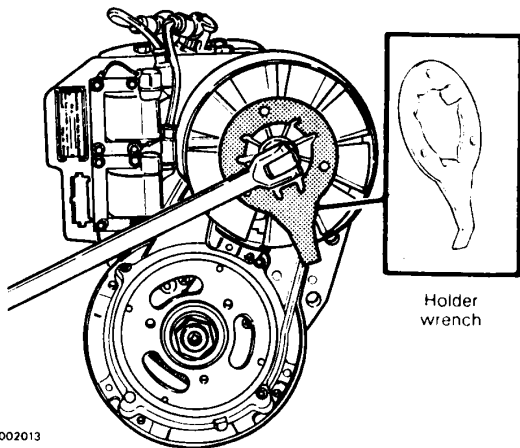
CLEANING

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

DISASSEMBLY AND ASSEMBLY

21, Fan nut

To remove or install fan pulley retaining nut, lock fan pulley with special holder wrench P/N 420 876 357. At assembly, torque nut to 65 N•m (48 lbf•ft).



A009002013

18,22, Shim & V-belt

Fan belt deflection must be 9.5 mm (3/8") when applying a force of 50 N (11 lbf). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lock washer.

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 magne-

6, Cylinder cowl

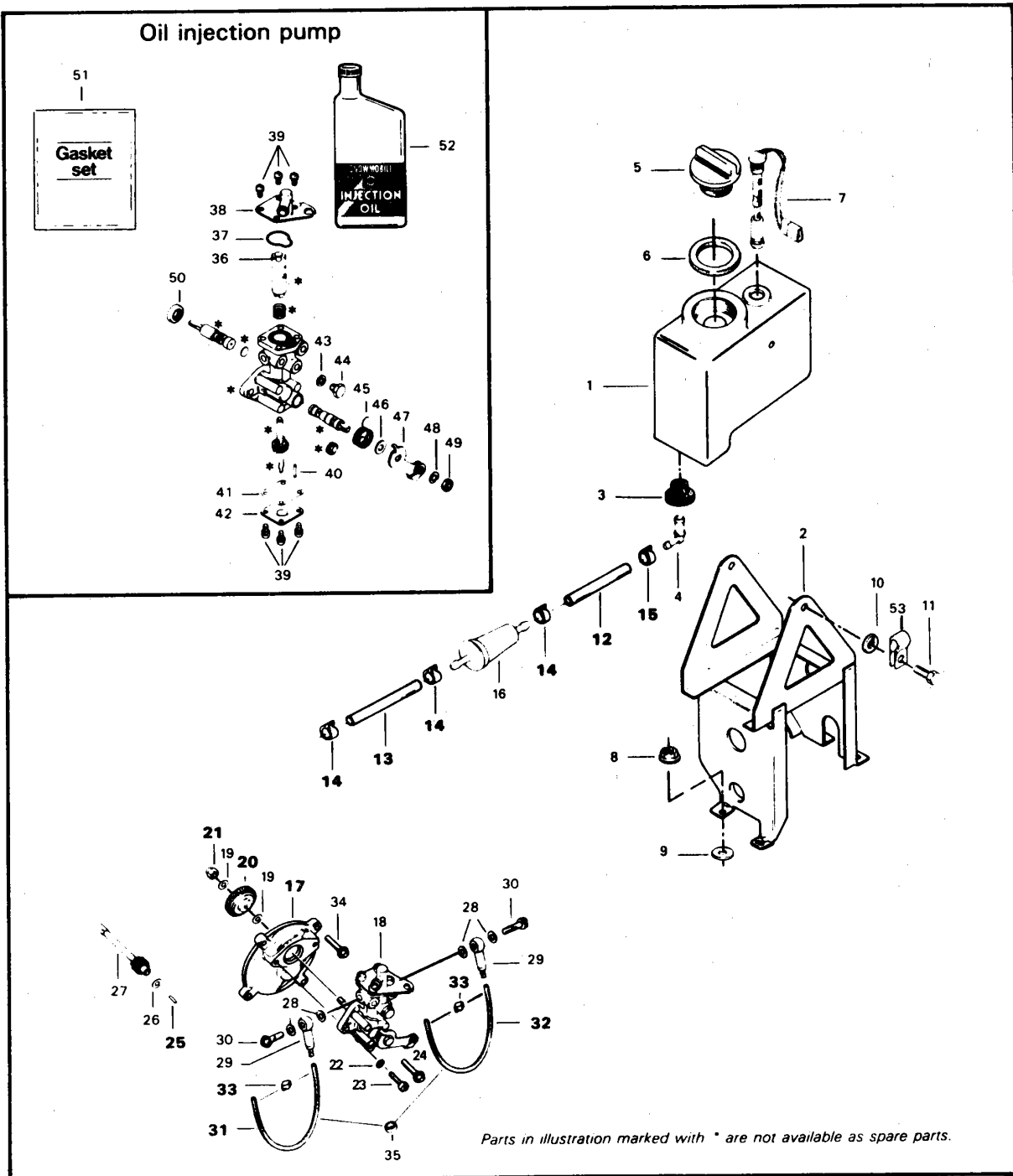
A gasket must be placed on both sides (inner and outer) of intake and exhaust holes or cylinder cowl.

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

Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE
Sub-section 04 (447 ENGINE TYPE)

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. Injection oil tank 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 12 (2) 12. Oil line (38 mm) 13. Oil line (102 mm) 14. Spring clip (3) 15. Spring clip 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 6 mm 22. Lock washer 5 mm (2) 23. Screw M5 x 16 (2) 24. Tapite screw M5 x 16 (2) 25. Needle roll 26. Washer 4.3 27. Gear 9 teeth | <ol style="list-style-type: none"> 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. Tapite 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 6 mm 50. Seal 51. Gasket set 52. Oil injection 53. Clip |
|---|---|

ASSEMBLY

20, Oil pump gear

At gear assembly, apply a light coat of grease on gear teeth.

25, Needle roll

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

14, 15, 33, Spring clip & clamp

Always check for spring clips and clamps tightness.

CLEANING

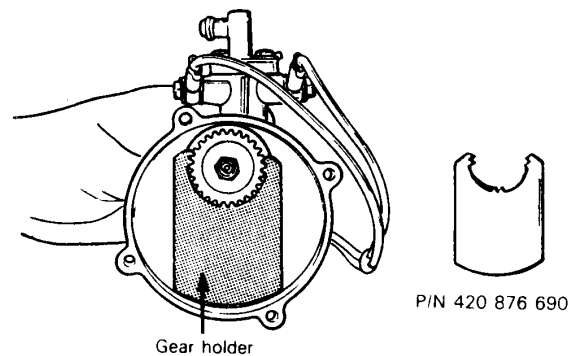
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

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

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

To remove retaining nut, extract the needle roll with pliers and lock gear in place using no 420 876 690 tool.



A003002014

Section 02 ENGINE

Sub-section 04 (447 ENGINE TYPE)

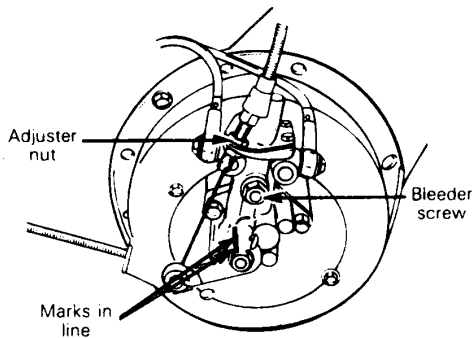
ADJUSTMENT

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.



A001002008

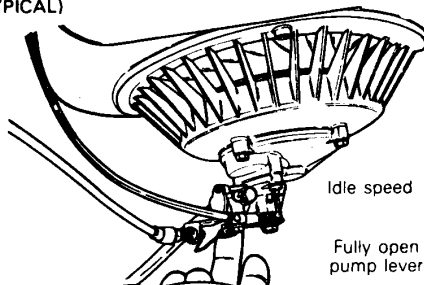
To bleed oil lines:

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.

(TYPICAL)

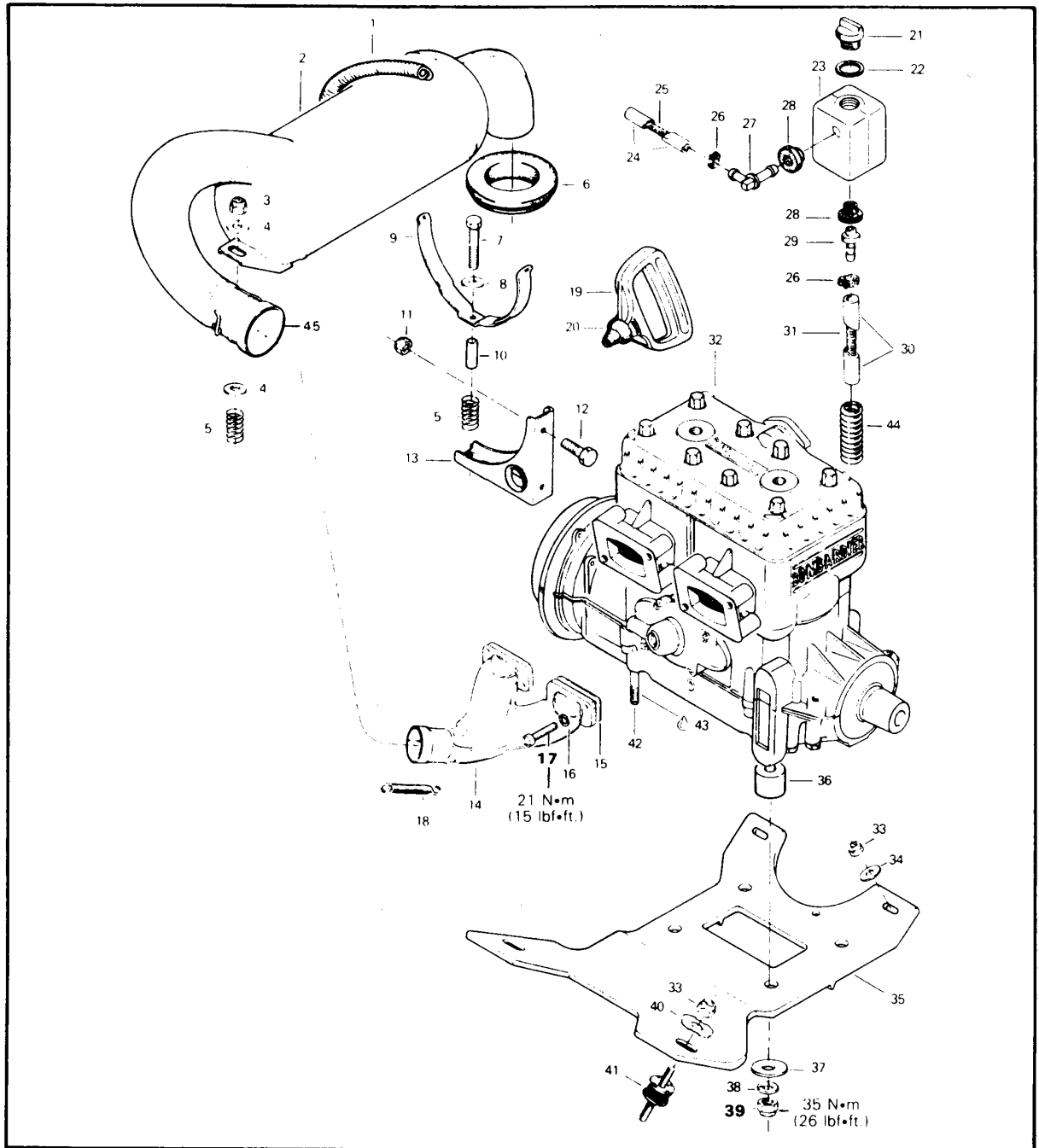


A001002009

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

462 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION



Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

- | | |
|-------------------------------|------------------------------------|
| 1. Muffler | 24. Oil line |
| 2. Spring | 25. Spring |
| 3. Elastic stop nut M8 | 26. Gear clamp (4) |
| 4. Washer 8,4 mm (2) | 27. Elbow male connector |
| 5. Spring (2) | 28. Grommet (2) |
| 6. Exhaust washer | 29. male connector |
| 7. Hex. screw M6 x 20 | 30. Oil line |
| 8. Washer 6 mm | 31. Spring |
| 9. Muffler attachment | 32. Engine Rotax 462 |
| 10. Bushing | 33. Elastic stop nut M10 x 1.5 (4) |
| 11. Elastic stop nut 6 mm (2) | 34. Washer (2) |
| 12. hex. screw M6 x 16 (2) | 35. Engine support |
| 13. Muffler support | 36. Distance sleeve 15 mm (4) |
| 14. Exhaust manifold | 37. Washer 10.5 mm |
| 15. Gasket (2) | 38. Lock washer 10 mm (4) |
| 16. Lock washer 8 mm (4) | 39. Nut 10 mm (4) |
| 17. Allen screw M8 x 25 (4) | 40. Internal tooth cup washer (2) |
| 18. Spring (2) | 41. Rubber mount (4) |
| 19. Starter grip | 42. Stud M10 x 42 (4) |
| 20. Rubber buffer | 43. Loctite 242 |
| 21. Cap | 44. Grip 394 mm (16 5 ") |
| 22. Sealing ring | 45. Female ball joint |
| 23. Rotary valve oil tank | |
-

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- coolant hose (drain cooling system first),
- exhaust manifold,
- oil injection hose,
- oil injection cable,
- wiring harness,
- rewind starter cable,
- pulsation hose,
- rotary valve lubrication hose,
- pulley guard,
- belt,
- clutch,
- engine support nut (under engine support),
- clamp between carburetor and intake manifold.

ENGINE SUPPORT & MUFFLER DISASSEMBLY & ASSEMBLY

17,39, Manifold bolts & engine nuts

Torque the engine support nuts (under engine support) to 35 N•m (26 lbf•ft).

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

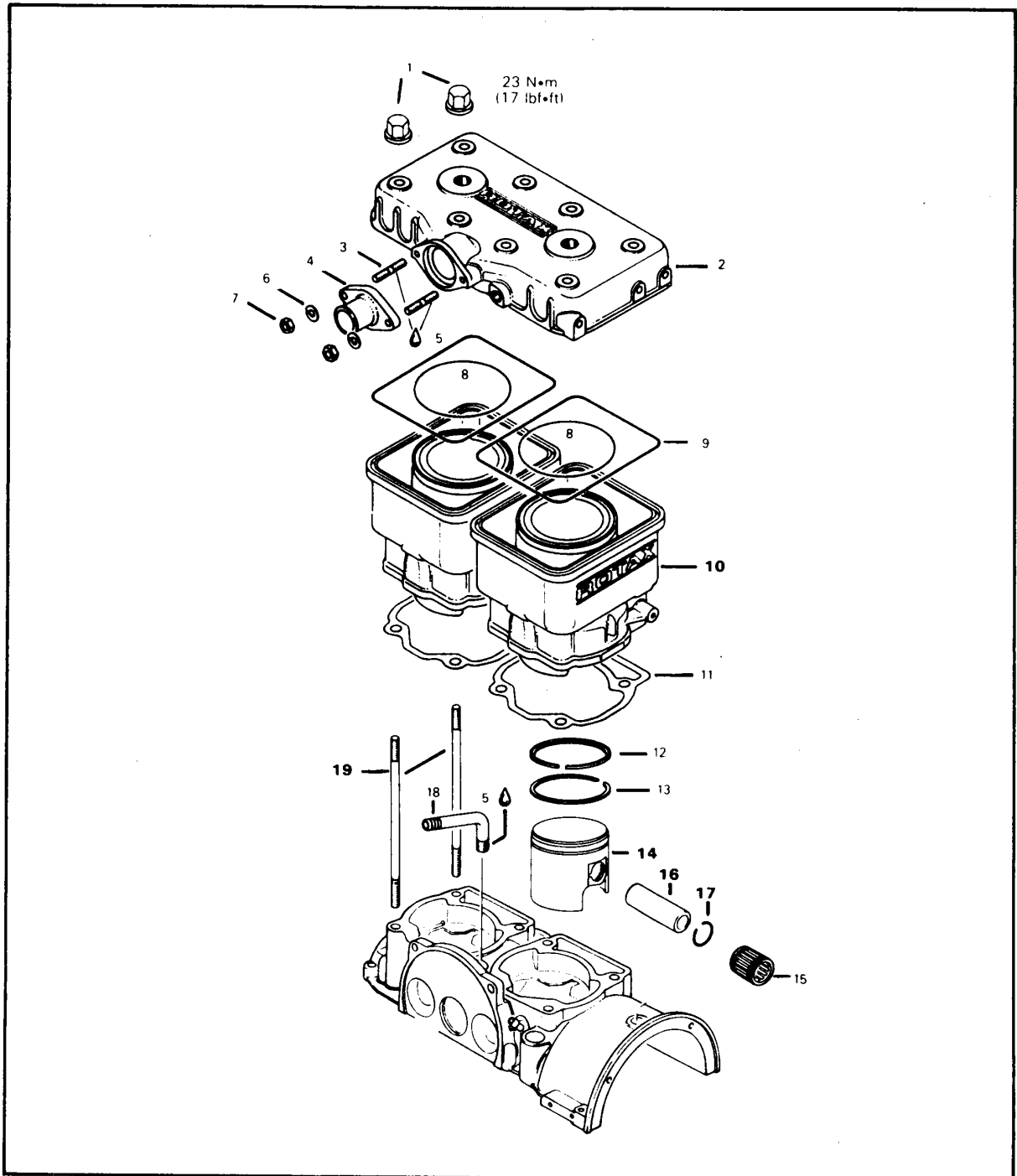
INSTALLATION ON VEHICLE

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 carburetor maximum throttle slide opening and oil pump adjustment.
- Check pulley alignment and drive belt tension.

Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

TOP END



Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

1. Cap nut M8 (8)
2. Cylinder head
3. Stud M6 x 25 (2)
4. Coolant outler collar
5. Loctite 242 blue (medium strength)
6. Lock washer 6 mm (2)
7. Nut M6 (2)
8. Gasket (O-ring) (2)
9. Gasket (O-ring) (2)
10. Cylinder (2)

11. Cylinder/crankcase gasket (2)
12. L-ring
13. Rectangular-ring
14. Piston
15. Needle bearing
16. Gudgeon pin
17. Circlip (4)
18. Angular tube, oil inlet
19. Cylinder stud M8 x 175 (8)

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

14,16,17, Piston, gudgeon 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 circlips from piston.

Drive the gudgeon pins out using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

INSPECTION

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

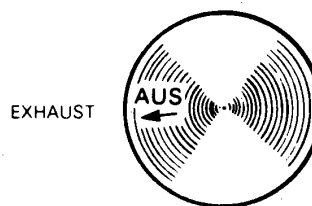
MEASUREMENTS	TOLERANCES		
	FITTING NEW PARTS (MIN.)	(MAX.)	WEAR LIMIT
Cylinder taper	N.A.	N.A.	.08 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0020")
Cylinder/piston clearance	.08 mm (.0031")	.10 mm (.0039")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.0016")	.11 mm (.0043")	.20 mm (.0079")
Ring end gap	20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

○ **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

14, Piston

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



A001002001

17, Circlip

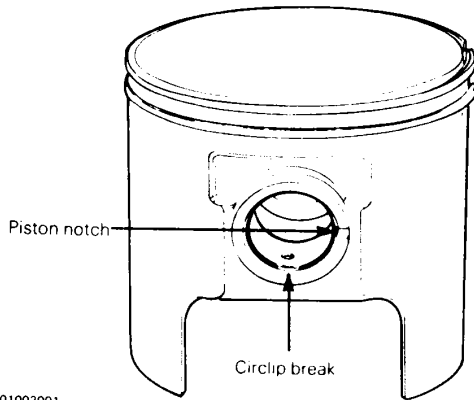
To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

Using very fine emery cloth, remove any burrs on piston caused through circlip installation.

Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

10, 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. A special tool (as per illustration) can be used to align the cylinders.



A001002001

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

10, Cylinder

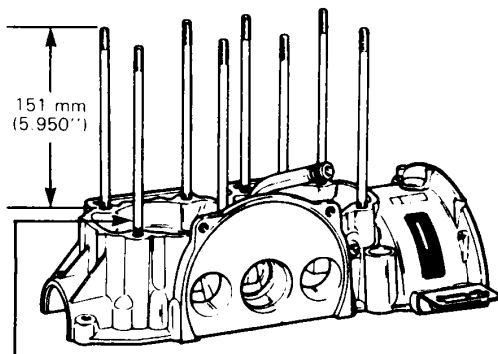
Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

Cylinders are identical they can be interchanged as far as the pistons are matched to their own cylinder.

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.

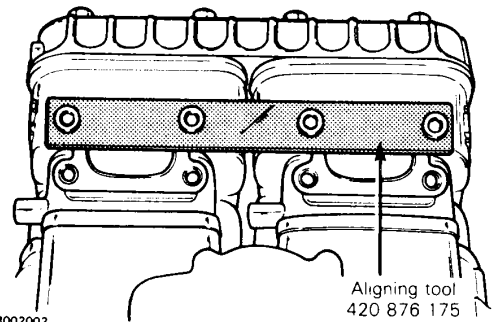
19, Cylinder studs

Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not protrude by more than 151 mm (5.950''). Longest threaded part should be in the crankcase.



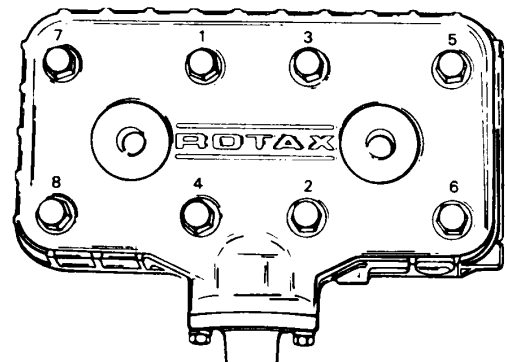
Longest threaded end in the crankcase

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A013002002

Torque cylinder head nuts to 23 N•m (17 lbf•ft) following illustrated sequence.

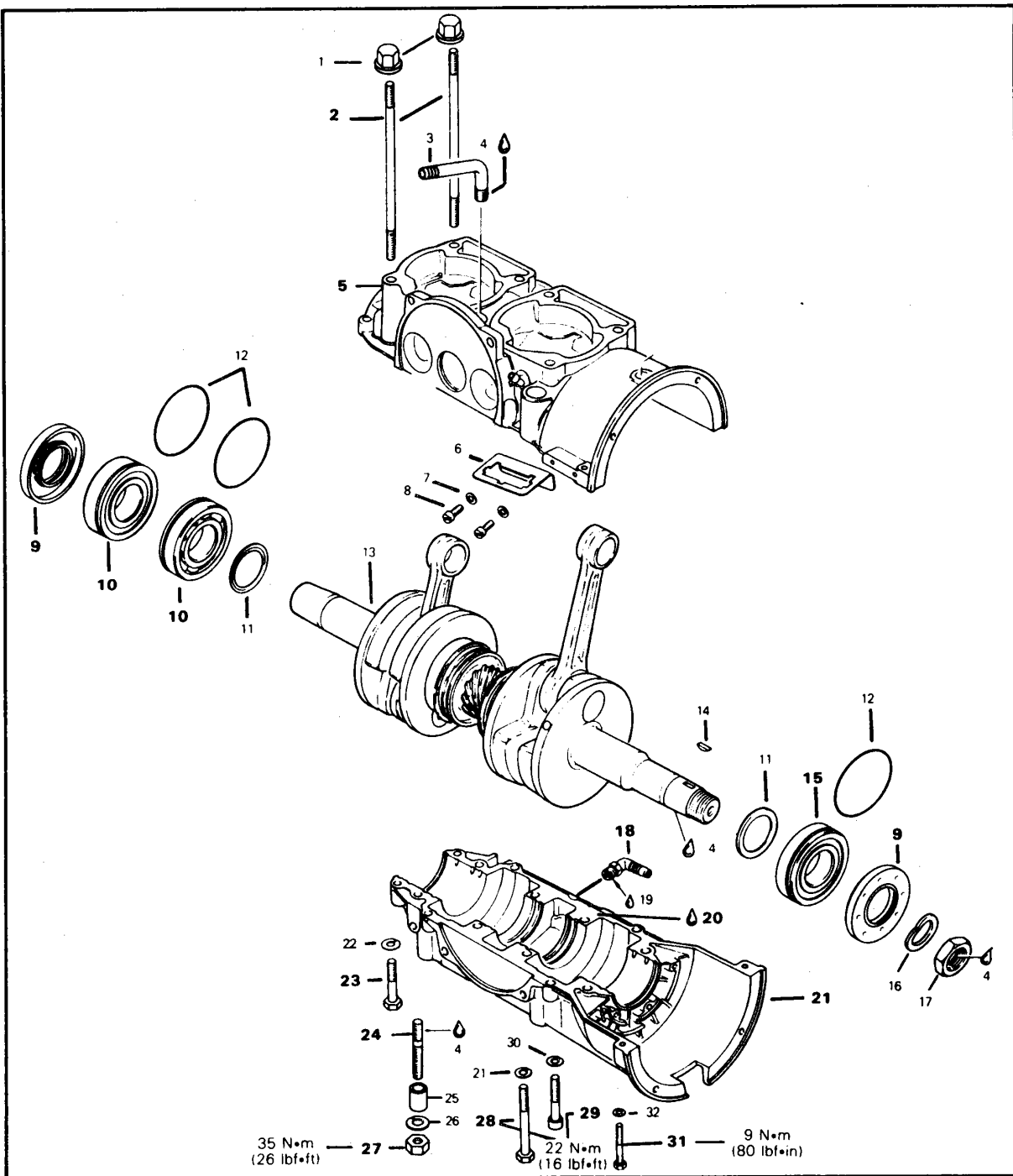


A013002003

Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

BOTTOM END



Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

1. Cap nut M8 (8)
2. Stud M8 x 175 (8)
3. Angular tube, oil inlet
4. Loctite 242
5. Crankcase upper half
6. Junction box bracket
7. Lock washer 5 mm (2)
8. Cyl. screw M5 x 12 (2)
9. Oil seal (2)
10. Ball bearing, (2)
11. Distance ring (2)
12. O-ring (3)
13. Crankshaft
14. Woodruff key 3 x 3.7
15. Ball bearing (1)
16. Lock washer 22 mm

17. Hex. nut M22x 1.5
18. Angular tube, oil outlet
19. Loctite 271
20. Loctite 515
21. Crankcase lower half
22. Lock washer 8 mm (10)
23. Hex. screw M8 x 45 (2)
24. Stud M10 x 42 (4)
25. Distance sleeve 15 mm (4)
26. Lock washer 10 mm (4)
27. Hex. nut M10 (4)
28. Hex. screw M8 x 70 (8)
29. Allen bolt M8 x 40 (4)
30. Lock washer 8 mm (4)
31. Hex. screw M6 x 35 (2)
32. Lock washer 6 mm (2)

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.

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

DISASSEMBLY

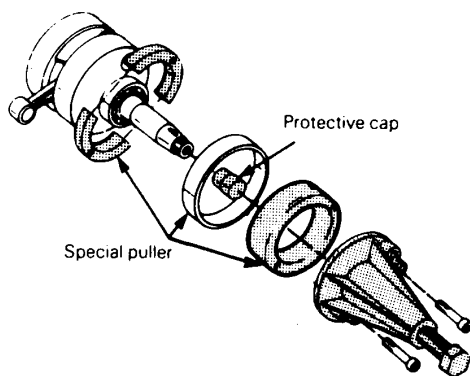
General

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

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

10,15, Ball bearings

To remove bearings from crankshaft use a protective cap special puller as illustrated.



A000001082

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.	.08 mm (.0031")
Connecting rod big end axial play	.20 mm (.0079")	.53 mm (.0208")	1.00 mm (.0394")

NOTE: For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

10,15, Ball bearings

Prior to installation, place bearings into an oil container filled with oil previously heated to 100° C (210° F). This will expand bearing and ease installation. Then put the distance rings on each side of the crankshaft, flat side of the inner diameter against the bearing and round side against the counterweight.

Install the bearings being careful not to mix them. The two bearings on the PTO side have more clearance between the balls and the bearing cage, and it also has plastic cage.

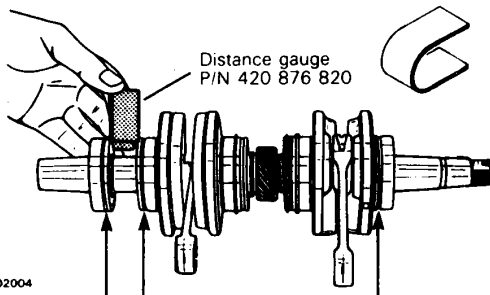
Make sure that the distance ring does not move between the counter-weight and the bearing on each side of the crankshaft.

Use the distance gauge (P/N 420 876 820) to adjust the position of the second bearing on PTO side. See illustration.

Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

Install the bearings with oil seal groove as per the following illustration:



A013002004

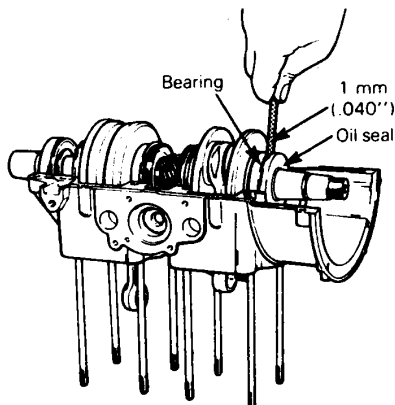
CAUTION: Do not mix up the bearings. The two bearings on PTO side have more clearance between the balls and the bearing cage, and it also has plastic cage.

9, 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") 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.



A013002005

5,20,21, Crankcase halves & Loctite

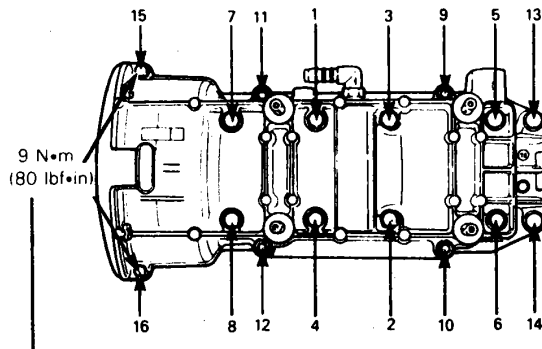
Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, spray some new injection oil (or equivalent) on all the moving parts of the crankshaft. Then apply a light coat of Loctite 515 (413 7027 00) on mating surfaces.

02-05-8

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.

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

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



All the other bolts are torque to 21 N·m (15 lbf·ft)

A013002006

NOTE: Torque the two smaller bolts (6 mm) on magneto side to 9 N·m (80 lbf·in).

23,28,29, Hexagonal screws & Allen bolts M8

Torque the M8 screws to 21 N·m (15 lbf·ft).

31, Hexagonal screws M6 x 35

Torque the M6 screws to 9 N·m (80 lbf·in).

24, Stud

At assembly on crankcase, apply Loctite 242 on threads.

Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

27, Hexagonal nut

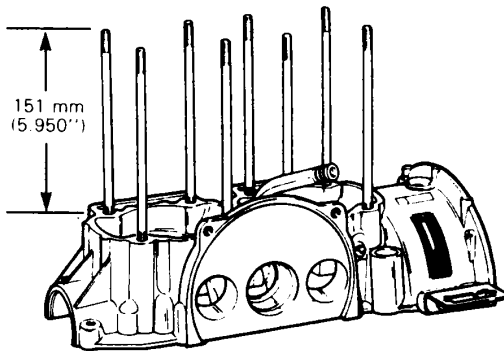
Torque to 35 N•m (26 lbf•ft).

18, Angular tube & oil outlet

Apply Loctite 271 on threads prior to assembly.

2, Stud

Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not exceed further than 151 mm (5.950''). Longest threaded end should be in the crankcase.

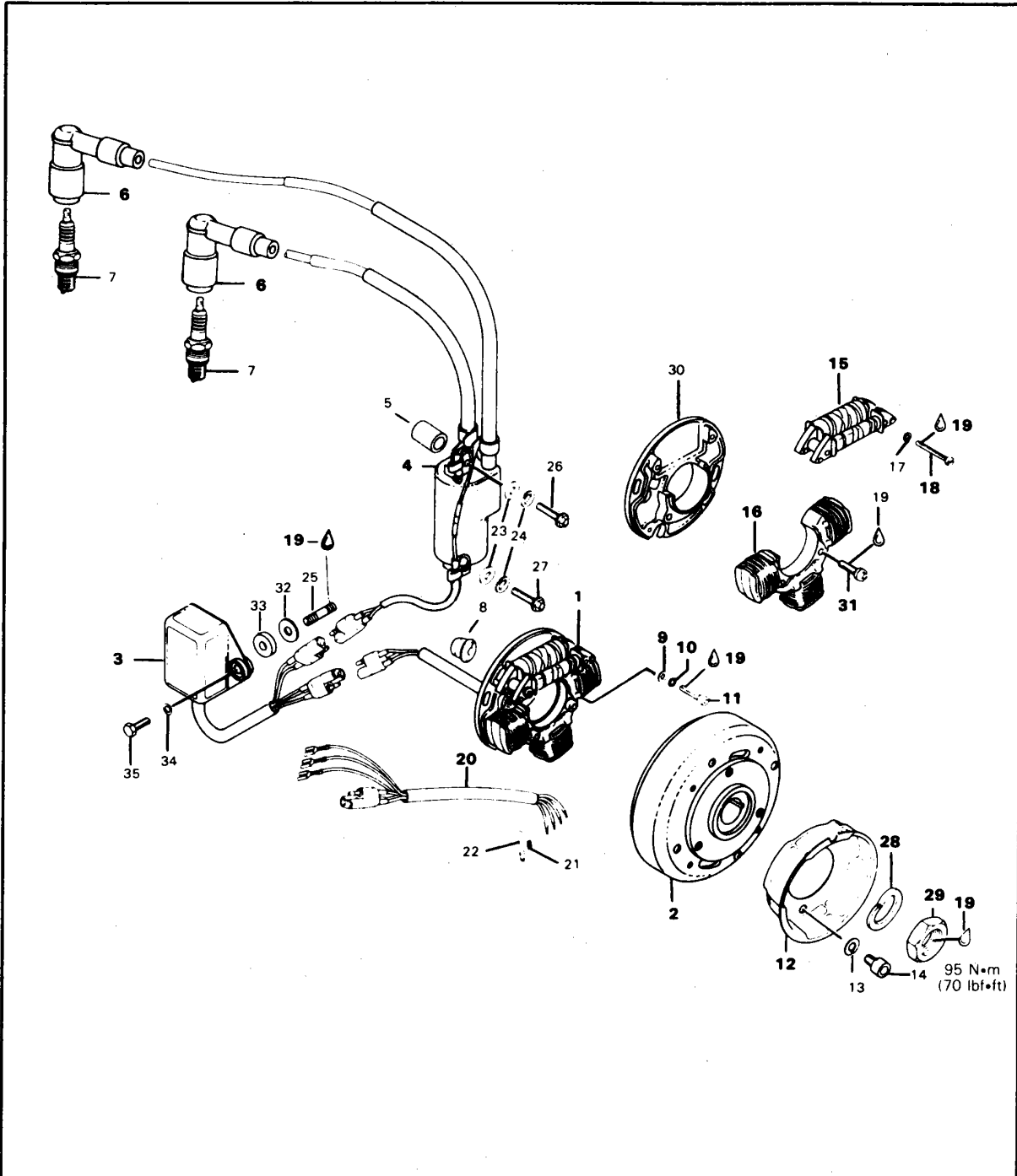


A013002001

Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

MAGNETO



Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

1. Armature plate ass'y
2. Magneto flywheel ass'y
3. C.D. Box
4. Ignition coil
5. Distance sleeve (2)
6. Spark plug protector ass'y (2)
7. Spark plug (2)
8. Cable grommet
9. Washer 5.5 mm (2)
10. Lock washer 5 mm (2)
11. Allen screw M5 x 18 (2)
12. Starting pulley (1)
13. Lock washer 8 mm (3)
14. Hex. screw M8 x 16 (3)
15. Generating coil
16. Lighting coil
17. Lock washer 5 mm (2)
18. Screw M5 x 35 (2)

19. Loctite 242
20. Wire ass'y
21. Cable terminal (6)
22. Protection tube (6)
23. Washer 6 mm (2)
24. Lock washer 6 mm (2)
25. Stud M6 x 25 (2)
26. Allen screw M6 x 50 (1)
27. Allen screw M6 x 45 (1)
28. Lock washer 22
29. Hex. nut M22 x 1.5
30. Armature plate
31. Combined screw M6 x 25 (2)
32. Washer 6.2 mm (2)
33. Rubber washer (2)
34. Washer 6.4 mm (2)
35. Elastic stop nut M6 (2)

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 located to facilitate reassembly.

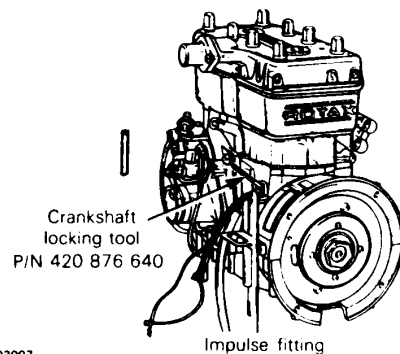
29, Hexagonal nut

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (service tool) 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.

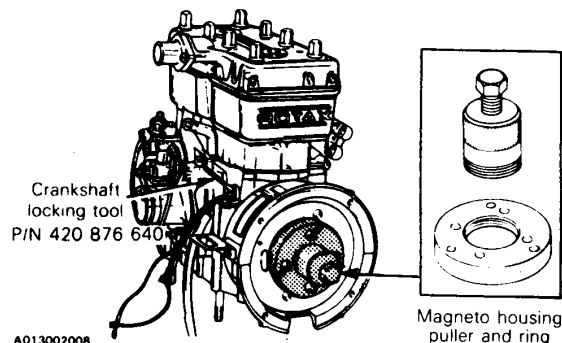


A013002007

2, Magneto flywheel assembly

To remove magneto housing (flywheel):

- lock crankshaft with crankshaft locking tool (service tool) as illustrated;
- adjust magneto housing puller and puller ring as illustrated;



A013002008

Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

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

1, Armature plate assembly

To remove the armature plate:

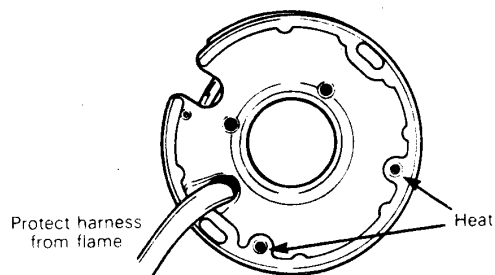
- Remove Allen screws.
- Take off the grommet from crankcase
- Pull out the armature, being careful when passing the connectors through the crankcase.

REPAIR

15, Generating coil

To replace generating coil:

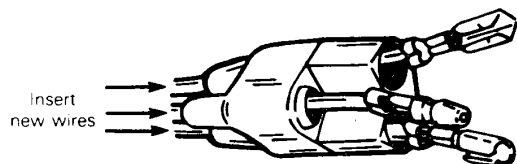
- Heat the armature plate to 93° C (200° F) around the screw holes to break the Loctite bond.



A001002003

▼ 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.

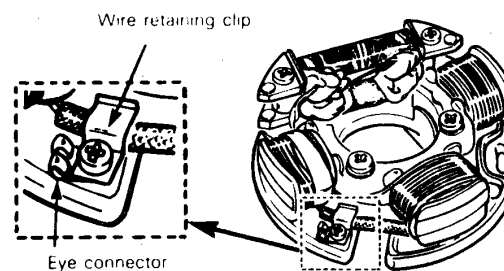


A001002004

02-05-12

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

- Install a new receptacle connector to the black/yel-low 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 oil wire.
- Solder an eye connector to the lead and fasten it under the wire retaining clip.



A001002005

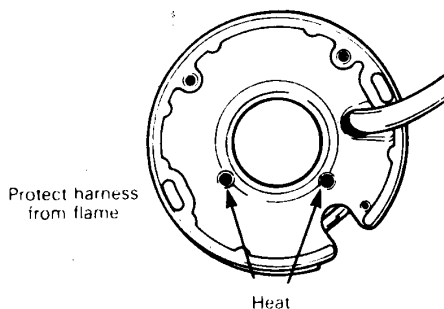
18,19, Generating coil screw & Loctite 242

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.

▼ 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.

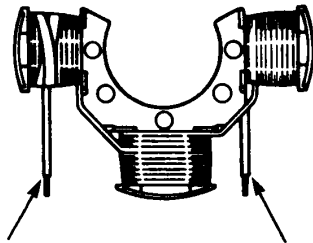


A001002003

▼ CAUTION: Protect harness from flame.

Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

- 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.



White protector with yellow wire of harness

Black protector with yellow/black wire of harness

A001002006

22, Protector tube

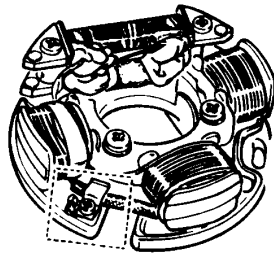
Position protector tubes over connections.

19,31, Loctite 242 & lighting coil screws

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

- Fasten retaining clip onto protector tubes.

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



A001002005

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

1,9,10,11,19, Armature plate, lock washers, washers, Loctite 242 & screws

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.

2,19,28,29, Loctite 242, flywheel, lock washer & nut

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

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 95 N•m (70 lbf•ft).

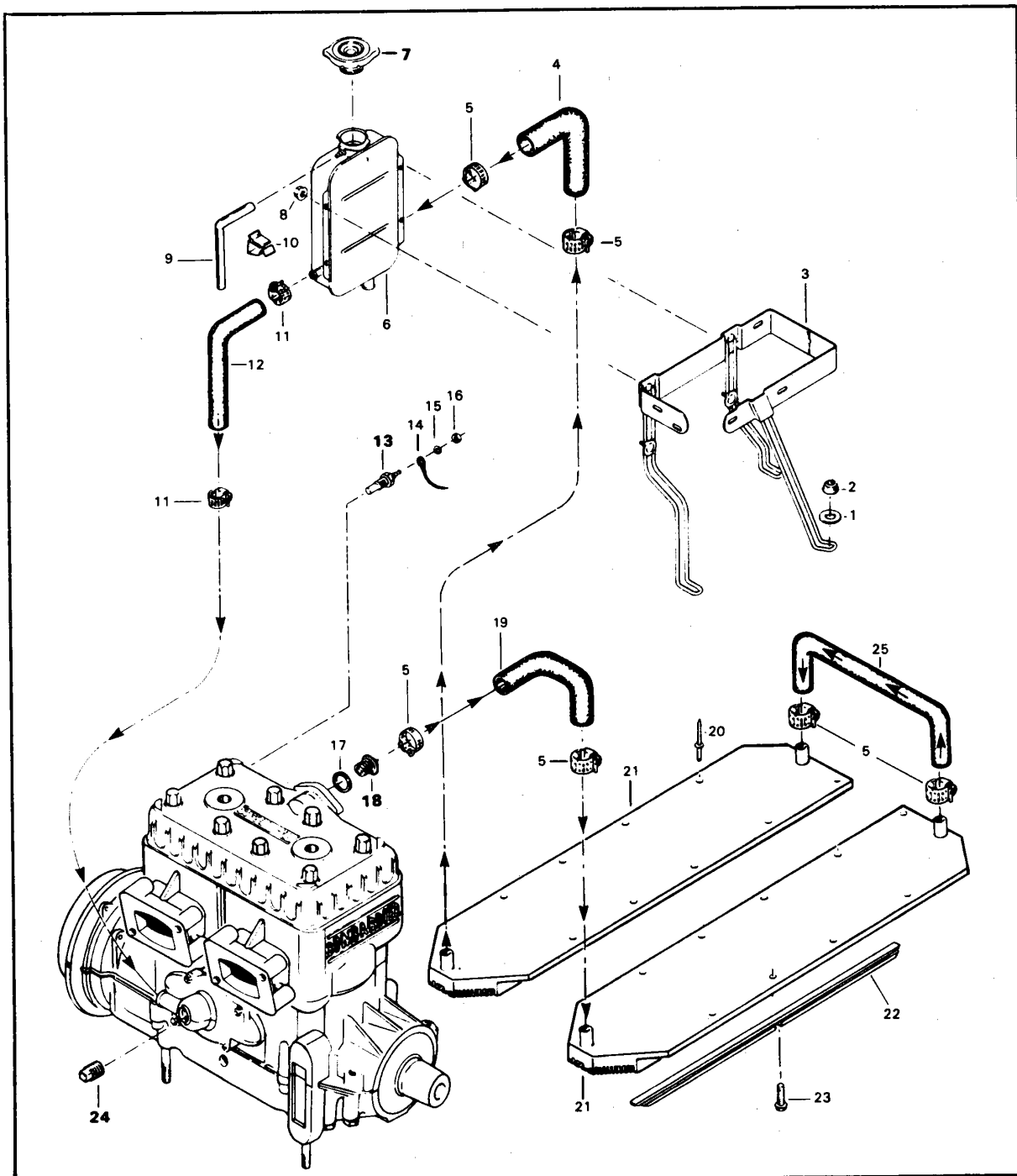
At reassembly coat all electric connections with silicone dielectrique grease to prevent corrosion or moisture penetration.

▼ **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 05 (462 ENGINE TYPE)

COOLING SYSTEM



Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

1. Washer 6.2 mm (3)
2. Elastic stop nut M5 (3)
3. Tank support
4. Hose
5. Clamp (6)
6. Coolant tank
7. Pressure cap
8. Elastic stop nut M5 (4)
9. Overflow hose 292 mm
10. Clip
11. Clamp (2)
12. Hose 419 mm
13. Sender

14. Sender wire
15. Lock washer
16. Hex. nut
17. Grommet
18. Thermostat
19. Hose
20. Rivet (40)
21. Radiator (2)
22. Radiator protector (2)
23. Taptite screw M5 x 15 (2)
24. Plug
25. U-hose

INSPECTION

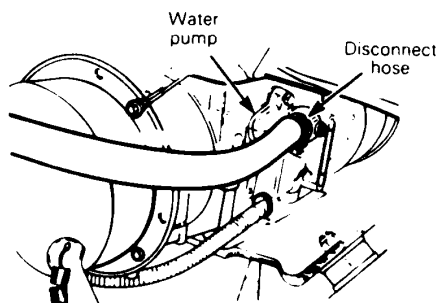
Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

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

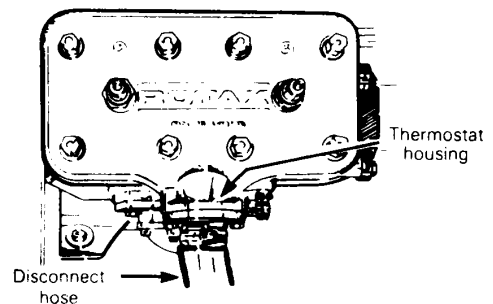
To drain cooling system:

- Use a length of hose long enough to drain coolant into a container lower than engine.
- Remove the engine coolant hose from water pump.



A013002009

- Connect "drain hose" onto water pump.
- Put both hoses ends into the container.
- Remove coolant tank cap and lift the rear of the vehicle to drain the heat exchangers.
- When the coolant level is low enough, remove the hose from thermostat housing.



A013002010

DISASSEMBLY & ASSEMBLY

13,24, Plug, sender

Apply Loctite pipe thread sealant to avoid leaks.

7, Pressure cap

Check that the cap pressurizes the system. If not, install a new 90 kPa (13 lb/in²). (Do not exceed 90 kPa (13 lb/in²).

18, Thermostat

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

Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

REFILLING THE SYSTEM

Capacity:

Approximately 5 liters

(1.1 Imp. gal.) (1.3 U.S. gal.)

60% antifreeze + 40% water

▼ **CAUTION:** To prevent rust formation or freezing condition, always replenish the system with 60% antifreeze and 40% water.

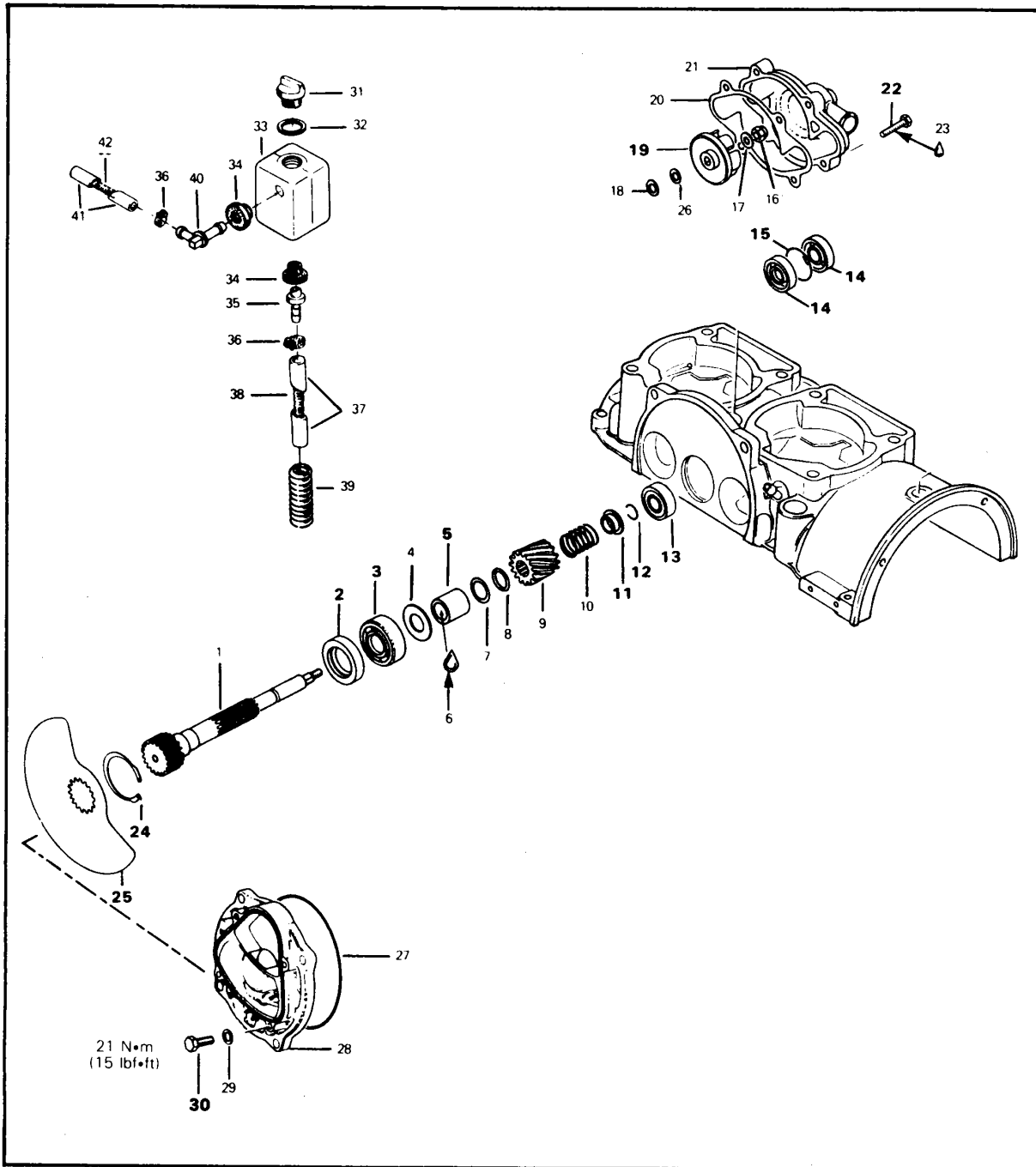
Pure antifreeze without water produces premature freezing. Always use ethylene-glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

To refill cooling system:

- Remove "drain hose" and reinstall initial one.
- Place rear of vehicle on the ground.
- Refill coolant tank slowly until coolant overfills at thermostat housing.
- Reinstall hose at thermostat housing.
- Continue to pour coolant in the tank until level reaches 25 mm (1 in.) below filler neck.
- With the coolant tank cap still removed, start engine and let it warm to reach its normal operating temperature and thermostat open. Allow it to run a few minutes more.
- Stop engine and check coolant level. Refill as required then put back the cap.

Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

ROTARY VALVE, COOLANT PUMP & OIL RESERVOIR



Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

1. Shaft, rotary valve
2. Oil seal
3. Ball bearing
4. Shim 0.5 mm
5. Distance sleeve 24.5 mm
6. Loctite 271
7. Shim 0.5 mm
8. O-ring
9. Sprocket 14 teeth
10. Spring
11. Spring holder cup
12. Circlip
13. Ball bearing
14. Oil seal (2)
15. Distance ring
16. Lock nut M6
17. Washer 6.4 mm
18. Washer 8 mm
19. Impeller, coolant pump
20. Gasket
21. Housing, coolant pump
22. Hex screw M6 x 25 (4)
23. Loctite 242
24. Locking ring
25. Rotary valve
26. Friction washer
27. O-ring
28. Cover
29. Lock washer 8 mm (4)
30. Hex screw M8 x 20 (4)
31. Cap
32. Sealing ring
33. Rotary valve oil tank
34. Grommet (2)
35. Male connector
36. Gear clamp
37. Oil line
38. Spring
39. Oil line housing
40. Elbow male connector
41. Oil line
42. Spring

CLEANING

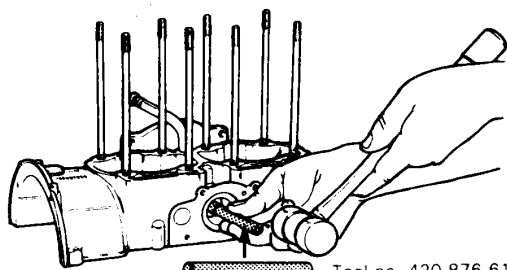
Discard all seals and O-rings.

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

DISASSEMBLY & ASSEMBLY

19,24, Coolant pump impeller & circlip

To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip. Using the suitable pusher (P/N 420 876 610) and a fiber hammer, push shaft assembly.



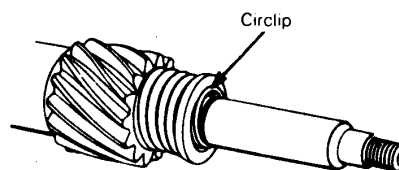
A013002011

Tool no. 420 876 610

CAUTION: To prevent damage to the end of the rotary valve shaft, use pusher (tool P/N 420 876 610).

11,12, Spring holder cup & circlip

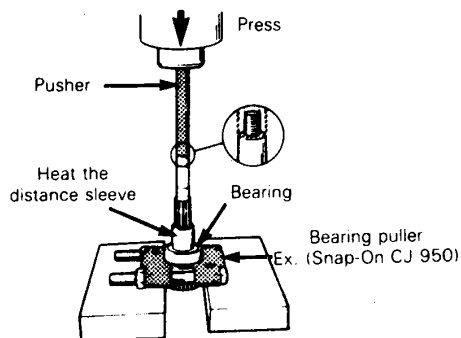
If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup in order to remove circlip.



A013002012

5, Distance sleeve

To remove the distance sleeve use a bearing puller (Ex: Snap-on no. CJ 950) and pusher (P/N 420 876 610). Heat the distance sleeve. Proceed as illustrated:



A013002013

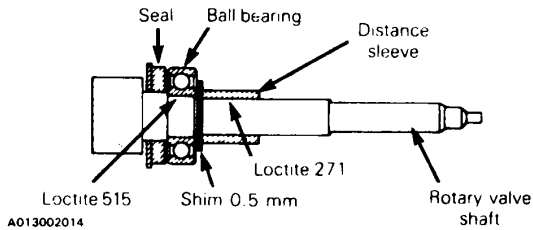
CAUTION: Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

Clean rotary valve shaft and inside of distance sleeve. At assembly apply Loctite 271 inside of distance sleeve.

Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

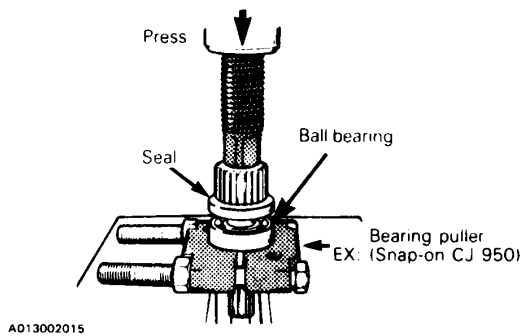
2, Oil seal

At assembly apply lithium grease on seal lips.



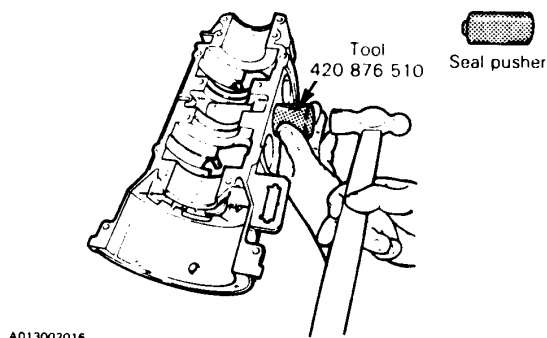
3, Ball bearing

Install ball bearing as illustrated.



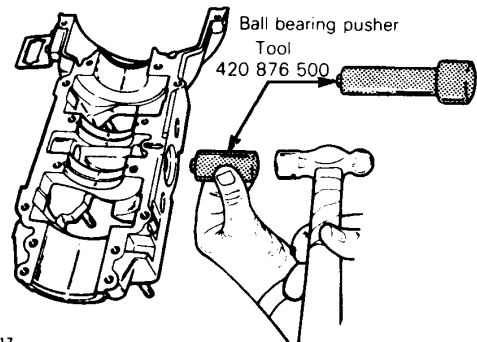
13,14,15, Ball bearing, oil seal & distance ring

To remove seals and bearing:



13, Ball bearing

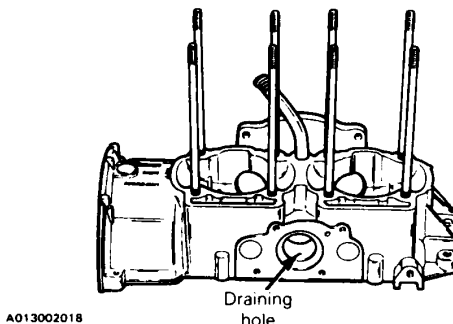
To install ball bearing.



○ **NOTE:** Ball bearing **13** shielded side must be facing crankshaft.

14,15, Oil seal & distance ring

To install seals proceed as follows:



Apply lithium grease on seal lips.

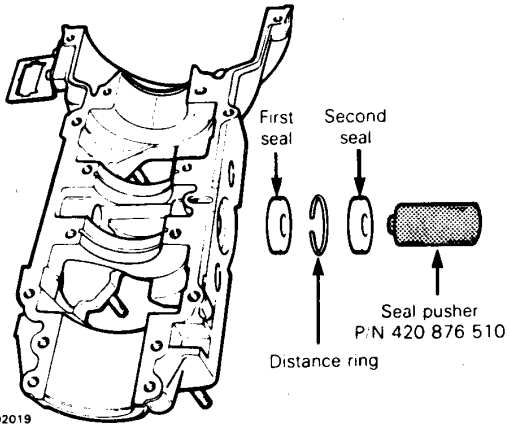
First seal sits on bearing outer ring. Align the distance ring with the opening in line with crankcase draining hole. The second seal sits on the distance ring.

The spring side of the seals must face toward crankshaft.

○ **NOTE:** 35% of the distance between first and second seals must be filled with lithium grease or equivalent.

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

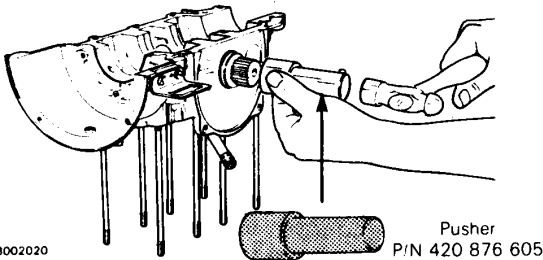
Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)



A013002019

NOTE: After installation of seals check if the bearing is correctly positioned (use pusher P/N 420 876 500).

To install rotary valve shaft proceed as follow with the suitable pusher (P/N 420 876 605):



A013002020

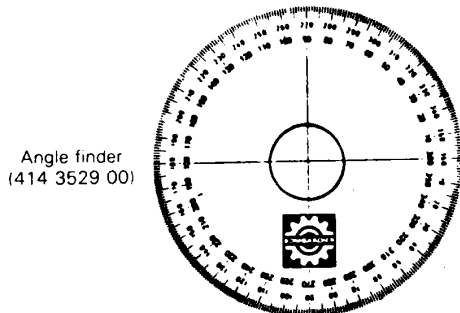
22, Hexagonal screw

Apply Loctite 242 on threads.

25, Rotary valve

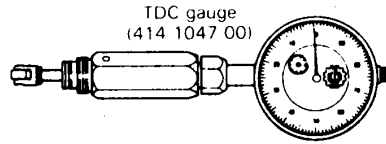
Rotary valve adjustment when replacing crankcase having no timing marks.

REQUIRED TOOLS



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02-05-20

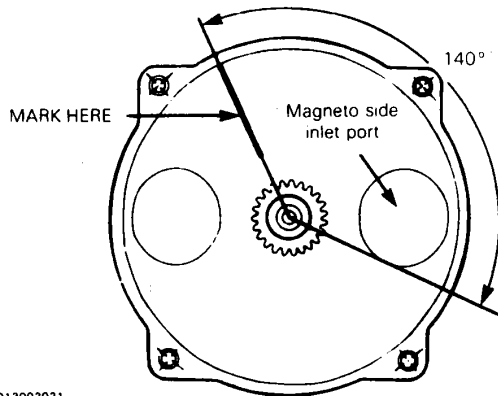


A000001001

ENGINE TYPE	TIMING MARKS opening, closing
462	140°, 51°

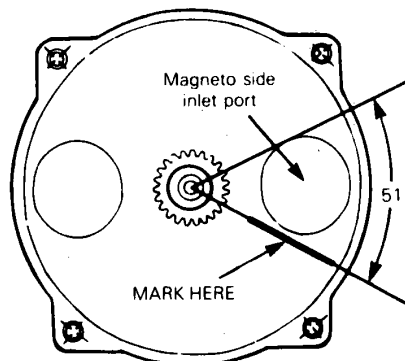
For example: 140° opening
 51° closing

Using angle finder, mark crankcase at 140° from bottom edge of magneto side inlet port.



A013002021

From top edge of magneto side inlet port, mark crankcase at 51°.



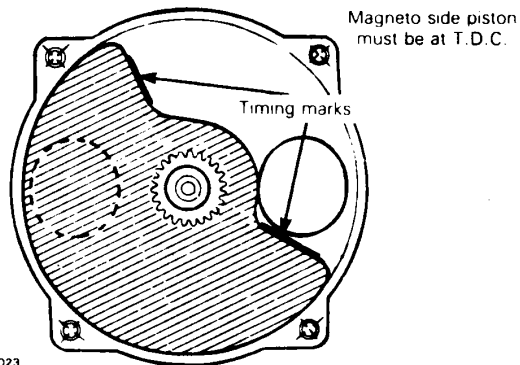
A013002022

Section 02 ENGINE
Sub-section 05 (462 ENGINE TYPE)

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 T.D.C. 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.



A013002023

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

30, Screw M8 × 20

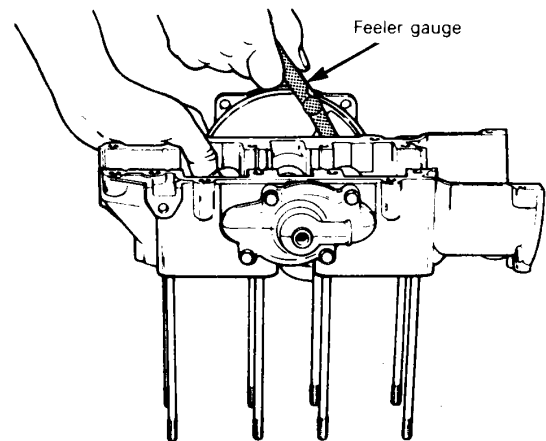
Torque the four cover screws to 21 N•m (15 lbf•ft).

INSPECTION

25,28, Rotary valve, rotary valve cover

A gap of .27 - .48 mm (0.011" - 0.019") must be maintained between the rotary valve and the crankcase.

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

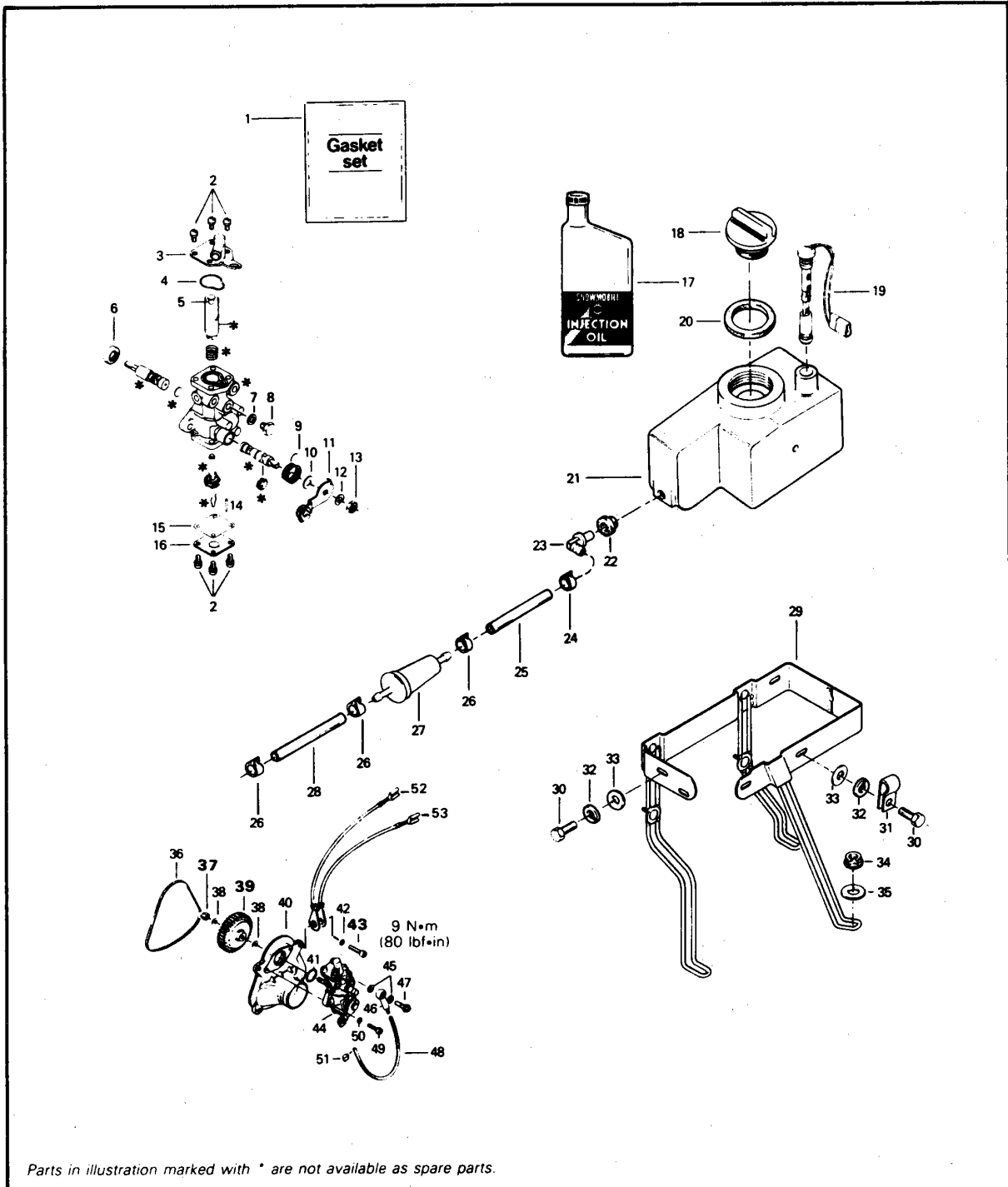


A013002024

Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

1. Gasket set
2. Screw with lock washer (8)
3. Plate
4. O-ring
5. Retainer
6. Seal
7. Washer
8. Hex. screw M6 x 7
9. Spring
10. Washer
11. Lever
12. Lock washer 6 mm
13. Nut 6 mm
14. Stop pin
15. Gasket
16. Cam casing plate
17. Oil injection
18. Oil tank cap
19. Oil level sensor
20. Gasket
21. Injection oil tank
22. Grommet
23. Male connector
24. Spring clip
25. Hose 60.2 mm
26. Spring clip (3)
27. Filter
28. Hose 79.2 mm
29. Support
30. Hex. screw M6 x 12 (5)
31. Clip
32. Lock washer 6 mm (5)
33. Washer 6.4 mm (5)
34. Elastic stop nut M15 (3)
35. Washer 6.2 mm (2)
36. Rubber ring
37. Nut 6 mm
38. Washer 6.2 mm (2)
39. Oil pump gear 44 teeth
40. Oil pump mounting flange
41. O-ring
42. Lock washer 6 mm (4)
43. Screw M6 x 20 (4)
44. Oil pump
45. Oil banjo gasket (4)
46. Banjo (2)
47. Banjo bolt M6 x 16 (2)
48. Oil line 170 mm
49. Screw M5 x 16 (2)
50. Lock washer 5 mm (2)
51. Clamp (4)
52. Ground wire
53. Ground wire

CLEANING

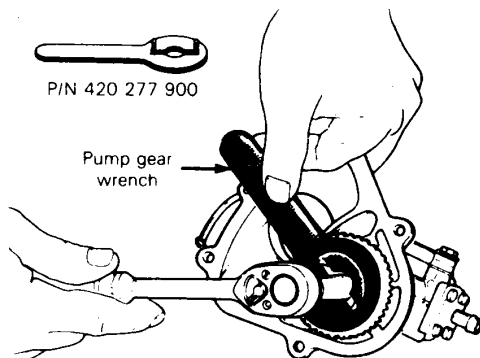
Discard all seals and O-rings. Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

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

37,39, Lock nut & oil pump gear

To remove retaining nut, lock gear using no. 420 277 900 tool.



A000001085

ASSEMBLY

43, Hexagonal screw

Torque to 9 N•m (80 lbf•in).

ADJUSTMENT

Always perform carburetor adjustment prior to oil injection pump adjustment.

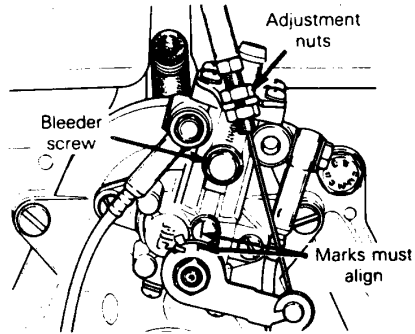
To synchronize pump with carburetor:

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. Tighten the lock nut.

Section 02 ENGINE

Sub-section 05 (462 ENGINE TYPE)

Injection pump cable adjustment



A013002025

▼ **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. To bleed the main oil line (between tank and pump), loosen the bleeder screw (do not start engine) and let the air escape until oil starts to flow out.

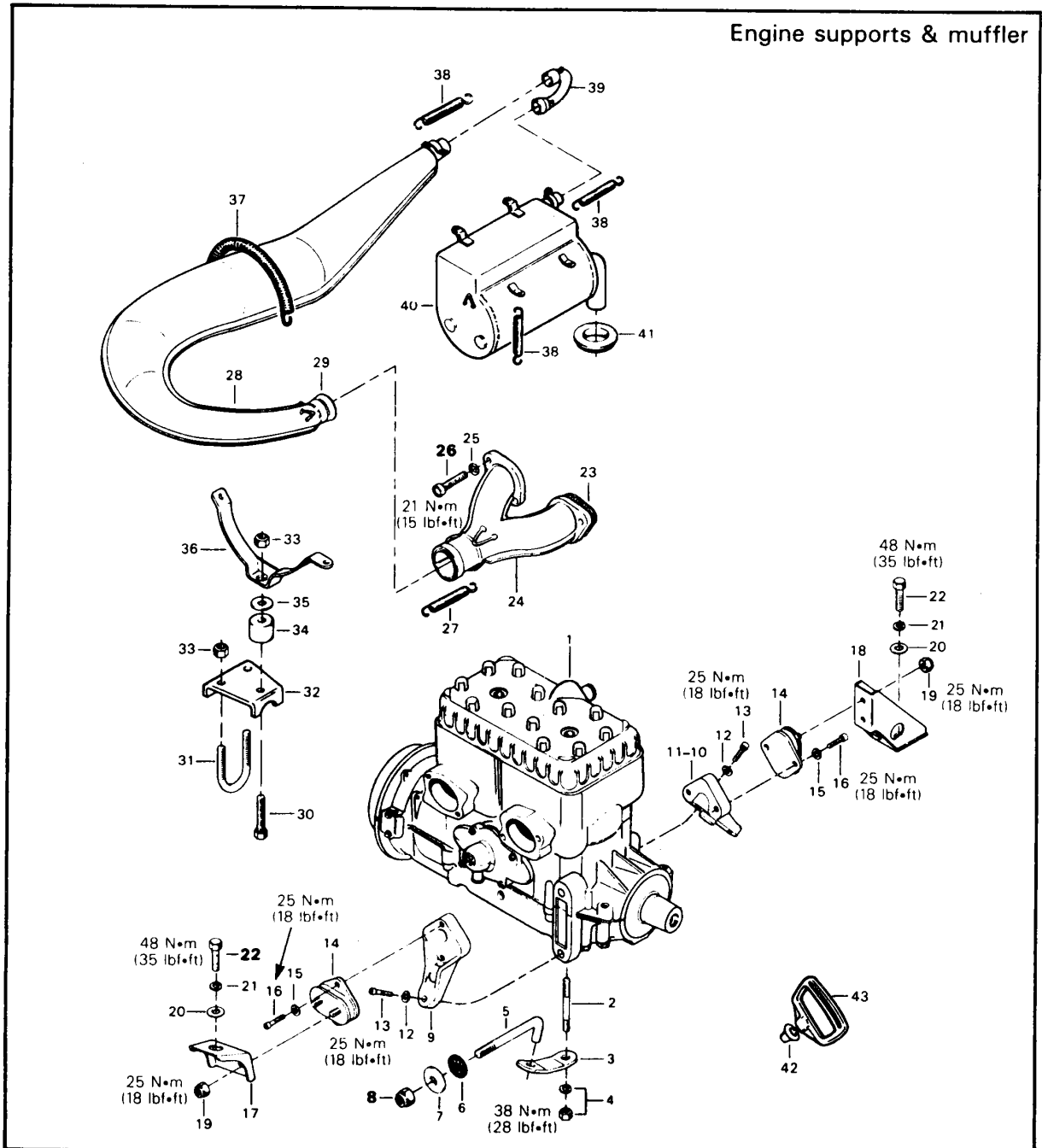
Make sure tank has enough oil

To bleed the small injection lines, start the engine and let it run at idle speed. Move injection pump lever to fully open position until lines are full of oil.

467 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION

Engine supports & muffler



Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

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

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicles:

- Air silencer.
- Pulley guard and drive belt.
- Throttle cable from carburetors and oil injection pump.
- Fuel lines, pulsation 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).
- 4 screws retaining engine supports on frame.

ENGINE SUPPORTS & MUFFLER DISASSEMBLY & ASSEMBLY

22,26, Engine support screw & manifold screw

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

Torque the manifold screws to 21 N•m (15 lbf•ft).

INSTALLATION ON VEHICLE

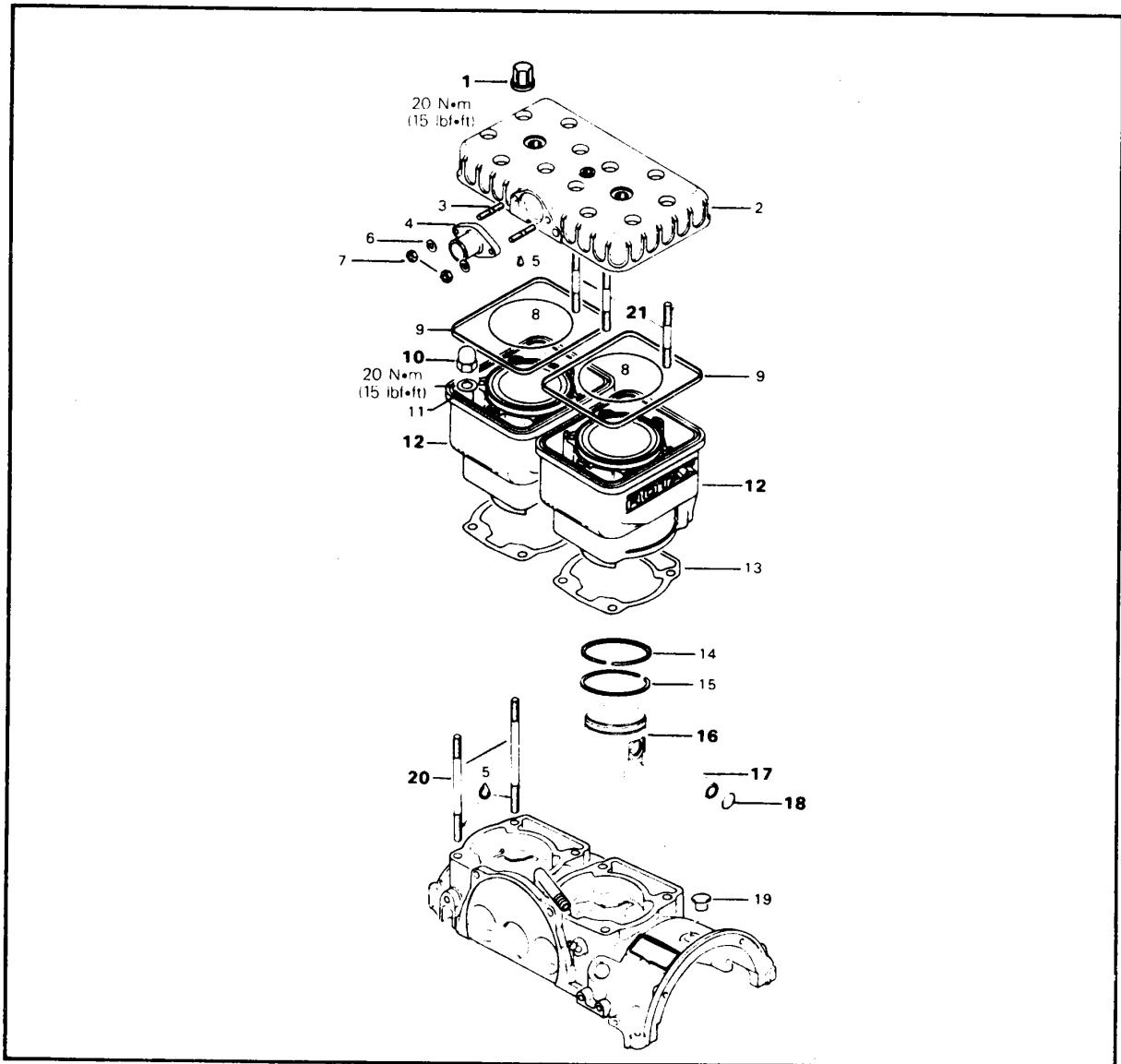
To install engine on vehicle, reverse removal procedure. However, pay attention to the following:

- 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 jettings.

Section 02 ENGINE
Sub-section 06 (467 ENGINE TYPE)

TOP END



- 1. Cap nut M8 (12)
- 2. Cylinder head
- 3. Stud M6 - 15 (2)
- 4. Coolant outlet collar
- 5. Loctite 242 blue (medium strength)
- 6. Lock washer 6 mm (2)
- 7. Nut M6 (2)
- 8. Gasket (O-ring) (2)
- 9. Gasket (2)
- 10. Cap nut M8 (8)
- 11. Flat washer 8.4 (8)

- 12. Cylinder (2)
- 13. Cylinder/crankcase gasket (2)
- 14. Ring
- 15. Rectangular-ring
- 16. Piston
- 17. Gudgeon pin
- 18. Circlip (4)
- 19. Needle bearing
- 20. Cylinder stud M8 x 79 (8)
- 21. Stud (head) M8 - 50 (2)

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

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, gudgeon pin & circlips

Place a clean cloth over crankcase then with a pointed tool inserted in piston notch, remove circlip from piston. Drive the gudgeon pin out of piston using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin in or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

INSPECTION

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

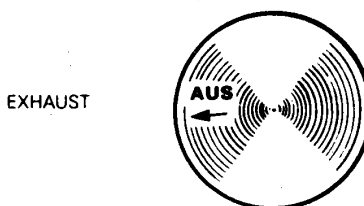
MEASUREMENTS	TOLERANCES		
	FITTING NEW PARTS (MIN.)	(MAX.)	WEAR LIMIT
Cylinder taper	N.A.	N.A.	.08 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0020")
Cylinder/piston clearance	.10 mm (.0039")	.12 mm (.0047")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.0016")	.11 mm (.0043")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

○ **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

16, Piston

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.



A001002001

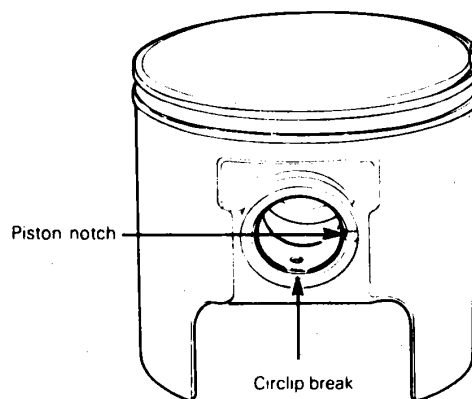
○ **NOTE:** Spare parts pistons and cylinders are identified with a green or red dot, it is important to match the piston with the cylinder of the same color.

18, Circlip

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

Using very fine emery cloth, remove any burrs on piston caused through circlip installation.

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

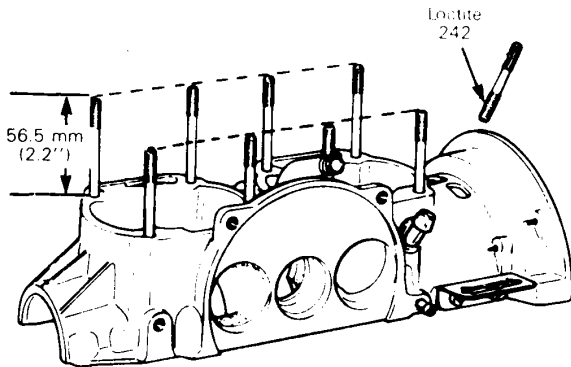


A001002002

Section 02 ENGINE
Sub-section 06 (467 ENGINE TYPE)

20, Crankcase studs

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 (2.2").

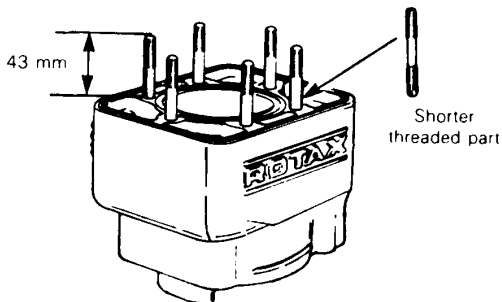


A015002001

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

12,21, Cylinder & cylinder head stud

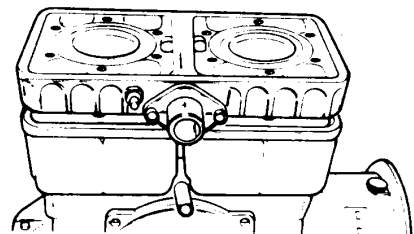
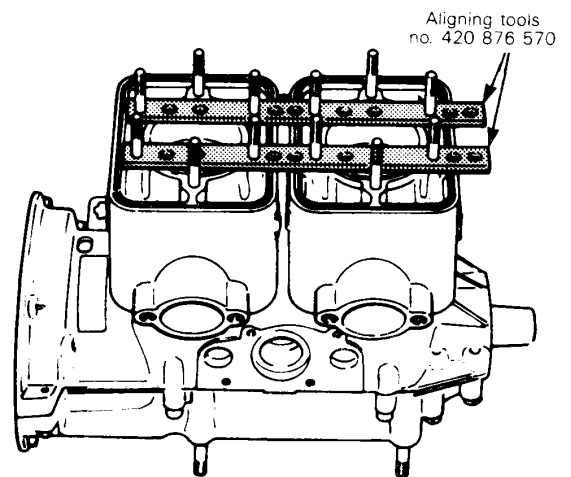
Because of cap nuts, cylinder head studs have to be screwed into the cylinder so that they do not protrude by more than 43 mm (1.700"). If it is not possible to obtain this length, add a washer between cylinder head and cap nut. Shorter threaded part of stud should be screwed into cylinder.



A015002018

10,12, Crankcase/cylinder nuts & cylinders

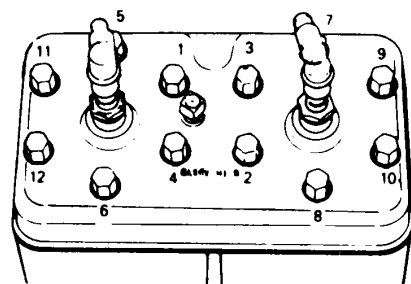
When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. A special tool (as per illustration) (or cylinder head itself) can be used to align the cylinders. Cross torque cylinder nuts to 20 N•m (15 lbf•ft).



A015002011

1, Cylinder head nut

Torque cylinder head nuts to 20 N•m (15 lbf•ft) following illustrated sequence.

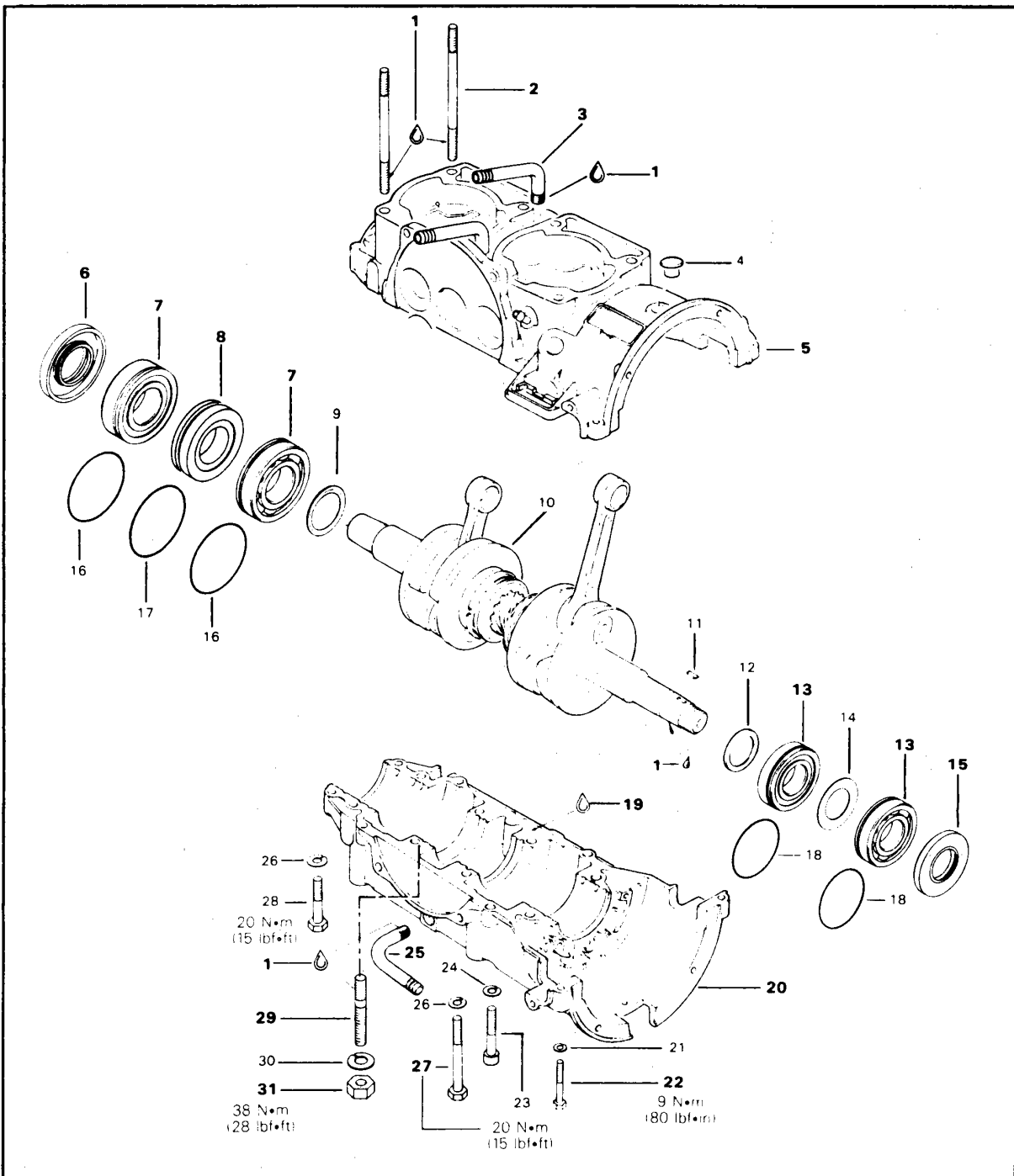


A015002004

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

BOTTOM END



Section 02 ENGINE

Sub-section 06 (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. Screw M8 x 40 (4)
24. Lock washer 8 mm (4)
25. Angular tube, oil outlet
26. Lock washer 8 mm (10)
27. Hex. screw M8 x 64 (8)
28. Hex. screw M8 x 45 (2)
29. Stud M10 x 42
30. Lock washer 10 mm
31. Hex. nut M10

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 or equivalent.

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

DISASSEMBLY

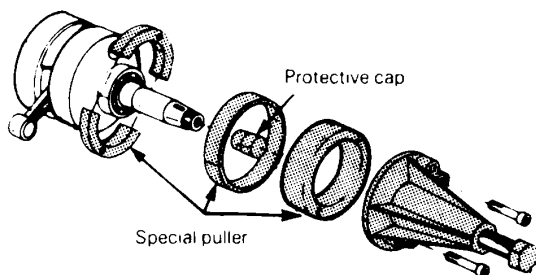
General

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

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

7,13, Crankshaft bearings

To remove bearings from crankshaft use a protective cap and special puller as illustrated.



A009001082

INSPECTION

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

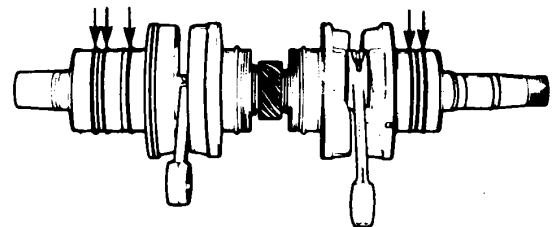
MEASUREMENTS	TOLERANCES		WEAR LIMIT
	FITTING NEW PARTS (MIN.)	(MAX.)	
Crankshaft deflection	N.A.	N.A.	.08 mm (.0032")
Connecting rod big end axial play	.40 mm (.0157")	.73 mm (.0287")	1.2 mm (.0468")

○ **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

7,8,13, Crankshaft bearings & labyrinth sleeve

Prior to installation, place bearings into an oil container filled with oil previously heated to 100°C (210°F). This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration.



A015002005

Section 02 ENGINE

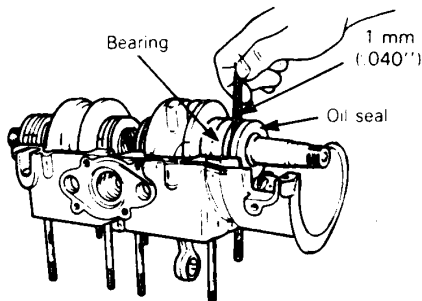
Sub-section 06 (467 ENGINE TYPE)

6,15, Seals

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

For bearing lubrication purpose, a gap of 1.0 mm (.040") 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

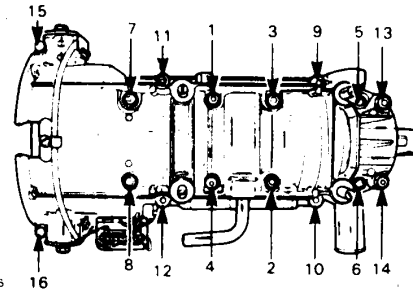
Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of Loctite 515 (413 7027 00) on mating surfaces.

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.

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

Follow sequence shown
1 to 14 -- 20 N•m (15 lbf•ft)
15 and 16 -- 9 N•m (80 lbf•in)



NOTE: Torque the two smaller bolts (15 and 16) on magneto side to 9 N•m (80 lbf•in).

1,3,25, Loctite 242, angular tubes (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 20 N•m (15 lbf•ft).

22, Crankcase M6 screws

Torque the crankcase M6 screws to 9 N•m (80 lbf•in).

1,29, Loctite 242 & crankcase stud

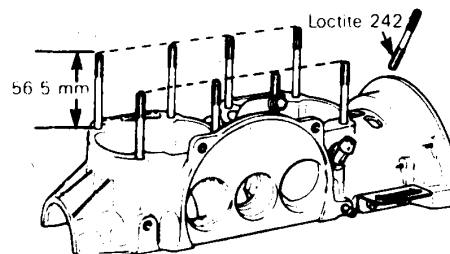
At assembly on crankcase, apply Loctite 242 on stud threads

31, Crankcase/engine bracket nut

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

1,2, Loctite 242 & upper crankcase studs

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").

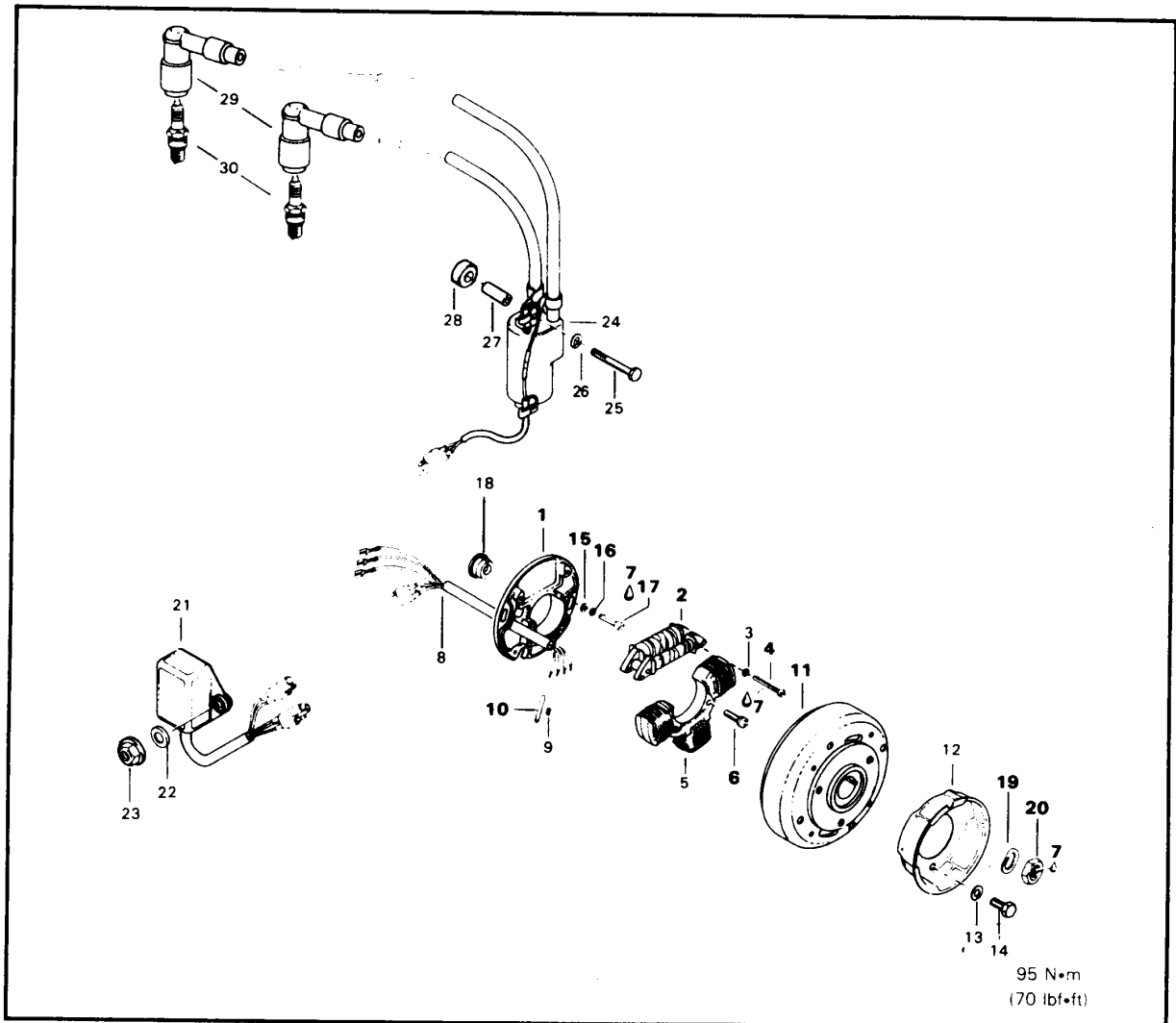


Apply Loctite 242 on the threaded end of the studs going into the crankcase.

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

Section 02 ENGINE
Sub-section 06 (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 (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 (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. Flat washer 6.4 mm (2)
- 23. Flanged elastic hexagonal stop nut M6 (2)
- 24. Ignition coil
- 25. Hexagonal screw M6 x 85 (2)
- 26. Lock washer 6 mm (2)
- 27. Spacer (2)
- 28. Isolator
- 29. Spark plug protector (2)
- 30. Spark plug (2)

95 N·m
 (70 lbf·ft)

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

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:

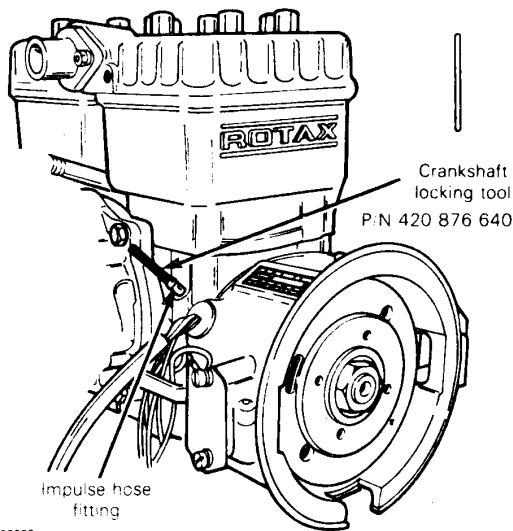
- muffler
- rewind starter
- starting pulley.

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

20, Flywheel retaining nut

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (service tool) as illustrated (magneto side piston must be at top dead center)
- remove magneto retaining nut.



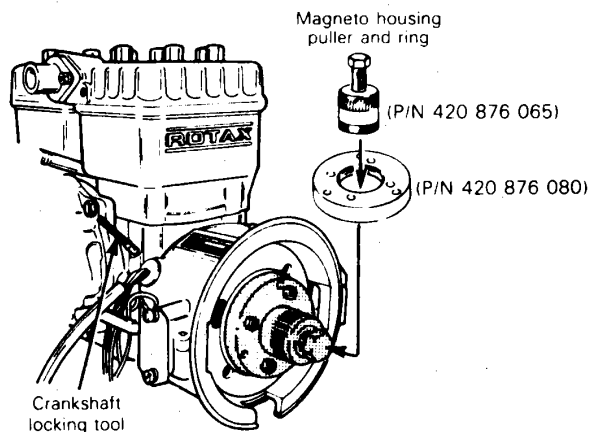
A015002008

○ **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 (service tool) as illustrated;
- adjust magneto housing puller and puller ring as illustrated;



A015002009

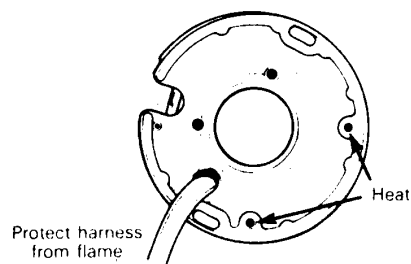
- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

2, Generating coil

To replace generating coil:

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



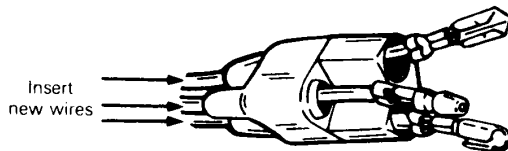
A001002003

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

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

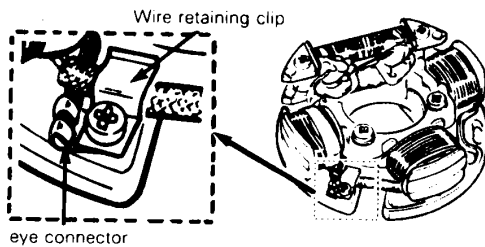
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector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



A001002004

▼ **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.



A001002005

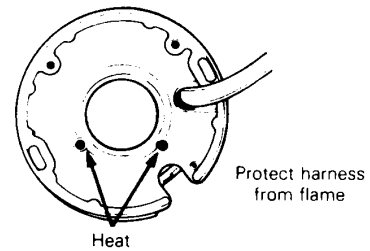
4,7, Generating coil screw & Loctite 242

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.

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

To replace lighting coil:

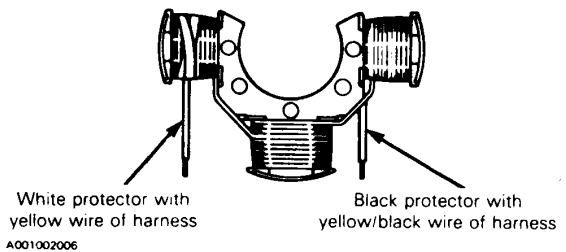
- Heat the armature plate around the screw holes to break the Loctite bond 93°C (200°F).



A001002003

▼ **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.



A001002006

10, Protector tube

Position protector tubes over connections.

6,7, Loctite 242 & lighting coil screws

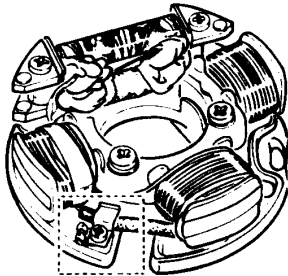
Prior to assembly, apply Loctite 242 (blue, medium strength).

- Fasten retaining clip onto protector tubes.

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

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



A001002005

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

ASSEMBLY

1,7,15,16,17, Armature plate, Loctite 242, washers, lock washers & screws

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, lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 95 N•m (70 lbf•ft).

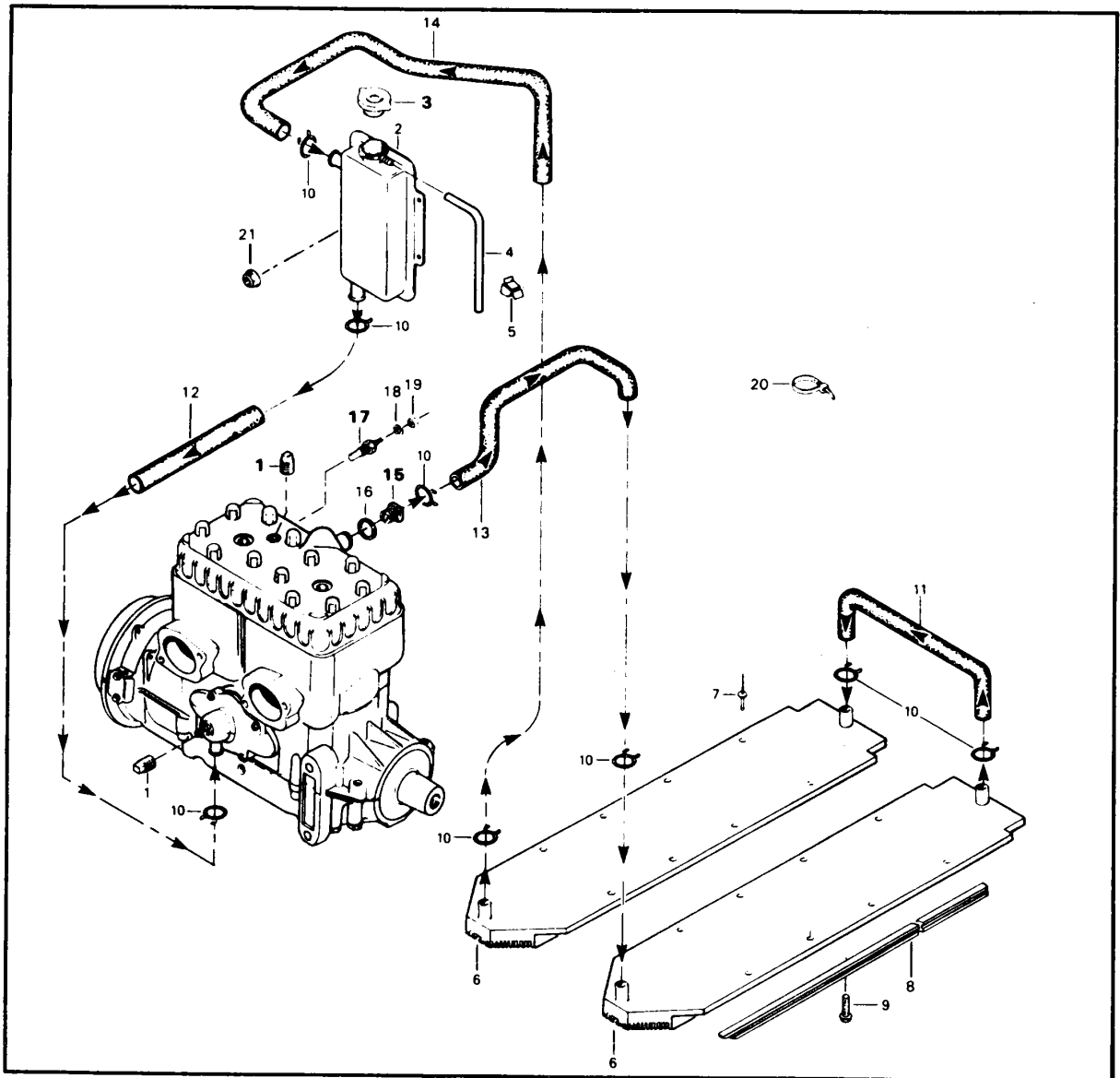
At reassembly coat all electric connections with silicone dielectric grease to prevent corrosion or moisture penetration.

▼ **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 06 (467 ENGINE TYPE)

COOLING SYSTEM



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

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

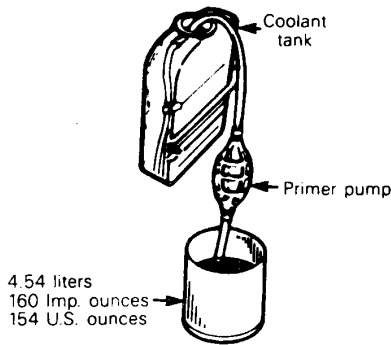
INSPECTION

Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

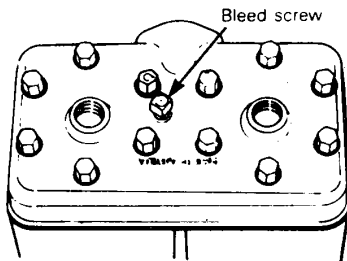
◆ **WARNING:** Never drain or refill the cooling system when engine is hot.

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.



A015002010

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



A015002011

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 90 kPa (13 PSI) of pressure.

15, Thermostat

To check thermostat, put in water and heat water. Thermostat should open when water temperature reaches 37°C (98°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.)
55% antifreeze + 45% water

▼ **CAUTION:** To prevent rust formation or freezing condition, always replenish the system with 55% antifreeze and 45% water. Pure antifreeze without water produces premature freezing. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

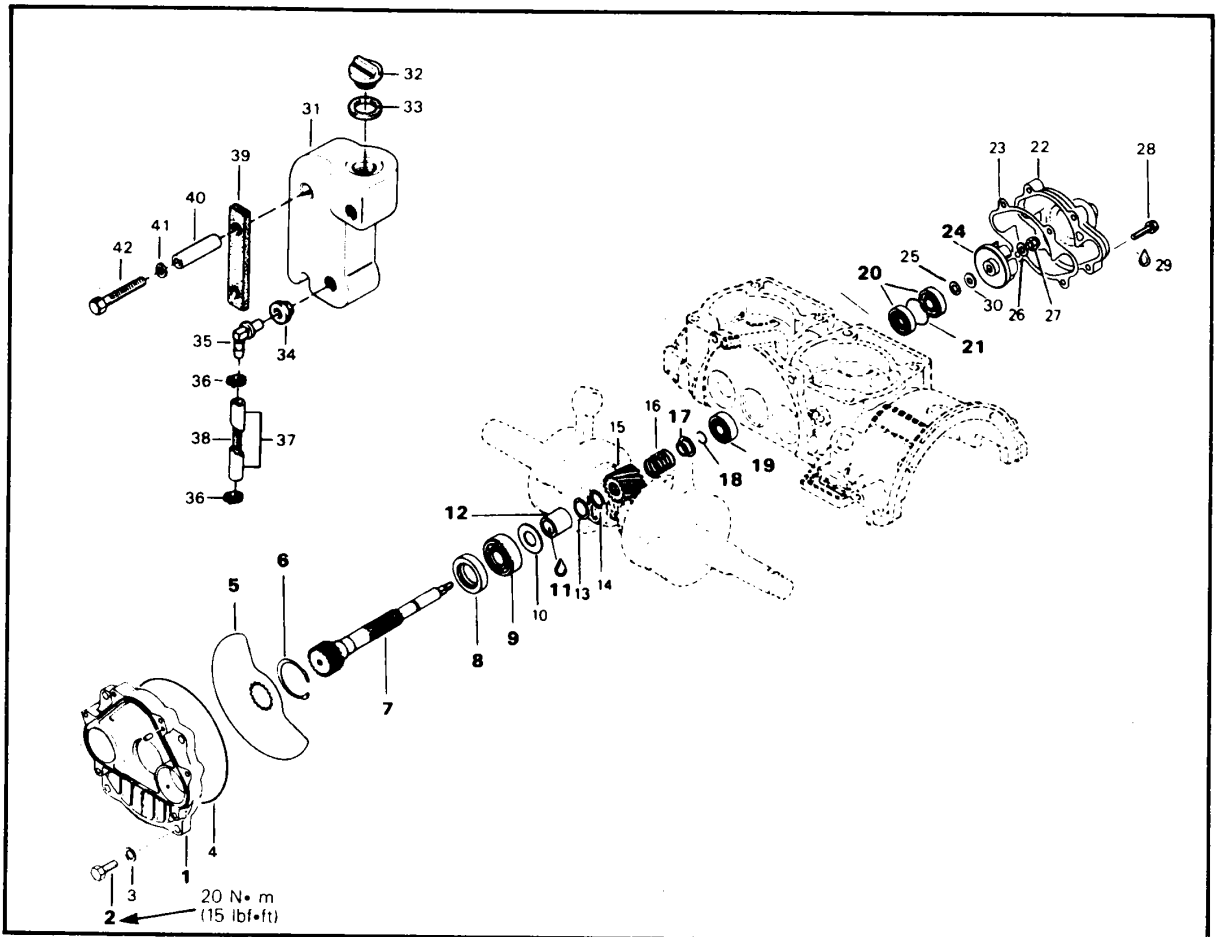
To refill cooling system:

- 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 25 mm (1") below filler neck.
- 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 level. Refill as required then put back the cap.

◆ **WARNING:** Before removing the cap place a cloth over the coolant tank and release the cap to the first step to release the pressure. Loss of fluid and possibility of severe burns could occur if this notice is disregarded.

Section 02 ENGINE
Sub-section 06 (467 ENGINE TYPE)

ROTARY VALVE, COOLANT PUMP & RESERVOIR



- | | |
|-----------------------------|---------------------------------|
| 1. Rotary valve cover | 22. Pump housing |
| 2. Bolt M8 × 20 (4) | 23. Gasket |
| 3. Lock washer 8 mm (4) | 24. Pump impeller |
| 4. O-ring | 25. Washer 8.1 mm |
| 5. Rotary valve | 26. Washer 6.4 mm |
| 6. Circlip | 27. Nut M6 |
| 7. Rotary valve shaft | 28. Bolt M6 × 25 (4) |
| 8. Seal | 29. Loctite 242 |
| 9. Bearing 6203 | 30. Friction washer |
| 10. Shim 0.5 mm | 31. Rotary valve oil tank |
| 11. Loctite 271 | 32. Oil tank cap |
| 12. Distance sleeve 24.5 mm | 33. O-ring |
| 13. Shim 0.5 mm | 34. Isolating washer (2) |
| 14. O-ring | 35. Elbow connector (2) |
| 15. Gear | 36. Hose clamp (4) |
| 16. Spring | 37. Oil line 7.75" (196 mm) (2) |
| 17. Spring retaining cup | 38. Spring (2) |
| 18. Circlip | 39. Isolator |
| 19. Bearing 6201 | 40. Spacer (2) |
| 20. Seal (2) | 41. Lock washer 6 mm |
| 21. Distance ring | 42. Hexagonal screw M6 x 85 (2) |

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

CLEANING

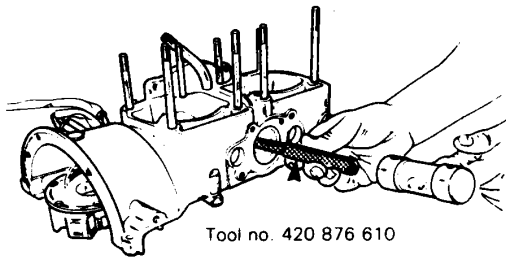
Discard all seals and O-rings.

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

DISASSEMBLY & ASSEMBLY

6,24, Pump impeller & circlip

To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip. Using the suitable pusher (P/N 420 876 610) and a fiber hammer, push shaft assembly.



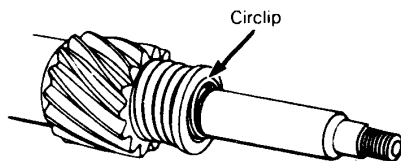
Tool no. 420 876 610

A015002012

▼ **CAUTION:** To prevent damage to the end of the rotary valve shaft, use pusher (tool P/N 420 876 610).

17,18, Spring retaining cup & circlip

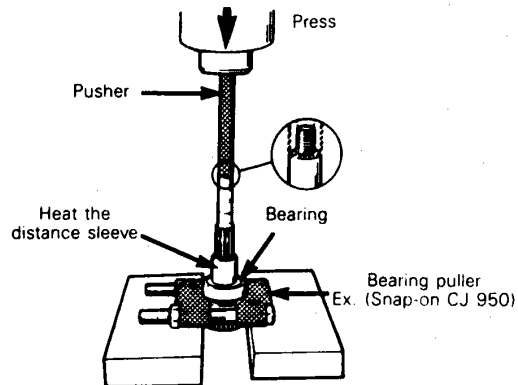
If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup in order to remove circlip.



A013002012

11,12, Distance sleeve & Loctite 271

To remove the distance sleeve use a bearing puller (Ex: Snap-on no. CJ 950) and pusher (P/N 420 876 610) as illustrated. Heat the distance sleeve to break the Loctite bond 93°C (200°F) and proceed as illustrated



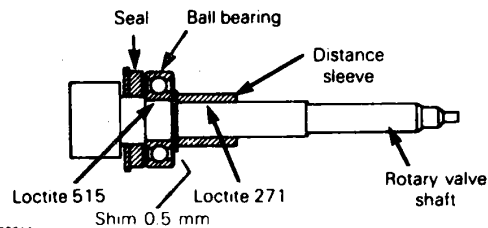
A013002013

▼ **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 271 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.



A013002014

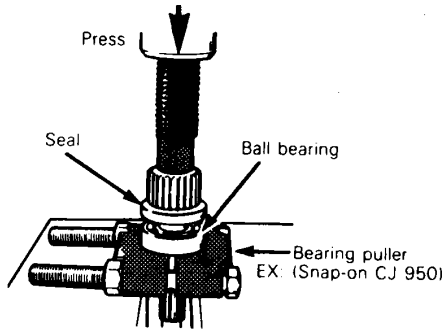
7,9, Rotary valve shaft & bearing 6203

At assembly, apply crankcase sealant Loctite 515 on bearing and rotary valve shaft mating surfaces.

▼ **CAUTION:** Don't put any Loctite on bearing balls.

Section 02 ENGINE
Sub-section 06 (467 ENGINE TYPE)

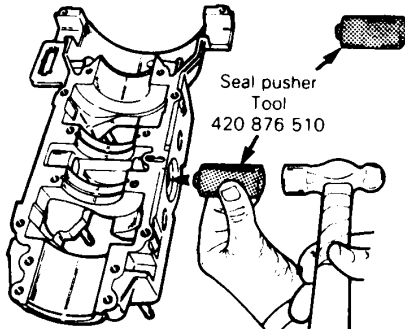
Install ball bearing as illustrated.



A013002015

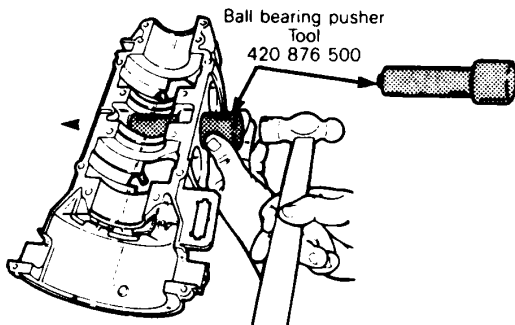
19,20,21, Bearing 6201, seal & distance ring

To remove bearing 6201 (the smallest one), seals and distance ring use pusher (P/N 420 876 510).



A015002013

To install ball bearing 6201 use ball bearing pusher (P/N 420 876 500).

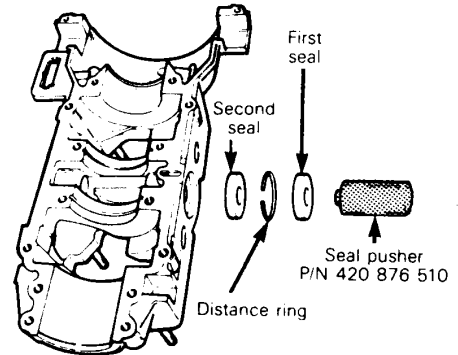


A013002028

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

20,21, Seals & distance ring

To install seals on water pump side proceed as follows:

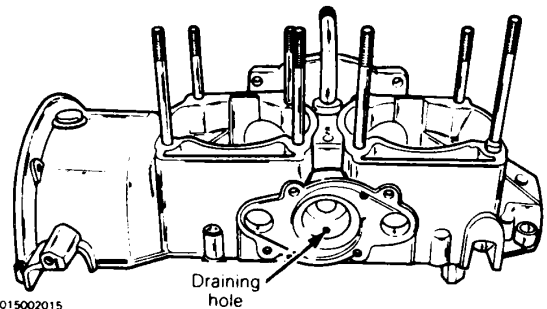


A015002014

Apply some lithium grease or equivalent on seal lips. Position all seals with shielded portion towards water pump using pusher (P/N 420 876 510). Align distance ring opening with crankcase draining hole (see note and illustration). Push seals and distance ring assembly against bearing.

○ **NOTE:** 35% of the distance between first and second seals must be filled with lithium grease or equivalent.

○ **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.



A015002015

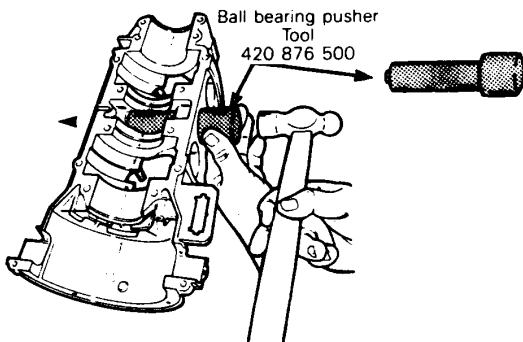
▼ **CAUTION:** Failure to position the seals as specified may provoke the seal spring to be corroded by coolant. Severe damages will occur if these notices are disregarded.

Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

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

○ **NOTE:** After seals installation, check if the water pump end bearing is correctly positioned (use pusher P/N 420 876 500).

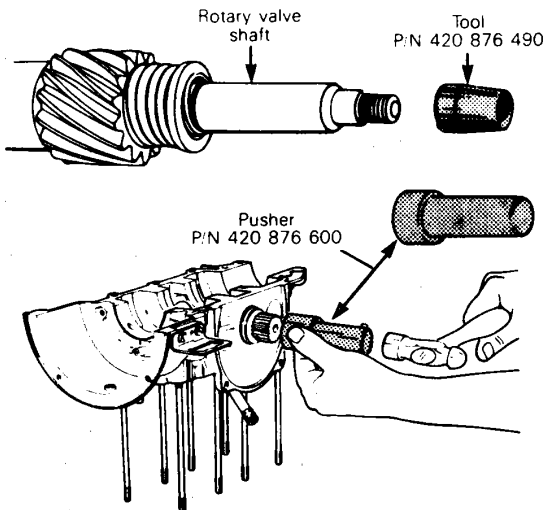


A015002028

7, Rotary valve shaft

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

- Pusher P/N 420 876 600.
- Water pump seal sleeve P/N 420 876 490.



A015002016

22,23, Pump housing bolts & Loctite 242

Apply Loctite 242 on bolts thread.

2, Rotary valve cover bolts

Torque the rotary valve cover bolts to 20 N•m (15 lbf•ft).

5, Rotary valve

Installation on genuine crankcase with mark (ridge)

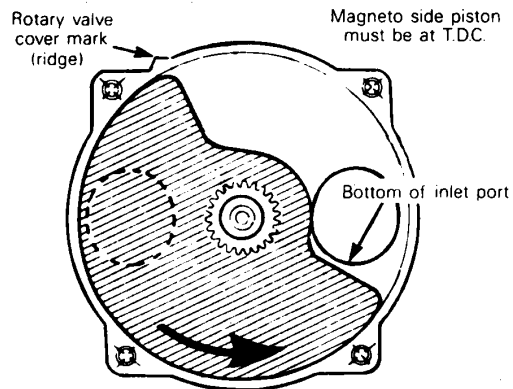
REQUIRED TOOL
Crankshaft locking tool
P/N 420 876 640

A000001039

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 will be 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 cover.

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



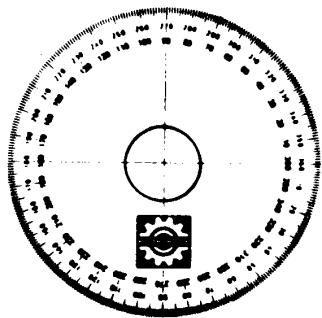
A013002028

Section 02 ENGINE
Sub-section 06 (467 ENGINE TYPE)

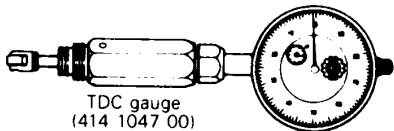
Installation on spare crankcase without mark (ridge)

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

REQUIRED TOOLS



Angle finder
(414 3529 00)



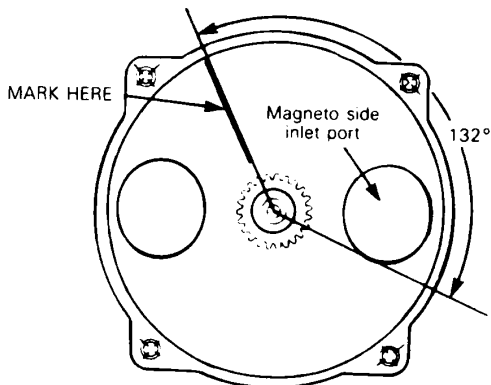
TDC gauge
(414 1047 00)

A000001086

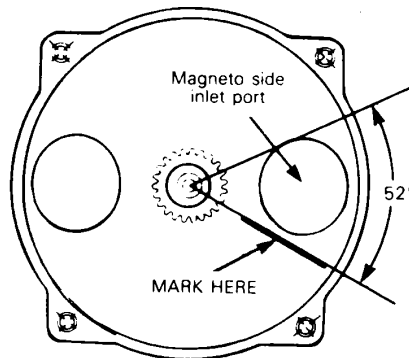
ENGINE TYPE	TIMING MARKS opening, closing
467	132°, 52°

For example: 132° opening
52° closing

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



A013002021

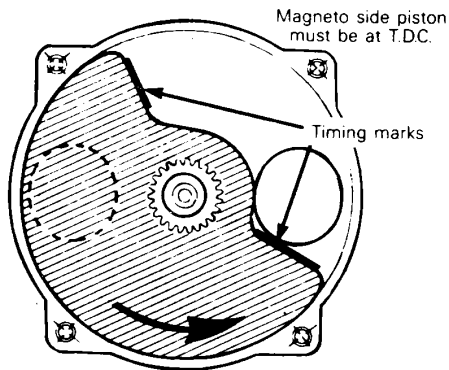


A013002027

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 T.D.C. 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.



A013002029

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

2, Rotary valve cover bolts

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

Section 02 ENGINE

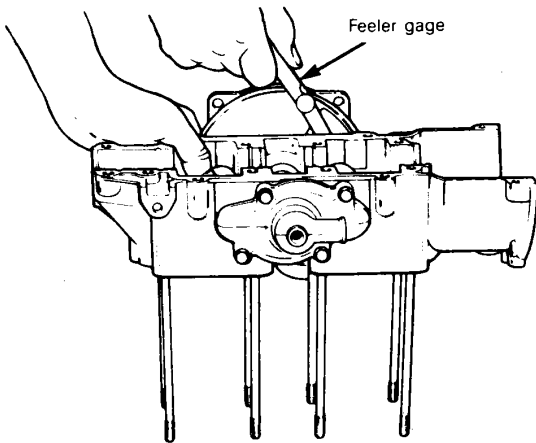
Sub-section 06 (467 ENGINE TYPE)

INSPECTION

1,5, Rotary valve cover & rotary valve

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

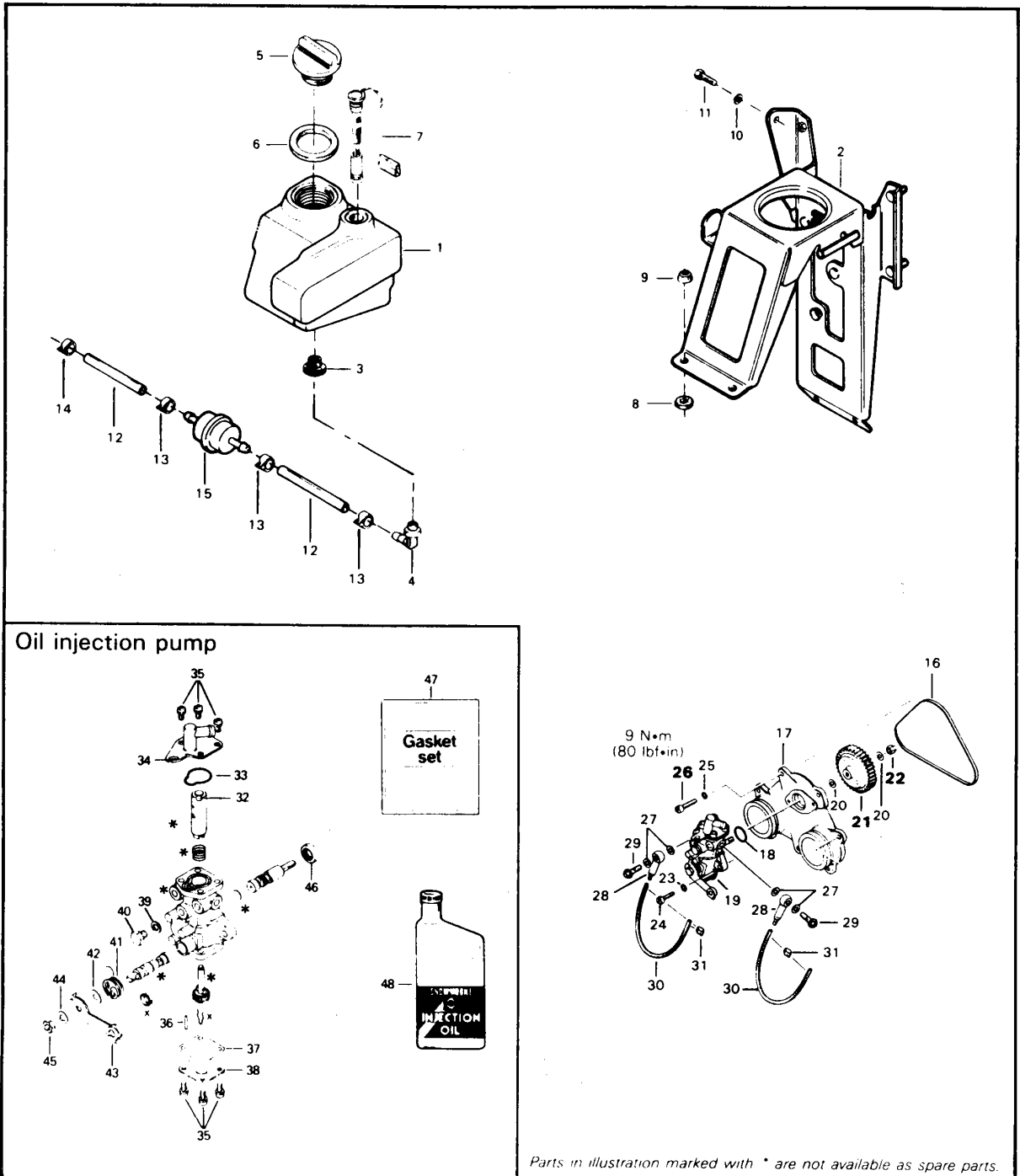
To measure this gap use a feeler gage inserted between rotary valve and upper crankcase with the rotary valve cover in place **without its O-ring**. Check the more surface as possible. Follow the same procedure for the lower crankcase.



A013002024

Section 02 ENGINE
Sub-section 06 (467 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 06 (467 ENGINE TYPE)

1. Injection oil tank
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" (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 mm
45. Hexagonal nut 6 mm
46. Seal
47. Gasket set
48. Injection oil (1 liter)

CLEANING

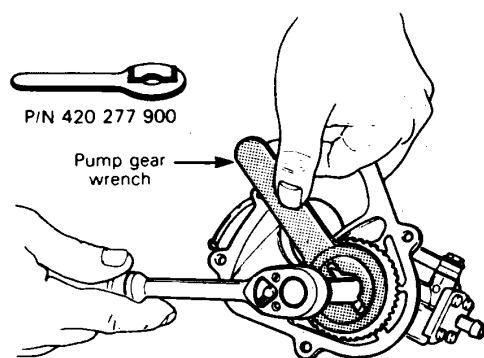
Discard all seals and O-rings. Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

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

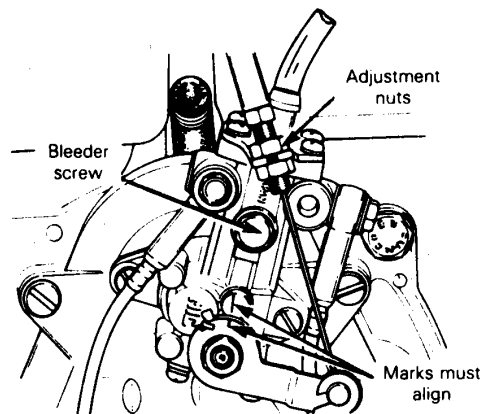
21,22, Oil pump gear & lock nut

To remove retaining nut, lock gear using no. 420 277 900 tool.



A000001085

Injection pump cable adjustment



A013002005

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. To bleed the main oil line (between tank and pump), loosen the bleeder screw (do not start engine) and let the air escape until oil starts to flow out.

Make sure tank has enough oil

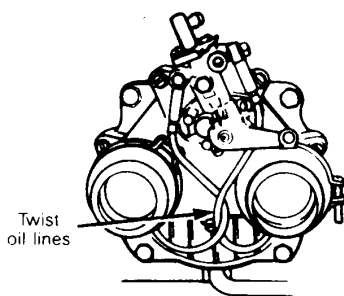
To bleed the small oil injection lines, start the engine and let it run at idle speed. Move injection pump lever to fully open position until lines are full of oil.

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

Always perform carburetor adjustment prior to oil injection pump adjustment.

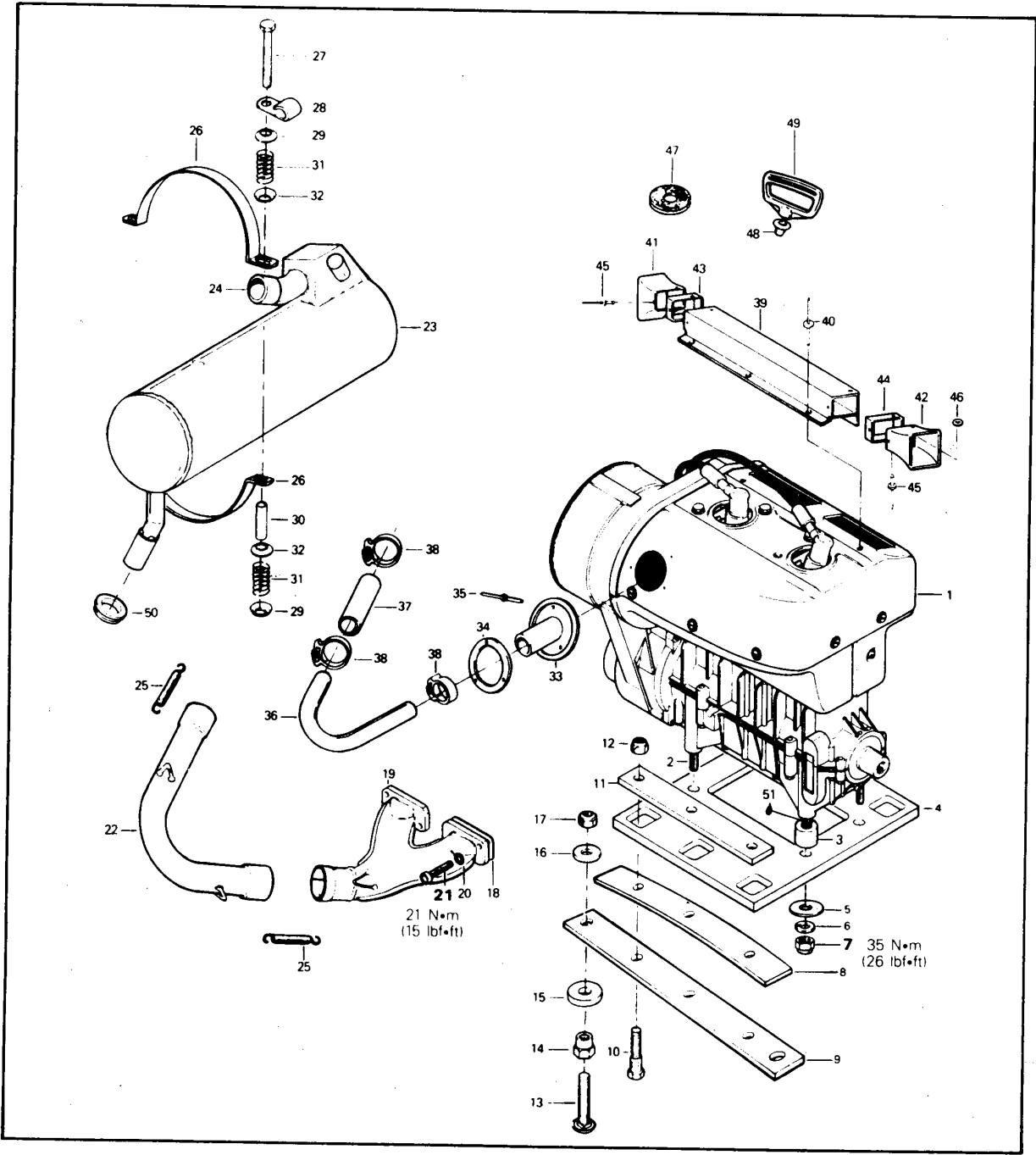
To synchronize pump with carburetor:

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. Tighten the lock nut.



503 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION



Section 02 ENGINE

Sub-section 07 (503 ENGINE TYPE)

- | | |
|--|--|
| 1. Engine Rotax type 503 | 27. Hexagonal head cap screw 5/16-18 x 3 1/4 |
| 2. Stud M10 x 45 | 28. Clip |
| 3. Distance sleeve | 29. Cup |
| 4. Engine bracket | 30. Bushing |
| 5. Flat washer 10.5 mm x 21 x 2 | 31. Spring |
| 6. Lock washer 10 mm | 32. Cup |
| 7. Hexagonal nut 10 mm | 33. Connector |
| 8. Leaf spring | 34. Connector ring |
| 9. Cross support | 35. Rivet |
| 10. Knurled screw | 36. Elbow |
| 11. Retainer plate | 37. Hose 4" (102 mm) |
| 12. Hexagonal elastic stop nut 5/16-24 | 38. Clamp |
| 13. Carriage bolt 3/8-24 x 1 1/2 | 39. Air duct |
| 14. Threaded spacer bushing | 40. Rivet |
| 15. Insulator rubber | 41. R.H. outlet duct |
| 16. Flat washer 25/64 x 7/8 x .090 | 42. L.H. outlet duct |
| 17. Hexagonal elastic stop nut 3/8-24 | 43. R.H. retainer clamp |
| 18. Gasket | 44. L.H. retainer clamp |
| 19. Exhaust manifold | 45. Rivet |
| 20. Lock washer 8 | 46. Flat washer |
| 21. Allen screw M8 x 30 | 47. Spark plug grommet |
| 22. Connector pipe | 48. Rubber buffer |
| 23. Muffler | 49. Starter grip |
| 24. Muffler female ball joint | 50. Exhaust grommet |
| 25. Spring | 51. Loctite 242 (blue, medium strength) |
| 26. Muffler clamp | |
-

REMOVAL FROM VEHICLE

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

- pulley guard, drive belt,
- muffler,
- clamp between intake manifold and carburetor,

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

- remove steering shaft,
- transmission rod,
- speed cable on speedo,
- brake cable on caliper,
- throttle cable from carburetor and handlebar,
- console,
- upper column,
- engine mount nuts.

ENGINE SUPPORT & MUFFLER DISASSEMBLY & ASSEMBLY

7,21, Crankcase/engine bracket nuts & exhaust manifold bolts

Torque the crankcase/engine bracket nut to 35 N•m (26 lbf•ft).

Torque the exhaust manifold bolt to 21 N•m (15 lbf•ft).

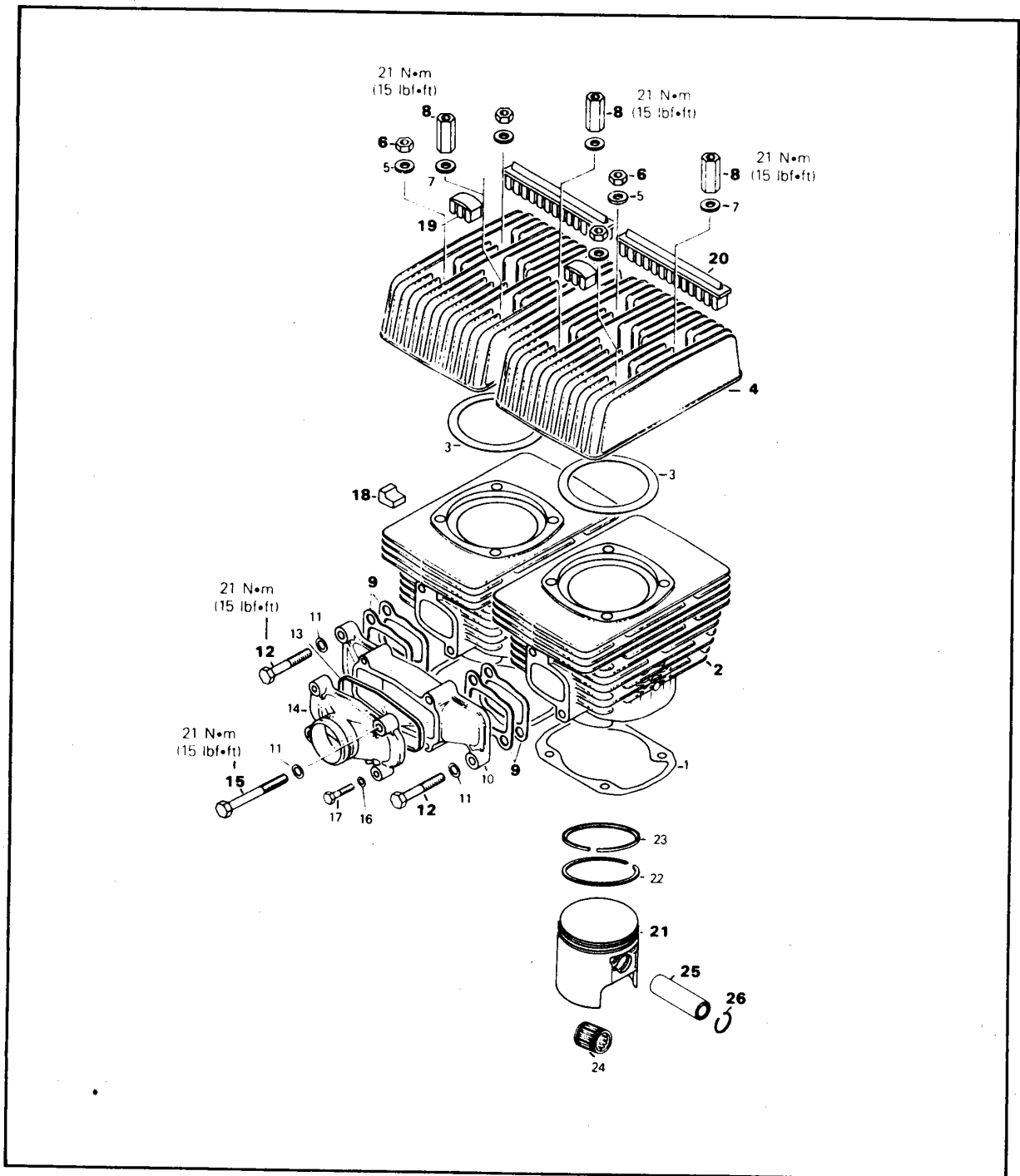
INSTALLATION ON VEHICLE

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

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

Section 02 ENGINE
Sub-section 07 (503 ENGINE TYPE)

TOP END



Section 02 ENGINE

Sub-section 07 (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 8 mm (4)
7. Washer 8.4 mm (4)
8. Distance nut 8 x 37 mm (4)
9. Intake manifold gasket (4)
10. Intake manifold
11. Lock washer 8 mm (4)
12. Hexagonal bolt M8 x 40 mm (2)
13. O-ring

14. Intake manifold cover
15. Hexagonal bolt M8 x 64 mm (2)
16. Lock washer 6 mm (2)
17. Hexagonal bolt M6 x 30 mm (2)
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. Gudgeon pin (2)
26. Circlip (4)

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 gudgeon 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 circlip from piston.

Drive the gudgeon pin out of piston using a suitable drive punch and hammer.



CAUTION: When tapping out gudgeon pins, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

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.	.08 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0020")
Cylinder/piston clearance	.07 mm (.0028")	.09 mm (.0035")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.0016")	.11 mm (.0043")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

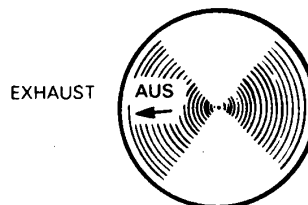


NOTE: For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

21,26, Pistons & circlips

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.



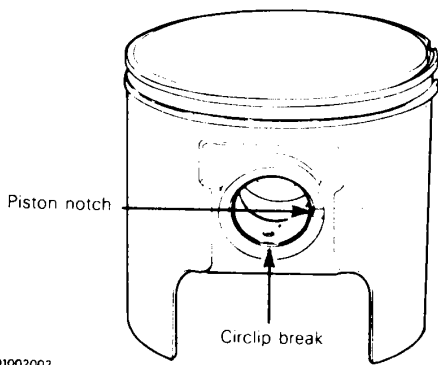
A001002001

Section 02 ENGINE
Sub-section 07 (503 ENGINE TYPE)

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 minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

Remove any burrs from piston caused through circlip installation using very fine emery cloth.



A001002002

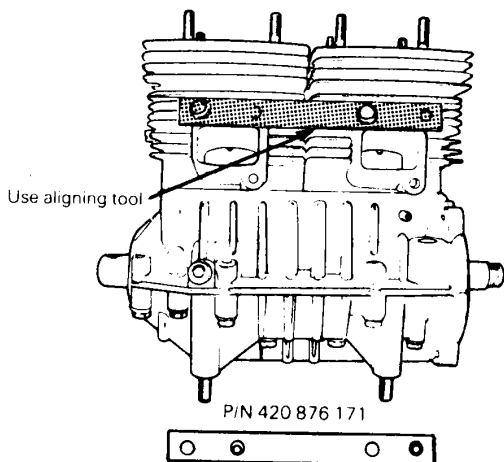
CAUTION: Circlips must not move freely in the groove after installation. If so, replace them.

2,21, Cylinders & pistons

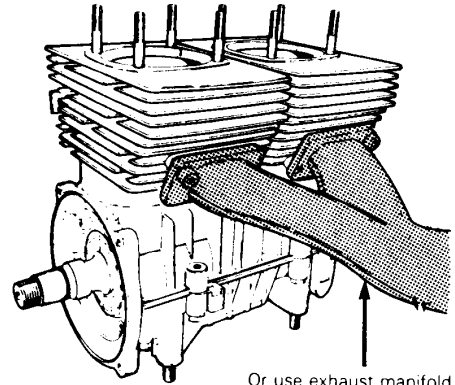
Before inserting piston in cylinder, lubricate the cylinder with new injection oil or equivalent.

2,4, Cylinders & cylinder heads

At cylinder and/or cylinder head installation, use P/N 420 876 171 aligning tool (or exhaust manifold) to ensure sealing of intake manifold and exhaust (See Tools Section), before tightening cylinder head nuts.



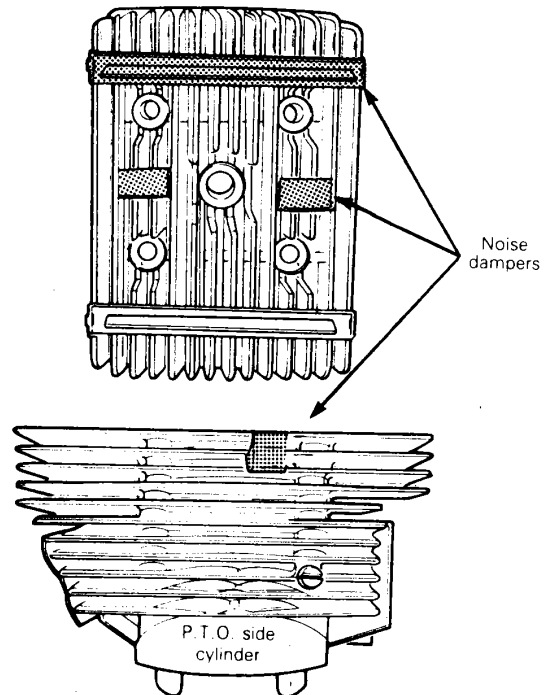
A017002001



A017002002

18,19,20, Noise dampers

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



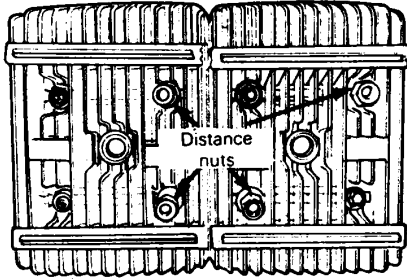
A017002003

Section 02 ENGINE

Sub-section 07 (503 ENGINE TYPE)

6,8, Nuts & distance nuts

Position nuts and distance nuts as illustrated.



A017002006

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 gaskets

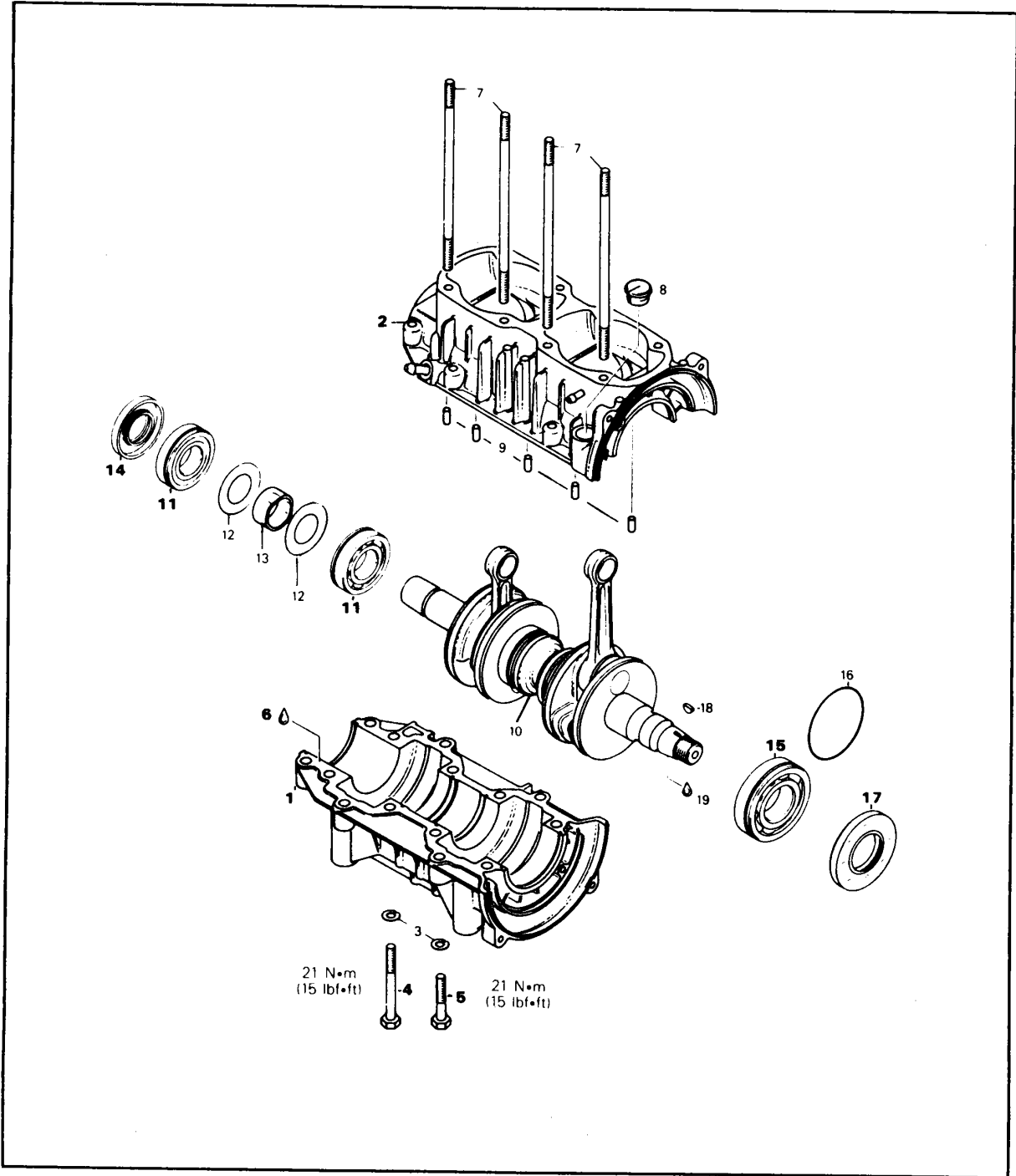
Install a gasket on each side of the air deflector.

12,15, Intake manifold bolts

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

Section 02 ENGINE
Sub-section 07 (503 ENGINE TYPE)

BOTTOM END



Section 02 ENGINE

Sub-section 07 (503 ENGINE TYPE)

1. Crankcase lower half
2. Crankcase upper half
3. Lock washer 8 mm (14)
4. Screw M8 x 70 (6)
5. Screw M8 x 45 (8)
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 P.T.O. side
15. Ball bearing 6207
16. O-ring
17. Seal mag side
18. Woodruff key
19. Loctite 242

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.

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

DISASSEMBLY

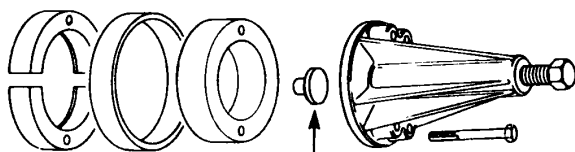
General

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

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

11,15, P.T.O. side bearings & mag. side bearing

To remove ball bearings from crankshaft, use a special puller (see Tools).



P.T.O. side
P/N 420 876 296

A000001017

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.	.08 mm (.0031")
Connecting rod big end axial play	.20 mm (.0079")	.53 mm (.0208")	1.0 mm (.0394")

NOTE: For the measurement procedures, refer to "Engines dimensions measurement", section 02-10.

ASSEMBLY

11,15, P.T.O. side bearings & mag. side bearing

Prior to installation, place bearings into an oil container filled with oil heated to 100°C (212°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.

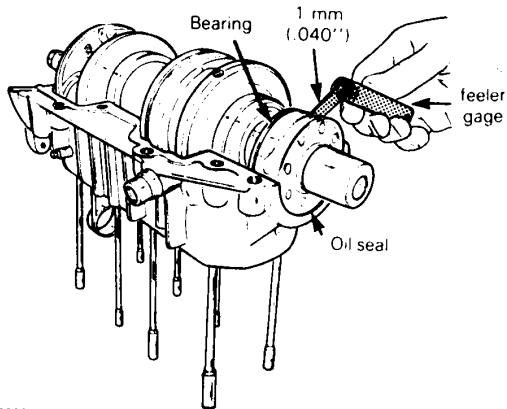
14,17, Oil seals

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

For bearing lubrication purpose, a gap of 1.0 mm (.040") 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.

Section 02 ENGINE
Sub-section 07 (503 ENGINE TYPE)



A017002007

1,2, Lower and upper crankcase

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

6, Loctite 515

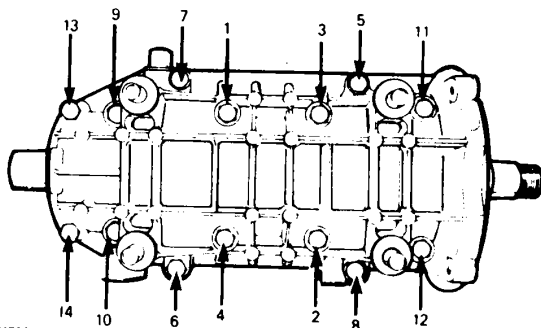
Prior to joining of crankcase halves spray some new injection oil (or equivalent) on all moving parts of the crankshaft. Then apply Loctite 515 (413 7027 00) on crankcases mating surfaces.

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 armature plate (tighten) on magneto side to correctly align the crankcase halves.

4,5, Crankcases bolts

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



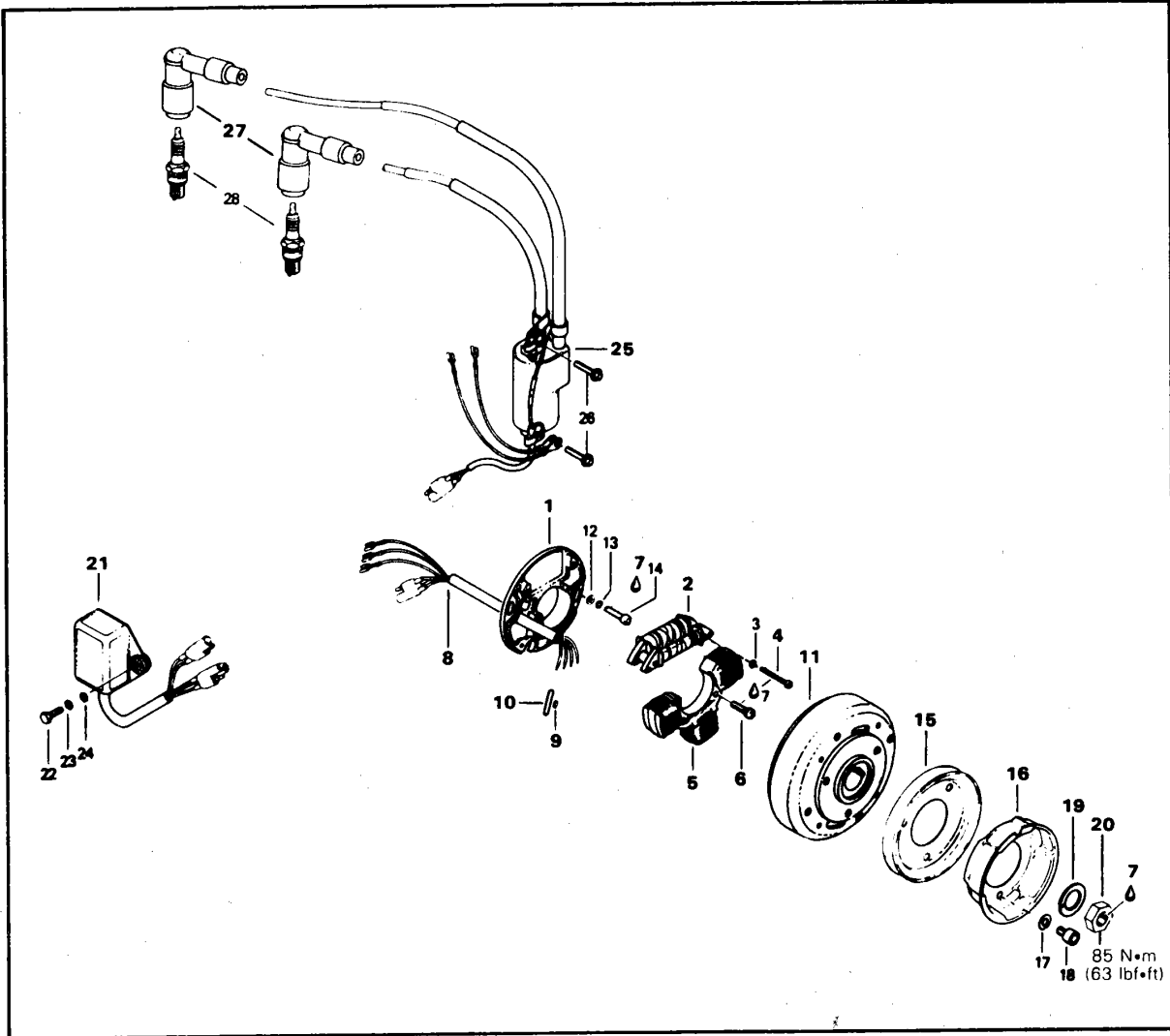
A017002008

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

Section 02 ENGINE

Sub-section 07 (503 ENGINE TYPE)

MAGNETO



1. Armature plate
2. Generating coil
3. Lock washer 5 mm (2)
4. Cylindrical slotted head screw M5 × 35 (2)
5. Lighting coil
6. Screw M6 × 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 × 18 (2)

15. V-belt pulley
16. Starting pulley
17. Lock washer 8 mm (3)
18. Allen screw M8 × 12 (3)
19. Lock washer 22 mm
20. Hexagonal nut 22 × 1.5 mm
21. C.D. box
22. Hexagonal screw M6 × 20 mm (2)
23. Lock washer 6 mm (2)
24. Washer 6.4 mm (2)
25. Ignition coil
26. Hexagonal head tapite screw M5 × 25 (2)
27. Spark plug protector (2)
28. Spark plug (2)

02-07-10

Section 02 ENGINE
Sub-section 07 (503 ENGINE TYPE)

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:

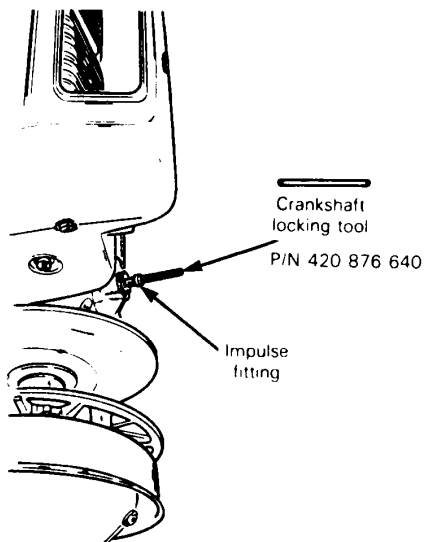
- rewind starter;
- starting and V-belt pulleys.

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

20, Flywheel retaining nut

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (P/N 420 876 640) as illustrated (magneto side piston must be at top dead center);
- remove magneto retaining nut.



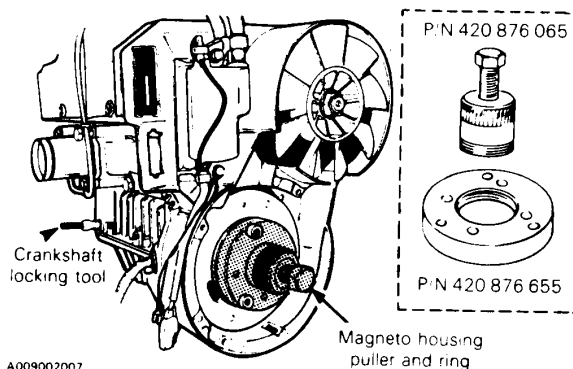
A009002011

○ **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 (service tool) and adjust magneto housing puller and puller ring (service tool) as illustrated;



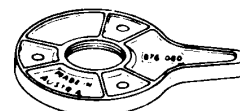
A009002007

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



P/N 420 876 065

A000001083



P/N 420 876 080

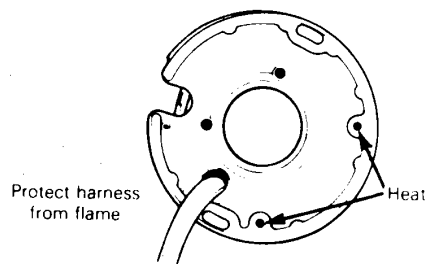
- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

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.



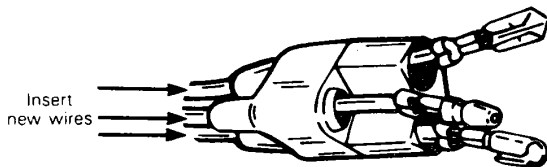
A001002003

Section 02 ENGINE

Sub-section 07 (503 ENGINE TYPE)

▼ CAUTION: Protect harness from flame.

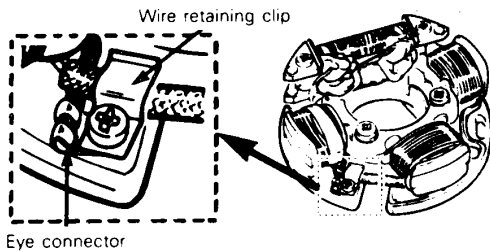
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector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



A001002004

▼ 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.



A001002005

4,7, Generating coil screws & Loctite 242

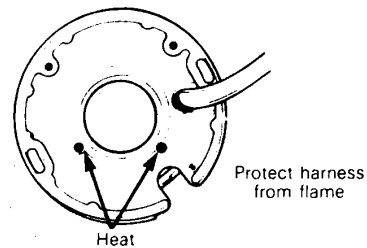
- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws before assembly.

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

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.



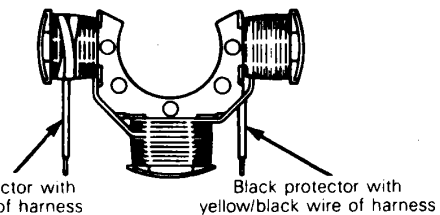
A001002003

▼ CAUTION: Protect harness from flame.

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

9,10, Splice connectors 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.



A001002006

- Position protector tubes over connections.

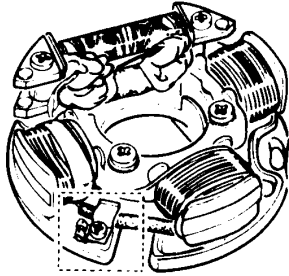
6,7, Lighting coil screws & Loctite 242

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

- Fasten retaining clip onto protector tubes.

Section 02 ENGINE
Sub-section 07 (503 ENGINE TYPE)

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



A001002005

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

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, lockwasher 22 mm, woodruff key

Position woodruff key, magneto flywheel and lockwasher 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 protectors

At reassembly coat all electric connections with silicone dielectric grease to prevent corrosion or moisture penetration.

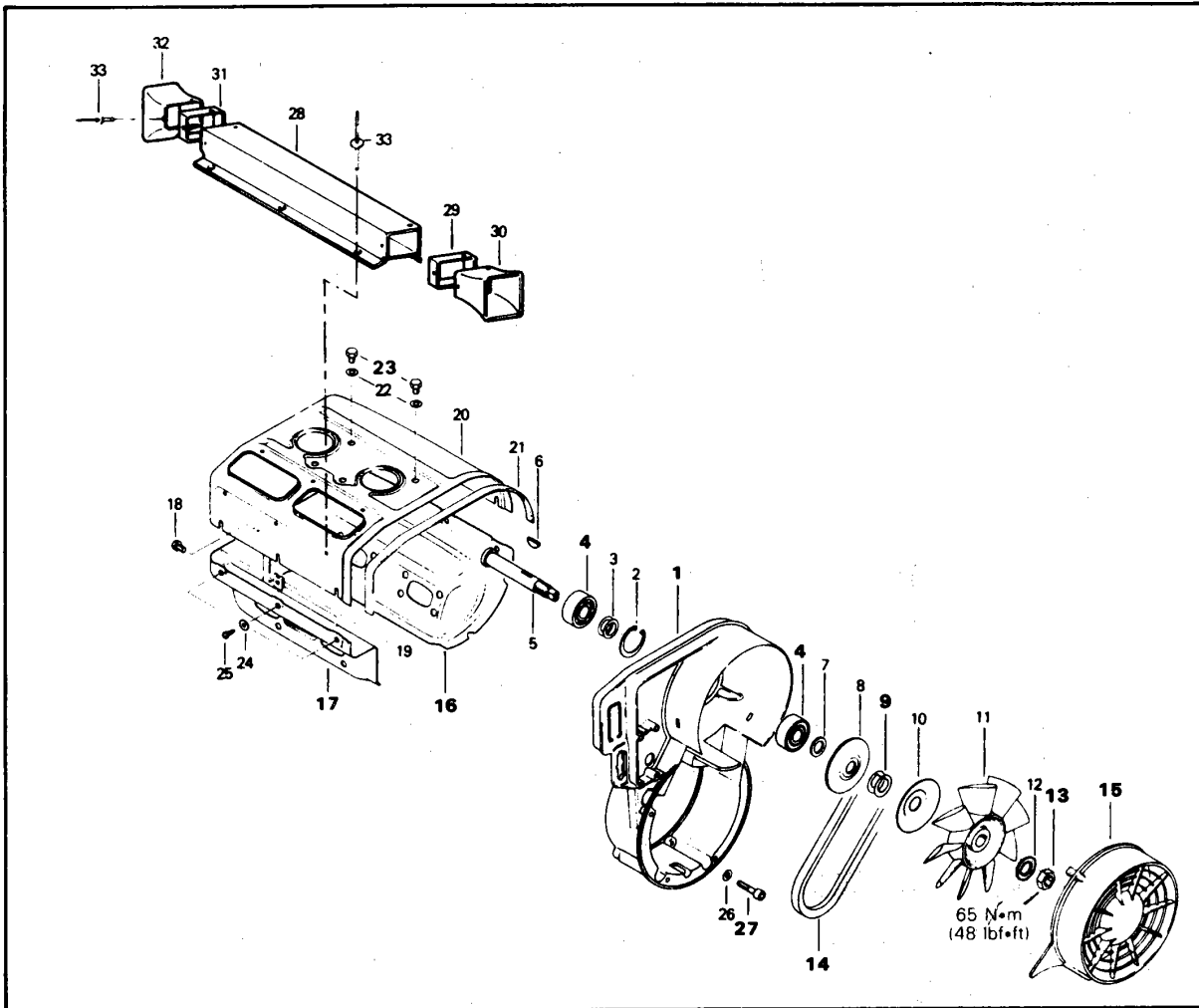
▼ **CAUTION:** Do not use silicone "sealant", this product will corrode contacts.

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

Section 02 ENGINE

Sub-section 07 (503 ENGINE TYPE)

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
13. Hexagonal nut 16 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 V4.8 (8)
20. Cylinder cowl, upper half
21. Sealing strip 440 mm
22. Lock washer 8 (4)
23. Hexagonal screw M8 x 16 (4)
24. Washer 4 x 15.8 (8)
25. Screw B4.8 x 16 (8)
26. Lock washer 6 (4)
27. Cylindrical screw M6 x 30 (4)
28. Air duct
29. R.H. retainer clamp
30. R.H. outlet duct
31. L.H. retainer clamp
32. L.H. outlet duct
33. Rivet

Section 02 ENGINE
Sub-section 07 (503 ENGINE TYPE)

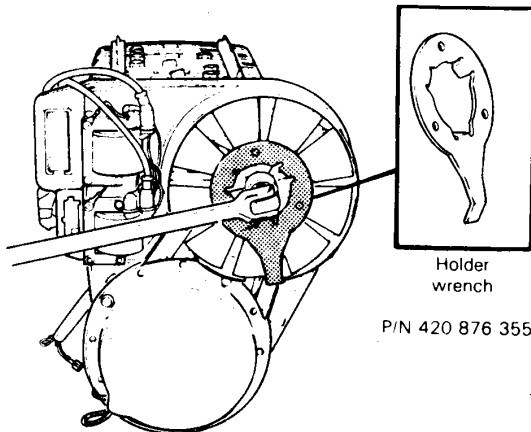
CLEANING

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

DISASSEMBLY AND ASSEMBLY

13, Fan retaining nut

To remove or install fan pulley retaining nut, lock fan pulley with special holder wrench. (Use tool P/N 420 876 355). At assembly, torque not to 65 N•m (48 lbf•ft).



A009002013

9,14, Shim & V-belt

Fan belt deflection must be 8.5 mm (11/32") when applying a force of 50 N (11 lbf). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lock washer.

1,4, Fan housing & bearings

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

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

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.

16,17, Cylinder cowls

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

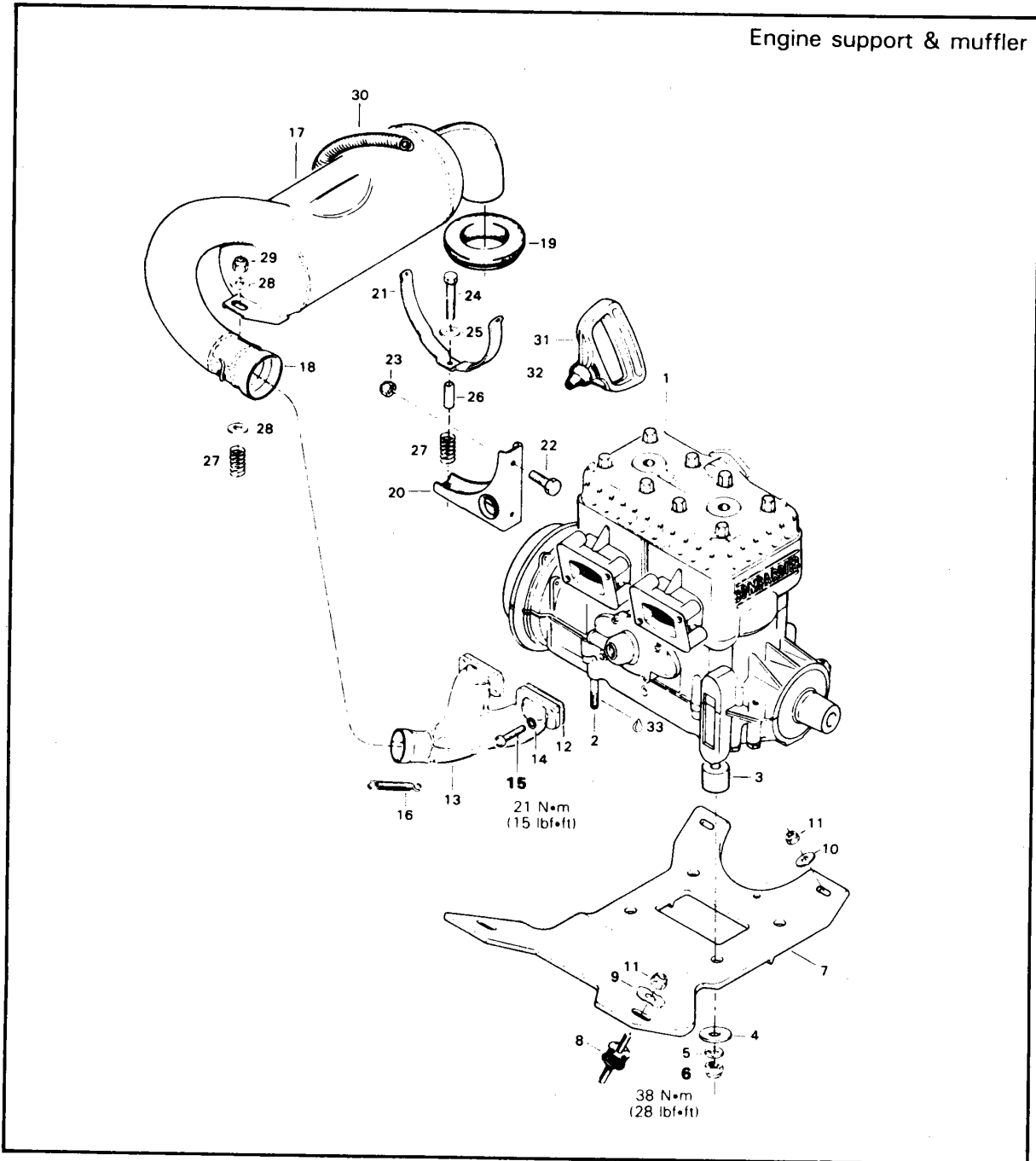
◆ **WARNING:** If fan protector is removed, always reinstall after servicing.



532 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION

Engine support & muffler



Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

- | | |
|--|---|
| 1. Engine | 18. Female ball joint |
| 2. Stud M10 x 52 (4) | 19. Exhaust washer |
| 3. Distance sleeve 22 mm (4) | 20. Muffler support |
| 4. Flat washer 10.5 mm x 21 x 2 (4) | 21. Muffler attachment |
| 5. Lock washer 10 mm (4) | 22. Hexagonal head cap screw M6 x 16 (2) |
| 6. Hexagonal nut 10 mm (4) | 23. Hexagonal elastic flanged stop nut 6 mm (2) |
| 7. Engine bracket | 24. Hexagonal head cap screw M6 x 20 |
| 8. Rubber mount (4) | 25. Flat washer 6 x 20 |
| 9. Internal tooth cup washer (2) | 26. Bushing |
| 10. Washer | 27. Spring (2) |
| 11. Hexagonal elastic stop nut M10 x 1.5 (4) | 28. Flat washer 8.4 x 25 x 1.6 (2) |
| 12. Gasket (2) | 29. Hexagonal elastic stop nut M8 x 1.25 |
| 13. Exhaust manifold | 30. Spring |
| 14. Lock washer 8 mm (4) | 31. Starter grip |
| 15. Cylindrical screw M8 x 30 (4) | 32. Rubber grip |
| 16. Spring (3) | 33. Loctite 242 (blue) |
| 17. Muffler | |

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- Battery cables and starter wires (see "Battery" section 04-04)
- Pulley guard and drive belt
- Clamp between carburetor and intake manifold
- Pulsation lines
- Muffler
- Electric wires
- Drain the cooling system and disconnect hoses at engine
- Rotary valve oil reservoir
- Disconnect rewind starter and cab retainer cable at engine

ENGINE SUPPORT & MUFFLER ASSEMBLY

6, 15, Crankcase/engine support nuts & exhaust socket allen screws

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

Torque the exhaust socket Allen screws to 21 N•m (15 lbf•ft).

INSTALLATION ON VEHICLE

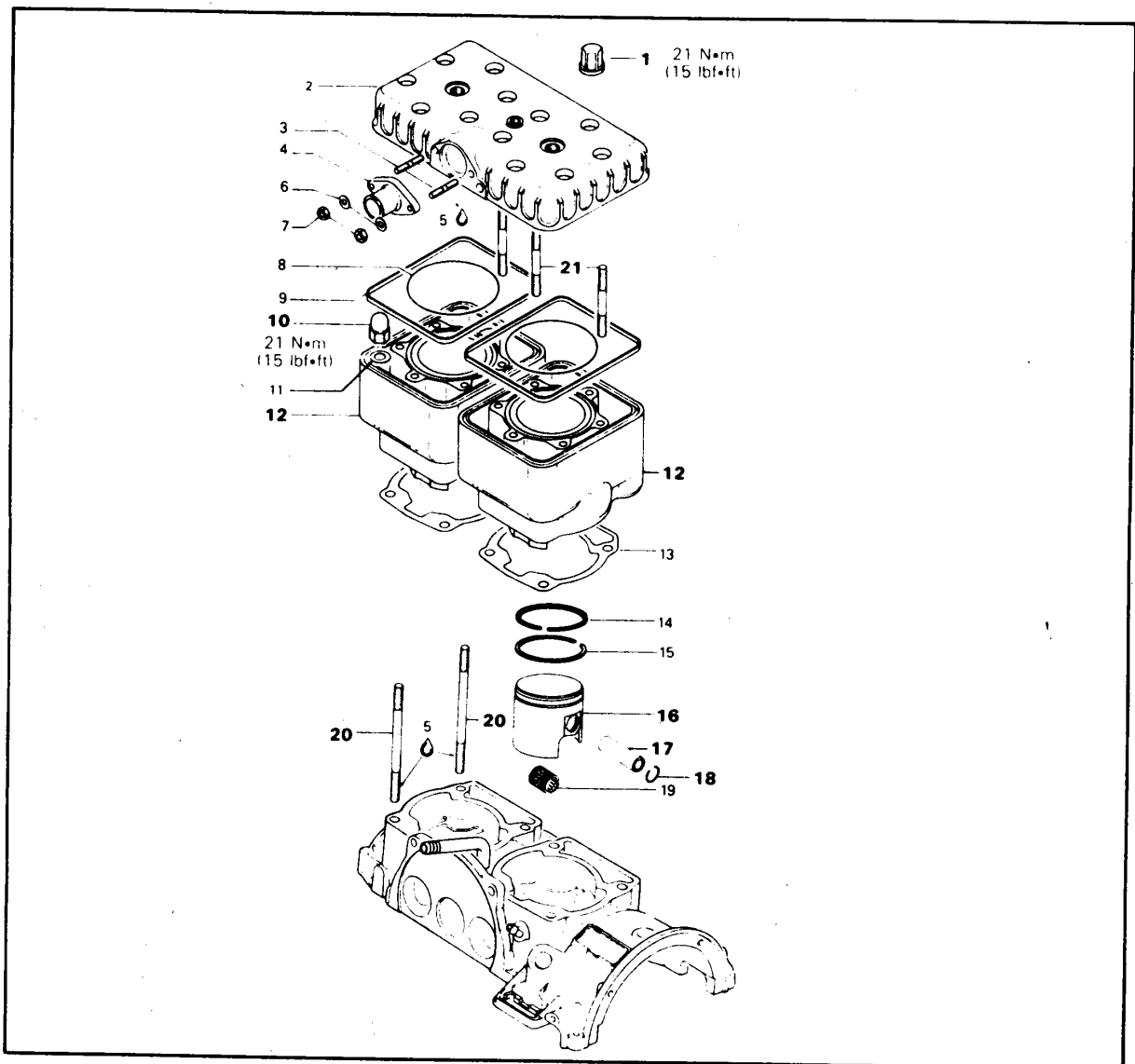
To install on vehicle, reverse removal procedure. However, pay attention to the following:

Check tightness of engine mount nuts.

Check pulley alignment and drive belt tension.

Section 02 ENGINE
Sub-section 08 (532 ENGINE TYPE)

TOP END



- | | |
|---------------------------------------|-----------------------------------|
| 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. Gudgeon 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 (12) |
| 11. Flat washer 8.4 (8) | |

Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

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 and 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, gudgeon pin & circlips

Place a clean cloth over crankcase then with a pointed tool inserted in piston notch, remove circlip from piston. Drive the gudgeon pin out of piston using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

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.	.08 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0020")
Cylinder:piston clearance	.10 mm (.0039")	.12 mm (.0047")	.20 mm (.0079")
Ring:piston groove clearance	.04 mm (.0016")	.11 mm (.0039")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

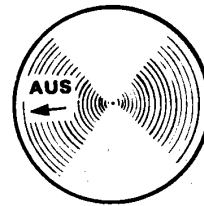
○ **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

16, Piston

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.

EXHAUST



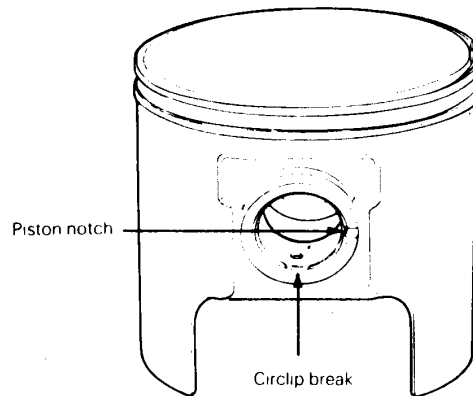
A001002001

○ **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.

18, Circlip

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.

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

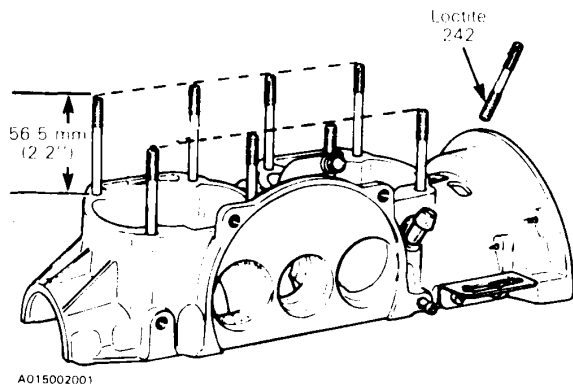


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Section 02 ENGINE
Sub-section 08 (532 ENGINE TYPE)

20, Crankcase studs

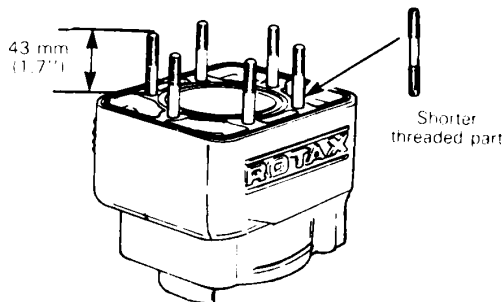
Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not protrude by more than 56.5 mm (2.2").



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

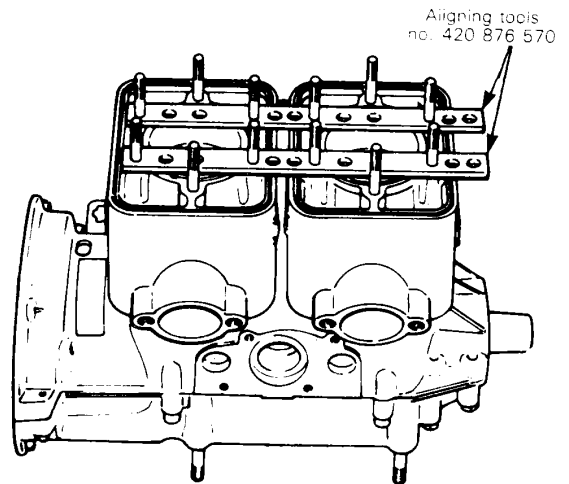
12,21, Cylinder & cylinder head stud

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 (1.700"). 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.



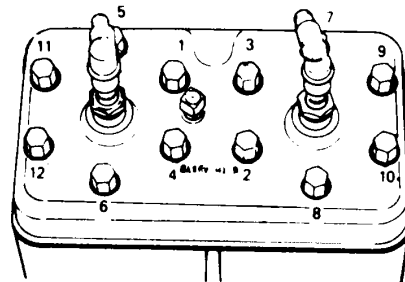
10,12, Crankcase/cylinder nuts & cylinders

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. A special tool (as per illustration) (or cylinder head itself) can be used to align the cylinders. Cross torque cylinder nuts to 21 N•m (15 lbf•ft).



1, Cylinder head nut

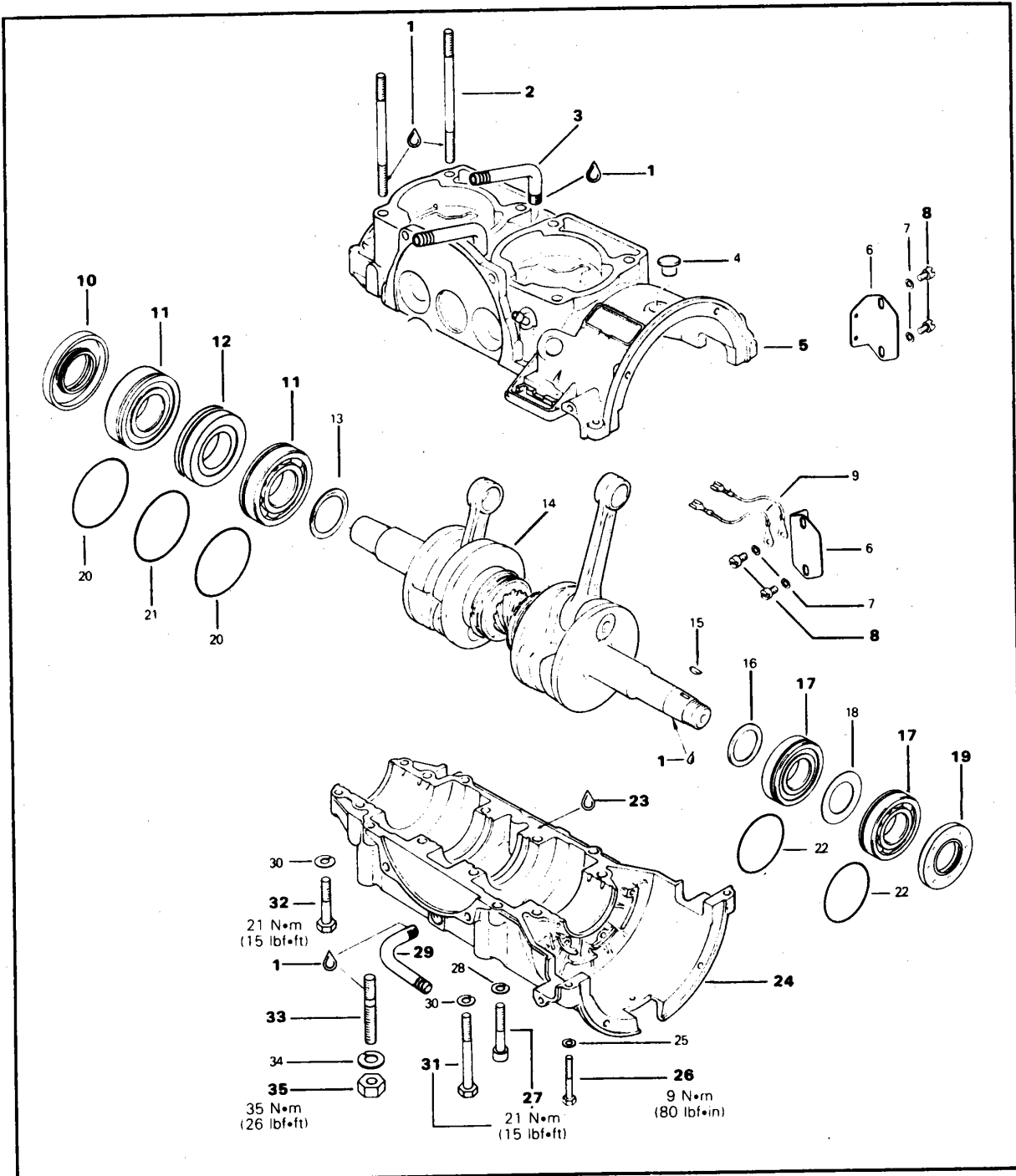
Torque cylinder head nuts to 21 N•m (15 lbf•ft) following illustrated sequence.



Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

BOTTOM END



Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

1. Loctite 242
2. Stud M8 x 79 (8)
3. Angular tube, oil inlet
4. Plug
5. Crankcase upper half
6. Cover (2)
7. Lock washer 6 mm (4)
8. Cyl. slotted head screw M6 x 10 (4)
9. Mass cable ass'y
10. Seal
11. Ball bearing 6207 (2)
12. Labyrinth sleeve
13. Distance ring
14. Crankshaft
15. Woodruff key 3 x 3,7
16. Distance ring
17. Ball bearing 6206 (2)
18. Shim 1 mm

19. Seal
20. O-ring (2)
21. O-ring
22. O-ring (2)
23. Loctite 515
24. Crankcase lower half
25. Lock washer 6 mm (2)
26. Hex. screw M6 x 35 (2)
27. Screw M8 x 40 (4)
28. Lock washer 8 mm (4)
29. Angular tube, oil outlet
30. Lock washer 8 mm (10)
31. Hex. screw M8 x 64 (8)
32. Hex. screw M8 x 45 (2)
33. Stud M10 x 42 (4)
34. Lock washer 10 mm (4)
35. Hex. nut M10 (4)

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 or equivalent.

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

DISASSEMBLY

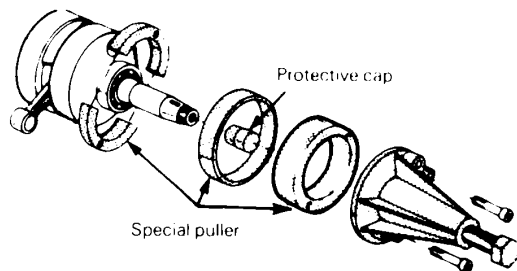
General

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

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

11, 17, Crankshaft bearings

To remove bearings from crankshaft use a protective cap and special puller as illustrated.



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INSPECTION

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

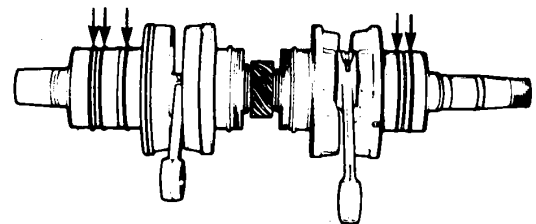
MEASUREMENTS	TOLERANCES		WEAR LIMIT
	FITTING NEW PARTS (MIN.)	(MAX.)	
Crankshaft deflection	N.A.	N.A.	.08 mm (.0032")
Connecting rod big end axial play	.40 mm (.0157")	.73 mm (.0287")	1.2mm (.0468")

○ **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

11,12,17, Crankshaft bearings & labyrinth sleeve

Prior to installation, place bearings into an oil container and heat the oil to 100° C (210° F). This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration.



A015002005

Section 02 ENGINE

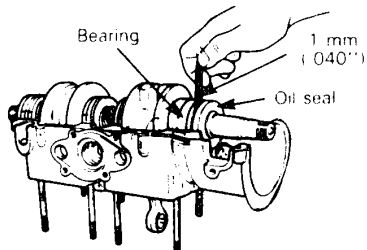
Sub-section 08 (532 ENGINE TYPE)

10,19, Seals

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

For bearing lubrication purpose, a gap of 1.0 mm (.040") 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.



A015002007

5,23,34, Upper crankcase, Loctite 515 & lower crankcase

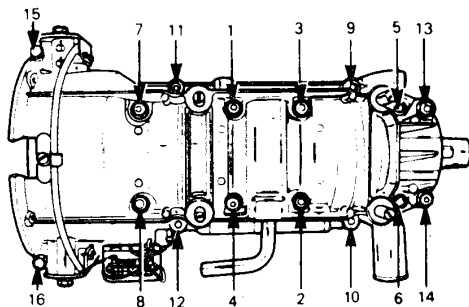
Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of Loctite 515 (413 7027 00) on mating surfaces.

NOTE: Prior 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 torque bolts by hand then install armature plate (tighten) on magneto side to correctly align crankcase halves. Torque bolts as specified following illustrated sequence.

Follow sequence shown
1 to 14 - 21 N•m (15 lbf•ft)
15 and 16 - 9 N•m (80 lbf•in)



A015002006

02-08-8

NOTE: Torque the two smaller bolts (15 and 16) on magneto side to 9 N•m (80 lbf•in).

1,3,8,29, Loctite 242 angular tubes (oil inlet & oil outlet) & cover screws

Apply Loctite 242 on threads prior to assembly angular tubes and cover screws.

27,31,32, Crankcase M8 Screws

Torque the crankcase M8 screws to 21 N•m (15 lbf•ft).

26, Crankcase M6 screws

Torque the crankcase M6 screws to 9 N•m (80 lbf•in).

1,33, Loctite 242 & crankcase stud

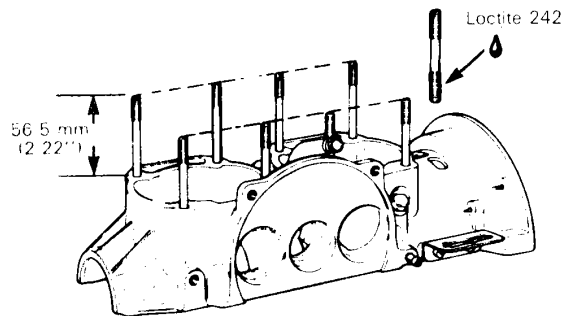
At assembly on crankcase, apply Loctite 242 on stud threads.

35, Crankcase/engine bracket nut

Torque the crankcase/engine bracket nut to 35 N•m (26 lbf•ft).

1,2, Loctite 242 & upper crankcase studs

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").



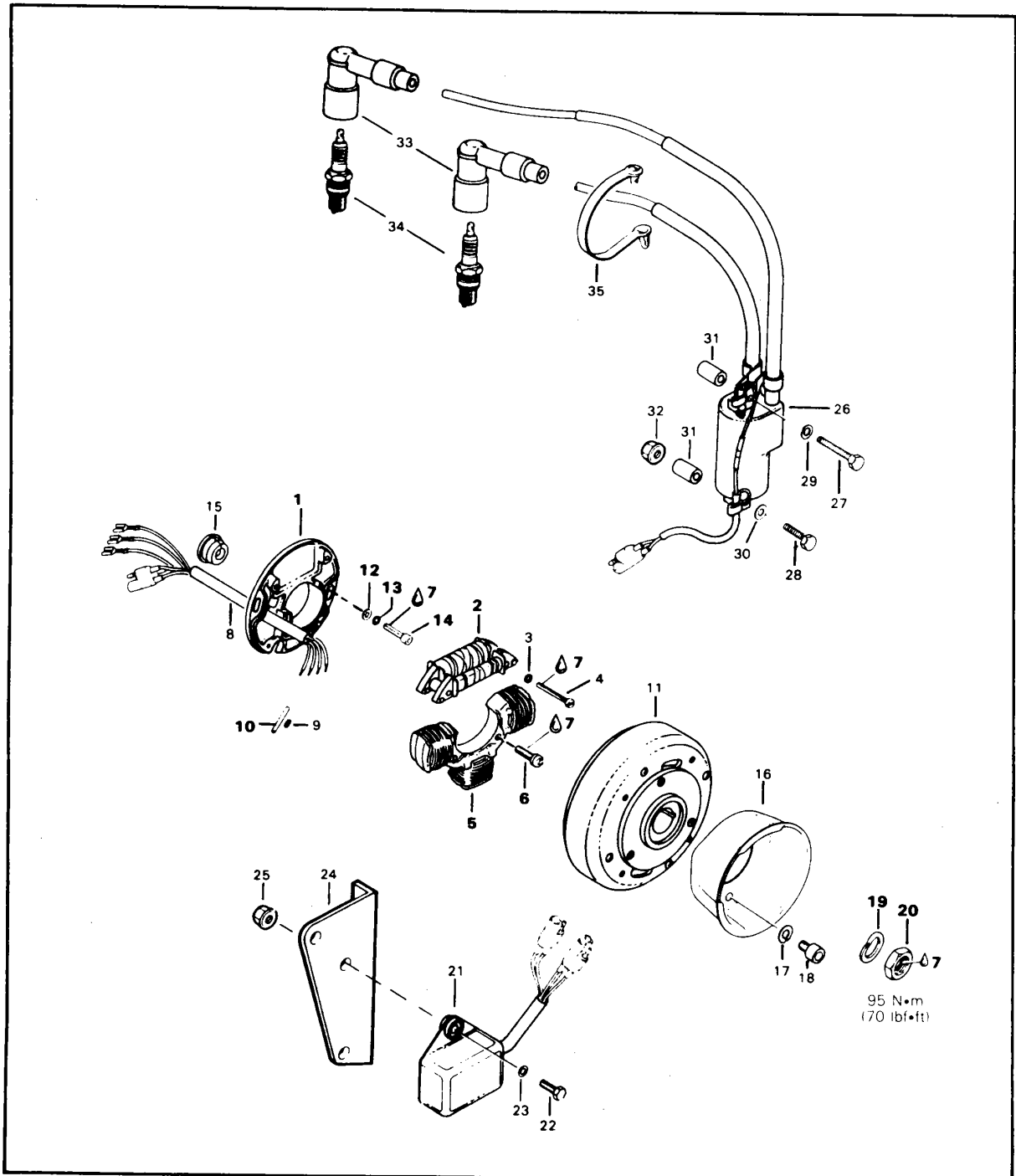
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Apply Loctite 242 on the threaded end of the studs going into the crankcase.

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

Section 02 ENGINE
Sub-section 08 (532 ENGINE TYPE)

MAGNETO



Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

1. Armature plate
2. Generation 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. Washer 5.5 mm (2)
13. Lock washer 5 mm (2)
14. Allen screw M5 x 18 (2)
15. Cable grommet
16. Starting pulley
17. Lock washer 8 mm (3)
18. Allen screw M8 x 16 (3)

19. Lock washer 22 mm
20. Hexagonal nut 22 x 1.5 mm
21. C.D. box
22. Hexagonal screw M6 x 20 (2)
23. Flat washer (2)
24. Coil support
25. Hexagonal elastic flanged stop nut M6 (2)
26. Ignition coil
27. Hexagonal screw M6 x 50
28. Hexagonal screw M6 x 45
29. Lock washer 6 mm (2)
30. Flat washer 6.4 mm (2)
31. Bushing (2)
32. Hexagonal elastic flanged stop nut M6
33. Spark plug protector (2)
34. Spark plug (2)
35. Cable clip

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:

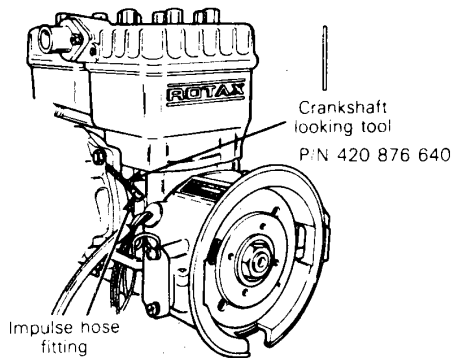
- muffler (if applicable)
- rewind starter
- starting pulley

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

20, Flywheel retaining nut

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (service tool) as illustrated (magneto side piston must be at top dead center)
- remove magneto retaining nut.



02-08-10

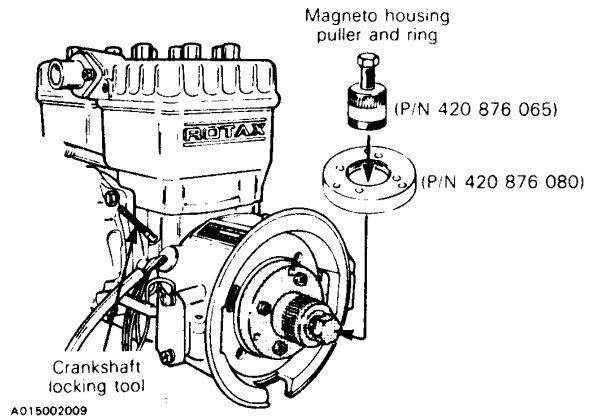
○ **NOTE:** It should be noted that to correctly remove a Loctite locked fastener it is first necessary to tap on the fastener to break the Loctite bond. This will eliminate the possibility of thread breakage.

11, Flywheel

To remove magneto housing (flywheel):

lock crankshaft with crankshaft locking tool (service tool) as illustrated;

adjust magneto housing puller and puller ring as illustrated;



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

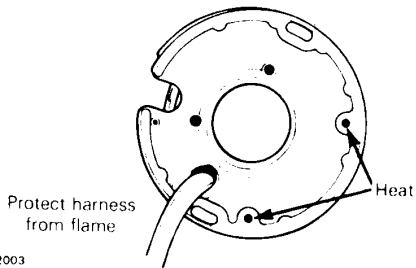
Section 02 ENGINE
Sub-section 08 (532 ENGINE TYPE)

REPAIR

2, Generating coil

To replace generating coil:

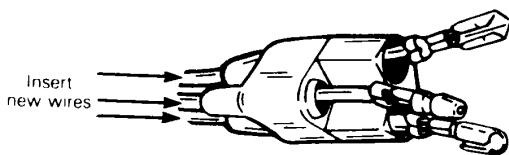
- heat the armature plate around the screw holes to break the Loctite bond 93° C (200° F).



A001002003

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

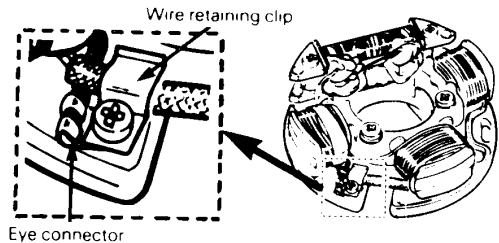
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector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



A001002004

▼ **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.



A001002005

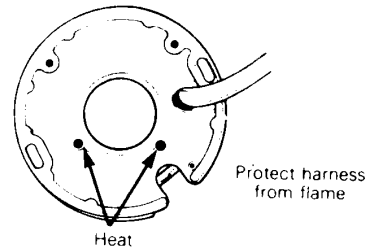
5,7, Generating coil screw & Loctite 242

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.

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

To replace lighting coil:

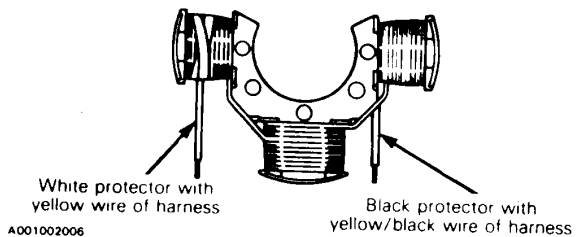
- Heat the armature plate around the screw holes to break the Loctite bond 93° C (200° F).



A001002003

▼ **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.



A001002006

Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

10, Protector tube

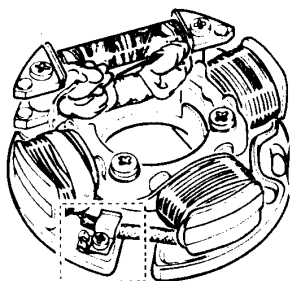
Position protector tubes over connections.

6,7, Loctite 242 & lighting coil screws

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

— Fasten retaining clip onto protector tubes.

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



A001002005

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

ASSEMBLY

1,7,12,13,14, Armature plate, Loctite 242, washers, lock washers & nut

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, lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 95 N•m (70 lbf•ft).

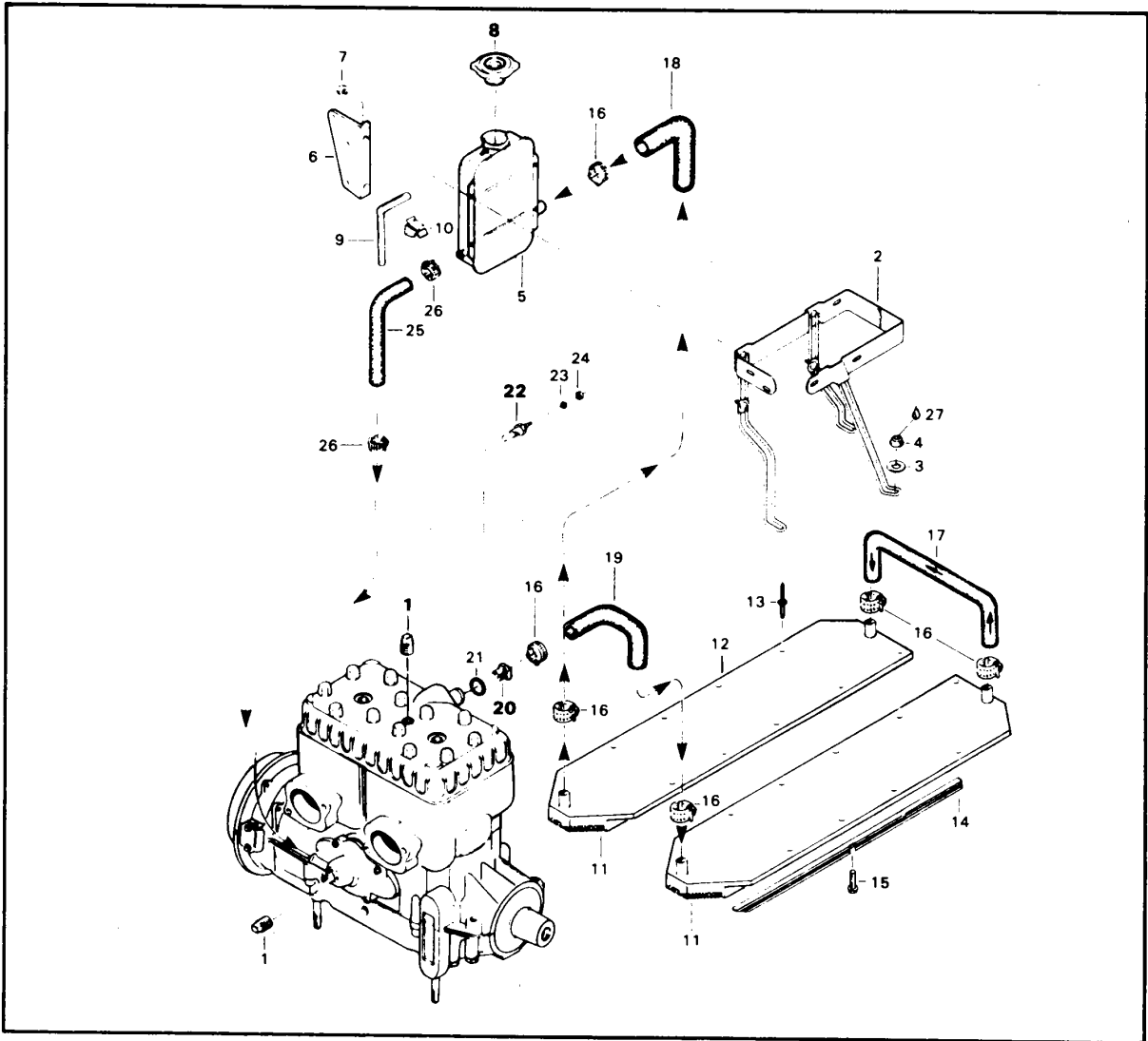
At reassembly coat all electric connections with silicone dielectric grease (P/N 413 7017 00) to prevent corrosion or moisture penetration.

▼ **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 08 (532 ENGINE TYPE)

COOLING SYSTEM



- | | |
|---|---|
| 1. Plug (2) | 15. Hexagonal taptite washer head screw M5 x 15 (2) |
| 2. Tank support | 16. Clamp (6) |
| 3. Flat washer 6.2 mm (3) | 17. U-hose |
| 4. Hexagonal elastic stop nut M5 x .080 (3) | 18. Hose |
| 5. Coolant tank | 19. Hose |
| 6. Coil support | 20. Thermostat |
| 7. Hexagonal elastic flanged stop nut M5 x 0.80 (4) | 21. Grommet |
| 8. Pressure cap | 22. Sender |
| 9. Overflow hose | 23. Lock washer |
| 10. Clip | 24. Hexagonal nut |
| 11. R. H. radiator | 25. Hose |
| 12. L. H. radiator | 26. Clamp (2) |
| 13. Rivet (40) | 27. Loctite 271 (red, high strength) |
| 14. Radiator protector (2) | |

Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

INSPECTION

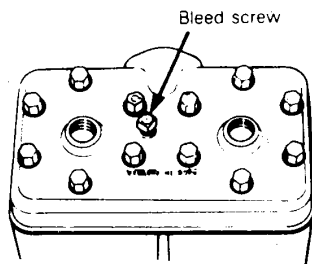
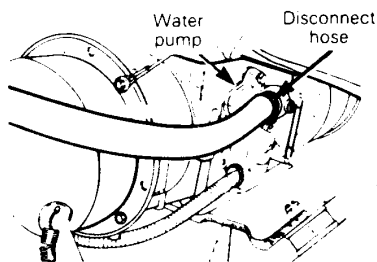
Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

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

To drain cooling system:

- Use a length of hose long enough to drain coolant into a container lower than engine.
- Remove the engine coolant hose from water pump.
- Connect "drain hose" onto water pump.
- Put both hose ends into the container.
- Remove coolant tank cap and lift the rear of the vehicle to drain the heat exchangers.
- Remove the engine bleed screw (plug).



A012002001

DISASSEMBLY & ASSEMBLY

1,22, Plug & sender

Apply thread sealant on sender and plug to avoid leaks.

8, Pressure cap

Check if the cap pressurizes the system. If not, install a new cap. Do not exceed 90 kPa (13 lbs) of pressure.

20, Thermostat

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

Install the thermostat with its hole on top of the housing.

REFILLING THE SYSTEM

Capacity:

Approximately 5 liters

(1.1 Imp. gal.) (1.3 U.S. gal.)

60% antifreeze + 40% water

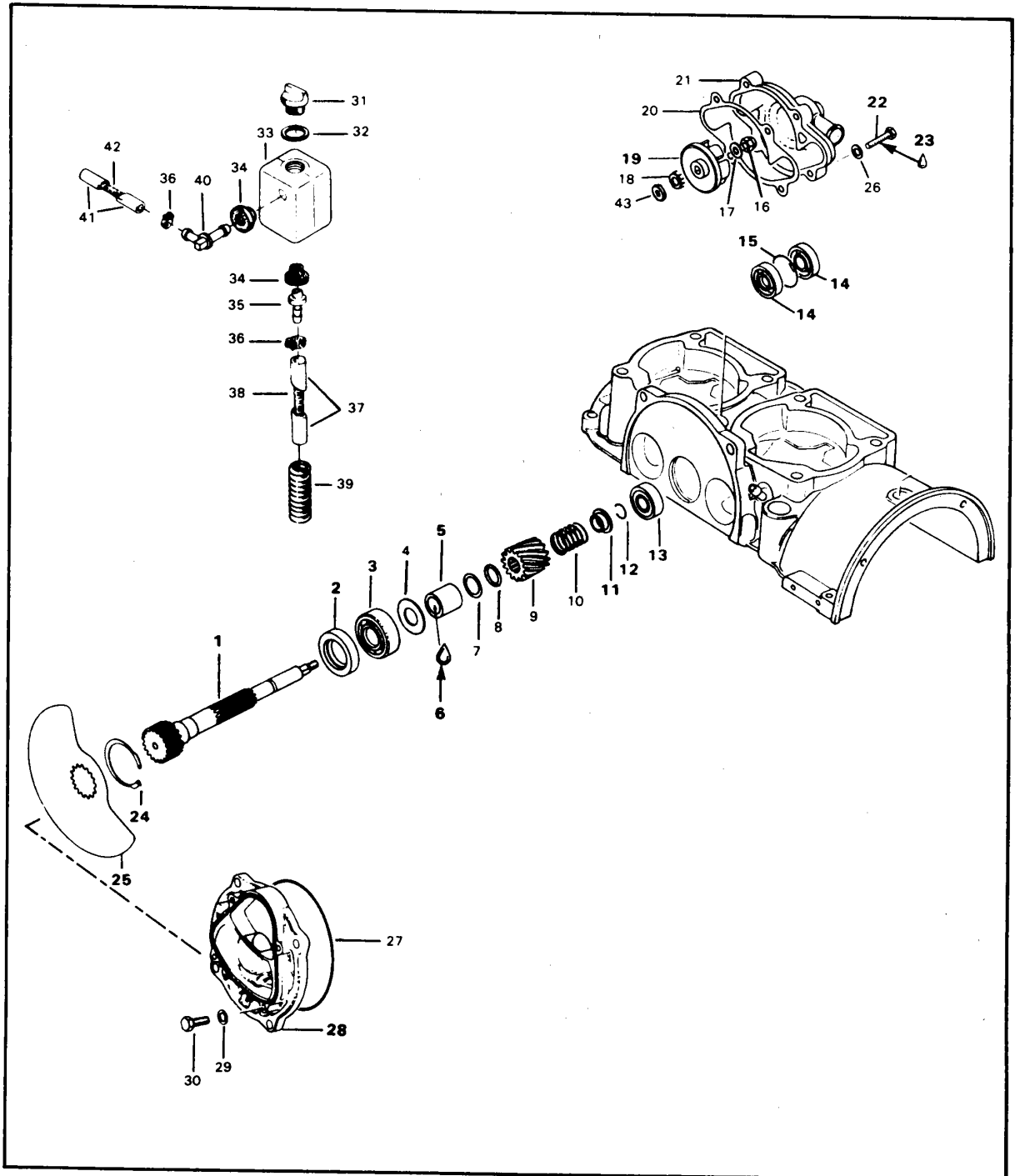
▼ **CAUTION:** To prevent rust formation of freezing condition, always replenish the system with 60% antifreeze and 40% water. Pure antifreeze without water produces premature freezing. Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

To refill cooling system:

- Remove "drain hose" and reinstall initial one.
- 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 25 mm (1") below filler neck.
- With the coolant tank cap still removed, start engine and let it warm to its normal operating temperature until thermostat opens. Allow it to run a few minutes more.
- Stop engine and check coolant level. Refill as required then put back the cap.

◆ **WARNING:** Always unscrew cap to the first step with a cloth to release pressure, before removing it.

ROTARY VALVE, COOLANT PUMP & OIL RESERVOIR



Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

1. Shaft, rotary valve
2. Oil seal
3. Ball bearing 6203
4. Shim 0,5 mm
5. Distance sleeve 24,3 mm
6. Loctite 271
7. Shim 0,5 mm
8. O-ring
9. Sprocket 14 t
10. Spring
11. Spring holder cup
12. Circlip
13. Ball bearing 6201
14. Oil seal (2)
15. Distance ring
16. Lock nut M6
17. Washer 6.4 mm
18. Friction washer
19. Impeller, coolant pump
20. Gasket
21. Housing, coolant pump
22. Hex. screw M6 x 25 (4)

23. Loctite 242
24. Locking ring
25. Rotary valve
26. Gasket ring 6 mm (4)
27. O-ring
28. Cover
29. Lock washer 8 mm (4)
30. Hex screw M8 x 20 (4)
31. Cap
32. Sealing ring
33. Rotary valve oil tank
34. Grommet (2)
35. Male connector
36. Gear clamp
37. Oil line
38. Spring
39. Oil line housing
40. Elbow male connector
41. Oil line
42. Spring
43. Washer 8.1 mm

CLEANING

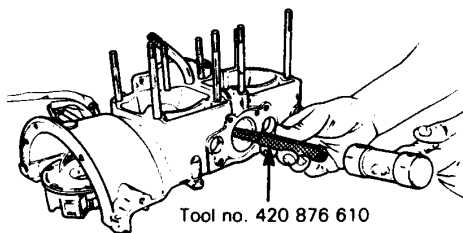
Discard all seals and O-rings.

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

DISASSEMBLY & ASSEMBLY

19,24, Pump impeller & circlip

To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip. Using the suitable pusher (P/N 420 876 610) and a fiber hammer, push shaft assembly.

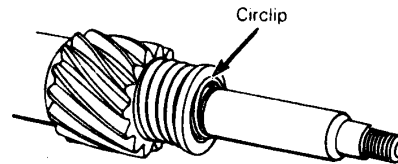


A015002012

CAUTION: To prevent damage to the end of the rotary valve shaft, use pusher (tool P/N 420 876 610).

11,12, Spring retaining cup & circlip

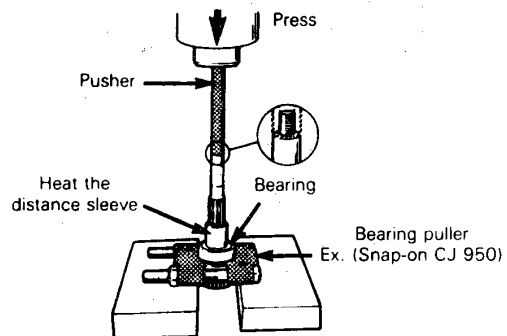
If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup in order to remove circlip.



A013002012

5,6, Distance sleeve & Loctite 271

To remove the distance sleeve use a bearing puller (ex.: Snap-On no. CJ 950) and pusher (P/N 420 876 610) as illustrated. Heat the distance sleeve to break the Loctite bond 93° C (200° F) and proceed as illustrated.



A013002013

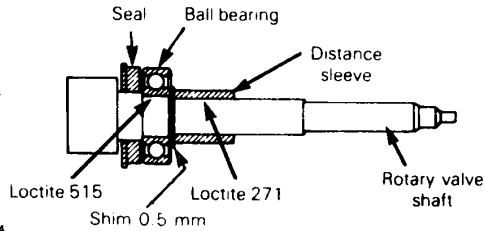
CAUTION: Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

Clean rotary valve shaft and inside of distance sleeve. At assembly apply Loctite 271 inside of distance sleeve.

Section 02 ENGINE
Sub-section 08 (532 ENGINE TYPE)

1,2, Rotary valve shaft & seal

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



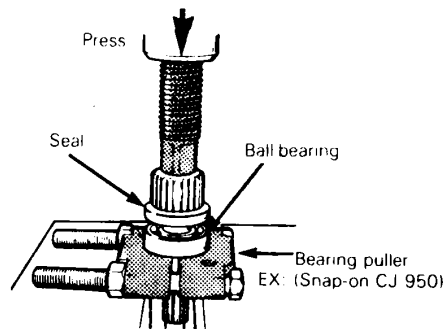
A013002014

1,3, Rotary valve shaft & bearing 6203

At assembly apply crankcase sealant Loctite 515 on bearing and rotary valve shaft mating surfaces.

CAUTION: Make sure Loctite doesn't come in contact with bearing balls.

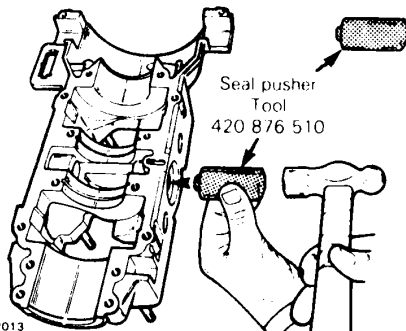
Install ball bearing as illustrated.



A013002015

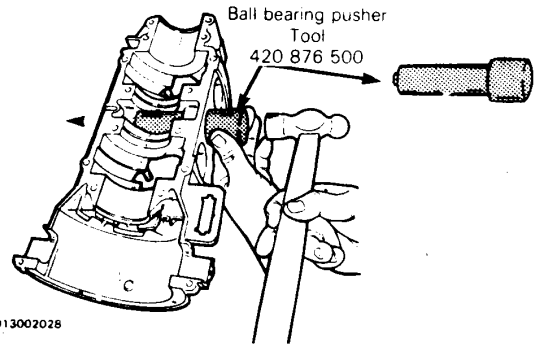
13,14,15, Bearing 6201, seal & distance ring

To remove bearing 6201 (the smallest one), seals and distance ring use pusher (P/N 420 876 510).



A015002013

To install ball bearing 6201 use ball bearing pusher (P/N 420 876 500).

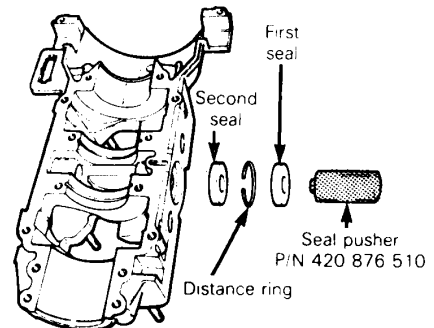


A013002028

NOTE: Ball bearing shielded must be facing rotary valve.

14,15, Seals & distance ring

To install seals on water pump side proceed as follows:



A015002014

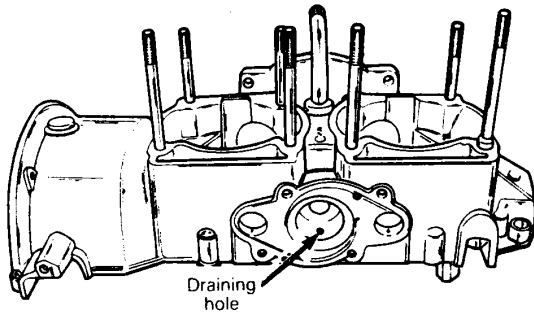
Apply lithium grease or equivalent on seal lips. Position all seals with shielded portion towards water pump using pusher (P/N 420 876 510). Align distance ring opening with crankcase draining hole (see note and illustration). Push seals and distance ring assembly against bearing.

NOTE: 35% of the distance between first and second seals must be filled with lithium grease or equivalent.

NOTE: The draining hole is used to detect seal malfunction. If oil or coolant is noticed at the exit of the draining hole, this means that oil seal or coolant seal leaks.

Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

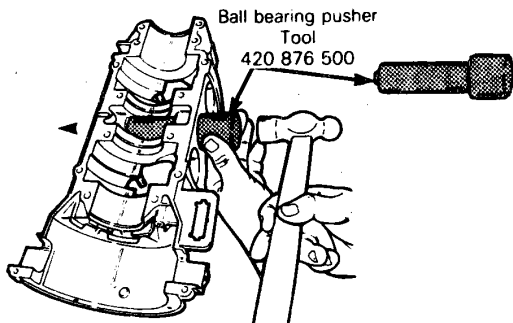


A015002015

CAUTION: Failure to position the seals as specified may cause the seal spring to be corroded by coolant. Severe damage will occur if this notice is disregarded.

13,14,15, Bearing 6201, seals & distance ring

NOTE: After seals installation, check if the water pump end bearing is correctly positioned (use pusher P/N 420 876 500).

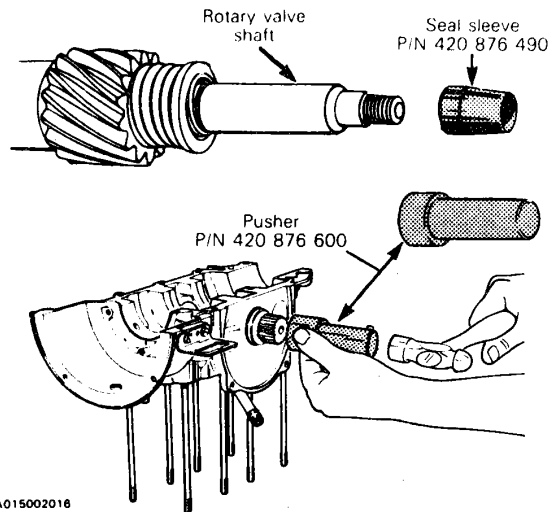


A013002028

1, Rotary valve shaft

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

- pusher P/N 420 876 600
- water pump seal sleeve P/N 420 876 490.



A015002016

22,23, Pump housing bolts & Loctite 242

Apply Loctite 242 on bolts thread.

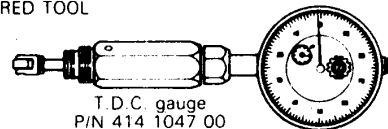
30, Rotary valve cover bolts

Torque the rotary valve cover bolts to 20 N•m (15 lbf•ft).

25, Rotary valve

Installation on genuine crankcase with mark (ridge).

REQUIRED TOOL



A000001001

To correctly install the rotary valve, proceed as follows:

- Turning crankshaft counterclockwise, (drive pulley side) bring magneto side to top dead center using a T.D.C. gauge.

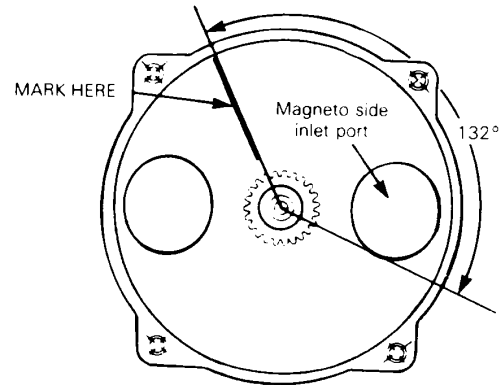
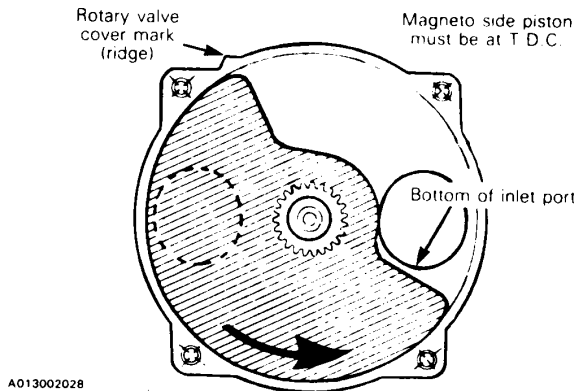
NOTE: Do not use crankshaft locking tool to find out mag. Side top dead center. It will not give the right position.

- 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 cover.

Section 02 ENGINE
Sub-section 08 (532 ENGINE TYPE)

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

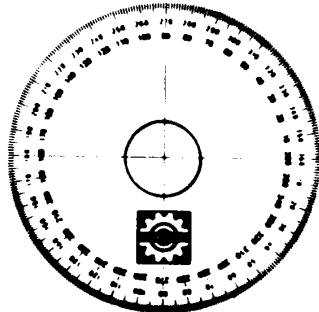
Using angle finder, mark crankcase at 132° from bottom edge of magneto side inlet port.



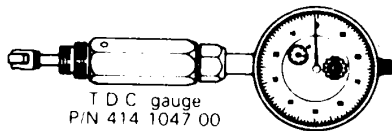
Installation on spare crankcase without mark (ridge).

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

REQUIRED TOOLS



Angle finder
(414 3529 00)

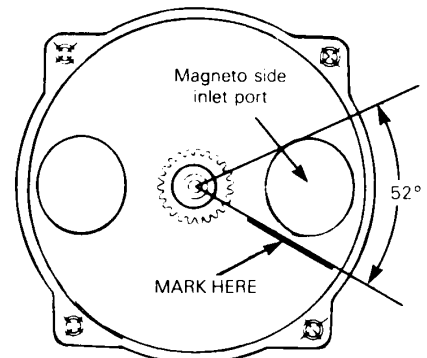


T D C gauge
P/N 414 1047 00

A000001086

ENGINE TYPE	TIMING MARKS opening, closing
532	132°, 52°

For example: 132° opening
52° closing



A013002022

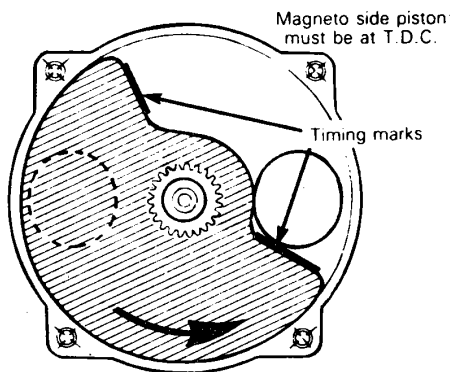
To correctly install the rotary valve disc proceed as follows:

- Turning crankshaft counterclockwise, (drive pulley side) bring magneto side piston to top dead center using a T.D.C. gauge.
- Position the rotary valve disc on gear to have edges as close as possible to the marks.

Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

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



A013002029

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

30, Rotary valve cover bolts

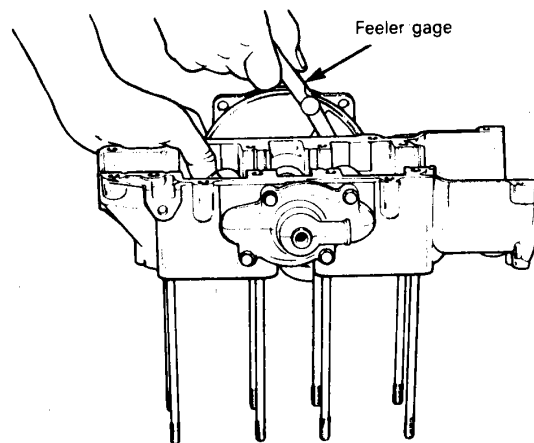
The rotary valve cover bolts must be torque to 20 N•m (15 lbf•ft).

INSPECTION

25,28, Rotary valve cover & rotary valve

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

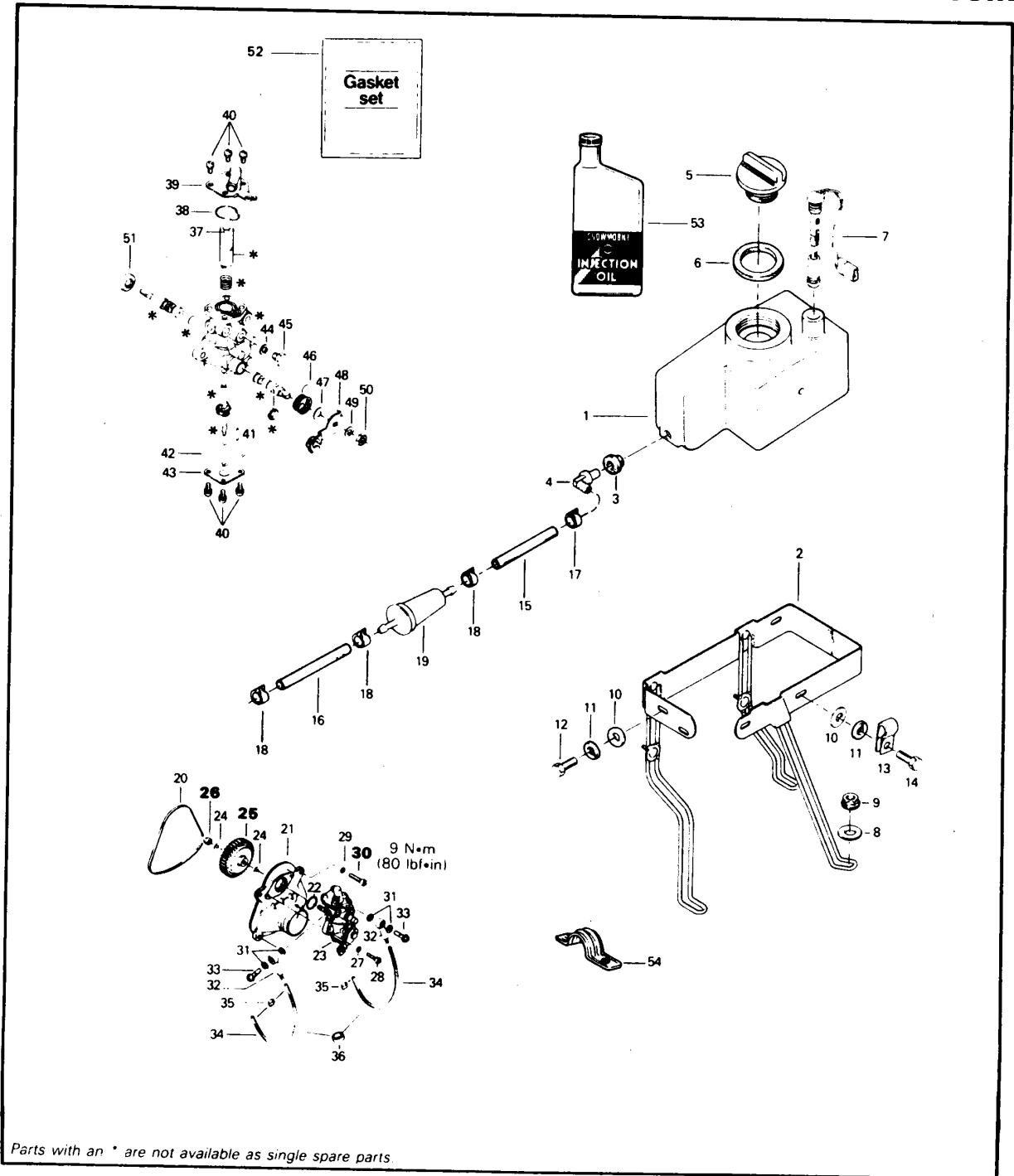
To measure this gap use a feeler gage inserted between rotary valve and upper crankcase with the rotary valve cover in place without its O-ring. Check the more surface as possible. Follow the same procedure for the lower crankcase.



A013002024

Section 02 ENGINE
Sub-section 08 (532 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 08 (532 ENGINE TYPE)

1. Injection oil tank
2. Support
3. Grommet
4. Male connector
5. Oil tank cap
6. Gasket
7. Oil level sensor
8. Flat washer 6.2 mm (3)
9. Hexagonal elastic stop nut M5 x 0.80 (3)
10. Flat washer 6.4 mm (4)
11. Lock washer 6 mm (4)
12. Hexagonal head cap screw M6 x 12 (3)
13. Clip
14. Hexagonal head cap screw M6 x 16
15. Oil line 60 mm
16. Oil line 73 mm
17. Spring clip
18. Spring clip (3)
19. Filter
20. Rubber ring
21. Oil pump mounting flange
22. O-ring
23. Oil pump
24. Washer 6.2 (2)
25. Oil pump gear 44 teeth
26. Lock nut 6 mm
27. Lock washer 5 (2)
28. Cylindrical slotted screw M5 x 16 (2)
29. Lock washer 6 mm (4)
30. Cylindrical slotted screw M6 x 20 (4)
31. Oil banjo gasket (4)
32. Banjo (2)
33. Banjo bolt M6 x 16 (2)
34. Oil line 170 mm (2)
35. Clamp (4)
36. Rubber ring (2)
37. Retainer
38. O-ring
39. Plate
40. Screw with lock washer (8)
41. Stop pin
42. Gasket
43. Cam casing plate
44. Washer
45. Hexagonal head screw M6 x 7
46. Spring
47. Washer
48. Lever
49. Lock washer 6
50. Hexagonal nut 6 mm
51. Seal
52. Gasket set
53. Injection oil
54. Clip

CLEANING

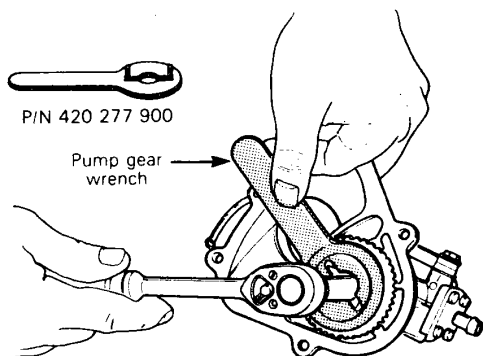
Discard all seals and O-rings. Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

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

25,26, Oil pump gear & lock nut

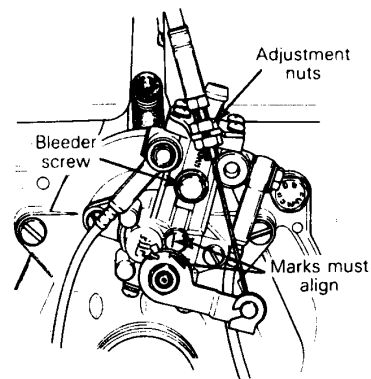
To remove retaining nut, lock gear using no. 420 277 900 tool.



A000001085

02-08-22

Injection pump cable adjustment



A013002005

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. To bleed the main oil line (between tank and pump), loosen the bleeder screw (do not start engine) and let the air escape until oil starts to flow out.

Make sure tank has enough oil

To bleed the small injection oil lines, start the engine and let it run at idle speed. Move injection pump lever to fully open position until lines are full of oil.

ASSEMBLY

30, Screw

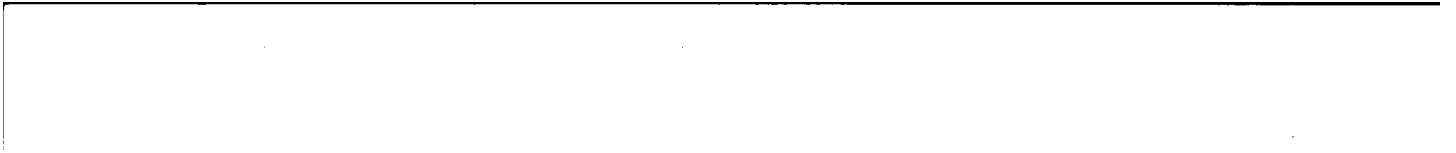
Torque to 9 N•m (80 lbf•ft).

ADJUSTMENT

Always perform carburetor adjustment prior to oil injection pump adjustment.

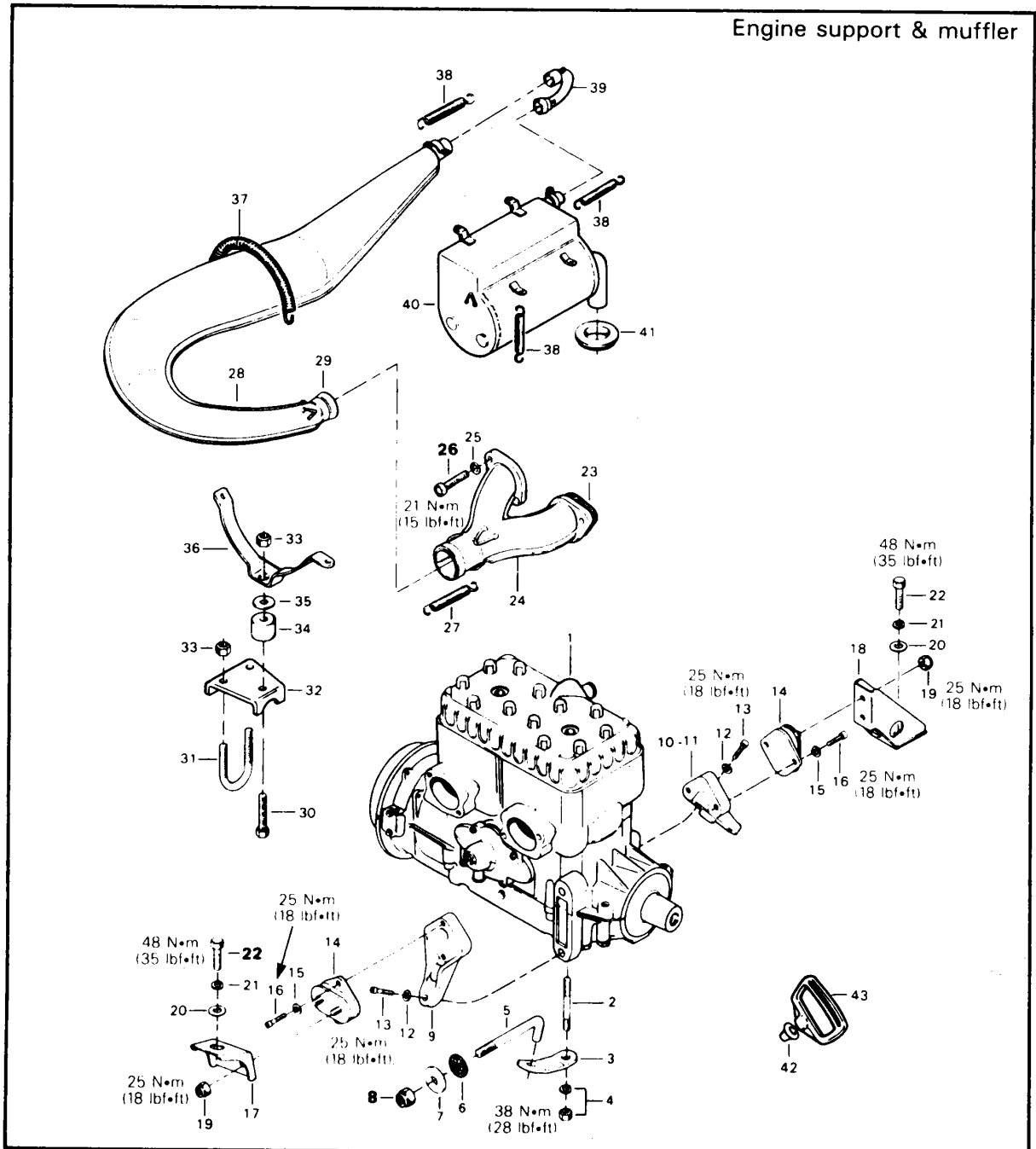
To synchronize pump with carburetor:

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. Tighten the lock nut.



537 ENGINE TYPE

ENGINE REMOVAL & INSTALLATION



Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

- | | |
|---|---|
| 1. 537 engine | 23. Gasket (2) |
| 2. Stud M10 x 18/18 | 24. Exhaust manifold |
| 3. Clamp | 25. Lock washer 8 mm |
| 4. Hexagonal elastic stop nut M10 | 26. Cylindrical screw M8 x 30 |
| 5. Support | 27. Spring |
| 6. Rubber washer | 28. Single exhaust pipe |
| 7. Washer | 29. Female ball joint |
| 8. Hexagonal elastic stop nut M10 | 30. Hexagonal head cap screw M6 x 30 |
| 9. Front support (2) | 31. U-bracket |
| 10. Right rear support | 32. Pipe bracket |
| 11. Left rear support | 33. Flanged elastic hexagonal stop nut M6 (3) |
| 12. Lock washer 8 mm (8) | 34. Rubber spacer |
| 13. Allen screw M8 x 25 (8) | 35. Asbestos washer |
| 14. Bounding rubber mount (4) | 36. Exhaust pipe support |
| 15. Lock washer 8 mm (8) | 37. Spring |
| 16. Allen screw M8 x 20 (8) | 38. Spring (6) |
| 17. Front support (2) | 39. Tail pipe |
| 18. Rear support (2) | 40. Muffler |
| 19. Flanged hexagonal elastic stop nut M8 (8) | 41. Exhaust grommet |
| 20. Lock washer (4) | 42. Rubber buffer |
| 21. Spring lock washer 10 mm (4) | 43. Starter grip |
| 22. Hexagonal head cap screw M10 x 20 (4) | |
-

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- air silencer
- pulley guard and drive belt
- throttle cable from carburetors, oil injection pump, and handlebar
- fuel lines, pulsation line and primer tube
- 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)
- 4 screws retaining engine supports on frame.

ENGINE SUPPORT & MUFFLER DISASSEMBLY & ASSEMBLY

22,26, Engine support screw & manifold screw

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

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

INSTALLATION ON VEHICLE

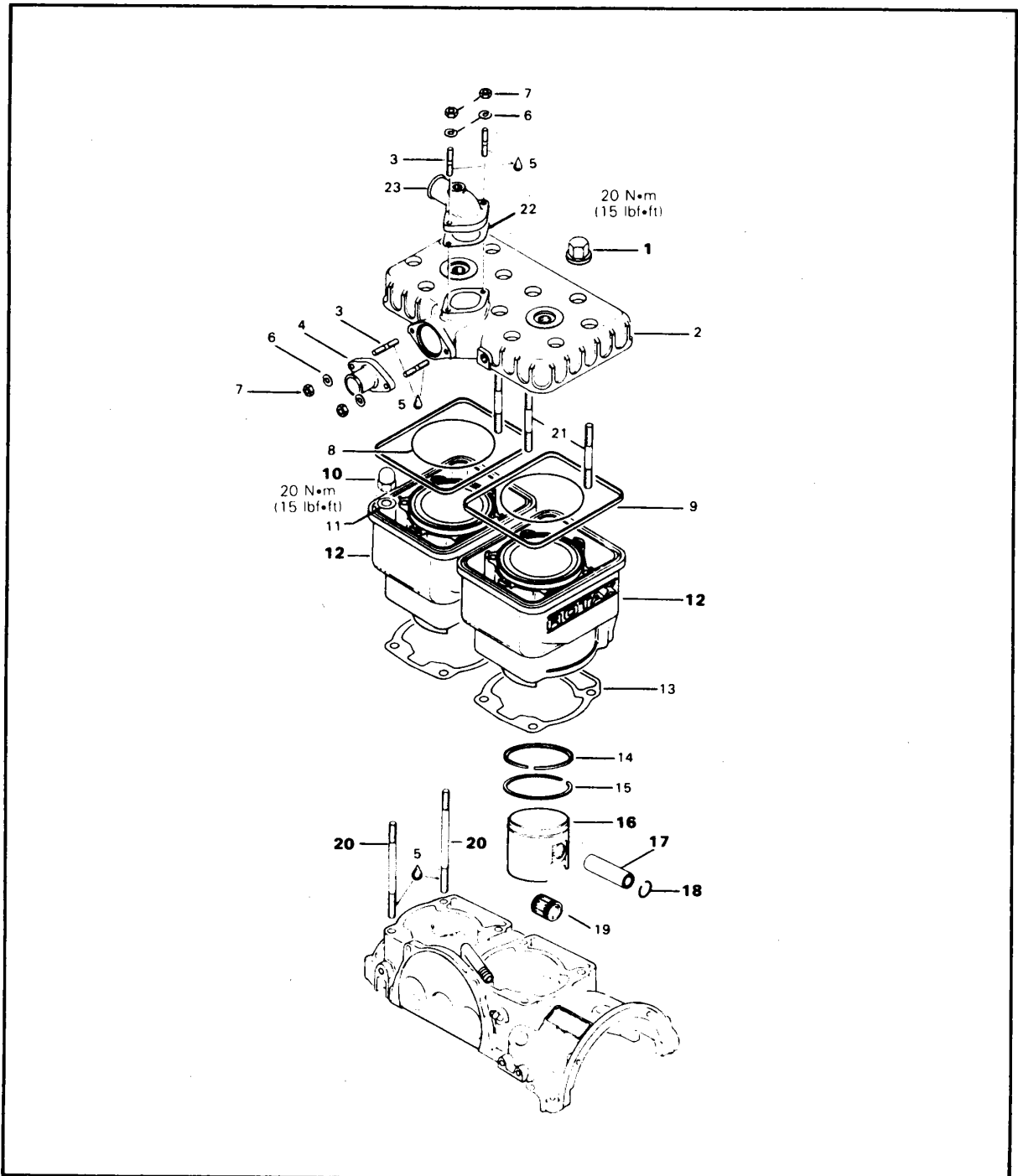
To install on vehicle, reverse removal procedure. However, pay attention to the following:

- 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 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.

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

TOP END



Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

1. Cap nut M8 (12)
2. Cylinder head
3. Stud M6 x 15 (2)
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 (2)
10. Cap nut M8 (8)
11. Flat washer 8.4 (8)
12. Cylinder (2)

13. Cylinder/crankcase gasket (2)
14. L-ring
15. Rectangular-ring
16. Piston
17. Gudgeon pin
18. Circlip (4)
19. Needle bearing
20. Cylinder stud M8 x 79 (8)
21. Stud (head) M8 x 50 (12)
22. Gasket
23. Water outlet socket

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, gudgeon pin & circlips

Place a clean cloth over crankcase then with a pointed tool inserted in piston notch, remove circlip from piston. Drive the gudgeon pin out of piston using a suitable drive punch and hammer.

▼ **CAUTION:** When tapping gudgeon pin or out of piston, hold piston firmly in place to eliminate the possibilities of transmitting shock and pressure to the connecting rod.

INSPECTION

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

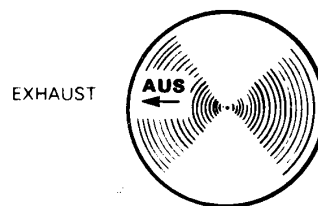
MEASUREMENTS	TOLERANCES		
	FITTING NEW PARTS (MIN.)	FITTING NEW PARTS (MAX.)	WEAR LIMIT
Cylinder taper	N.A.	N.A.	.08 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0020")
Cylinder/piston clearance	.09 mm (.0035")	.11 mm (.0043")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.0016")	.10 mm (.0039")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

○ **NOTE:** For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

16, Piston

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.



A001002001

Section 02 ENGINE

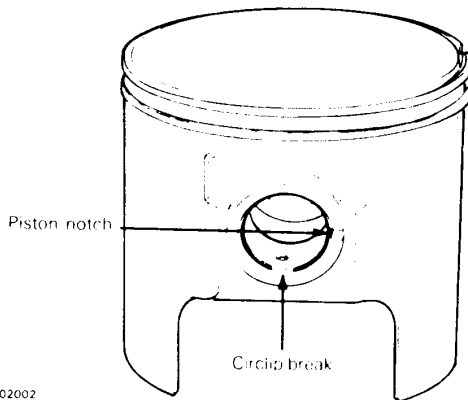
Sub-section 09 (537 ENGINE TYPE)

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.

18, Circlip

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Using very fine emery cloth, remove any burrs on piston caused through circlip installation.

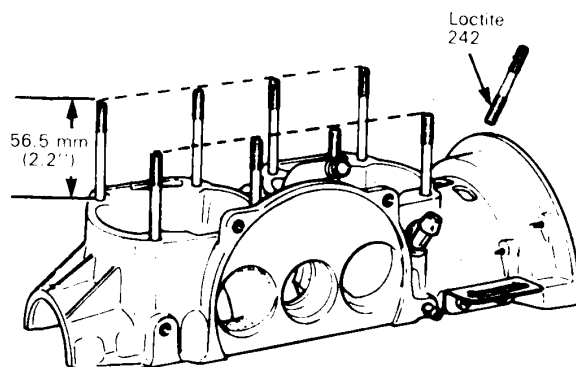
CAUTION: Circlips must not move freely after installation if so, replace them.



A001002002

20, Crankcase studs

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 (2.2").

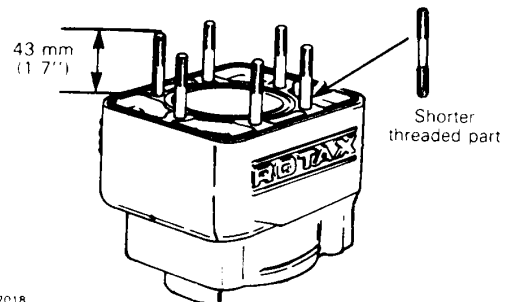


A015002001

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

12,21, Cylinder & cylinder head stud

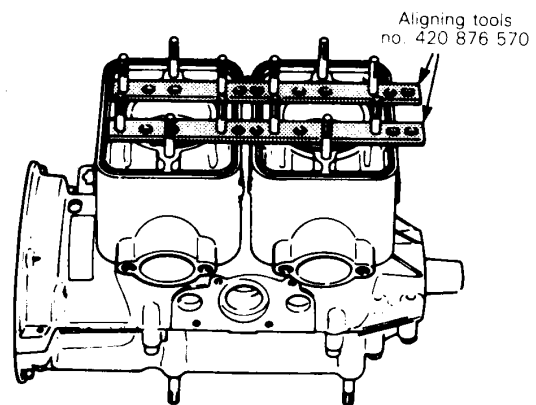
Because of cap nuts, cylinder head studs have to be screwed into the cylinder so that they do not protrude by more than 43 mm (1.700"). If it is not possible to obtain this length, add a washer between cylinder head and cap nut. Shorter threaded part of stud should be screwed into cylinder.



A015002018

10,12, Crankcase/cylinder nuts & cylinders

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. A special tool (as per illustration) (or cylinder head itself) can be used to align the cylinders. Cross torque cylinder nuts to 20 N•m (15 lbf•ft).



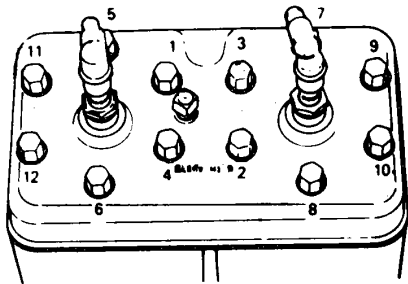
A000001022

Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

1, Cylinder head nut

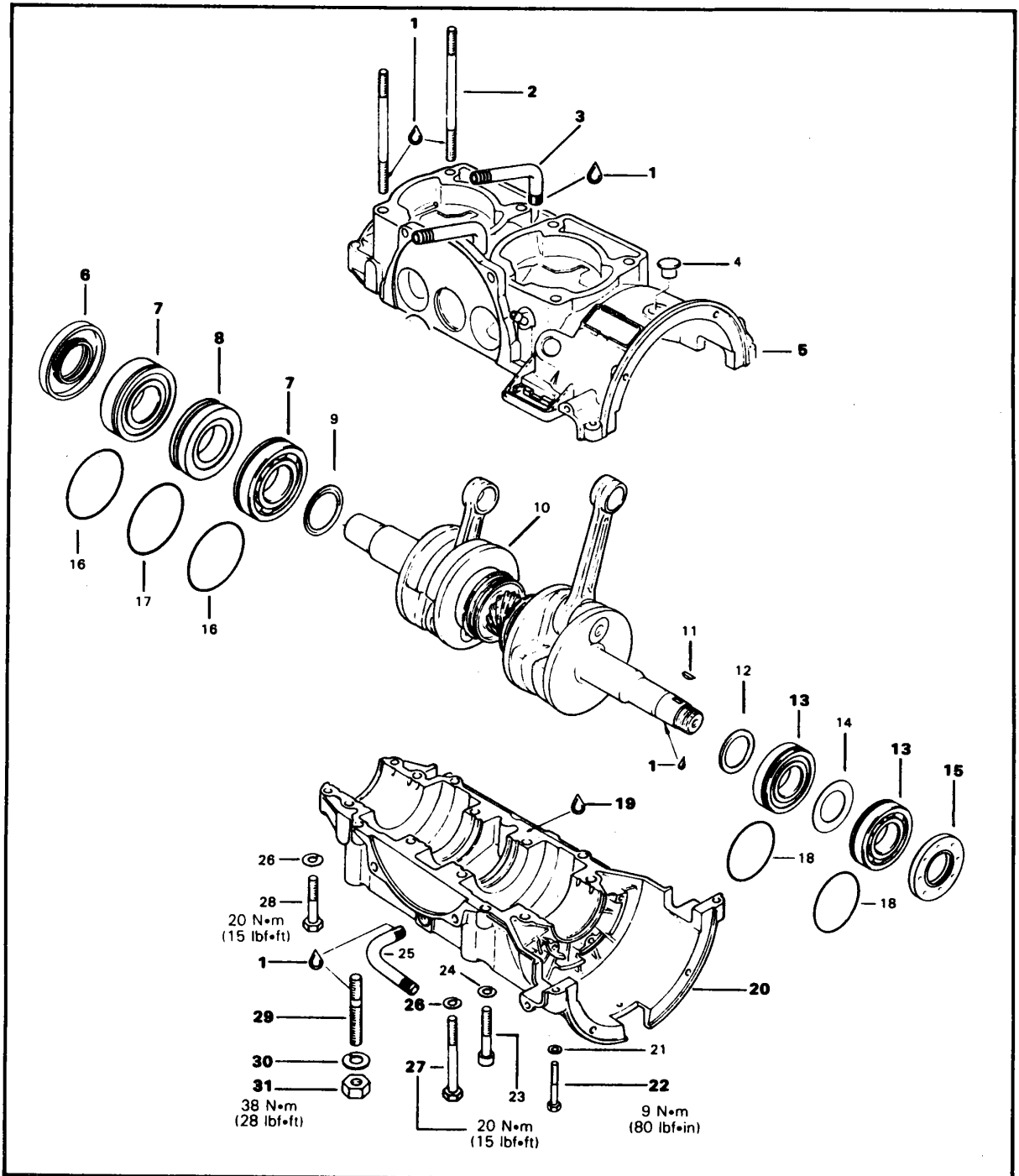
Torque cylinder head nuts to 20 N•m (15 lbf•ft) following illustrated sequence.



A015002004

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

BOTTOM END



Section 02 ENGINE

Sub-section 09 (537 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. Screw M8 x 40 (4)
24. Lock washer 8 mm (4)
25. Angular tube, oil outlet
26. Lock washer 8 mm (10)
27. Hex. screw M8 x 64 (8)
28. Hex. screw M8 x 45 (2)
29. Stud M10 x 42
30. Lock washer 10 mm
31. Hex. nut M10

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 or equivalent.

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

DISASSEMBLY

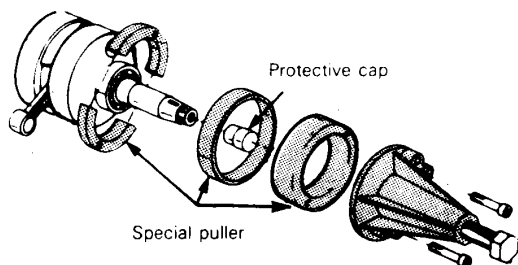
General

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

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

7, 13, Crankshaft bearings

To remove bearings from crankshaft use a protective cap and special puller as illustrated.



A000001082

INSPECTION

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

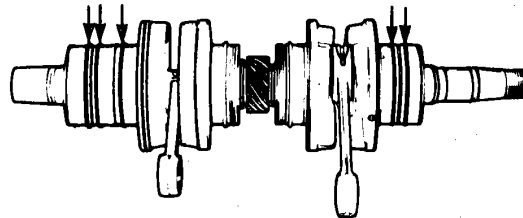
MEASUREMENTS	TOLERANCES		WEAR LIMIT
	FITTING NEW PARTS (MIN.)	(MAX.)	
Crankshaft deflection	N.A.	N.A.	.08 mm (.0032")
Connecting rod big end axial play	.40 mm (.0157")	.73 mm (.0287")	1.2 mm (.0468")

NOTE: For the measurement procedures, refer to "Engine dimensions measurement", section 02-10.

ASSEMBLY

7,8,13, Crankshaft bearings & labyrinth sleeve

Prior to installation, place bearings into an oil container filled with oil previously heated to 100° C (210° F). This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration.



A015002005

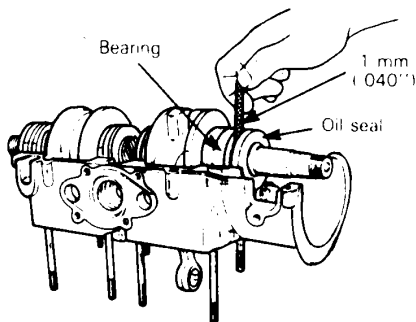
Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

6,15, Seals

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

For bearing lubrication purpose, a gap of 1.0 mm (.040") 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.



A015002007

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

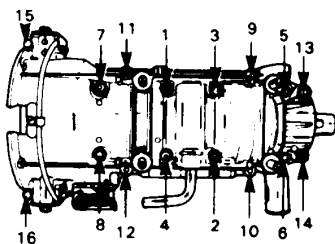
Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of Loctite 515 (413 7027 00) on mating surfaces.

NOTE: Prior 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 torque bolts by hand then install armature plate (tighten) on magneto side to correctly align crankcase halves. Torque bolts as specified following illustrated sequence.

Follow sequence shown
 1 to 14 - 20 N•m (15 lbf•ft)
 15 and 16 - 9 N•m (80 lbf•in)



A015002006

NOTE: Torque the two smaller bolts (15 and 16) on magneto side to 9 N•m (80 lbf•in).

1,3,25, Loctite 242, angular tubes (oil inlet & oil outlet) & cover screws

Apply Loctite 242 on threads prior to assembly angular tubes.

23,27,28, Crankcase M8 Screws

Torque the crankcase M8 screws to 20 N•m (15 lbf•ft).

22, Crankcase M6 screws

Torque the crankcase M6 screws to 9 N•m (80 lbf•in).

1,29, Loctite 242 & crankcase stud

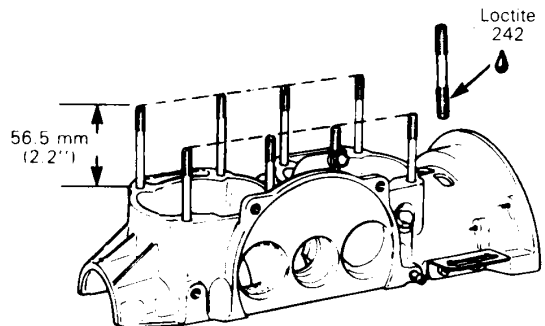
At assembly on crankcase, apply Loctite 242 on stud threads.

31, Crankcase/engine bracket nut

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

1,2, Loctite 242 & upper crankcase studs

Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not protrude by more than 56.6 mm (2.22").



A015002001

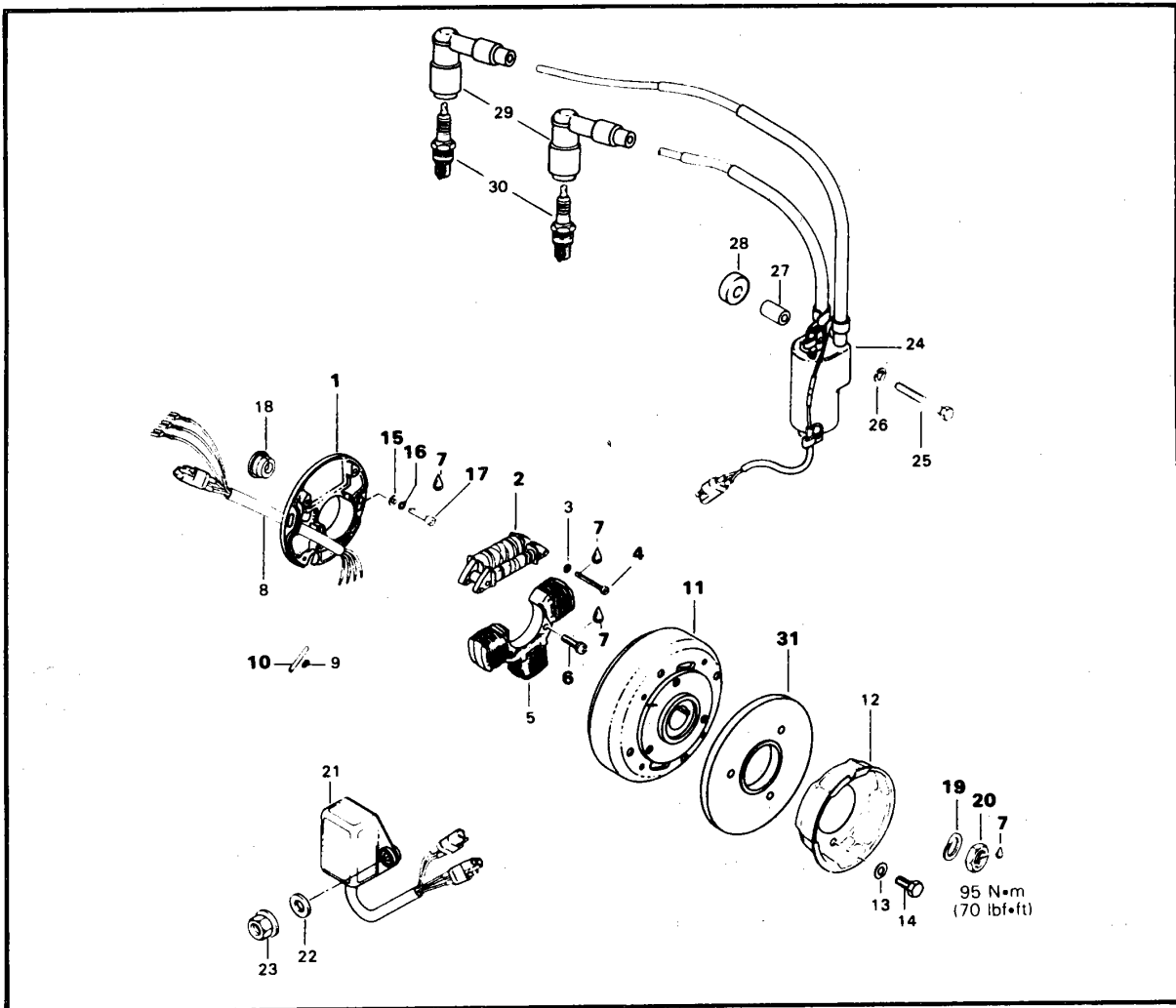
Apply Loctite 242 on the threaded end of the studs going into the crankcase.

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

Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

MAGNETO



1. Armature plate
2. Generation 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 M8 x 16 (3)
14. Hexagonal screw M8 x 16 (3)
15. Washer 5.5 mm
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. Flat washer 6.4 mm (2)
23. Flanged elastic hexagonal stop nut M6 (2)
24. Ignition coil
25. Hexagonal screw M6 x 85 (2)
26. Lock washer 6 mm (2)
27. Spacer (2)
28. Insulator
29. Spark plug protector (2)
30. Spark plug (2)
31. Flywheel counterweight

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

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:

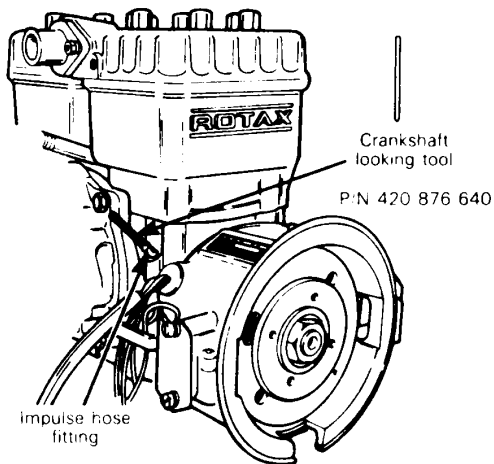
- muffler
- rewind starter
- starting pulley

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

20, Flywheel retaining nut

To remove magneto flywheel retaining nut:

- lock crankshaft with crankshaft locking tool (service tool) as illustrated (magneto side piston must be at top dead center)
- remove magneto retaining nut.



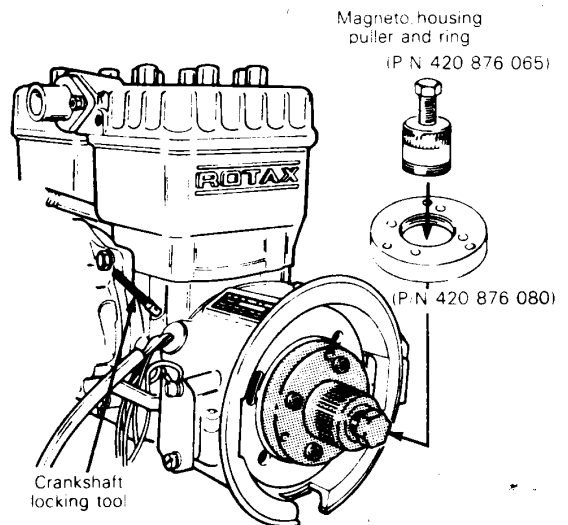
A015002008

○ **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 (service tool) as illustrated;
- adjust magneto housing puller and puller ring as illustrated;



A015002009

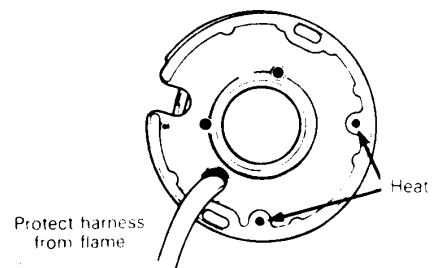
- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

2, Generating coil

To replace generating coil:

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



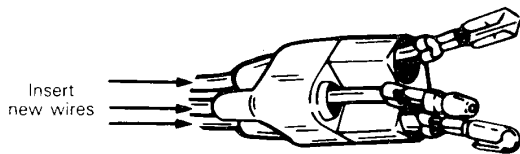
A001002003

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

Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

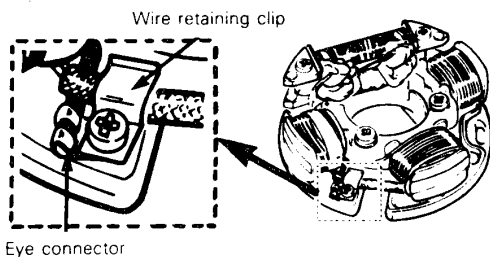
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector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



A001002004

▼ **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.



A001002005

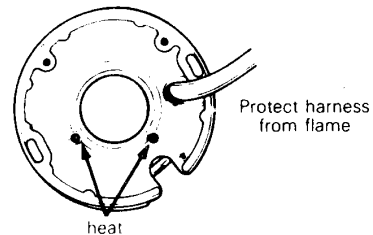
4,7, Generating coil screw & Loctite 242

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.

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

To replace lighting coil:

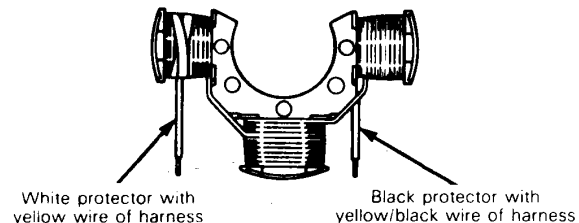
- Heat the armature plate around the screw holes to break the "Loctite" bond 93° C (200° F).



A001002003

▼ **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.



A001002006

10, Protector tube

Position protector tubes over connections.

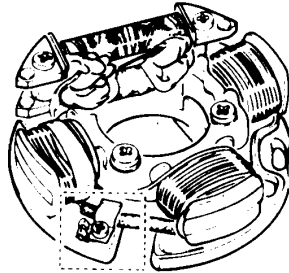
6,7, Loctite 242 & lighting coil screws

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

- Fasten retaining clip onto protector tubes.

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

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



A001002005

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

ASSEMBLY

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

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, lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue, medium strength) before tightening nut to 95 N•m (70 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.

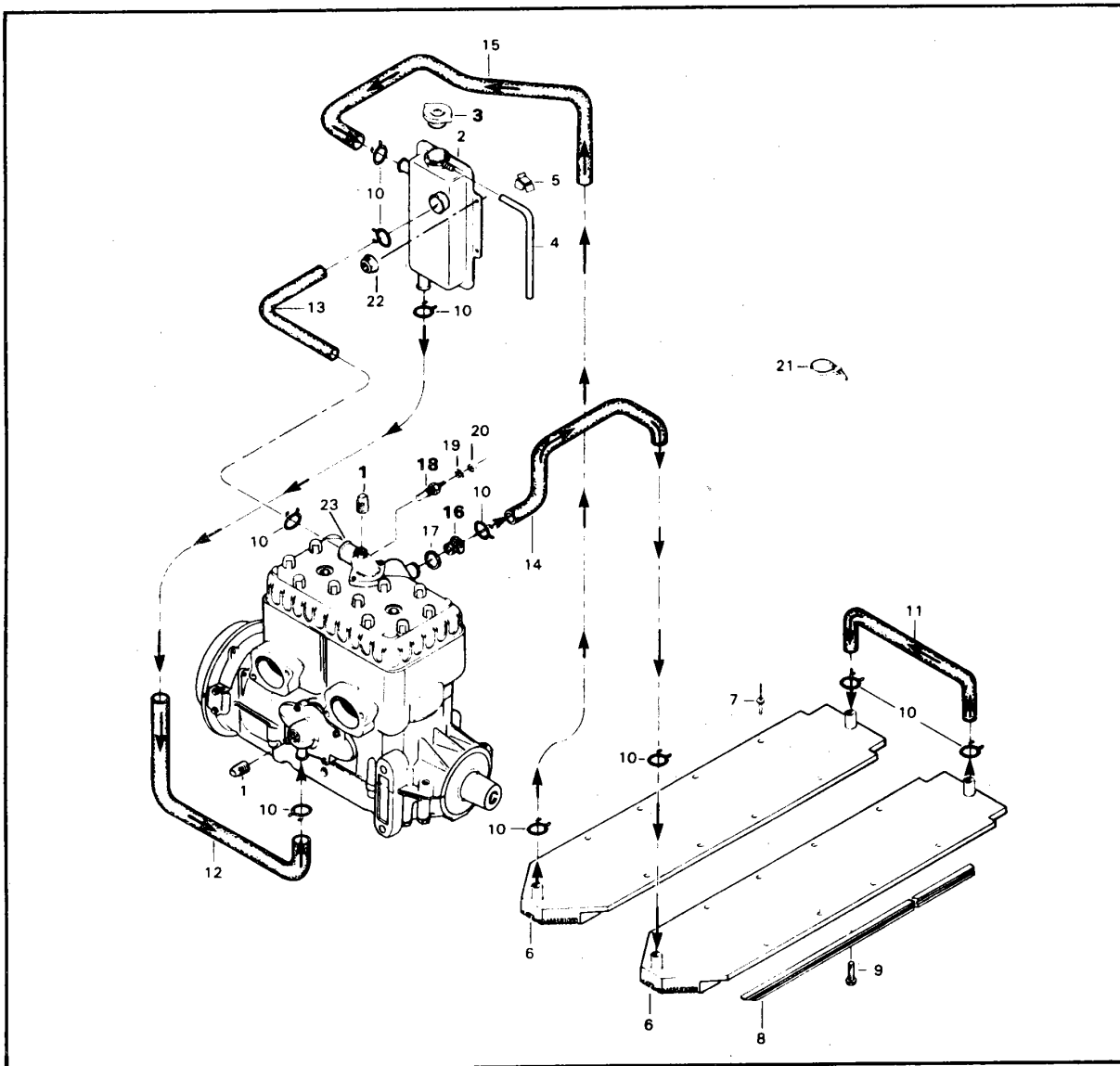
31, Flywheel counterweight

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 09 (537 ENGINE TYPE)



1. Plug
2. Coolant tank
3. Pressure cap
4. Overflow hose 20" (510 mm)
5. Clip
6. Radiator (2)
7. Rivet
8. Radiator protector (2)
9. Hexagonal taptite washer head screw M5 x 15 (2)
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. Flow reducer

02-09-14

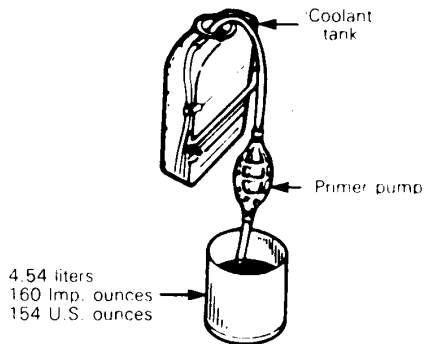
INSPECTION

Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

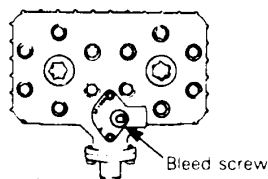
◆ WARNING: Never drain or refill the cooling system when engine is hot.

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.



A015002010

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



A016002001

DISASSEMBLY & ASSEMBLY

1,18, Plug & sender

Apply thread sealant on sender and plug to avoid leaks.

3, Pressure cap

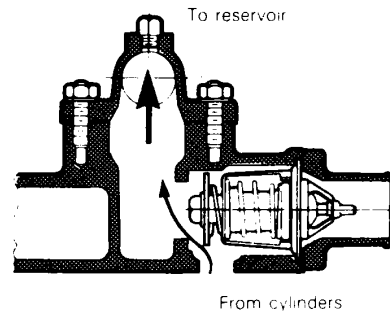
Check if the cap pressurizes the system. If not, install a new 90 kPa (13 PSI cap), do not exceed 90 kPa (13 lbs) of pressure.

16, Thermostat

To check thermostat, put it in water and heat the water. Thermostat should open when water temperature reaches 42° C (107.6° F).

This thermostat is a "double action type".

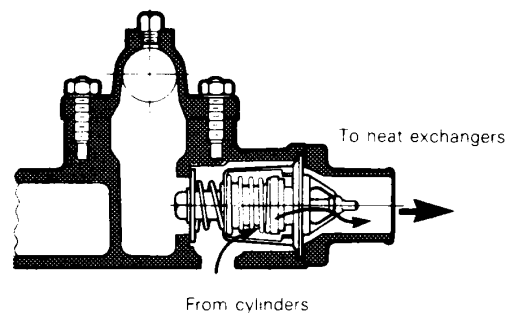
A- Its function is to give a faster warm up of the engine by provoking a circuit; water pump - engine - reservoir. This is done by closing the heat exchanger circuit.



CLOSED THERMOSTAT, COLD ENGINE

A016002002

B- When the liquid is warmed to 42° C (107.6° F), the thermostat opens the circuit, water pump - engine - heat exchangers - reservoir to keep the liquid at the desired temperature. (See the diagram to the exploded view).



OPEN THERMOSTAT, WARM ENGINE

A016002003

These two functions have the advantage of preventing a massive entry of cold water into the engine.

Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

REFILLING THE SYSTEM

Capacity:

Approximately 4.2 liters

(148 Imp. oz) (142 U.S. oz)

55% antifreeze + 45% water

▼ **CAUTION:** To prevent rust formation of freezing condition, always replenish the system with 55% antifreeze and 45% water. Pure antifreeze without water produces premature freezing. Always use ethylene-glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

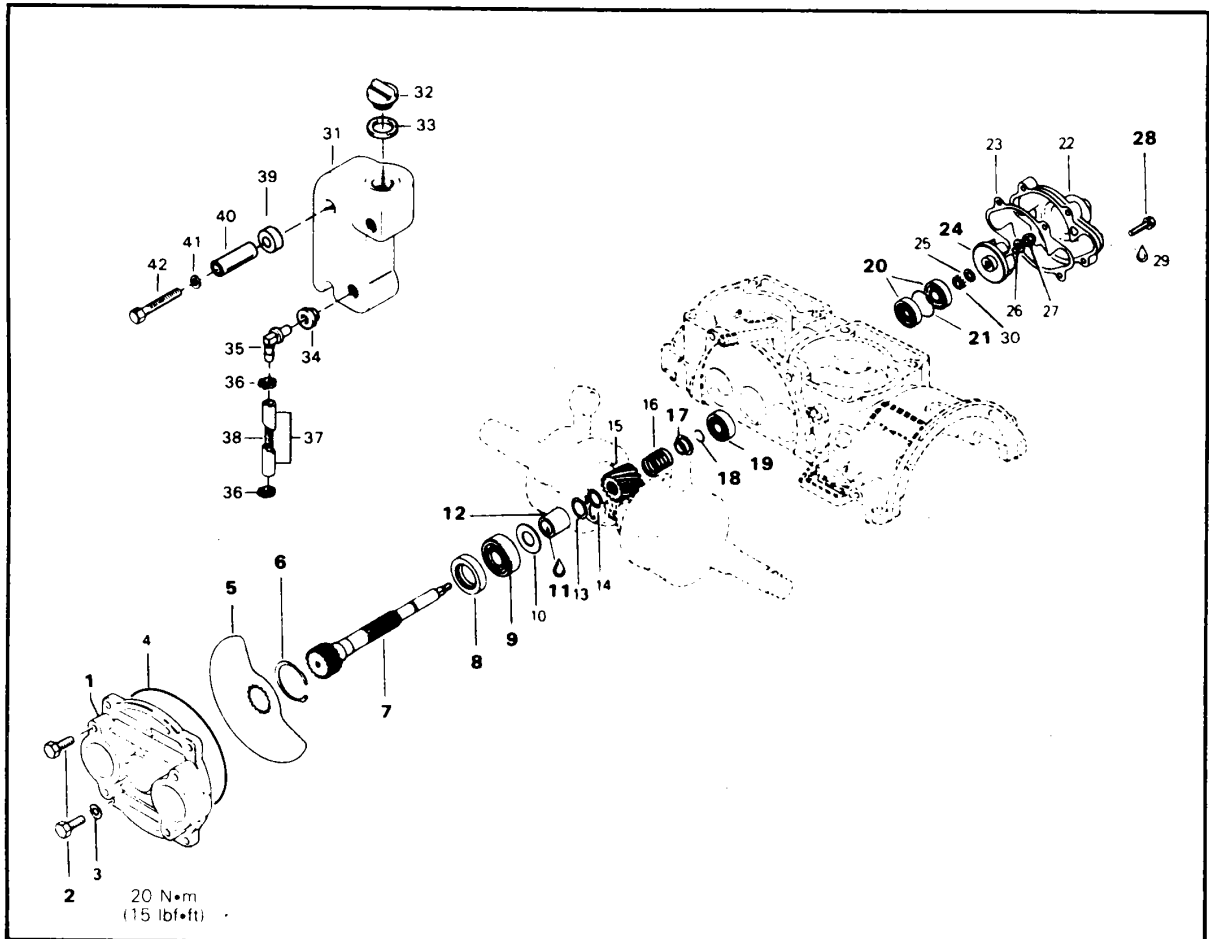
To refill cooling system:

- 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 25 mm (1") below filler neck.
- With the coolant tank cap still removed, start engine and let it warm to reach its normal operating temperature and thermostat opens. Allow it running a few minutes more.
- Stop engine and check coolant level. Refill as required then put back the cap.

◆ **WARNING:** Before removing the cap place a cloth over the coolant tank and release the cap to the first step to release the pressure. Loss of fluid and possibility of severe burns could occur if this notice is disregarded.

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

ROTARY VALVE, COOLANT PUMP & OIL RESERVOIR



- | | |
|-----------------------------|---------------------------------|
| 1. Rotary valve cover | 22. Pump housing |
| 2. Bolt M8 x 20 (4) | 23. Gasket |
| 3. Lock washer 8 mm (4) | 24. Pump impeller |
| 4. O-ring | 25. Washer 8.1 mm |
| 5. Rotary valve | 26. Washer 6.4 mm |
| 6. Circlip | 27. Nut M6 |
| 7. Rotary valve shaft | 28. Bolt M6 x 25 (4) |
| 8. Seal | 29. Loctite 242 |
| 9. Bearing 6203 | 30. Friction washer |
| 10. Shim 0.5 mm | 31. Rotary valve oil tank |
| 11. Loctite 271 | 32. Oil tank cap |
| 12. Distance sleeve 24.5 mm | 33. O-ring |
| 13. Shim 0.5 mm | 34. Isolating washer (2) |
| 14. O-ring | 35. Elbow connector (2) |
| 15. Gear | 36. Hose clamp (4) |
| 16. Spring | 37. Oil line 7.75" (196 mm) (2) |
| 17. Spring retaining cup | 38. Spring (2) |
| 18. Circlip | 39. Isolator |
| 19. Bearing 6201 | 40. Spacer (2) |
| 20. Seal (2) | 41. Lock washer 6 mm (2) |
| 21. Distance ring | 42. Hexagonal screw M6 x 85 (2) |

Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

CLEANING

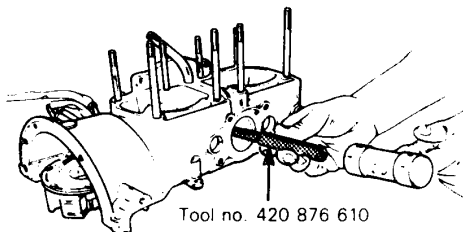
Discard all seals and O-rings.

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

DISASSEMBLY & ASSEMBLY

6,24, Pump impeller & circlip

To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller and circlip. Using the suitable pusher (P/N 420 876 610) and a fiber hammer, push shaft assembly.

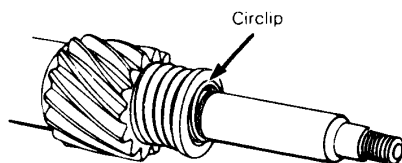


A015002012

▼ **CAUTION:** To prevent damage to the end of the rotary valve shaft, use pusher (tool P/N 420 876 610).

17,18, Spring retaining cup & circlip

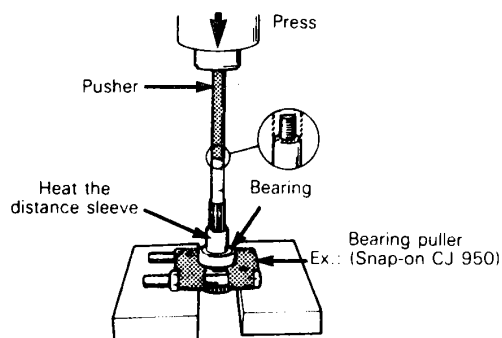
If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup in order to remove circlip.



A013002012

11,12, Distance sleeve & Loctite 271

To remove the distance sleeve use a bearing puller (ex.: Snap-On no. CJ 950) and pusher (P/N 420 876 610) as illustrated. Heat the distance sleeve to break the Loctite bond 93° C (200° F) and proceed as illustrated.



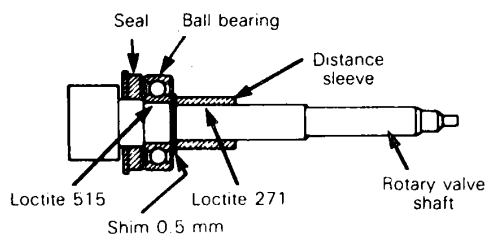
A013002013

▼ **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 271 inside of distance sleeve.

7,8, Rotary valve shaft & seal

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



A013002014

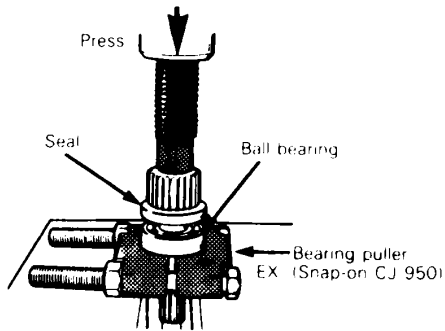
7,9, Rotary valve shaft & bearing 6203

At assembly apply crankcase sealant Loctite 515 on bearing and rotary valve shaft mating surfaces.

▼ **CAUTION:** Don't put any Loctite on bearing balls.

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

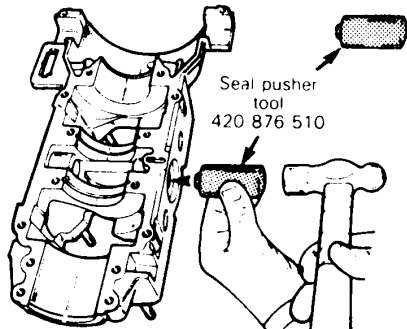
Install ball bearing as illustrated.



A013002015

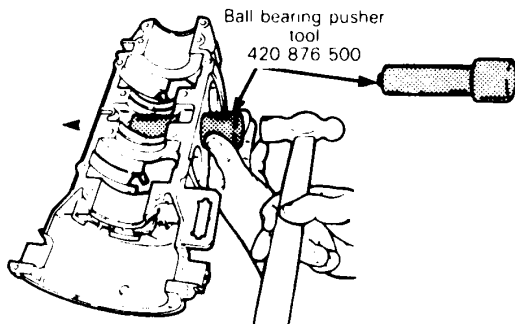
19,20,21, Bearing 6201, seal & distance ring

To remove bearing 6201 (the smallest one), seals and distance ring use pusher (P/N 420 876 510).



A015002013

To install ball bearing 6201 use ball bearing pusher (P/N 420 876 500).

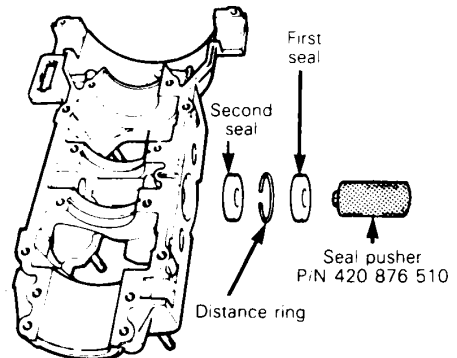


A013002028

NOTE: Ball bearing shielded must be facing rotary valve.

20,21, Seals & distance ring

To install seals on water pump side proceed as follows:

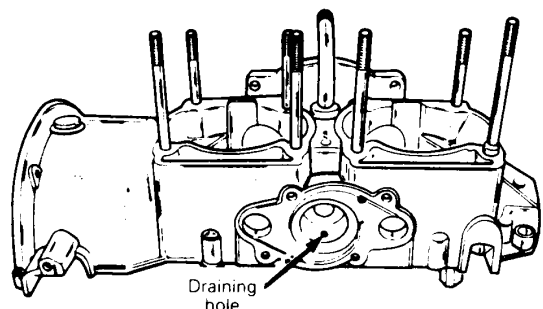


A015002014

Apply some lithium grease or equivalent on seal lips. Position all seals with shielded portion towards water pump using pusher (P/N 420 876 510). Align distance ring opening with crankcase draining hole (see note and illustration). Push seals and distance ring assembly against bearing.

NOTE: 35% of the distance between first and second seals must be filled with lithium grease or equivalent.

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



A015002015

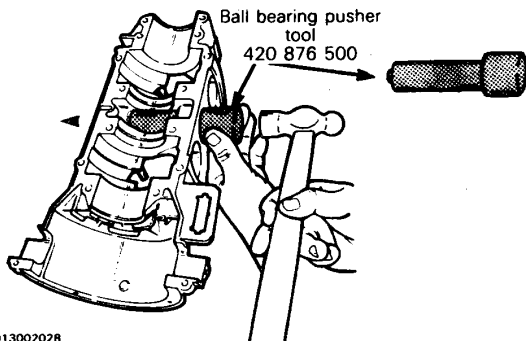
CAUTION: Failure to position the seals as specified may cause the seal spring to be corroded by coolant. Severe damage may occur if these notices are disregarded.

Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

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

NOTE: After seals installation, check if the water pump end bearing is correctly positioned (use pusher P/N 420 876 500).

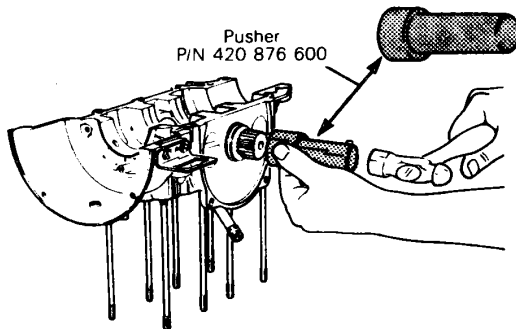
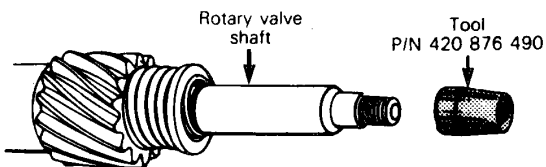


A013002028

7, Rotary valve shaft

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

- pusher P/N 420 876 600
- water pump seal sleeve P/N 420 876 490.



A015002016

22,23, Pump housing bolts & Loctite 242

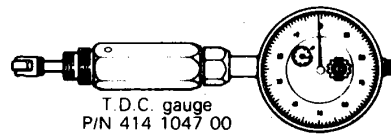
Apply Loctite 242 on bolts thread.

2, Rotary valve cover bolts

Torque the rotary valve cover bolts to 20 N•m (15 lbf•ft).

Installation on genuine crankcase with mark (ridge)

REQUIRED TOOL



A000001001

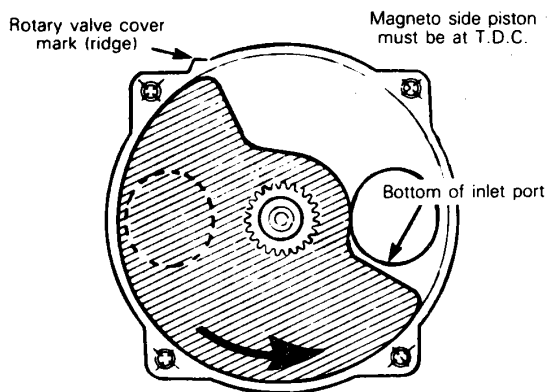
To correctly install the rotary valve, proceed as follows:

- Turning crankshaft counter-clockwise, (drive pulley side) bring magneto side to top dead center using a T.D.C. gauge.

NOTE: Do not use crankshaft locking tool to find out mageto 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 cover.

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



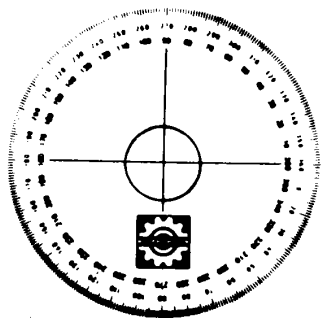
A013002028

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

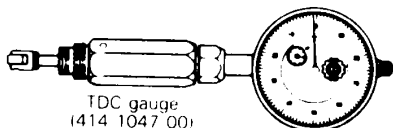
Installation on spare crankcase without mark (ridge).

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

REQUIRED TOOLS



Angle finder
(414 3529 00)



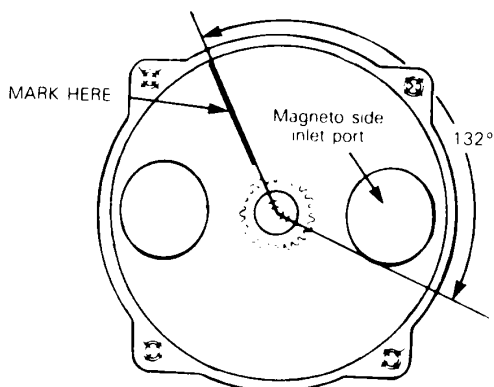
TDC gauge
(414 1047 00)

A000001086

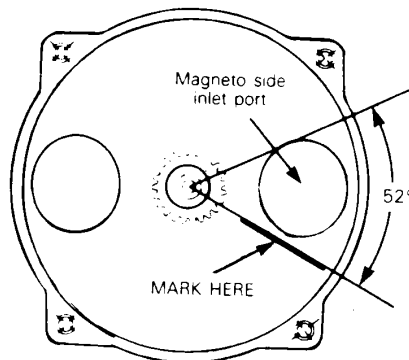
ENGINE TYPE	TIMING MARKS	
	opening	closing
532	132°	52°

For example: 132° opening
 52° closing

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



A013002021

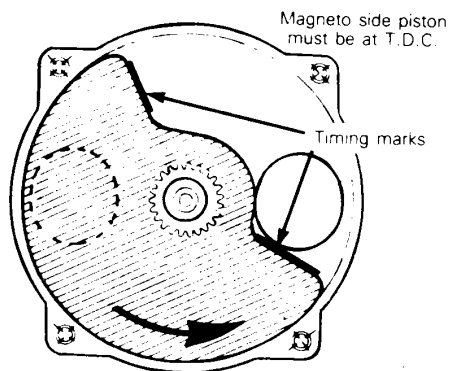


A013002022

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 T.D.C. 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.



A013002023

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

2, Rotary valve cover bolts

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

Section 02 ENGINE

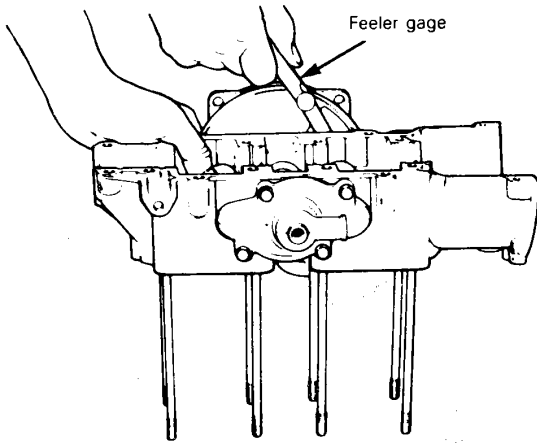
Sub-section 09 (537 ENGINE TYPE)

INSPECTION

1,5, Rotary valve cover & rotary valve

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

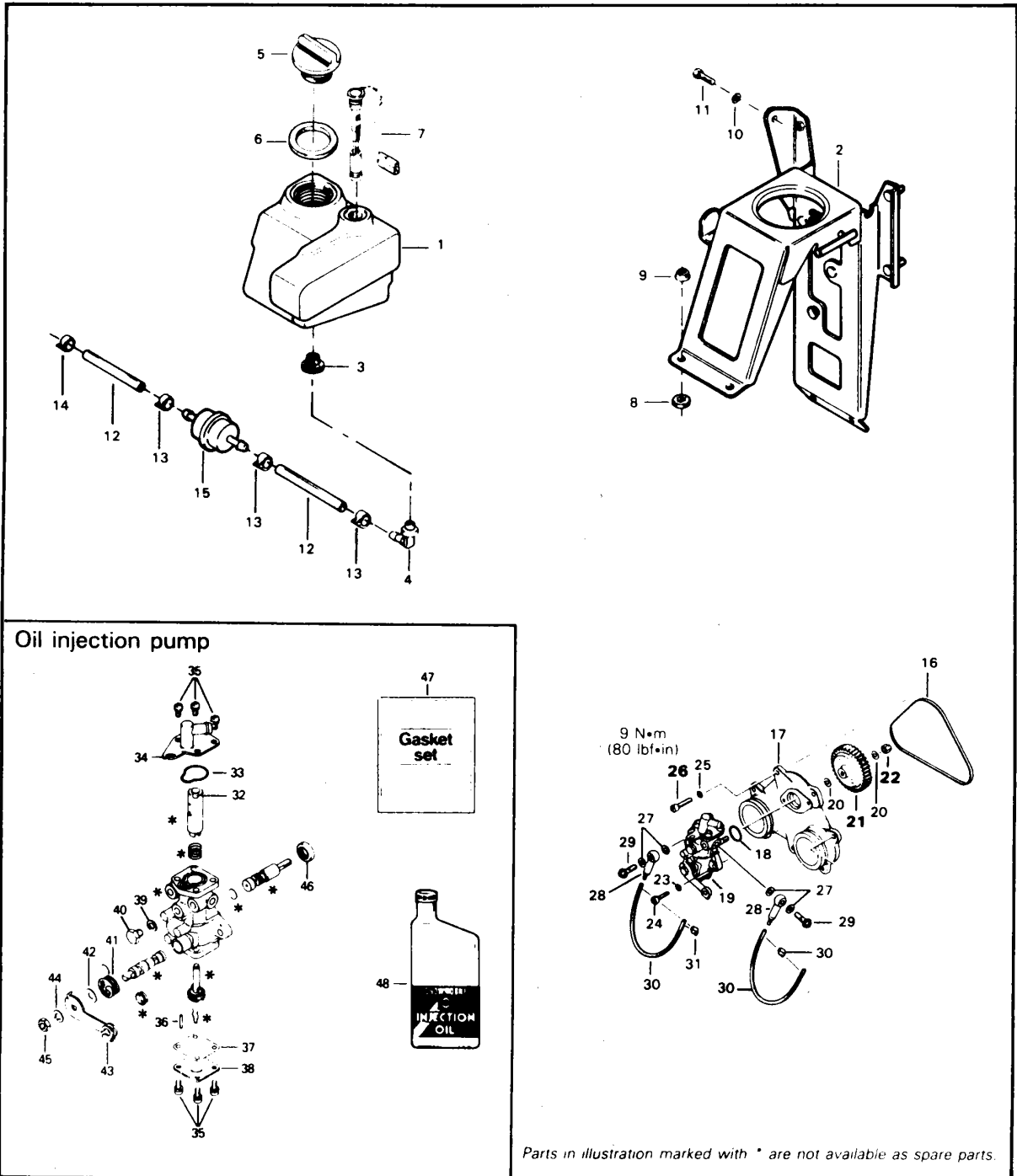
To measure this gap use a feeler gage inserted between rotary valve and upper crankcase with the rotary valve cover in place **without its O-ring**. Check as much surface as possible. Follow the same procedure for the lower crankcase.



A013002024

Section 02 ENGINE
Sub-section 09 (537 ENGINE TYPE)

OIL INJECTION PUMP & RESERVOIR



Section 02 ENGINE

Sub-section 09 (537 ENGINE TYPE)

1. Injection oil tank
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" (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)

CLEANING

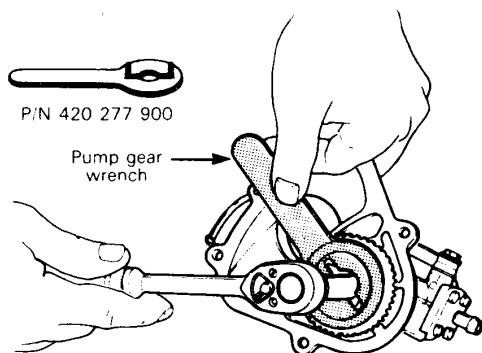
Discard all seals and O-rings. Clean metal components in a non-ferrous metal cleaner.

DISASSEMBLY

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

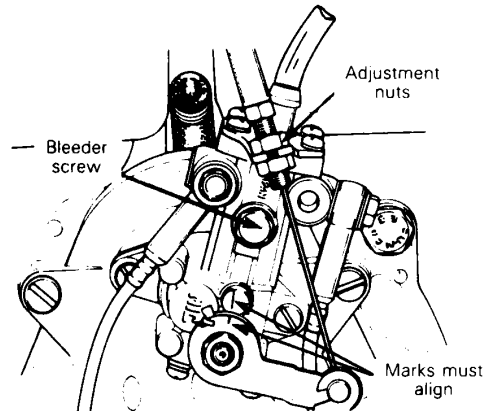
21,22, Oil pump gear & lock nut

To remove retaining nut, lock gear using no. 420 277 900 tool.



A000001085

INJECTION PUMP CABLE ADJUSTMENT



A013002005

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 to bleed the main oil line (between tank and pump), loosen the bleeder screw (do not start engine) and let the air escape until oil starts to flow out.

Make sure tank has enough oil

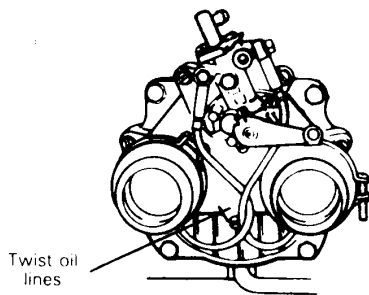
To bleed the small injection lines, start the engine and let it run at idle speed. Move injection pump lever to fully open position until lines are full of oil.

ASSEMBLY

26, Screw

Torque to 9 N•m (80 lbf•ft).

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



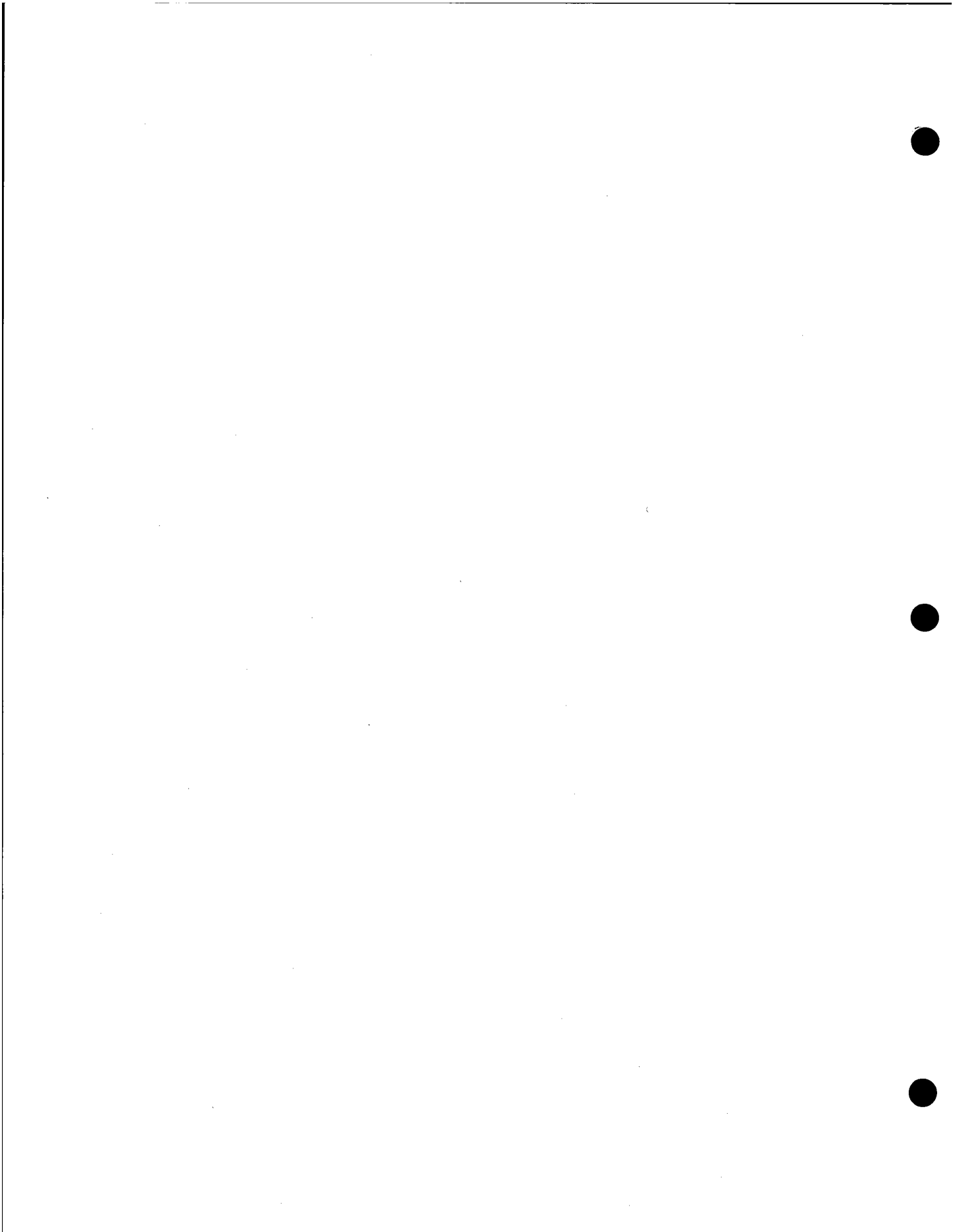
A015002017

ADJUSTMENT

Always perform carburetor adjustment prior to oil injection pump adjustment.

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. Tighten the lock nut.



Section 02 ENGINE

Sub-section 10 (ENGINE DIMENSIONS MEASUREMENT)

ENGINE DIMENSIONS MEASUREMENT

This section cover all 1985 engine types:
247, 253, 377, 447, 462, 467, 503, 532, 537

CYLINDER TAPER

253 engine type

Not applicable.

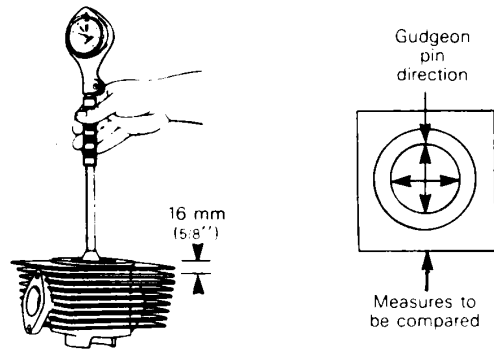
All others 1985 engines

MAXIMUM: 0.08 mm (.003'')

Compare cylinder diameter 16 mm (5/8'') from top of cylinder to just below its intake port area.

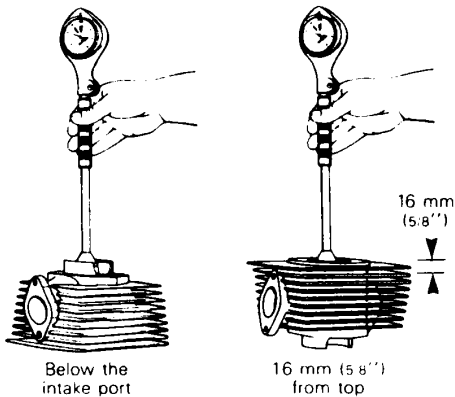
On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds 0.08 (.003'') the cylinder should be rebored and honed or should be replaced.

Measuring 16 mm (5/8'') 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.



A001002021

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'') from top. Compare the measurements at this position.



A001002016

CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
253	0.10 mm (.004'')
All other 1985 engines	0.05 mm (.002'')

CYLINDER/PISTON CLEARANCE

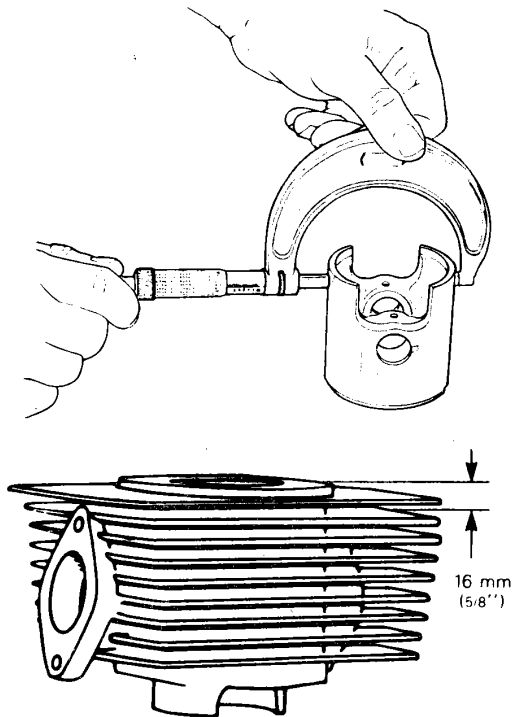
ENGINE TYPE	NEW PARTS MINIMUM - MAXIMUM	WEAR LIMIT
247	0.065 - 0.20 mm (.0026 - .008'')	0.20 mm (.008'')
253 377 447 462	0.08 - 0.10 mm (.0031 - .0039'')	
503	0.07 - 0.09 mm (.0028 - .0035'')	
467 532	0.10 - 0.12 mm (.0039 - .0047'')	
537	0.09 - 0.11 mm (.0035 - .0043'')	

Section 02 ENGINE

Sub-section 10 (ENGINE DIMENSIONS MEASUREMENT)

Measurement

To 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'') below its top edge.



A00100204

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'') from top.

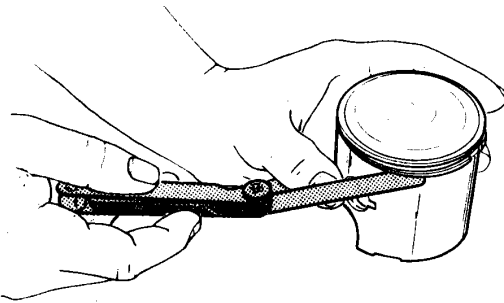
The difference between these two measurements should be within specified tolerance.

RING/PISTON GROOVE CLEARANCE

ENGINE TYPE	MINIMUM	MAXIMUM (wear limit)
All 1985 engines	0.04 mm (.002'')	0.20 mm (.008'')

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.



A00100205

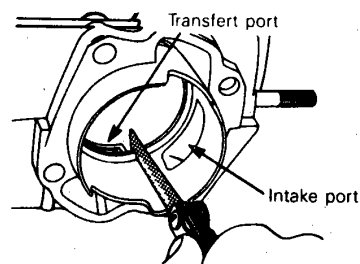
RING ENG GAP

ENGINE TYPE	NEW RING MINIMUM—MAXIMUM	WEAR LIMIT
All 1985 engines	0.20 — 0.35 mm (.008 — .014'')	1.0 mm (.039'')

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.



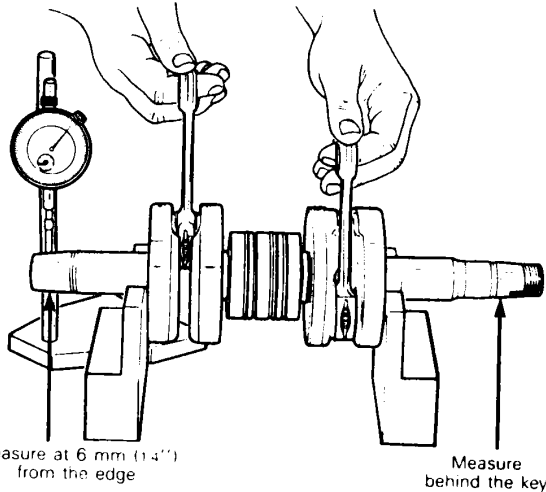
A00100206

Section 02 ENGINE
Sub-section 10 (ENGINE DIMENSIONS MEASUREMENT)

CRANKSHAFT DEFLECTION

ENGINE TYPE	MAXIMUM
247	0.10 mm (0.0039")
All other 1985 engines	0.08 mm (0.0031")

Turn crankshaft on "V" shaped blocks; using a dial indicator measure deflection on each side as illustrated. If deflection exceeds specified tolerance, the crankshaft should be repaired or replaced.

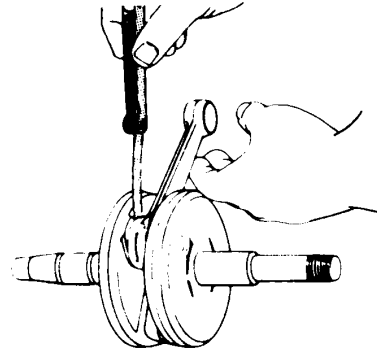


A001002027

CONNECTING ROD BIG END AXIAL PLAY

ENGINE TYPE	MINIMUM	MAXIMUM (wear limit)
247, 253, 377, 447, 462, 503	0.20 mm (.008")	1.00 mm (.039")
467, 532, 537	0.40 mm (.016")	1.20 mm (.047")

Using a feeler gauge measure distance between thrust washer and crankshaft balancer. If the distance exceeds specified tolerance, repair or replace the crankshaft.



A001002028

CRANKSHAFT END-PLAY

247 engine type

ENGINE TYPE	MINIMUM	MAXIMUM
247	0.20 mm (.008")	0.40 mm (.016")

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.

The following is required for the adjustment procedure:

— adjustment shims (refer to parts catalog)

Thicknesses available: - 0.10 mm (.004")
- 0.20 mm (.008")
- 0.30 mm (.012")
- 0.50 mm (.020")
- 1.00 mm (.040")

— micrometer

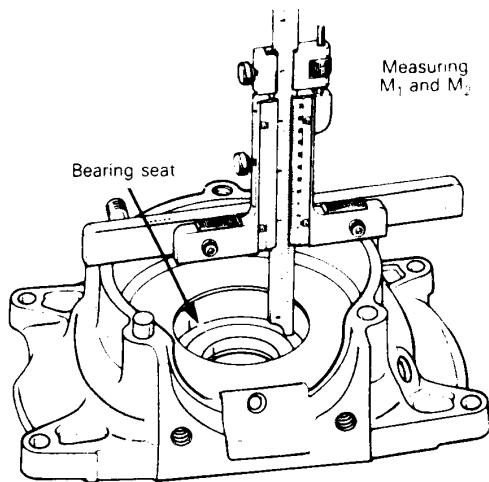
— vernier

Section 02 ENGINE

Sub-section 10 (ENGINE DIMENSIONS MEASUREMENT)

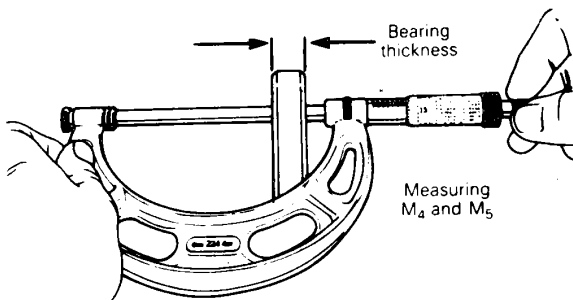
Total shim thickness needed for the end-play adjustment is determined with the following procedure:

- a) Measure crankcase halves as illustrated (M_1 and M_2).
A standard compressed crankcase gasket will have a 0.30 mm (.012") thickness (M_3). Add these measurements to obtain dimension "A".



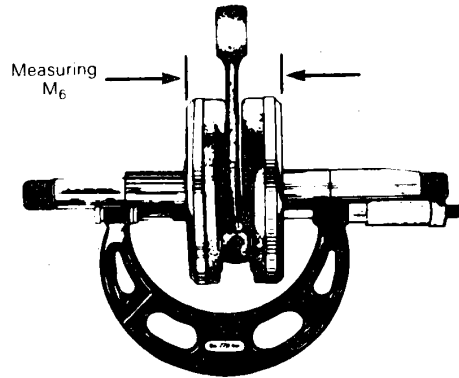
A001002029

- b) Measure the thickness of each ball bearing (M_4 and M_5).



A001002030

- c) Measure distance between bearing shoulders on crankshaft (M_6).



A001002031

- d) Measure the distance ring and adjustment shims thickness (M_7 and 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

$$A = M_1 + M_2 + M_3$$

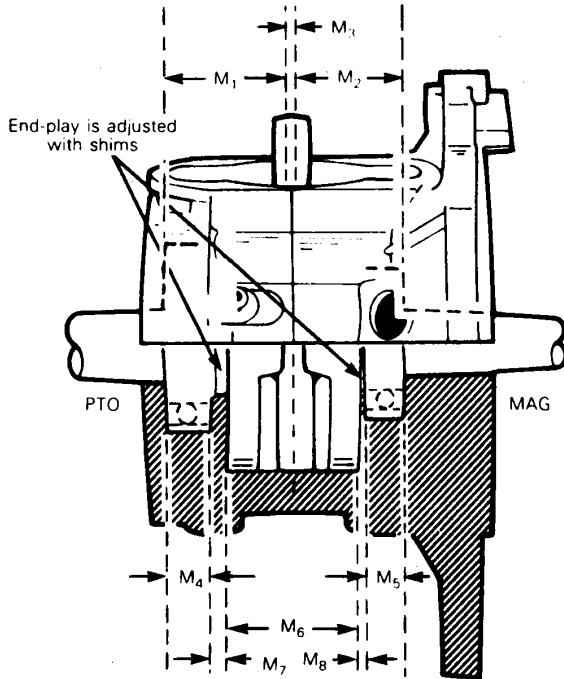
$$B = M_4 + M_5 + M_6 + M_7 + M_8$$

$$A - B = \text{actual end-play that must be within specification.}$$

M_8 is the dimension that must be adjusted to obtain the specified crankshaft end-play.

Section 02 ENGINE

Sub-section 10 (ENGINE DIMENSIONS MEASUREMENT)



A001002032

253 engine type

ENGINE TYPE	MINIMUM	MAXIMUM
253	0.1 mm (.004'')	0.4 mm (.016'')

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.

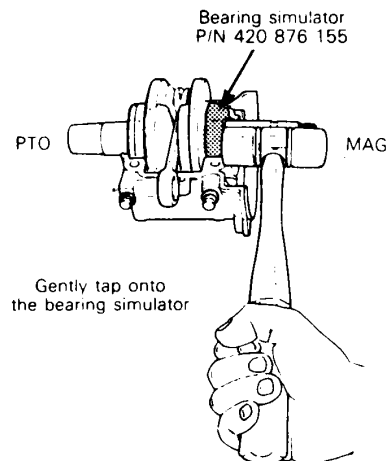
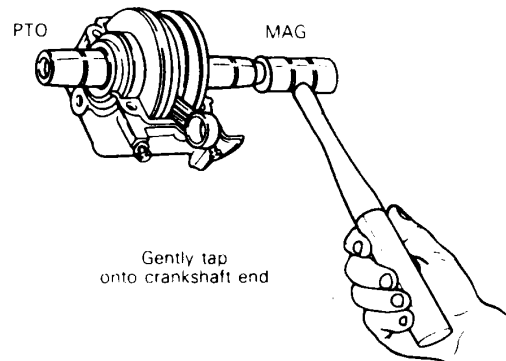
The following is required for the adjustment procedure:

- a feeler gauge
- adjustment shims (refer to parts catalog)
 - Thickness available: - 0.10 mm (.004'')
 - 0.20 mm (.008'')
 - 0.30 mm (.012'')
 - 0.50 mm (.020'')

- bearing simulator P/N 420 876 155.

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.
- Using a plastic hammer, gently tap the crankshaft end then the bearing simulator to take all the slack.

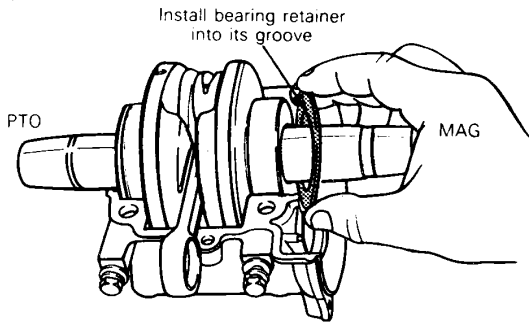


A001002037

Section 02 ENGINE

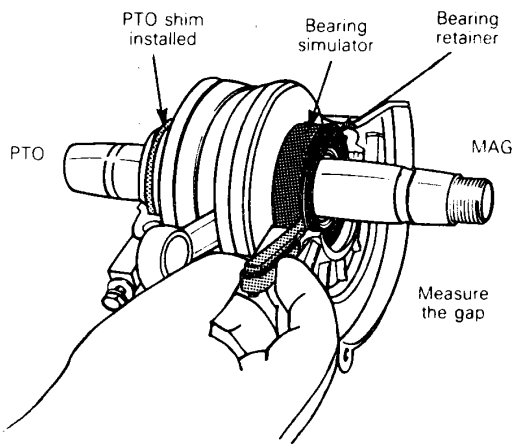
Sub-section 10 (ENGINE DIMENSIONS MEASUREMENT)

- Install the bearing retainer into its groove on MAG side.



A001002035

- Measure the gap between the bearing retainer and the bearing simulator close to the crankcase half.



A001002036

- 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.

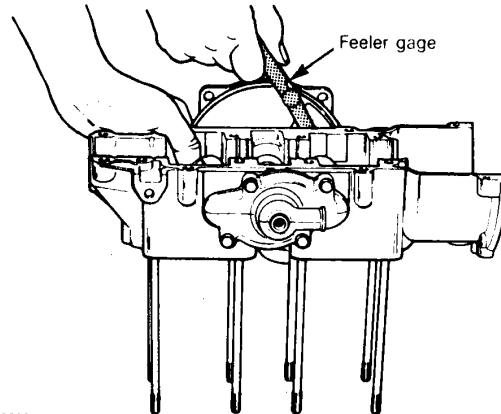
377,447,462,467,503,532,537 engine types

These engine types do not have end-play adjustment.

CRANKCASE/ROTARY VALVE GAP

ENGINE TYPE	MINIMUM	MAXIMUM
All 1985 liquid cooled	0.27 mm (0.011")	0.48 mm (0.019")

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.



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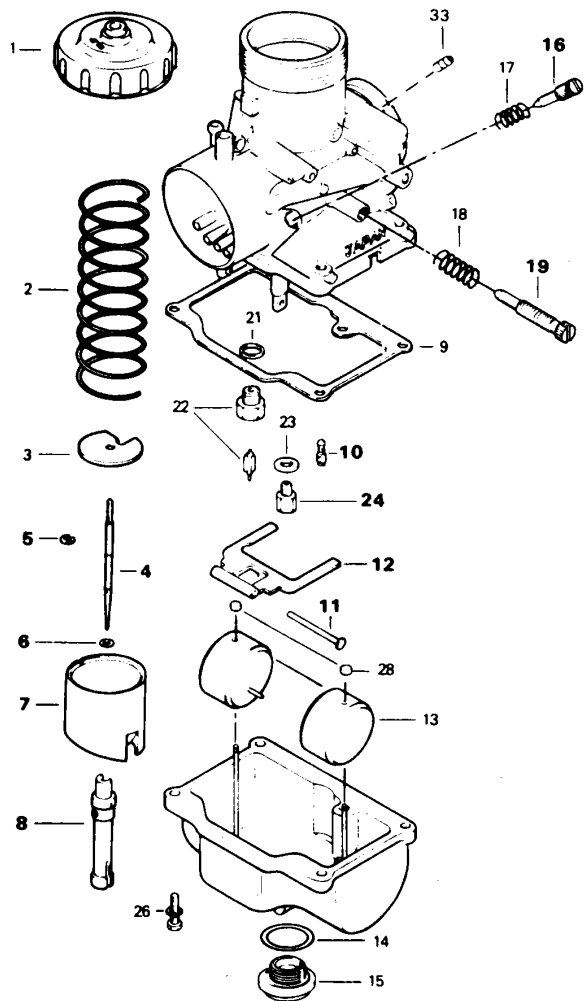
CARBURETOR & FUEL PUMP

MIKUNI CARBURETOR

List of engines with their respective carburetor

ENGINE TYPE	MIKUNI NO.
247	VM 28-242
253	VM 34-319
377 Safari 377/E Mirage III	VM 34-309
377 Skandic/R	VM 34-276
447	VM 34-310
462	VM 34-334
467	MAG. VM 34-321 PTO VM 34-320
503	VM 34-297
532	VM-34-312
537	MAG. VM 40-30 PTO VM 40-29

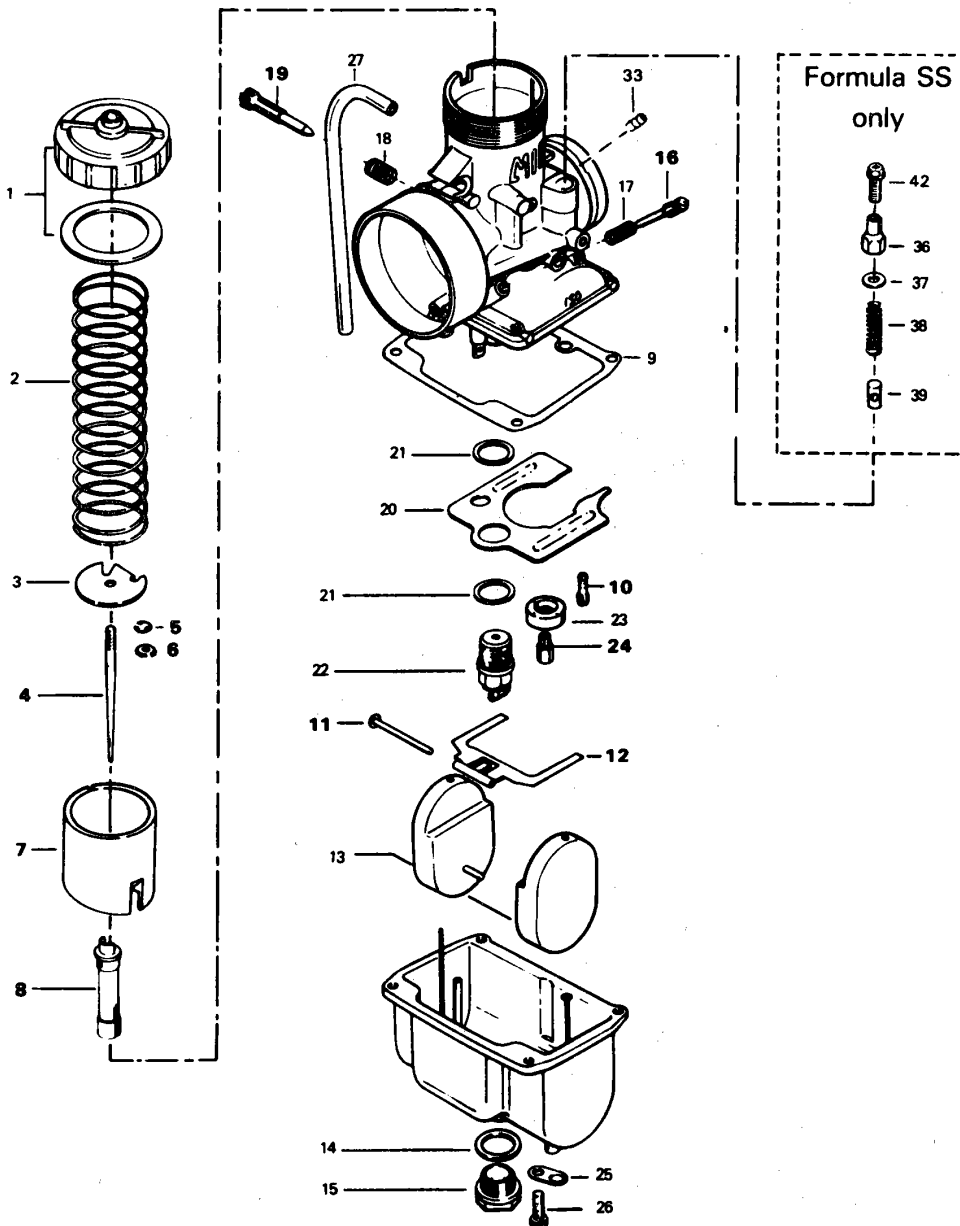
Carburetor VM 28-242



Section 02 ENGINE

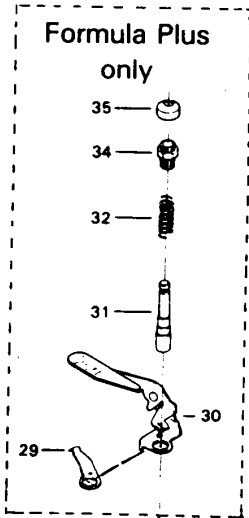
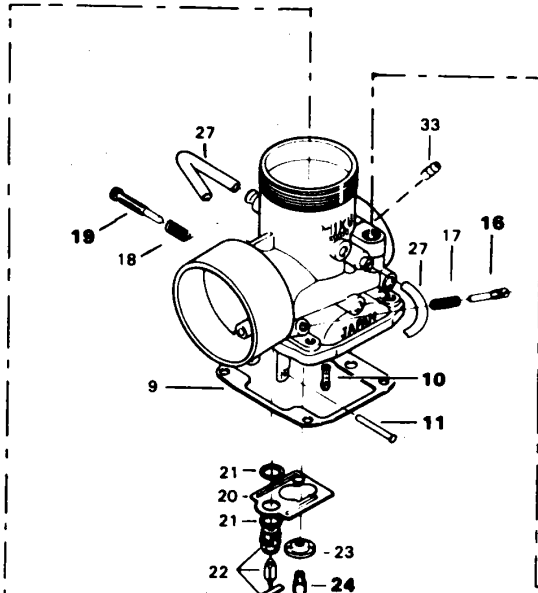
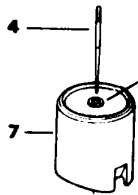
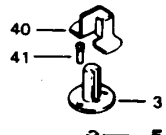
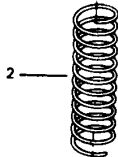
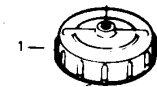
Sub-section 11 (CARBURETOR & FUEL PUMP)

Carburetors VM 34-276
VM 34-297
VM 34-309
VM 34-310
VM 34-312



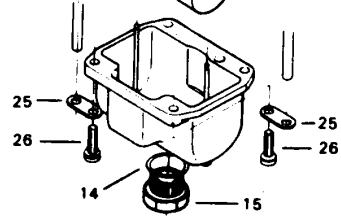
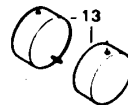
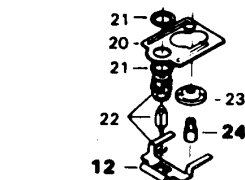
Section 02 ENGINE
Sub-section 11 (CARBURETOR & FUEL PUMP)

Carburetors VM 34-319
 VM 34-320
 VM 34-321
 VM 34-334
 VM 40-29
 VM 40-30



Formula Plus
 only

- 35 — [part 35]
- 34 — [part 34]
- 32 — [part 32]
- 31 — [part 31]
- 30 — [part 30]



Section 02 ENGINE

Sub-section 11 (CARBURETOR & FUEL PUMP)

1. Cover
2. Spring (throttle valve)
3. Needle retainer plate
4. Needle
5. Circlip
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. Idle air screw
17. Spring
18. Spring (throttle stop screw)
19. Throttle stop screw
20. Baffle plate
21. Washer
22. Needle valve
23. Baffle ring
24. Main jet
25. Tube retainer plate
26. Screw and lock washer
27. Vent tube
28. Cap
29. Spring plate
30. Choke lever
31. Starting piston
32. Spring
33. Nipple
34. Plunger cap
35. Rubber cap
36. Holder guide
37. Washer
38. Spring
39. Plunger
40. Throttle cable retainer
41. Screw
42. Screw M6

REMOVAL

Remove air silencer box, fuel inlet line and primer line. 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 carburetor, hand-lebar and as necessary, oil injection pump.

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.

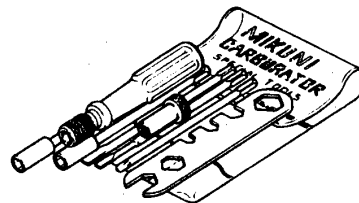
Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

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 Mikuni carburetor disassembly and assembly procedures it is recommended to use a special tool kit available under P/N 404 1120 00.



A000001087

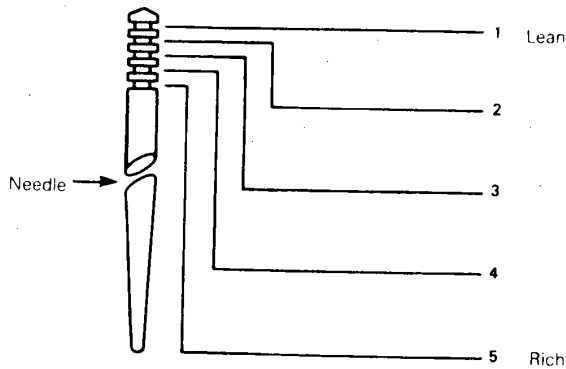
4,5, Needle, circlip

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 is the leanest, 5 the richest.

NOTE: The last digit of the needle identification number gives the position of the clip from the top of the needle.

Section 02 ENGINE
Sub-section 11 (CARBURETOR & FUEL PUMP)

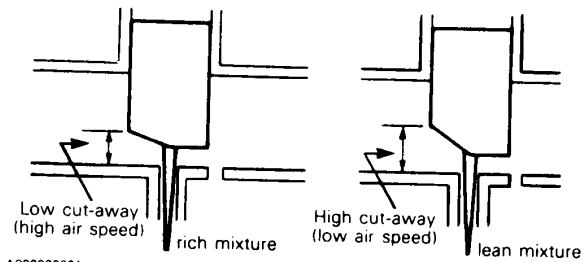
Example:
Needle identification → 6DH4-3
Position of the "E" clip from top



A000001088

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.



A000002001

24, Main jet

The main jet installed in the carburetor is suitable for a wide range of temperature (-30° to 5°C/-20° to 40°F) at sea level. However, different jetting is available. Always check spark plug tip color to find out correct jetting.

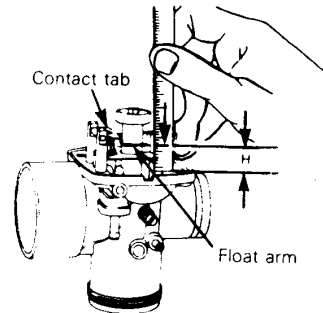
MIKUNI CARBURETOR FLOAT LEVEL ADJUSTMENT

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.

Ex.: VM 36 carburetor



A000002002

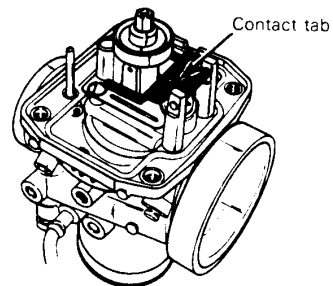
Float arm height dimensions:

CARBURETOR DIMENSION	VM 28	VM 34	VM 40
H (inch)	.59 ≈ .66	.86 ≈ .94	.67 ≈ .75
(mm)	15 ≈ 17	22 ≈ 24	17 ≈ 19

○ **NOTE:** As a general rule, the float arm must be parallel with the flange rib.

To adjust height "H":

- Bend the contact tab of float arm until the specified height is reached.

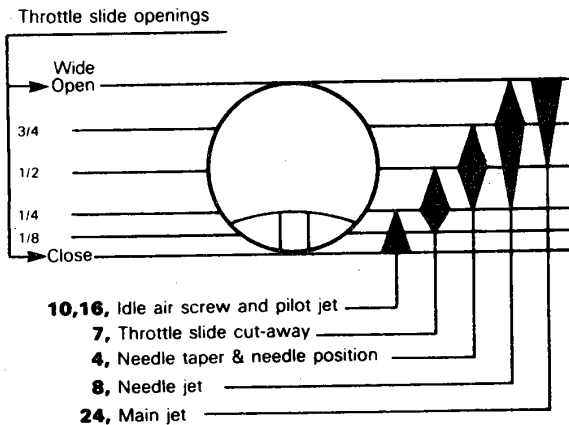


A000002003

Section 02 ENGINE

Sub-section 11 (CARBURETOR & FUEL PUMP)

The illustration below shows which part of the carburetor begins to function at different throttle slide openings.



A000002004

NOTE: For fine tuning refer to section 09, "Technical data" and to section 04-03, "Spark plug".

NOTE: For high altitude regions, the "High Altitude Technical Data" booklet can inform you about the carburetor tuning according to altitude.

INSTALLATION

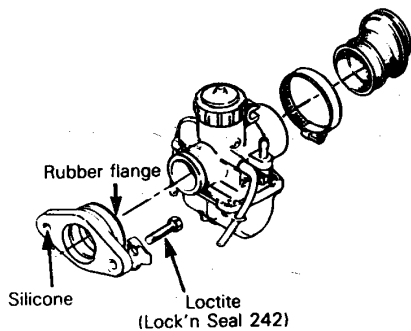
To install carburetor on engine, inverse removal procedure.

However, pay attention to the following:

Inspect throttle cable & housing prior to installation.

Apply a thin layer of silicone sealant between carburetor rubber flange and intake cover on engine.

Apply Loctite Lock'n Seal 242 on bolts retaining flange to intake cover.



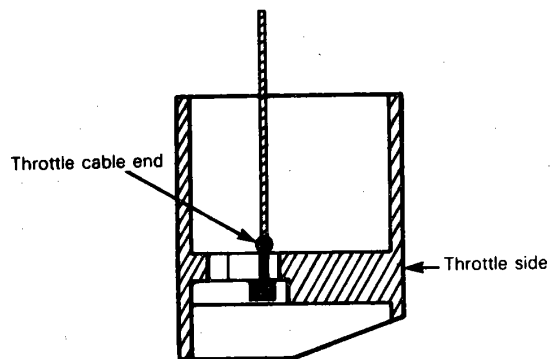
A000002005

02-11-6

On all models except Elan, Alpine, Formula MX/Plus, make sure to insert tap into the notch to assemble the carburetor adaptor with the engine, or the carburetor or the air silencer.

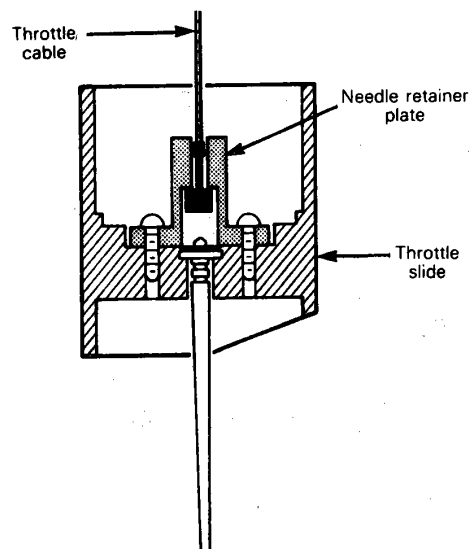
CAUTION: The rubber flange must be checked for cracks and/or damage. At assembly, the flange must be perfectly matched with the air intake manifold or severe engine damage will occur.

When installing throttle cable end in throttle slide, hook up cable by using the stopper at the extremity of the cable.



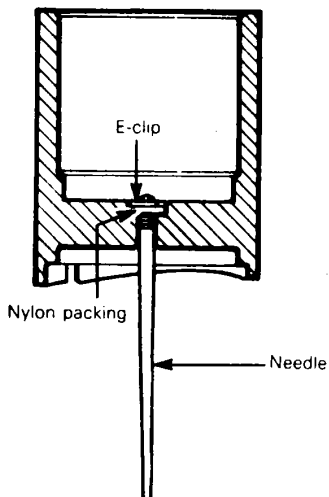
A000002006

Some carburetors are equipped with a center post retaining device. On this system the throttle cable is hooked into the needle retainer plate.

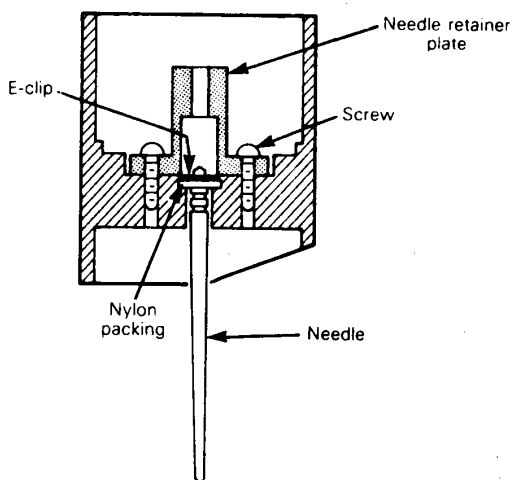


A000002007

4,6, Needle, nylon packing



A000002008



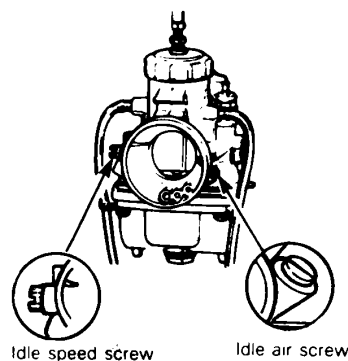
A000002009

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.

CARBURETOR ADJUSTMENTS



A000002010

16, Air screw adjustment

Completely close the air screw (until a slight seating resistance is felt) then back off as specified.

(Refer to section 09 "Technical data" for the specifications).

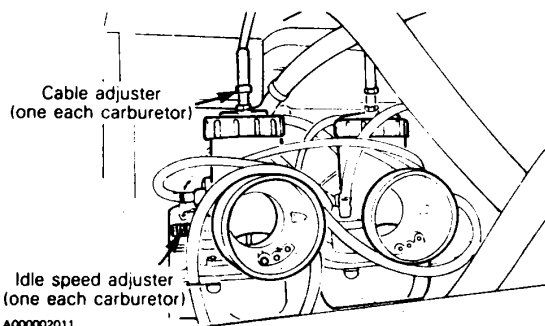
7, Throttle slide adjustment

◆ **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:

- Remove the air intake silencer.
- Back off the idle speed screw completely.



A000002011

Turn the idle-speed screw clockwise until it contacts the throttle slide then continue turning two (2) additional turns. Repeat on the other carburetor. This will ensure identical throttle slide idle setting.

Section 02 ENGINE

Sub-section 11 (CARBURETOR & FUEL PUMP)

Tighten carburetor cover with the throttle cable adjuster jam nut unlocked, press the throttle lever against the handle grip.

All models except Formula Plus

By turning the cable adjuster, adjust the carburetor slide cut away so that it is flush with the top of the carburetor bore.

Formula Plus (VM 40)

By turning the cable adjuster, adjust the carburetor slide, so that it is flush with the top of the carburetor outlet bore.

Tighten the cable adjuster jam nut.

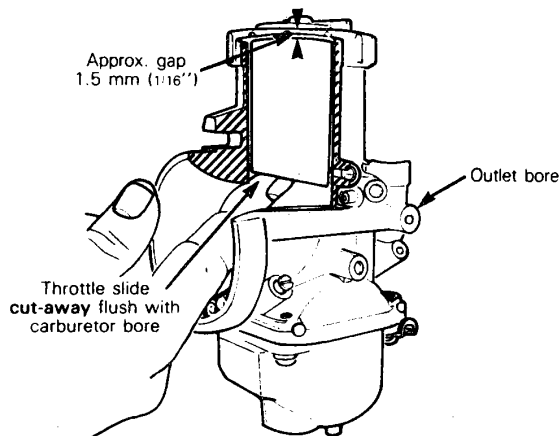
Repeat for the other carburetor.

▼ **CAUTION:** On twin carburetor models, make sure both carburetors start to operate simultaneously.

◆ **WARNING:** It is important that the throttle slide adjustment be performed to ensure proper functioning of throttle mechanism.

▼ **CAUTION:** On twin carburetor model with rotary valve (Formula MX, Formula Plus) do not interchange carburetors, the jetting is different on each side.

Once carburetor adjustment is performed, check that with the throttle lever fully depressed, there is a free play of $1/16''$ between the cover(s) and throttle slide. Readjust accordingly.



A000002012

◆ **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.

▼ **CAUTION:** On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted.

19, Idle speed final adjustment

Turn idle speed screw clockwise until it contacts the throttle slide then continue turning two (2) additional turns.

This will provide a preliminary idle speed setting. Start engine and allow it to warm then adjust idle speed to specifications by turning idle speed screw clockwise or counterclockwise.

(Refer to section 09 "Technical data" for the specifications).

▼ **CAUTION:** Do not attempt to set the idle speed by using the air screw. Severe engine damage can occur.

Section 02 ENGINE
Sub-section 11 (CARBURETOR & FUEL PUMP)

MIKUNI FUEL PUMP

FIG. (A)

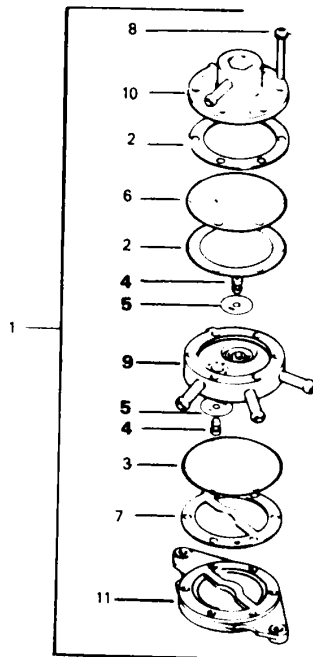
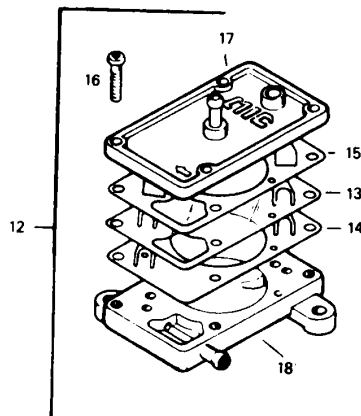


FIG (B)



SINGLE OUTLET
PUMP

Section 02 ENGINE

Sub-section 11 (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. Pulse chamber
11. Cover
12. Fuel pump assembly
13. Diaphragm
14. Membrane
15. Packing (cap)
16. Screw
17. Cover
18. Pulse 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.
- Disconnect fuel outlet line(s).
- Disconnect pulsation line.
- Remove screws (or nuts if applicable) securing fuel pump.

FIG. (A)

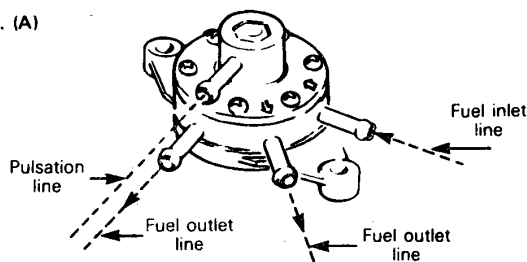
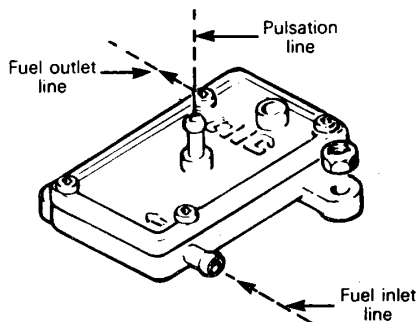


FIG. (B)



A000002013

DISASSEMBLY & ASSEMBLY

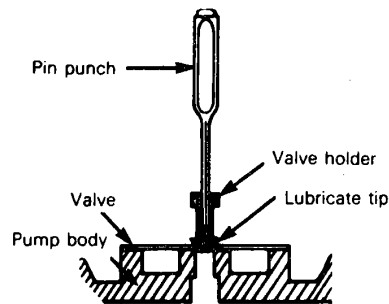
4,5,9, Grommet, valve, pump body

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 3/32'' pin punch inside valve holder and lubricate tip of holder with a drop of oil.
- Push holder into pump body as illustrated.



A000002018

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 or imperfections. Replace as needed.

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.

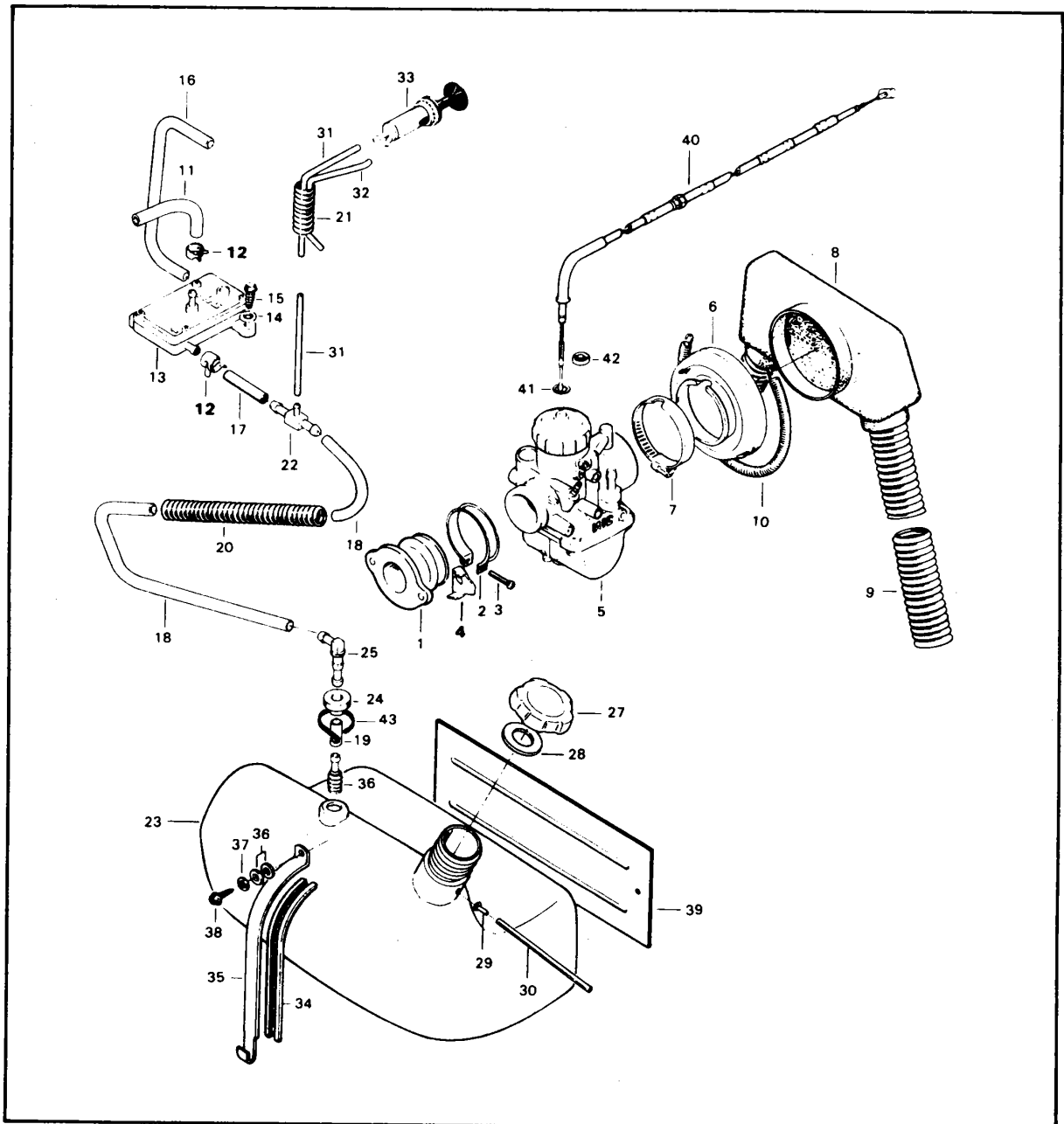
○ **NOTE:** On model fitted with two outlets, plug one outlet with finger while checking outlet valve.

INSTALLATION

To install, inverse removal procedure.

AIR INTAKE SILENCER & FUEL TANK

ELAN



Section 02 ENGINE

Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

- | | |
|---|--|
| 1. Carburetor adaptor | 23. Fuel tank |
| 2. Clamp | 24. Grommet |
| 3. Screw | 25. Male connector |
| 4. Tab lock (2) | 26. Fuel filter |
| 5. Carburetor VM28-242 | 27. Fuel tank cap |
| 6. Adaptor | 28. Gasket |
| 7. Clamp | 29. Air vent fitting |
| 8. Air intake box | 30. Air vent tube 27" (586 mm) |
| 9. Tube (2) | 31. Primer tube 18 1/2" (470 mm) |
| 10. Spring | 32. Primer tube 7" (178 mm) |
| 11. Impulse hose 7 1/4" (184 mm) | 33. Primer valve |
| 12. Spring clip (2) | 34. Protector strip 9" (229 mm) |
| 13. Fuel pump | 35. Retainer strip |
| 14. Internal tooth lock washer 1/4" (2) | 36. Rubber spacer (2) |
| 15. Hexagonal washer head metal screw 12 x 3/4" (2) | 37. Flat washer 7/32" x 5/8" x .060" |
| 16. Fuel line 17" (332 mm) | 38. Hexagonal washer head self tapping screw 12 x 1" |
| 17. Fuel line 1 1/2" (38 mm) | 39. Heat shield |
| 18. Fuel line 36 1/2" (927 mm) | 40. Throttle cable & housing |
| 19. Fuel line 14" (356 mm) | 41. O-ring |
| 20. Isolating line 29 1/2" (750 mm) | 42. Retaining ring |
| 21. Isolating line 4" (102 mm) | 43. Tie rap |
| 22. Tee | |
-

4, Tab lock

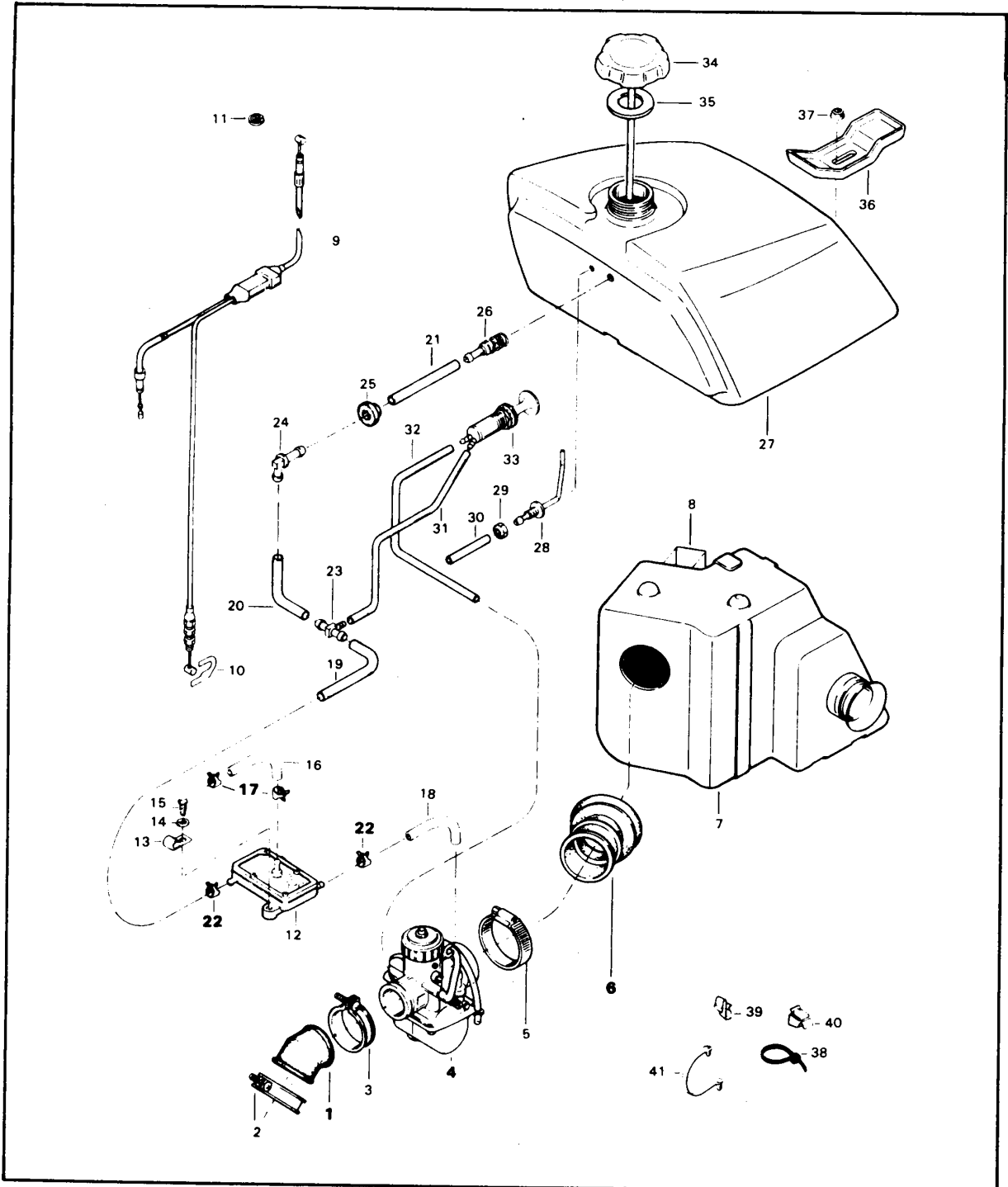
Always bend tab lock over screws and replace if they seem worn.

12, Spring clips

Always reposition spring clips after any repair to prevent possible leaks.

Section 02 ENGINE
Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

CITATION LS, LSE, TUNDRA, TUNDRA LT



Section 02 ENGINE

Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)


- | | |
|--|---|
| 1. Rubber flange | 22. Spring clip |
| 2. Collar | 23. Tee |
| 3. Clamp | 24. Male connector |
| 4. Carburetor VM 34-319 | 25. Grommet |
| 5. Clamp | 26. Fuel filter |
| 6. Intake adaptor | 27. Fuel tank |
| 7. Air silencer | 28. Air vent fitting |
| 8. Warning label | 29. Hexagonal nut 5/16" x 18 |
| 9. Throttle cable & housing | 30. Air vent tube 55" (1398 mm) |
| 10. Tab lock | 31. Primer tube 16" (406 mm) |
| 11. Circlip | 32. Primer tube 19" (483 mm) |
| 12. Fuel pump | 33. Primer valve |
| 13. Clip (2) | 34. Fuel tank cap |
| 14. Internal tooth lock washer 1/4" (2) | 35. Gasket |
| 15. Hexagonal washer head self-tapping screw 1/2" x 3/4" (2) | 36. Retainer (2) |
| 16. Impulse hose 9" (228 mm) | 37. Hexagonal flanged elastic stop nut 6 mm (4) |
| 17. Spring clip (2) | 38. Tie rap |
| 18. Fuel line 15" (380 mm) | 39. Clip |
| 19. Fuel line 9.5" (241 mm) | 40. Clip |
| 20. Fuel line 18" (457 mm) | 41. Cable clip |
| 21. Fuel line 14" (356 mm) | |

17,22, Spring clips

Always reposition spring clips after any repair to prevent possible leaks.

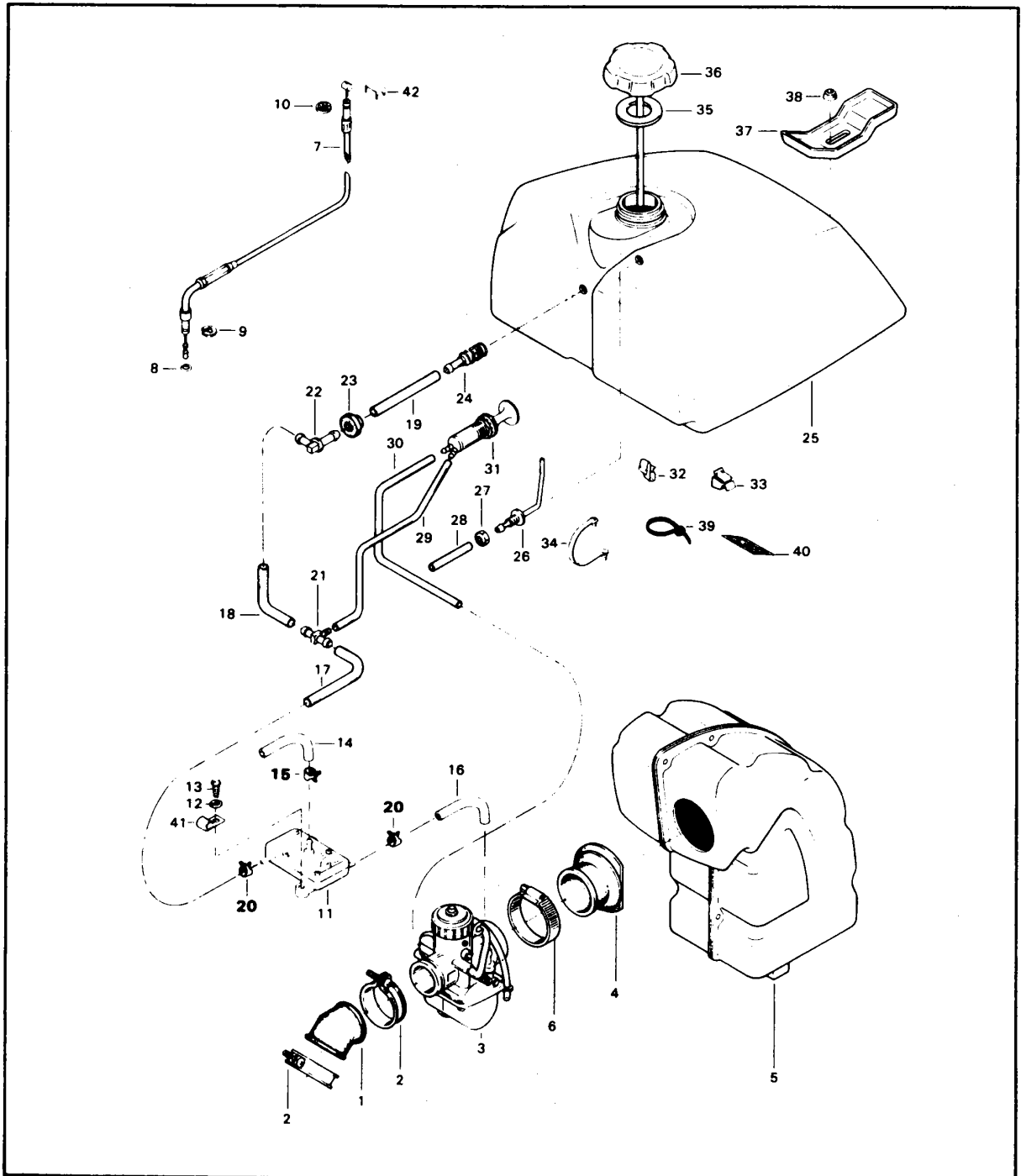
1,4,6, Rubber flange, carburetor & intake adaptor

Always insert engine and carburetor tabs into rubber flange notches.

 **CAUTION: Disregarding indexation might cause severe engine damage.**

Section 02 ENGINE
Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

SKANDIC, SKANDIC-R



Section 02 ENGINE

Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)


- | | |
|--|---|
| 1. Rubber flange | 22. Male connector |
| 2. Clamp (2) | 23. Grommet |
| 3. Carburetor VM 34-276 | 24. Fuel filter |
| 4. Adaptor | 25. Fuel tank |
| 5. Air silencer | 26. Air vent fitting |
| 6. Clamp | 27. Hexagonal nut 5/16" 18 |
| 7. Throttle cable & housing | 28. Air vent tube |
| 8. O-ring | 29. Primer tube 7" (178 mm) |
| 9. Retaining ring | 30. Primer tube (amorreur) 20" (508 mm) |
| 10. Circlip | 31. Primer valve |
| 11. Fuel pump | 32. Clip |
| 12. Internal tooth lock washer 1/4" (2) | 33. Clip |
| 13. Hexagonal washer head self-tapping screw M6 x 1 x 20 (2) | 34. Cable clip |
| 14. Impulse hose 11" (280 mm) | 35. Gasket |
| 15. Spring clip | 36. Cap |
| 16. Fuel line 20" (508 mm) | 37. Retainer |
| 17. Fuel line 20" (508 mm) | 38. Hexagonal flanged elastic stop nut 6 mm (2) |
| 18. Fuel line 15" (380 mm) | 39. Tie rap |
| 19. Fuel line 14" (356 mm) | 40. Warning label |
| 20. Spring clip (2) | 41. Clip |
| 21. Tee | 42. Lock tab |
-

15,20, Spring clips

Always reposition spring clips after any repair to prevent possible leaks.

Always insert engine tab into rubber flange notch.

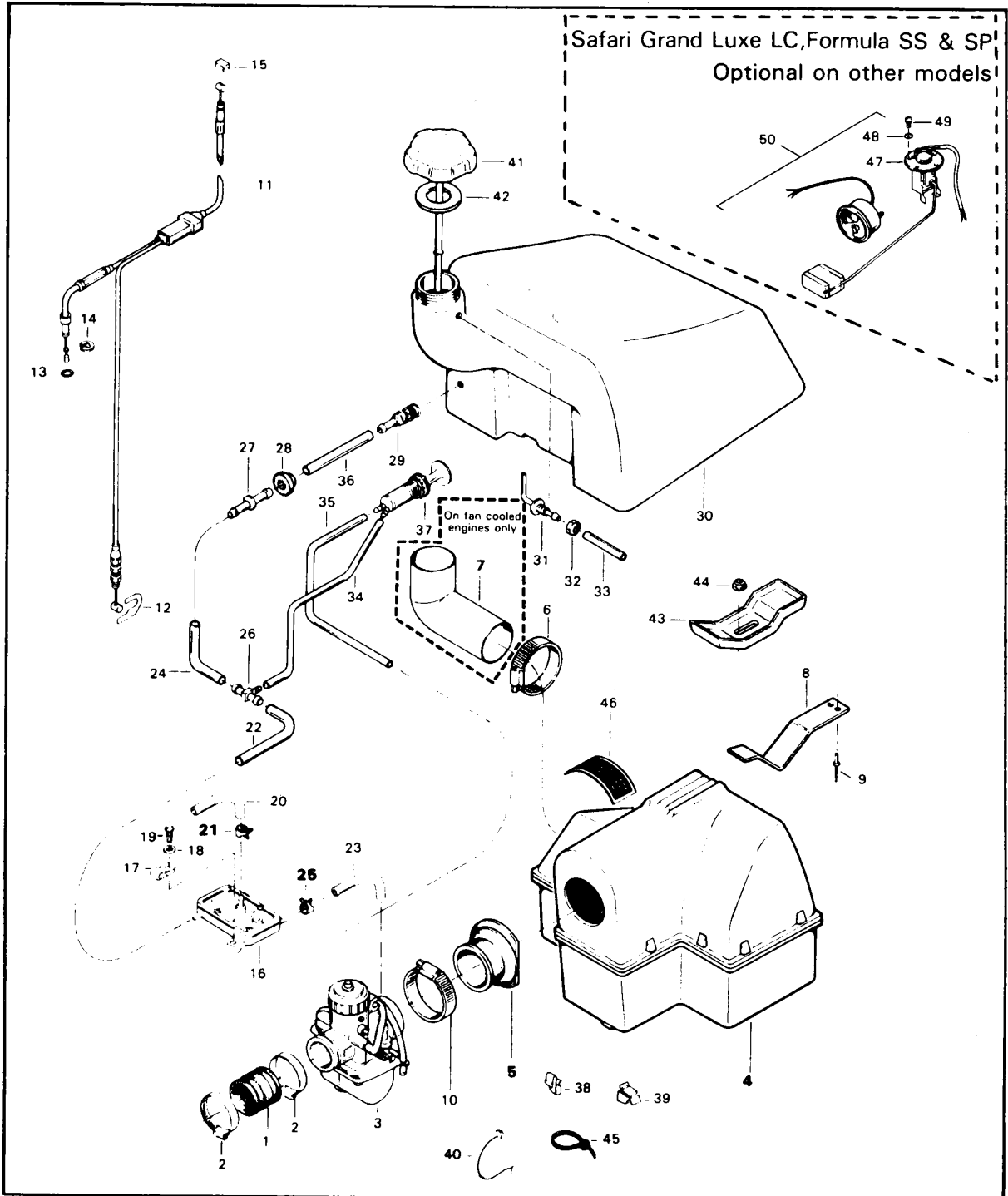
Always install air intake adaptor in such away that its flat edge will be vertical and located at the left hand side.

 **CAUTION:** Disregarding indexation might cause severe engine damage.

Section 02 ENGINE

Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

SAFARI 377,377E,447,GRAND LUXE LC,MIRAGE III, FORMULA SS & SP



Section 02 ENGINE

Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

- | | |
|--|---|
| 1. Rubber flange | 26. Tee |
| 2. Clamp (2) | 27. Male connector |
| 3. Carburetor | 28. Grommet |
| 4. Air silencer | 29. Fuel filter |
| 5. Adaptor | 30. Fuel tank |
| 6. Clamp | 31. Air vent fitting |
| 7. Elbow | 32. Hexagonal nut 5/16"-18 |
| 8. Air silencer support | 33. Air vent tube 65" (1665 mm) |
| 9. Rivet (2) | 34. Primer tube 7.0" (177 mm) |
| 10. Clamp | 35. Primer tube 16.5" (419 mm) |
| 11. Throttle cable & housing | 36. Fuel line 17" |
| 12. Tab lock | 37. Primer valve |
| 13. O-ring | 38. Clip |
| 14. Retaining ring | 39. Clip |
| 15. Lock tab | 40. Cable clip |
| 16. Fuel pump | 41. Cap |
| 17. Clip | 42. Gasket |
| 18. Internal tooth lock washer 1/4" (2) | 43. Retainer (2) |
| 19. Hexagonal washer head self-tapping screw 12 x 3/4" (2) | 44. Hexagonal flanged elastic stop nut 6 mm (4) |
| 20. Impulse hose | 45. Tie rap |
| 21. Spring clip (2) | 46. Warning label |
| 22. Fuel line | 47. Fuel level sensor |
| 23. Fuel line | 48. External tooth lock washer 5 mm (5) |
| 24. Fuel line 6.5" (177 mm) | 49. Cylindrical Phillips head screw M5 x 14 (5) |
| 25. Spring clip | 50. Fuel level sensor kit with dial indicator |
-

21,25, Spring clips


Always reposition spring clips after any repair to prevent possible leaks.

7, Elbow

The air box elbow must be maintain upward in any condition on fan cooled engines only.

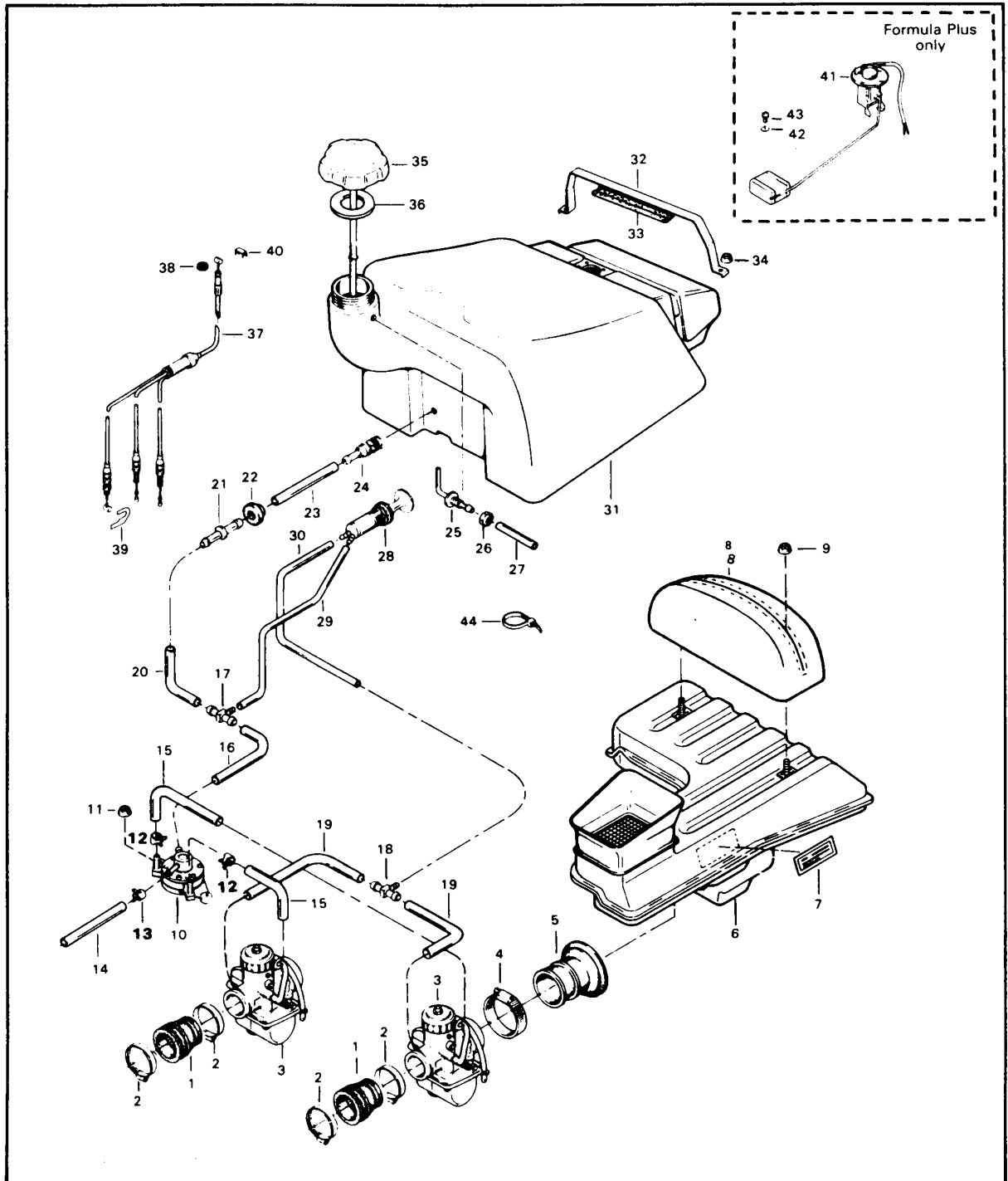
4,5, Air silencer, adaptor

* Always insert tab of adaptor into notch of air silencer.

 **CAUTION: Disregarding indexation might cause severe engine damage.**

Section 02 ENGINE
Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

FORMULA MX, FORMULA PLUS



Section 02 ENGINE

Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

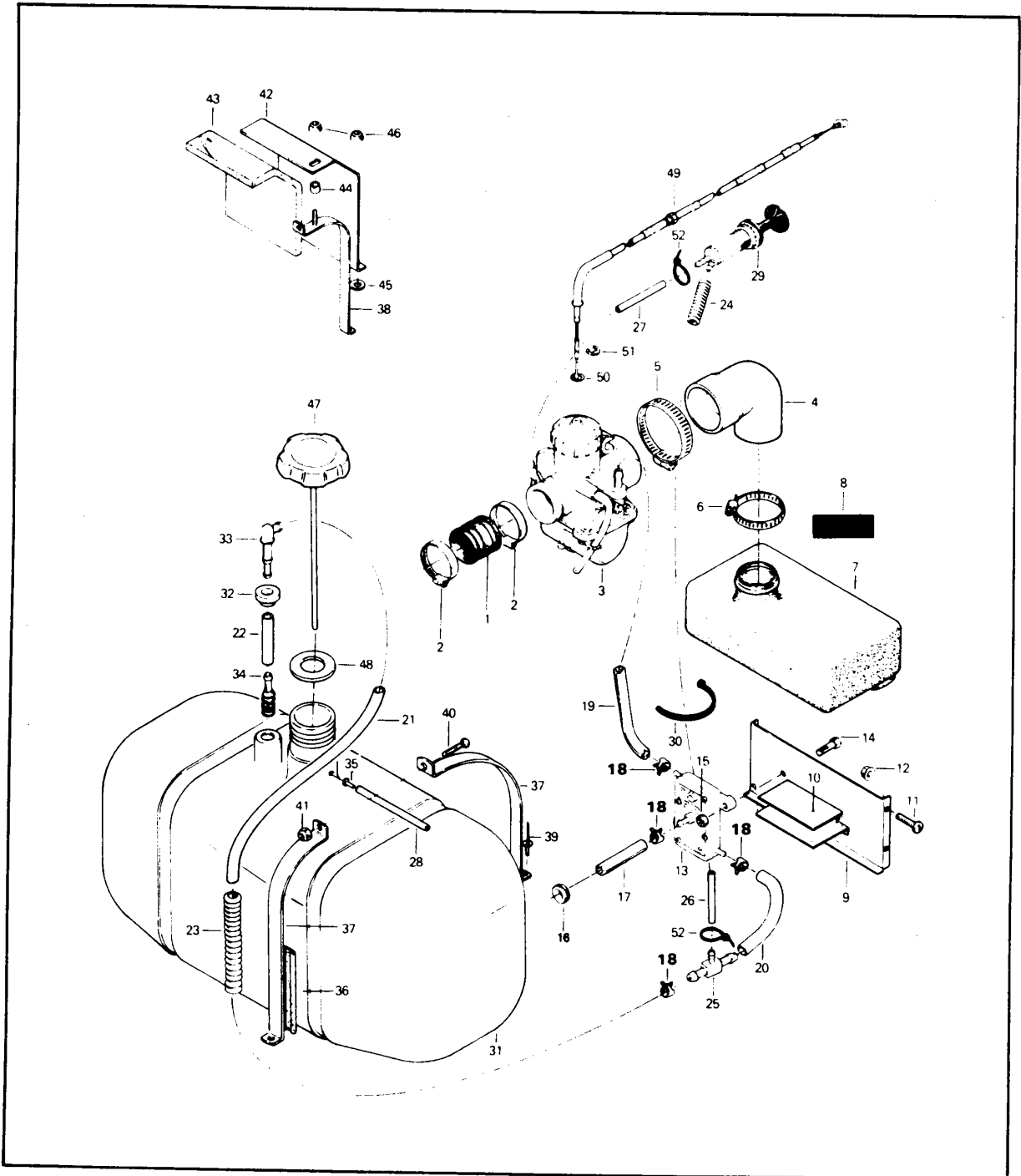
- | | |
|---|---|
| 1. Rubber flange (2) | 23. Fuel line 12" |
| 2. Clamp | 24. Fuel filter |
| 3. Carburetor | 25. Air vent fitting |
| 4. Clamp | 26. Hexagonal nut 5/16-18 |
| 5. Intake adaptor (2) | 27. Air vent tube 70" (1778 mm) |
| 6. Air silencer | 28. Primer valve |
| 7. Warning label | 29. Fuel line 12" |
| 8. Tool bag | 30. Fuel line 24" |
| 9. Hexagonal flanged elastic stop nut M5 (2) | 31. Fuel tank |
| 10. Fuel pump | 32. Fuel tank bracket |
| 11. Hexagonal flanged elastic stop nut M6 (2) | 33. Protector strip 15" |
| 12. Spring clip (4) | 34. Flanged hexagonal elastic stop nut (2) |
| 13. Spring clip (2) | 35. Cap |
| 14. Impulse hose 11" (279 mm) | 36. Gasket |
| 15. Fuel line 13" (330 mm) (2) | 37. Throttle cable & housing |
| 16. Fuel line 10" (254 mm) | 38. Circlip |
| 17. Tee | 39. Oil pump clip |
| 18. Tee | 40. Tab lock |
| 19. Fuel line 5" (127 mm) (2) | 41. Fuel level sensor |
| 20. Fuel line 5" (127 mm) | 42. External tooth lock washer 5 mm (5) |
| 21. Male connector | 43. Cylindrical Phillips head screw M5 x 14 (5) |
| 22. Grommet | 44. Tie rap |
-

12,13, Spring clips

Always reposition spring clips after any repair to prevent leaks.

Section 02 ENGINE
Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

ALPINE



Section 02 ENGINE

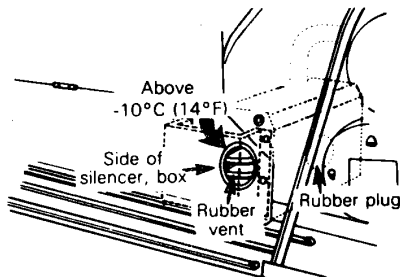
Sub-section 12 (AIR INTAKE SILENCER & FUEL TANK)

1. Carburetor adaptor
2. Clamp (2)
3. Carburetor VM34-297
4. Air intake elbow
5. Gear clamp
6. Hose clamp
7. Air intake
8. Warning label
9. Baffle
10. Foam for baffle
11. Pan slotted head machine screw 1/4"-20 x 3/4" (4)
12. Hexagonal flanged elastic stop nut 1/4"-20 (4)
13. Fuel pump
14. Hexagonal head cap screw 1/4"-20 x 3/4" (2)
15. Hexagonal elastic stop nut 1/4"-20 (2)
16. Grommet
17. Impulse hose 16" (407 mm)
18. Spring clip (4)
19. Fuel line 26" (661 mm)
20. Fuel line 15" (381 mm)
21. Fuel line 49.5" (1258 mm)
22. Fuel line 17" (432 mm)
23. Isolating line 34" (864 mm)
24. Isolating line 10" (254 mm)
25. Tee (primer valve)
26. Primer tube 22" (559 mm)
27. Primer tube 14" (356 mm)
28. Air vent tube 57.5" (1461 mm)
29. Primer valve
30. Tie wrap
31. Fuel tank
32. Grommet
33. Male connector
34. Fuel filter
35. Air vent fitting
36. Protector strip 4 x 9" (229 mm)
37. Retainer strip (3)
38. Retainer strip
39. Rivet (4)
40. Round slotted head machine screw 10-24 x 3" (2)
41. Hexagonal elastic stop nut 10-24 (2)
42. Tank deflector
43. Foam
44. Rubber spacer
45. Rubber washer (2)
46. Hexagonal flanged elastic stop nut 1/4"-20 (3)
47. Fuel tank cap
48. Gasket
49. Throttle cable & housing
50. O-ring
51. Retainer ring
52. Tie rap

18, Spring clips

Always reposition spring clips after any repair to prevent possible leaks.

When operating the vehicle in temperature exceeding -10°C (14°F), the rubber plug must block the engine side orifice and the rubber vent must be positioned on the side of the silencer box to allow cold air circulation.

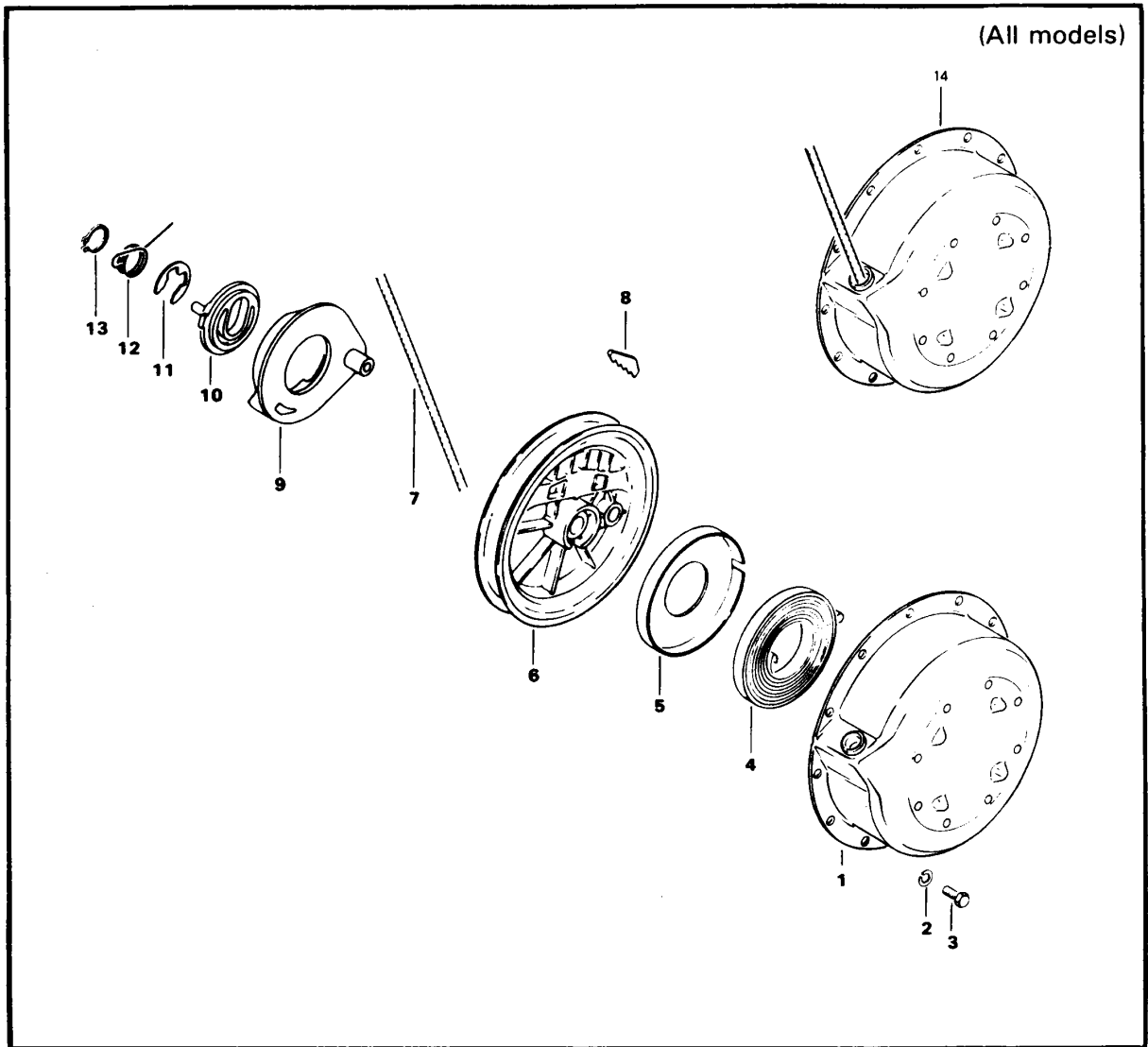


A017002009

In temperature below -10°C (14°F) and/or powder snow, the rubber plug must block the entry of fresh air on the side of the silencer box and the rubber vent must allow the warm air being emitted from the engine to be directed over the carburetor.

CAUTION: Observe temperature changes and locate plugs accordingly. Incorrect location of plugs may cause carburetor ice-up or engine overheating.

REWIND STARTER



1. Starter housing
2. Lock washer
3. Screw M6 x 14
4. Rewind spring
5. Spring guide
6. Rope sheave
7. Starter rope

8. Key
9. Pawl
10. Pawl lock
11. Circlip
12. Lock spring
13. Lock ring
14. Starter ass'y

Section 02 ENGINE

Sub-section 13 (REWIND STARTER)

REMOVAL

1,2,3, Starter housing, lockwashers & screws

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 attaching bolts).

On fan cooled models with oil injection pump remove pump from rewind starter cover.

DISASSEMBLY

To remove rope from rewind starter mechanism:

9,10,11,12,13, Pawl, pawl lock, circlip, lock spring & lock ring

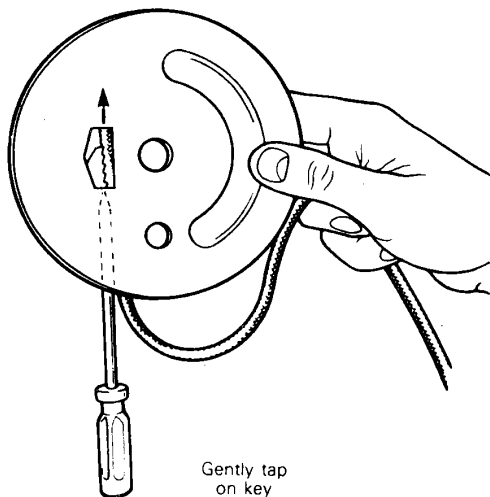
— First remove lock ring, lock spring, circlip, pawl lock and pawl.

1,6, Starter housing & rope sheave

— Remove sheave from starter housing.

7,8, Starter rope & key

— Disengage key and pull out rope.

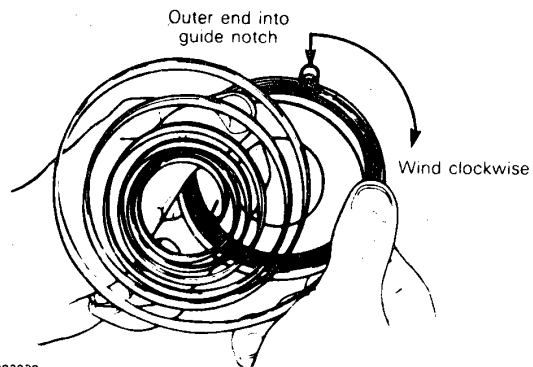


ASSEMBLY

4,5, Rewind spring & spring guide

At assembly, position spring outer end into spring guide notch then wind the spring clockwise into guide.

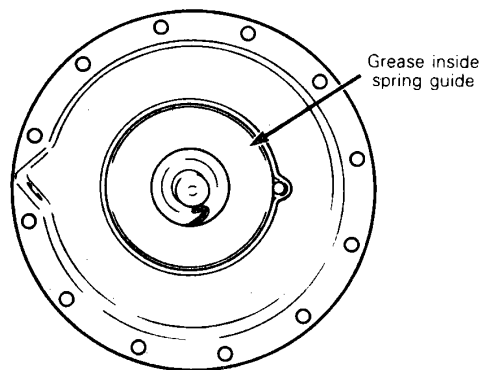
◆ **WARNING:** Since the spring is tightly wound inside the guide it may fly out when the guide is handled. Always handle with care.



▼ **CAUTION:** It is of the utmost importance that the rewind starter spring(s) be lubricated periodically using specific lubricants. Otherwise, starter components life will be shortened and/or 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 (if so equipped) as it does not stay on under vibration.

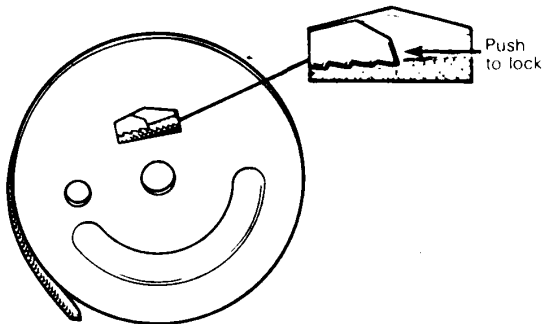


▼ **CAUTION:** The use of standard multi-purpose grease could result in starter malfunction.

Section 02 ENGINE
Sub-section 13 (REWIND STARTER)

6,7,8, Rope sheave, starter rope & key

To install a new rope: insert rope into sheave orifice and lock it with the key as illustrated.



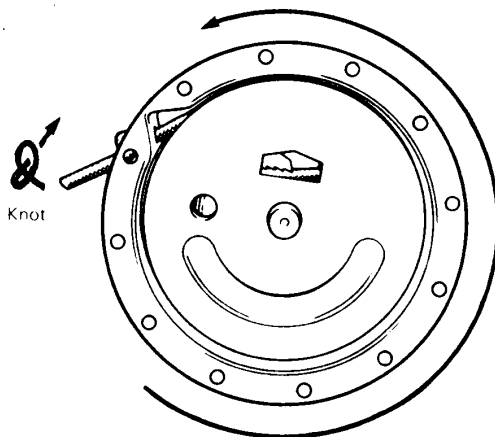
A001002041

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.



A001002012

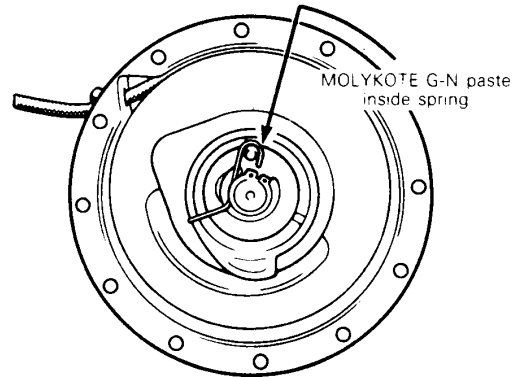
1 turn preload will give
7 turns of tension when fully extended

9,10,11, Pawl, pawl lock & circlip

Position pawl, pawl lock and circlip.

12, Lock spring

Install lock spring and lubricate with MOLYKOTE G-N paste P/N 413 7037 00.



A001002043

Install lock ring.

CAUTION: This lubricant must not be used on rewind springs as it does not stay on when dry.

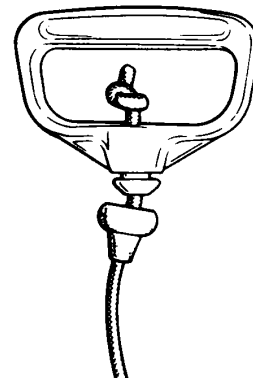
INSTALLATION

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 retainer bolt.

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.



A001002044



PULLEY GUARD

DISASSEMBLY & ASSEMBLY

○ NOTE: For additional information (ex.: exploded view) refer to the 1985 correspondent parts catalog.

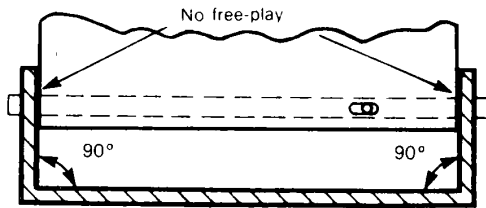
◆ WARNING: Engine should be running only when belt guard and/or pulley guard are well secured in place.

INSPECTION

Elan & Alpine models

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.



A000003001

◆ WARNING: No lateral free-play should exist between drive pulley guard and frame bracket.

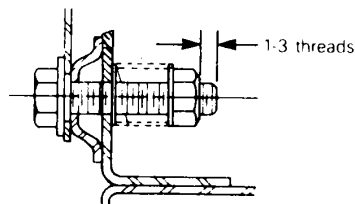
ADJUSTMENT

Elan, Citation LS/LSE, Tundra, Tundra LT, Skandic 377/R & Alpine models

Elan & Alpine only

The length of the uncompressed retaining pin spring should not be less than 47 mm (1 7/8").

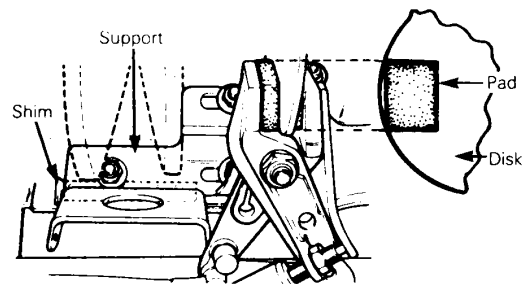
An uncompressed front guard spring should not be less than 20 mm (13/16"). When assembling adjust length as illustrated below.



A000003002

Skandic models

When replacing the belt guard and brake support bracket, the support bracket must be leveled to ensure full contact of brake pad on disk. Use shim as illustrated below.



A007003001



Section 03 TRANSMISSION
Sub-section 02 (DRIVE BELT)

DRIVE BELT

APPLICATION CHART (1985 MODELS)

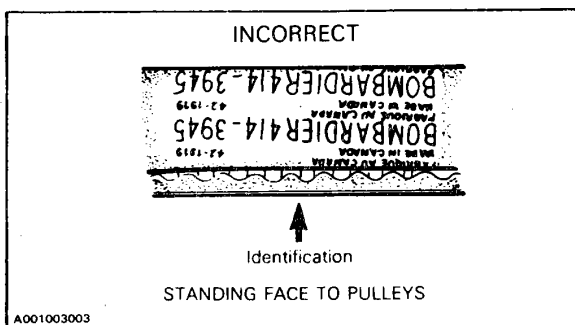
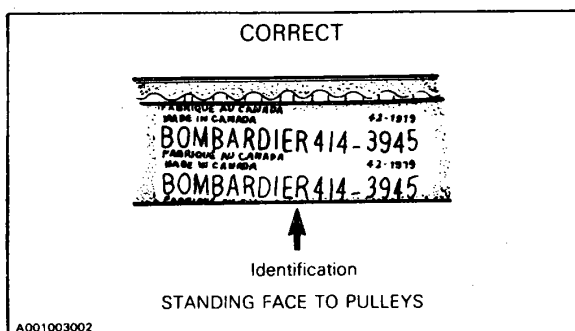
MODEL	NUMBER	MAX. WIDTH (NEW)	MIN. WIDTH (WEAR LIMIT)
ELAN	570 0411 00	30 mm (1 3/16'')	27 mm (1 1/16'')
CITATION LS, LSE TUNDRA TUNDRA LT	414 5234 00	33.3 mm (1 5/16'')	30 mm (1 3/16'')
SAFARI (all) FORMULA (all) MIRAGE III	414 5233 00	35 mm (1 3/8'')	32 mm (1 1/4'')
SKANDIC ALPINE	414 3758 00	33.3 mm (1 5/16'')	30 mm (1 3/16'')

Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

ROTATION DIRECTION

The maximum drive belt life span is obtained when the belt has the proper rotation direction.



○ NOTE: For used drive belt, mark and reinstall in the same rotation direction.

REMOVAL & INSTALLATION

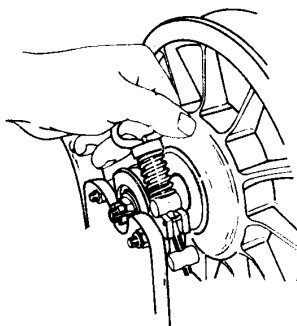
▼ CAUTION: Do not force or use tools to pry the belt into place, as this could cut or break the cords in the belt.

◆ WARNING: Do not operate snowmobile without drive belt or its guard installed. Serious bodily injury could occur.

Tilt cab and remove pulley or belt guard.

Skandic models

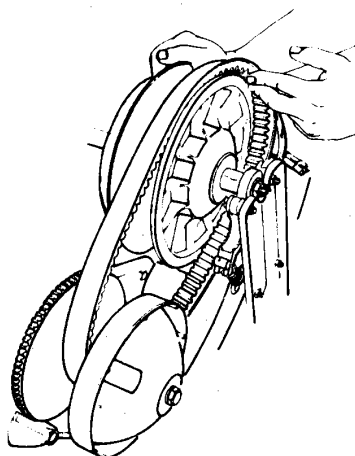
Loosen the countershaft bearing retaining screw and open the bearing cage.



Open the driven pulley by twisting and pushing the sliding half. Hold in fully open position.



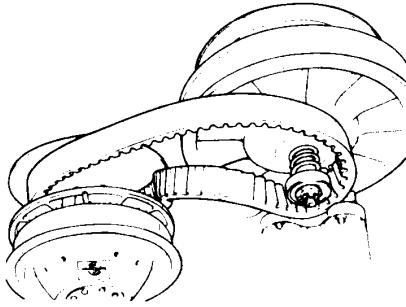
Slip the belt over the top edge of the fixed half.



Section 03 TRANSMISSION

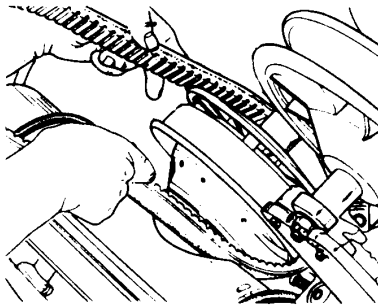
Sub-section 02 (DRIVE BELT)

Lift the countershaft upward approx. 50 mm (2 in.) and slip the belt between the shaft and the bearing cage to remove completely.



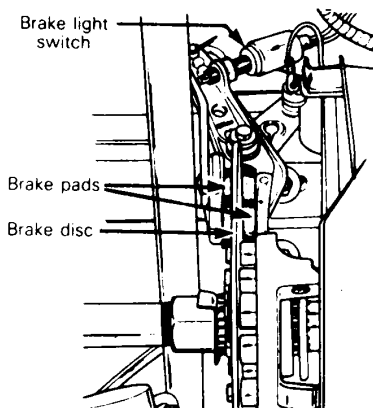
A007003022

○ **NOTE:** It may be necessary to loosen the brake adjustment in order to easily lift the countershaft. Slip the belt out from the drive pulley.



A007003023

◆ **WARNING:** After drive belt installation, always check that the brake disc is correctly installed between the brake pads and that the brake is well adjusted. Check brake light operation.



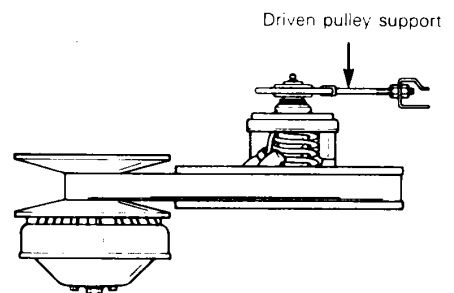
A007003024

To install the drive belt, reverse the procedure.

▼ **CAUTION:** Once belt is installed, be sure to secure the countershaft bearing by closing the bearing cage and firmly tightening the retaining screw.

Citation LS, LSE, Tundra, Tundra LT, Safari (all), Formula SS, SP, Mirage III

Unlock and raise the driven pulley support.



A004003006

Open the driven pulley by twisting and pushing the sliding half. Hold in fully open position.



A007003020

Slip slackened belt over the top edge of the sliding half.



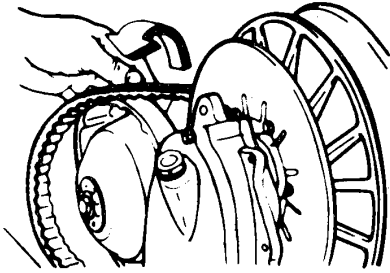
A004003008

Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

Slip the belt out from the drive pulley and remove completely from vehicle.

(TYPICAL)

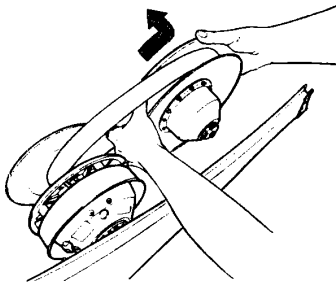


A004003005

To install the drive belt, reverse the procedure.

Elan, Formula MX, Plus

Open the driven pulley by twisting and pushing the sliding half. Hold in fully open position.

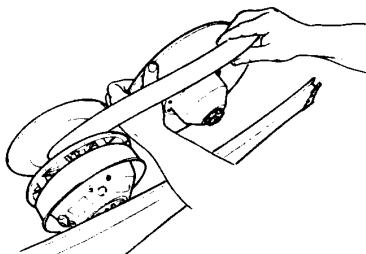


A002003015

Formula MX, Plus only:

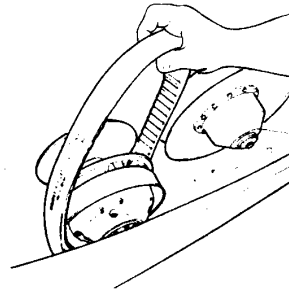
To open the driven pulley easily, use an Allen key 3 mm to screw one of the three Allen screws. (See installation procedure).

Slip the belt over the top edge of the fixed half.



A002003016

Slip the belt out from the drive pulley and remove it completely from the vehicle.



A002003017

To install the drive belt reverse procedure.

Formula MX, Plus only:

Unscrew the same Allen screw which as been screwed to open the driven pulley (easier procedure). Unscrew this Allen screw until it's slightly in contact with the sliding pulley to obtain an equal pressure on the three Allen screws.

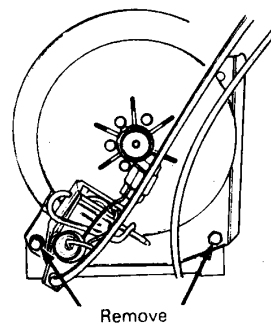
○ **NOTE:** The top of the drive belt must be flush with the driven pulley edge. Equally screw or unscrew the three Allen screws to obtain this specific adjustment.

Alpine model

To remove belt from pulleys, follow the Elan procedure.

To remove belt from vehicle:

- Remove the two bolts holding brake support to the frame.

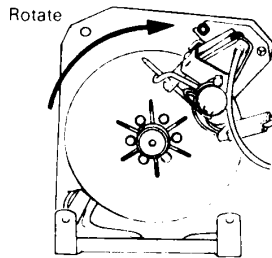


A017003013

Section 03 TRANSMISSION

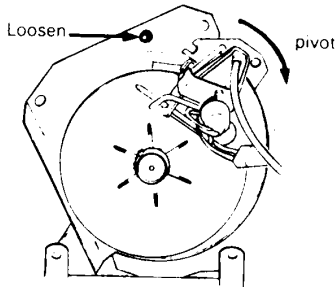
Sub-section 02 (DRIVE BELT)

- Rotate the brake support on the transmission shaft.



A017003014

- Loosen the nut holding the brake caliper to brake bracket and pivot the brake assembly half a turn.



A017003015

- Slip the belt over the transmission shaft.
- To install drive belt, reverse procedure.

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 miles) to the drive belt.

Before checking the belt deflection, ensure vehicle has its proper belt number and correct belt width. (Refer to the application chart, at the beginning of this sub-section.)

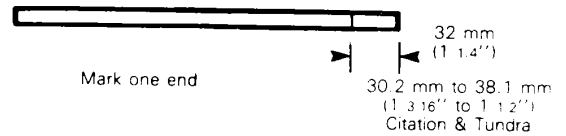
To obtain maximum vehicle performance, the belt tension must be adjusted to 6.8 kg (15 pounds) with a deflection:

All models except Citation, Tundra: 32 mm (1 1/4").
 Citation, Tundra: 30.2 mm to 38.1 mm (1 3/16" to 1 1/2").

To check tension

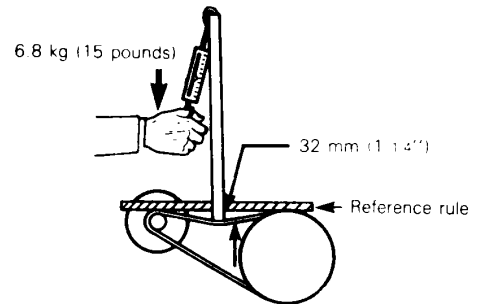
Position a reference rule on drive belt.

Wooden stick and fish scale method:



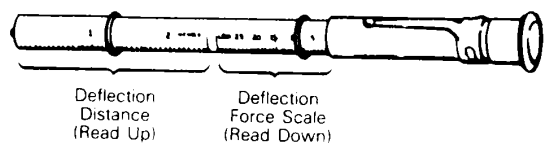
A000003005

Apply a 6.8 kg (15 pounds) pressure on drive belt. Deflection must be 32 mm (1 1/4").



A000003006

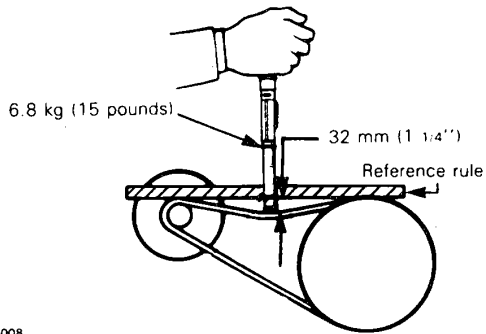
Using the belt tension tester P/N 414 3482 00 (service tool).



A000003007

1. Slide lower O-ring of deflection distance scale to 32 mm (1 1/4").
2. Slide upper O-ring to zero pound on the deflection force scale.
3. Apply pressure until lower O-ring is flush with edge of rule.
4. Read deflection force on the upper scale (at top edge of O-ring). Reading of 6.8 kg (15 pounds) should be obtained.

Section 03 TRANSMISSION
Sub-section 02 (DRIVE BELT)



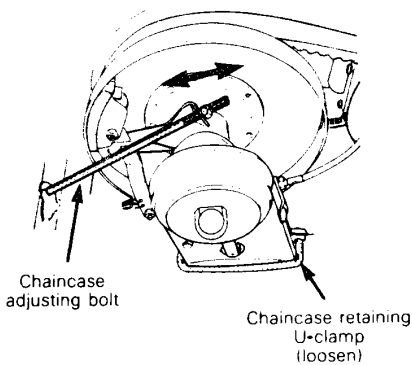
A000003008

DEFLECTION ADJUSTMENT

Elan model

The proper drive belt deflection is obtained by chaincase movement.

To do so, loosen the chaincase retaining U-clamp and screw or unscrew the chaincase adjusting bolt.



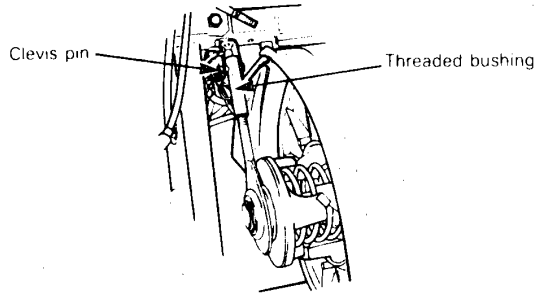
A002003018

Citation LS, LSE, Tundra, Tundra LT

Drive belt deflection is adjusted with the movement of the chaincase.

To do so, loosen the 4 chaincase retaining nuts; remove the clevis pin and pull out the threaded bushing from its bracket.

Adjust the pulley distance according to specification and measure drive belt deflection. Readjust the pulley distance, then tighten the 4 nuts and adjust the threaded bushing length to proper fitting in its bracket.

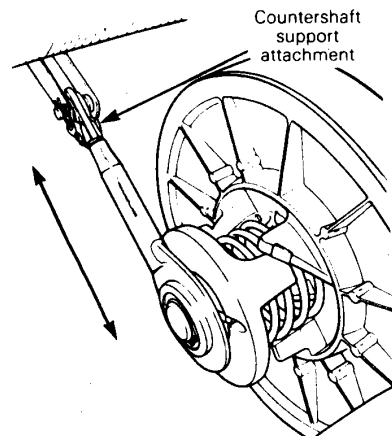
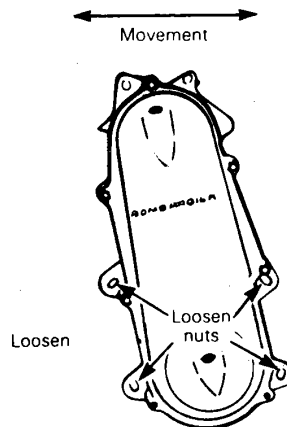


A004003010

Safari (all), Formula SS, SP, Mirage III

Drive belt deflection is adjusted with the movement of the chaincase/countershaft assembly.

To do so, loosen the 4 chaincase retaining nuts; unlock the countershaft support attachment and screw or unscrew to adjust distance between pulleys.



A009003008

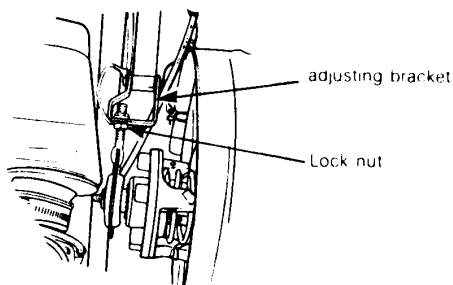
Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

Skandic 377/R, Formula MX, Plus

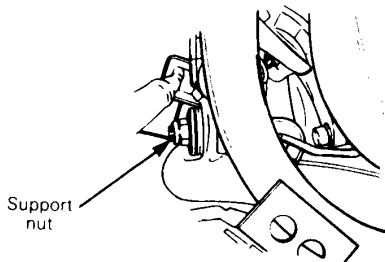
Check if pulley distance is according to specifications. If not, adjust as follows:

Skandic 377/R: Slack the four (4) chaincase retaining nuts and the countershaft support lock nut. Remove the clevis pin and screw or unscrew the adjusting bracket to adjust distance between pulleys.



A008003005

Formula MX, Plus: Loosen the four (4) engine support bolts, adjust pulley distance according to specifications. Tighten engine support bolts and recheck pulley distance. Torque bolts to 48 N•m (35 lbf•ft). Check support nut and washers for tightness. They should be firmly in contact with the frame.



A008003006

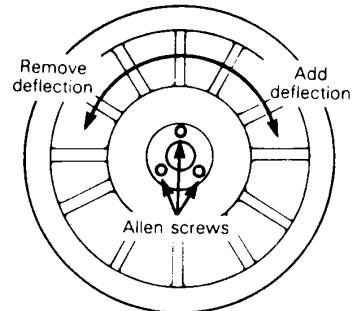
Skandic 377/R, Formula MX, Plus

The drive belt deflection is adjusted with three (3) Allen screws located to the outer face of the driven (fixed half) pulley.

To add deflection, equally screw the three Allen screws.

To remove deflection, equally unscrew the three Allen screws.

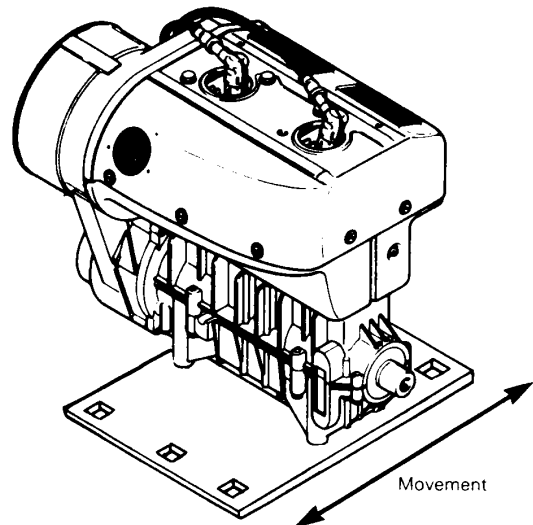
NOTE: At drive belt deflection adjustment, turn the Allen screws 1/4 turn at a time.



A008003007

Alpine model

The deflection is adjusted by moving engine bracket. To do so, loosen engine bracket nuts and adjust distance between pulleys.

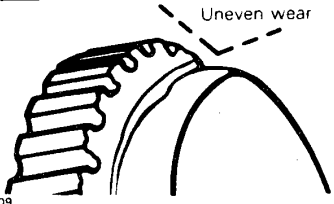
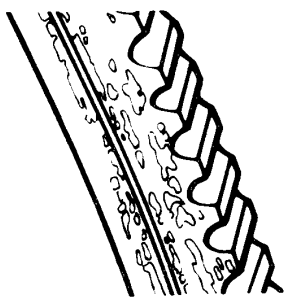
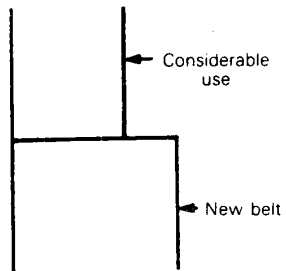


A017003016

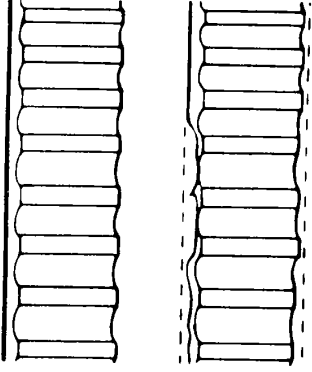
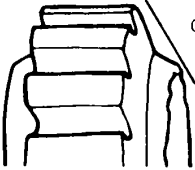
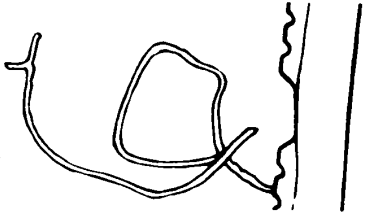
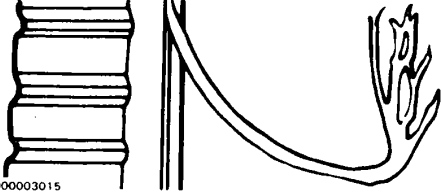
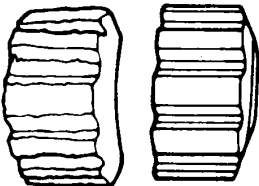
Section 03 TRANSMISSION

Sub-section 02 (DRIVE BELT)

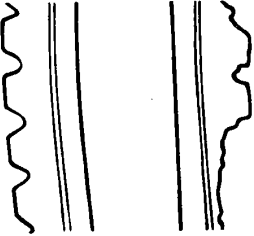
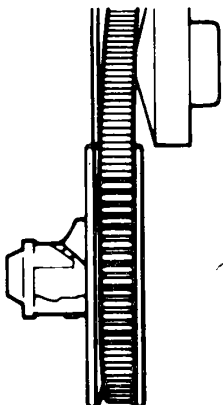
TROUBLE SHOOTING

1. Uneven belt wear on one side only.		
 <p>A000003009</p>	<p>CAUSE</p> <ul style="list-style-type: none"> a) Loosen engine mount. b) Pulley misalignment. c) Rough or scratched pulley surfaces. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Tighten engine mount nuts equally. b) Align pulleys. c) Repair or replace pulley half.
2. Belt glazed excessively or having baked appearance.		
 <p>A000003010</p>	<p>CAUSE</p> <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. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Check drive pulley for worn or missing flyweights/rollers. b) Clean shaft with steel wool and lubricate with low temperature grease. c) Clean pulley surfaces with fine emery cloth and clean cloth. d) Install correct governor.
3. Belt worn excessively in top width.		
 <p>A000003011</p>	<p>CAUSE</p> <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. 	<p>REMEDY</p> <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)

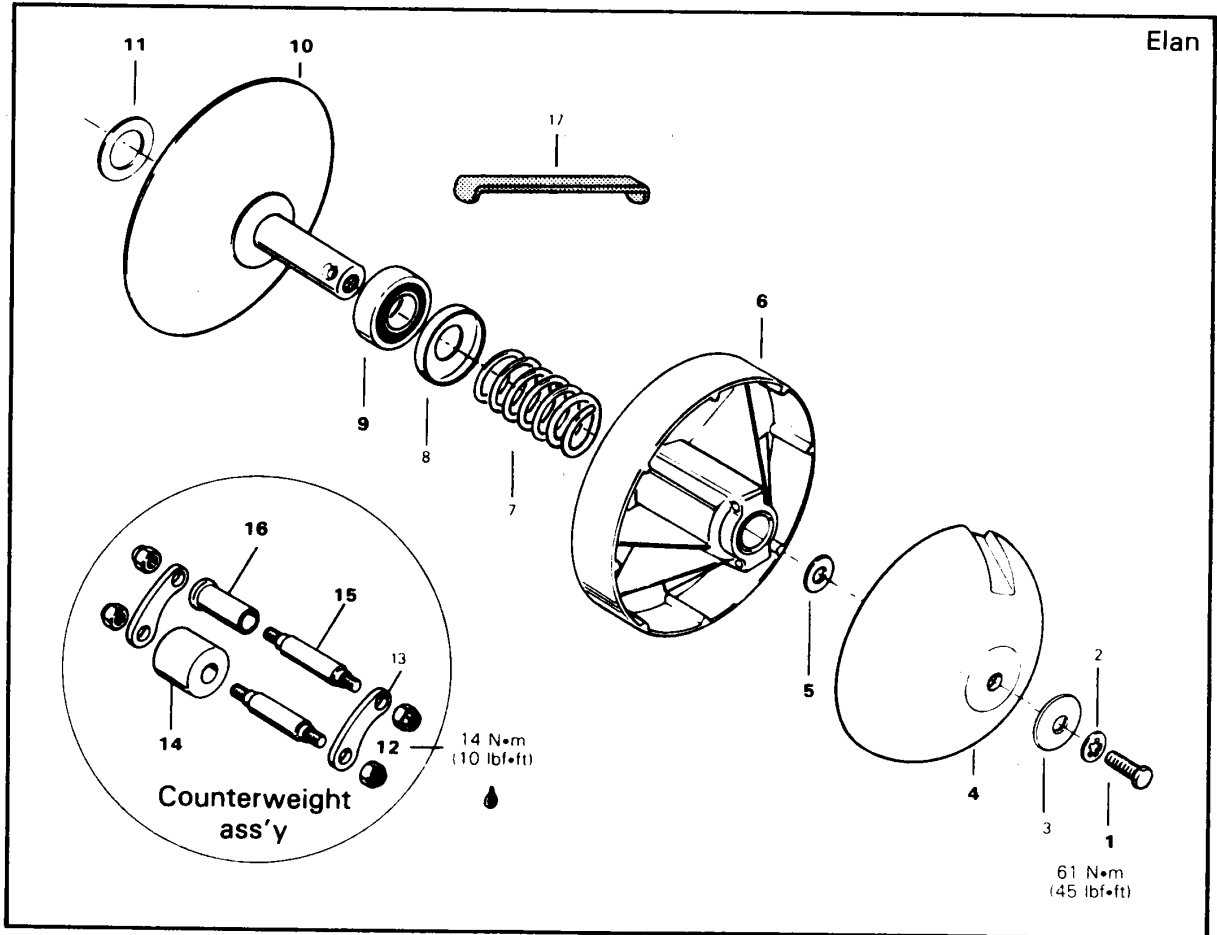
4. Belt worn narrow in one section.		
 <p>A000003012</p>	<p>CAUSE</p> <p>Excessive slippage in drive pulley caused by:</p> <ul style="list-style-type: none"> a) Frozen or too tight track. b) Drive pulley not functioning properly. c) Engine idle speed too high. d) Incorrect belt length. e) Incorrect pulley distance 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Liberate track from ice or check track tension and alignment. b) Repair or replace drive pulley. c) Reduce engine R.P.M. d) Using unspecified type of belt. Replace belt with correct Bombardier belt. e) Readjust to specifications.
5. Belt sides worn concave.		
 <p>A000003013</p>	<p>CAUSE</p> <ul style="list-style-type: none"> a) Rough or scratched pulley surfaces. b) Unspecified type of belt. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Repair or replace. b) Replace belt with correct Bombardier belt
6. Belt desintegration.		
 <p>A000003014</p>	<p>CAUSE</p> <ul style="list-style-type: none"> a) Excessive belt speed. b) Oil on pulley surfaces. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Using unspecified type of belt. Replace belt with proper type of belt. b) Clean pulley surfaces with fine emery cloth and lubricate with low temperature grease.
7. Belt edge cord breakage.		
 <p>A000003015</p>	<p>CAUSE</p> <ul style="list-style-type: none"> a) Pulley misalignment. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Align pulleys.
8. Flex cracks between cogs.		
 <p>A000003016</p>	<p>CAUSE</p> <ul style="list-style-type: none"> a) Considerable use, belt wearing out. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Replace belt.

Section 03 TRANSMISSION
Sub-section 02 (DRIVE BELT)

9. Sheared cogs, compression section fracture or torn.		
 <p>A000003017</p>	<p>CAUSE</p> <ul style="list-style-type: none"> a) Improper belt installation. b) Belt rubbing stationary object on pulleys. c) Violent engagement of drive pulley. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Refer to Installation section. b) Check drive components. c) Grease, replace spring or drive pulley.
10. Belt "Flip-Over" at high speed.		
 <p>A000003018</p>	<p>CAUSE</p> <ul style="list-style-type: none"> a) Pulley misalignment. b) Using unspecified type of belt. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Align pulleys. b) Replace belt with correct Bombardier belt.

DRIVE PULLEY

ROLLER ROUND SHAFT TYPE



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 Loctite 242
13. Counterweight
14. Roller
15. Shouldered pin
16. Shouldered bushing
17. Drive pulley retainer P/N 529 0017 00

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

◆ **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, Outer half & governor cup

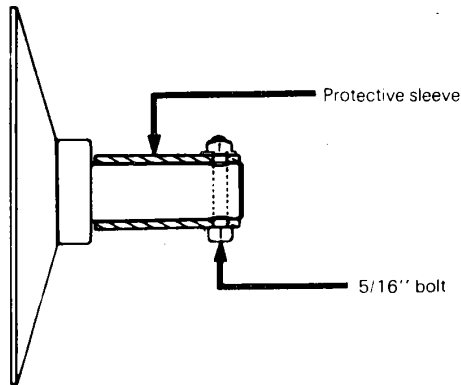
With engine cold, remove spark plug(s) then bring P.T.O. (Power Take Off) piston at T.D.C. (Top Dead Center) position.

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 0017 00.

10, Inner half

To remove the inner half, slide a length of steel pipe over shaft. Attach with a 5/16" nut and bolt, as illustrated. The inner half can then be removed with a pipe wrench. (Unscrew counterclockwise).



A002003001

DISASSEMBLY

▼ **CAUTION:** Do not disassemble counterweights unless replacement is necessary.

9,10, Bearing

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.

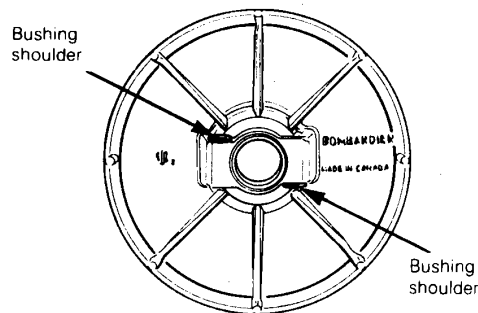
16, Shouldered bushing

Check for excessive wear.

ASSEMBLY

6,16, Shouldered bushings

Shouldered bushings must be assembled in outer half as per illustration.



A002003002

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

12,13,14,15, Counterweight ass'y

Apply Loctite 242 or equivalent on threads then torque nuts to 14 N•m (10 lbf•ft).

9,10, Bearing

To assemble bearing on inner half, press on bearing inner race with a suitable pusher.

INSTALLATION

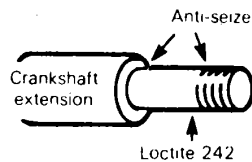
11, Shim (alignment)

This shim is used to obtain correct pulley alignment, refer to section 03-05.

10, Inner half

To install the inner half, lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° **counterclockwise** from T.D.C. position and that cylinder is completely filled with a starter rope.

Clean crankshaft extension and apply anti-seize on the unthreaded portion and Loctite 242 or equivalent on threads, (as illustrated) then install inner half on extension.



A002003003

To tighten inner half, use a protective sleeve as shown in the removal procedure.

5, Shim (neutral)

This shim is used to obtain a neutral function of the drive pulley when engine is idling: use as required, maximum of two (2). Refer to ADJUSTMENT.

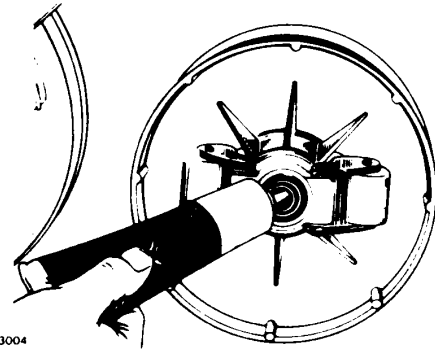
6, Outer half

For the outer half there is two kind of bushing. One made of brass, the other of kahrlon (kahrlon is black).

Only on outer half equipped with a brass bushing

Pack pulley bore with High Performance Drive Pulley Lubricant P/N 413 800 700.

▼ **CAUTION: Never lubricate an outer half with a kahrlon bushing.**



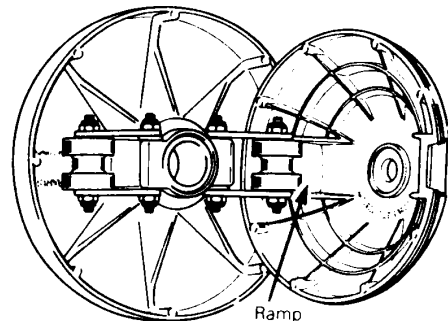
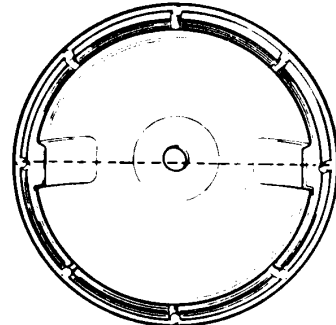
A002003004

○ **NOTE:** Brass bushing only.

1,4,6, Governor cup

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.



A002003005

Position the cap screw then lube and torque to 61 N•m (45 lbf•ft).

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

ADJUSTMENT

11, Shim (alignment)

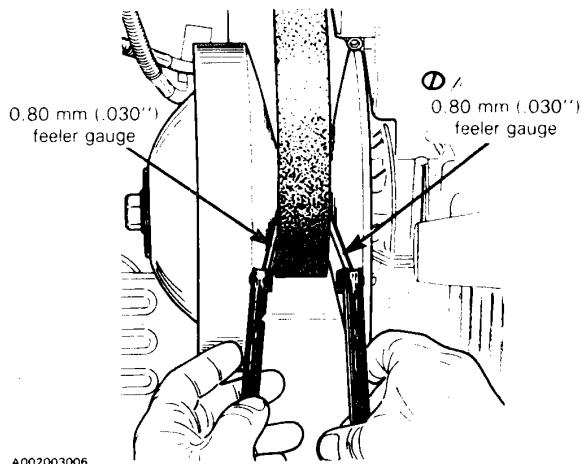
For pulley alignment procedure, refer to section 03-05.

5, Shim (neutral)

For neutral adjustment, proceed as indicated below.

◆ **WARNING: Shim(s) 5 is(are) used to obtain a neutral function of the drive pulley when engine is idling. Proceed as follows when retaining bolt is torqued:**

With a **new** drive belt installed, you should be able to insert a minimum of 0.80 mm (.030") thick feeler gauge on each side of the drive belt simultaneously pushing drive belt to sit on bearing.

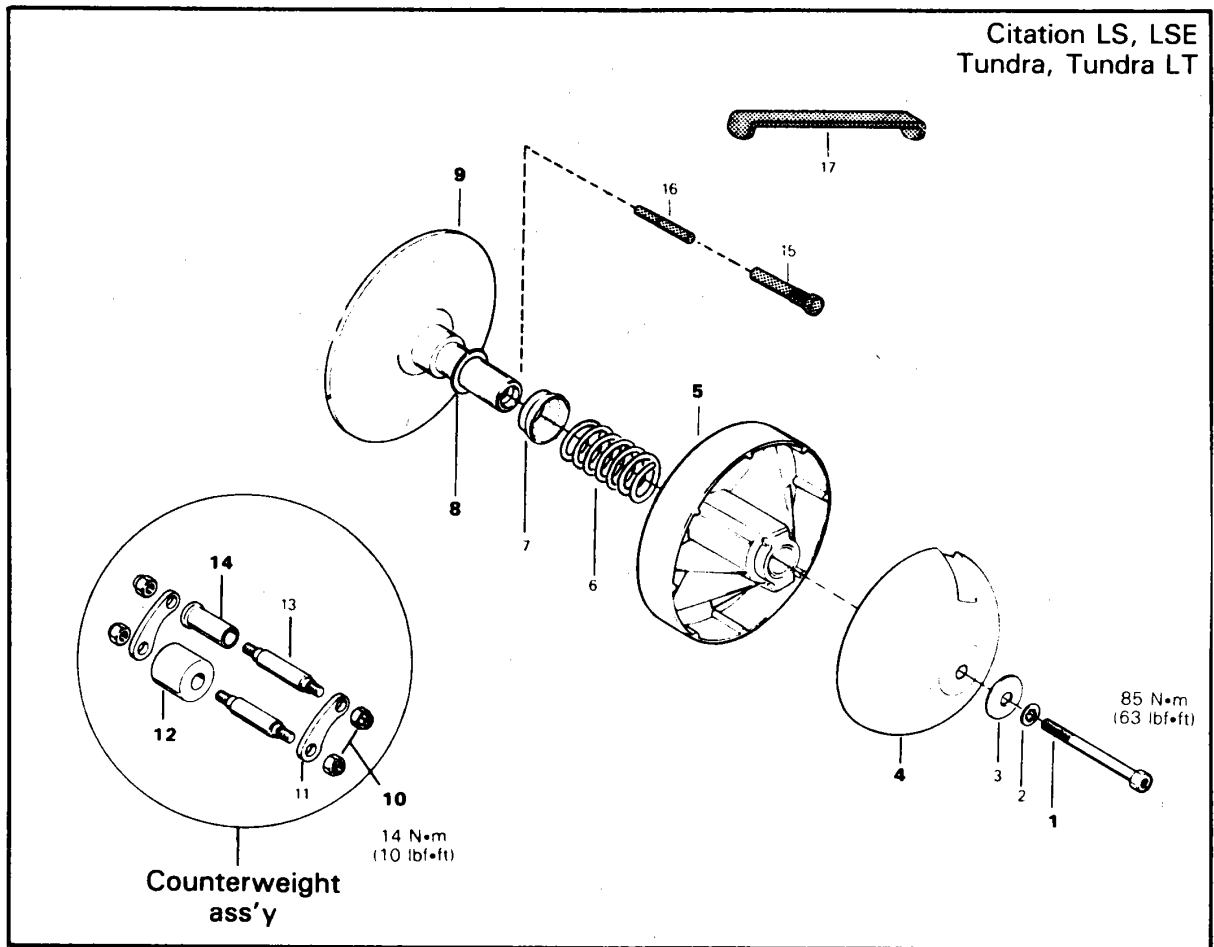


Shims located between governor cup and drive pulley shaft will help in obtaining correct adjustment. Do not use more than two (2) shims.

Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

ROUND SHAFT (TAPER) TYPE
LUBRICATION FREE

Citation LS, LSE
 Tundra, Tundra LT



1. Cap screw
2. Lock washer
3. Washer
4. Governor cup
5. Outer half
6. Spring
7. Spring seat
8. Shim
9. Inner half
10. Nut Loctite 242
11. Lever
12. Roller
13. Shouldered pin
14. Shouldered bushing
15. Puller P/N 529 0028 00
16. Puller P/N 529 0030 00
17. Drive pulley retainer P/N 529 0017 00

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

▼ **CAUTION:** This model is equipped with drive pulley of metric dimensions.

◆ **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.

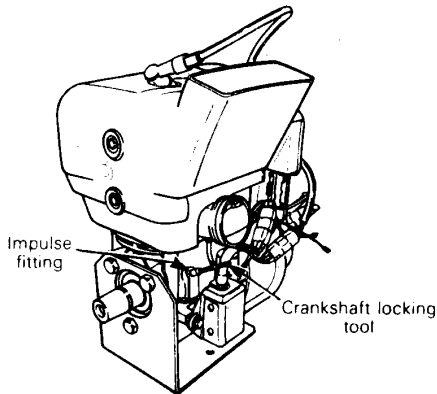
REMOVAL

1,4,5, Outer half & governor cup

Lock the crankshaft by using one of the following method:

Insert the crankshaft locking tool P/N 420 876 640 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 420 876 640.



Or:

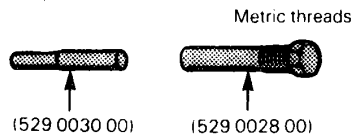
Remove spark plug then bring P.T.O. piston at T.D.C. position.

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 no. 529 002 800, 529 003 000.



▼ **CAUTION:** This pulley has metric threads. Do not use standard thread puller.

To block engine crankshaft:

Remove starter rope blocking piston, the reblock piston after having turned 45° counterclockwise from T.D.C. position; or install crankshaft locking tool.

To remove inner half:

Install puller in pulley shaft. 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 fine steel wool and dry cloth. Clean outer half bushing with clean dry cloth.

9, Inner half & crankshaft

Using cleaner such as acetone, clean crankshaft tapered end and the taper inside the inner half of the drive pulley.

◆ **WARNING:** This procedure must be performed in a well ventilated area.

▼ **CAUTION:** Avoid contact between crankshaft seal and acetone because damage may occur.

Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

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.

12, Nylon roller

Check for roundness of external diameter.

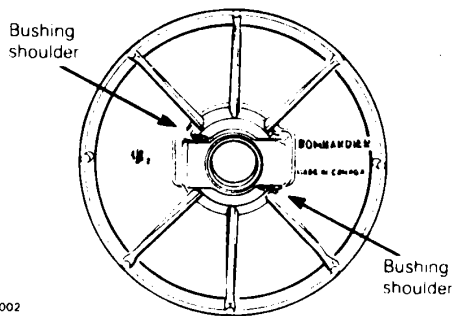
14, Shouldered bushing

Check for any excessive wear. Replace as required.

ASSEMBLY

14, Shouldered bushing

Shouldered pin bushings must be installed in outer half as per illustration.



10,11,12,13, Counterweight ass'y

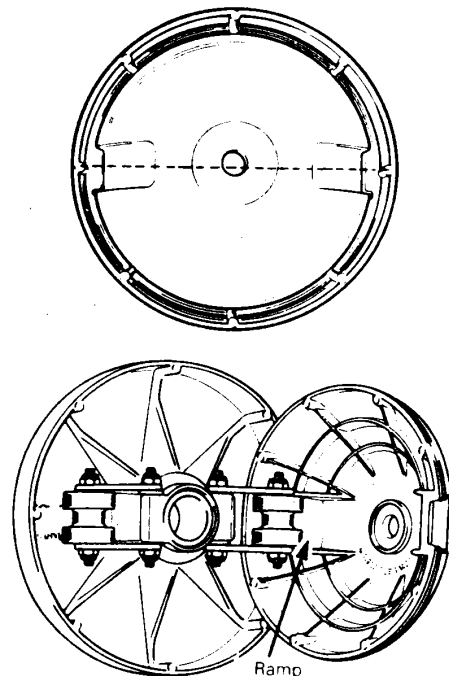
Apply Loctite 242 or equivalent on nut threads then torque nuts to 14 N•m (10 lbf•ft).

INSTALLATION

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with a starter rope.

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.**

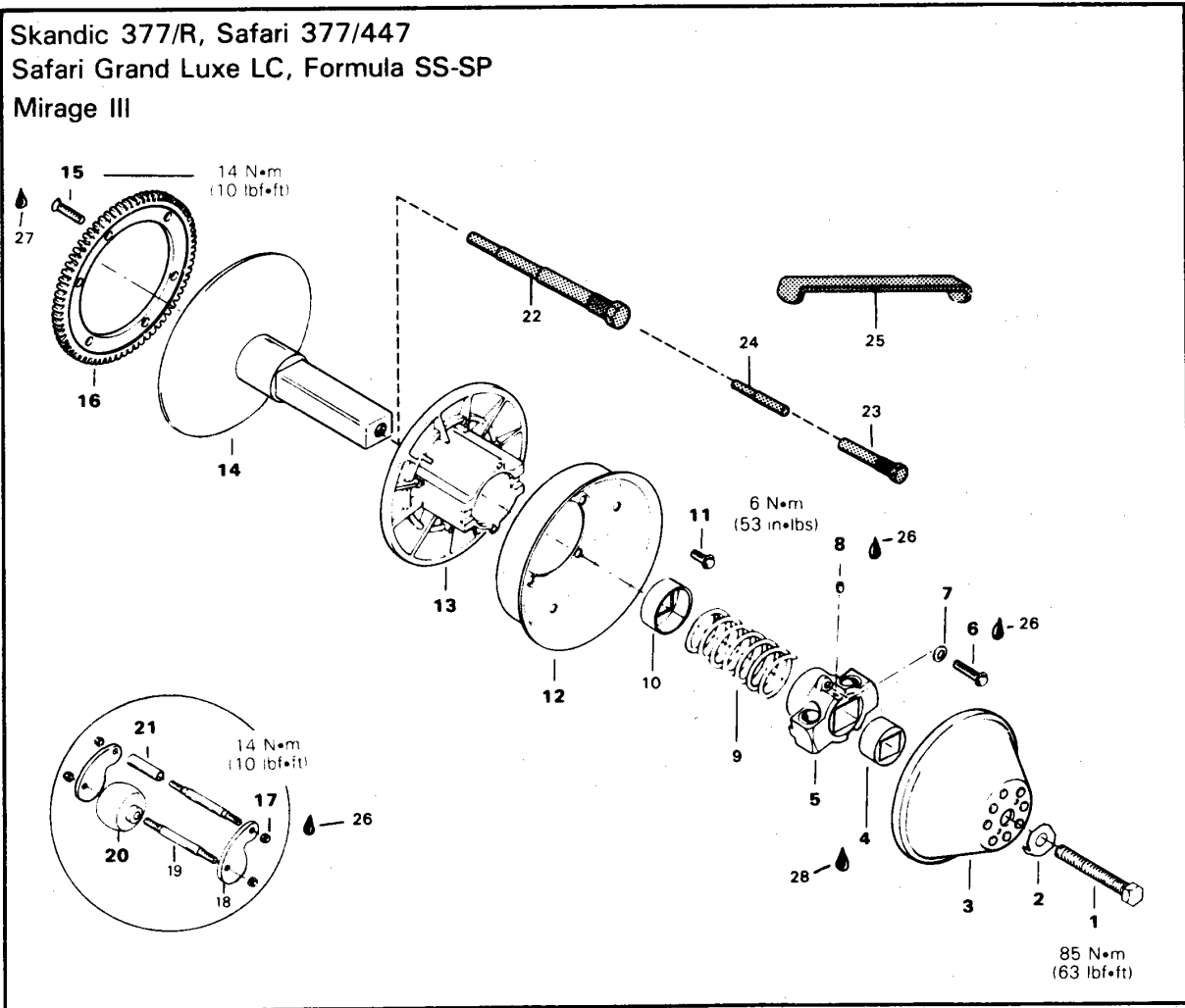


Position the cap screw and torque to 85 N•m (63 lbf•ft).

Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

ROLLER SQUARE SHAFT WITH DURALON BUSHING

Skandic 377/R, Safari 377/447
 Safari Grand Luxe LC, Formula SS-SP
 Mirage III



- | | |
|--|---|
| <ul style="list-style-type: none"> 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. Quart 13. Outer half 14. Inner half | <ul style="list-style-type: none"> 15. Self locking screw 16. Starter gear 17. Nut 18. Counterweight 19. Shouldered pin 20. Roller 21. Bushing 22. Puller P/N 529 0021 00 23. Puller P/N 529 0028 00 24. Puller pin P/N 529 0030 00 25. Drive pulley retainer 529 0017 00 26. Loctite 242 27. Loctite 271 28. Loctite 271 |
|--|---|

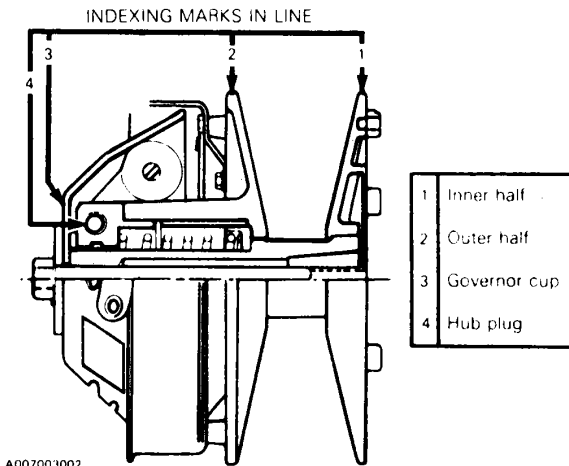
Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

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, thereby maintaining optimum balancement.

If components lack such marks, marking should be done manually before disassembly, as per illustration.



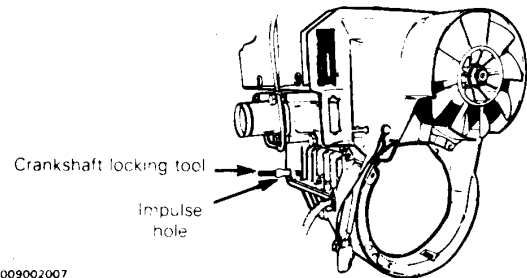
1,3,13, Outer half & governor cup

Lock the crankshaft by using one of the following method:

Insert the crankshaft locking tool P/N 420 876 640 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 420 876 640.

(TYPICAL)



Or:

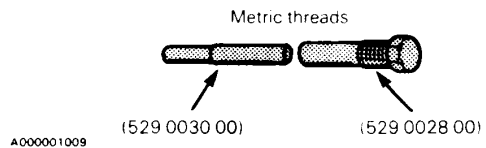
Remove spark plug(s) then bring P.T.O. piston at T.D.C. position.

Rotate drive pulley 45° clockwise then insert enough starter rope into cylinder to fill it completely.

Remove the cap screw.

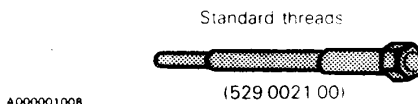
14, Inner half

To remove inner half on Skandic models, use metric threads puller:



CAUTION: Skandic model pulley has metric threads. Do not use standard threads puller.

On Safari and Formula models, use standard threads puller:



To block engine crankshaft:

Remove starter rope blocking piston, then reblock piston after having turned 45° counterclockwise from T.D.C. 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.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

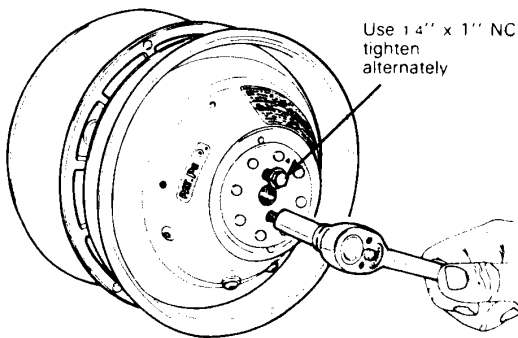
DISASSEMBLY

○ **NOTE:** Some bolts of the drive pulley have "Loctite" on their threads, it is advisable to use a tool such as an impact to break the "Loctite" seal 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 (2) 1/4" x 1" NC bolts and tightening alternately until cup pulls out.



A007003003

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 (2) 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.

CLEANING

13,14, Inner & outer half

Inside of outer half should be cleaned with a clean cloth. The square shaft can be cleaned with fine steel wool and a clean cloth.

14, Inner half & crankshaft

Using cleaner such as acetone, clean crankshaft tapered end and the taper inside the fixed half of the drive pulley.

03-03-10

◆ **WARNING:** This procedure must be performed in a well ventilated area.

▼ **CAUTION:** Avoid contact between crankshaft seal and acetone because damage may occur.

INSPECTION

Drive pulley should be inspected annually.

20, Roller

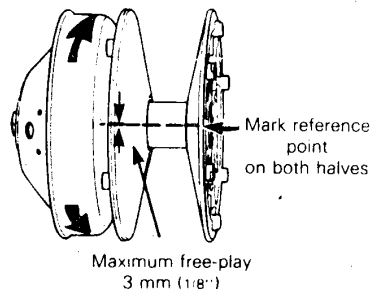
Check for roundness of external diameter.

21, Shouldered bushing

Check for excessive 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").



A007003004

ASSEMBLY

15,16, Starter ring gear

Apply Loctite 271 or equivalent on threads then torque the screws to 14 N•m (10 lbf•ft) or tighten with an impact screwdriver.

11,12, Guard

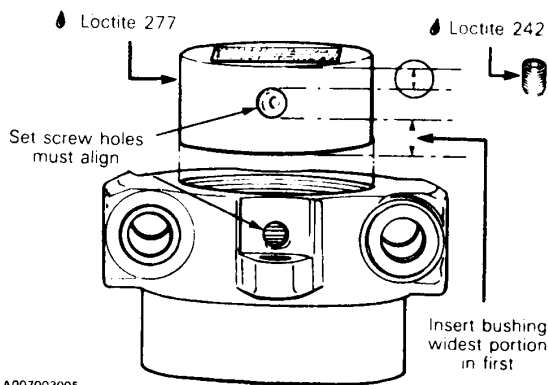
Torque to 6 N•m (53 lbf•ft).

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

4,5,8, "Duralon" bushing

To install "Duralon" bushing on hub plug, use suitable pusher and hammer or press. Install bushing as per illustration.

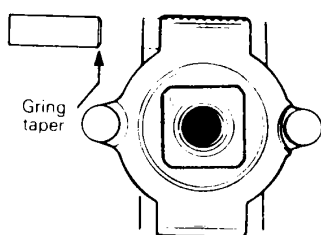


Apply Loctite 277 on "Duralon" bushing. Do not fill set screw holes with Loctite.

Apply Loctite 242 on set screw threads, then tighten screw slightly until it then rests against bottom of "Duralon" bushing hole.

5,21, Bushing

Gently grind a small taper at one end to ease bushing assembly and push into hub plug as illustrated.



17,18,19,20, Counterweight ass'y

Apply Loctite 242 on threads and torque to 14 N•m (10 lbf•ft).

▼ **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 16 N•m (12 lbf•ft).

INSTALLATION

Clean crankshaft extension using fine steel wool and a clean cloth.

▼ **CAUTION:** When installing drive pulley on engine, reference mark on inner half, outer half and governor cup must be in line.

13,14, Inner & outer half

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with a starter rope or use crankshaft locking tool.

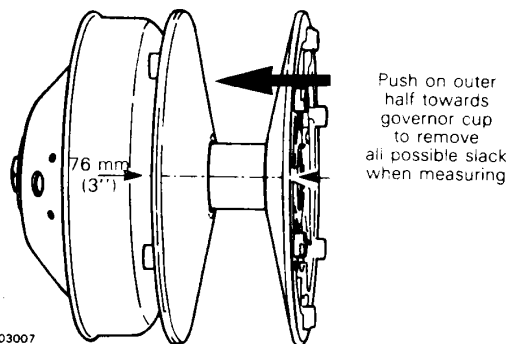
Install inner half on crankshaft extension then position outer half assembly on inner half square shaft.

▼ **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).

▼ **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").

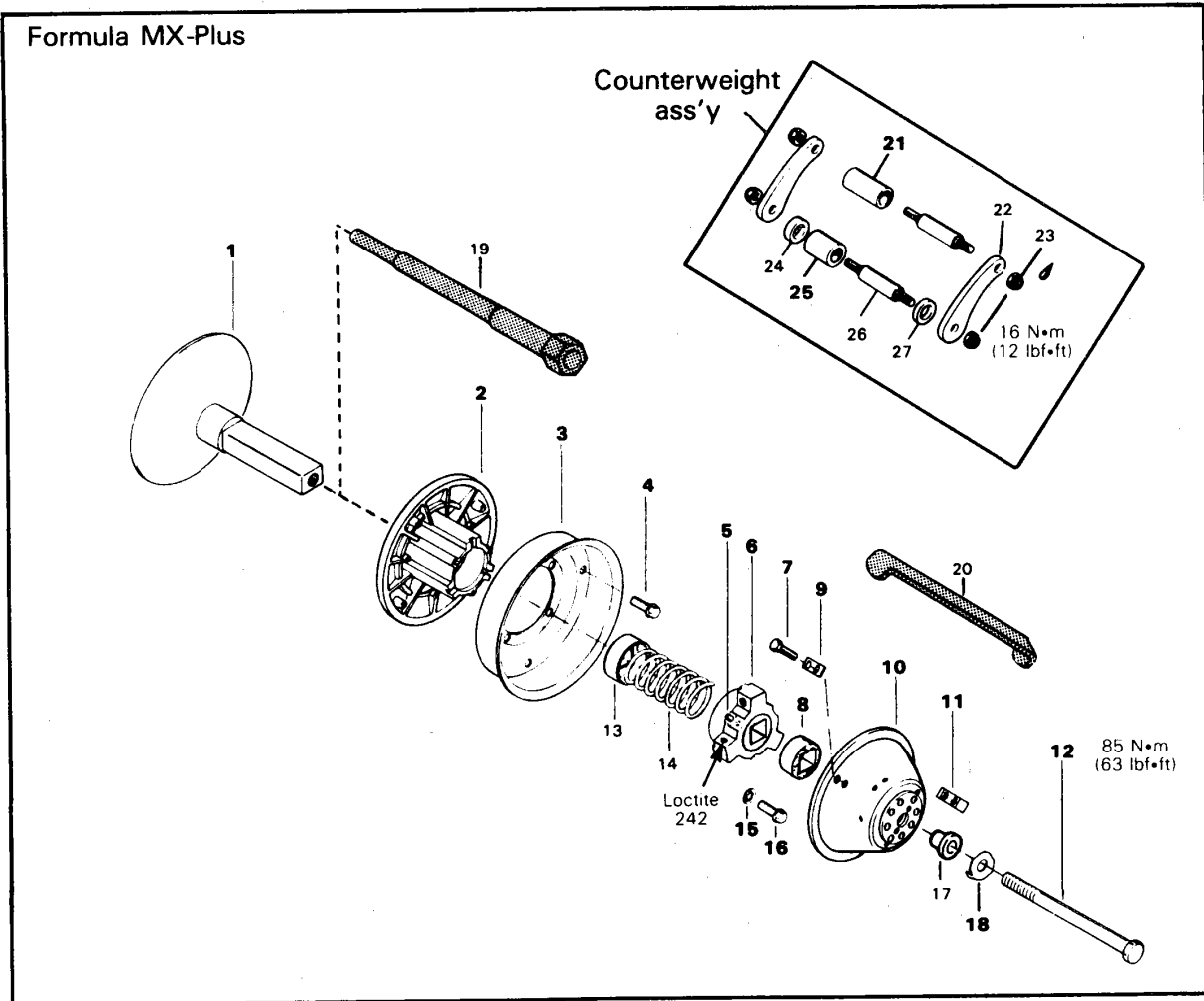


2, Lock tab

Lift rear of vehicle off the ground. Install drive belt, pulley guard and close cab then start engine and apply throttle and brake 2-3 times and close times. Stop engine and retorque cap screw. Bend one side of locking tab over governor bolt.

Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

SQUARE SHAFT WITH THREE COUNTERWEIGHT ASSEMBLIES



- | | |
|---|---|
| <ul style="list-style-type: none"> 1. Inner half 2. Outer half 3. Clutch roller guard 4. Cap screw 5. Allen setscrew Loctite 242 6. Hub plug 7. Cap screw 8. "Duralon" bushing 9. Tab lock 10. Governor cup 11. Ramp 12. Cap screw 13. Spring seat 14. Spring | <ul style="list-style-type: none"> 15. Internal tooth lock washer 16. Cap screw Loctite 242 17. Shouldered washer 18. Tab washer 19. Puller P/N 529 0021 00 20. Drive pulley retainer 529 0017 00 21. Bushing 22. Counterweight 23. Nut 24. Nylon washer 5.1 mm (.200") thickness 25. Bushing 26. Shouldered pin 27. Nylon washer 3.3 mm (.130") thickness |
|---|---|

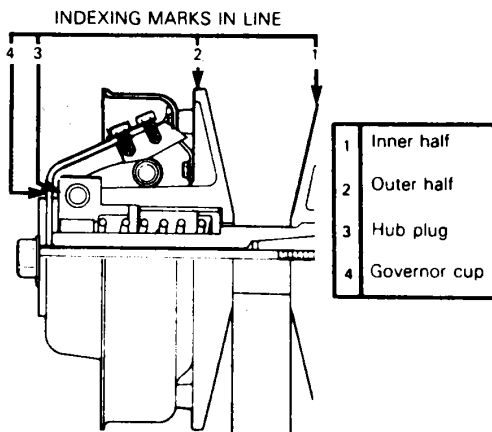
Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

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

Some pulley components are marked to insure proper assembly, thereby maintaining optimum balance. If components lack such marks, marking should be done manually before disassembly, as per illustration.



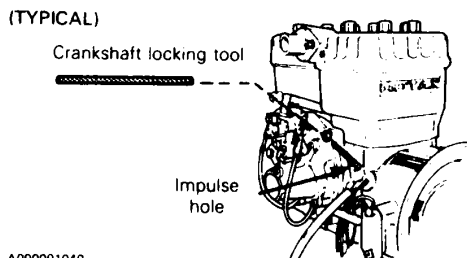
A015003001

2,10,12, Outer half & governor cup

— Lock the crankshaft by using one of the following method:

Insert the crankshaft locking tool P/N 420 876 640 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 420 876 640.



A000001040

Or:

Remove spark plug(s) then bring P.T.O. piston at T.D.C. position.

Rotate drive pulley 45° clockwise then insert enough starter rope into cylinder to fill it completely.

— Remove the cap screw.

1, Inner half

If it is necessary to remove inner half, use drive pulley puller P/N 529 002 100.

CAUTION: This pulley has standard threads. Do not use metric threads puller.

Standard threads



A000001008

(529 0021 00)

To block engine crankshaft:

Remove starter rope blocking piston, then reblock piston after having turned 45° counterclockwise from T.D.C. 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.

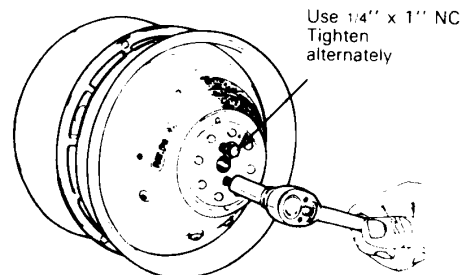
DISASSEMBLY

NOTE: Some bolts of the drive pulley have Loctite on their threads, it is advisable to break the Loctite seal before attempting to unscrew.

2,10, Outer half assembly & governor cup

CAUTION: Do not tap on the governor cup.

The governor cup can be easily removed by inserting two (2) 1/4" x 1" NC bolts and tightening alternately until cup pulls out.



A007008003

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

6,15,16, Hub plug

The hub plug is pushed by the clutch spring pressure. At disassembly, hold hub plug firmly against outer half until the three (3) bolts are completely removed. This will prevent damage of the outer half threads.

5,8, "Duralon" bushing

To disassemble "Duralon" bushing from hub plug, use a suitable pusher and hammer or press.

▼ **CAUTION:** Do not disassemble counterweights unless replacement is necessary.

CLEANING

1,2, Inner & outer half

Inside of outer half should be cleaned with a clean cloth. The square shaft can be cleaned with fine steel wool and a clean cloth.

1, Inner half & crankshaft

Using cleaner such as acetone, 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 crankshaft seal and acetone because damage may occur.

INSPECTION

Drive pulley should be inspected annually.

25, Roller

Check for roundness of external diameter.

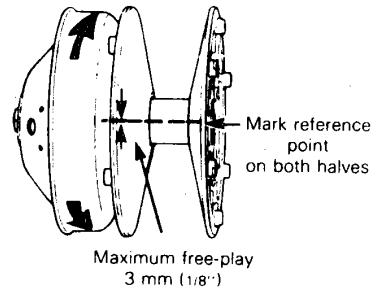
21, Shouldered pin bushing

Check for excessive wear.

Install new one with Loctite 242.

8, "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").



A007003004

▼ **CAUTION:** Ensure rollers are in good condition. Replace as required.

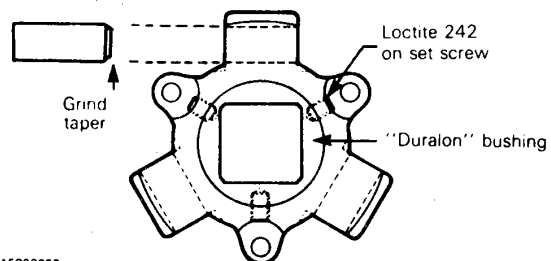
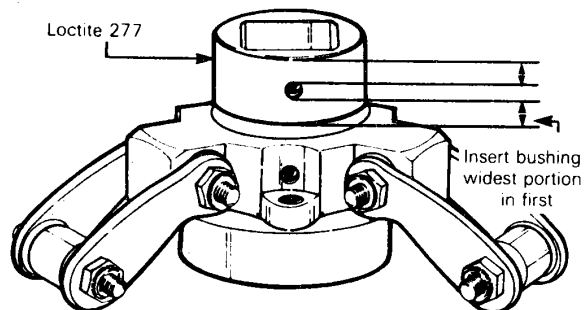
ASSEMBLY

3,4, Guard

Torque to 6 N•m (53 lbf•in).

5,6,8, "Duralon" bushing

To install or remove "Duralon" bushing from hub plus, use suitable pusher and hammer or press. Install bushing as per illustration.



A015003002

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

Apply Loctite 277 on "Duralon" bushing. Do not fill set screw holes with Loctite.

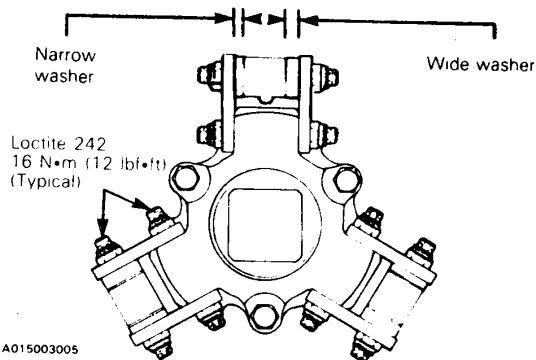
Apply Loctite 242 on set screw threads, then tighten until screw slightly rests against bottom of "Duralon" bushing hole.

21, Bushings

Gently grind a small taper at our end to ease bushing assembly and push into hub plug as illustrated above.

21 to 27, Counterweight ass'y

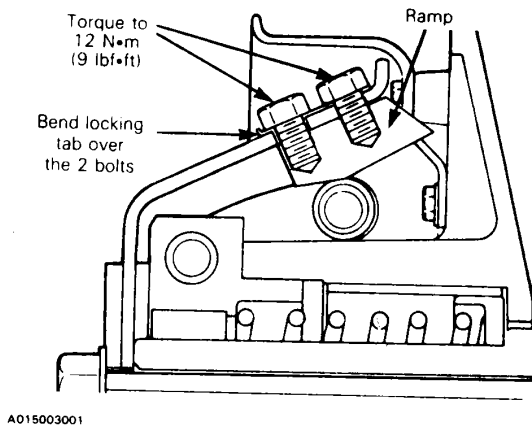
Rollers and nylon washers must move freely; install them as per illustration.



Apply Loctite 242 on shouldered pin threads and torque to 16 N•m (12 lbf•ft).

7,9,11, Ramps

Assemble ramps and torque cap screws as per illustration.



INSTALLATION

Clean crankshaft extension using fine steel wool and a clean cloth.

▼ **CAUTION:** When installing drive pulley on engine, reference mark on inner half, outer half, hub plug and governor cup must be in line.

1,2, Inner & outer half

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with a starter rope or use crankshaft locking tool.

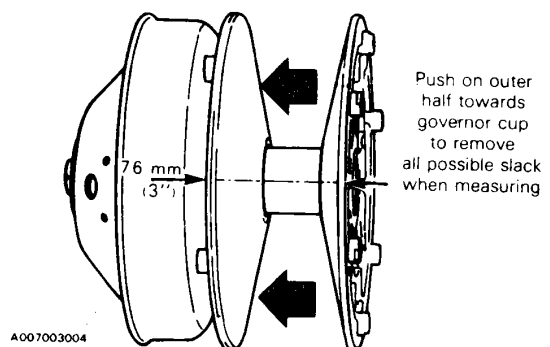
Install inner half on crankshaft extension then position outer half assembly on fixed half square shaft.

▼ **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.

10, 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•in).

▼ **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").



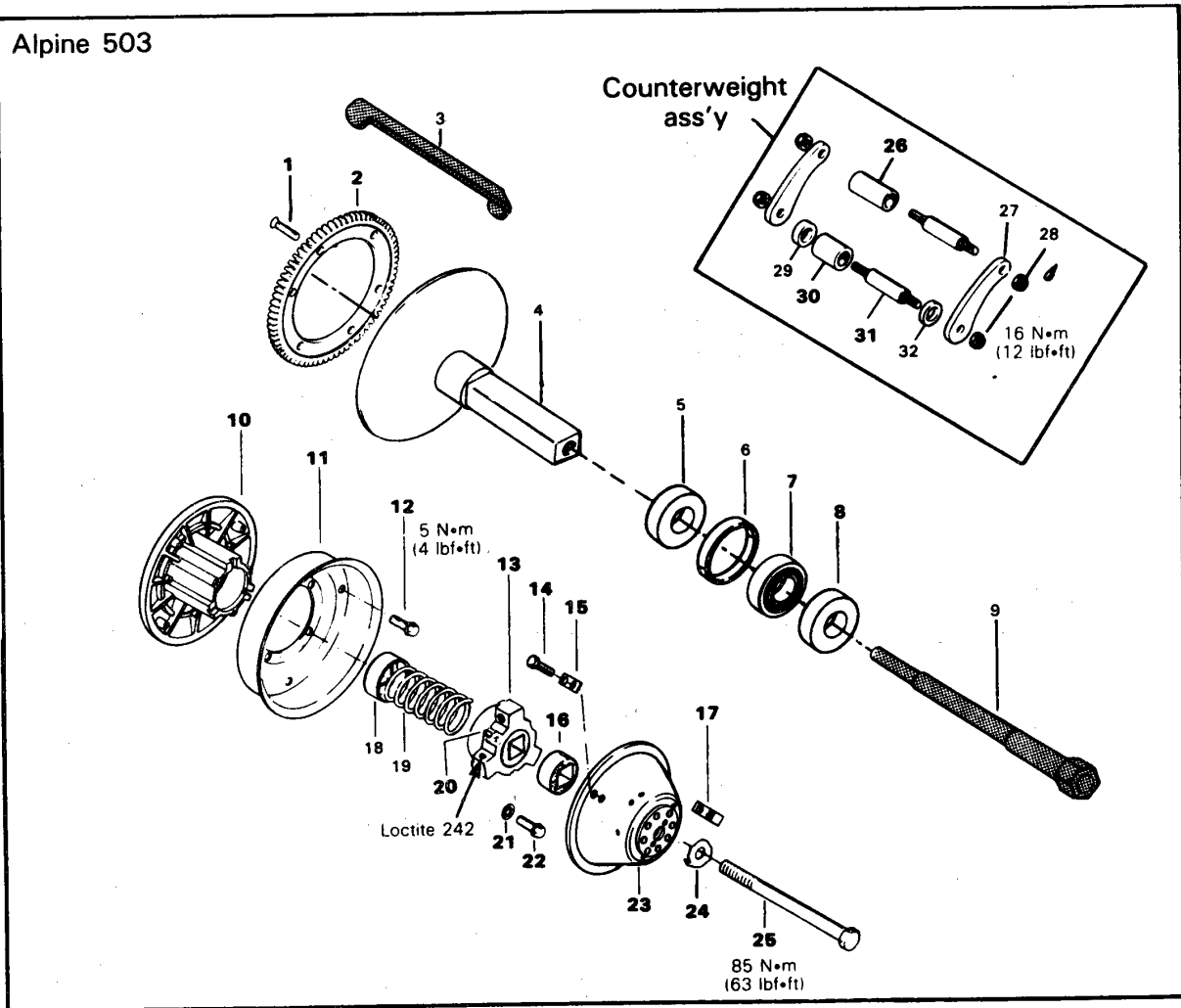
18, Lock tab

Lift rear of vehicle off the ground. Install drive belt, pulley guard and close cab then start engine and apply throttle and brake, 2-3 times. Stop engine and retorque cap screw. Bend one side of locking tab over governor bolt.

Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

SQUARE SHAFT WITH THREE COUNTERWEIGHT ASSEMBLIES

Alpine 503



1. Flat slotted head self locking screw
2. Starter ring gear
3. Drive pulley retainer P/N 529 0017 00
4. Inner flange
5. Spacer (thin)
6. Ring
7. Bearing
8. Spacer (thick)
9. Puller P/N 529 0021 00
10. Outer flange
11. Guard
12. Cap screw
13. Hub plug
14. Cap screw
15. Tab lock
16. "Duralon" bushing

17. Ramp
18. Spring seat
19. Spring
20. Allen set screw
21. Internal tooth lock washer
22. Cap screw Loctite 242
23. Governor cup
24. Tab lock
25. Cap screw
26. Bushing
27. Counterweight (two (2) each side)
28. Nut
29. Nylon washer 5.1 mm (.200") thickness
30. Bushing
31. Shouldered pin
32. Nylon washer 3.3 mm (.130") thickness

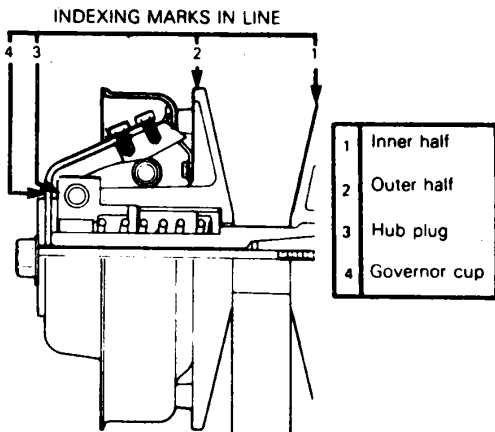
Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

◆ **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 details.

REMOVAL

Some pulley components are marked to insure proper assembly, thereby maintaining optimum balancement.

If components lack such marks, marking should be done manually before disassembly, as per illustration.



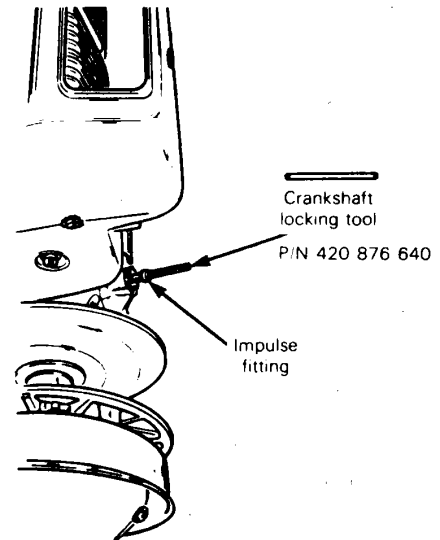
A015003001

10,23,25, Outer half & governor cup

— Lock the crankshaft by using one of the following method:

Insert the crankshaft locking tool P/N 420 876 640 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 420 876 640.



A009002011

Or:

Remove spark plug(s) then bring P.T.O. piston at T.D.C. position.

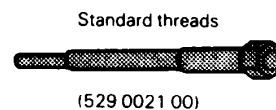
Rotate drive pulley 45° clockwise then insert enough starter rope into cylinder to fill it completely.

— Remove the cap screw.

4, Inner half

If it is necessary to remove inner half, use drive pulley puller P/N 529 002 100.

▼ **CAUTION:** This pulley has standard threads. Do not use metric threads puller.



A000001008

To block engine crankshaft:

Remove starter rope blocking piston, then reblock piston after having turned 45° counterclockwise from T.D.C. 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.

Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

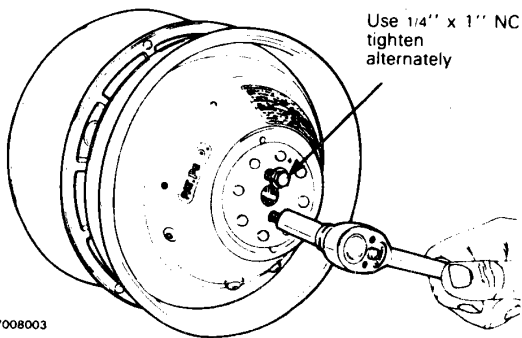
DISASSEMBLY

○ NOTE: Some bolts of the drive pulley have Loctite on their threads, it is advisable to break the Loctite seal before attempting to unscrew.

10,23, Outer half assembly & governor cup

▼ CAUTION: Do not tap on the governor cup.

The governor cup can be easily removed by inserting two (2) 1/4" x 1" NC bolts and tightening alternately until cup pulls out.



A007008003

13,21,22, Hub plug

The hub plug is pushed by the clutch spring pressure. At disassembly, hold hub plug firmly against outer half until the three (3) bolts are completely removed. This will prevent damage of the outer half threads.

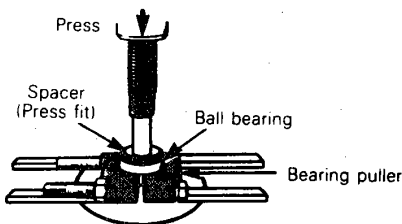
16,20, "Duralon" bushing

To disassemble "Duralon" bushing from hub plug, use a suitable pusher and hammer or press.

▼ CAUTION: Do not disassemble counterweights unless replacement is necessary.

7,8, Bearing

To disassemble bearing from inner half shaft, use a suitable bearing puller.



A017003001

03-03-18

○ NOTE: The press fit is on the thicker spacer only.

CLEANING

4,10, Inner & outer half

Inside of outer half should be cleaned with a clean cloth. The square shaft can be cleaned with fine steel wool and a clean cloth.

4, Inner half & crankshaft

Using cleaner such as acetone, 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 crankshaft seal and acetone because damage may occur.

INSPECTION

Drive pulley should be inspected annually.

30, Roller

Check for roundness of external diameter.

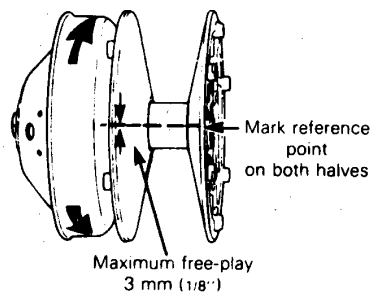
31, Shouldered pin bushing

Check for excessive wear.

Apply Loctite 242 when installing new one.

16, "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").



A007003004

Section 03 TRANSMISSION
Sub-section 03 (DRIVE PULLEY)

▼ **CAUTION:** Ensure rollers are in good condition. Replace as required.

ASSEMBLY

7, Bearing

To install bearing on inner half, use a suitable pusher and a press.

1,2, Starter ring gear

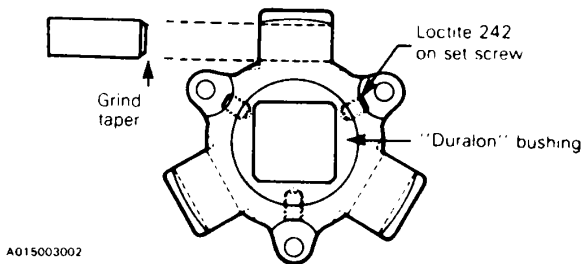
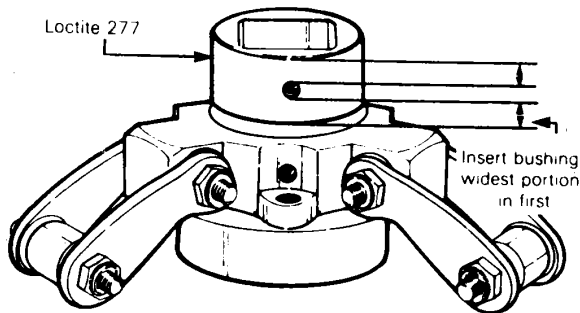
Apply Loctite 271 or equivalent on threads then torque the screws to 14 N•m (10 lbf•ft) or tighten with an impact screwdriver.

11,12, Guard

Torque to 6 N•m (53 lbf•in).

13,16,20, "Duralon" bushing

To install or remove "Duralon" bushing from hub plug, use suitable pusher and hammer or press. Install bushing as per illustration.



A015003002

Apply Loctite 277 on "Duralon" bushing. Do not fill set screw holes with loctite.

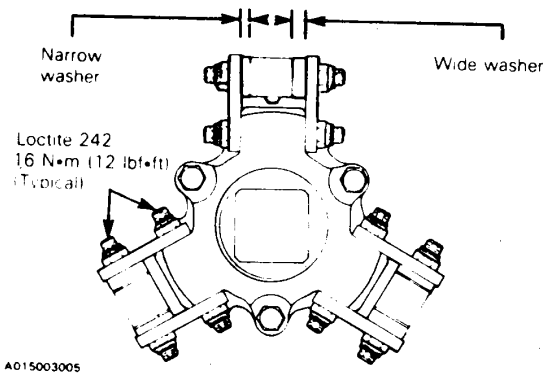
Apply Loctite 242 on set screw threads, then tighten until screw slightly rests against bottom of "Duralon" bushing hole.

26, Bushings

Gently grind a small taper at our end to ease bushing assembly and push into hub plug as illustrated above.

26 to 32, Counterweight ass'y.

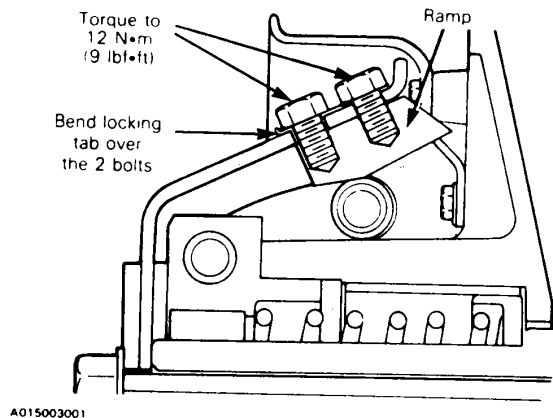
Rollers and nylon washers must move freely; install them as per illustration.



Apply Loctite 242 on shouldered pin threads and torque to 16 N•m (12 lbf•ft).

14,15,17, Ramps

Assemble ramps and torque cap screws as per illustration.



Section 03 TRANSMISSION

Sub-section 03 (DRIVE PULLEY)

INSTALLATION

Clean crankshaft extension using fine steel wool and a clean cloth.

▼ **CAUTION:** When installing drive pulley on engine, reference mark on inner half, outer half and governor cup must be in line.

4,10, Inner & outer half

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° counter-clockwise from T.D.C. position and that cylinder is completely filled with a starter rope or use crankshaft locking tool.

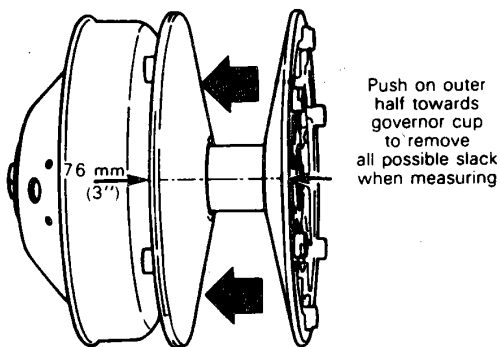
Install inner half on crankshaft extension then position outer half assembly on fixed half square shaft.

▼ **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.

23, Governor cup

Install governor cup making sure that the shaft end rests in governor cup seating. Position capscrew with a new locking tab then torque to 85 N•m (63 lbf•ft).

▼ **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").



A007003007

24, Lock tab

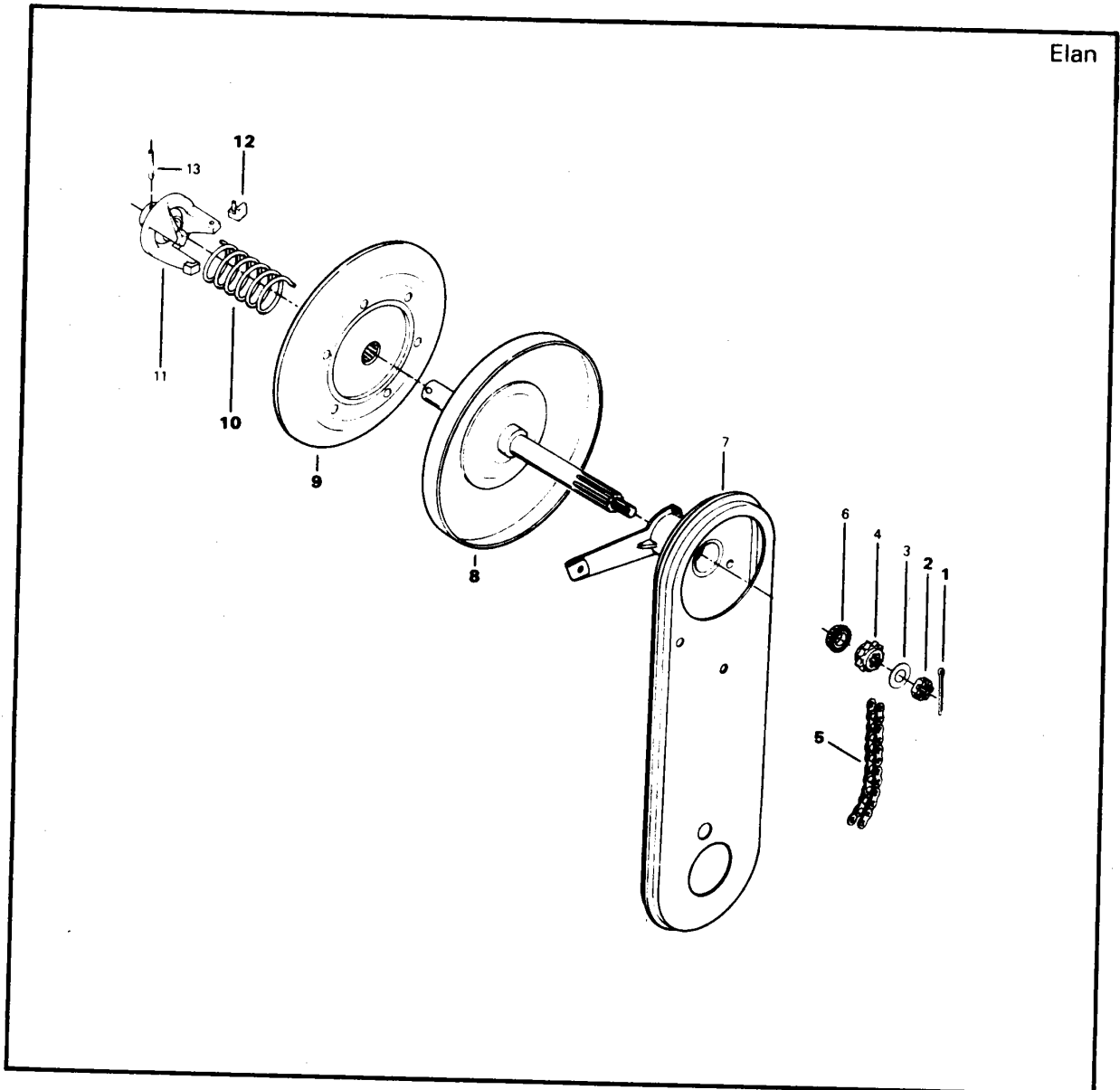
Lift rear of vehicle off the ground. Install drive belt, pulley guard and close cab then start engine and apply throttle and brake 2-3 times. Stop engine and retorque cap screw. Bend one side of locking tab over governor bolt.

03-03-20

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

DRIVEN PULLEY

Elan



- 1. Cotter pin
- 2. Castellated nut
- 3. Spring washer
- 4. Sprocket
- 5. Driving chain
- 6. Bearing cone
- 7. Chaincase

- 8. Fixed half
- 9. Sliding half
- 10. Release spring
- 11. Outer cam
- 12. Cam slider shoe
- 13. Roll pin

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

DISASSEMBLY

11,13, Roll pin & outer cam

Use a pin punch to remove roll pin from the outer cam.

REMOVAL

Pulley guard & drive belt

Remove.

Steering column bolts

Slacken.

5, Drive chain

Release tension.

1,2, Cotter pin & castellated nut

Remove from pulley shaft.

5, Drive chain

Attach to frame to prevent from falling inside chaincase.

Driven pulley assembly

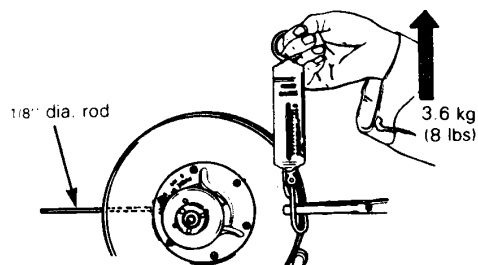
Pull toward engine and remove from vehicle.

INSPECTION

10, 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 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle.



A002003007

Spring pre-load should be 3.6 kg (8 lbs).
To correct pre-load see ADJUSTMENT.

03-04-2

12, Cam slider shoe

Inspect outer cam for worn slider shoes.

ASSEMBLY

Assemble driven pulley by reversing disassembly procedure.

12, Cam Slider Shoe

When replacing slider shoes, always install a set of new shoes to maintain balanced pressures on the cam.

INSTALLATION

Reinstall the driven pulley on vehicle by reversing the removal procedure.

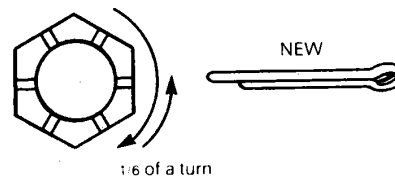
4,5, Sprocket & chain

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.



A002003008

CAUTION: It is important that nut is backed off or damage may occur due to a burnt or seized bearing.

1, Cotter pin

Lock assembly in position with a new cotter pin.

5, Drive chain

Apply chain tension.

ADJUSTMENT

10, Spring

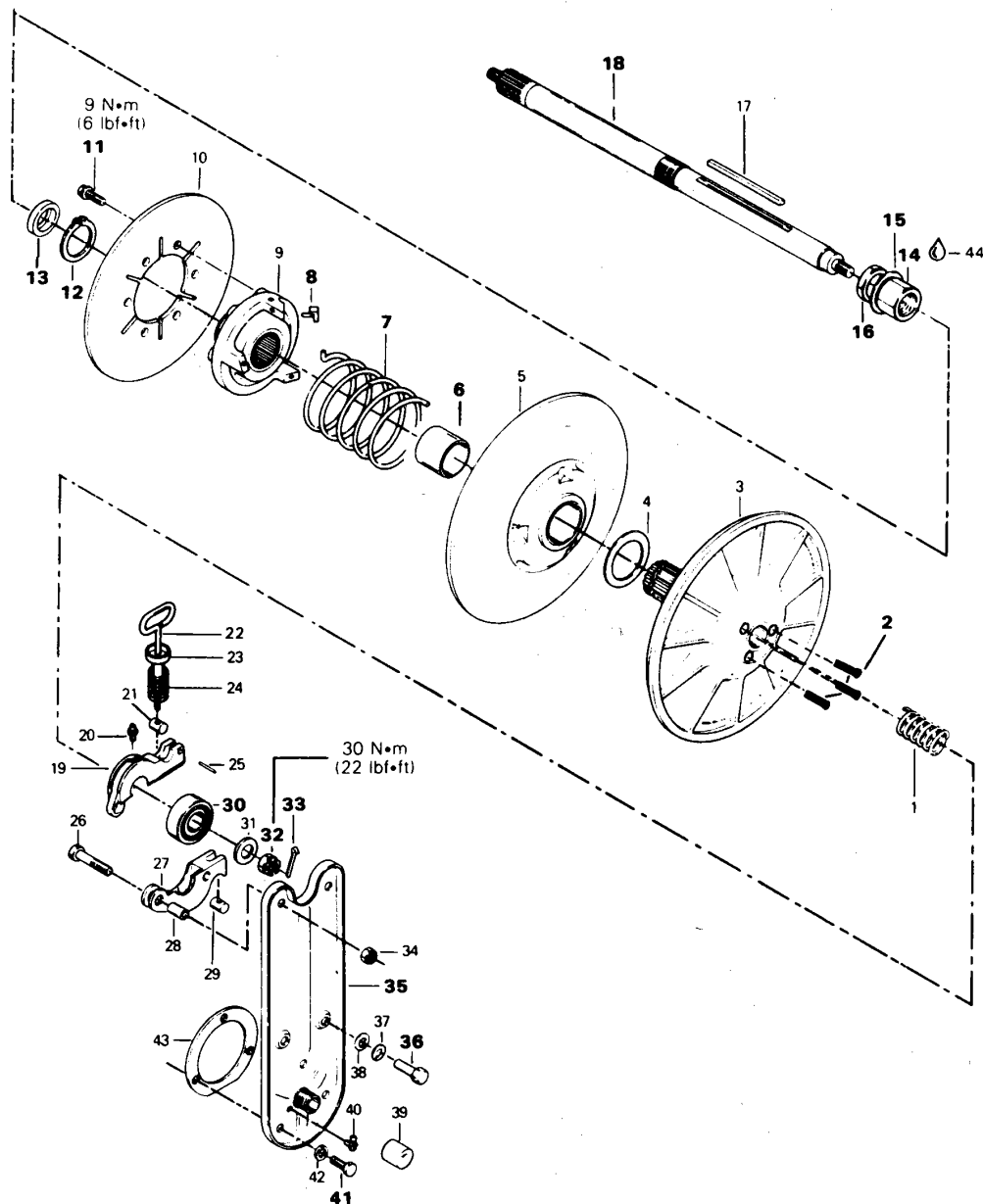
Spring torsional pre-load

Spring torsional pre-load should be 3.6 kg (8 lbs).

To correct spring pre-load relocate spring end in sliding pulley half.

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

Skandic



Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

1. Spring
2. Allen set screw
3. Fixed half
4. Thrust washer
5. Sliding half
6. Bushing
7. Spring
8. Slider shoe
9. Outer cam
10. Brake disc
11. Taptite screw
12. Snap ring
13. Thrust washer
14. Adjuster nut "Loctite 277"
15. Tab lock
16. Jam nut "Loctite 277"
17. Key
18. Countershaft
19. Bearing housing (upper half)
20. Grease fitting
21. Barrel
22. Eye bolt

23. Bushing
24. Spring
25. Roll pin
26. Cap screw M8 x 35
27. Bearing housing (lower half)
28. Bushing
29. Barrel
30. Bearing
31. Flat washer 17.32" x 1 1/16"
32. Slotted nut 14 mm
33. Cotter pin
34. Stop nut 8 mm
35. Support
36. Cap screw M8 x 1.25 x 16
37. Lock washer 8 mm
38. Flat washer 8.4 x 24 x 1.6 mm
39. Plug
40. Grease fitting
41. Cap screw M6 x 16
42. Lock washer 6 mm
43. Retainer flange
44. "Loctite 277"

REMOVAL

To remove driven pulley assembly, countershaft support must be tilted toward front of vehicle. Proceed as follows:

Pulley guard & drive belt

Remove from vehicle.

30, Bearing

To remove from countershaft, use a suitable bearing puller.

35,36,41, Support & screws

Remove support screws and drive axle screws. Tilt support forward.

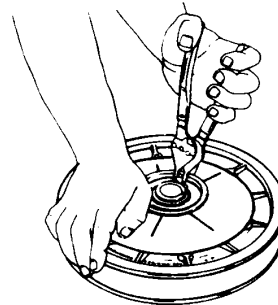
Driven pulley assembly

Remove from vehicle.

DISASSEMBLY

12, Snap ring

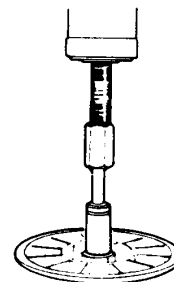
◆ **WARNING:** The driven pulley cam is spring loaded. Hold in place when removing the snap ring.



A007003004

5, Sliding half bushing

To remove a worn bushing push out using a press.



A007003005

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

INSPECTION

6, Sliding half bushing

Check sliding half bushing wear, replace bushing if wear is excessive.

8, Slider shoe

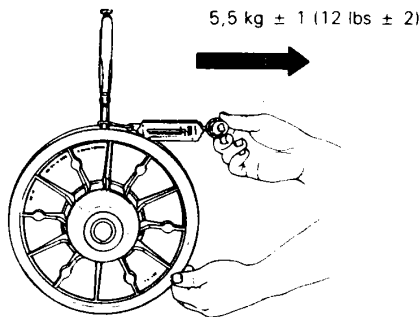
Check for excessive wear.

7, Spring

Spring torsional pre-load

Check pre-load using a fish scale positioned at 90° with the pulley axle.

The spring pre-load should be: 5,5 kg ± 1 (12 lbs ± 2)



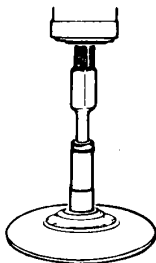
A007003006

To correct, refer to ADJUSTMENT.

ASSEMBLY

6, Sliding half bushing

Install a new bushing using a press and a suitable pusher.



A007003007

11, Brake disc capscrews

Torque to 9 N•m (6 lbf•ft)

03-04-6

8, Cam Slider Shoe

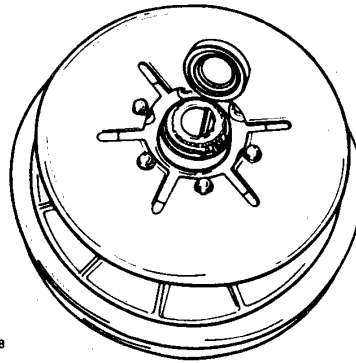
When replacing slider shoes, always install a new set of three shoes to maintain balanced pressures on the cam.

INSTALLATION

Reinstall the driven pulley on countershaft by reversing the removal procedure.

13, Thrust washer

Must be installed as illustrated to provide thrust area for the pulley snap ring.



A007003008

18, Countershaft

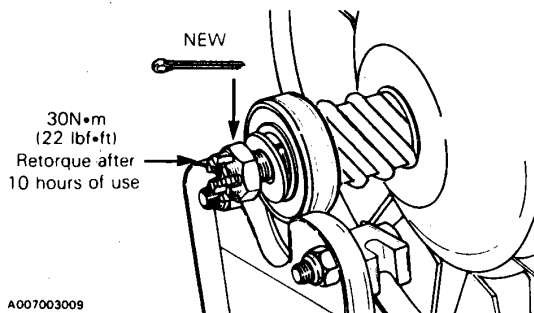
Always apply anti-seize compound (Loctite anti-seize lubricant P/N 413 7010 00) on unpainted surface of countershaft.

30, Bearing

Press on inner race with suitable pusher.

32, Nut

Torque to 30 N•m (22 lbf•ft).



A007003009

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

33, Cotter pin

Reinstall a new cotter pin.

Pulley alignment

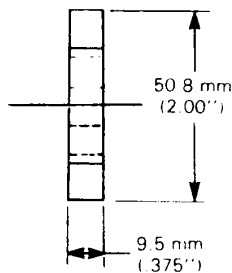
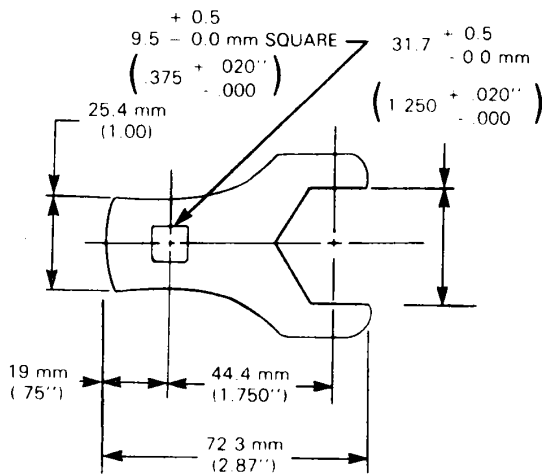
For pulley alignment procedure, refer to section 03-05.

14,16,44, Adjuster nut, jam nut & "Loctite 277"

Apply "Loctite 277" or equivalent on threads of both nuts.

Torque jam nut to 60-70 N•m (45-52 lbf•ft).

To torque the jam nut, it is necessary to make the following tool or use a Snap On extension key no. FC-40. Torque to: 60-70 N•m (45-52 lbf•ft).



Material: Steel bar 9.5 mm (.375) thickness cold roll.

A007003010

NOTE: For an accurate torque wrench reading you must use the following formulas:

$$\text{Torque wrench length cm (in)} = \text{Correction factor}$$

$$\text{Torque wrench length} + 4.44 \text{ cm (1.750 in)}$$

$$\frac{\text{Torque wrench reading}}{\text{Correction factor}} = \text{Real reading}$$

Ex.:

Torque wrench length: 25.4 cm (10 in.)

Torque wrench reading: 60 N•m (45 lbf•ft).

Correction factor

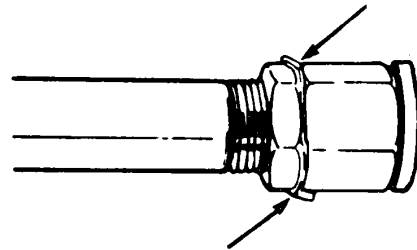
$$\frac{25.4 \text{ cm (10 in)}}{25.4 \text{ cm (10 in)} + 4.44 \text{ cm (1.750 in)}} = 0.85$$

Real reading

$$\frac{60 \text{ N}\cdot\text{m (45 lbf}\cdot\text{ft)}}{.85} = 70 \text{ N}\cdot\text{m (52 lbf}\cdot\text{ft)}$$

15, Tab lock

Make sure the tab lock is properly folded over each nut.



A007003011

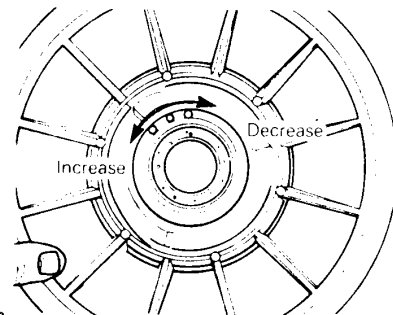
CAUTION: Do not bend lock tab more than twice. If necessary, install a new one (P/N 504 0480 00).

ADJUSTMENT

7, Spring

Spring torsional pre-load

To adjust spring pre-load displace spring end accordingly.



A007003012

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

Pulley alignment

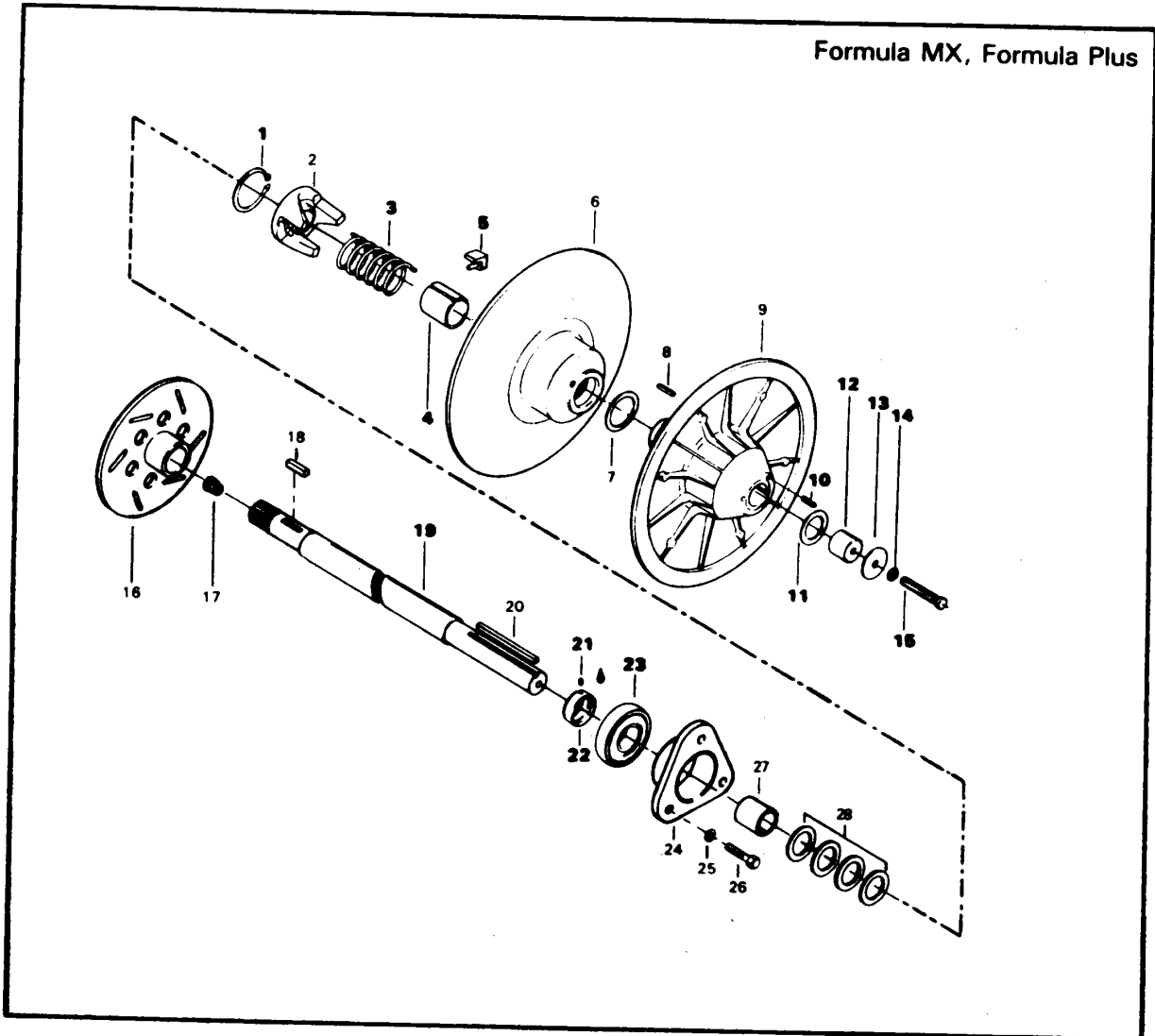
For pulley alignment procedure, refer to section 03-05.

2, Belt deflection sets screws

At assembly, the Allen screws must be set in accordance with the drive belt deflection specification (see section 03, sub-section 02 Drive Belt).

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

Formula MX, Formula Plus



- 1. Snap ring
- 2. Outer cam
- 3. Spring
- 4. Bushing
- 5. Slider shoe
- 6. Sliding half
- 7. Thrust washer
- 8. Key (cam)
- 9. Fixed half
- 10. Set screw
- 11. Shim
- 12. Extension
- 13. Washer
- 14. Lock washer 1/4

- 15. Screw M8 x 55
- 16. Brake disc
- 17. Cork
- 18. Key
- 19. Countershaft
- 20. Key (pulley ass'y)
- 21. Allen screw
- 22. Collar
- 23. Bearing
- 24. Outer housing
- 25. Lock washer 8 mm
- 26. Cap screw
- 27. Shim
- 28. Shim

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

REMOVAL

11,12,13,14,15, Shim, extension, washer , lock washer & screw

Remove the cap screw, pull the driven pulley from the countershaft.

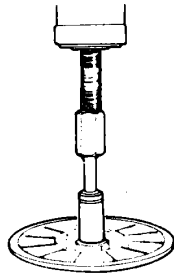
DISASSEMBLY

1, Snap ring

Remove snap ring to disassemble the outer cam and the two pulley halves.

4, Sliding half bushing

To disassemble a worn bushing, use a press and a suitable pusher.



A007003005

INSPECTION

4, Sliding half bushing

Check bushing wear, replace if wear is excessive.

5, Slider shoe

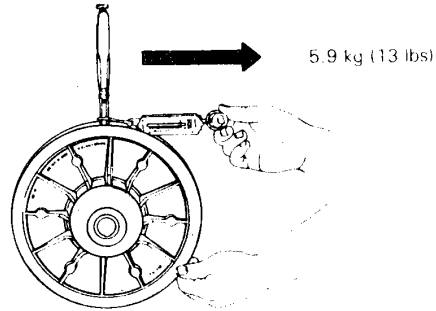
Check for excessive wear.

3, Spring

Spring torsional pre-load

Check pre-load using a fish scale positioned at 90° with the pulley axle.

The spring pre-load should be: 5.9 kg (13 lbs).



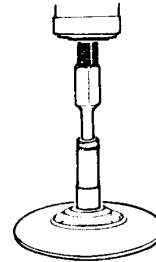
A007003006

To correct, refer to ADJUSTMENT.

ASSEMBLY

4, Sliding half bushing

Assemble a new bushing using a press and a suitable pusher.



A007003007

5, Cam slider shoe

When replacing slider shoes, always install a new set of three shoes to maintain balanced pressures on the cam.

INSTALLATION

Reinstall the pulley on the countershaft by reversing the removal procedure.

19, Countershaft

▼ **CAUTION:** Always apply anti-seize compound on the countershaft before final pulley installation (Loctite anti-seize lubricant P/N 413 7010 00).

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

22,23, Bearing and collar

Lock the slide fit bearing on countershaft with the ex-centric collar.

21, Socket set screw

Lock excentric collar in position with the set screw and apply "Loctite 242" blue (medium strength) P/N 413 7030 00 on threads.

15, Pulley retaining screw

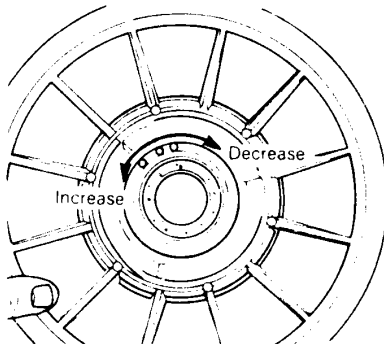
Torque to 25 N•m (18 lbf•ft).

ADJUSTMENT

3, Spring

Spring torsional pre-load

To adjust spring pre-load displace spring end accordingly.



A007003012

10, Drive belt deflection adjustment set screws

At assembly, the Allen screws must be set in accordance with the drive belt deflection specification (see section 03, sub-section 02 Drive belt).

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

22,23, Bearing and collar

Lock the slide fit bearing on countershaft with the ex-centric collar.

21, Socket set screw

Lock excentric collar in position with the set screw and apply "Loctite 242" blue (medium strength) P/N 413 7030 00 on threads.

15, Pulley retaining screw

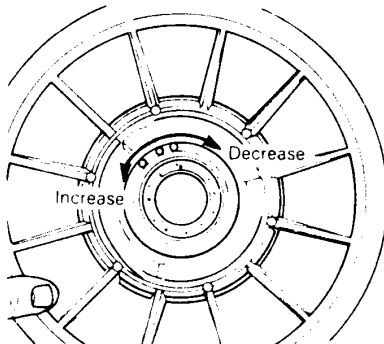
Torque to 25 N•m (18 lbf•ft).

ADJUSTMENT

3, Spring

Spring torsional pre-load

To adjust spring pre-load displace spring end accordingly.



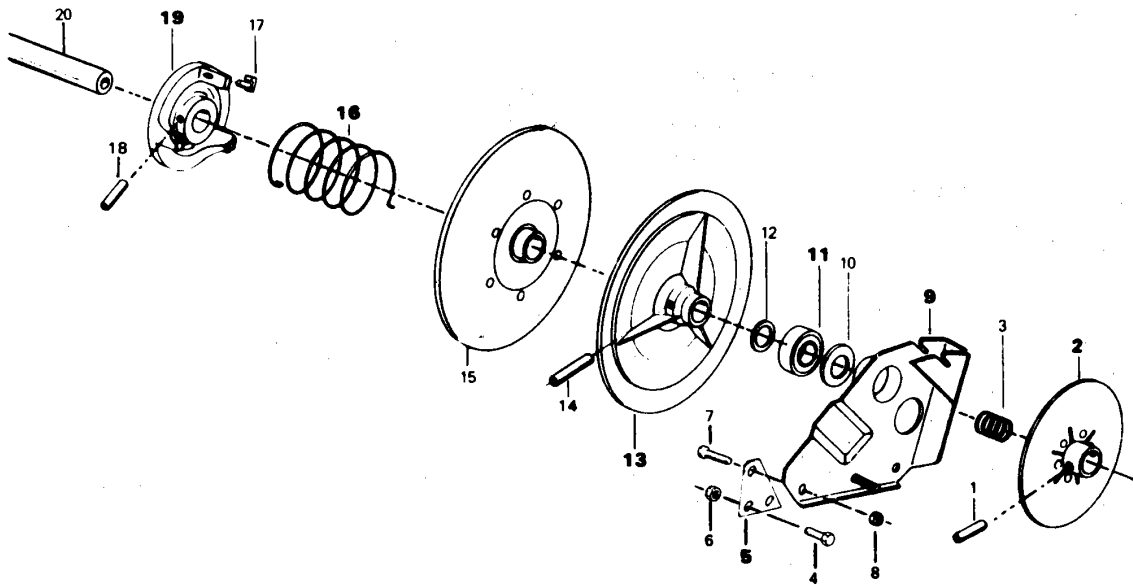
A007003012

10, Drive belt deflection adjustment set screws

At assembly, the Allen screws must be set in accordance with the drive belt deflection specification (see section 03, sub-section 02 Drive belt).

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

Alpine



- 1. Roll pin
- 2. Brake disc
- 3. Spring
- 4. Cap screw 1/4 - 20 x 3/4
- 5. Support bracket
- 6. Elastic stop nut 1/4 - 20
- 7. Cap screw 5/16 - 18 x 3/4
- 8. Elastic stop nut 5/16 - 18
- 9. Bearing support
- 10. Shim

- 11. Bearing
- 12. Spacer
- 13. Fixed half
- 14. Roll pin
- 15. Sliding half
- 16. Spring
- 17. Slider shoe
- 18. Roll pin
- 19. Outer cam
- 20. Transmission input shaft

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

REMOVAL

Driven pulley can be removed from the transmission shaft using the following procedure:

Pulley guard & drive belt

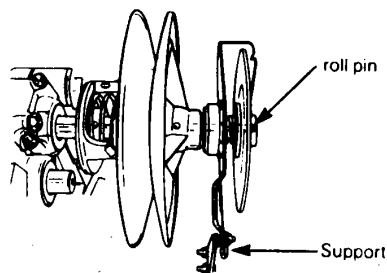
Remove from vehicle.

Brake caliper assembly

Remove from bearing support.

2,9, Disc & support

Position a suitable support under the drive shaft then punch the roll pin out of the shaft.



A017003002

The transmission shaft support is removed with the disc. Disengage support from bearing by tapping on its inner side.

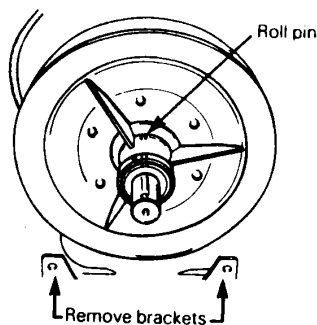
Pull disc and support out of the shaft.

11, Bearing

Use a suitable bearing puller.

5,13, Fixed half & support brackets

Remove the two support brackets. Push the roll pin out of the shaft and remove the fixed half.



A017003003

19, Outer cam

With sliding half and spring removed, push the roll pin out of the shaft and remove the outer cam.

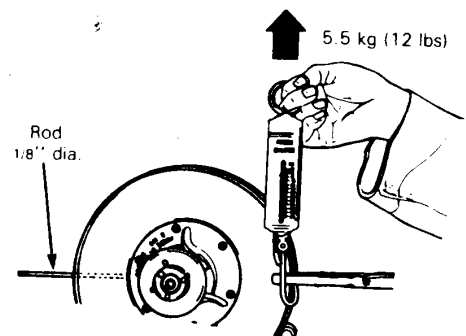
NOTE: If necessary, heat hub of fixed pulley and outer cam to facilitate removal.

INSPECTION

16, Spring

Spring torsional load

In order to measure driven pulley spring tension, the pulley halves must be separated. To do this, insert a length of 1/8" dia. rod between the halves. Check tension using a fish scale positioned 90° with pulley axle. Spring tension pre-load should be 5.5 kg (12 lbs).



A002003007

To correct, see ADJUSTMENT.

ASSEMBLY

17, Cam Slider Shoe

When replacing slider shoes, always install a new set of three shoes to maintain balanced pressures on the cam.

INSTALLATION

To install driven pulley, bearing, support and disc, reverse removal procedure.

ADJUSTMENT

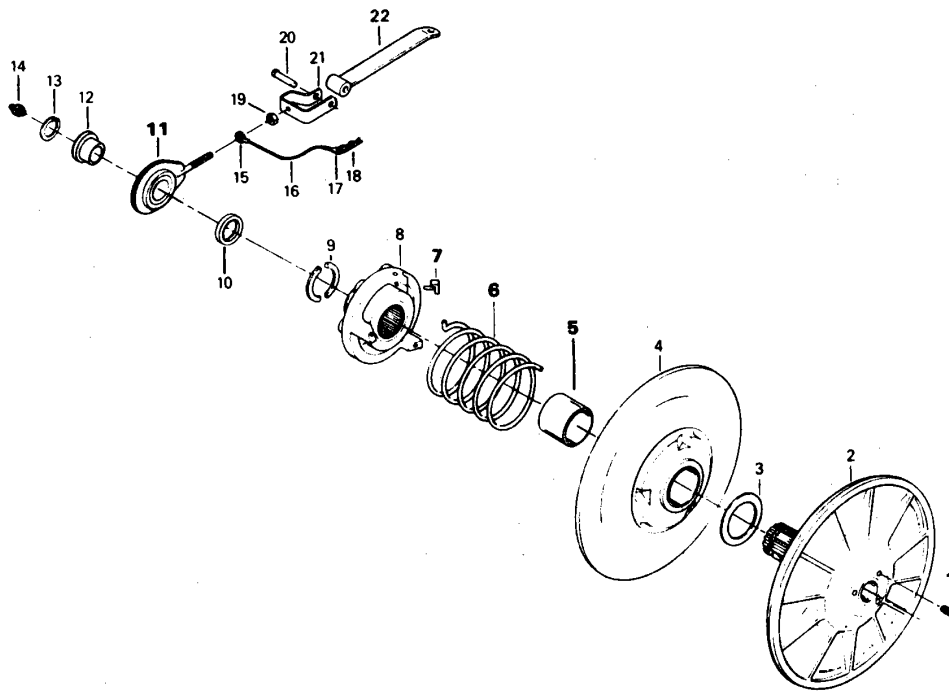
16, Spring

Spring torsional pre-load

To adjust spring pre-load, relocate spring end in sliding pulley half.

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

Skandic 377 R



- 1. Allen set screw M6 × 20
- 2. Fixed half
- 3. Thrust washer
- 4. Sliding half
- 5. bushing
- 6. Spring
- 7. Slider shoe
- 8. Outer cam
- 9. C-clip
- 10. Spacer
- 11. Support

- 12. Flanged ring
- 13. Snap ring
- 14. Grease fitting
- 15. Ring terminal
- 16. Wire 102 mm
- 17. Ring terminal
- 18. Hair pin
- 19. Nut M8 × 1.25 × 6
- 20. Clevis pin
- 21. Support bracket
- 22. Support clamp

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

REMOVAL

To remove driven pulley assembly, carburetor, air silencer and steering column have to be removed. Follow this procedure:

Pulley guard and drive belt

Remove from vehicle.

Air silencer

Remove from vehicle.

Carburetor

Disconnect carburetor rubber coupling at engine and move to side.

Steering column

Disconnect steering column upper and lower attaching bracket. Move steering to the foremost right.

○ **NOTE:** Maximum right steering movement is obtained when skis are turned to right.

11, Support

Disconnect countershaft support from support clamp. Remove circlip and using a suitable puller, remove countershaft support.

Driven pulley assembly

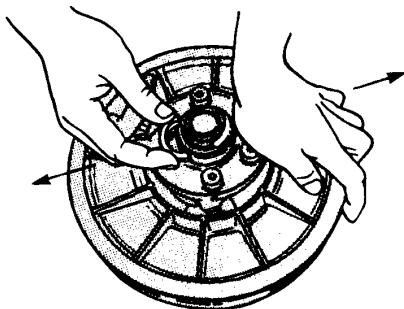
Remove from countershaft.

DISASSEMBLY

9, C-clip

Push outer cam and remove the C-clips.

◆ **WARNING:** Driven pulley cam is spring loaded. Hold it in place when removing the C-clips.

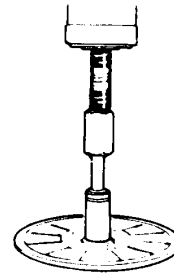


A007003013

Remove C-clips

5, Sliding half bushing

To disassemble a worn bushing, use a press and a suitable pusher.



A007003005

INSPECTION

5, Bushing

Check sliding half bushing wear, replace bushing if wear is excessive.

7, Slider shoe

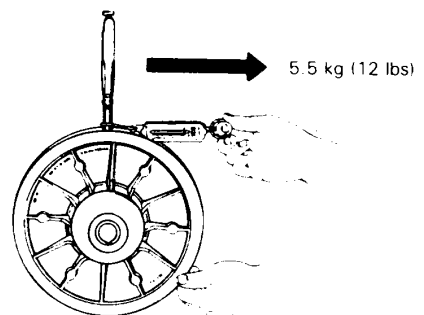
Check for excessive wear.

6, Spring

Spring torsional pre-load

Check pre-load using a fish scale positioned at 90° with the pulley axle.

The spring pre-load should be: 5.5 kg (12 lbs).



A007003008

To correct, refer to ADJUSTMENT.

ASSEMBLY

5, Bushing

Assemble a new bushing using a press and a suitable pusher.

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

REMOVAL

To remove driven pulley assembly, carburetor, air silencer and steering column have to be removed. Follow this procedure:

Pulley guard and drive belt

Remove from vehicle.

Air silencer

Remove from vehicle.

Carburetor

Disconnect carburetor rubber coupling at engine and move to side.

Steering column

Disconnect steering column upper and lower attaching bracket. Move steering to the foremost right.

○ **NOTE:** Maximum right steering movement is obtained when skis are turned to right.

11, Support

Disconnect countershaft support from support clamp. Remove circlip and using a suitable puller, remove countershaft support.

Driven pulley assembly

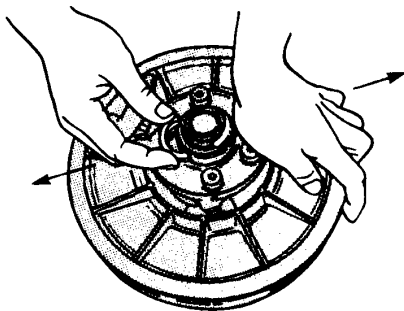
Remove from countershaft.

DISASSEMBLY

9, C-clip

Push outer cam and remove the C-clips.

◆ **WARNING:** Driven pulley cam is spring loaded. Hold it in place when removing the C-clips.

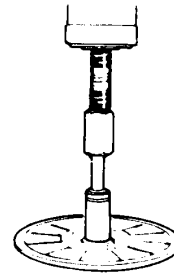


A007003013

Remove C-clips

5, Sliding half bushing

To disassemble a worn bushing, use a press and a suitable pusher.



A007003005

INSPECTION

5, Bushing

Check sliding half bushing wear, replace bushing if wear is excessive.

7, Slider shoe

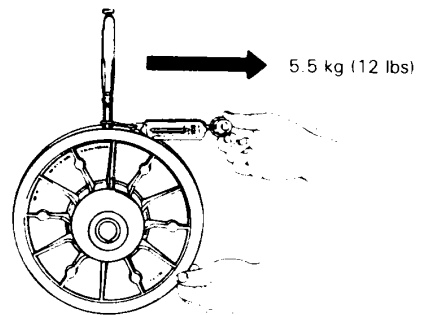
Check for excessive wear.

6, Spring

Spring torsional pre-load

Check pre-load using a fish scale positioned at 90° with the pulley axle.

The spring pre-load should be: 5.5 kg (12 lbs).



A007003008

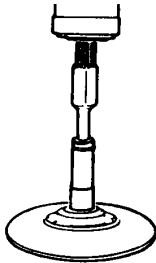
To correct, refer to ADJUSTMENT.

ASSEMBLY

5, Bushing

Assemble a new bushing using a press and a suitable pusher.

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)



A007003007

7, Cam slider shoe

When replacing slider shoes, always install a new set of three shoes to maintain balanced pressures on the cam.

INSTALLATION

Reinstall the pulley on the countershaft by reversing the removal procedure.

Countershaft

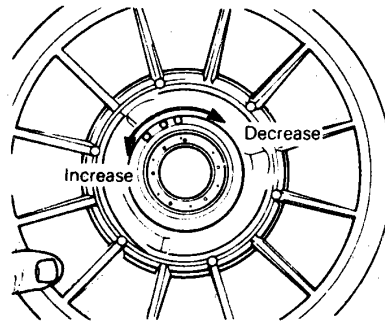
▼ **CAUTION:** Always apply anti-seize compound on the countershaft before final pulley installation (Loctite anti-seize lubricant P/N 413 7010 00).

ADJUSTMENT

6, Spring

Spring torsional pre-load

To adjust spring pre-load displace spring end accordingly.



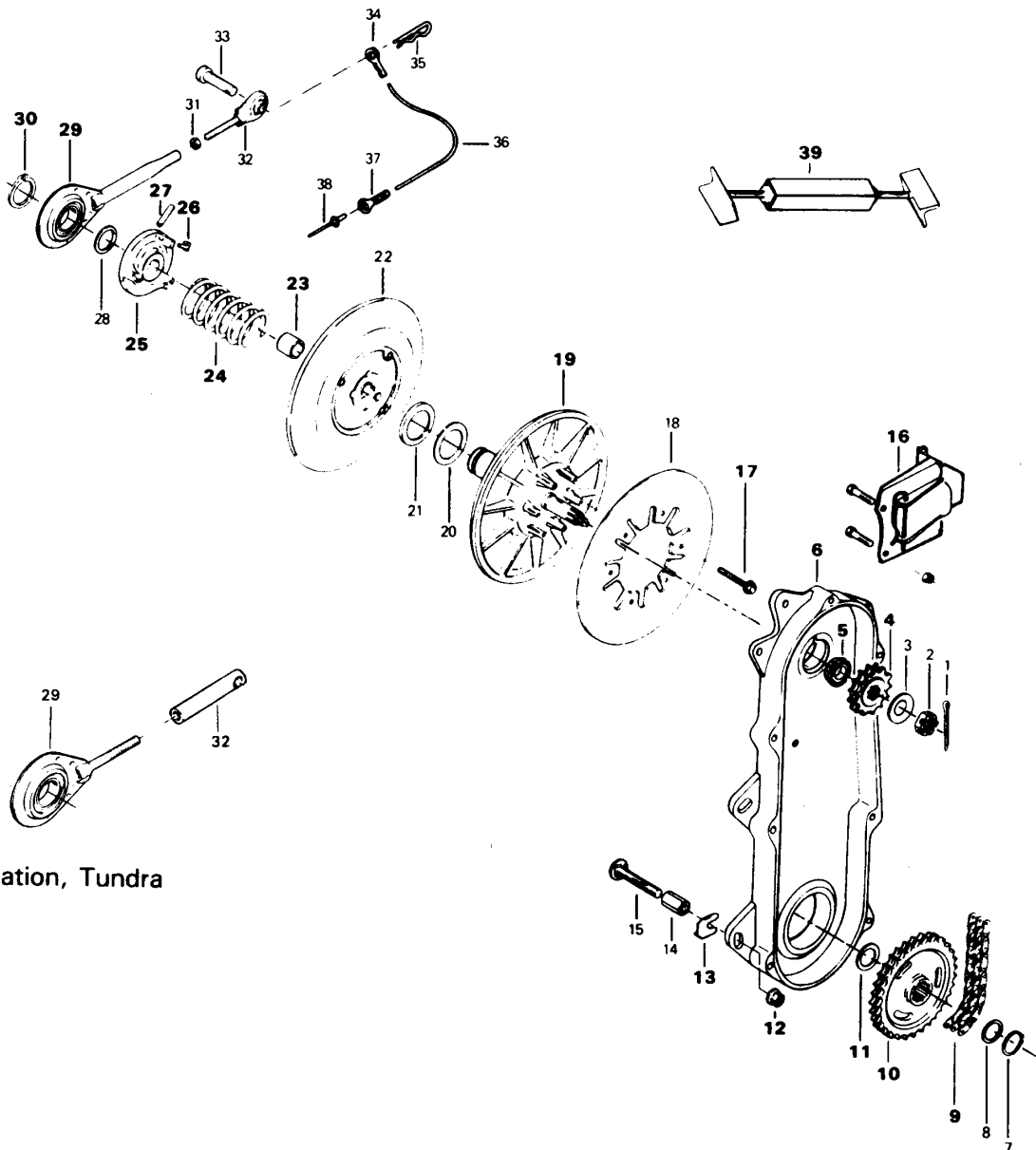
A007003012

1, Drive belt deflection adjustment set screws

At assembly, the Allen screws must be set in accordance with the drive belt deflection specification (see section 03, sub-section 02 Drive Belt).

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

Citation LS/E, Tundra/LT, Safari, Formula SS-SP, Mirage III



Citation, Tundra

Section 03 TRANSMISSION

Sub-section 04 (DRIVEN PULLEY)

1. Cotter pin
2. Castellated nut
3. Spring washer
4. Sprocket
5. Bearing cone
6. Chaincase
7. Snap ring
8. Spacer (thin)
9. Chain
10. Sprocket
11. Spacer (thick)
12. Elastic flanged stop nut M8 x 1.25
13. Shim
14. Threaded spacer
15. Carriage bolt M8 x 1.25 x 55
16. Brake assy
17. Taptite screw M6 x 16
18. Brake disc
19. Fixed half
20. Shim

21. Shim
22. Sliding half
23. Bushing
24. Spring
25. Outer cam
26. Slider shoe
27. Roll pin
28. Spacer
29. Support
30. Snap ring
31. Nut
32. Threaded attachment
33. Clevis pin
34. Ring terminal
35. Hair pin
36. Wire
37. Ring terminal
38. Rivet
39. Drive axle holder

REMOVAL

To remove driven pulley from vehicle, chaincase and driven pulley must be removed as an assembly. Follow this procedure:

Pulley guard & drive belt

Remove from vehicle.

16, Brake caliper

Remove from chaincase.

29,33,35, Countershaft support

To disconnect from support clamp, remove hair pin and clevis pin.

6, Chaincase

Open and drain oil.

4,9,10, Sprockets & chain

Remove lower sprocket snap ring.

Remove cotter pin and upper sprocket castellated nut.

Remove sprockets and chain.

5,11, Bearing & spacer

Remove from chaincase.

12,13, Retaining nuts & shims

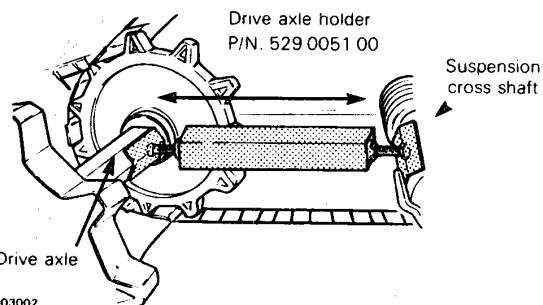
Remove the four chaincase retaining nuts and save aligning shims for installation.

Drive axle seal

Push towards drive axle sprocket.

39, Drive axle holder

Remove tension exerted by the track on the drive axle using drive axle holder as illustrated.



NOTE: To insert the drive axle holder on Citation and Tundra, reduce ends to 19 mm (3/4") wide.

Chaincase & pulley assembly

Pull out of vehicle.

DISASSEMBLY

Driven pulley & chaincase

To disassemble driven pulley from chaincase, press pulley shaft out of chaincase of knock with a plastic hammer.

29,30, Snap ring & support

Remove snap ring and slide support out of pulley shaft.

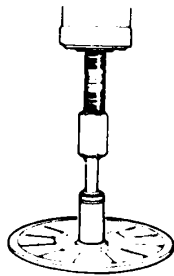
Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

25,27, Roll pin & outer cam

Remove roll pin and slide outer cam out of pulley shaft.

23, Sliding half bushing

To disassemble a worn bushing, use a press and a suitable pusher.



A007003005

INSPECTION

23, Sliding half bushing

Check sliding half bushing wear, replace bushing if wear is excessive.

26, Slider shoe

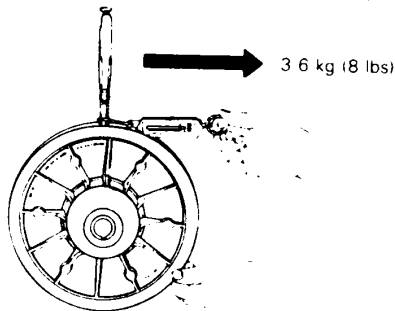
Check for excessive wear.

24, Spring

Spring torsional pre-load

Check pre-load using a fish positioned at 90° with the pulley axle.

The spring pre-load should be: 3.6 kg (8 lbs).



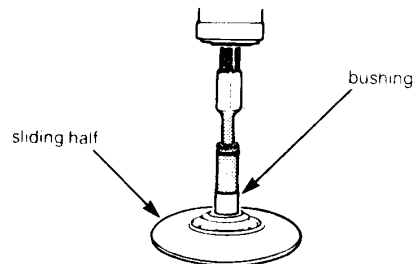
A007003006

To correct, refer to ADJUSTMENT.

ASSEMBLY

23, Sliding half bushing

Assemble a new bushing using a press and a suitable pusher.



A007003007

Driven pulley & chaincase

Assemble by reversing the disassembly procedure.

19, Fixed half shaft

▼ **CAUTION:** Always apply anti-seize compound on the pulley shaft before final pulley installation (Loctite anti-seize lubricant P/N 413 7010 00).

26, Cam slider shoe

When replacing slider shoes, always install a new set of three shoes to maintain balanced pressures on the cam.

INSTALLATION

Drive pulley & chaincase

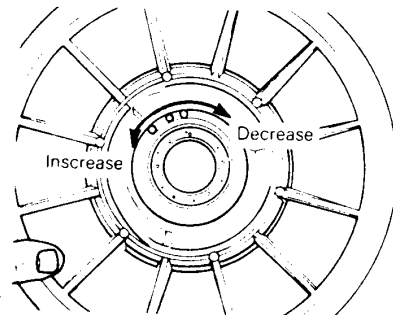
Reinstall by reversing the removal procedure.

ADJUSTMENT

24, Spring

Spring torsional pre-load

To adjust spring pre-load displace spring end accordingly.



A007003012

Section 03 TRANSMISSION
Sub-section 04 (DRIVEN PULLEY)

Track tension & alignment

Refer to section 05-05.

Drive belt deflection

Refer to section 03-02.

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 measurement).

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, the high drive belt operation and minimum wear will be obtained only with proper pulley alignment.

◆ **WARNING:** Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

The pulley distance refer to Z measurement

All pulley alignment specifications refer to:

x = Distance between straight edge and drive pulley inner half on driven pulley side.

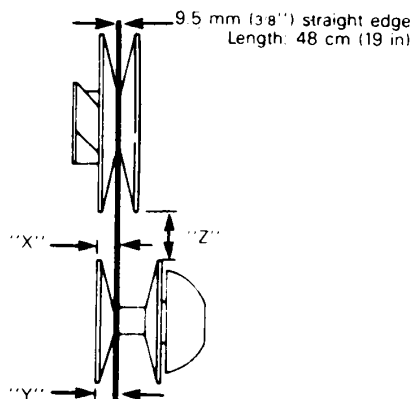
y = Distance between straight edge and drive pulley inner half edge on the opposite side.

GENERAL PROCEDURE

Remove belt guard and drive belt.

By turning and pushing the sliding pulley, open the driven pulley. Insert a straight edge 9.5 mm (.375") square into the driven pulley opened.

○ **NOTE:** Always measure distances x & y from the further straight edge side to the inner half edge on the engine side.



A000003002

On all models except Elan, the distance y must exceed distance x to compensate for the twist due to the drive pulley torque.

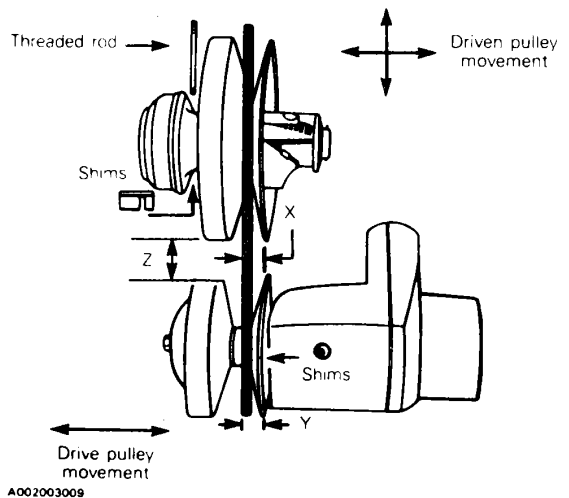
Drive belt deflection

○ **NOTE:** When pulley distance and alignment are adjusted to specifications, adjust drive belt deflection in accordance with section 03-02.

After adjustment checks

▼ **CAUTION:** This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

ELAN 250



Pulley distance specification

$$z = 44.45 \text{ mm} \pm \begin{matrix} 0.0 \\ 1.5 \end{matrix} (1.750'' \pm \begin{matrix} .000 \\ .060 \end{matrix})$$

Pulley distance adjustment method

With the threaded rod and nut located between chaincase and frame, shift chaincase to obtain the specified distance.

Pulley alignment specification

$$x = 34.14 \text{ mm} \pm 0.76 (1.344'' \pm 0.03)$$

y might exceed x up to 1.5 mm (.06'')

y might be smaller than x up to .76 mm (.030'')

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

Pulley alignment methods

Drive pulley alignment:

If drive pulley is too far in, remove drive pulley and add shim(s) on crankshaft. Shim P/N 504 0504 00, 0.81 mm (.032'') thickness.

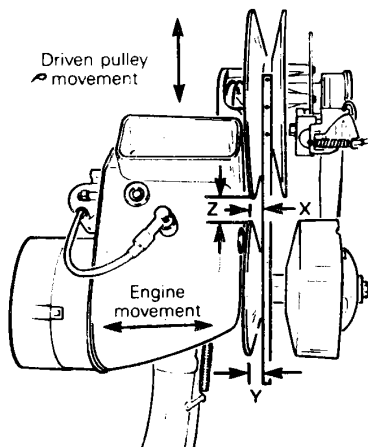
▼ **CAUTION:** Never use more than 5 shims on crankshaft.

◆ **WARNING:** Always torque drive pulley bolt within specifications. (See section 03-03).

Driven pulley alignment:

If driven pulley is too far in, add shim(s) between frame and chaincase. Shim P/N 504 0504 00, 0.81 mm (.032'') thickness.

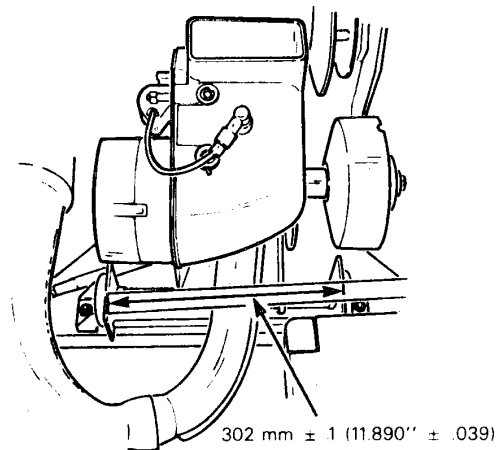
Citation LS/E, Tundra, Tundra LT



A004003003

▼ **CAUTION:** The rear suspension must be mounted on the vehicle and track tension and alignment must be done to provide the right frame width.

○ **NOTE:** Before checking pulley alignment, the distance between the two (2) front engine support must equal 302 mm \pm 1 (11.890'' \pm .039).



A004003004

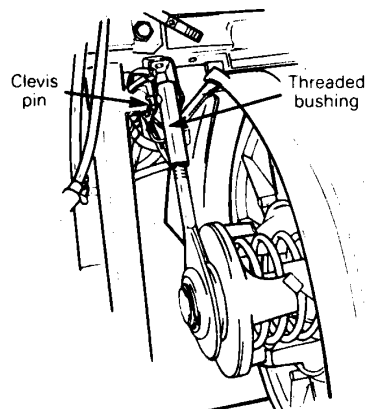
Pulley distance specification

36.6 mm \pm $\frac{1.5}{0}$ (1 $\frac{7}{16}$ '' \pm $\frac{1}{16}$ '')

Pulley distance adjustment method

Slack the four (4) chaincase retaining bolts and remove cotter pin, clevis pin from the bracket.

Move chaincase to obtain specific adjustment and adjust driven pulley support accordingly.



A004003005

Section 03 TRANSMISSION
Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

Pulley alignment specification

Citation LS, Tundra, Tundra LT

$$x = 34.03 \text{ mm} \pm .38 \text{ (1.340''} \pm .015)$$

Citation LSE

$$x = 45.30 \text{ mm} \pm .38 \text{ (1.783''} \pm .015)$$

Citation LS, Citation LSE, Tundra, Tundra LT

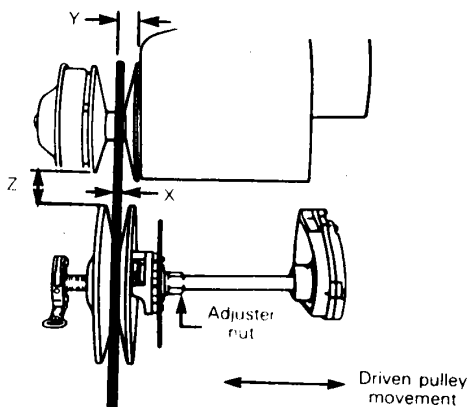
y must exceed x from 0.75 mm to 1.5 mm (.030'' to .060'')

Pulley alignment method

Slack the support retaining bolts and move the engine to obtain specified pulley alignment.

CAUTION: Always check the distance between the front engine supports. Distance must equal $302 \text{ mm} \pm 1 \text{ (11.890''} \pm .039)$.

SKANDIC 377



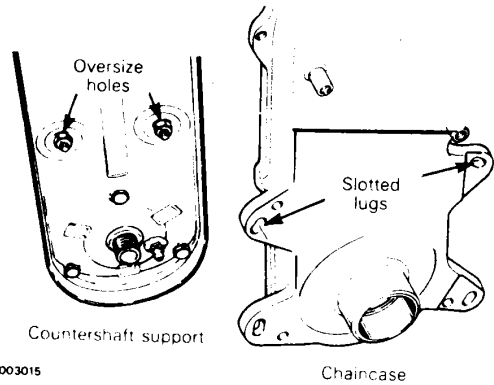
A007003004

Pulley distance specification

$$z = 41.43 \text{ mm} \pm \frac{3}{0} \text{ (1.631''} \pm \frac{18}{0})$$

Pulley distance adjustment method

Oversize holes on countershaft support and slotted lugs on chaincase casting allow movement of the countershaft.



A007003015

Move countershaft to obtain specified distance between pulleys.

Pulley alignment specification

$$x = 34.08 \text{ mm} \pm 0.81 \text{ (1.341''} \pm .032)$$

y must exceed x up to 1.5 mm (.060'')

Pulley alignment method

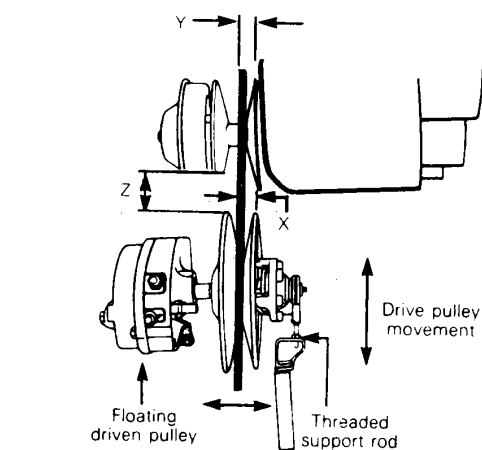
Driven pulley alignment:

An adjuster nut and a spring are mounted on the countershaft to align the driven pulley.

Align driven pulley to obtain specified dimensions.

For proper tightening of the adjuster and jam nuts, refer to "Driven pulley", section 03-04.

SKANDIC 377R



A008003001

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

Pulley distance specification

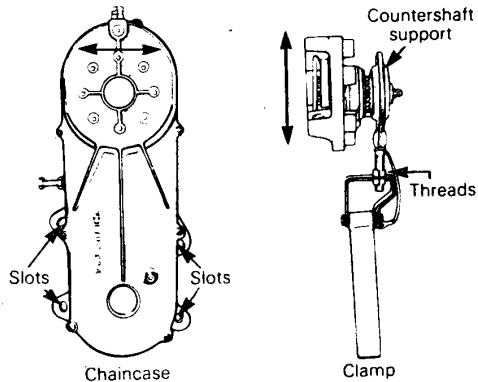
$$z = 41.3 \text{ mm} \pm \frac{3}{0} (1 \frac{5}{8}'' \pm \frac{1}{8})$$

Pulley distance adjustment method

Slotted lugs on gear box casting allow movement of the gearbox. Countershaft support has a threaded rod.

Adjustment:

Disconnect support from clamp, move gearbox until specified pulley distance is obtained and adjust support accordingly.



A008003002

Pulley alignment specification

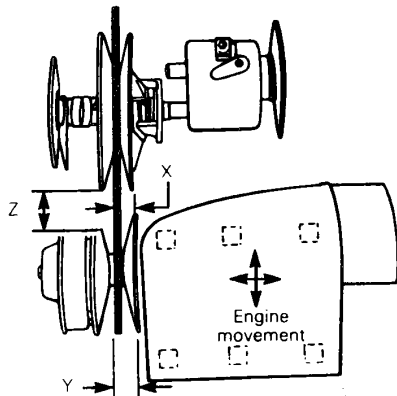
$$x = 34.08 \text{ mm} \pm 0.81 (1 \frac{11}{32}'' \pm \frac{1}{32})$$

y must exceed x up to 1.5 mm (1/16'')

Pulley alignment method

The floating type driven pulley is self aligning.

ALPINE



A017003004

03-05-4

Pulley distance specification

$$z = 44.45 \text{ mm} \pm \frac{3}{0} (1 \frac{3}{4}'' \pm \frac{1}{8})$$

Pulley distance adjustment method

Engine mounting bracket is provided with slotted holes. Move engine to obtain specified distance between pulleys.

Pulley alignment specification

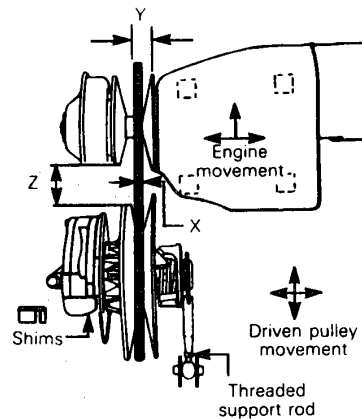
$$x = 34.11 \text{ mm} \pm .76 (1.343'' \pm .03)$$

y must exceed x up to 1.6 mm (1/16'')

Pulley alignment method

Move engine to obtain the specified pulley alignment.

SAFARI 377/E, 447, GL LC FORMULA SS, SP, MIRAGE III



A009003001

Pulley distance specification

$$z = 37.35 \text{ mm} \pm .75 (1.470'' \pm .030)$$

Pulley distance adjustment method

Slotted lugs on chaincase casting allow movement of the chaincase. Countershaft support has a threaded rod.

Adjustment:

Loose the lock nut on the threaded support rod.

Slack the four nuts on the chaincase. Screw or unscrew the support rod until specified pulley distance is obtained.

Section 03 TRANSMISSION

Sub-section 05 (PULLEY DISTANCE & ALIGNMENT)

Pulley alignment specification

$$x = 34.5 \text{ mm} \pm 0.4 \text{ (1 } 23/64 \text{ } \pm \text{ } 1/64)$$

$$y = 35.3 \text{ mm} \pm 0.75 \text{ (1 } 25/64 \text{ } \pm \text{ } 1/32)$$

Pulley alignment method

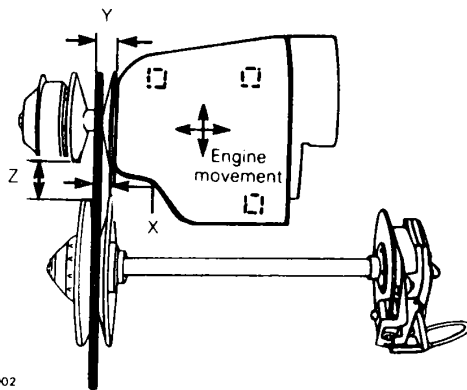
Engine movement:

Engine mounting bracket has slotted holes. Slide engine bracket on mounting studs to obtain specified pulley alignment.

Driven pulley movement:

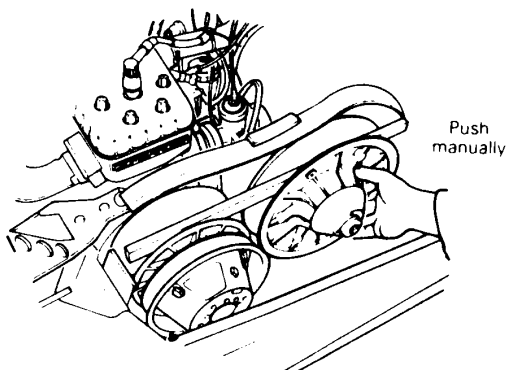
Shims can be mounted between chaincase and frame. Shim P/N 504 0398 00, 0.53 mm (.021") thickness.

FORMULA MX, PLUS



A015003002

○ NOTE: For proper measuring, driven pulley must be pushed toward disc brake.



A015003006

Pulley distance specification

$$z = 35 \text{ mm} \pm 0 \text{ (1.378"} \pm \text{ } 0.12)$$

Pulley distance adjustment method

Engine movement:

The engine bracket has slotted mounting holes. Move engine to obtain specified distance between pulleys.

Pulley alignment specification

$$x = 33.00 \text{ mm} \pm 0.75 \text{ (1.30"} \pm \text{ } 0.03)$$

y must exceed x from 0.75 mm (0.03") to 1.5 mm (0.06")

Pulley alignment method

Loose the four bolts retaining engine bracket to the frame. Position engine to obtain the specified alignment.

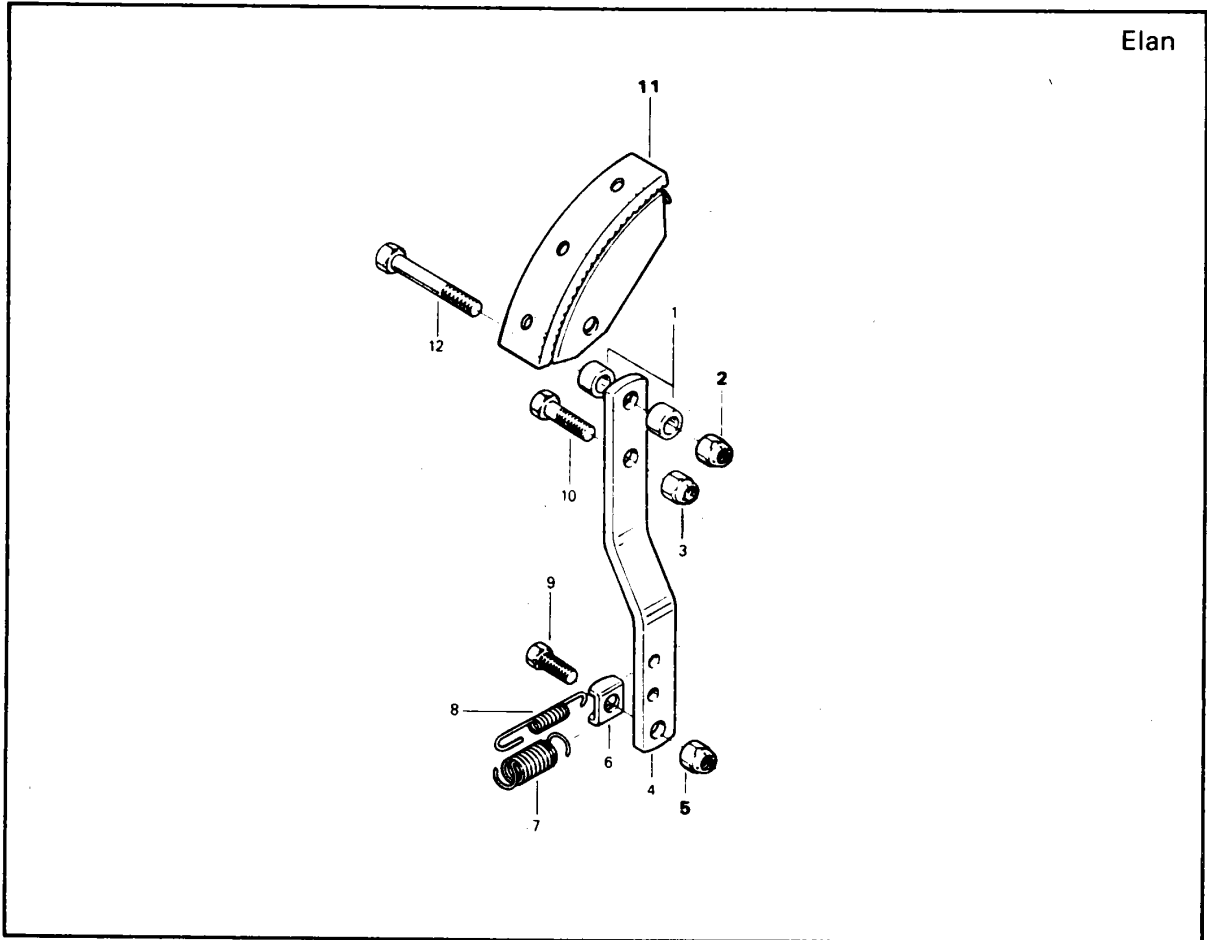


Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

BRAKE

DRUM BRAKE



- 1. Spacer
- 2. Nut (shoe)
- 3. Nut
- 4. Brake lever
- 5. Nut
- 6. Cable lock
- 7. Spring
- 8. Brake light switch spring
- 9. Bolt (cable)
- 10. Bolt
- 11. Brake shoe
- 12. Bolt (shoe)

Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

INSPECTION

11, Brake shoe

Check brake lining for wear. If necessary, replace.

○ **NOTE:** If oil traces are found on lining or drum, check chaincase seal for correct installation position or damage. Replace as needed. Wipe oil from pulley and replace brake shoe.

INSTALLATION

2, Shoe retaining nut

When torquing shoe retaining nut, shoe must be allowed to pivot when slight pressure is applied.

5, Lever retaining nut

When attaching brake lever assembly to chaincase bracket, tighten nut until lever pivots freely and all side play is eliminated.

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 solutions into cable.

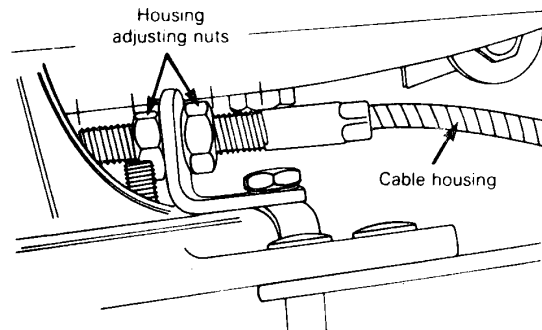
ADJUSTMENT

Brake lever control

Adjust so that brake applies fully when lever is 25 mm (1") from handlebar grip.

○ **NOTE:** Prior to cable installation, make sure cable housing adjusting nuts are located half way on adjuster threads.

If a final adjustment is indicated, use housing adjusting nuts.



A002003010

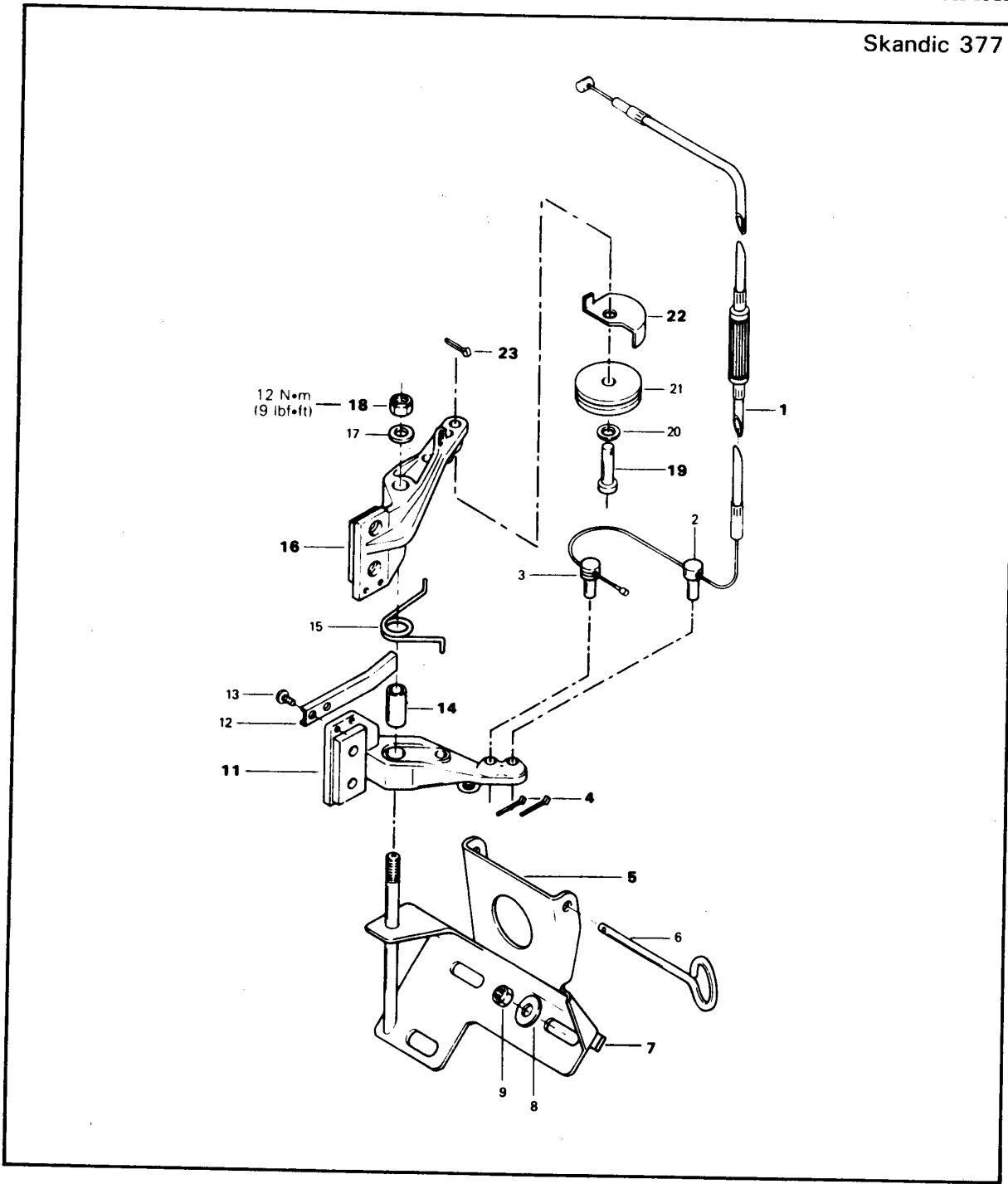
Brake light operation

Check brake light operation. If necessary, loosen brake light switch lock nuts and adjust.

Section 03 TRANSMISSION
Sub-section 06 (BRAKE)

DISC BRAKE

Skandic 377



Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

1. Cable
2. Barrel
3. Barrel
4. Cotter pin
5. Brake mounting bracket
6. Pin
7. Shim
8. Flat washer 8 mm
9. Elastic stop nut 8 mm
10. Flat washer 10 mm
11. Brake lever and pad
12. Brake switch bracket

13. Taptite screw M4 × 8
14. Bushing
15. Release spring
16. Brake lever and pad
17. Flat washer 10 mm
18. Elastic stop nut 10 mm
19. Pulley shaft
20. Spring washer
21. Pulley
22. Stop plate
23. Cotter pin

REMOVAL

Brake assembly

Disconnect brake light switch at connector and remove brake retainer nut, then pull out brake assembly, light switch and cable. Disconnect and remove brake cable.

◆ **WARNING:** Always readjust the brake light switch after removing the brake assembly.

INSPECTION

11,16, Brake pads

Measure the thickness of the brake pads. If less than 3 mm (1/8'') the pad and lever assembly should be replaced.

14, Bushing

Inspect for excessive wear.

1, Cable

Inspect for frayed braids.

ASSEMBLY

4,23, Cotter pin

Always reinstall new cotter pin.

19, Pulley shaft

Install in outer hole of brake lever.

22, Stop plate

Make sure the guard lock tab is inserted in the brake lever hole.

18, Elastic stop nut

Torque to 12 N•m (9 lbf•ft).

INSTALLATION

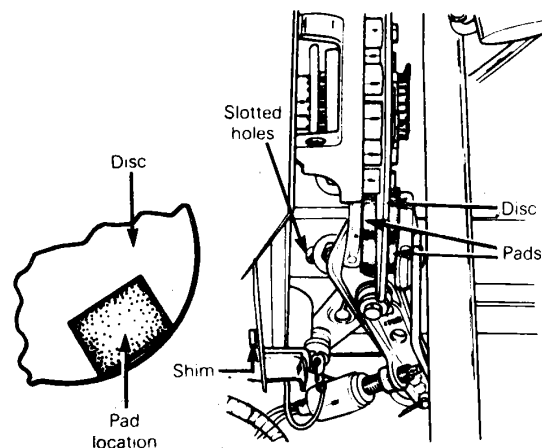
Reverse the removal procedure and pay particular attention to the following:

◆ **WARNING:** Avoid getting oil on brake shoe. Do not lubricate or apply anti-rust or anti-freeze solutions into cable.

5,7, Brake mounting bracket & shim

Use shim P/N 507 0174 00 (.8 mm/.032'' thickness) to ensure maximum pad friction area on disc.

Using mounting bracket slotted holes always align caliper ass'y so that the brake disc is well centered between the brake pads.



A007003016

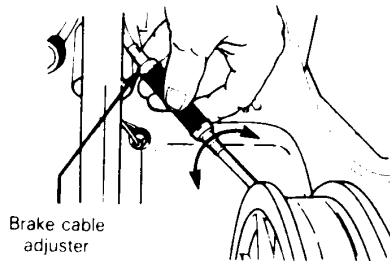
Section 03 TRANSMISSION
Sub-section 06 (BRAKE)

ADJUSTMENT

Control lever travel

Brake should apply fully while the brake control lever is approximately 13 mm (1/2") from the handlebar grip.

If adjustment is required, turn the brake cable adjuster counterclockwise until the brake disc can no longer turn then back off the adjuster approximately 1 1/2 turns. Recheck brake operation.

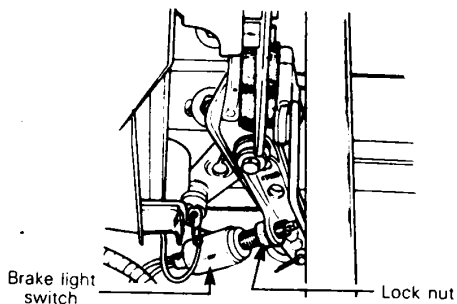


A007003017

Light switch

◆ **WARNING:** Whenever the brake is readjusted, the brake light switch operation must also be checked and adjusted.

To adjust, disconnect switch at terminal, loosen lock nut and screw switch as required.



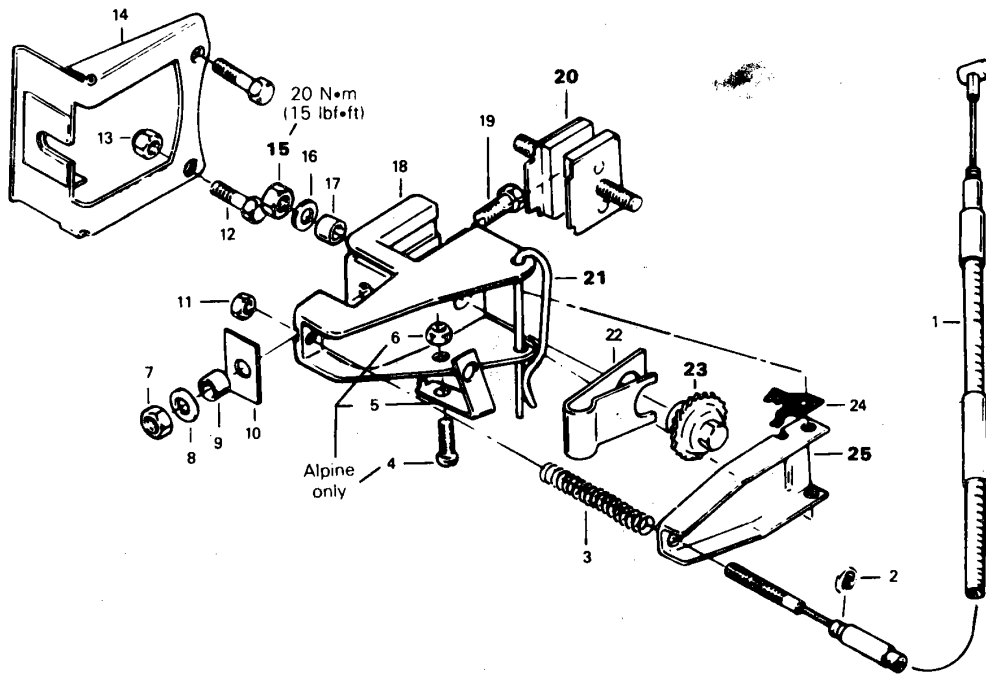
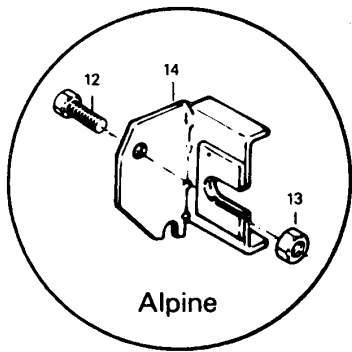
A007003018

Check brake light operation and tighten lock nut.

Section 03 TRANSMISSION
Sub-section 06 (BRAKE)

SELF ADJUSTING DISC BRAKE

Safari, Mirage III, Alpine



Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

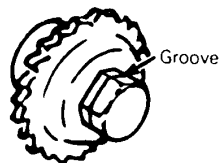
1. Cable
2. Snap ring
3. Release spring
4. Bolt
5. Brake light switch support
6. Elastic stop nut 10-24
7. Eslock nut 5/16 - 18
8. Washer
9. Bushing
10. Spacer
11. Elastic stop nut 10-24
12. Bolt
13. Elastic stop nut

14. Brake mounting bracket
15. Nylon nut 3/8 - 16
16. Flat washer 3/8 x 7/8 x .060"
17. Bushing
18. Caliper
19. Cap screw 5/16 - 18 x 3/4
20. Shoes
21. Pin
22. Release spring
23. Ratchet wheel
24. Ratchet spring
25. Lever

23, Ratchet wheel

▼ **CAUTION:** Similar ratchet wheels on caliper type disc brakes may have metric or standard threads. Identify with the following illustration

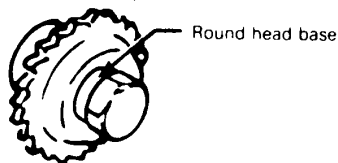
Standard thread ratchet wheels



A009003002

Hexagonal bolt head with groove.

Metric thread ratchet wheel



A009003003

Hexagonal head with round head base

REMOVAL

Caliper assembly

To remove, disconnect brake cable. On ALPINE models, disconnect brake light switch at connector.

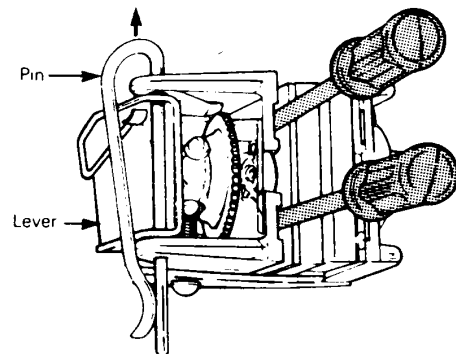
Remove nuts and/or bolts securing brake support to chaincase.

Slide brake caliper ass'y from brake support.

DISASSEMBLY

21,25, Pin & lever

To ease disassembly, activate lever and wedge two (2) screwdriver blades between caliper and brake shoe to release lever tension.



A009003004

CLEANING

Clean all metal components in a general purpose solvent. Using dry rag.

INSPECTION

20, Brake lining thickness

Measure thickness of brake lining. If less than 3 mm (1/8"), the lining should be replaced.

Section 03 TRANSMISSION

Sub-section 06 (BRAKE)

ASSEMBLY

23, Ratchet wheel

Apply low temperature grease on threads and spring seat prior to installation. Fully tighten then back off 1/2 turn.

15, Nylon nut

Torque to 20 N•m (15 lbf•ft).

INSTALLATION

◆ **WARNING:** Avoid getting oil on brake shoe. Do not lubricate or apply anti-rust or anti-freeze solutions into cable.

Caliper assembly

Slider caliper ass'y onto its support then secure support to vehicle.

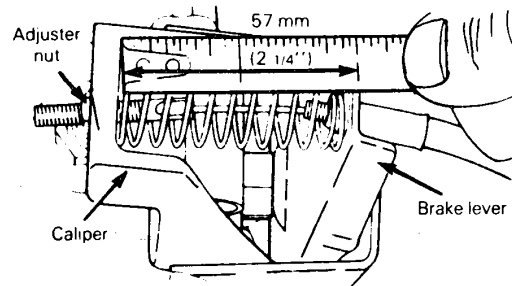
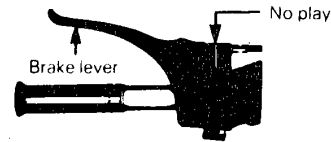
Activate lever by hand until ratchet click is no longer heard.

Secure brake cable housing to lever with the circlip on the inner side of the lever. Slide spring over cable then attach cable to housing with adjuster nut.

ADJUSTMENT

Brake control lever

Using adjuster nut, adjust until there is no free-play between the brake lever and its housing, and there is a gap of 57 mm \pm 3 (2 1/4" \pm 1/8") between lever and caliper.



A009003005

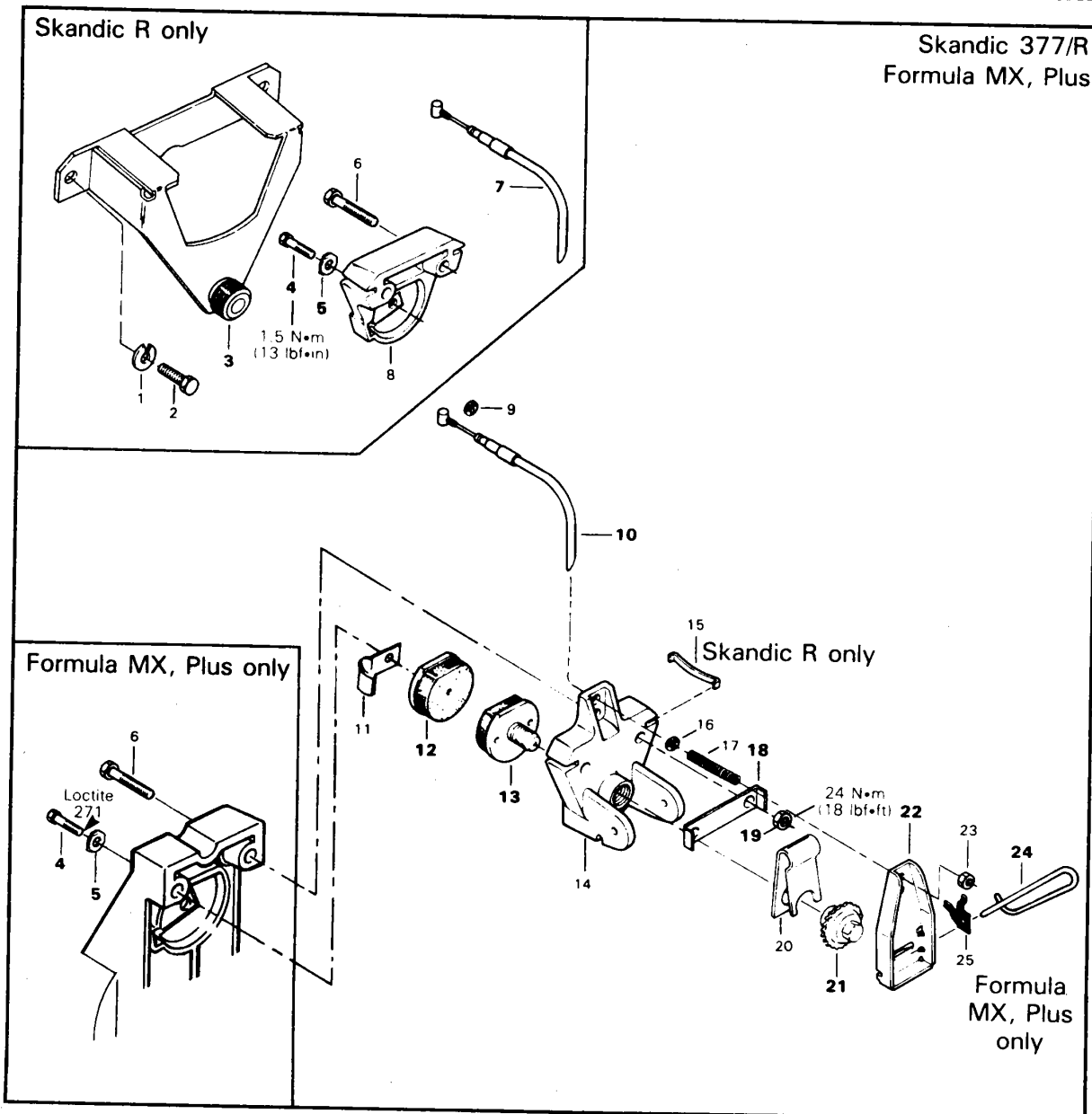
○ **NOTE:** On Alpine models, it may be necessary to change brake light switch support position to obtain recommended gap between lever and caliper housing.

Brake light switch (Alpine models)

Connect brake light switch and check operation. Adjust if necessary using two (2) adjuster nuts.

Section 03 TRANSMISSION
Sub-section 06 (BRAKE)

SELF ADJUSTING DISC BRAKE



Section 03 TRANSMISSION

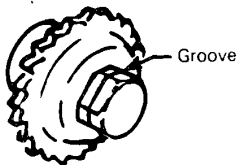
Sub-section 06 (BRAKE)

1. Lock washer M8
2. Cap screw M8 x 1.25 x 16
3. Brake support
4. Cap screw M5 x 80 x 12
5. Tab lock
6. Cap screw M8 x 1.25 x 50
7. Parking brake cable and housing
8. Inner caliper half
9. Retainer ring
10. Service brake cable and housing
11. Brake lining wear Warner
12. Inner shoe (fixed)
13. Outer shoe (sliding)
14. Outer caliper half
15. Caliper support spring
16. Snap ring
17. Spring
18. Tab lock
19. Elastic stop nut M8 x 1.25
20. Release spring
21. Ratchet wheel
22. Brake lever
23. Elastic stop nut 10-24
24. Pin
25. Pawl

RATCHET WHEEL

▼ **CAUTION:** Similar ratchet wheels on caliper type disc brakes may have metric or standard threads. Identify with the following illustration.

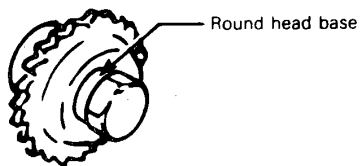
Standard thread ratchet wheel



A009003002

Hexagonal bolt head with groove.

Metric thread ratchet wheel



A009003003

Hexagonal head with round head base.

REMOVAL

Brake assembly

The splitted caliper type brake must be removed from vehicle as an assembly. Proceed as follows.

Skandic R

3, Brake support

Remove support bolts and slide assembly from disc.

7,10, Brake cables

Disconnect from brake lever.

03-06-10

Speedometer cable

Disconnect front angle drive.

Pull brake assembly out of vehicle.

Formula MX, Plus

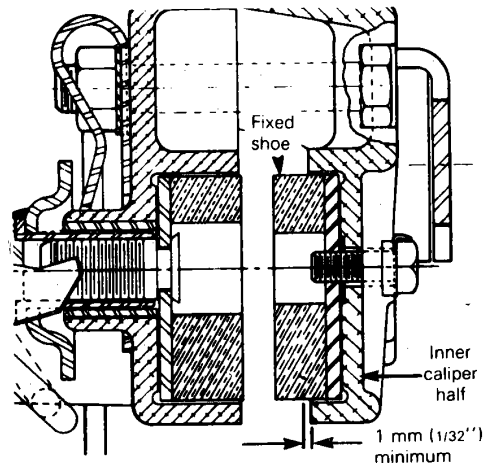
6,18,19, Bolt, tab lock & nut

Unfold tab lock and unscrew the two nuts. Remove bolts and caliper ass'y from the disc. Disconnect brake cable.

INSPECTION

12,13, Brake lining thickness

Brake linings are servicable when fixed shoe projects a minimum of 1 mm (1/32'') from caliper.



A015003003

ASSEMBLY

21, Ratchet wheel

Apply low temperature grease on threads and spring seat prior to installation. Fully tighten then back off 1/2 turn.

4,5, Inner shoe bolt & tab lock

Tighten bolt to 1.5 N•m (13 lbf•in) and secure with tab lock. (Loctite 271 on Formula).

18,19, Caliper ass'y nut & tab lock

With the release spring in position, slide the tab lock between the spring inner faces and secure the two caliper halves with nuts. Torque nuts to 24 N•m (18 lbf•ft). Caliper half side slots must align.

Bend tab lock over float surface of nuts.

24, Pin

Must be assembled from the pawl side and locked in the caliper casting recess to prevent from rotation.

INSTALLATION

To install brake assembly, reverse removal procedure and pay attention to the following:

◆ **WARNING:** Avoid getting oil on brake shoe. Do not lubricate or apply anti-rust or anti-freeze solutions into cable.

Caliper assembly

Slide caliper ass'y with springs onto its support then secure support to vehicle. (Skandic R).

Activate lever by hand until ratchet click is no longer heard.

Secure brake cable housing to lever, slide spring over cable then attach cable to housing with adjuster nut.

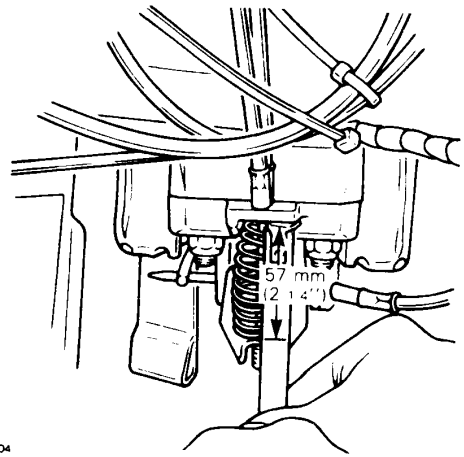
7,10, Brake cables (Skandic R)

The service brake cable must be installed in the lever upper hole.

ADJUSTMENT

Lever travel

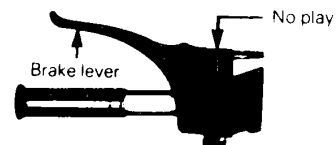
To insure optimum self adjusting function of the ratchet, screw the adjuster nut until there is a gap of 57 mm \pm 3 (2 1/4 \pm 1/8") between lever and cable support lug.



A015003004

Brake control lever

Using adjuster nut, screw until there is no free play between the brake lever and its housing. With brake unapplied, brake shoes must not restrict disc movement.



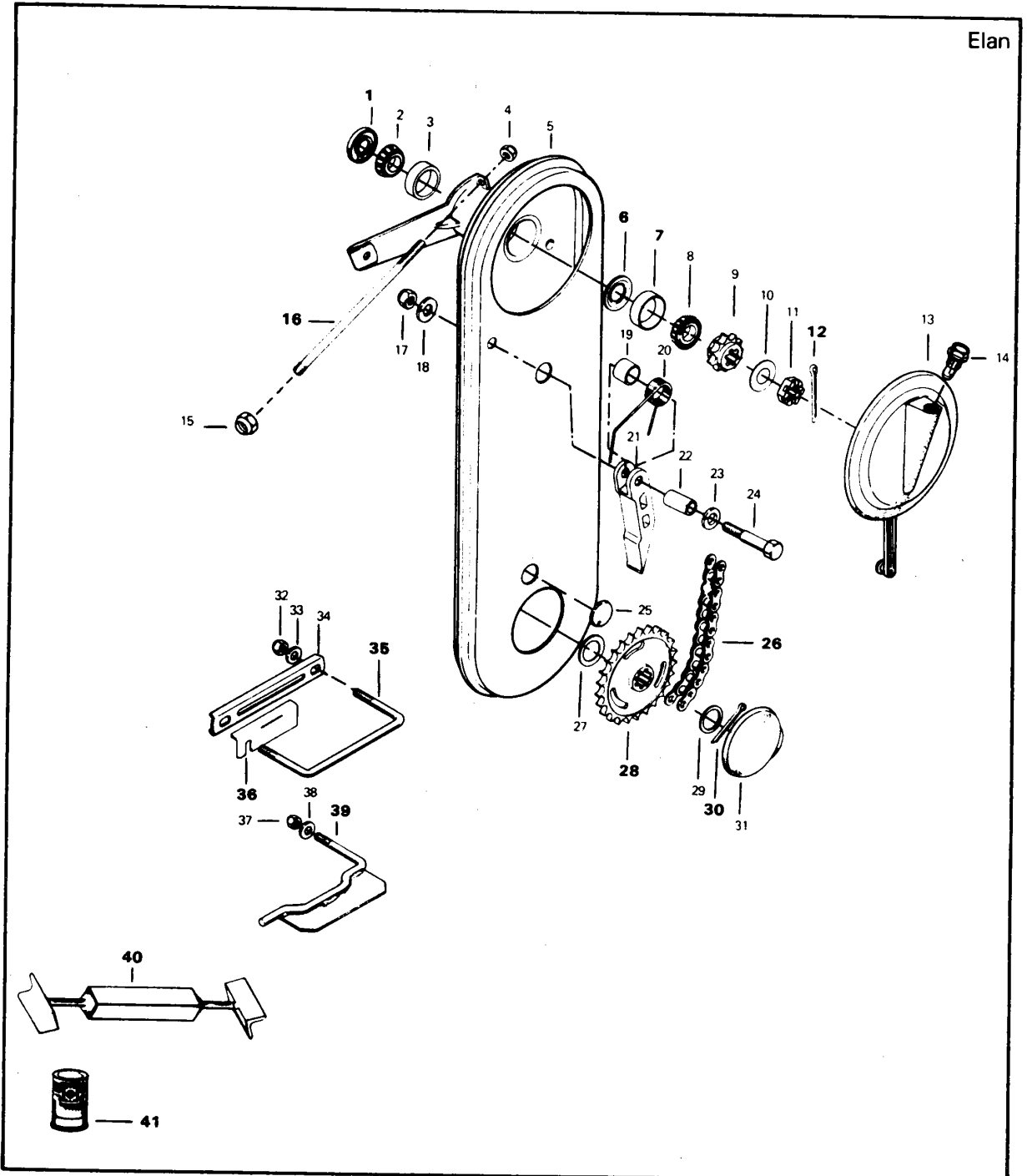
A015003005



Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

CHAINCASE

Elan



Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

1. Seal
2. Bearing cone
3. Bearing cup
4. Elastic stop nut 5/16-18
5. Chaincase
6. Oil deflector
7. Bearing cup
8. Bearing cone
9. Sprocket 10 teeth
10. Washer
11. Castellated nut 1/2-20
12. Cotter pin
13. Inspection cover
14. Breather
15. Elastic stop nut 5/16-18
16. Threaded rod
17. Elastic stop nut 1/4-20
18. Fiber washer
19. Spacer
20. Spring
21. Chain tensioner
22. Bushing
23. Fiber washer
24. Hexagonal cap screw 1/4-20 x 1 3/4
25. Chain case plug
26. Chain
27. Spacer
28. Sprocket 25 teeth
29. Spacer
30. Cotter pin
31. Access plug
32. Elastic stop nut 5/16-18
33. Flat washer
34. Spacer plate
35. U-clamp
36. Shim
37. Elastic stop nut 5/16-18
38. Flat washer
39. Bracket
40. Drive axle holder
41. Chaincase oil 200 ml (7 oz)

REMOVAL

Chaincase & driven pulley assembly

Chaincase and driven pulley can be removed from vehicle as a complete assembly. Proceed as follows.
Remove tool box, pulley guard, drive belt.

26, Drive chain

Remove access plug (upper) and release chain tension.

41, Chaincase oil

Pry lower oil seal from chaincase and drain oil.

Brake cable

Disconnect from chaincase.

30, Lower sprocket cotter pin

Pry out lower access plug, remove cotter pin and spacer.

16, Threaded rod

Disconnect from chaincase.

35,39, U-clamp & bracket

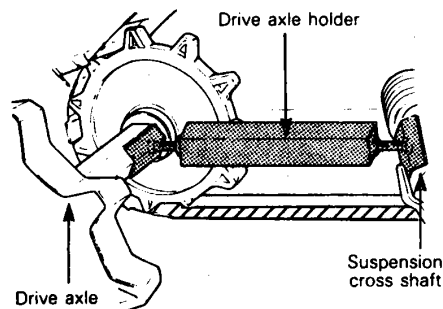
From the inner side of the frame, remove the nut securing chaincase lower bracket and remove bracket. Remove the nuts, washers and u-clamp holding the chaincase to frame.

36, Shims

Remove and save for installation.

40, Drive axle holder

Release track tension or use drive axle holder P/N 529 0051 00.

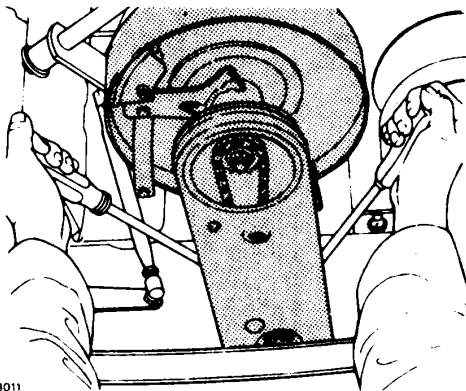


A004003002

Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

Chaincase & driven pulley assembly

Using two (2) large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.



A002003011

DISASSEMBLY

Disassemble driven pulley from chaincase. Refer to Driven pulley 03-04.

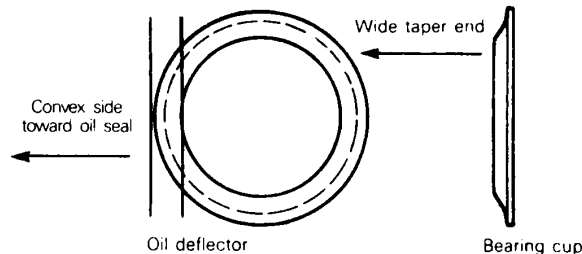
INSPECTION

Visually inspect chain for cracked, damaged or missing link rollers. Inspect for defective bearing cones, bearing cups and oil retainer ring. Inspect sprockets for damage, wear.

ASSEMBLY

6,7, Oil deflector & bearing cup

Position oil retainer ring then sit bearing cup in chaincase aperture. Cup must be seated so that wide taper end is facing oil deflector.



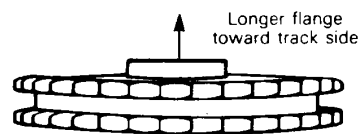
A002003012

1, Oil seal

Using an appropriate pusher, press oil seal into chaincase hub. Oil seal must sit flush with case hub edge.

28, Sprocket

Place lower sprocket with longer flange toward track side of chaincase. (For proper sprocket and chain use, see Technical Data.)



A002003013

INSTALLATION

To install chaincase driven pulley assembly, reverse removal procedure and pay attention to the following.

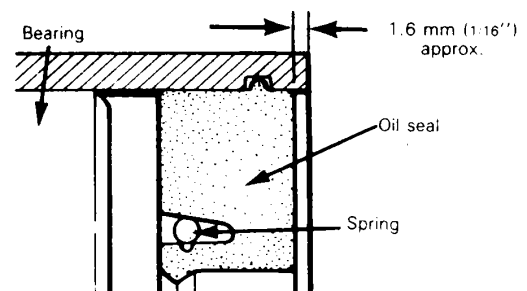
12,30, Cotter pins

Install new cotter pins.

Lower oil seal

Install oil seal into chaincase flange.

NOTE: A gap of approximately 1.6 mm (1/16") should exist between the end of chaincase flange and oil seal.



A002003014

41, Chaincase oil

Fill with 200 ml (7 oz) of chaincase oil.

Pour Bombardier chaincase oil into chaincase until it reaches 13 mm (1/2") lower than the oil level plug.

Section 03 TRANSMISSION**Sub-section 07 (CHAINCASE)**

ADJUSTMENT**Pulley alignment**

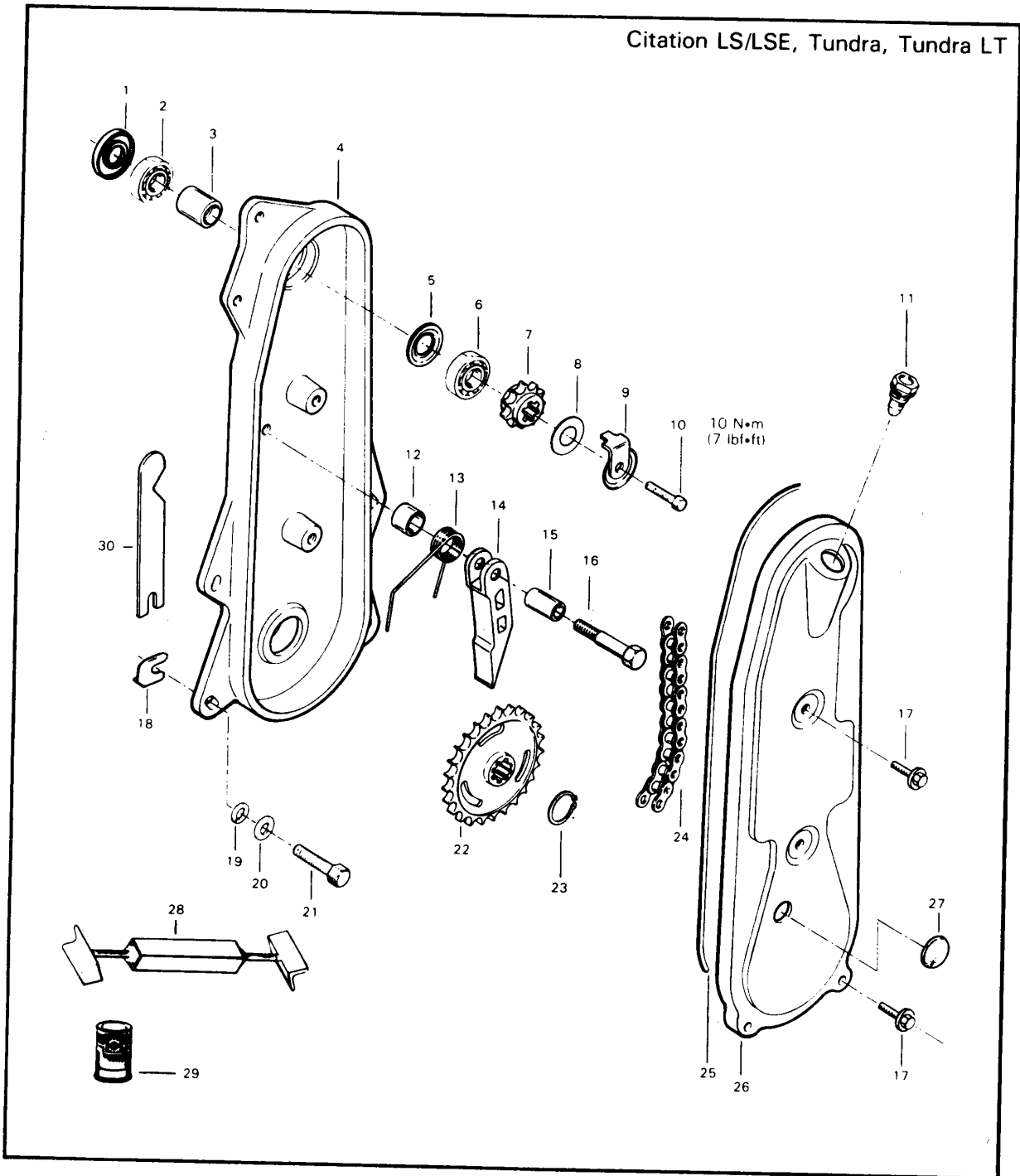
Refer to "Pulley distance and alignment" sub-section 05.

Brake operation & brake light

Refer to "Brake" sub-section 06.

Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

Citation LS/LSE, Tundra, Tundra LT



Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

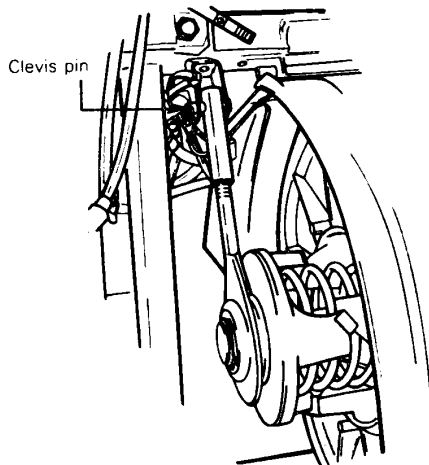
1. Oil seal
2. Ball bearing
3. Spacer
4. Chaincase
5. Oil retainer ring
6. Ball bearing
7. Single sprocket
8. Washer
9. Lock tab
10. Cap screw M6 x 1 x 20
11. Breather
12. Spacer
13. Spring
14. Chain tensioner
15. Bushing

16. Cap screw M6 x 1 x 40
17. Taptite screw M6 x 1 x 16
18. Shim
19. Flat washer 8.4 mm (except Citation LSE)
20. Lock washer 8 mm
21. Cap screw M8 x 1.25 x 25
22. Single sprocket
23. Circlip
24. Driving chain
25. Sealing strip
26. Chaincase cover
27. Chaincase plug
28. Drive axle holder
29. Chaincase oil 200 ml (7 oz)
30. Shim (Citation LSE only)

REMOVAL

Chaincase and driven pulley can be removed from the vehicle as an assembly.

Remove clevis pin from the bracket.



A004003010

○ **NOTE:** On Citation LSE disconnect and remove battery from its rack.

▼ **CAUTION:** Be careful not to ground positive terminal with the chassis. Always disconnect black negative cable first.

26, Chaincase cover

Remove and drain oil.

Drive axle oil seal

Pry out from chaincase.

7,22,24, Sprockets & chain

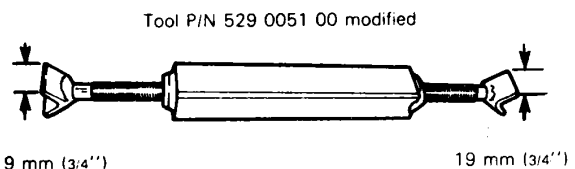
Unscrew the bolt on the upper sprocket and remove circlip on the bottom one. Remove chain and sprockets simultaneously.

19,20,21, Washers & cap screws

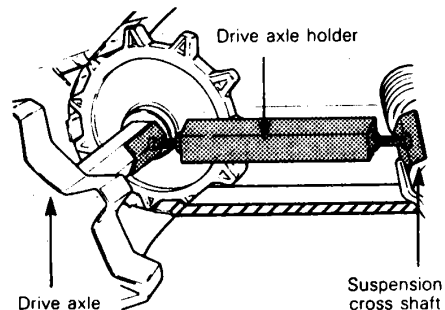
Remove cap screws securing chaincase to frame.

28, Drive axle holder

Remove track tension on drive axle using tool P/N 529 0051 00 (reduce tool ends to 19 mm (3/4'') wide) and pull chaincase out of the vehicle.



A004003011



A004003002

Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Inspect for defective bearing, sprockets.

INSTALLATION

Reverse removal procedure. Pay particular attention to the following.

10, Cap screw

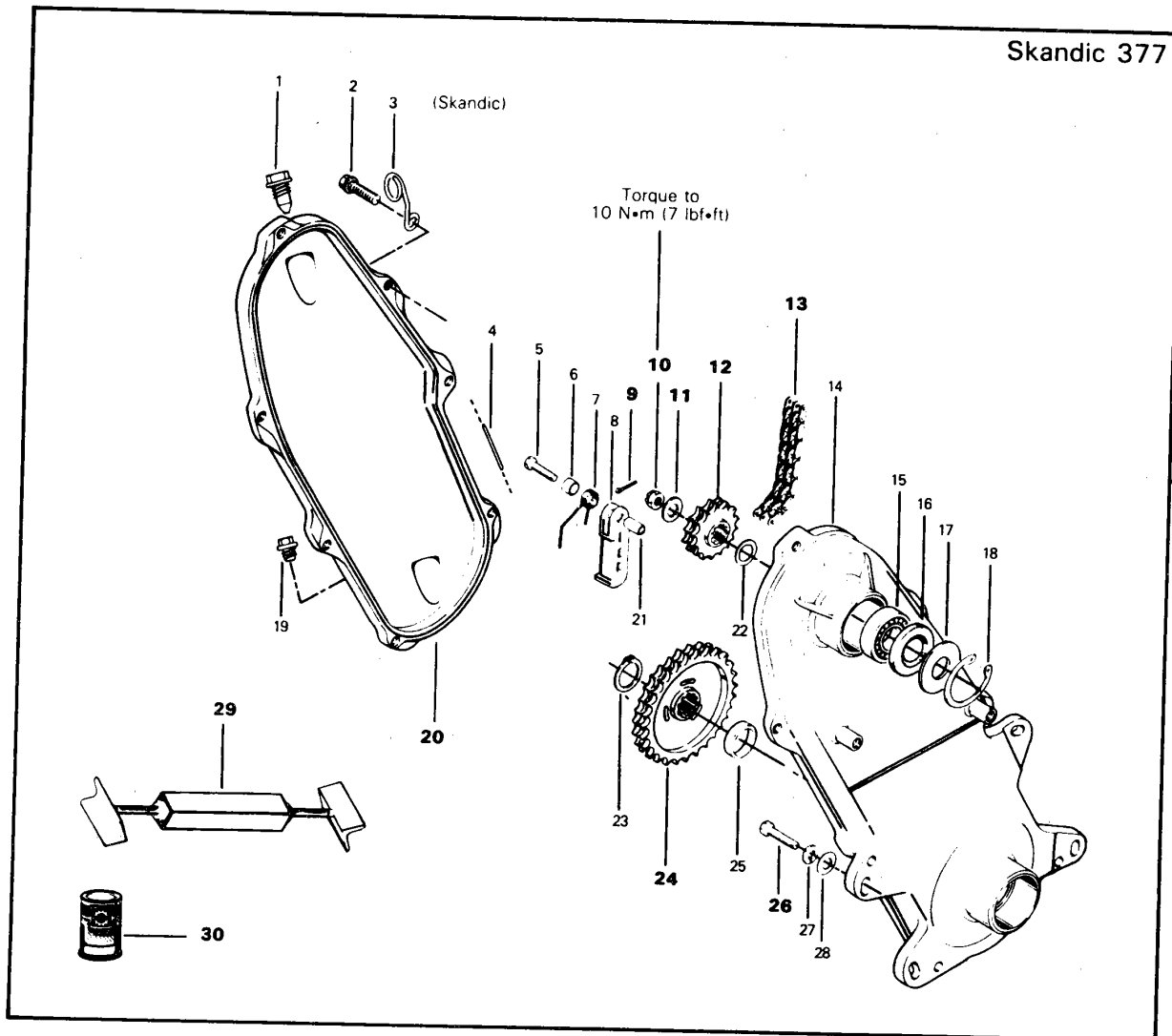
Torque to 10 N•m (7 lbf•ft).

29, Chaincase oil

Refill with chaincase oil (200 ml/7 fl.oz.).

Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

Skandic 377



NOTE: Skandic 377R is equipped with a gearbox.
 See section 03-08 for more details.

- 1. Breather
- 2. Washer head tapite screw
- 3. Rope guide
- 4. O-ring
- 5. Cap screw
- 6. Spacer
- 7. Spring
- 8. Chain tensioner
- 9. Cotter pin
- 10. Castellated nut
- 11. Spring washer
- 12. Sprocket
- 13. Driving chain
- 14. Chaincase
- 15. Bearing

- 16. Seal
- 17. Stopper spacer
- 18. Snap ring
- 19. Plug
- 20. Chaincase cover
- 21. Bushing
- 22. Spacer
- 23. Snap ring
- 24. Sprocket
- 25. Spacer
- 26. Cap screw M8 x 25
- 27. Lock washer 8 mm
- 28. Flat washer 8 mm
- 29. Drive axle holder
- 30. Chaincase oil 200 ml (7 oz)

Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

REMOVAL

To remove chaincase from vehicle, proceed as follows:

20, Chaincase cover

Remove and drain oil.

Drive axle oil seal

Pry out from chaincase.

12,13,24, Sprockets & chain

Remove from chaincase

26, Chaincase retaining bolts

Remove bolts and nuts securing chaincase to frame.

29, Drive axle holder

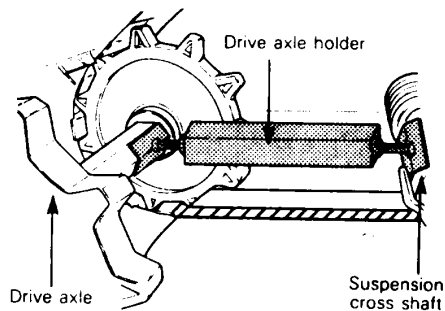
Remove track tension on drive axle using tool P/N 529 0051 00 and pull chaincase out of vehicle.

9, Cotter pin

Install a new cotter pin.

30, Chaincase oil

Refill with chaincase oil (200 ml/7 fl.oz.).



A004003002

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Inspect for defective bearing, sprockets.

INSTALLATION

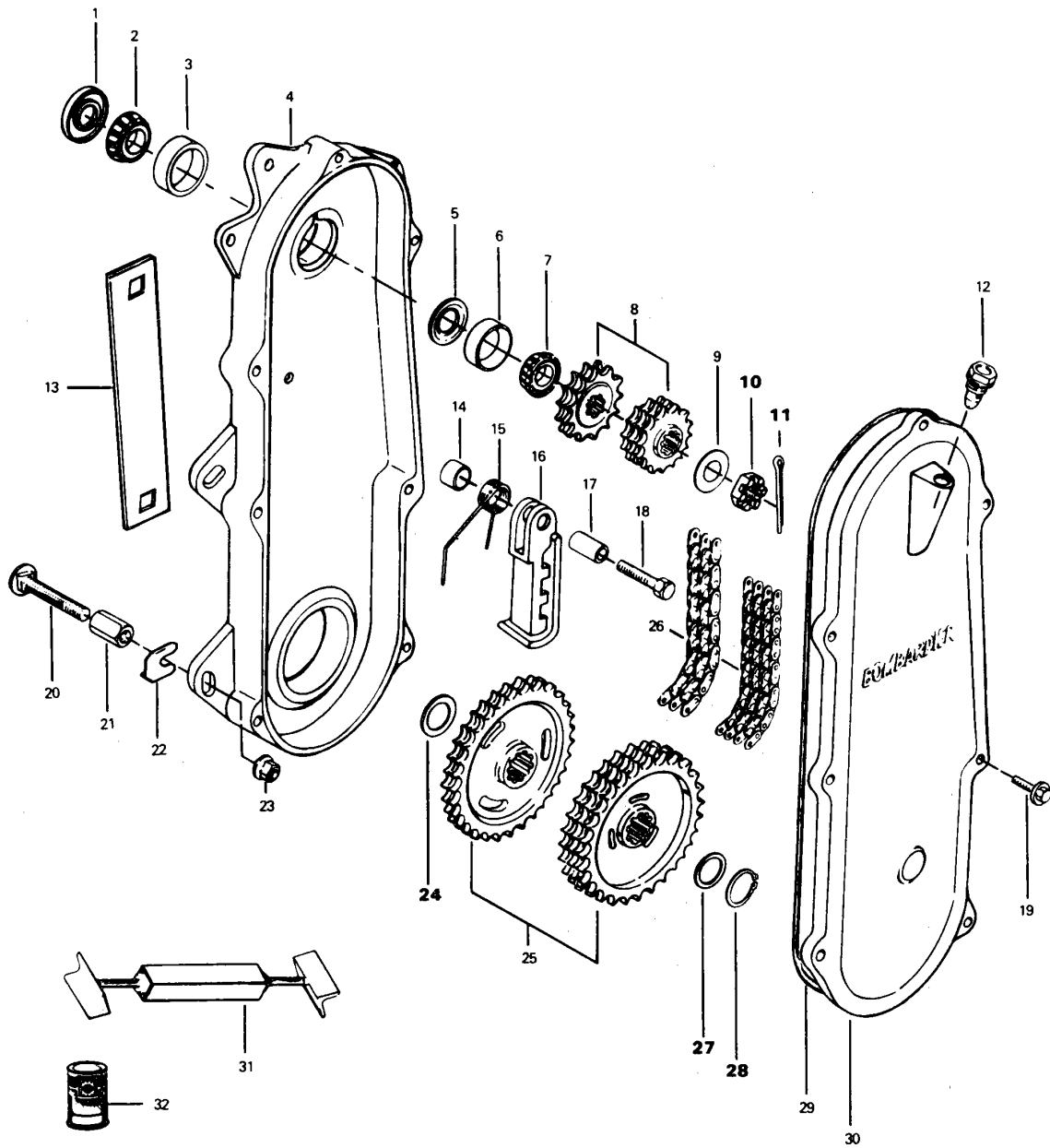
Reverse removal procedure. Pay particular attention the following.

10,11, Castellated nut & spring washer

Install spring washer and torque nut to 10 N•m (7 lbf•ft).

Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

All Safari, Formula SS, Formula SP, Mirage III



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
9. Spring washer
10. Castellated nut
11. Cotter pin
12. Breather
13. Reinforcement
14. Spacer
15. Spring
16. Chain tensioner


17. Bushing
 18. Screw
 19. Tapite screw M6 x 30 or 14-20 x 1"
 20. Carriage bolt M8 x 1.25 x 55
 21. Threaded spacer
 22. Shim
 23. Elastic stop nut M8 x 1.25
 24. Spacer (thicker)
 25. Lower sprocket
 26. Drive chain
 27. Spacer thinner
 28. Snap ring
 29. O-ring
 30. Chaincase cover
 31. Drive axle holder
 32. Chaincase oil 200 ml (7 oz)
-

REMOVAL

Chaincase and driven pulley can be removed from vehicle as an assembly. Refer to Driven pulley sub-section 04, see the corresponding models.

DISASSEMBLY

To disassemble chaincase from driven pulley, press pulley shaft out of chaincase or knock with a plastic hammer.

 **NOTE:** On Safari 377, Formula SP and Mirage III models, serial nos. 3609 03336 to 3609 04402, 3614 00003 to 3614 01547, 5147 00003 to 5147 00502 the tapite screws are standard instead of metric type.

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Inspect for defective bearing, sprockets, etc.

INSTALLATION

Reverse removal procedure and pay attention to the following:

24,27, Spacers

Install the thicker spacer on the chaincase side of the sprocket.


10, Castellated nut

Torque to 12-17 N•m (9-12 lbf•ft). Loosen the nut and retorque to a maximum value of 10-15 N•m (7-11 lbf•ft).

11, Cotter pin

Install a new cotter pin.

28, Snap ring

 **CAUTION:** It is of the utmost importance to install the snap ring otherwise damage to the chaincase components may occur.

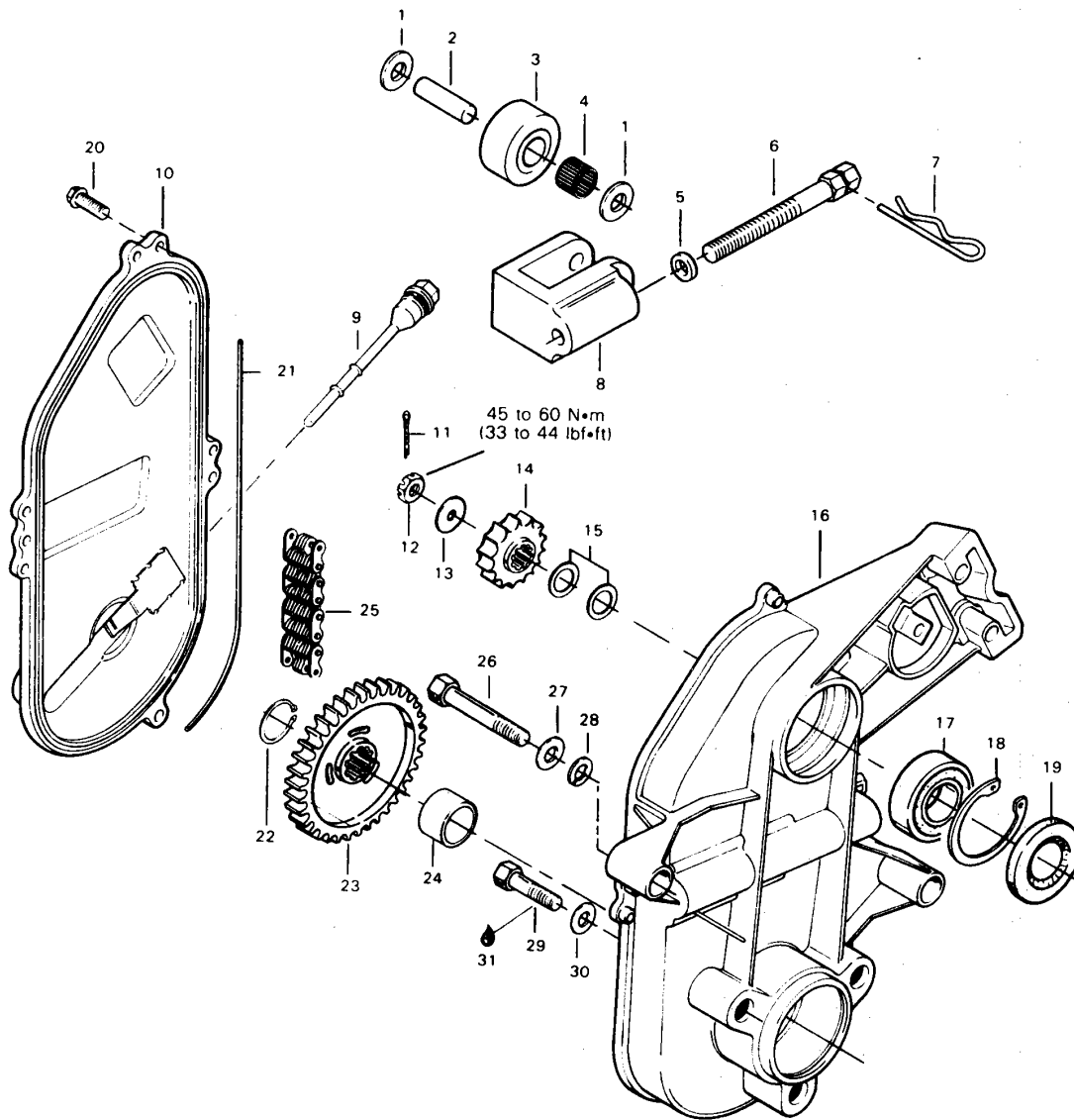
ADJUSTMENT

Pulley alignment

For pulley distance and adjustment, refer to sub-section 05.

Section 03 TRANSMISSION
Sub-section 07 (CHAINCASE)

Formula MX, Formula PLUS




Section 03 TRANSMISSION

Sub-section 07 (CHAINCASE)

1. Shim
2. Tensioner shaft
3. Roller
4. Needle bearing
5. Brass washer
6. Tensioner adjustment screw
7. Hair pin
8. Chain tensioner
9. Filler cap
10. Chaincase cover
11. Cotter pin
12. Castellated nut
13. Washer
14. 26 teeth sprocket
15. Shim
16. Chaincase
17. Ball bearing
18. Retaining ring
19. Seal
20. Taprite screw M6 x 30
21. O-ring
22. Snap ring
23. Shim
24. Shim
25. Drive chain
26. Cap screw
27. Flat washer 10.5 mm
28. Spring lock washer
29. Cap screw M10 x 20
30. Brass washer
31. Loctite 242

REMOVAL

 **NOTE:** Release track tension before attempting to remove chaincase.

To remove chaincase proceed as follows:

6,7,8, Adjusting screw, hair pin & chain tensioner

Remove hair pin. Release drive chain tension by unscrewing tensioner adjustment screw.

10,20, Chaincase cover & screws

Drain oil by removing chaincase cover.

11,12,13,14,15,22,23,24,25, Sprockets & drive chain

Remove cotter pin, nut, washer retaining upper sprocket and circlip retaining lower sprocket. Pull sprockets and drive chain simultaneously. Remove shims

26,27,28,29,30, Cap screw & washers

Remove cap screws (5). Three (3) cap screws are behind the lower sprocket location.

Caliper retaining bolts and nuts

Unscrew two (2) nuts securing caliper to chaincase. Remove the two (2) bolts.

Drive axle oil seal

Pry out from chaincase.

Pull chaincase from drive axle and countershaft.

INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Inspect for defective bearing, sprocket etc.

INSTALLATION

Reverse removal procedure and pay attention to the following:

Oil seal

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the case hub edge.


14,23, Sprockets

Position the sprockets with the writing facing the chaincase cover.

12, Upper sprocket castellated nut

Torque to 45 to 60 N•m (33 to 44 lbf•ft).

Snap ring

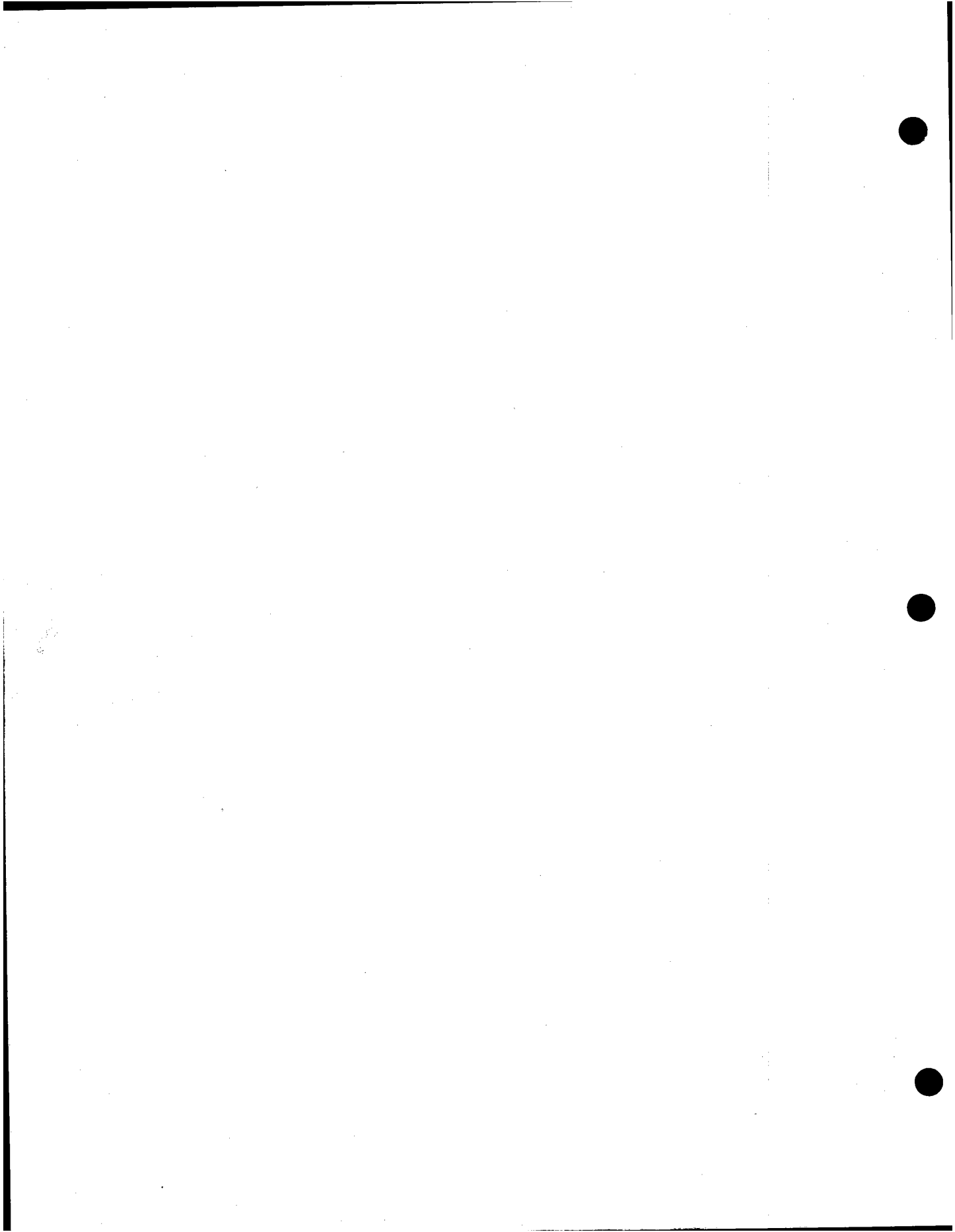
 **CAUTION:** It is of the utmost importance to install the snap ring otherwise damage to the chaincase components may occur.

Drive chain adjustment

Drive chain deflection: 6 mm (1/4")

Measure deflection on half distance between sprockets. Adjust with the tension adjuster screw.

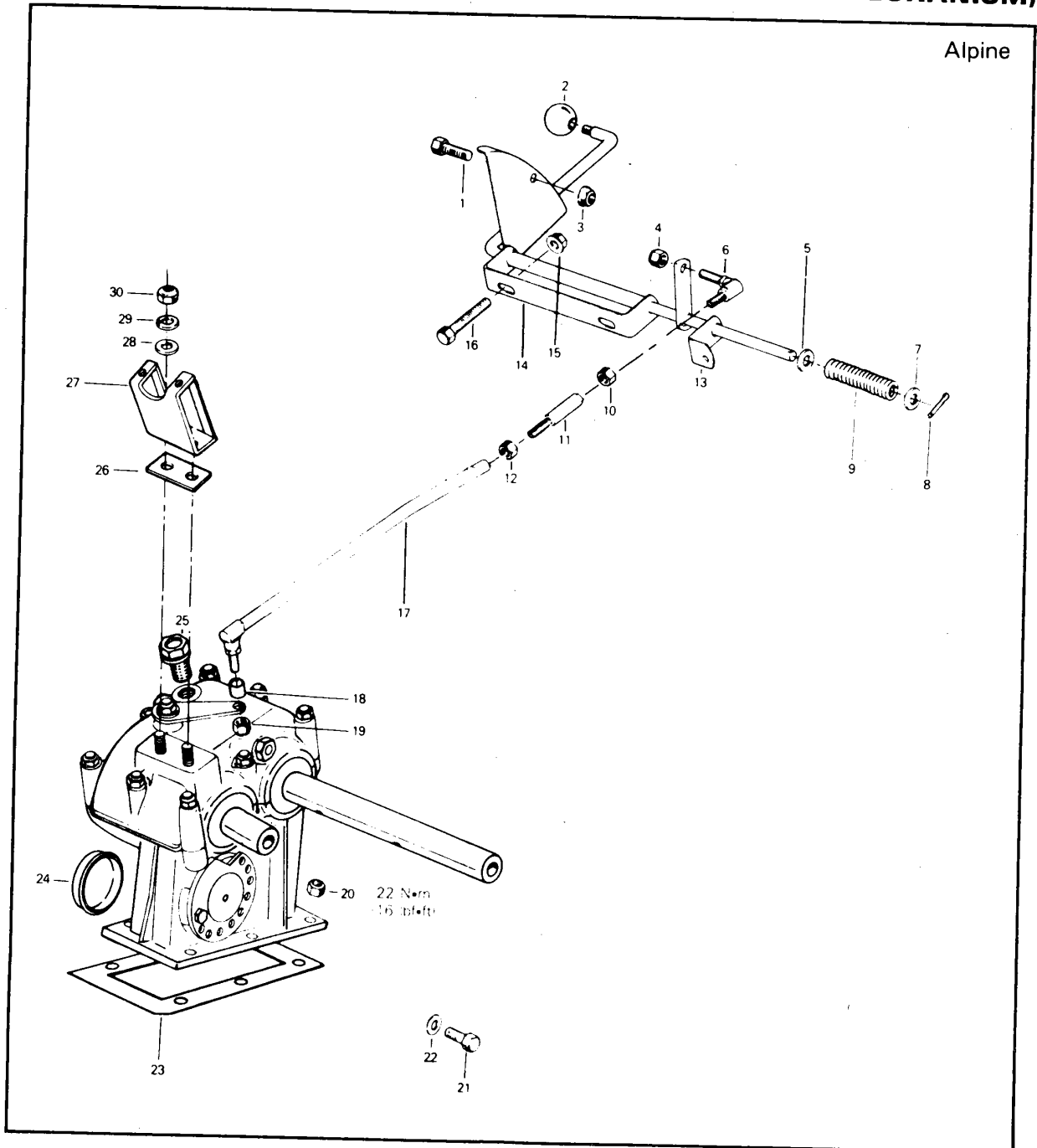
Install chaincase cover and fill chaincase with 256 ml (9 oz) of new chaincase oil.



GEAR BOX

3 SPEEDS GEAR BOX (SHIFTER MECHANISM)

Alpine



Section 03 TRANSMISSION

Sub-section 08 (GEAR BOX)

- | | |
|-----------------------------------|------------------------------|
| 1. Cap screw 1/4-20 x 3/4 | 16. Bolt 1/4-20 x 1 1/4 |
| 2. Handle | 17. Transmission rod |
| 3. Elastic stop nut 1/4-20 | 18. Spacer |
| 4. Elastic stop nut 3/8 x 24 | 19. Elastic stop nut 3/8-24 |
| 5. Flat washer | 20. Elastic stop nut 5/16-24 |
| 6. Tie rod end (R.H.) | 21. Drain plug |
| 7. Flat washer | 22. Flat washer |
| 8. Cotter pin | 23. Gasket |
| 9. Spring | 24. Rubber cover |
| 10. Jam nut 3/8-24 (R.H. threads) | 25. Breather |
| 11. Turnbuckle | 26. Spacer |
| 12. Jam nut 3/8-24 (L.H. threads) | 27. Steering bracket |
| 13. Bracket | 28. Flat washer |
| 14. Transmission lever | 29. Lock washer |
| 15. Elastic stop nut 1/4 x 20 | 30. Nut M10 |
-

INSTALLATION

At assembly, pay attention to the following.

23, Gasket

Ensure the gasket is properly positioned.

20, Gearbox retaining nuts

Torque to 22 N•m (16 lbf•ft).

8, Cotter pin

Reinstall a new cotter pin.

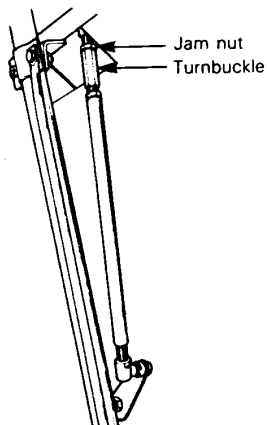
ADJUSTMENT

10,11, Turnbuckle

With gearbox lever properly engaged in gear, adjust so that shifter lever fits correctly in corresponding gear groove.

To adjust, loosen jam nut and adjust turnbuckle as required.

Retighten jam nut.



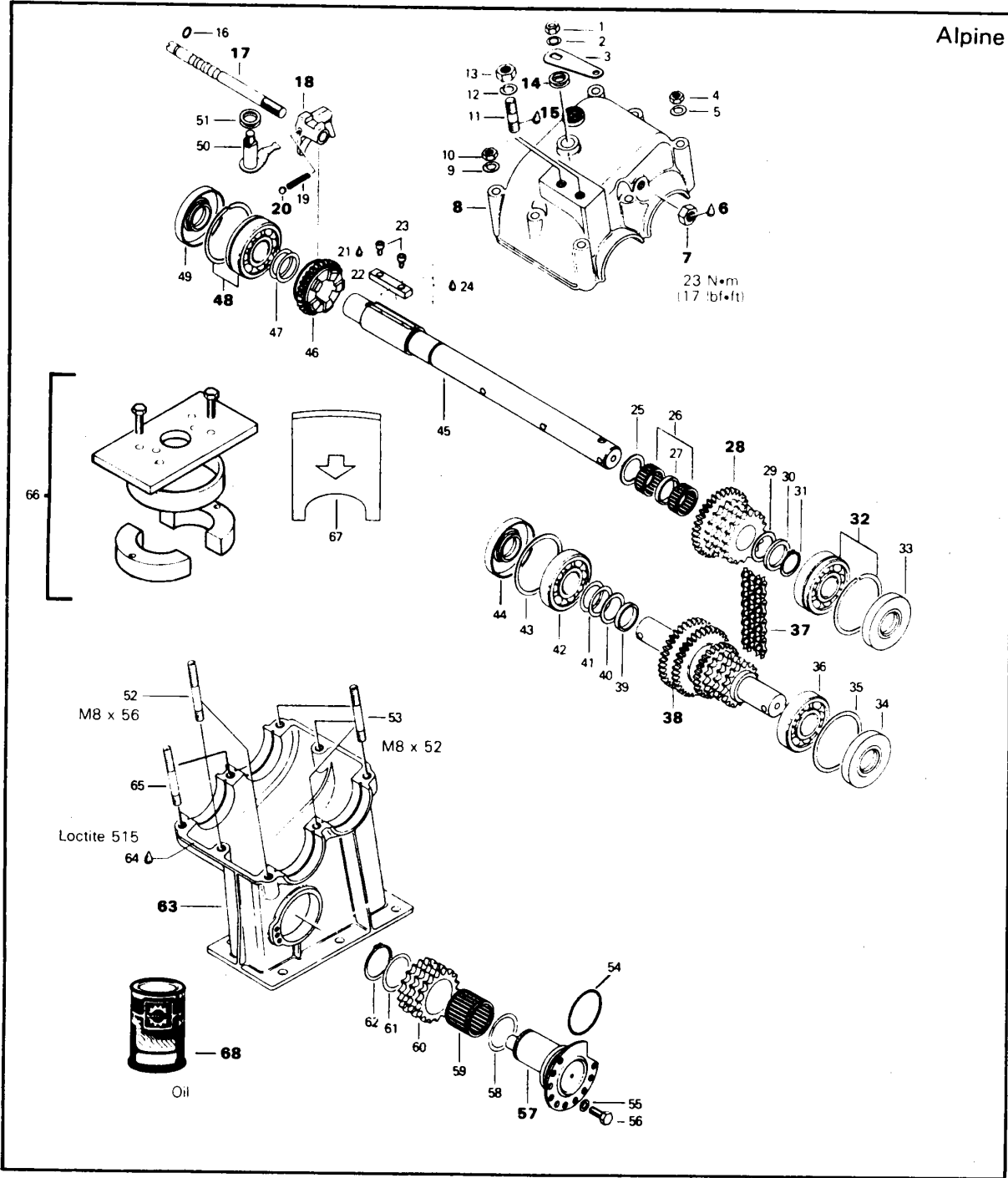
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03-08-2

Section 03 TRANSMISSION
Sub-section 08 (GEAR BOX)

3 SPEEDS GEAR BOX

Alpine



Section 03 TRANSMISSION

Sub-section 08 (GEAR BOX)

1. Lock nut M8
2. Washer
3. Gear change lever
4. Hexagonal nut M8
5. Lock washer
6. Loctite 242 (blue)
7. Hexagonal nut M10
8. Transmission cover
9. Lock washer
10. Hexagonal nut M8
11. Stud M10 x 23
12. Lock washer
13. Hexagonal nut M10
14. Shim
15. Loctite 242 (blue)
16. O-ring
17. Index rod
18. Gear change fork
19. Gear change fork spring
20. Steel ball (1/4")
21. Loctite 271 (red)
22. Key
23. Allen cap screw M4 x 8
24. Loctite 271 (red)
25. Washer
26. Needle bearing
27. Distance sleeve
28. 19 tooth shift sprocket
29. Shim 25.5/34/1
30. Distance ring
31. Snap ring
32. Ball bearing 6205
33. Seal
34. Seal
35. Washer
36. Ball bearing 6005
37. 90 links triple roller chain
38. Layshaft ass'y
39. Distance sleeve
40. Shim 25.5/34/1
41. Shim
42. Ball bearing 6005
43. Washer
44. Seal
45. Drive shaft
46. 23 teeth shift sprocket
47. Shim
48. Ball bearing 6205
49. Seal
50. Gear change shaft
51. Shim
52. Stud M8 x 56
53. Stud M8 x 52
54. O-ring
55. Lock washer
56. Cap screw M6 x 14
57. Tensioner axle
58. Washer
59. Needle bearing
60. 18 teeth tensioner sprocket
61. Washer
62. Snap ring
63. Transmission housing
64. Loctite 515 (violet)
65. Stud M8 x 52
66. Bearing puller ass'y
67. Chain alignment tool
68. Chaincase oil 450 ml (16 oz)

REMOVAL

First remove the following

- hood, pulley guard and drive belt
- exhaust manifold
- brake assembly
- shifter mechanism
- upper column retaining brace
- lower steering bracket from gearbox and slacken upper bracket.

57, Tensioner

Release chain tension.

Track tension removal

Release track tension by unlocking link plate springs. Insert a pry bar between structural members of center bogie wheel sets and pry sets upward to reverse installation position. Reverse front then rear bogie wheel sets. Remove rear axles.

Oil seals

Remove oil seals from end bearing housings and center frame (to drain the oil).

End bearing housing

Remove end bearing housings. (Pry out housings with two (2) screwdrivers inserted between housing and frame).

Drive axles

Release drive axle sprocket teeth from track notches while at the same time, pulling the drive axle towards end bearing side of frame. (This action will disengage the axle splines from the lower sprocket of the gearbox).

Allow drive axles to remain within the tracks.

63, Gear box

Remove gearbox and gasket from frame.

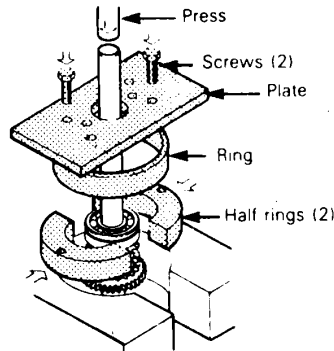
Section 03 TRANSMISSION
Sub-section 08 (GEAR BOX)

DISASSEMBLY

32,48, Bearings

Use the following tools and proceed as follows:
 Remove the bearings from the drive shaft using the following tools:

- 1 hydraulic press
- 2 ring halves (P/N 420 876 330)
- 1 ring (P/N 420 977 480)
- 1 plate (P/N 420 977 700)
- 2 hexagonal screws M8 x 25 (P/N 420 240 275)



A017003006

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, Transmission housing & cover

Clean mating surfaces of Loctite residue.

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

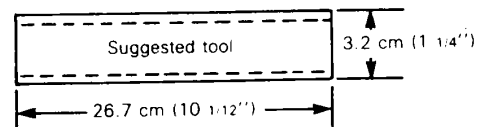
Reinstall the layshaft components on the layshaft.
 Compensate the distance on the layshaft up to a clearance of 0.1 to 0.3 mm (.003 to .011'') and assemble.

45, Drive shaft & components

To reinstall the drive shaft components on the drive shaft, proceed as follows:

- Install the driven pulley shaft side bearing (P/N 420 432 040) on the shaft using the following suggested tool:

- cylindrical steel tube.



Material: cylindrical steel tube
 32 mm (1 1/4'') O.D.
 26.8 mm (1.055'') I.D.

A017003007

- 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 420 944 470)
- 25.5/34/0.3 (P/N 420 944 471)
- 25.5/34/0.5 (P/N 420 944 472)

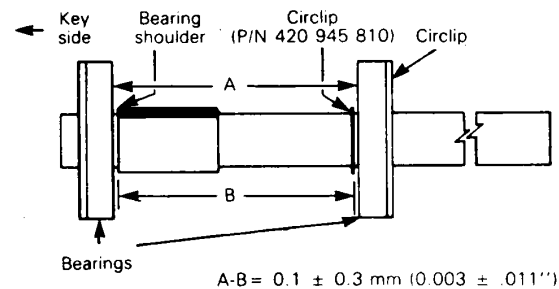
Drive shaft clearance

Place ball bearings with circlips mounted in the transmission housing and measure (A) distance between the bearings.

Measure (B) distance on drive shaft between the circlip (P/N 420 945 810) and the shaft bearing shoulder (key side).

The difference between measures A and B should be 0.1 ± 0.3 mm ($0.003 \pm .011''$).

Refer to the following illustration.



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Section 03 TRANSMISSION

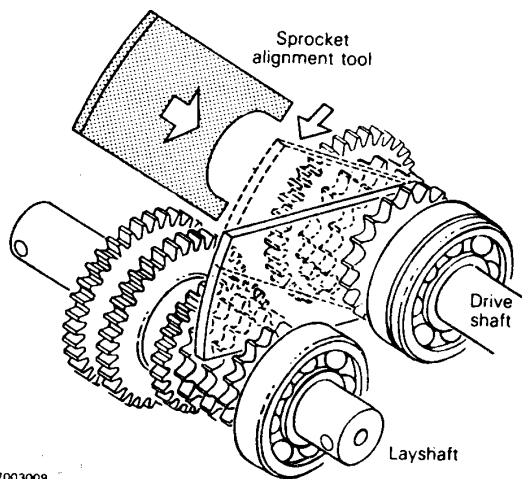
Sub-section 08 (GEAR BOX)

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 and turn it into the corresponding layshaft and tensioner sprockets as illustrated.



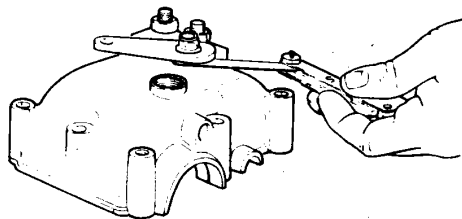
A017003009

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 shims

Lubricate gear change shaft and compensate clearance with shims (required end play 0.3 mm (.011'')). Set 1 shim 0.3 mm on inner side and as many as required on outer side under gear change lever, leaving 0.3 mm (.011'') play.



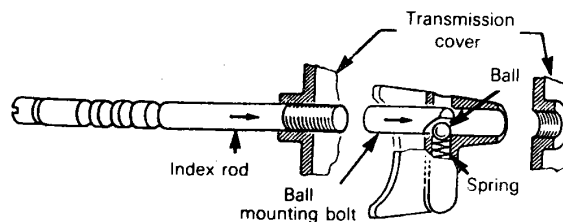
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03-08-6

▼ **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 bolt P/N 420 476 020 then the ball mounting bolt is pushed through with the index rod and the index rod is screwed in.



A017003011

6,7, Index rod lock nut

Apply Loctite 242 to nut and torque to 23 N•m (17 lbf•ft).

37, Chain

○ **NOTE:** If a master link is required, install it in order to have the locking clip facing the driven pulley side with its closed end towards the rotary motion direction when in "FORWARD" position.

8,63, Housing & cover

Set the shift sprocket 23 teeth to reverse position.

Apply Loctite 515 (P/N 413 7027 00) to the transmission housing mating surface and reinstall the transmission cover. Torque the retaining nuts in a criss-cross sequence to: 27 N•m (20 lbf•ft).

▼ **CAUTION:** Before cover installation, ensure that the shifter arm and the 23 teeth shift sprocket are in REVERSE position.

Section 03 TRANSMISSION

Sub-section 08 (GEAR BOX)

INSTALLATION

Gear box assembly

Position gasket on frame studs and place lower sprocket in drive chain. Secure gearbox to frame.

- Set the shifter lever in REVERSE.
- Install the shifter rod to the shifter lever.

Drive axles & seals

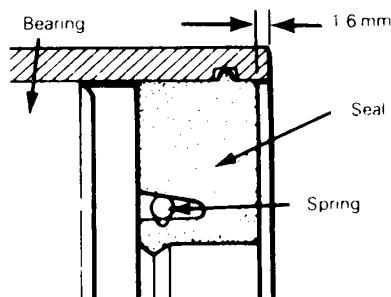
▼ **CAUTION:** Check condition of drive axle seals; replace if necessary.

From the left side of vehicle, place the drive axle within the track. Push the end bearing side of axle through the orifice in left side of frame, then push the splined end of axle into gearbox lower sprocket. Install opposite drive axle.

Press each end bearing housing into frame and over axle bearing. Secure housings to frame.

Install seals.

○ **NOTE:** A gap of approximately 1.6 mm (1/16") should exist between the end of bearing housing and seal.



A017003012

Install rear axle and bogie wheel sets to their original position.

68, Chaincase oil

Fill gearbox with 450 ml (16 Imp. ounces) of Bombardier chaincase oil.

Adjustments

Shifter arm position

Set the shifter lever to NEUTRAL position, turn driven pulley clockwise and adjust shifter arm position using the adjuster screw located at the R.H. transmission cover portion. This will ensure the transmission is perfectly adjusted.

Chain tension

Rotate the tensioner axle 57 to obtain 6 mm (1/4") maximum drive chain free-play.

Pulley alignment

Refer to section 03-05.

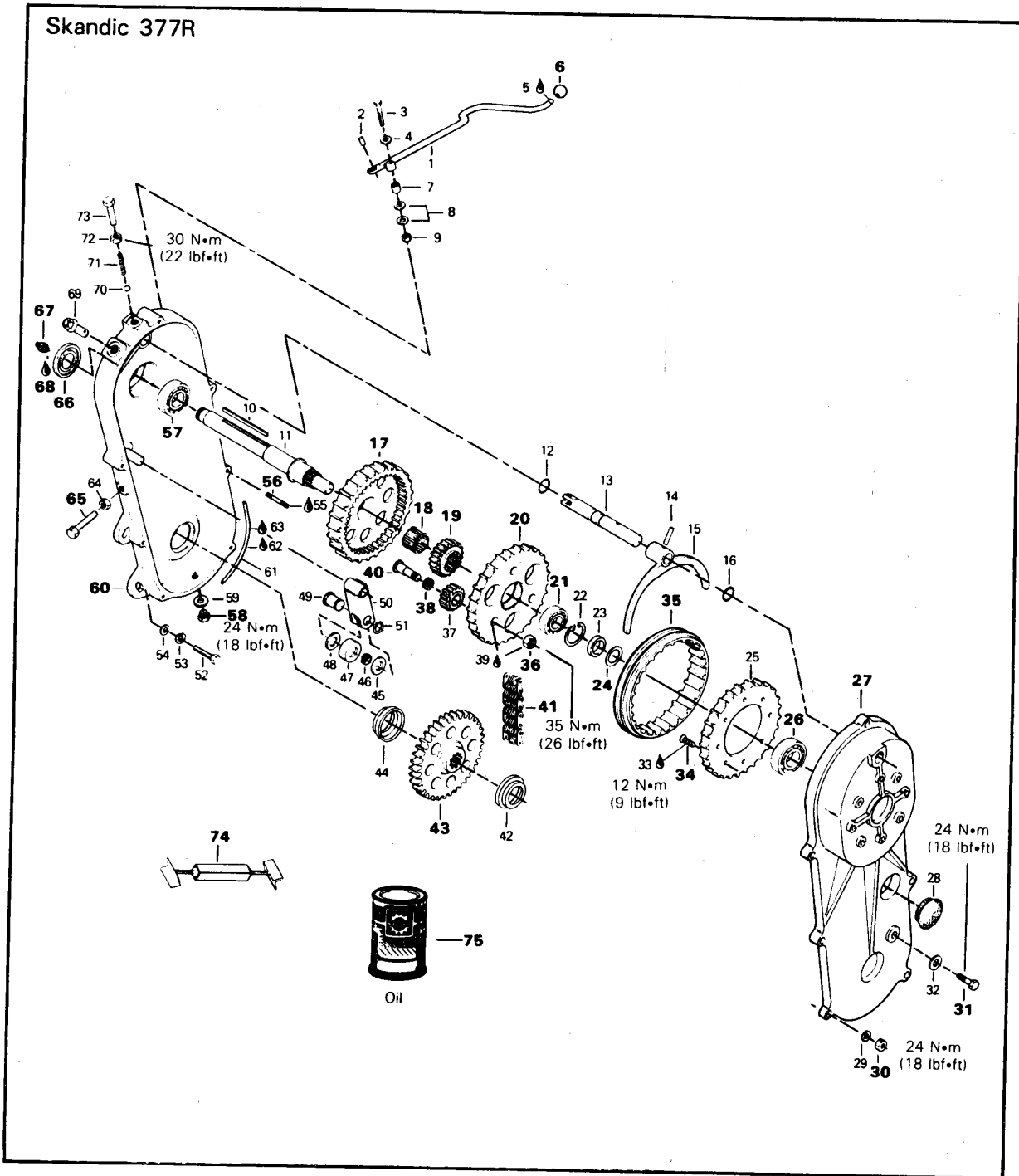
Track tension & alignment

Refer to section 05-05.

Section 03 TRANSMISSION
Sub-section 08 (GEAR BOX)

2 SPEEDS GEARBOX

Skandic 377R



Section 03 TRANSMISSION

Sub-section 08 (GEAR BOX)

1. Transmission lever
2. Pin
3. Cap screw M6 x 1 x 40
4. Washer 6.2 x 20 x 2
5. Loctite 242 (blue)
6. Handle
7. Spacer
8. Washer 6.2 x 20 x 2
9. Flanged elastic stop nut M6 x 1
10. Key
11. Countershaft
12. O-ring
13. Fork shaft
14. Pin
15. Fork
16. O-ring
17. Planetary ring gear
18. Needle bearing
19. Sun gear
20. Planet carrier
21. Ball bearing
22. Snap ring
23. Spacer
24. Shim
25. Blocking wheel (reverse driving hub)
26. Ball bearing
27. Transmission cover
28. Rubber cap
29. Lock washer 8 mm
30. Nut M8 x 1.25
31. Lock screw M8 x 1.25 x 12
32. Lock washer
33. Loctite 262
34. Flat head screw 5/8"
35. Planetary connecting sleeve
36. Nut M10 x 15
37. Planet wheel
38. Needle bearing
39. Loctite 262
40. Planet wheel shaft
41. Chain 92 links
42. Flanged ring
43. Sprocket 40 teeth
44. Flanged ring
45. Spacer
46. Needle bearing
47. Tensioner roller
48. Spacer
49. Tensioner shaft
50. Tensioner
51. Snap ring
52. Cap screw M8 x 1.25 x 25
53. Lock washer 8 mm
54. Washer 8.4 x 17 x 1.6
55. Loctite 262
56. Stud
57. Ball bearing
58. Drain plug M8 x 1.25 x 12
59. Brass washer
60. Transmission case
61. O-ring
62. Loctite 515
63. Locquic primer-N-
64. Nut M10 x 1.5
65. Chain tension adjustment screw
66. Seal
67. Grease fitting
68. Loctite 262
69. Breather plug
70. Ball #8
71. Spring
72. Lock nut M12 x 1.75
73. Screw M12 x 1.75 x 25
74. Drive axle holder
75. Chaincase oil 450 ml (16 oz)

REMOVAL

Gear box and driven pulley can be removed from vehicle as an assembly. Proceed as follows.

Pulley guard & drive belt

Remove from vehicle.

58, Drain plug

Remove and drain oil from gear box (450 ml/16 oz).

1, Transmission lever

Disconnect from fork shaft.

Countershaft support

Disconnect from support clamp by removing hair pin and pin.

65, Chain tension

Remove chain tension and remove transmission cover.

19,20,35, Carrier ass'y, connecting sleeve & sun gear

Pull out of countershaft.

17,41,43, Ring gear, chain & sprocket

Pull out of transmission case.

Drive axle oil seal

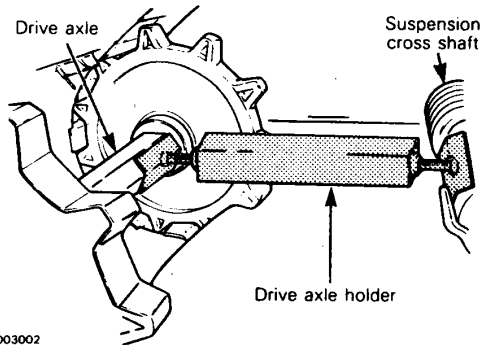
Push seal towards axle sprocket.

Section 03 TRANSMISSION

Sub-section 08 (GEAR BOX)

74, Drive axle holder

Hold drive axle with tool P/N 529 0051 00.



A004003002

Transmission case & driven pulley ass'y

Pull out of vehicle.

DISASSEMBLY

Driven pulley

Remove snap ring, support assembly, driven pulley and key from countershaft.

66, Seal

Remove seal from transmission case.

11, Countershaft

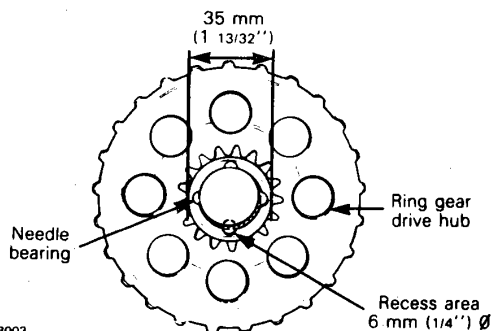
Press countershaft out of transmission case.

57, Ball bearing (case)

Press countershaft out of bearing.

18, Needle bearing (ring gear)

Use a suitable pusher and press bearing out of ring gear through bearing access recess.



A008003003

03-08-10

36, Planet wheels and components

Loctite mounted shaft nut may require heat for disassembly. For easier disassembly heat up to 150°C (300°F).

To remove bearing from planet wheels, use a press and a suitable pusher (15.96 mm/5/8" Ø max.).

21, Planet carrier bearing

Remove snap ring and use a suitable pusher to press bearing out of carrier.

25, Blocking wheel (reverse driving hub)

Loctite mounted screws may require heat for disassembly. For easier disassembly heat up to 150°C (300°F).

CLEANING

27,60, Transmission cover & case

Remove Loctite residue from cover and case mating surfaces.

INSPECTION

Visually inspect the components for excessive wear and damage.

ASSEMBLY

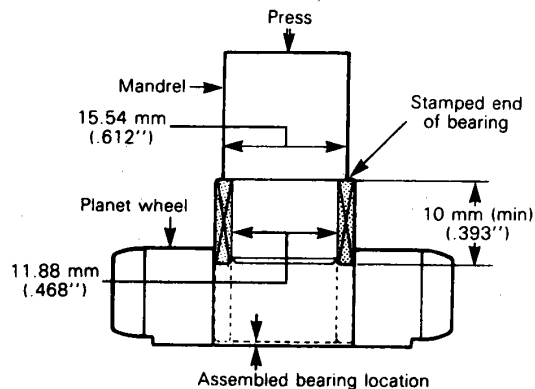
25,34, Blocking wheel (reverse driving hub)

Apply Loctite 262 on screw threads, and torque to 12 N•m (9 lbf•ft).

38,40, Planet wheel & needle bearing

The bearing is press fitted into the planet wheel 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.



A008003004

Section 03 TRANSMISSION

Sub-section 08 (GEAR BOX)

○ **NOTE:** Assemble bearing must not project out of planet wheel.

20,36, Carrier assembly

Apply Loctite 262 in planet wheel shaft bores. With planet wheel installed on shaft, press shaft into carrier bore.

Apply Loctite 262 on shaft threads.

Install and torque nut to 35 N•m (26 lbf•ft).

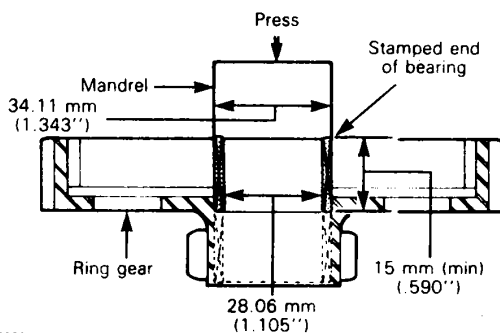
21, Planet carrier bearing

With a suitable pusher, press bearing into carrier bore and lock in place with snap ring.

18, 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.



26, Cover bearing

With a suitable pusher, press bearing into cover.

57, Case bearing

With a suitable pusher, press bearing on countershaft.

11, Countershaft

Press countershaft with the assembled ball bearing into the transmission case bore.

56, Studs

Assemble studs in transmission case with Loctite 262 and torque to 5 N•m (44 lbf•in).

6, Transmission lever handle

Put Loctite 242 on handle threads.

47, Tensioner ass'y

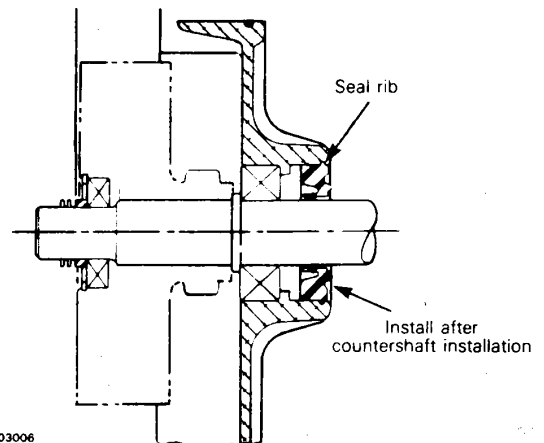
Ensure that roller turns freely.

67, Grease fitting

At grease fitting assembly, apply Loctite 262 on grease fitting threads.

66, Seal (countershaft)

Install seal in transmission case so that the seal rib is seated in the bore groove.



Driven pulley assembly

Coat countershaft with antiseize compound and assemble driven pulley and support.

INSTALLATION

Reverse removal procedure, paying particular attention to the following.

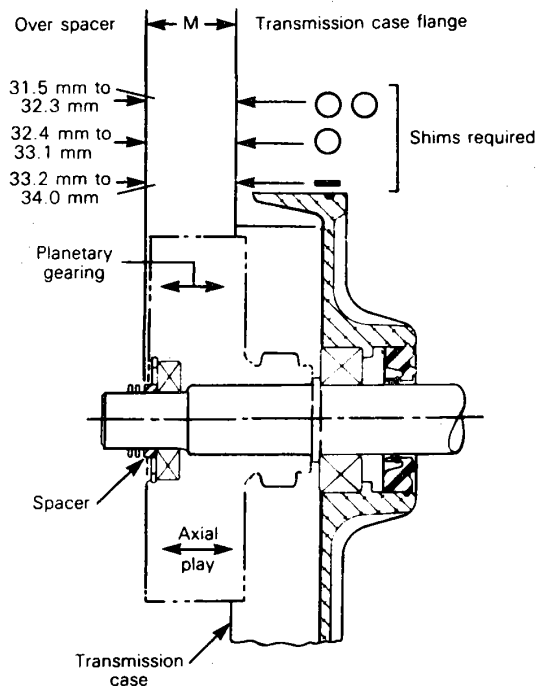
24, Shim (axial play)

The planetary gearing axial free-play must be controlled with shim. To determine shim thickness, measure distance "M" from transmission case flange to spacer. In accordance with the following table, select the proper amount of shims.

Section 03 TRANSMISSION

Sub-section 08 (GEAR BOX)

M		REQUIRED SHIMS
FROM	TO	
31.5 mm (1.240'')	32.3 mm (1.271'')	2
32.4 mm (1.275'')	33.1 mm (1.303'')	1
33.2 mm (1.304'')	34.0 mm (1.339'')	0



A008003007

NOTE: Planet carrier bearing must be assembled in carrier and locked with snap ring. Spacer must be installed on countershaft.

27,60, Transmission cover & case

- 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.

03-08-12

- Install cover lock washer and nuts 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.

75, Oil

Refill with 450 ml (16 oz) of fresh chaincase oil.

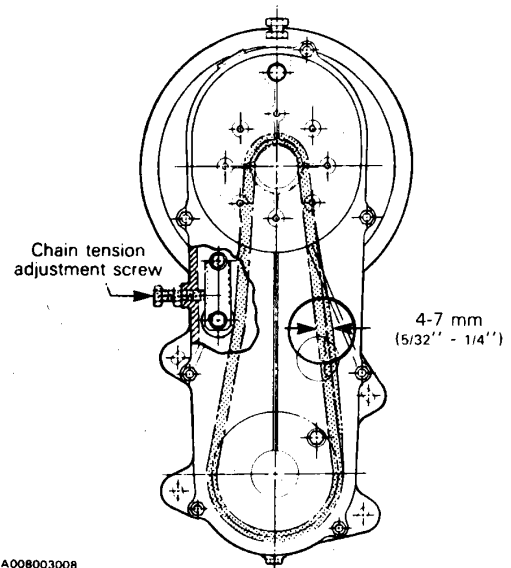
31, Oil level plug

Torque to 24 N•m (18 lbf•ft).

ADJUSTMENT

65, Chain tension

Turn adjustment screw until 4-7 N•m (5/32'' - 1/4'') chain travel is obtained. Torque lock nut to 30 N•m (22 lbf•ft).



A008003008

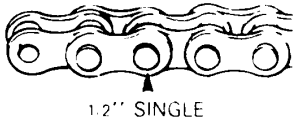
Pulley distance

Refer to section 03-05.

DRIVE CHAIN

GENERAL

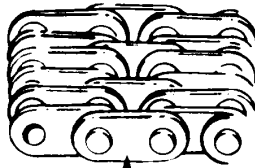
There are four (4) types of the Bombardier drive chains: a single 1/2" pitch, a triple 3/8" pitch and a silent chain type. For proper use refer to Technical data.



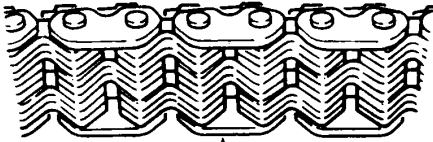
1.2" SINGLE



3/8" DOUBLE



3/8" TRIPLE



Silent chain

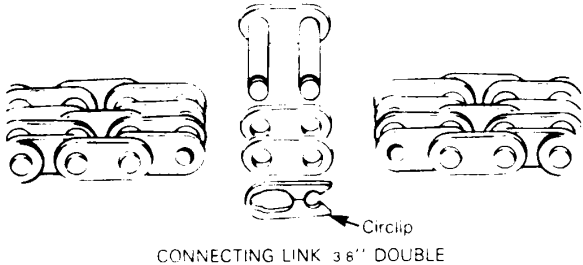
A000003026

NOTE: No work (separation, lengthening) can be done on the silent chain type.

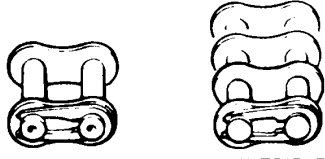
There two (2) variations of chains: detachable and endless.

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.



CONNECTING LINK 3/8" DOUBLE



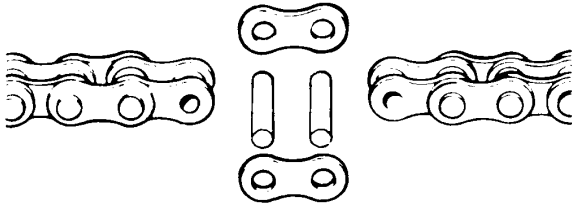
1/2" SINGLE

3/8" TRIPLE

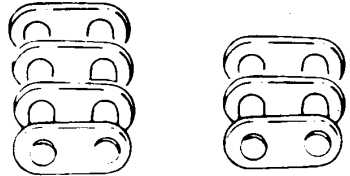
A000003021

CHAIN SEPARATION

When separating an endless chain, always use a chain bearing pin extractor. Also, make sure to remove one complete link.



1/2" SINGLE LINK



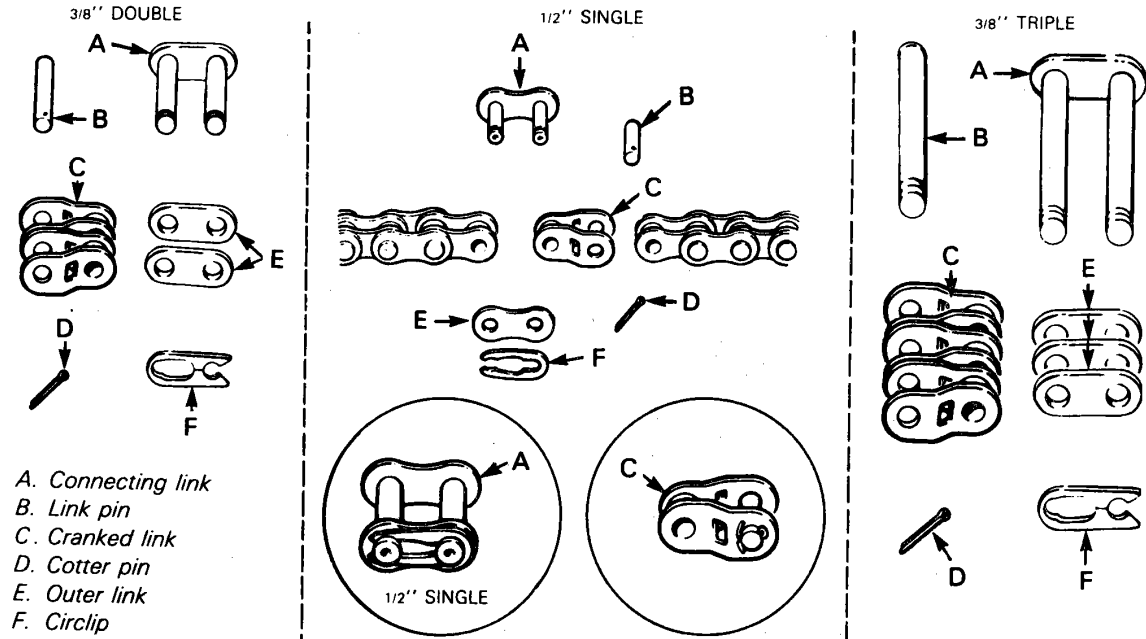
3/8" TRIPLE LINK

3/8" DOUBLE LINK

A000003022

Section 03 TRANSMISSION
Sub-section 09 (DRIVE CHAIN)

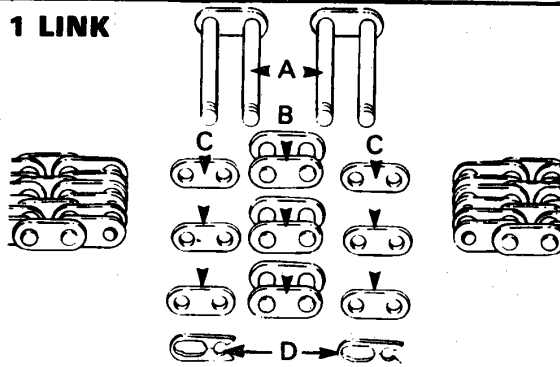
LENGTHENING 1/2 LINK



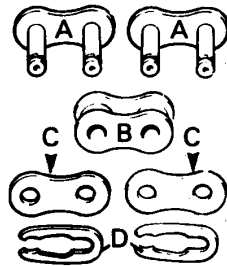
A000003023

LENGTHENING 1 LINK

3/8" TRIPLE

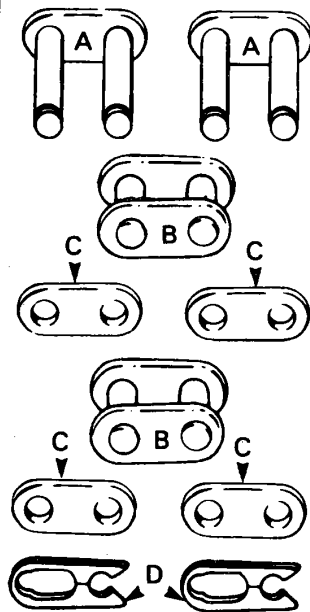


1/2" SINGLE



- A. Connecting link
- B. Inner link
- C. Outer link
- D. Circlip

3/8" DOUBLE

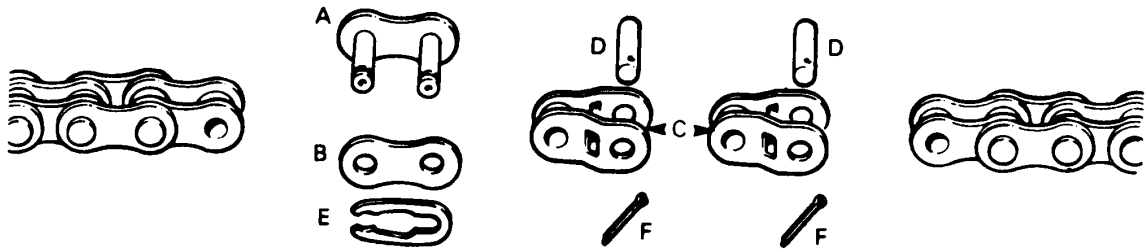


A000003024

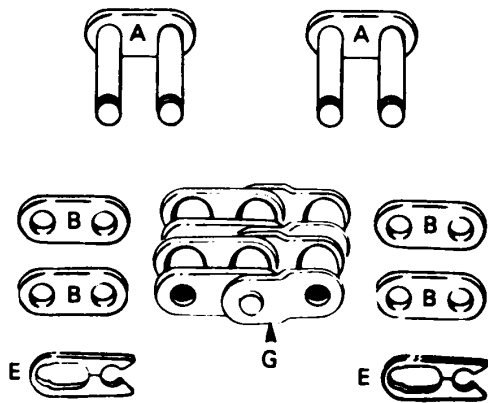
Section 03 TRANSMISSION
Sub-section 09 (DRIVE CHAIN)

LENGTHENING 1 1/2 LINK

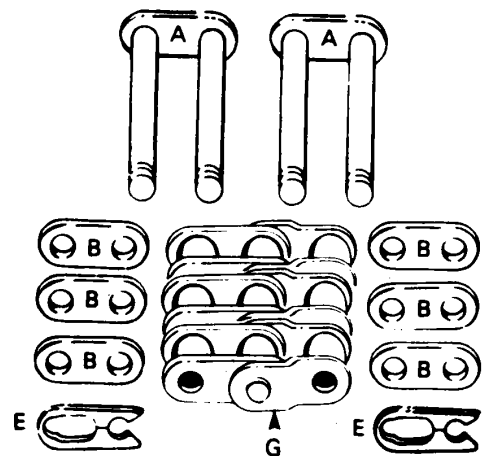
1/2" SINGLE



3/8" DOUBLE



3/8" TRIPLE



- A. Connecting link
- B. Outer link
- C. Cranked link
- D. Link pin
- E. Circlip
- F. Cotter pin
- G. Double cranked link

A000003025



Section 04 ELECTRICAL
Sub-section 01 (ELECTRIC CHARTS)

ELECTRIC CHARTS

MODEL	CHART PAGE	HEADLAMP (watt)	TAILLIGHT (watt)	ELECTRICAL SYSTEM OUTPUT (watt)
Elan	04-01-2	60/60	5/21	75/23
Citation LSE	04-01-4	60/60	5/21	160
Tundra/LT, Citation LS	04-01-3	60/60	5/21	160
Skandic 377/R	04-01-5	60/60	5/21	160
Safari 377,447	04-01-6	60/60	5/21	160
Safari 377E	04-01-7	60/60	5/21	160
Safari Grand Luxe LC	04-01-8	60/55	5/21	160
Formula SS	04-01-9	60/55	5/21	160
Formula SP	04-01-9	60/55	5/21	160
Formula MX	04-01-9	60/60	5/21	160
Formula Plus	04-01-9	60/55	5/21	160
Alpine	04-01-10	60/60	5/21	160
Mirage III	04-01-6	60/60	5/21	160

CHART CODES

WIRING COLOUR CODE

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.

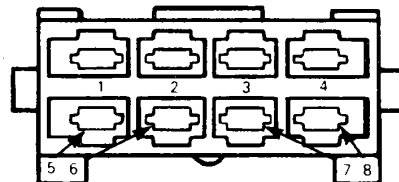
COLOUR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN

CONNECTOR POSITION CODE

Numbers are printed at the back of the connectors housings.

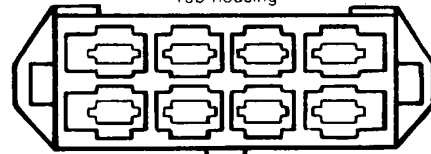
They correspond to the numbers on connectors of the electrical chart.

Seen from wires side
Receptacle housing



A000004001

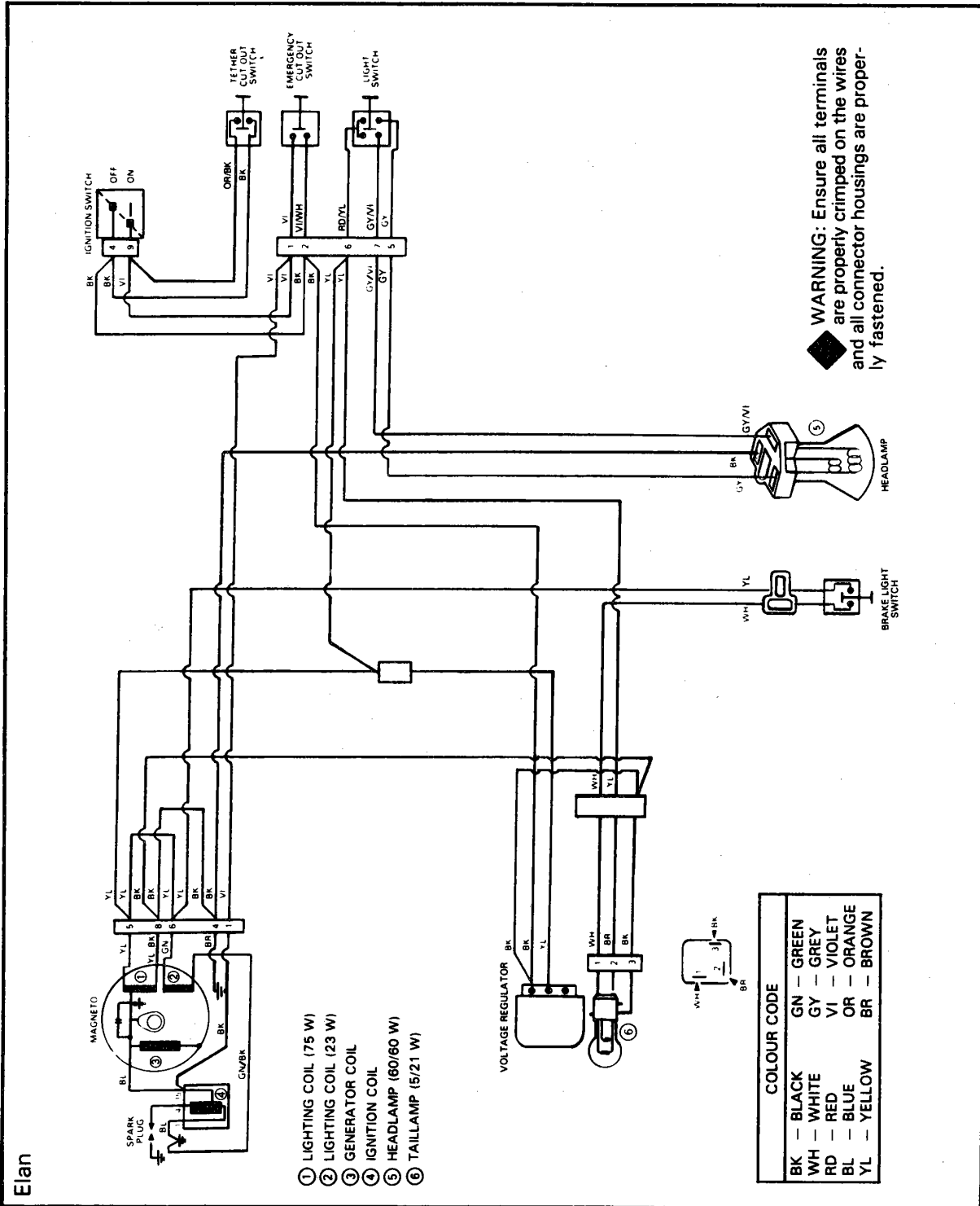
Tab housing



A000004002

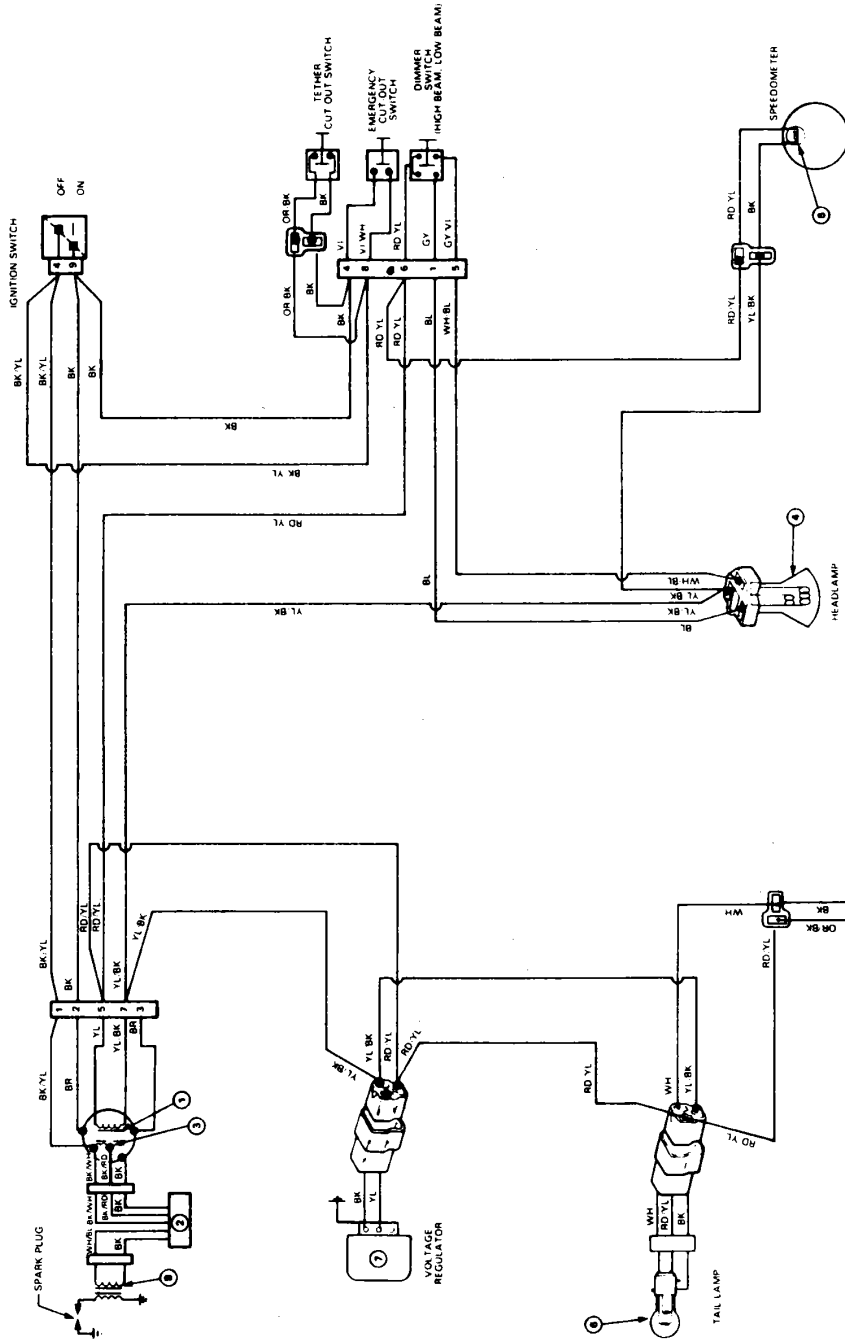
○ NOTE: Normally 18 GA wires is used. Sometime we 16 GA is used and it is note with an * beside color code of charts.

Section 04 ELECTRICAL
Sub-section 01 (ELECTRIC CHARTS)



Section 04 ELECTRICAL
Sub-section 01 (ELECTRIC CHARTS)

Citation LS, Tundra & Tundra LT



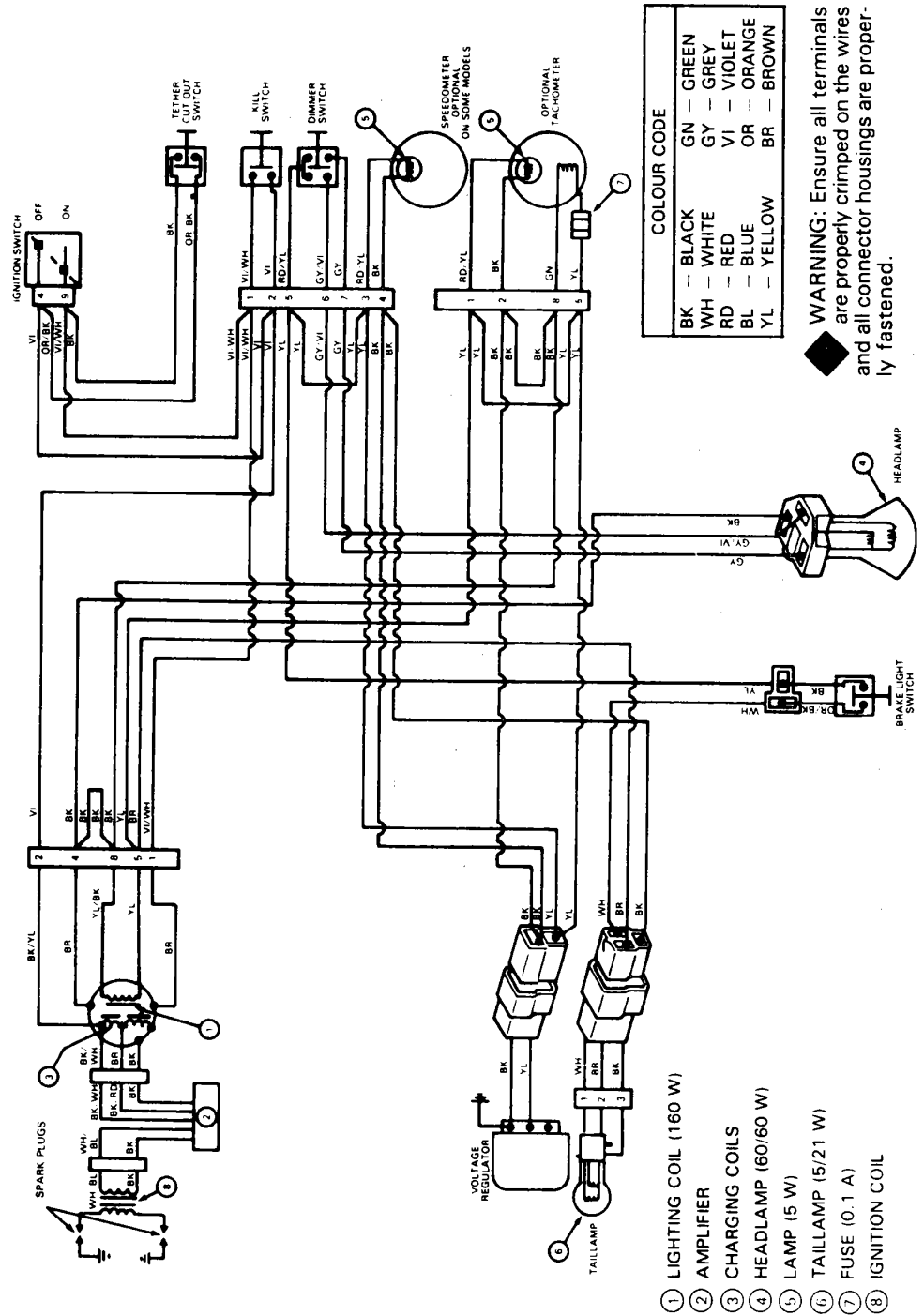
COLOUR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN

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

- ① LIGHTING COIL
- ② AMPLIFIER
- ③ GENERATOR COIL
- ④ HEADLAMP (60/60 W)
- ⑤ LIGHT (5 W)
- ⑥ REAR LAMP (5-21 W)
- ⑦ VOLTAGE REGULATOR
- ⑧ IGNITION COIL

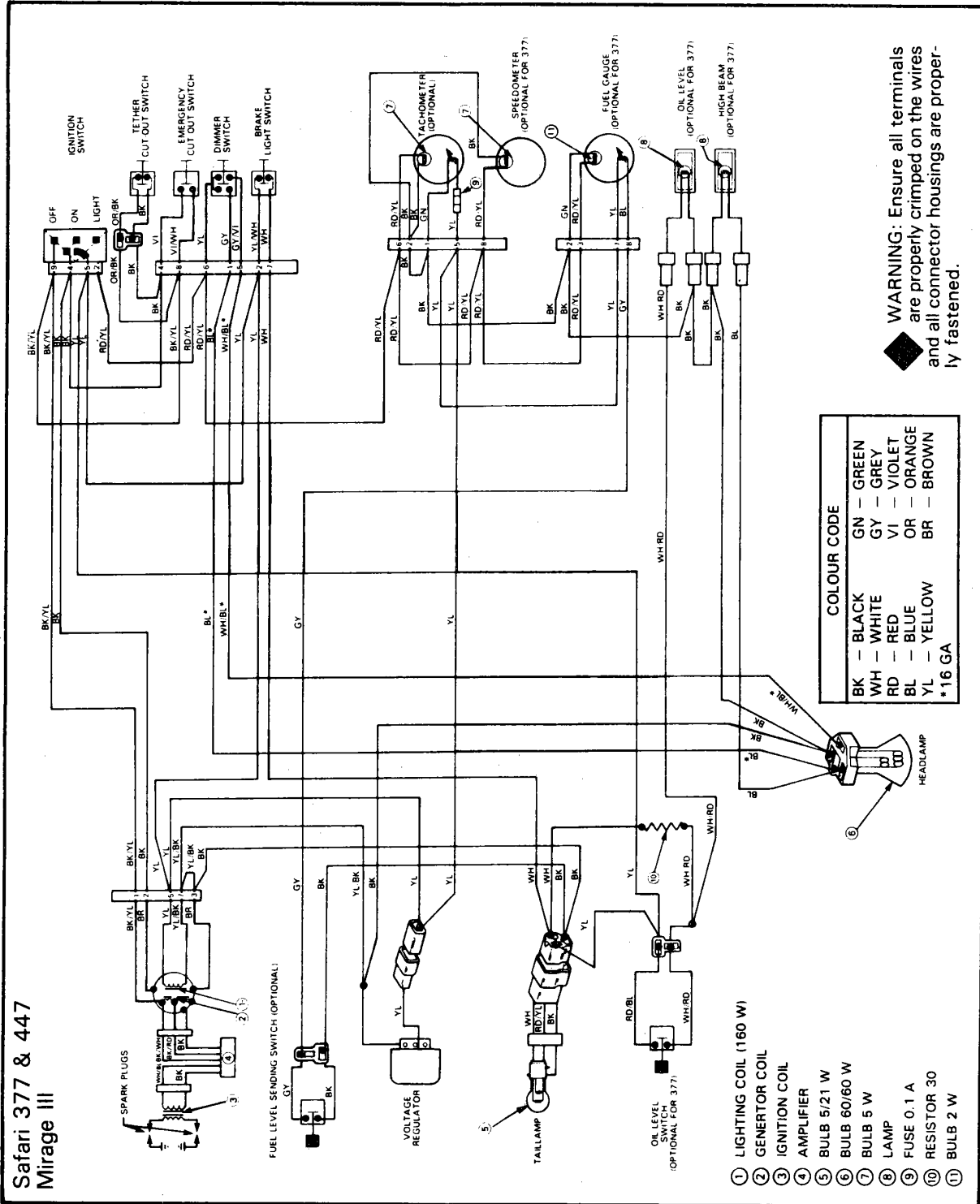
Section 04 ELECTRICAL
 Sub-section 01 (ELECTRIC CHARTS)

Skandic 377/R

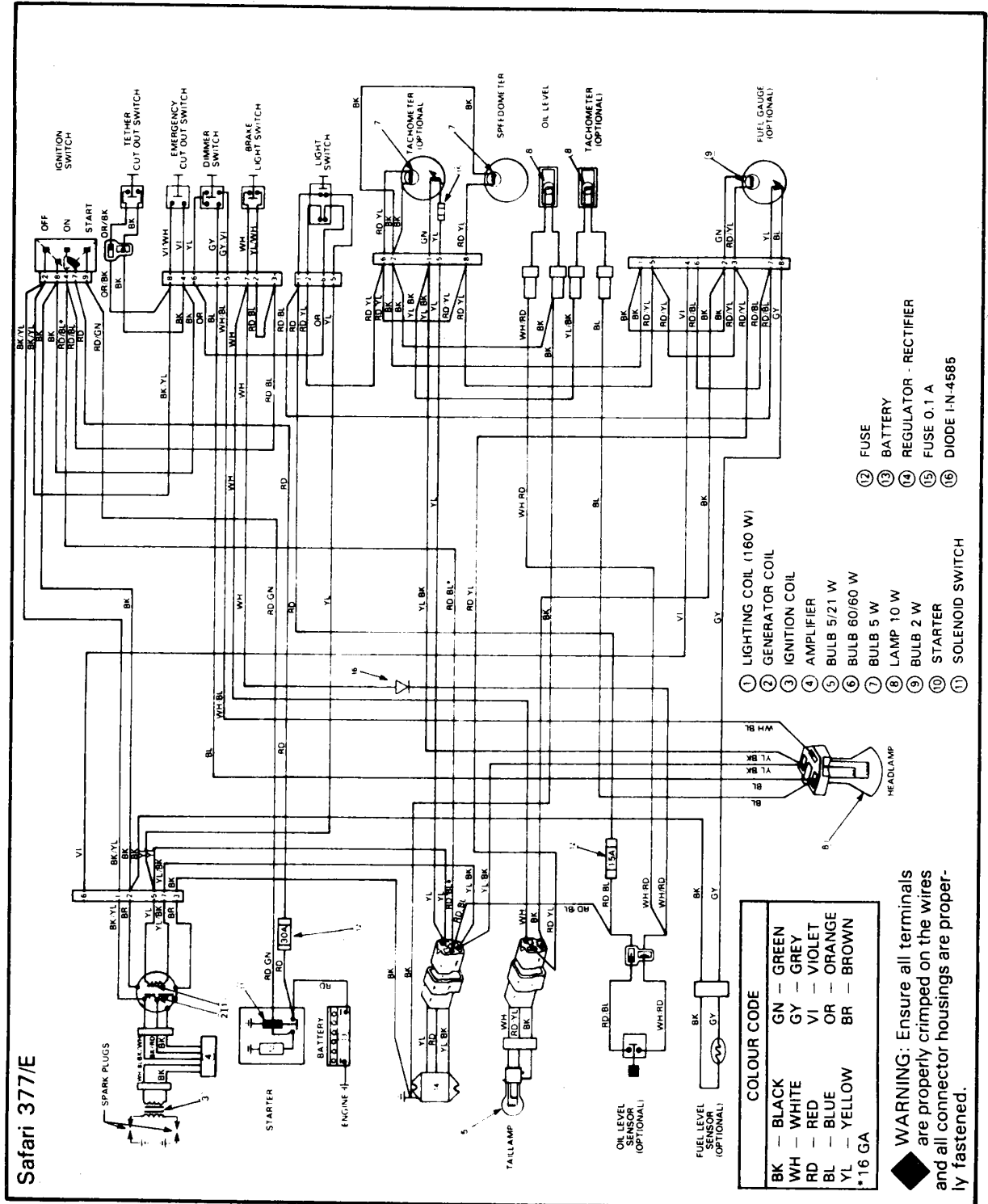


- ① LIGHTING COIL (160 W)
- ② AMPLIFIER
- ③ CHARGING COILS
- ④ HEADLAMP (60/60 W)
- ⑤ LAMP (5 W)
- ⑥ TAILLAMP (5/21 W)
- ⑦ FUSE (0.1 A)
- ⑧ IGNITION COIL

Section 04 ELECTRICAL
Sub-section 01 (ELECTRIC CHARTS)

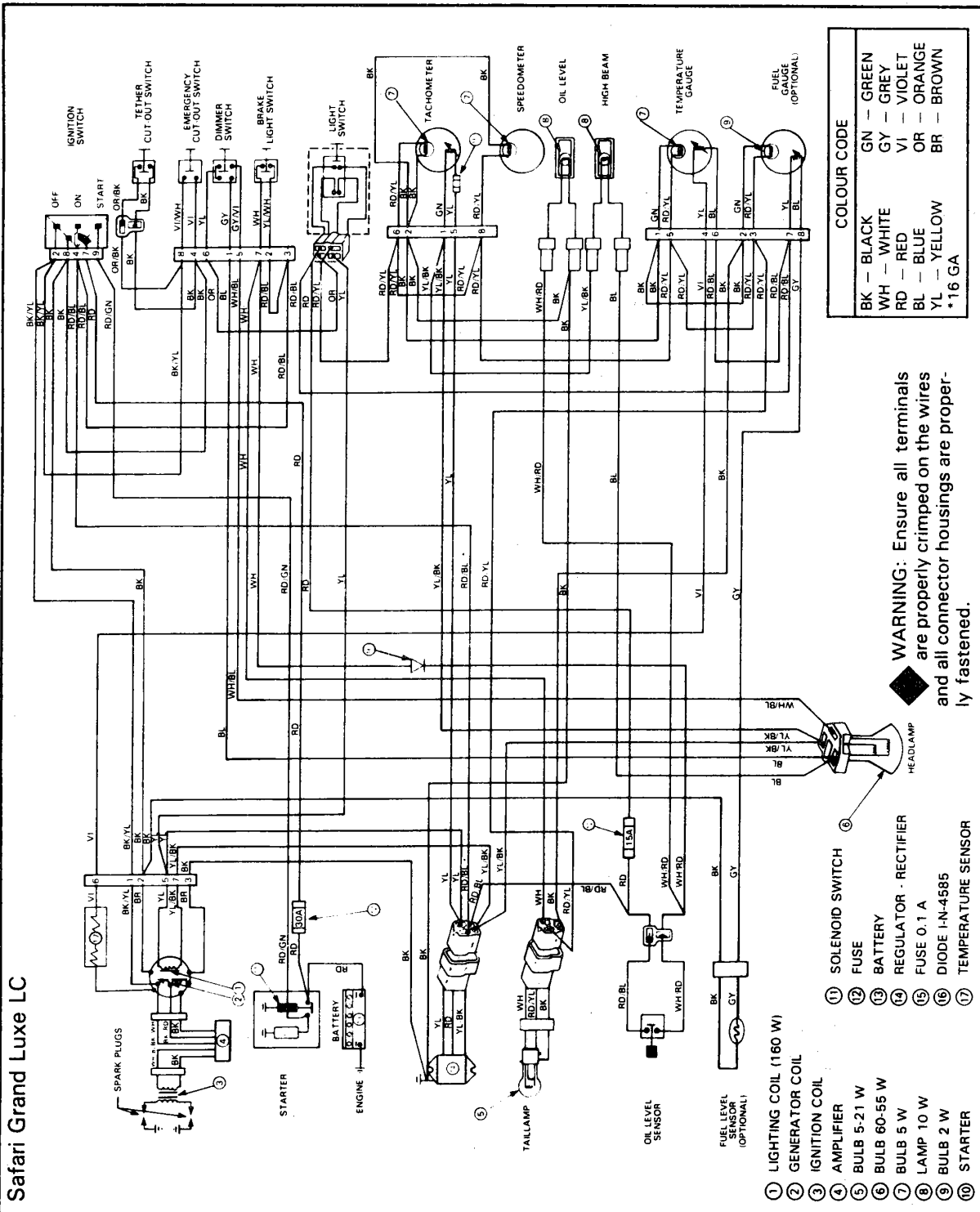


Section 04 ELECTRICAL
Sub-section 01 (ELECTRIC CHARTS)

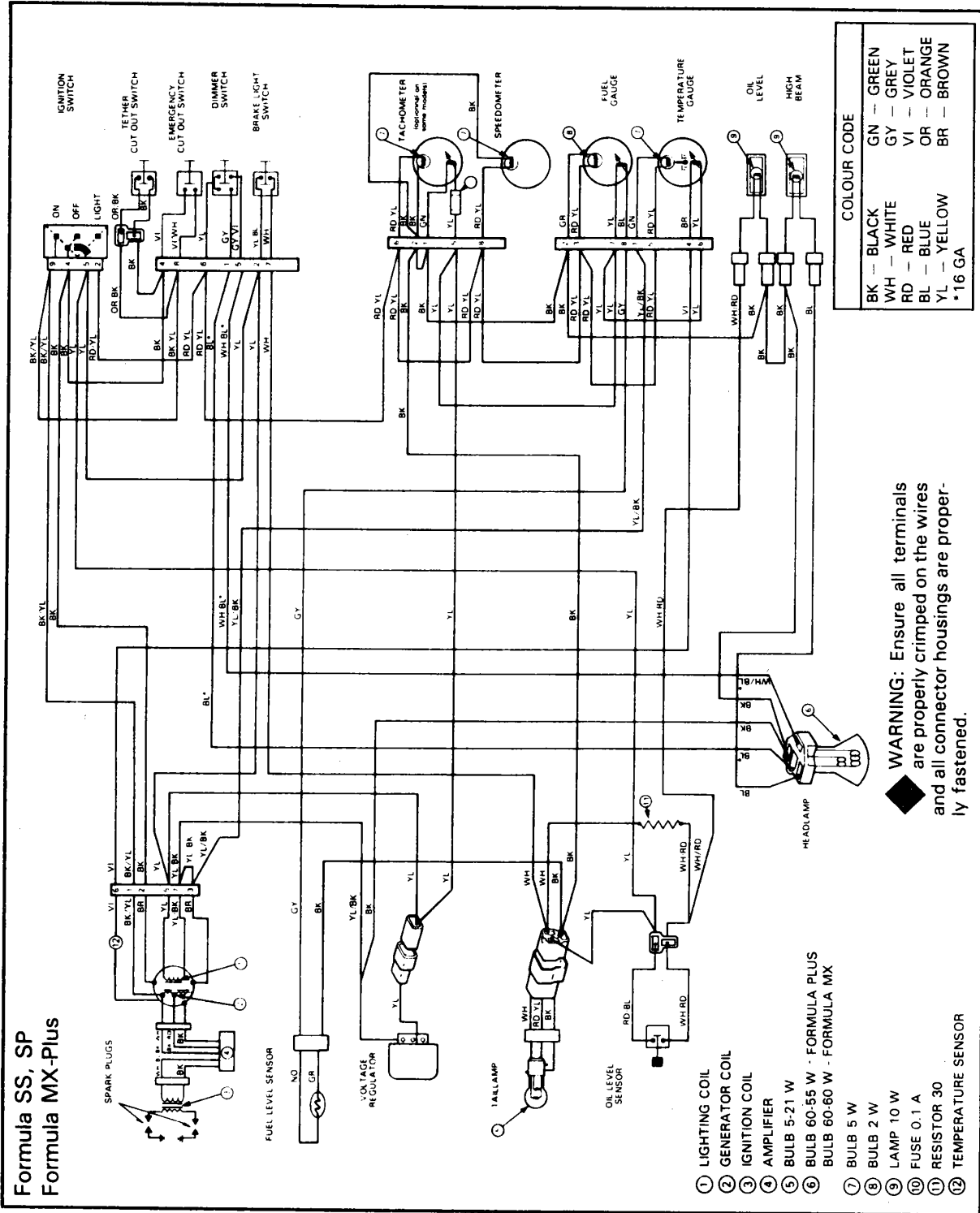


Section 04 ELECTRICAL

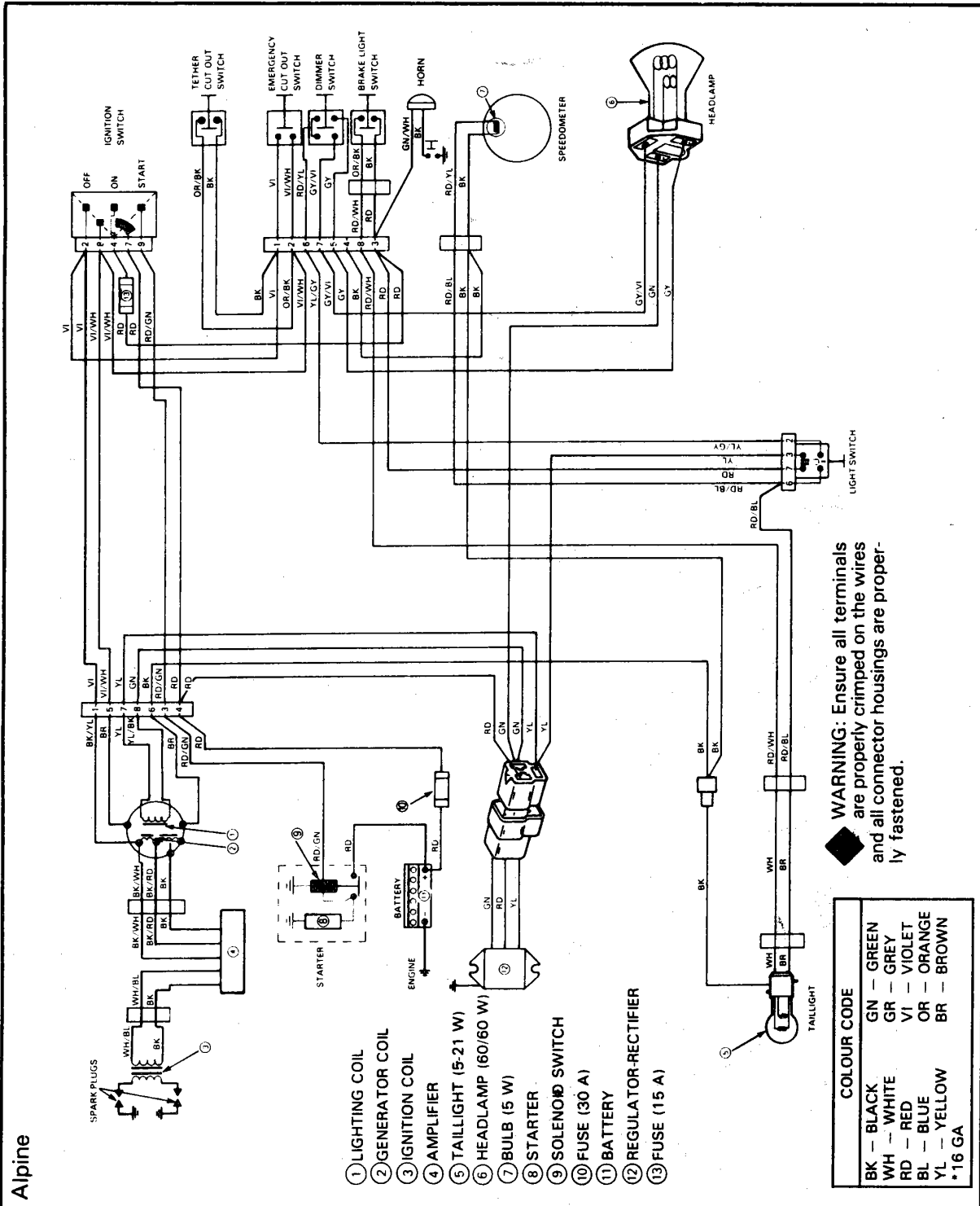
Sub-section 01 (ELECTRIC CHARTS)



Section 04 ELECTRICAL
Sub-section 01 (ELECTRIC CHARTS)



Section 04 ELECTRICAL
Sub-section 01 (ELECTRIC CHARTS)



IGNITION TIMING

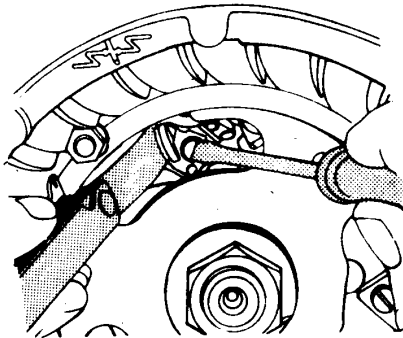
BREAKER POINTS IGNITION SYSTEMS

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 crankshaft until breaker points, visible through magneto ring opening, are fully opened. Adjust points gap to 0.35-0.40 mm (0.014-0.016") using a feeler gauge and a screwdriver as illustrated.

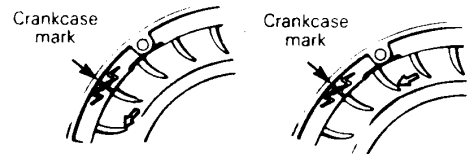


A002004001

○ **NOTE:** Breaker points gap can change upon tightening. Always recheck after tightening.

4. Disconnect junction block at engine then connect one lead of a timing light (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 crankshaft until timing marks align. Slacken the three (3) armature plate retaining screws then rotate armature plate until timing light fluctuates.

Retighten retaining screws at this position.



Too early:
Turn armature
plate clockwise

Too late:
Turn armature
plate counter-clockwise

A002004002

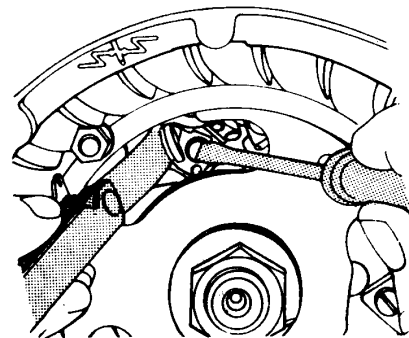
○ **NOTE:** The arrow (embossed on the fan) indicates the timing fin.

○ **NOTE:** Ignition timing can change upon tightening. Always recheck after tightening.

Top dead center gauge 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 crankshaft until breaker points, visible through magneto ring opening, are fully open. Adjust points gap to 0.35-0.40 mm (0.014-0.016") using a feeler gauge and a screwdriver as illustrated.

○ **NOTE:** Breaker points gap can change upon tightening. Always recheck after tightening.

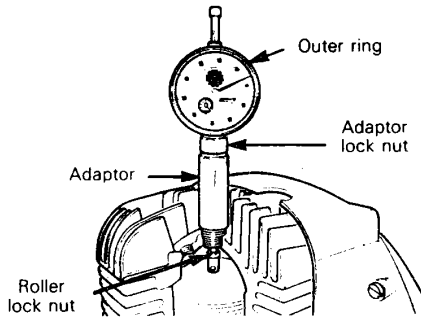


A002004001

4. Disconnect junction block at engine then connect one lead of a timing instrument (flashlight type P/N 414 0122 00) to the blue wire coming from engine. Connect other to ground (metallic portion of the engine).

Section 04 ELECTRICAL
Sub-section 02 (IGNITION TIMING)

5. Install and adjust T.D.C. gauge on engine as follows:
- Rotate magneto 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.



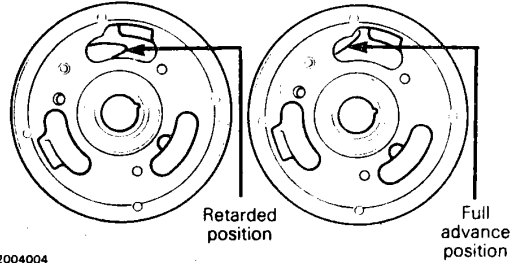
A002004003

- 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 magneto until piston is at Top Dead Center.
 - Unlock outer ring of dial and turn it until "O" 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 magneto counter-clockwise until piston is at:
DIRECT TIMING 3.98 ± 0.25 mm BTDC
 $(0.157 \pm .010$ "")

BTDC: Before top dead center.

Slowly rotate armature plate until flashlight switch off. Retighten retaining screws.

NOTE: For 247 engine type, hold advance mechanism centrifugal lever in full advance position (toward magneto rim).



A002004004

NOTE: Ignition timing can change upon tightening. Always recheck after tightening.

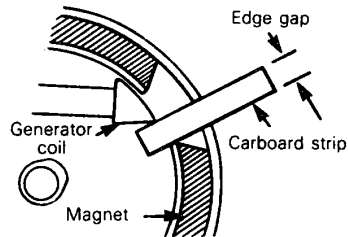
Edge gap verification

By following either of the two procedures herein mentioned the edge gap will automatically be adjusted. However, if the edge gap is to be verified, proceed as follows:

From timing marks, rotate magneto clockwise 1/4 of a turn, (for 247 engine type hold advance mechanism centrifugal weight in full advance position (toward magneto rim)), then slowly turn magneto back counter-clockwise until timing light fluctuates.

At this point check the distance between generator coil end and magnet (edge gap), with a cardboard strip of appropriate width.

ENGINE TYPE	EDGE GAP
247	5 - 8 mm (0.197 - 0.315")



A002004005

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.

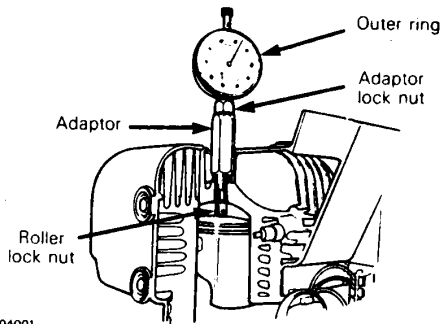
ELECTRONIC IGNITION SYSTEMS — NIPPONDENSO

253 ENGINE TYPE

Two methods are detailed in this section, the first one using a **top dead center gauge to check the flywheel timing mark**. The second one using a **stroboscopic timing light** to verify ignition timing.

Top dead center gauge verification

1. Disconnect spark plug wire and remove spark plug.
2. Install and adjust T.D.C. gauge on engine as follows:
 - Rotate magneto 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.
- Rotate magneto until piston is at Top Dead Center.
- Unlock outer ring of dial and turn it until "O" on dial aligns with pointer.
- Lock outer ring in position.

3. Rotate the crankshaft until the piston is at:
 - DIRECT TIMING: 2.31 mm (.091) B.T.D.C.
 - BTDC: Before top dead center.

At this point, the crankcase central mark and the flywheel mark **MUST** align.

If the marks do not correspond to the specification, scribe a new mark on the flywheel.

▼ CAUTION: Timing marks verification cannot be used as a timing procedure, therefore, always check the timing (using a stroboscopic timing light) at 6000 R.P.M. after the marks have been aligned.

Stroboscopic timing light

○ NOTE: To perform this procedure we strongly recommend a stroboscopic timing light which is able to exceed 6000 R.P.M. such as:

SNAP-ON MT 212

ELECTRO-SPECIALTY, model 978.

The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold, after **MAXIMUM 20** seconds idling.

Connect timing light pick-up to the spark plug lead. Connect a tachometer to the yellow and yellow/black wires of magneto.

○ NOTE: Use a separate battery to supply timing light. (Except Citation LSE).

◆ 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.

○ NOTE: Turn headlamp "ON" when checking the timing.

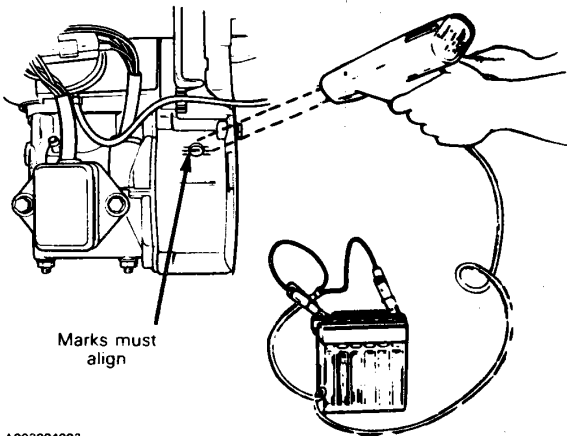
Start the engine and point timing light straight in line with the crankcase timing mark.

Bring engine to 6000 R.P.M. for a brief instant.

Section 04 ELECTRICAL

Sub-section 02 (IGNITION TIMING)

Cold engine



A003004002

Check timing mark alignment. If flywheel mark aligns within housing marks, timing is correct.

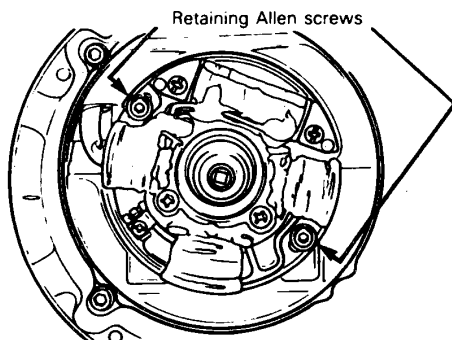
Stop engine.

If the marks do not align, armature plate must be adjusted.

Armature plate will have to be moved to advance or retard timing.

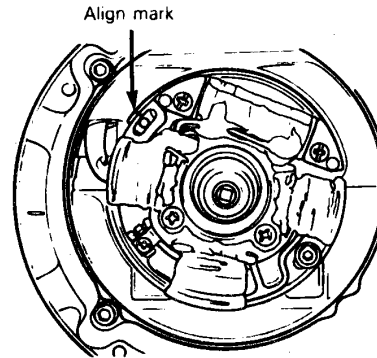
To adjust, remove rewind starter and insert crankshaft locking tool P/N 420 876 640 through the vacuum outlet. Then unscrew the magneto retaining nut. Using magneto puller ring P/N 420 876 655 or 420 876 080 and with the magneto puller P/N 420 876 065, remove magneto.

Slack the two Allen screws retaining the armature plate. Then align the armature plate mark with the magneto housing mark. Tighten Allen screws and reassemble magneto and rewind starter. Torque magneto retaining nut to 85 N•m (63 lbf•ft).



A003004003

04-02-4



A003004003

Recheck ignition timing with the timing marks at 6000 R.P.M.

If marks do not align, move the armature plate until marks align at 6000 R.P.M. Then scribe a new mark on the magneto housing in line with the armature plate mark.

377, 447, 503, ENGINE TYPES

Two methods are detailed in this section, the first one using a **top dead center gauge** to check the flywheel timing mark. The second one using a **stroboscopic timing light** to verify ignition timing.

Top dead center gauge verification

Remove the spark plugs.

On 503 models, remove the fan cover.

◆ **WARNING: Ensure the engine is cold before fan cover removal on 503 models.**

Install a dial indicator in magneto side spark plug hole.

Bring magneto side piston to top dead center position.

Back-off (rotate counter-clockwise) piston to:

377 engine type: 2.31 mm (0.091") BTDC

447 engine type: 1.88 mm (0.074") BTDC

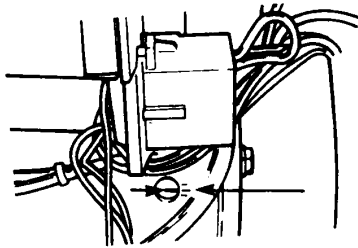
503 engine type: 2.29 mm (0.090") BTDC

BTDC: Before top dead center.

Section 04 ELECTRICAL

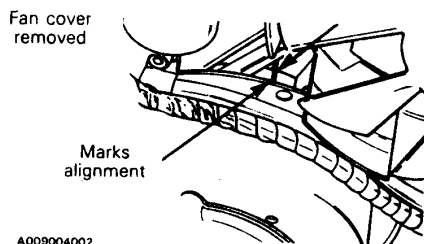
Sub-section 02 (IGNITION TIMING)

377,447, engine type: Look through inspection hole and check if the flywheel and magneto housing marks align. If the marks do not correspond to the specification, scribe a new mark on the flywheel.



A009004001

503 engine type: Look through the fan and check if the flywheel and the crankcase marks align. If the marks do not correspond to the specification, scribe a new mark on the flywheel.



A009004002

Stroboscopic timing light

○ **NOTE:** Timing can be checked using a stroboscopic timing light (Snap-On MT 212 or Electro Speciality, model 978). The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold after approximately 20 seconds idling.

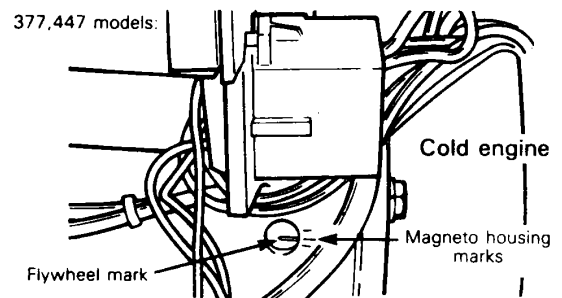
Connect timing light pick-up to magneto side spark plug lead (on manual start models use a separate battery to supply timing light).

◆ **WARNING:** Place ski tips against a wall, raise rear of the vehicle on a stand so that the 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.

○ **NOTE:** Turn headlamp "ON" when checking the timing.

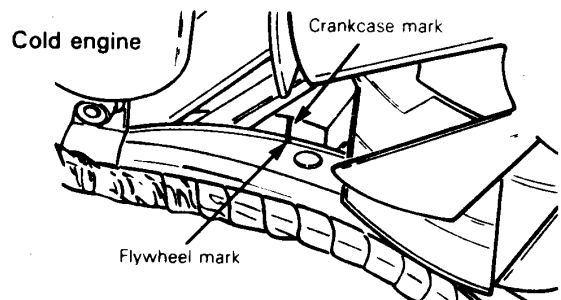
Start engine and point timing light straight in line with the timing marks:

377,447: Look through inspection hole.
503: Look through the fan.



A009004003

503 model



A017004001

Check timing mark alignment. If timing marks align, timing is correct.

For the three models (377,447 & 503 engine) if the timing marks do not align, armature plate must be adjusted.

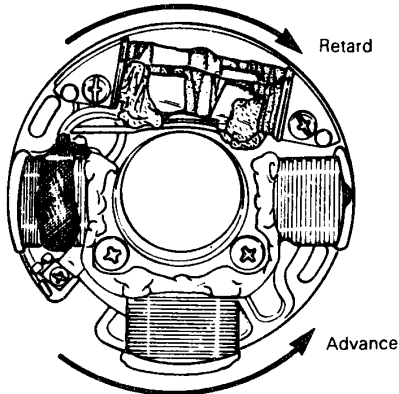
Armature plate will have to be moved to advance or retard timing.

Section 04 ELECTRICAL

Sub-section 02 (IGNITION TIMING)

To adjust, remove rewind starter assembly and starter pulley.

Loosen the armature plate screws, move the plate in the appropriate direction.



A017004002

Tighten armature plate screws.

CAUTION: Make sure armature plate screws are well secured.

Reassemble starter pulley and assembly.

Recheck engine timing (make sure engine is cold).

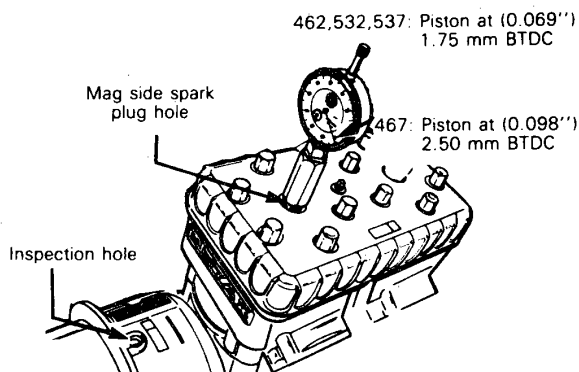
462, 467, 532, 537 ENGINE TYPE

Two methods are detailed in this section, the first one using a **top dead center gauge** to check the flywheel timing mark. The second one using a **stroboscopic timing light** to verify ignition timing.

Top dead center gauge verification

Remove spark plugs.

Remove inspection plug on magneto housing.



A000004001

04-02-6

Install dial indicator in magneto side spark plug hole.

Bring magneto side piston to top dead center.

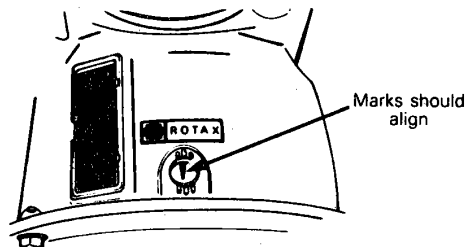
Back-off (rotate counter-clockwise) piston to:

ENGINE TYPE	DIRECT TIMING B.T.D.C.
462	1.75 mm (.069")
467	2.50 mm (.098")
532	1.75 mm (.069")
537	1.75 mm (.069")

B.T.D.C.: Before top dead center.

Look through inspection hole and check if flywheel and magneto housing timing marks align.

If the marks do not correspond to the specifications, scribe a new mark on the magneto housing.



A000004002

Stroboscopic timing light

NOTE: Timing can be checked using a stroboscopic timing light (Electro Specialty 978, Snap-On MT 212 or equivalent). The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold.

Remove the timing inspection plug on magneto housing.

Connect timing light pick-up to magneto side spark plug lead (on manual start models use a separate battery to supply timing light).

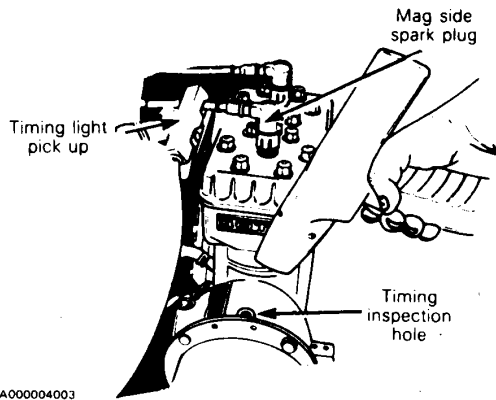
Section 04 ELECTRICAL

Sub-section 02 (IGNITION TIMING)

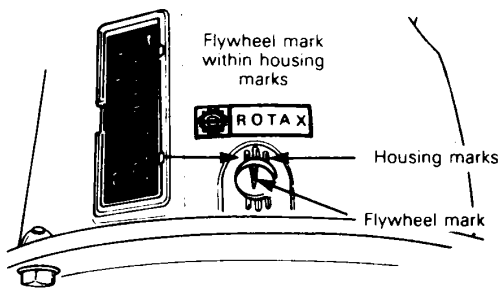
◆ **WARNING:** Place ski tips against a wall, raise rear of vehicle on a stand so that track does not contact the ground. Make sure no one passes behind the vehicle while engine is running. Keep clear of track and other moving parts.

○ **NOTE:** Turn headlamp "on" when checking timing.

Start engine and point timing light straight into inspection hole.

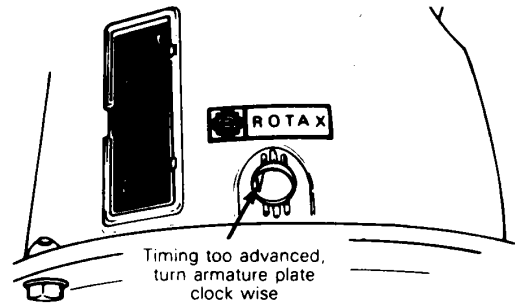


Bring engine to 6000 R.P.M. for a brief instant. Check timing mark alignment. If flywheel mark aligns within housing marks, timing is correct. Stop engine.



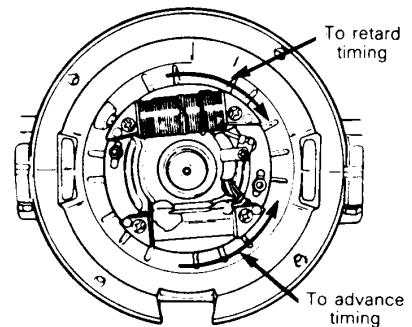
If flywheel mark did not align within magneto housing marks, armature plate must be adjusted.

Armature plate will have to be moved to advance or retard timing.



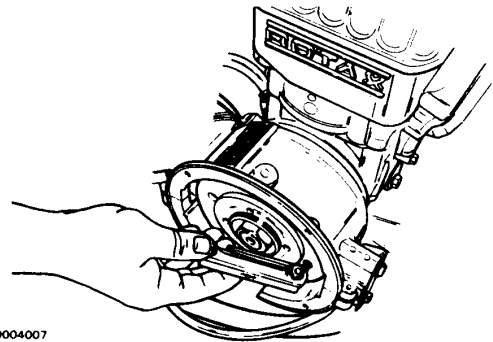
To adjust remove rewind starter assembly and starter pulley.

Using a 4 mm Allen key, loosen the two armature plate retaining screws and lightly move plate in appropriate direction. (Refer to the difference between timing marks to determine how much to move the armature plate).



Tighten the armature plate screws.

▼ **CAUTION:** Make sure armature plate screws are well secured.



Reassemble starter pulley and assembly.

Recheck engine timing (make sure engine is cold).

Reinstall inspection plug.



SPARK PLUGS

○ **NOTE:** The 1985 Bombardier snowmobiles are using two (2) spark plug brands, Bosch spark plugs and NGK spark plugs.

BOSCH SPARK PLUG TYPE

(Elan)

SPARK PLUG NUMBERING SYSTEM

Bosch has introduced a new numbering code for its complete line of spark plugs. The new code is shorter, therefore easier to use. The following charts will assist you in making the change-over easily and effectively.

IMPORTANT: The new code has a different heat range identification system.

High number → hot plug

Low number → cold plug

1985 CROSS REFERENCE CHART

List of Bosch spark plugs used on 1985 Bombardier snowmobiles.

New number	Old number
M 7 A	M 175 T 1

Section 04 ELECTRICAL SYSTEM

Sub-section 03 (SPARK PLUGS)

EXPLANATION OLD SYSTEM

Example:

- M** For Marine Engines, resistant to seawater
- P** Electrode with Platinum Tips
- S** Silver Center Electrode
- X** Wide-Gap Electrodes — .060"
- X4** Wide-Gap Electrodes — .044"
- X6** Wide-Gap Electrodes — .060"

Thread Reach

- ER** Shielded, water-proof; built-in burn-off resistor
- M** Plugs for 2-cycle engines
- P** Electrodes of precious metals
- R** Suppressor resistor, 5000 ohms, built-in
- S** Silver ground electrode
- T** Standard type
- Z** Semicovered front electrode

Heat Range

- A** SAE conical seat
- AK** Miniplug with tapered seat
- B** SAE connector dimensions, for 7 mm dia. cable
- C** SAE connector dimensions, for 5 mm dia. cable
- D** Glide-air-gap spark plug with conical seat
- E** Surface gap (C.D. ignition)
- G** Glide-air-gap spark plug with control electrode
- K** Mini-plug with special connector
- KA** Mini-plug
- V** Booster gap

Thread

- M** M 18 x 1.5
- U** M 10 x 1
- W** M 14 x 1.25
- X** M 12 x 1.25
- Z** 7/8"-18 SAE

EXPLANATION NEW SYSTEM

Example:

- C** Copper core center electrode
- X** wide gap .044" (1.1 mm)
- Y** wide gap .060" (1.5 mm)

- 0**
- 1** special
- 2** shell or
- 3** electrode
- 4** designs
- 5**

Thread Reach

- A** Thread reach .460" standard electrode
- B** Thread reach .460" extended tip electrode
- C** Thread reach 3/4" regular electrode
- D** Thread reach 3/4" extended tip electrode
- E** Thread reach 3/8" regular electrode
- F** Thread reach 3/8" extended tip electrode
- H** Thread reach 3/4" extra extended tip
- L** Extra extended tip
- P** Platinum electrode
- S** Silver electrode

Heat Range

- B** SAE connector for 7 mm diameter cable
- C** SAE connector for 5 mm diameter cable
- E** Surface gap
- R** Resistor
- S** Mini-plug

Thread

- D** 18 mm thread diameter tapered seat
- F** 14 mm thread diameter 5/8" hex.
- H** 14 mm thread diameter tapered seat
- M** 18 mm thread diameter
- W** 14 mm thread diameter

Section 04 ELECTRICAL SYSTEM

Sub-section 03 (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 1985 snowmobile models.

The heat range identification system is:

High number —————> cold plug

Low number —————> hot plug

1985 CROSS REFERENCE CHART

List of NGK spark plugs used on 1985 Bombardier snowmobiles.

BR7ES
BR8ES
BR9ES

Section 04 ELECTRICAL SYSTEM
Sub-section 03 (SPARK PLUGS)

DESIGN SYMBOLS USED IN NGK SPARK PLUGS

First letter prefix for thread and hexagon size

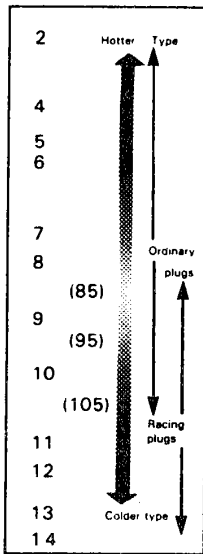
Second & third letter prefix for construction feature, except single prefix

Heat rating number

First letter suffix for thread reach

Second letter suffix for construction feature, etc.

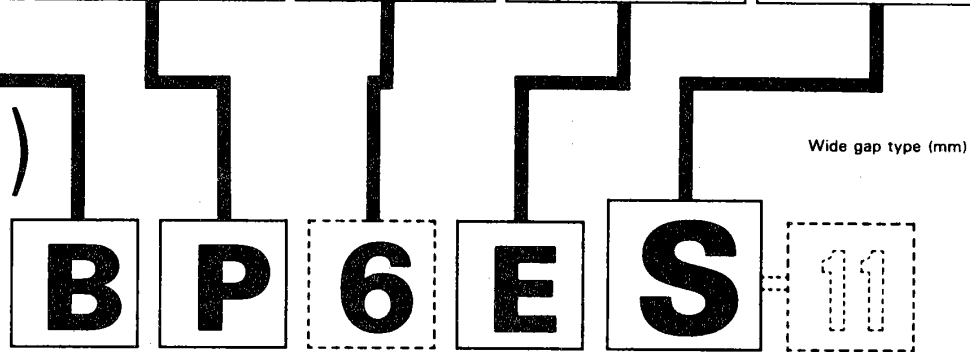
Letter	Thread size	Hexagon size	Letter	Construction feature	Heat rating number	Letter	Thread reach	Letter	Construction feature, etc.
A	18 mm	25.4 mm	B	Hexagon size 20.6 mm	2		12.0 mm (thread dia. 18 mm)	A	Specials
B	14 mm	20.6 mm	C	Hexagon size 16.0 mm	4		9.5 mm (thread dia. 14 mm)	B	Special plug for Honda vehicles
C	10 mm	16.0 mm	G	Hexagon size 23.8 mm	5		None	C	Competition type
D	12 mm	18.0 mm	L	Compact type (SHORTY)	6		22.5 mm (thread dia. PF 1/2" 14 mm)	G	Racing plugs, center electrode of nickel alloy
F	7/8"-18	23.8 mm	M	Compact type (BANTAM)	7		18.0 mm (thread dia. 7/8"-18 mm)	GV	Racing plugs, center electrode of precious metal
G	PF 1/2"-14	23.8 mm	P	Projected insulator nose type	8		11.2 mm	N	Racing plugs, nickel electrode
			R	Resistor type	9	(85)		P	Racing plugs, platinum ground electrode
			S	Shielded type	10	(95)	L	R	Shielded resistor plugs
			U	Surface discharge type	11	(105)	H	S	Copper core center electrode (Super)
					12		E	V	Center electrode of precious metal
					13		F	W	Tungsten electrode
					14			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.



Letter	Thread reach
	12.0 mm (thread dia. 18 mm)
	9.5 mm (thread dia. 14 mm)
None	22.5 mm (thread dia. PF 1/2" 14 mm)
	18.0 mm (thread dia. 7/8"-18 mm)
L	11.2 mm
H	12.7 mm (Racing type 12.5 mm)
E	19.0 mm (Racing type 18.0 mm)
F	Conical seat type
	A - F 10.9 mm
	B - F 11.2 mm
	BM - F 7.8 mm
	BE - F 17.5 mm

Letter	Construction feature, etc.
A	Specials
B	Special plug for Honda vehicles
C	Competition type
G	Racing plugs, center electrode of nickel alloy
GV	Racing plugs, center electrode of precious metal
N	Racing plugs, nickel electrode
P	Racing plugs, platinum ground electrode
R	Shielded resistor plugs
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.)



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

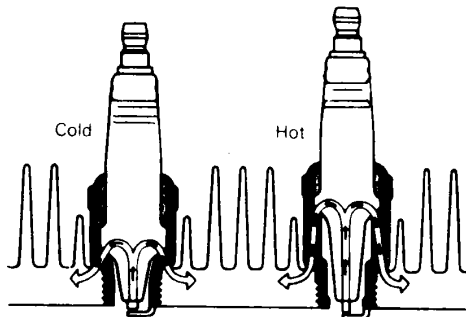
The proper operating temperature or heat range of the spark plugs is determined by the spark plug's ability to dissipate the heat generated by combustion.

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.



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▼ **CAUTION:** Severe engine damage can occur if a wrong heat range plug is used:

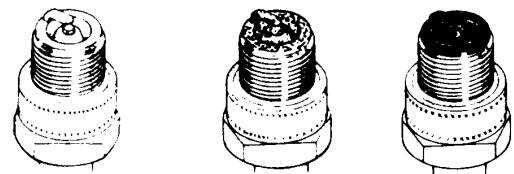
A too "hot" plug will result in overheating and pre-ignition, etc.

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, running the engine with the choke on, or running on a too rich a 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



Overheated
(light grey)

Normal
(brownish)

Fouled
(black)

A000004010

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.

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.
2. Apply a light coat of graphite grease over the spark plug threads to prevent possible seizure.

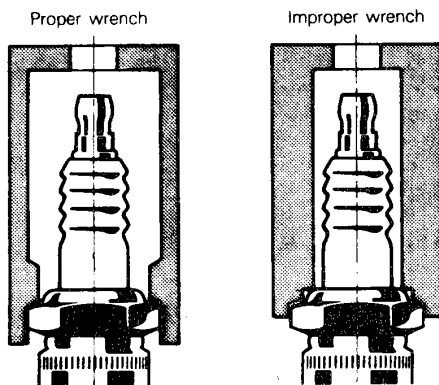
Section 04 ELECTRICAL SYSTEM

Sub-section 03 (SPARK PLUGS)

3. Hand screw spark plug into cylinder head and tighten with a torque wrench:

Bosch - "M" plug (18 mm) 37 N•m (27 lbf•ft)

NGK - "B" plug (14 mm) 27 N•m (20 lbf•ft)



A000004011

Use a proper wrench to tighten the spark plug.

SPARK PLUG CHART

Models	Engine type	Spark plugs
Elan	247	Bosch M175T1 (M7A)
Citation LS, LSE	253	NGK BR9ES
Tundra/LT	253	NGK BR9ES
Skandic 377/R	377	NGK BR9ES
Safari 377/E	377	NGK BR9ES
Safari 447	447	NGK BR9ES
Safari Grand Luxe LC	532	NGK BR8ES
Formula SS	462	NGK BR8ES
Formula SP	462	NGK BR8ES
Formula MX	467	NGK BR9ES
Formula Plus	537	NGK BR9ES
Alpine	503	NGK BR7ES
Mirage III	377	NGK BR9ES

BATTERY

REMOVAL

◆ **WARNING:** When disconnecting battery cables, always remove the black negative cable first then the positive cable (red).

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 copper brush.

INSPECTION

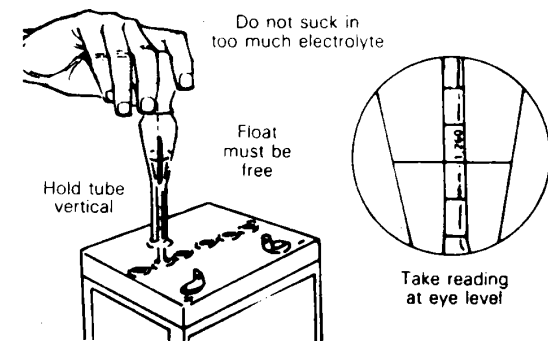
Visually inspect battery casing for cracks or other possible damage. If casing is damaged, replace battery.

Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

◆ **WARNING:** Some battery caps do not have vent holes. If so, make sure that overflow tube is unobstructed.

HYDROMETER TEST



A000004012

A hydrometer measures the state of charge of a battery in terms of specific gravity. Most hydrometers only read true 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 points for every 5.5°C (10°F) below 27°C (80°F).

THIS CHART WILL HELP YOU TO FIND THE CORRECT READING.

	°C		°F		
At	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
 Acid 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
 Acid 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 may crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the state of charge of the battery.

Section 04 ELECTRICAL

Sub-Section 04 (BATTERY)

Temperature-Corrected Specific Gravity	Battery state of 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 as required.

▼ **CAUTION: Do not overfill.**

The battery must always be stored in fully charged conditions. If required, recharge until specific gravity of 1.260 is obtained.

▼ **CAUTION: Battery electrolyte must not exceed 50°C (122°F).**

Clean battery terminals and cable connections using a copper brush. Apply a light coat of dielectric grease (P/N 413 7017 00) or petroleum jelly on terminals.

Clean battery casing and vent 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 "Topped up" and near full charge as possible (trickle charge).

ACTIVATION OF NEW BATTERY

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 at pre-delivery operations and anytime you have to install a new battery.

1. Remove the sealing tube from the vent elbow. Install overflow tube included in the battery kit.

◆ **WARNING: Failure to remove the sealing tube could result in an explosion.**

2. Remove caps and fill battery to the 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 can dissolve.

4. Readjust the electrolyte level to UPPER LEVEL.

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.**

▼ **CAUTION: If cell temperature rises higher than 50°C (122°F) discontinue charging temporarily or reduce the charging rate.**

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.

8. Reinstall the caps and wipe off any electrolyte spilt on battery using baking soda and water solution.

◆ **WARNING: Overflow tube must be free and open. A kinked or bent tube will restrict ventilation and create gas accumulation that could result in an explosion.**

○ **NOTE:** It is recommended to verify the battery state once a month. If necessary readjust the battery at fully charged condition.

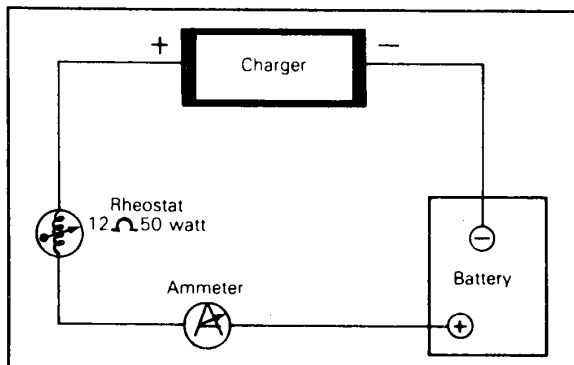
BATTERY CHARGING EQUIPMENT

The battery charger must 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.

If your 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 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.



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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.**

Section 04 ELECTRICAL
Sub-Section 04 (BATTERY)

INSTALLATION OF BATTERY

Install battery, connect positive cable (red) then negative cable (black).

Coat battery posts with petroleum jelly then slide protective cap over positive post.

Connect one end of vent tube to battery vent elbow and insert the other end in bottom pan hole.

▼ **CAUTION:** Ensure that neither the positive or the negative cables touch the muffler.

TROUBLE SHOOTING:

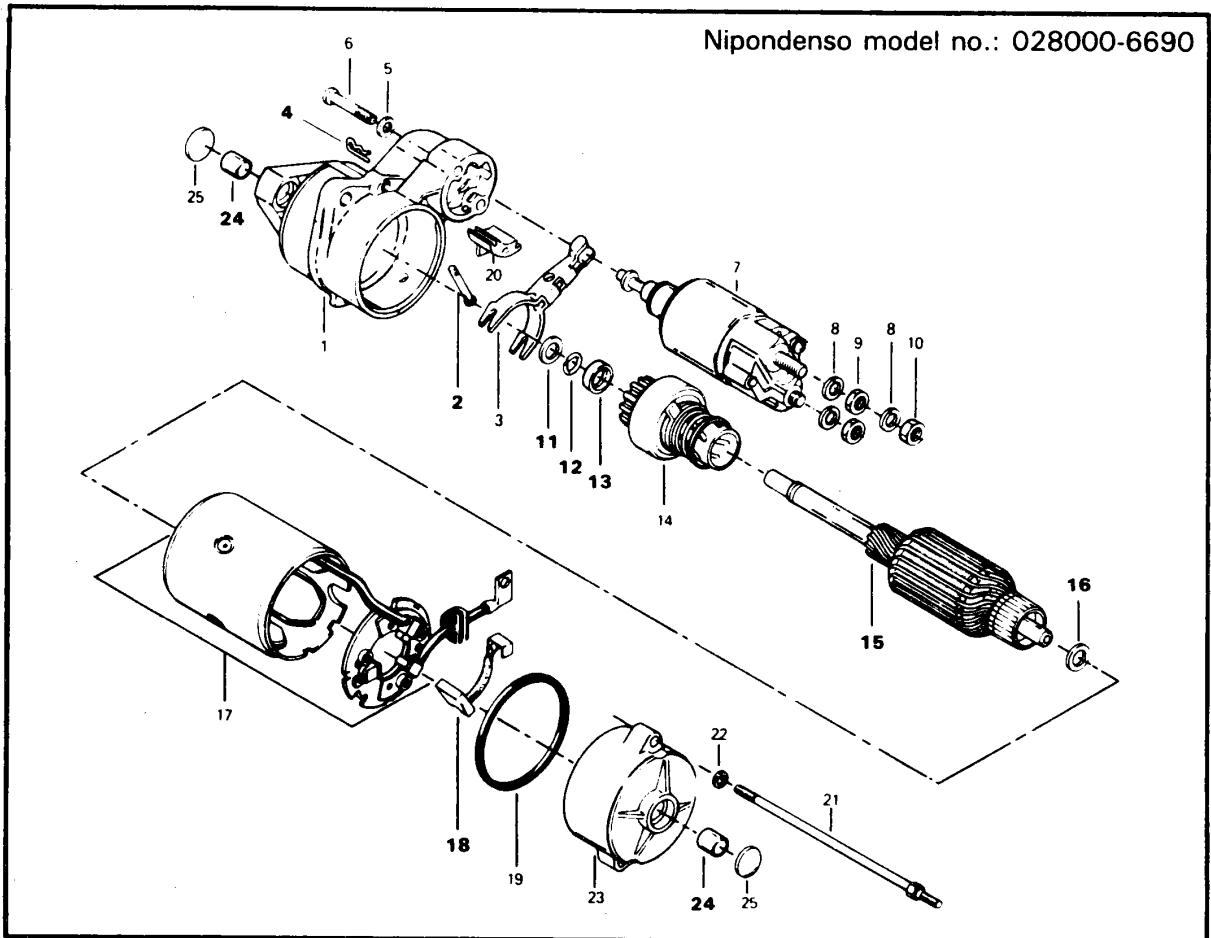
Symptom	Cause	Remedy
Discharged or weak battery	<ul style="list-style-type: none">*1. Faulty rectifier2. Faulty charging coil3. Loose or bad ground connections4. Battery poles and/or cable terminals oxidized5. Faulty battery (cracked casing, damaged or loose posts)	<ul style="list-style-type: none">1. Replace rectifier2. Replace charging coil3. Tighten cable terminals4. Clean battery posts and cable terminals5. Replace battery

*To test the charging system, disconnect positive cable at the battery, install an ammeter between cable and battery post. If the reading indicates that the charging system operates normally, check items 2, 3 and 4.

ELECTRIC STARTER

SAFARI 377E, SAFARI GRAND LUXE LC & ALPINE

Nipondenso model no.: 028000-6690



1. Drive housing assembly
2. Drive lever set pin
3. Pinion drive lever
4. Snap pin
5. Lock washer
6. Magnetic switch screw
7. Magnetic switch
8. Lock washer 8 mm
9. Hexagonal nut 8 mm
10. Hexagonal nut 8 mm
11. Shim
12. Snap ring
13. Clutch stop collar

14. Clutch
15. Armature
16. Washer
17. Yoke
18. Brush
19. Rubber packing
20. Rubber seal
21. Through bolt
22. Lock washer
23. End frame
24. Bushing
25. Bushing cover

Section 04 ELECTRICAL
Sub-section 05 (ELECTRIC STARTER)

REMOVAL

Disconnect black cable ground connection from battery. Disconnect the red battery cable and the red and green wire from the solenoid switch. Remove starter.

DISASSEMBLY & ASSEMBLY

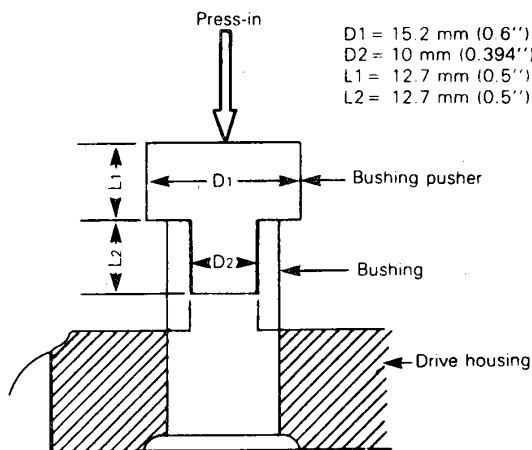
CAUTION: To carry out some of the following procedures, it is necessary that special equipment be available. If you do not possess such equipment, either replace the damaged components or have the parts overhauled in a workshop equipped with proper tooling.

24, Bushings

Check the wear on bushings by measuring the amount of side play between the armature shaft and the bushings.

The side play should not exceed 0.20 mm (0.008"). If excessive, replace the bushing. To replace a bushing, press out the old one and press in a new one with a bushing pusher. The correct size of the bushing pusher to use is given in the illustration below.

NOTE: It may be required to ream the new bushing to obtain proper fit.



2,4, Drive lever set pin & snap pin

To pull out the armature with overrunning clutch assembly and the drive lever from the drive housing, remove the hair pin and pull out the drive lever set pin.

11,15,16, Shims, armature & washer

Note the number and the position of the washers and shims located at both ends of the armature. An end play of 0.050 to 0.35 mm (0.002 — 0.014") should exist between armature and end housing.

04-05-2

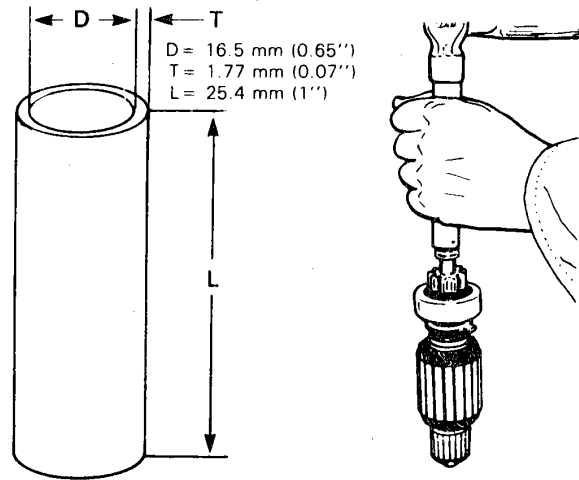
12,13, Snap ring & clutch stop collar

To remove the clutch stop collar from the armature, make a tool similar to the illustration below.

First push the clutch stop collar towards the clutch.

Take off snap ring.

Drive out the clutch stop collar.

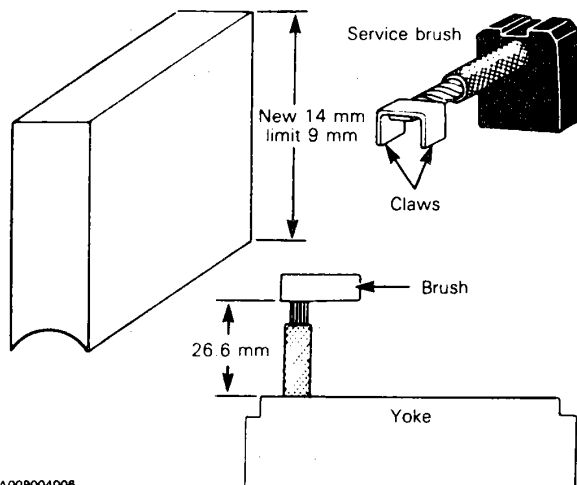


18, Brushes

Check the brushes length less than 9 mm (0.350"), replace the brushes. (A new brush is 14 mm (.550" long).

To replace a brush, cut off the old brush from the yoke and insert the remaining brush lead on the yoke between the claws of the new brush. Solder it in place. Cover the soldered portion with the tube on the new brush lead.

Standard brush lead length is 26.6 mm (1.05").



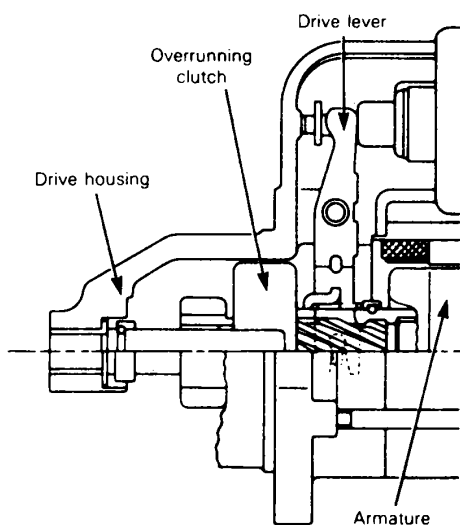
Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

For assembly, follow the disassembly procedure in the reverse order, paying attention to the following.

Coat the sliding surfaces and moving portions of the armature splines, overrunning clutch, bushings and the solenoid switch plunger with multipurpose grease (water, climate and cold resistant).

Reinstall the drive lever as illustrated below.



A009004007

When reassembling the yoke to the drive housing align the embossment on the yoke with the notch pin on the drive housing.

When reassembling the brush holder to the yoke align the embossment on the brush holder with the notch on the yoke.

○ **NOTE:** Make sure to reinstall the same number of shims on the armature at the place noted during disassembly.

When reassembling the commutator end frame to the brush holder align the notch on the commutator end frame with the pilot embossment on the brush holder.

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.

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:** Bearing bushing of the drive unit must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

INSPECTION

Armature

○ **NOTE:** For the following testing procedures, the 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.

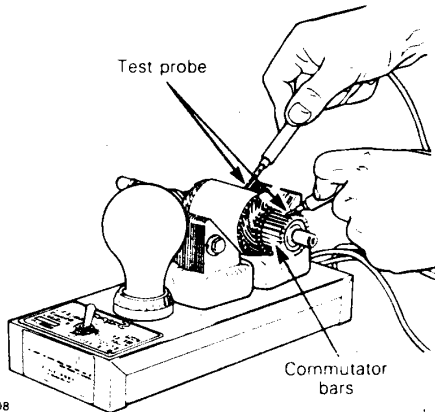
Check the commutator out-of-round condition with V Blocks and an indicator. If the commutator out-of-round is more than 0.40 mm (.016"), the commutator should be turned on a lathe.

Check the commutator for mica depth. If the depth is less than 0.20 mm (0.008"), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.

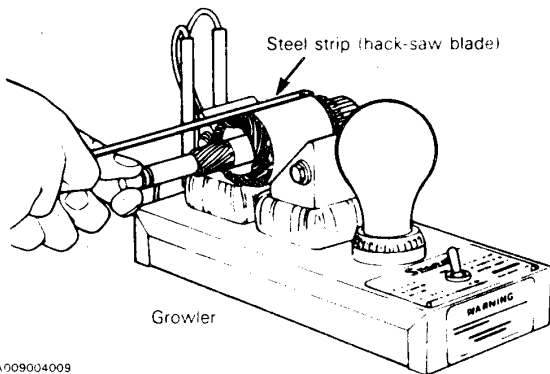
Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

Test for ground circuit in the armature using growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded.



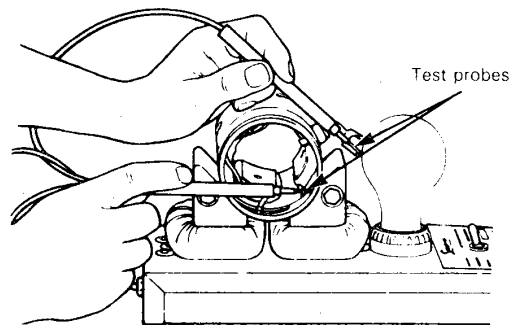
Test armature for shorted winding using a growler. When the armature is rotated in the growler with a steel strip (hack-saw blade) held above it, the strip will vibrate over that area of the armature which has short circuited.



Test the armature for open circuit using 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-circuit armature coil).

Field windings and brushes (028000-6690 starter model only)

Test the field winding for open circuit using 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 performance 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 poor insulation and has to be repaired or replaced.

Check the brush spring tension with a spring scale. This should be done by placing 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).

Overrunning clutch

The pinion of the overrunning clutch should turn smoothly in the clockwise direction, and should not slip in a counterclockwise direction with the armature fixed. If defective, replace

Check the pinion teeth for wear and damage. If defective, replace.

Section 04 ELECTRICAL
Sub-section 05 (ELECTRIC STARTER)

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.

TROUBLE SHOOTING

Causes of troubles are not necessarily in the starting system (starter) but may be due to a faulty battery, switches, electrical cables and/or connections. Trouble may also be attributed to a malfunctioning of the ignition system and/or fuel system. The following trouble shooting table is limited to the starting system.

◆ 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.

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.	Replace solenoid switch
	Open circuit of solenoid switch pull-in winding.	Replace solenoid switch.
	Open circuit of solenoid switch hold-in winding.	Replace solenoid switch.
	Poor contact of brush.	Straighten commutator and brush.
	Burnt out commutator.	Turn commutator in lathe.
	Commutator mica too high.	Undercut mica.
	Shorted field coil. (028000-6690 starter model only).	Repair or replace yoke.
	Shorted armature.	Repair or replace armature.
	Weak brush spring tension.	Replace spring.
	Weak magnet (128000-1670 starter model only).	Replace yoke assembly
	Worn bushings.	Replace bushings.
	Weak battery.	Recharge battery.
	Shorted battery cell(s).	Replace battery.
Poor contact of battery terminal(s).	Clean and tighten terminal(s).	
Open circuit between starter switch and solenoid switch.	Repair.	
Poor battery ground cable connection.	Clean and tighten.	

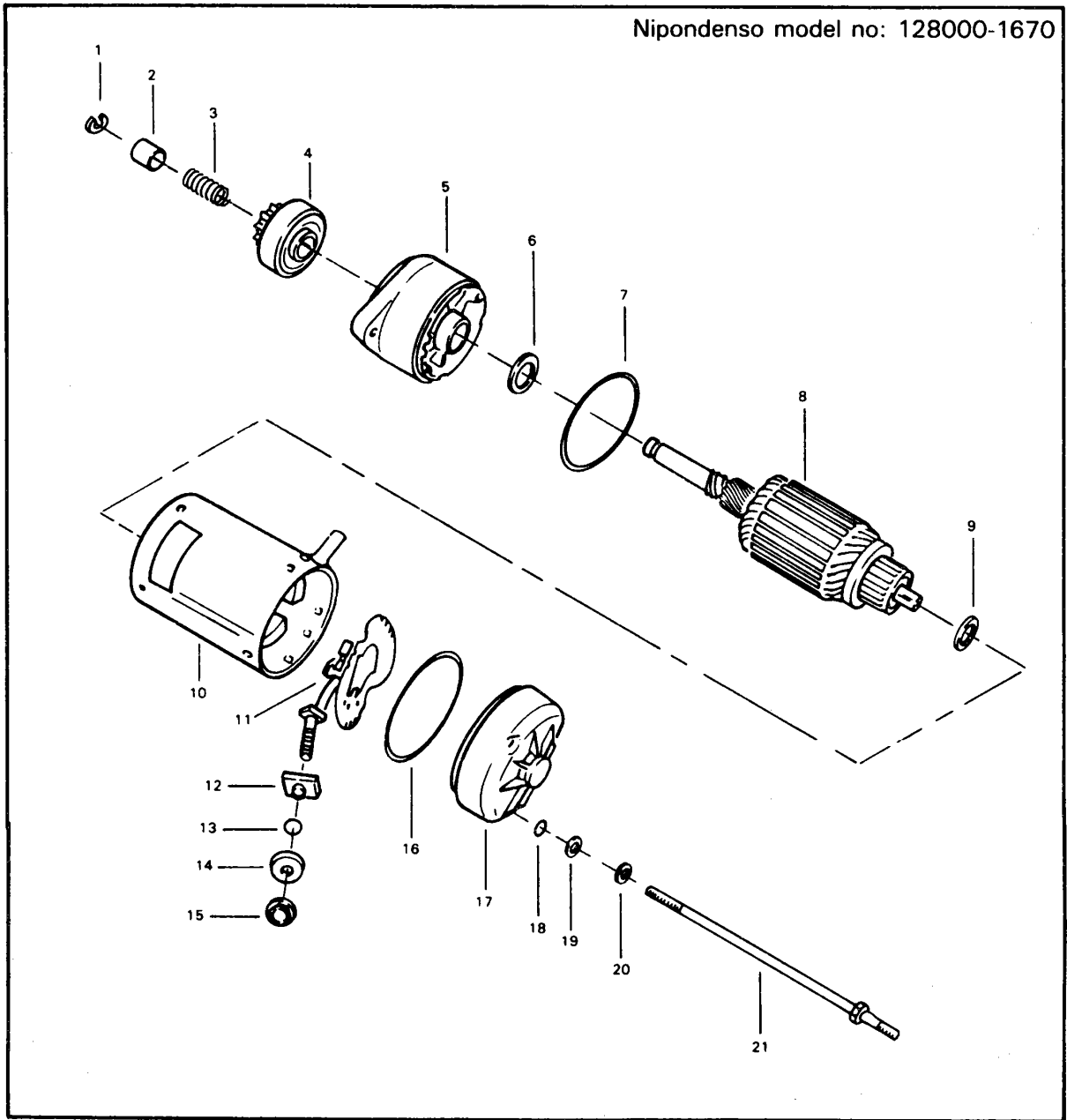
Section 04 ELECTRICAL**Sub-section 05 (ELECTRIC STARTER)**

SYMPTOM	CAUSE	REMEDY
Starter turns, but overrunning clutch pinion does not mesh with ring gear.	Worn clutch pinion gear.	Replace clutch.
	Defective clutch.	Replace clutch.
	Poor movement of clutch on splines.	Clean and correct.
	Worn clutch bushing.	Replace clutch.
	Worn starter bushing(s).	Replace bushing(s).
Starter motor keeps running.	Worn ring gear.	Replace ring gear.
	Shorted solenoid switch winding(s).	Replace solenoid switch.
	Melted solenoid switch contacts.	Replace solenoid switch.
	Starter switch returns poorly.	Replace ignition switch.

Section 04 ELECTRICAL
Sub-section 05 (ELECTRIC STARTER)

CITATION LSE

Nipondenso model no: 128000-1670



Section 04 ELECTRICAL

Sub-section 05 (ELECTRIC STARTER)

1. Snap ring
2. Pinion stop nut
3. Compression coil spring
4. Clutch assembly
5. Housing assembly
6. Shim
7. O-ring
8. Armature assembly
9. Washer
10. Yoke assembly
11. Brush holder

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.

DISASSEMBLY & ASSEMBLY

▼ **CAUTION:** To carry out some of the following procedures, it is necessary that special equipment be available. If you do not possess such equipment, either replace the damaged components or have the parts overhauled in a workshop equipped with proper tooling.

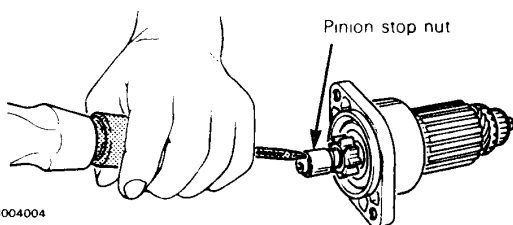
10,11,17,21, Yoke, brushes holder, end frame & through bolts

Remove the two through bolts by unscrewing the nut then separate end frame from yoke assembly. Remove armature assembly from yoke assembly.

Brushes holder can be removed from end frame by unscrewing nut retaining terminal.

1,2,3, Snap ring, pinion stop nut & spring

Tap the pinion stop nut using a screwdriver. Remove snap ring. Disassemble pinion stop nut and spring.



A003004004

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.

04-05-8

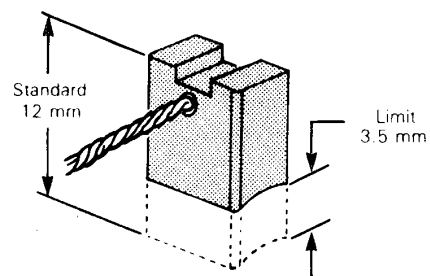
CLEANING

Refer to electric starter, model no. 028000-6690 for cleaning procedure.

INSPECTION

Brushes

Measure the brush length. If it exceeds the limit, replace the brush holder assembly with a new one.



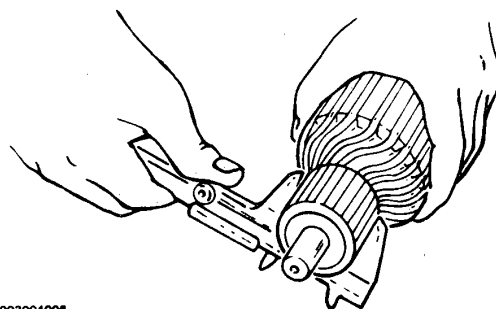
A003004005

Armature

Refer to the armature inspection procedure; model no. 028000-6690 except for the following.

MEASUREMENT OF COMMUTATOR OUTER DIAMETER

Service limit: 30.7 mm. If worn, replace the armature.



A003004006

Section 04 ELECTRICAL
Sub-section 05 (ELECTRIC STARTER)

REASSEMBLY

Reverse the order of disassembly to reassemble the starter. However, attention should be paid to the following operations.

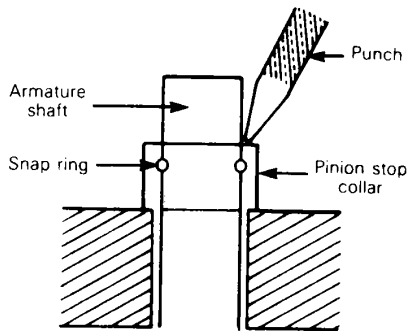
LUBRICATION

Before reassembling, apply 10W-30 on moving parts. (Shaft, bearing etc.).

1,2, Snap ring & pinion stop nut

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.

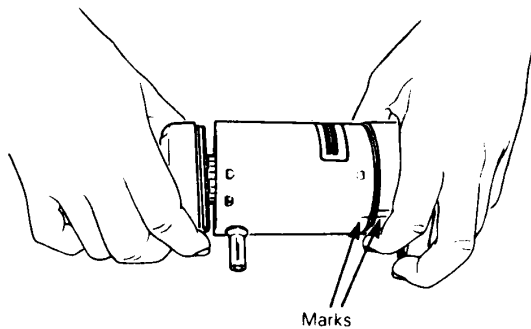
Tap the pinion to slide the stop collar onto the snap ring. Using a punch, secure the stop collar by punching it in two or three places.



A003004007

5,10, Housing & yoke ass'y

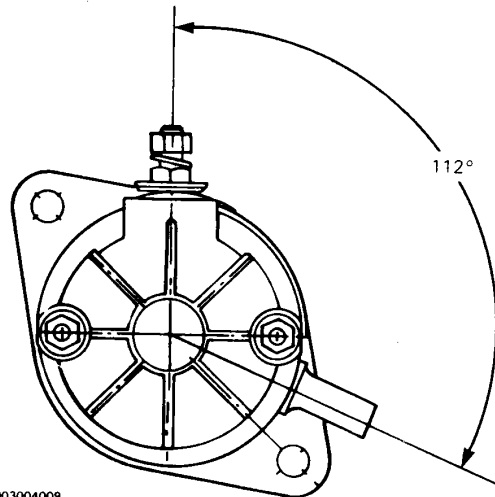
Be sure that the marks align.



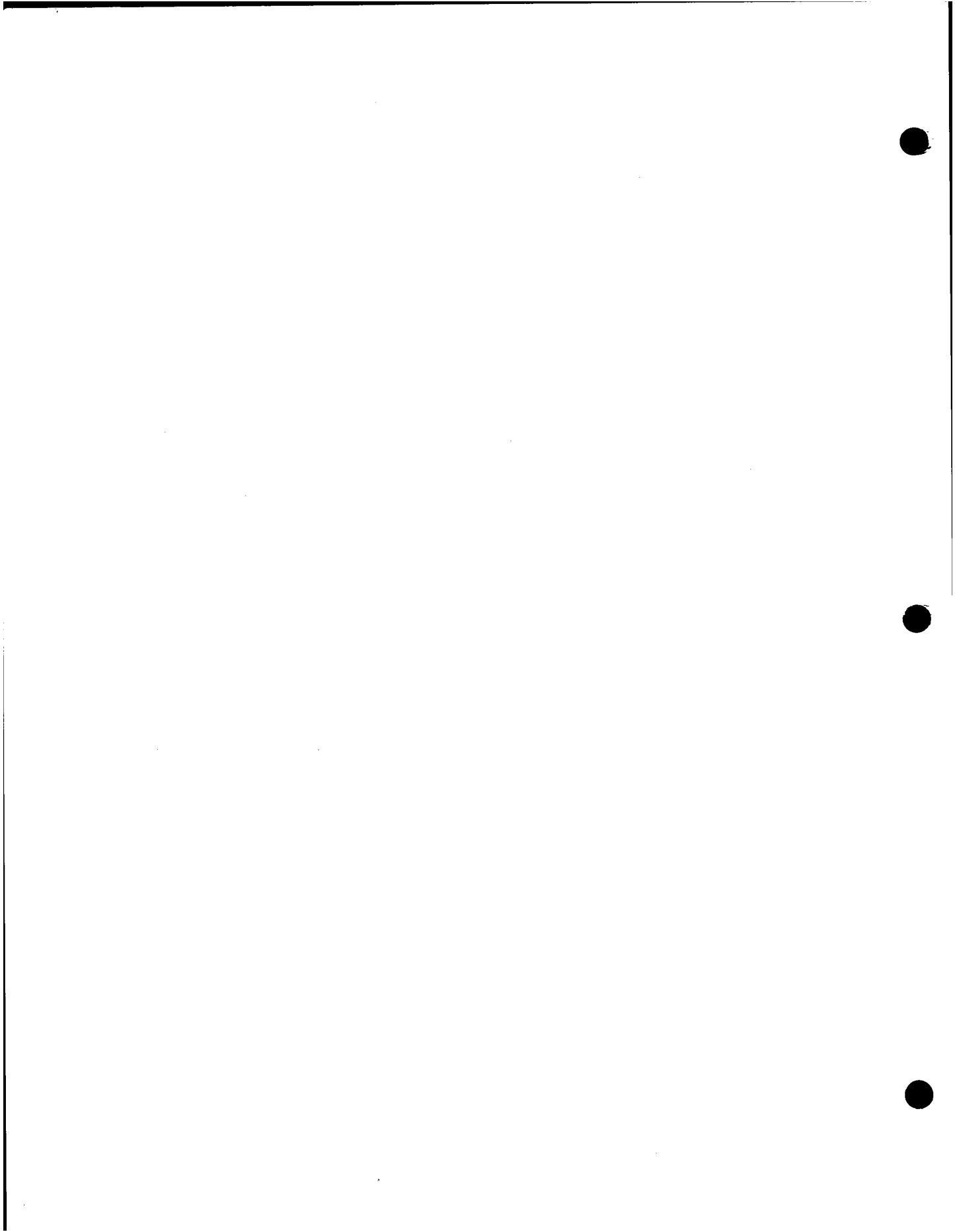
A003004008

10,17, Yoke ass'y & end frame

The vent tube must make an angle of 112° with the electric connector.

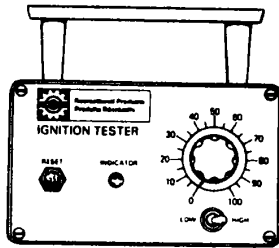


A003004009



TESTING PROCEDURE

BOMBARDIER IGNITION TESTER



A000004014

GENERAL

The Bombardier ignition tester is an electrical energy measuring device capable of measuring the peak energy output of a coil.

The tester is of solid state construction and performs as a comparator. The correct value of energy output is indicated in each test and is then compared with the value taken from the engine being tested.

The energy output is verified by means of a 0-100 scale on the tester. The greater the energy output, the greater value indication on the scale. The indication is in the form of an incandescent lamp that lights when the scale knob is set at the position corresponding to the energy output.

The tester has two input ranges selected by a toggle switch. The **LOW** range is sensitive to AC or DC voltages from 0.5 to 27 volts. The **HIGH** range is sensitive to AC or DC voltages of from approximately 75 to 500 volts.

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.

Read all instructions **thoroughly** and as you become familiar with this test instrument it will be possible to test a complete ignition system in a matter of minutes. Always proceed in the following order:

1. Connect tester **P** and **N** clip leads as illustrated.
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 ignition.

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.

Double trouble

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.

Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)

ANALYSER TEST AND MAINTENANCE

A test simulator is provided with each tester as a means to test the lamp, detector circuit, and batteries.

High scale test

- a) Place switch in **HIGH** position. Plug the simulator into an electric outlet (117 VAC) for ten seconds.

▼ **CAUTION:** After charging, do not touch plug terminals while pressing test button. A mild shock will result.

- b) Remove the simulator from the outlet, and connect the "P" and "N" leads from the tester to the simulator as indicated on the button of the simulator.
- c) Set the tester dial to 50, or below. Depress the button of the simulator. The indicator lamp on the tester should light.

○ **NOTE:** For each test performed by the simulator, it must be recharged.

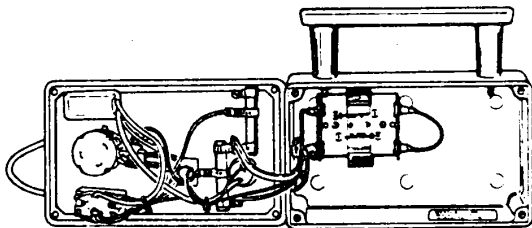
Low scale test

- a) Place switch in **LOW** position.
- b) Set tester dial to 50, or below.
- c) Connect **N** lead to negative terminal of 12 volt battery. Connect **P** lead to positive terminal of 12 volt battery; indicator lamp should light.

If lamp does not light, check tester batteries. If they are installed correctly and are good, check the clip leads for faulty connections. If no fault can be found, refer to the warranty statement for instructions for sending the tester back to Electro-Specialties, Inc.

Battery replacement

- 1. Remove the four (4) screws securing cover to case.
- 2. Carefully lift cover.
- 3. Replace batteries with size "C" Alkaline batteries. Be sure to observe polarity markings on battery holder or lamp will not light.



A00004015

- 4. Carefully install cover on case being certain that no wires are pinched between cover and case. Secure cover.

○ **NOTE:** Weak batteries will not impair tester operation or calibration. The light will glow dim.

The ignition tester may give false readings if the rivets on the back cover come in contact with metal.

Indicator knob alignment

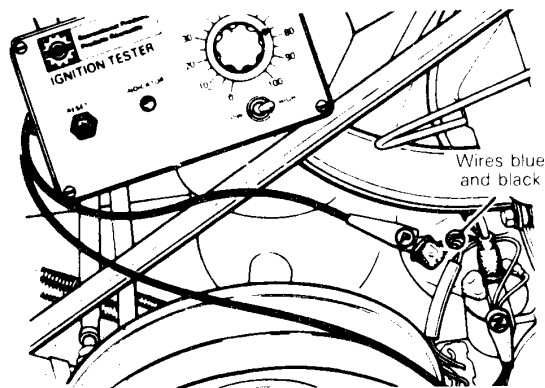
Check indicator knob alignment by turning knob fully clockwise. The white mark on the knob must align with no. 100 on the scale. If the marks does not line up with the no. 100, loosen the knob set screw, line the mark on the knob with no. 100, and tighten the set screw. Re-check alignment.

○ **NOTE:** If after adjustment, the knob is turned fully counter-clockwise and it does not exactly align with the 0, it is of no consequence.

ONE CYLINDER ENGINES (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.



A00004016

- 3) Set tester dial and switch as follows:

Engine type	Switch position	Dial
247	HIGH	75

Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)

4) Turn ignition key to ON position, disable emergency cut-out button circuit and tether cut-out switch and then crank engine.

a) **Indicator lamp lights:** Coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.

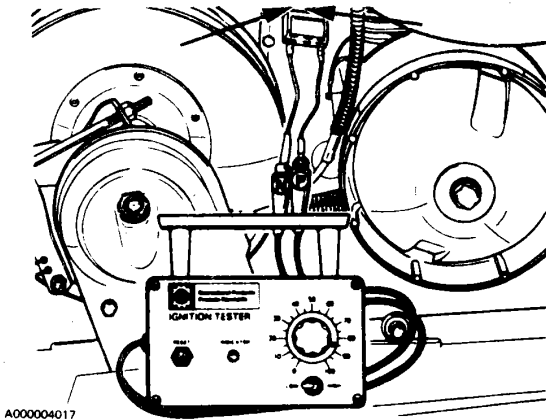
b) **Indicator lamp does not light:** Coil output is below specifications. This could be caused by a faulty coil or breaker points. Check breaker points condition and adjustment, and correct as necessary. Repeat test. If lamp still does not light the coil is defective and should be replaced.

2. Lighting coils output (247 engine type)

○ **NOTE:** There are two independent coils; main (large) coil wires are yellow and yellow/black while brake light 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 coil: yellow and yellow/black wires
small 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.

a) **Indicator lamp lights:** Coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.

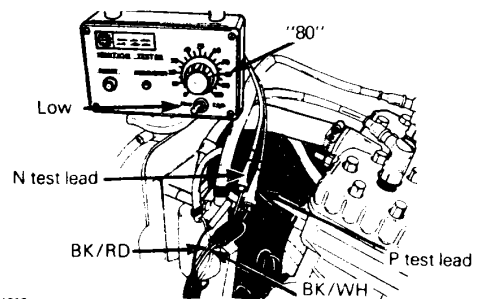
b) **Indicator lamp does not light:** Coil is faulty.

**253,377,447,462,467,503,532,537,
CDI SYSTEMS VERIFICATION**

1. High speed charging coil

- 1) Disconnect wire connectors from C.D.I. electronic box 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.

(TYPICAL)



3) Set tester switch and dial as follows:

ENGINE TYPE	SWITCH POSITION	DIAL
253,377,447, 462,467, 503,532,537	«LOW»	80

4) Turn ignition key 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 when engine is running, do not touch any components related to electronic ignition system (ignition coil, high tension wire, wire harness, etc.).

a) **Indicator lamp lights:** 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 charging coil.

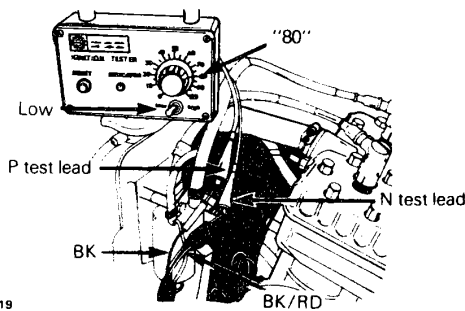
◆ **WARNING:** Do not touch tester P lead clip while cranking the engine. Also make sure that tester leads do not touch any metallic object.

Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)

2. Low speed charging coil

- 1) Disconnect wire connectors from C.D.I. electronic box harness to engine.
- 2) At the magneto harness, connect tester **P** test lead to: Black wire and connect tester **N** test lead to **black/red** wire.

(TYPICAL)



- 3) Set tester switch and dial as follows:

Engine type	Switch position	Dial
253,377,447, 462,503,532 537	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 when engine is running, do not touch any electronic ignition components (ignition coil, high tension wire, wire harness, etc.).

- a) **Indicator lamp lights:** Low speed charging 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 charging coil is faulty.

3. Lighting coil

- 1) Disconnect wiring harness junction block at engine.
- 2) Connect tester **P** test lead to:
YL/BK wire and connect **N** test lead to **YL** wire.
- 3) Set tester and dial as follows:

ENGINE TYPE	SWITCH POSITION	DIAL
253,377,447, 462,467,503, 532,537	«LOW»	70

- 4) Crank engine.
 - 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)

C.D.I. PARTS INSPECTION PROCEDURE

Disconnect the connectors of the C.D.I. electronic box, ignition coil and junction block at engine. Check the resistance or continuity between each terminals with an ohmmeter and refer to the following:

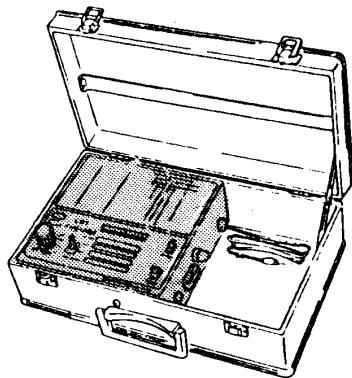
PART NAME		WIRE COLOR	RESISTANCE	BOMBARDIER IGNITION TESTER SETTING	REMARKS
MAGNETO	High speed charging coil	BK/WH with BK/RD	2.8-4.2 Ω	Low 80	If the reading is: $\circ \Omega$ short circuit $\infty \Omega$ open circuit
	Low speed charging coil	BK with BK/RD	120-180 Ω	Low 80	
	Lighting coil	YL/BK with YL	0.21-0.31 Ω	Low 70	
IGNITION COIL	Primary	BK with WH/BL	0.23-0.43 Ω	N.A.	
	Secondary winding	High tension wire with high tension wire (spark plug protector removed)	2.45-4.55 K Ω	N.A.	
	Insulation	WH/BL with core	$\infty \Omega$	N.A.	
		WH/BL with high tension wire	$\infty \Omega$	N.A.	

N.A.: Not applicable

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

BOMBARDIER CDI CHECKER



A000004020

GENERAL

The Bombardier CDI checker is a feature for the verification of the NIPPONDENSO CDI systems. This checker combines the function of all test equipments into one checker, and it tests all NIPPONDENSO systems under actual operating conditions with one set of connections. All test results are digitized and will show on the LED level indicator which is calibrated from 0 to 9. You can diagnose the CDI system by comparing the test results with the diagnostic chart.

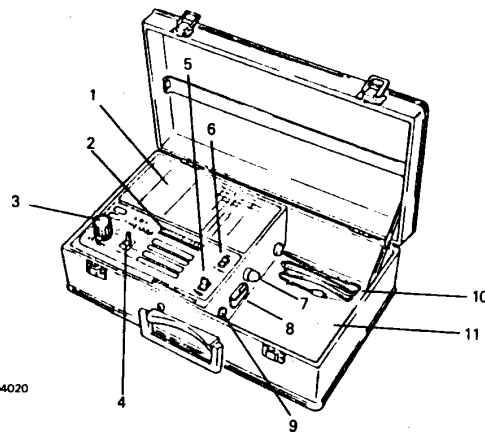
NOTE: The Bombardier CDI checker is only applicable to the Nippondenso CDI systems used on the Bombardier recreational products.

SPECIFICATION AND CONSTRUCTION

Specification

Power source:	AC 115 volts/60 Hz
Power consumption:	Less than 50 watts
Ambient temperature:	-10° C to 40° C (for usage) -30° C to 60° C (for storage)
Dimensions:	370 (H) x 230 (W) x 120 (D)
Weight:	Approx. 4.0 kg
Standard accessories:	Test wire harness A, B and C grounding wire

Construction



A000004020

- 1 Diagnostic chart
- 2 LED level indicator
- 3 Selector
- 4 HI & LO switch
- 5 START & RESET switch
- 6 Power switch
- 7 Fuse box
- 8 Test wire harness connector
- 9 Grounding wire connector
- 10 Power cord
- 11 Accessories box

Precautions & safety

- a) Do not give a shock to the checker.
- b) Never touch the connector terminals when the power switch is on position.
- c) Before connecting the test wire harness, be sure that the engine is stopped.
- d) Use the checker under the specified temperature (-10° C to 40° C).
- e) Connect the power cord to the recognized power source. (AC 115 volts/60Hz).
- f) When spark test, do not touch the high-tension cable. A mild shock will result. Hold high-tension cable by an insulator.

Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)

Test items

CODE NUMBER	IGNITION TYPE	ENGINE TYPE	TEST ITEM
2	4-5P (Harness B)	253,377,447,462 467,503,532,537	Generator coil Control unit diode Control unit spark test

This checker tests the following items:

TEST	CHECK POINT	APPLICABLE	
		CODE NO.	IGNITION TYPE
Generator coil test	HI	1,2	4-4P 4-5P
	LO	1,2	4-4P 4-5P
Control unit test	Output of control test	1,2	4-4P 4-5P
Control unit diode test	Check of control diode in in control unit	2	4-5P
Spark test	Check of ignition spark	1,2	4-4P 4-5P

Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

Generator coil test (HI and LO)

This test is performed on the vehicle at cranking speed. The two generator coils are called high and low speed generator coils. The checker indicated the output of these coils by switching HI and LO positions as follows.

HI: Output of high speed generator coil.

LO: Output of high and low speed generator coil.

Analysis of this test is diagnosed by its level.

Control unit test

The CDI checker inputs alternative current into the control unit instead of the generator coil.

The output of the control unit will be indicated on the LED level indicator. Analysis of this test is diagnosed by its level.

Control unit diode test (for 4-5P ignition type, 253,377,447,462,467,503,532,537)

The control unit includes the diode which controls the output of the generator coil according to the engine speed. This checker can diagnose this diode. The result will be indicated on the LED level indicator.

Spark test

Using an ignition coil equipped on the vehicle, this tester can cause the spark across the high-tension wire and engine body.

○ **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).

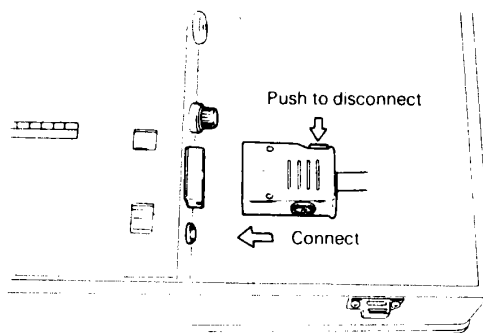
▼ **CAUTION:** To prevent any damage to the checker, do not try other power source than the above mentioned one and ensure that the checker is installed on a plane surface, away from vehicle vibrations.

CONNECTION OF TEST WIRE HARNESS

a) Choose the right test wire harness according to the following.

CODE NO.	IGNITION TYPE	ENGINE TYPE	TEST WIRE HARNESS
2	4-5P	253,377,447, 462,467,503, 532,537	B

b) Connect the test wire harness to the checker aligning the arrow marks.

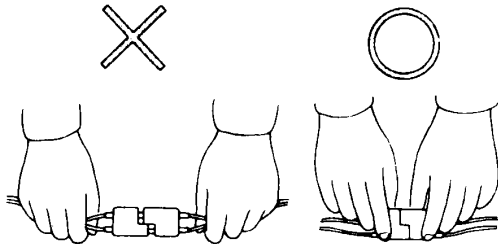


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Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)

c) Disconnect the connectors of magneto and control unit.

▼ **CAUTION:** Never pull the wire harness to disconnect.



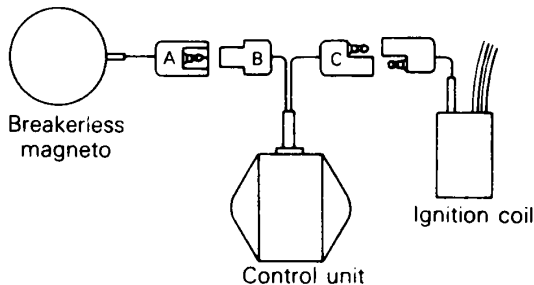
A000004022

d) Securely connect the connectors of test wire harness according to the connectors letters on the following figures.

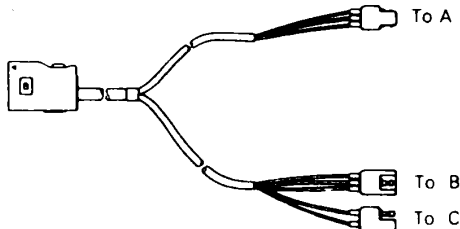
▼ **CAUTION:** When connecting, be sure that the test wire harness does not interfere with moving part of engine.

4-4P ignition type engine (253,377,447,462, 467,503,532,537)

(Vehicle wiring)



(Test wire harness "B")



A000004023

○ **NOTE:** The harness "A" supplied in the kit is applicable to the 84's 462 engine type equipped with a 4-4P ignition type (140 W). It is also applicable to order engines type 354 and 454 equipped with a Nippondenso CDI system.

The harness "C" is only applicable to the Can-Am 504 engine type.

TEST

a) Turn the power switch on. Then one LED or two LED's will light to indicate the checker is operating. Reset the indication circuit by depressing the reset switch, the 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.

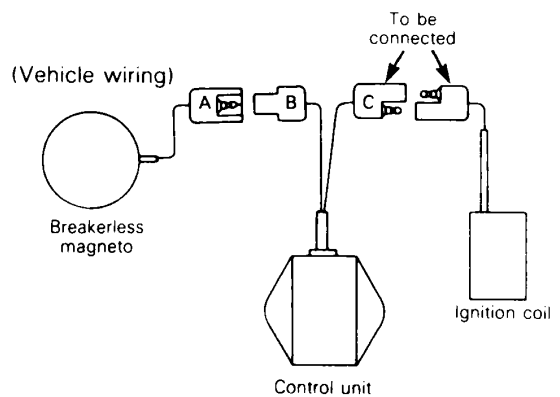
d) If the test results are over or lower than the limit, see "Analysis of test".

○ **NOTE:** Test results 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 control unit and the control unit diode (if applicable) have been checked.

b) Disconnect the checker from the connector of the control unit output side (originally connected to the ignition coil).

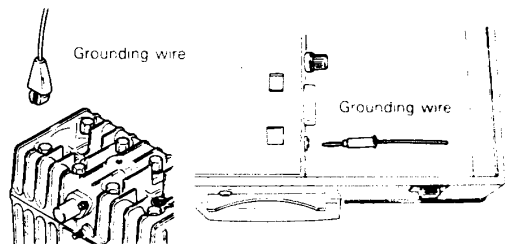


A000004024

Section 04 ELECTRICAL

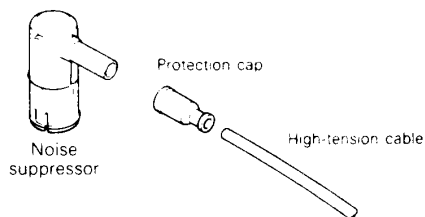
Sub-section 06 (TESTING PROCEDURE)

- c) Connect the ignition coil connectors to the control unit connectors.
- d) Connect the grounding wire to the checker and to a bare surface of the engine.



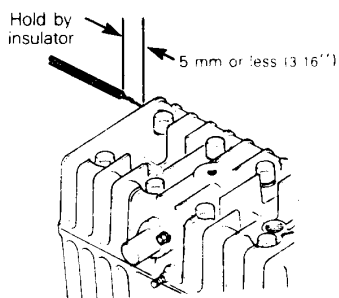
A000004025

- e) Set the selector to CONTROL UNIT position.
- f) Remove the noise suppressor and the protection cap from the end of high-tension wire.



A000004026

- g) Keep the distance 5 mm (3/16") 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.



A000004027

WARNING: Do not touch the high tension wire while doing the procedure. Hold high tension wire with an insulator.

Generator coil test

- a) This test should be performed at both HI & LO switch positions. Switch LO position and set the selector to GENERATOR COIL position.
- b) Crank the engine and read the LED level indicator. Reading should be:
 - for 4-4P: from 2 to 8
 - for 4-5P: from 2 to 8
- c) Switch to HI position and repeat procedure. Reading should be:
 - for 4-4P: from 3 to 8
 - for 4-5P: from 2 to 8

Control unit test

- a) To perform this test, switch can be at LO or HI position.
- b) Set the selector to CONTROL UNIT position.
- c) Depress START switch for **5 seconds** minimum and read LED level indicator. Reading should be:
 - for 4-4P: from 4 to 5
 - for 4-5P: from 4 to 5

Control unit diode test

NOTE: This test is applicable **only** to 4-5P ignition systems.

- a) Set the selector to CONTROL UNIT DIODE position. Then, four or five LED's will light. If four or five LED's do not light, check the power source and that the selector and switches are positioned correctly.
- b) Depress the START switch and read LED level indicator. Reading should be:
 - for 4-5P only: 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 in below.

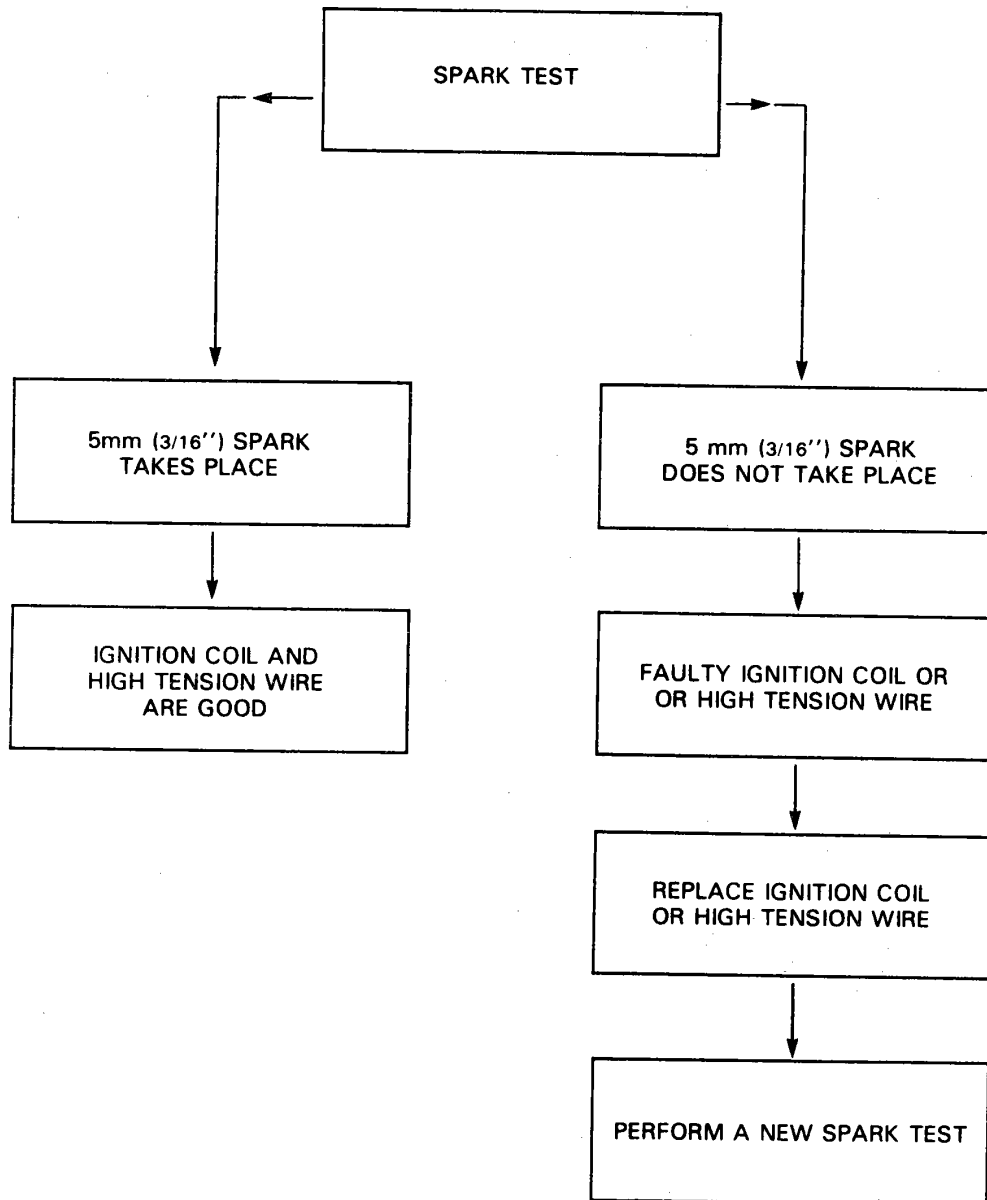
CODE NO.	IGNITION TYPE	CHECK PART		LEVEL INDICATOR						NG		OK	HARNESS	ENGINE TYPE	
				0	1	2	3	4	5	6	7				8
2	4-5P	Generator coil	HI											B	253,377,447, 462,467,503, 532,537
			LO												
		Control unit													
		Control unit diode													
				0	1	2	3	4	5	6	7	8	9		

If the reading of the LED level indicator is higher or lower than the correct value (OK zone), refer to "Analysis of test result" as described hereafter.

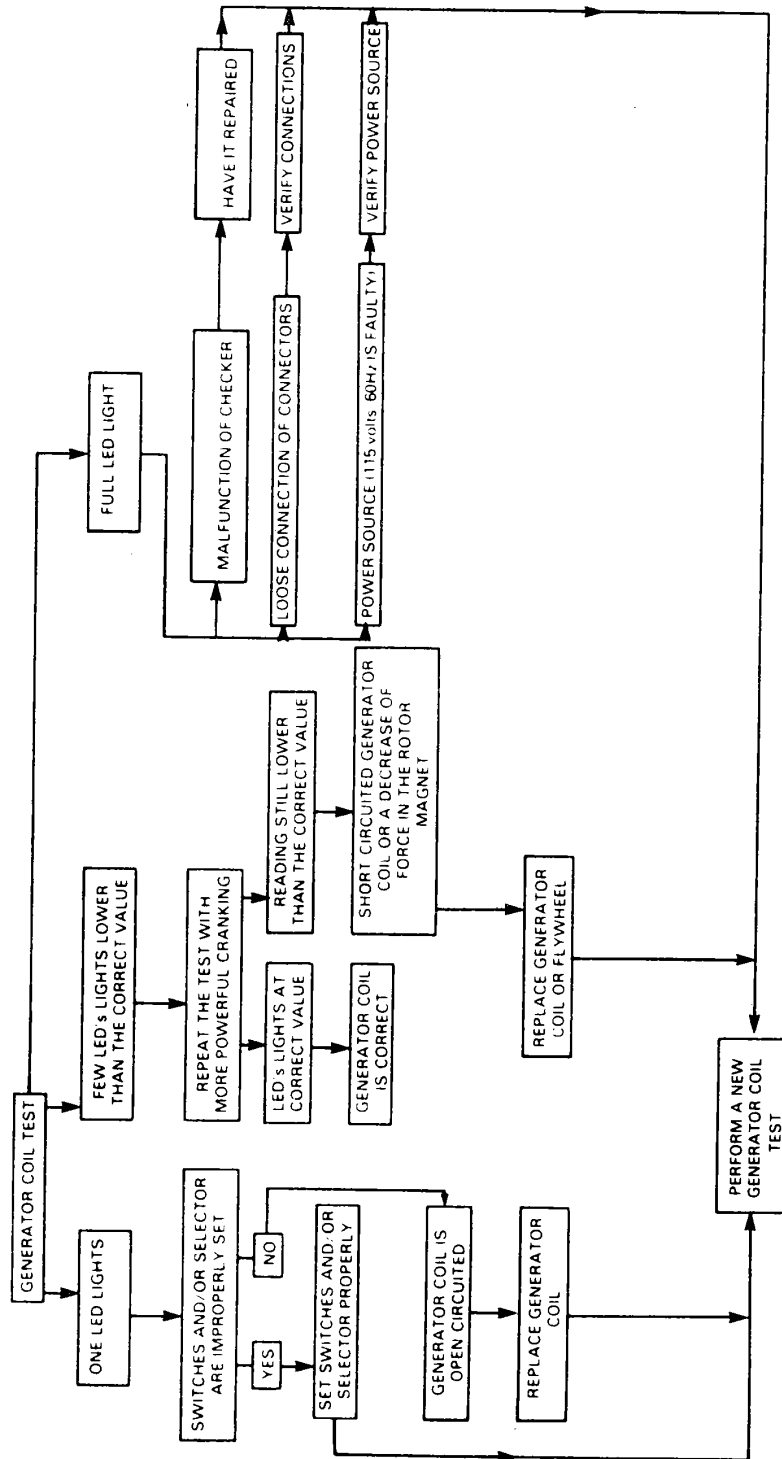
Section 04 ELECTRICAL

Sub-section 06 (TESTING PROCEDURE)

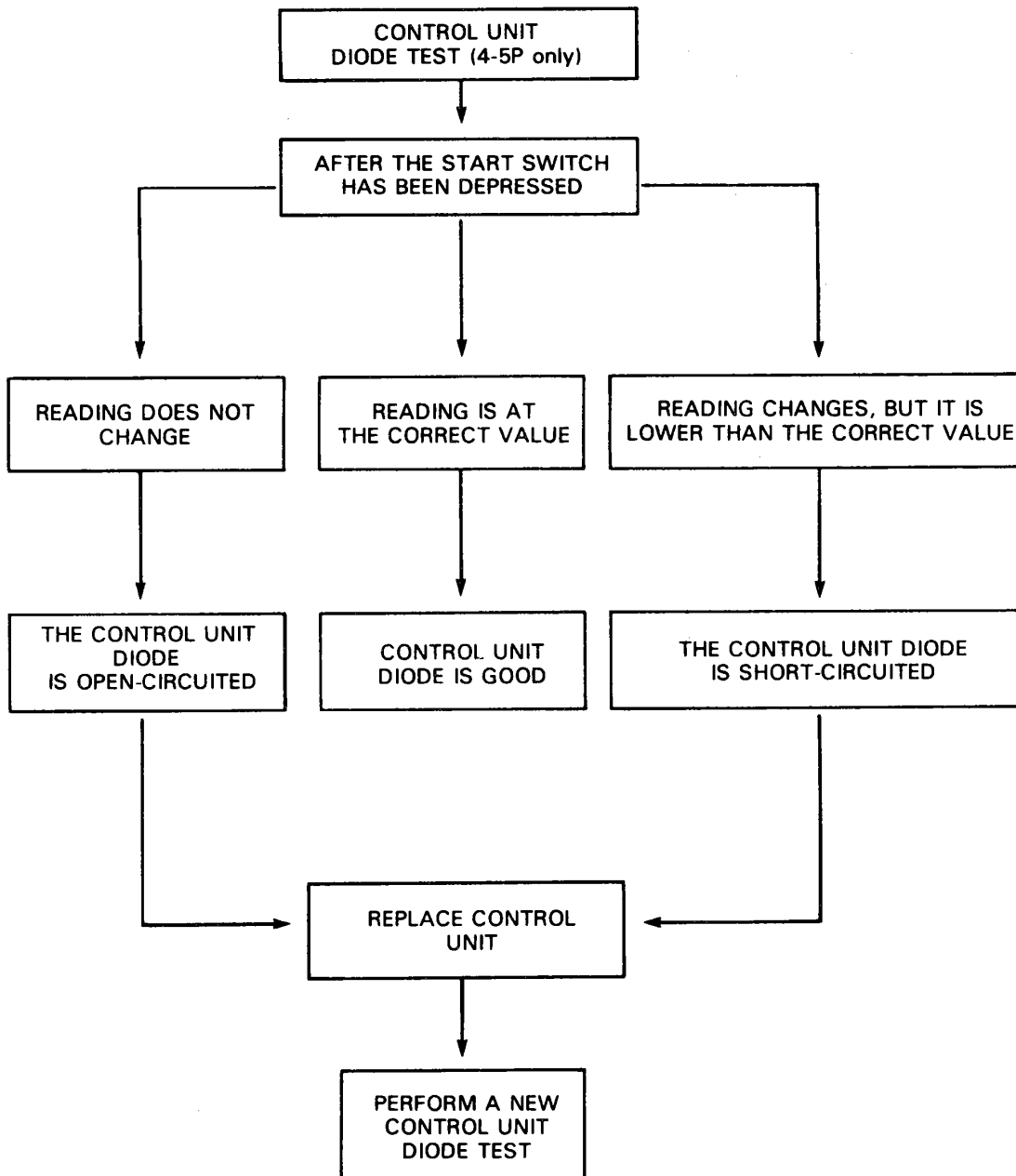
TROUBLE SHOOTING CHART — NIPPONDENSO CDI SYSTEMS



Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)



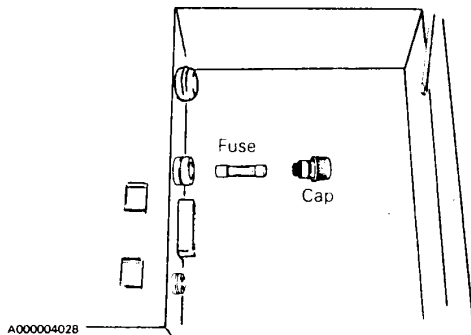
Section 04 ELECTRICAL
Sub-section 06 (TESTING PROCEDURE)



FUSE REPLACEMENT

If no LED lights, check fuse provided in checker.

- a) Unscrew the cap.
- b) Replace the fuse with new one (1 amps Midget glass tube type, \varnothing 6.4 x 30 mm) if necessary.

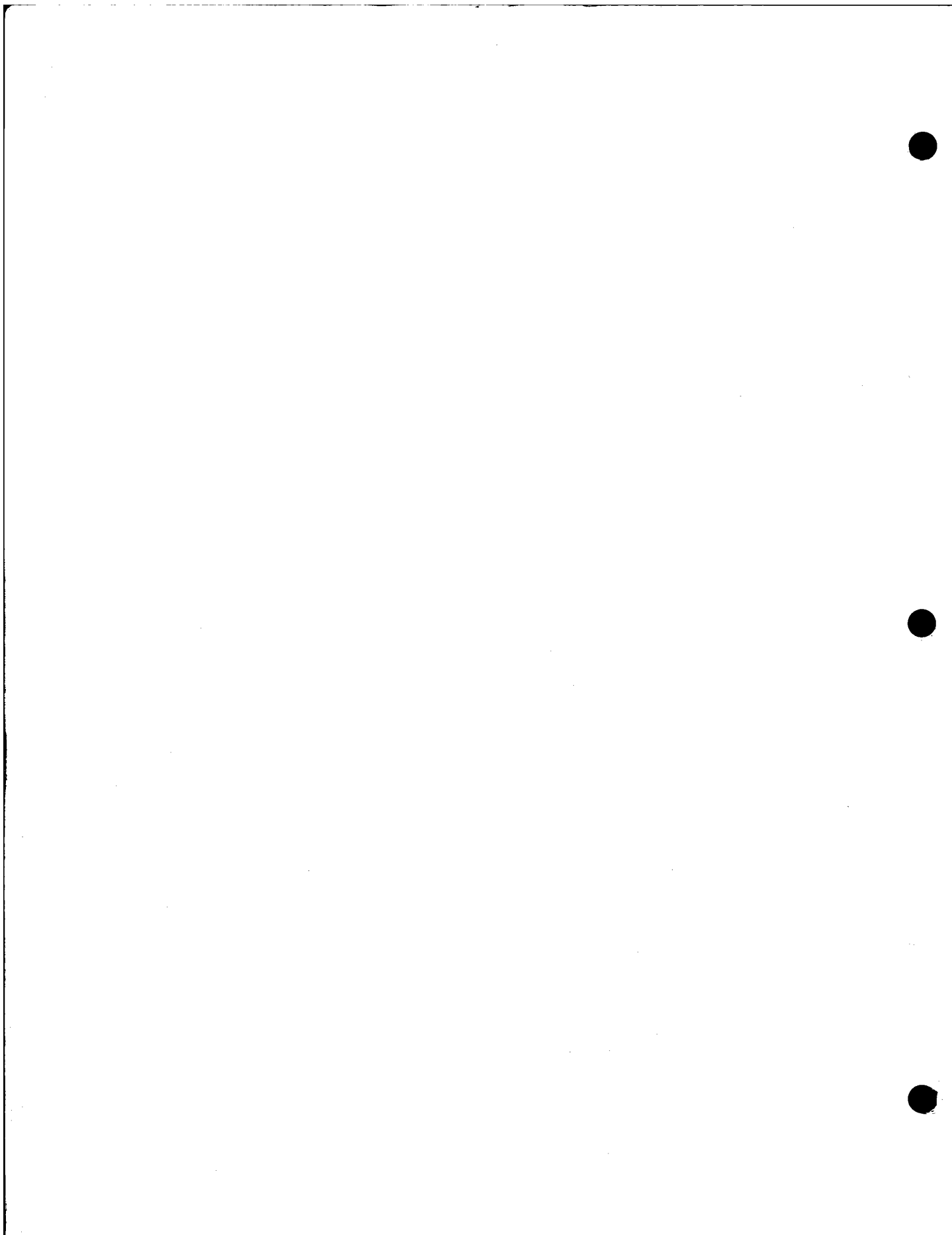


REPAIR AND AFTER-CARE SERVICE

In the event of a failure or fault calling for repair, contact Nippondenso Canada Ltd. It is strictly prohibited that the user should disassemble the instrument. Be aware that some semiconductors may be damaged even by static electricity stored in the human body.

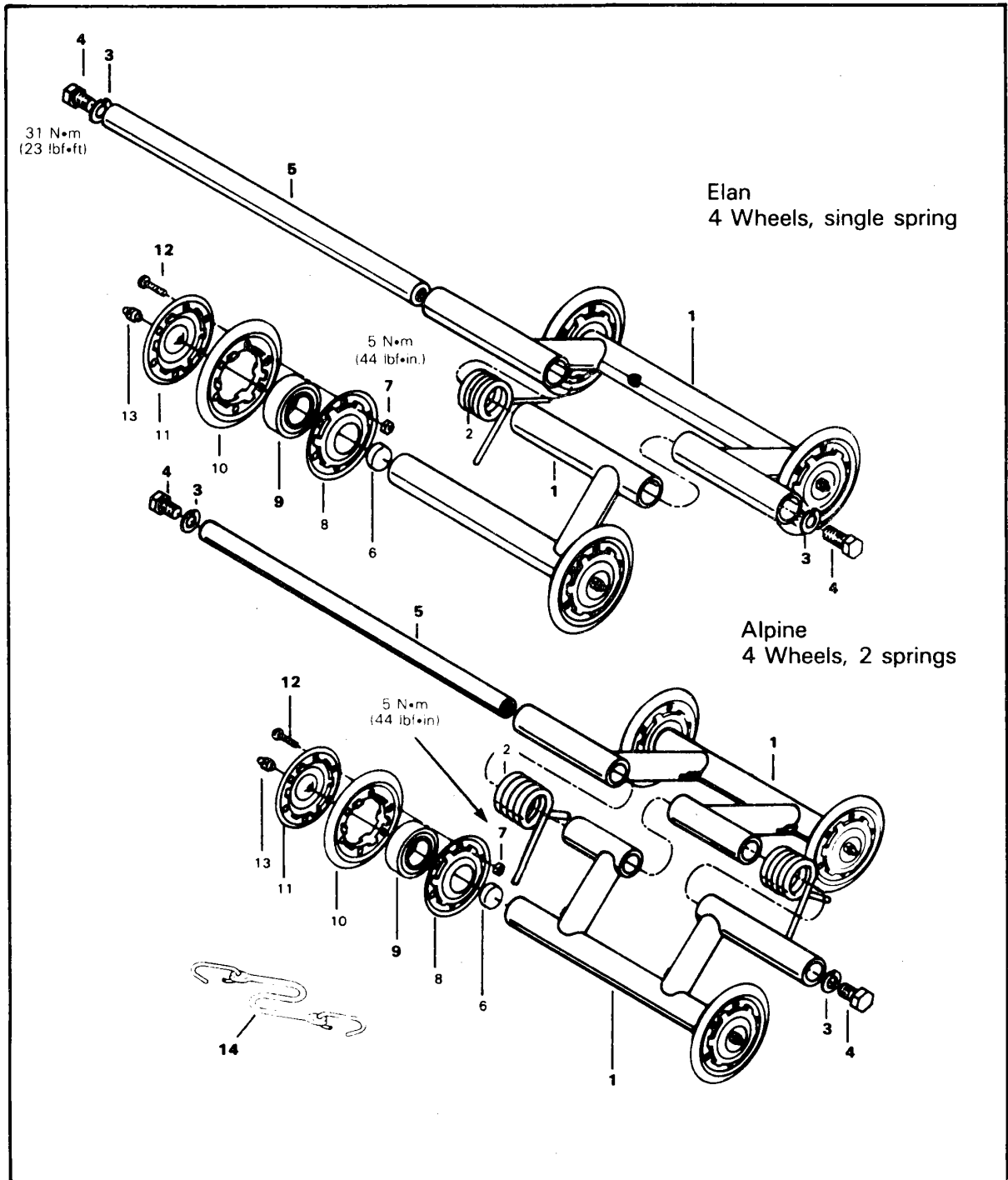
Also, contact Nippondenso Canada Ltd, for the supply of accessories.

Nippondenso Canada Ltd.
4500 Sheppard Avenue East, Unit 29
Agincourt, Ontario
Canada (M1S 3R6)



Section 05 SUSPENSION
Sub-section 01 (BOGIE WHEELS)

BOGIE WHEELS



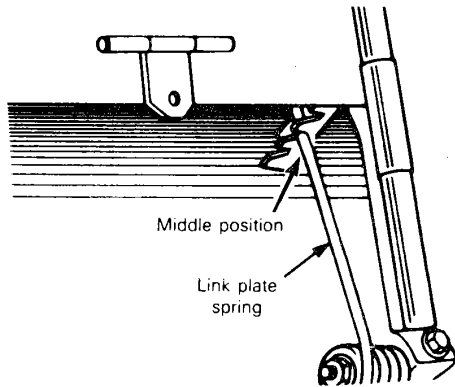
Section 05 SUSPENSION
Sub-section 01 (BOGIE WHEELS)

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
14. Elastic band (Alpine)

REMOVAL

Raise and block rear of vehicle off the ground.
 Release track tension by unlocking the link plate springs using an appropriate tool.

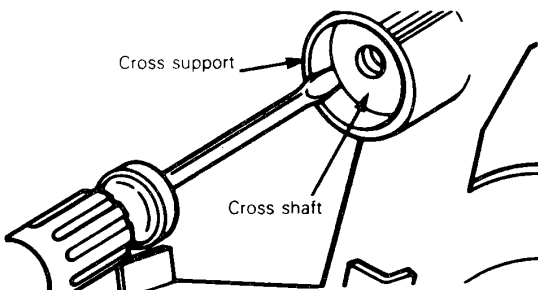


A002005001

3,4,5, Lock washers, cap screws & cross shafts

Starting at center bogie wheel set, remove bolts 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.



A002005002

Remove bogie wheel set.

NOTE: Since spring diameter may vary depending upon 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

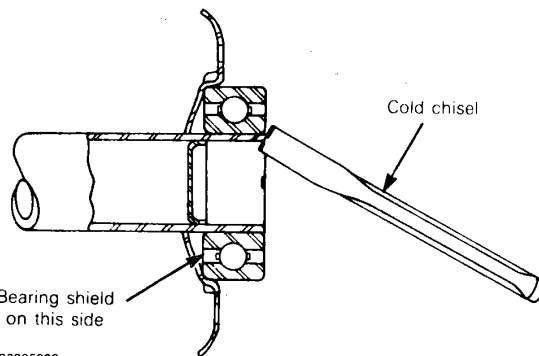
Heat spring anchor on wheel support before attempting to open or close anchor.

5, Cross shafts

Clean then lubricate cross shaft with low temperature grease (P/N 413 7044 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.



A002005003

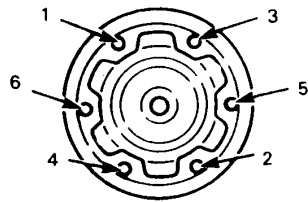
7,12, Flanges nuts & bolts

Bogie wheels are factory riveted. When separation is necessary, remove rivets securing wheel tire and flanges by using a 3/16" dia. drill. Secure flanges and tire using

Section 05 SUSPENSION

Sub-section 01 (BOGIE WHEELS)

bolts and nuts tighten in the following sequence to 5 N•m (44 lbf•in.).



Torque sequence

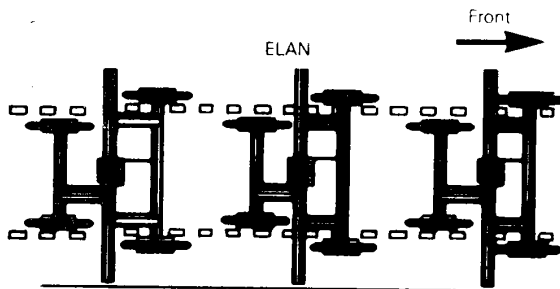
A002005004

INSTALLATION

3,4,5, Lock washers, capscrews & cross shafts

With rear of vehicle supported off the ground, position front bogie wheel set in location and secure to frame using lock washers and capscrews. Secure rear set then remaining set(s) to frame.

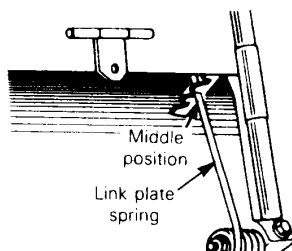
○ NOTE: On Elan models, put the wider portion of bogie wheel to the front direction of vehicle.



A002005005

Using an appropriate tool, apply track tension by hooking the link plate springs into the anchors.

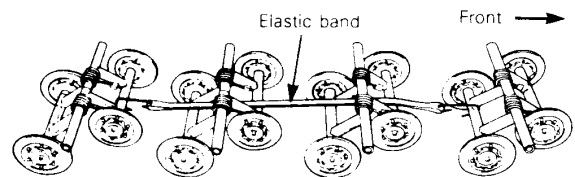
○ NOTE: If applicable, place spring ends in middle position of the 3 position slotted anchor.



A002005001

1,14, Wheel support & elastic band

On Alpine models it is necessary to place an elastic band between rear tube of front bogie and front tube of rear bogie. This will prevent center bogies from tipping up.



A017005001

Lubricate each bogie wheel until new grease appears at joint. Wipe off excess grease (grease P/N 413 7044 00).

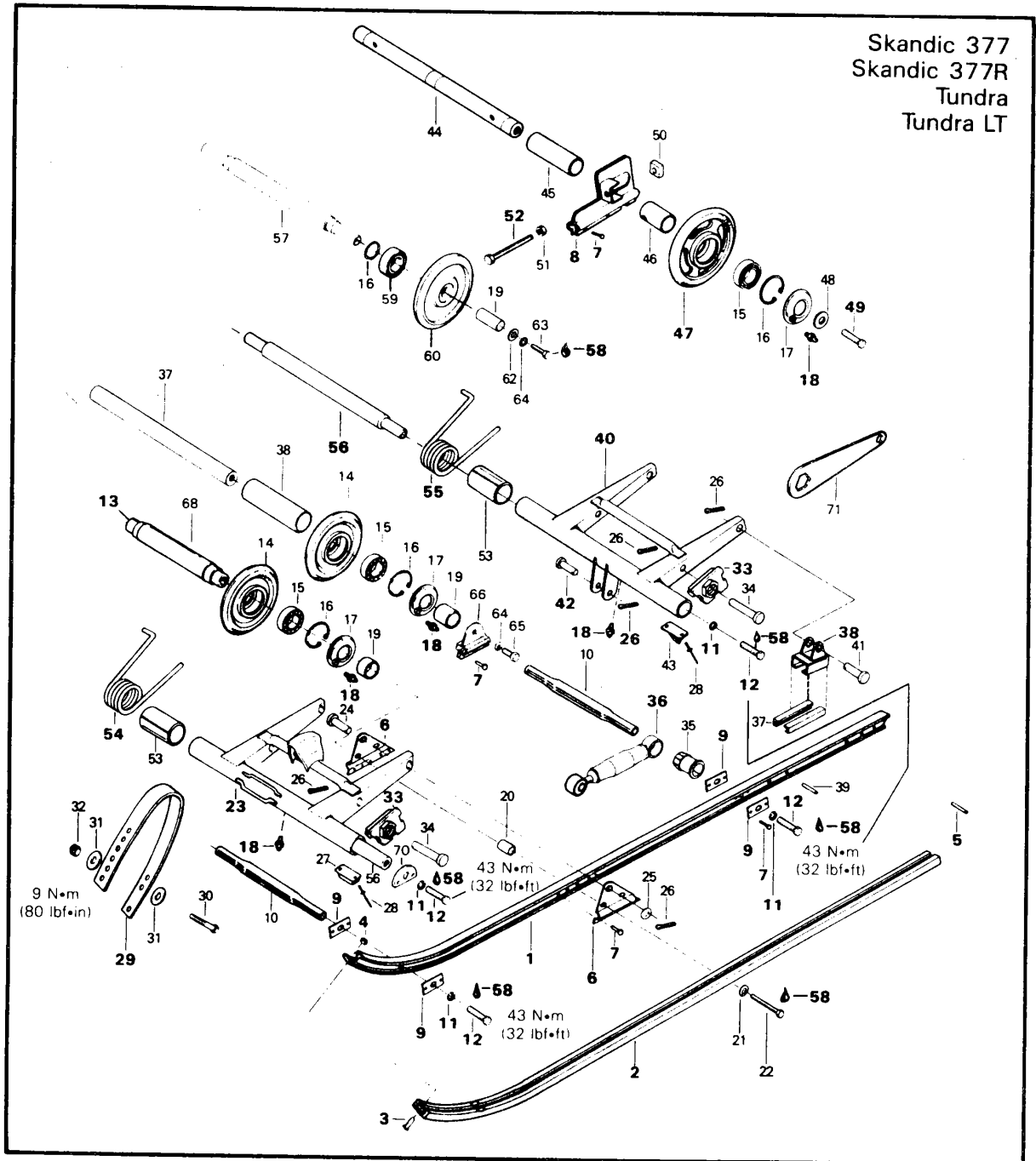
○ NOTE: To adjust the track tension and alignment refer to section 05-08.



Section 05 SUSPENSION
Sub-section 02 (SLIDE SUSPENSION)

SLIDE SUSPENSION

"TORQUE REACTION" TYPE SUSPENSION



Section 05 SUSPENSION

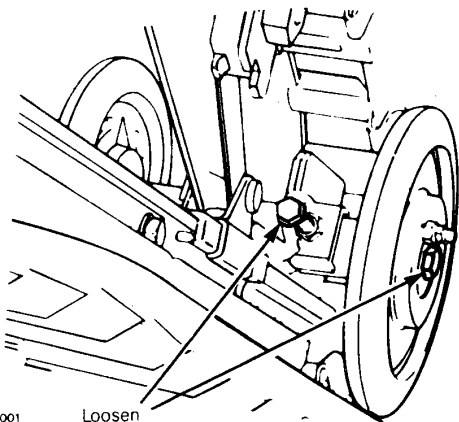
Sub-section 02 (SLIDE SUSPENSION)

1. Runner
2. Slider shoe
3. Screw
4. Stop nut
5. Spirol pin
6. Front arm bracket
7. Rivet
8. Adjustment plate
9. Reinforcement bracket
10. Tube
11. Lock washer
12. Screw
13. Front idler shaft
14. Idler wheel
15. Bearing
16. Retainer ring
17. Cap
18. Grease fitting
19. Spacer
20. Spacer
21. Lock washer
22. Screw
23. Front arm
24. Clevis pin
25. Flat washer
26. Cotter pin
27. Rubber stopper
28. Rivet
29. Stopper strap
30. Screw
31. Washer
32. Stop nut
33. Adjustment cam
34. Clevis pin
35. Bushing
36. Shock absorber
37. Slider pad
38. Sliding support
39. Spirol pin
40. Rear arm
41. Clevis pin
42. Clevis pin
43. Rubber stopper
44. Rear axle
45. Spacer
46. Spacer
47. Idler wheel
48. Washer
49. Screw
50. Square nut
51. Nut
52. Adjustment screw
53. Bushing
54. Front spring
55. Rear spring
56. Cross shaft
57. Upper idler shaft
58. Loctite 242
59. Bearing
60. Idler wheel
61. Flat washer
62. Lock washer
63. Screw
64. Lock washer
65. Screw
66. Wheel support
67. Center idler shaft
68. Spacer tube
69. Bushing
70. Washer
71. Suspension adjustment wrench

REMOVAL

49,52, Screw & adjustment screw

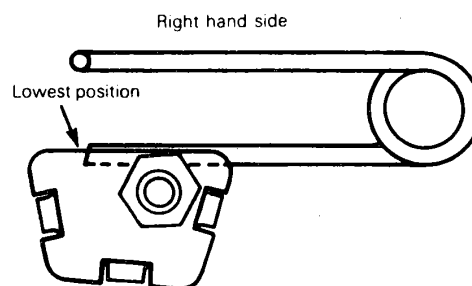
Release track tension by loosening wheel retaining screw and adjustment screw located on inner side of rear idler wheel.



A009005001

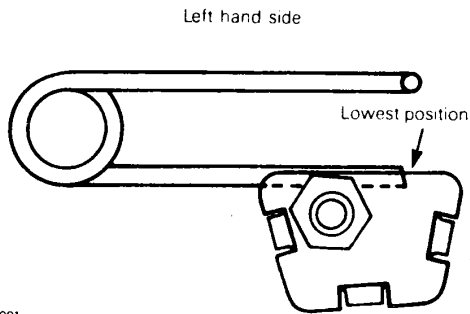
33, Adjustment cams

Position the adjustment cams at the lowest position.



A007005004

Section 05 SUSPENSION
Sub-section 02 (SLIDE SUSPENSION)



A007005001

12,56, Screws & cross shafts

Remove the four (4) screws securing front and rear arm to frame.

Remove suspension system.

NOTE: To prevent cross shaft from turning within the suspension arm, wedge the blade of a small screwdriver between the shaft and suspension arm.

DISASSEMBLY & ASSEMBLY

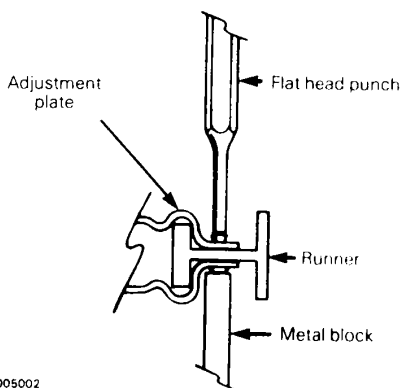
1,2,3,4,5, Runners, slider shoes, screws, stop nuts & spirol pins

To replace a worn slider shoe, remove the rear spirol pin, the front screw and stop nut then slide the shoe rearwards out of the runner.

7,8, Rivets & adjustment plates

To remove the rivets securing the adjustment palte on the front arm supports, cut-off the rivet heads using a cold chisel.

At assembly, position the rivet head on a suitable metal block and hold the assembly firmly in place. With a flat head punch and hammer secure the rivet in place.



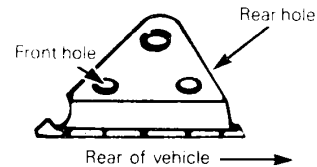
A007005002

7,9, Rivets & reinforcement bracket

To remove rivet use a 3/16" dia. drill. At assembly secure reinforcement bracket to runner with two (2) 10-32 x 1/2" bolts and nuts.

6,13, Front arm bracket & front idler shaft

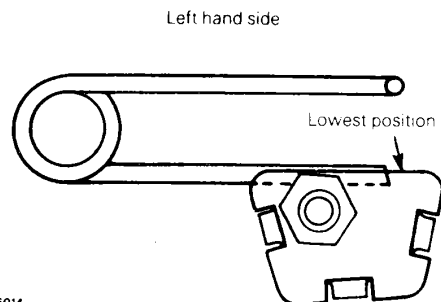
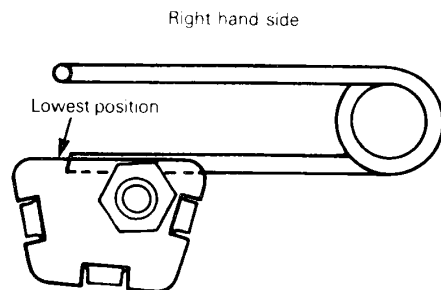
The front idler shaft must be positioned in the front hole of the front arm bracket.



A007005003

33, Adjustment cams

At assembly, position the adjustment cams at the lowest position.



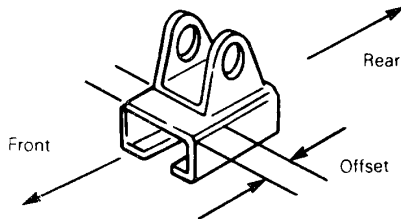
A007005014

Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

38, Sliding support

Sliding support must be installed with offset toward front.



A007005005

12,22,58,63,65, Screws & Loctite 242

Clean all screw threads. Prior to assembly, apply a light coat of "Loctite 242" or equivalent on threads.

54,55, Front & rear springs

Prior to assembly, identify front and rear springs.

Spring location	Model	Color
Front	Tundra Tundra LT Skandic 377 Skandic 377R	Midnight blue
	Tundra Tundra LT	Violet
Rear	Skandic 377 Skandic 377R	Orange

INSTALLATION

On all slide suspension models, install the suspension ass'y as shown.

Preparation

29, Stopper strap

Detach the front stopper strap.

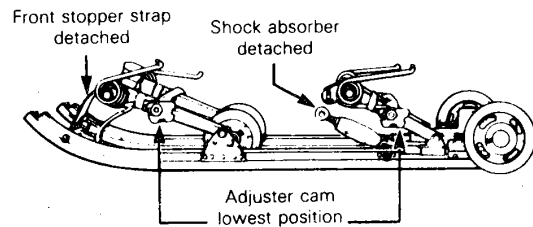
26,36,42, Cotter pin, shock absorber & clevis pin

- Remove the cotter pin locking the shock absorber clevis pin and detach the shock absorber by removing the clevis pin.

47, Rear idler wheels

- Push the rear idler wheels forward.

(TYPICAL)



A007005006

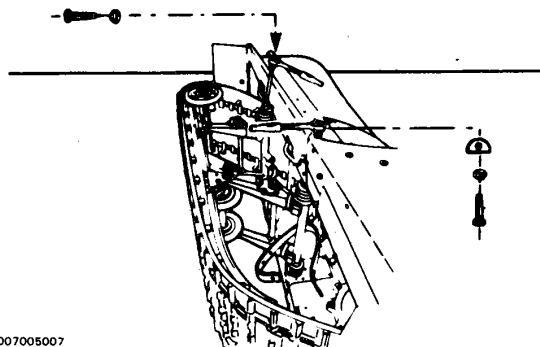
Installation

- Place a cardboard on the floor.
- Plug vent holes in chaincase filler cap and oil injection reservoir cap with a wire to prevent leaks.
- Tilt the vehicle on one side.

23,40, Front & rear arms

- Attach front suspension and the rear suspension arm to the frame. Do not torque.

(TYPICAL)



A007005007

- Tilt the vehicle on the other side.

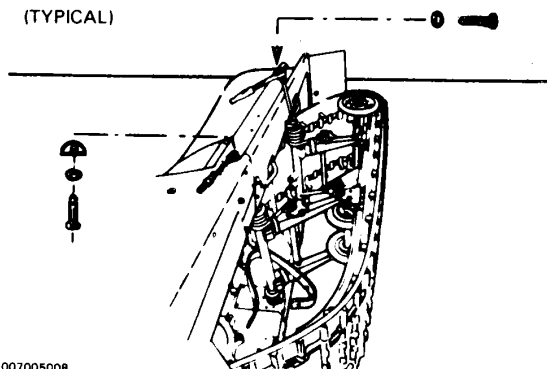
Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

23,40, Front & rear arm

- Attach the front then the rear suspension arm to frame.

(TYPICAL)



A007005008

- Reposition vehicle on the ground.

33, Adjustment cams

- Position adjustment cams at the lowest elevation.

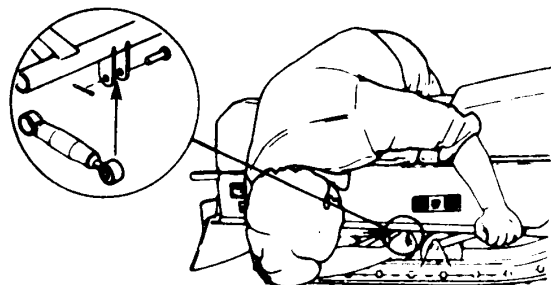
12, Screws (front & rear arms)

- Torque the four suspension retaining screws to 43 N•m (32 lbf•ft).
- Apply downward pressure on the seat.

26,36,42, Cotter pin, shock absorber & clevis pin

- Secure the extended shock with clevis pin and a new cotter pin.

(TYPICAL)

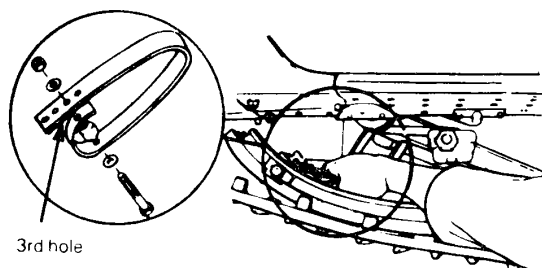


A007005009

29, Stopper strap

- Attach front stopper strap at 3rd hole from strap end.
- Torque nut to 9 N•m (80 lbf•in).

(TYPICAL)



A007005010

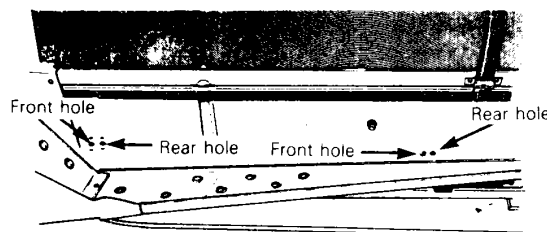
- Remove chaincase and oil injection reservoir vent hole plugs.

NOTE: On all models, the holes in the frame provide the possibility of locating the suspension arms for easier track tension adjustment 13 mm (1/2") clearance. It means that if the slide suspension adjustment screws are at the maximum adjustment and the suspension arms are at the front holes in the frame, you may move the suspension arms at the rear holes and obtain greater track tension adjustment.

CAUTION: Ensure that suspension arms are at the same position on each side of the frame to avoid any damage to the suspension system and to the track.

CAUTION: Ensure that front and rear suspension arms are at the same position on each end (front, rear) of the frame to avoid any damage to the suspension system and to the track.

(TYPICAL)



A007005011

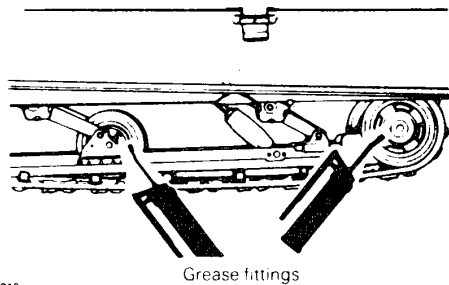
Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

18, Grease fittings

If necessary, lubricate the idler wheels and swing arms at grease fittings until grease appears at joints. Use low temperature grease only (P/N 413 7044 00).

(TYPICAL)



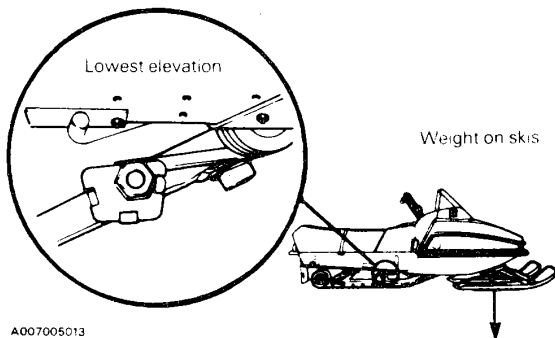
A007005012

○ **NOTE:** To adjust the track tension and alignment, refer to section 05-08.

RIDE ADJUSTMENT

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.

The rear adjustment blocks should be adjusted to rider preference.



A007005013

▼ **CAUTION:** Always turn left side adjustment cams in a clockwise direction, the right side cams in a counterclockwise direction. Left and right adjustment cams of each adjustment (front and rear), must always be set at the same elevation.

Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

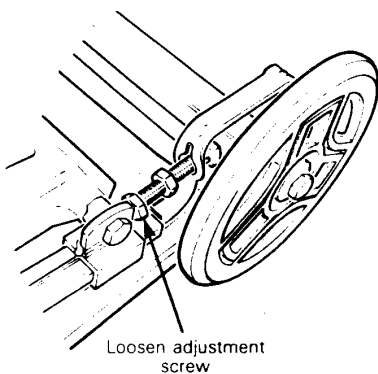
1. Runner (2)
2. Slider shoe (2)
3. Screw M5 x 20 (2)
4. Stop nut M5 (2)
5. Rubber stopper (4)
6. Rivet (4)
7. Push nut (4)
8. Stopper (2)
9. Screw M5 x 12 (2)
10. Stop nut M5 (2)
11. Lower front cross shaft
12. Screw M10 x 25 (10)
13. Lock washer 10 mm (14)
14. Loctite 242
15. Front idler shaft
16. Idler wheel shaft (2)
17. Snap ring (4)
18. Ball bearing (4)
19. Idler wheel 135 mm (2)
20. Flat washer 10 mm (4)
21. Screw M10 x 90 (2)
22. Front arm
23. Lower cross shaft (3)
24. Bushing (4)
25. Upper cross shaft (2)
26. Front spring (2)
27. Bushing (4)
28. Lock washer 10 mm (4)
29. Screw M10 x 35 (4)
30. Stopper strap
31. Flat washer (2)
32. Screw M8 x 35
33. Stop nut M8
34. Rear arm
35. Slider pad (2)
36. Sliding support (2)
37. Rear spring (2)
38. Shock absorber cross shaft
39. Bushing
40. Shock absorber
41. Clevis pin
42. Cotter pin
43. Adjustment screw M10 x 75 (2)
44. Stop nut M10 (2)
45. Square nut M10 (2)
46. Rear axle
47. Idler wheel 190 mm (2)
48. Screw (2)
49. Upper cross shaft
50. Idler wheel (2)
51. Ball bearing (2)
52. Spacer (2)
53. Lock washer (2)
54. Screw M8 x 25 (2)
55. Snap ring (2)
56. Flat washer 10.5 mm

REMOVAL

43, Adjustment screws

Release track tension by loosening adjustment screws located on inner side of rear idler wheels.

○ **NOTE:** It is not required to loosen rear axle screws.



A003005001

50,54, Upper idler wheel & screw

Remove both screws then upper idler wheels set.

25,29, Upper cross shaft & screws

Remove the four (4) screws securing front and rear arm to frame.

Remove suspension system.

○ **NOTE:** To prevent cross shaft from turning within the suspension arm, wedge the blade of a small screwdriver between the shaft and suspension arm.

DISASSEMBLY & ASSEMBLY

1,2,3,4,8,9,10, Runners, slider shoes, stoppers, screws & stop nuts

To replace a worn slider shoe, remove the stopper fasteners, the front screw and stop nut then slide the shoe rearwards out of the runner.

5,6,7, Rubber stoppers, rivets & push nuts

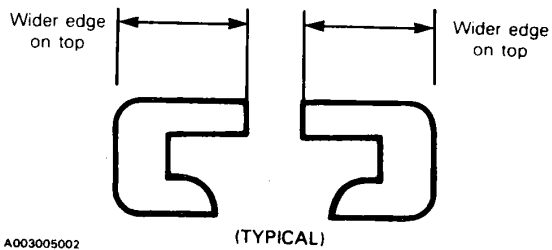
Pry off push nut with a screwdriver to remove. To install, press push nut while retaining rivet.

Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

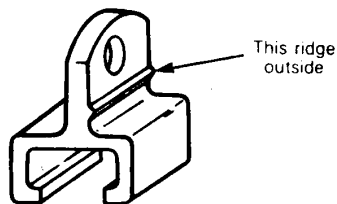
35, Slider pad

Install the larger edge on top (each side of the runner).



36, Sliding support

Must be installed with identification ridge outside.



12,14,21,29,48,54, Screws & Loctite 242

Clean all screw threads. Prior to assembling, apply low temperature grease only (P/N 413 7044 00) on cross shafts and Loctite 242 or equivalent on threads.

26,37, Front & rear springs

Prior to assembly, identify springs location. Make sure to insert nylon bushing inside springs.

Front springs: Midnight blue
Rear springs: Black

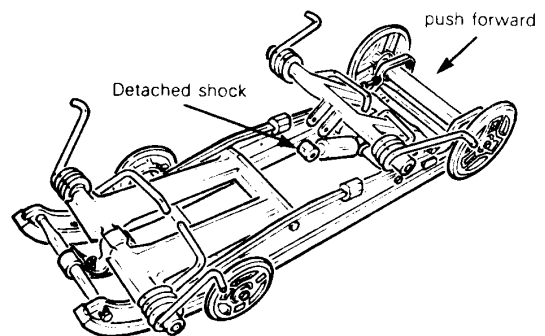
INSTALLATION

Preparation

Prepare the suspension ass'y as shown.

40,41,42, Shock absorber, clevis pin & cotter pin

Remove the cotter pin locking the shock absorber clevis pin and detach the shock absorber by removing the clevis pin.

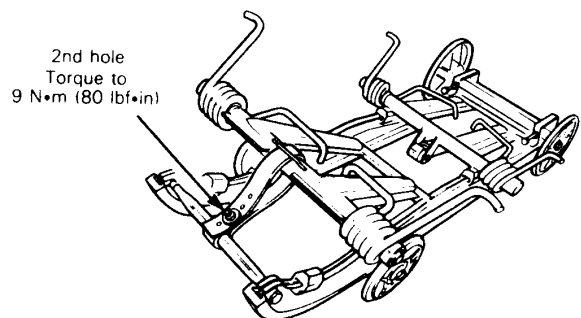


47, Rear idler wheels

Unscrew adjustment screws as far as possible to push the rear axle forward.

30, Stopper strap

Make sure the stopper strap is attached through the 2nd hole from strap end. Torque nut to 9 N•m (80 lbf•in).



Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

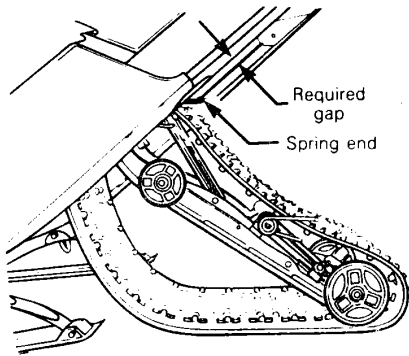
Installation

Using the appropriate equipment, lift the rear of vehicle off the ground.

To perform installation of suspension into frame; it is necessary to determine the proper height:

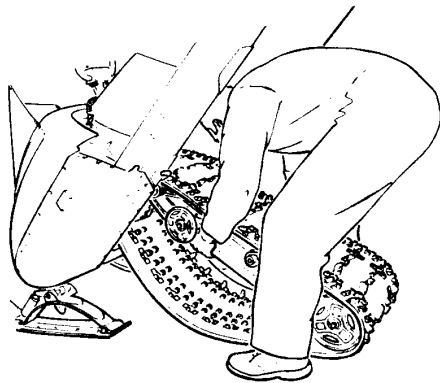
- Leave rear portion of suspension on ground, lift rear of vehicle high enough to keep a gap between front spring end and bottom of frame when cross shaft is close to its frame holes.

○ **NOTE:** The above mentioned gap is important to prevent spring torsion at the time of installing suspension system.



A003005006

- After the right height is found out as indicated above, install front portion of suspension into frame.



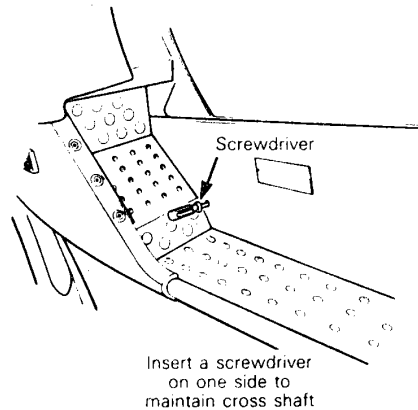
Installing front portion of suspension

A003005007

25,29, Upper front cross shaft & screw

Insert a screwdriver into one side of frame to maintain cross shaft when installing screw into hole of other side. Do not tighten.

Replace the screwdriver by the right screw.



A003005008

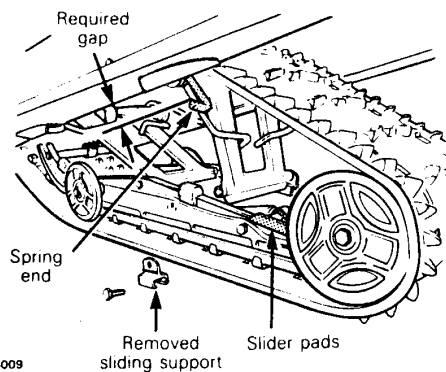
12,34,36, Screw, rear arm & sliding support

Remove screw and sliding support from one side only withdraw rear arm from runners.

25,29, Upper rear cross shaft & screw

Attach upper cross shaft to frame. Do not tighten screws.

- Let down rear of vehicle just enough to keep a gap between rear spring end and bottom of frame when rear arm is close to slider pads.



A003005009

Section 05 SUSPENSION

Sub-section 02 (SLIDE SUSPENSION)

12,36, Screw & sliding support

Slide rear arm side with sliding support over slider pads. Re-install removed sliding support and screw. Torque screw to 48 N•m (35 lbf•ft).

▼ **CAUTION:** Make sure slider pads (35) are well installed. Check sliding action when sliding supports are installed.

— Reposition vehicle on ground.

29, Screw

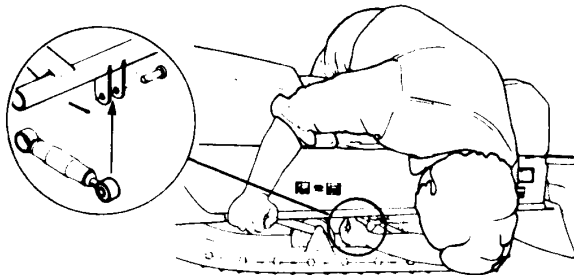
Torque four suspension retaining screws to 48 N•m (35 lbf•ft).

40,41,42, Shock absorber, clevis pin & cotter pin

Apply downward pressure on the frame.

Secure the extended shock with clevis pin and a new cotter pin.

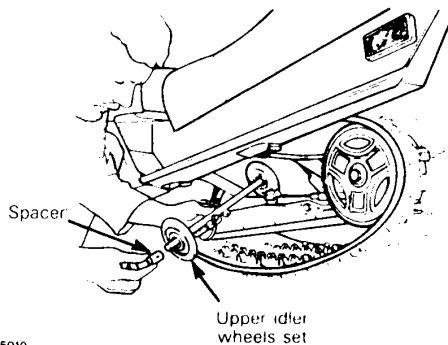
TYPICAL



A007005009

50,52,54, Upper idler wheel, spacer & screw

Reinstall upper idler wheels set. Make sure to install spacers on shaft ends.

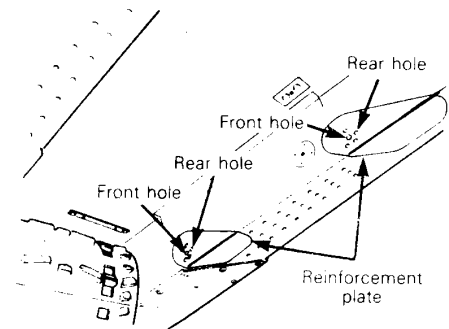


A003005010

○ **NOTE:** When no more adjustment is available from adjustment screws, it is possible to move back both suspension arms if they are actually located in front holes.

Drill the rear hole diameter 10.5 mm (13/32") through the frame using reinforcement plate hole as guide.

▼ **CAUTION:** Reinforcement plate has 3 rows of 2 holes (6 holes). Drill hole at the same level as the existing hole.



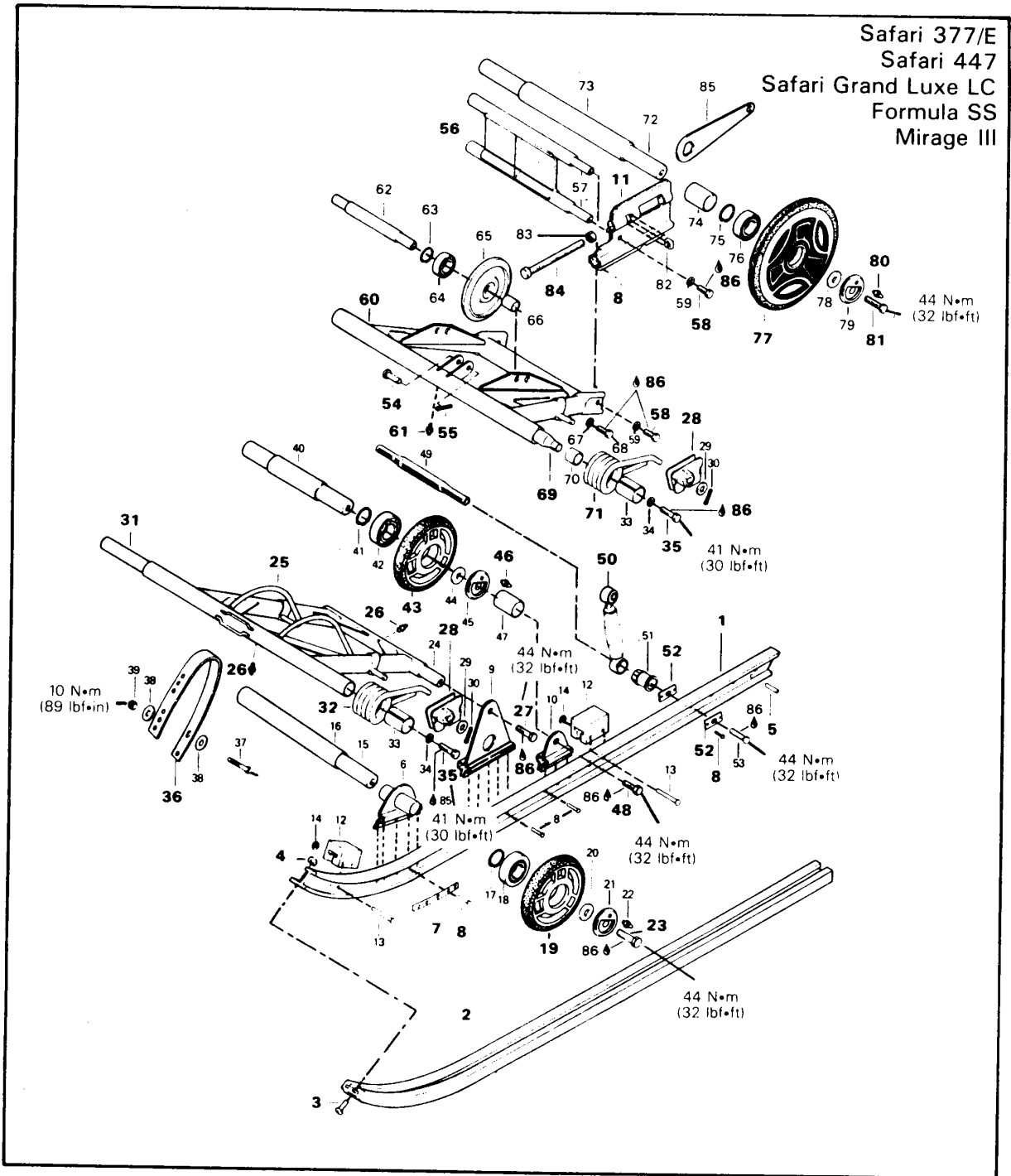
A003005011

▼ **CAUTION:** Ensure that suspension arms are at the same position on each side of the frame and they are at the same position on each end (front, rear) of the frame to avoid any damage to the suspension system and to the track.

○ **NOTE:** To adjust the track tension and alignment, refer to section 05-08.

Section 05 SUSPENSION
Sub-section 03 (TRS 6 SUSPENSION)

TRS 6 SUSPENSION



Section 05 SUSPENSION

Sub-section 03 (TRS 6 SUSPENSION)

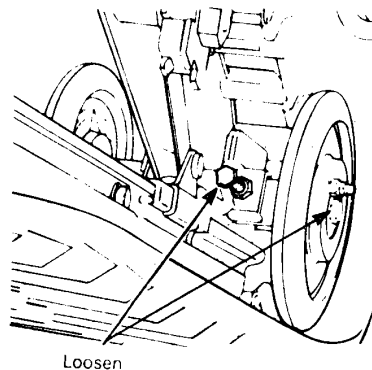
1. Runner (2)
2. Slider shoe (2)
3. Cylinder slotted head machine screw M5 x 20 (2)
4. Hexagonal elastic stop nut M5 (2)
5. Spirol pin (2)
6. Front wheel support (2)
7. Reinforcement strip (2)
8. Rivet (36)
9. Front arm support (2)
10. Wheel support (2)
11. R.H. adjustment plate
L.H. adjustment plate
12. Rubber stopper (4)
13. Rivet (8)
14. Push nut (8)
15. Cross shaft
16. Spacer tube
17. Snap ring (2)
18. Ball bearing (2)
19. Idler wheel
20. Washer (2)
21. Cap (2)
22. Grease fitting (2)
23. Hexagonal head cap screw M10 x 35 (2)
24. Lower front cross shaft
25. Front arm
26. Grease fitting (2)
27. Hexagonal head cap screw M10 x 35 (2)
28. R.H. adjustment cam (2)
L.H. adjustment cam (2)
29. Flat washer (4)
30. Cotter pin (4)
31. Upper front cross shaft
32. R.H. front spring
L.H. front spring
33. Bushing (4)
34. Lock washer 10 (4)
35. Hexagonal head cap screw M10 x 35 (4)
36. Stopper strap
37. Hexagonal head cap screw M8 x 45
38. Washer (2)
39. Hexagonal elastic stop nut 8 mm
40. Center axle
41. Snap ring (2)
42. Ball bearing (2)
43. Idler wheel (2)
44. Washer (2)
45. Cap (2)
46. Grease fitting (2)
47. Spacer tube (2)
48. Hexagonal head cap screw M10 x 35 (2)
49. Swaged tube
50. Shock absorber
51. Auto-lock bushing
52. Reinforcement bracket (4)
53. Hexagonal head cap screw M10 x 35 (2)
54. Clevis pin
55. Cotter pin
56. Pivot arm
57. Pivot shaft (2)
58. Hexagonal head cap screw M8 x 20 (4)
59. Lock washer 8 mm (4)
60. Rear arm
61. Grease fitting
62. Idler shaft
63. Snap ring (2)
64. Ball bearing (2)
65. Idler wheel (2)
66. Spacer (2)
67. Lock washer 8 mm (2)
68. Hexagonal head cap screw M8 x 25 (2)
69. Rear cross shaft
70. Bushing (2)
71. Rear R.H. spring
Rear L.H. spring
72. Rear axle
73. Spacer tube
74. Spacer tube (2)
75. Snap ring
76. Ball bearing (2)
77. Idler wheel
78. Washer (2)
79. Cap (2)
80. Grease fitting (2)
81. Hexagonal head cap screw M10 x 35 (2)
82. Square nut (2)
83. Hexagonal nut M10 (2)
84. Hexagonal adjustment screw M10 x 110 (2)
85. Hexagonal wrench (cam adjustment)
86. Loctite 242

REMOVAL

81,84, Screw, adjustment screw

Release track tension by loosening wheel retaining screws and adjustment screws located on inner side of rear idler wheels.

(TYPICAL)



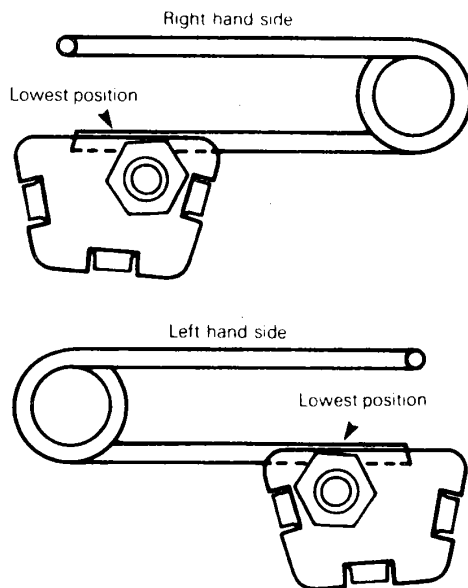
A009005001

Section 05 SUSPENSION

Sub-section 03 (TRS 6 SUSPENSION)

28, Adjustment cams

Position the adjustment cams at the lowest position.



A007005014

31,35,69, Screws & cross shafts

Remove the four (4) screws securing suspension to frame.

Remove suspension system.

○ **NOTE:** To prevent cross shaft from turning within the suspension arm, wedge the blade of a small screwdriver between the shaft and suspension arm.

DISASSEMBLY & ASSEMBLY

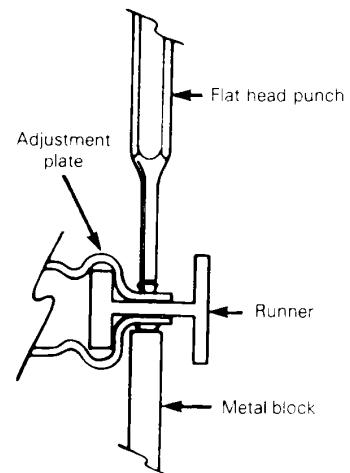
1,2,3,4,5, Runners, slider shoes, screws, stop nuts & spirol pins

To replace a worn slider shoe, remove the rear spirol pin, the front screw and stop nut then slide the shoe rearwards out of the runner.

8,11, Rivets & adjustment plates

To remove the rivets securing the adjustment plate on the front arm supports, cut off the rivet heads using a cold chisel.

At assembly, position the rivet head outside of the runner on a suitable metal block and hold the assembly firmly in place. With a flat head punch and hammer secure the rivet in place.



A007005002

7,8,52, Reinforcement strips, rivets & reinforcement bracket

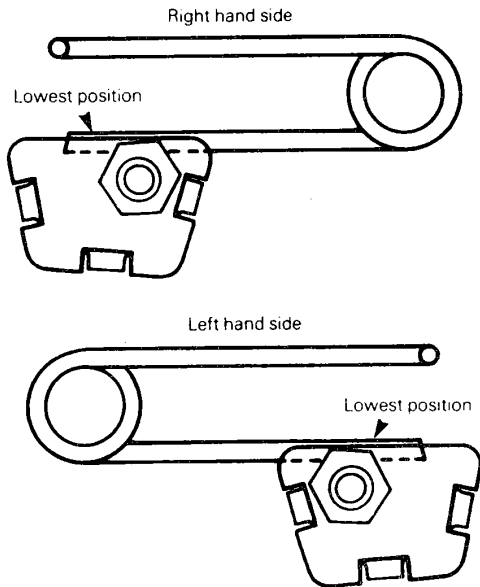
To remove rivet use a 3/16" dia. drill. At assembly, secure reinforcement brackets to runner with two (2) 10-32 x 1/2" bolts and nuts, and five (5) bolts and nuts for the reinforcement strips. Position bolt head outside of the runner.

Section 05 SUSPENSION

Sub-section 03 (TRS 6 SUSPENSION)

28, Adjustment cams

At assembly, position the adjustment cams at the lowest position.



A007005014

23,27,35,48,53,58,68,86, Screws, loctite 242

Clean all screws threads. Prior to assembly, apply a light coat of "Loctite 242" or equivalent on threads.

32,71, Front & rear springs

Prior to assembly, identify front and rear springs.

Spring location	Model	Color
Front	Safari 377/377E, 447 Grand Luxe LC Mirage III	Orange
	Formula SS	Red
Rear	Safari 377/377E Mirage III	Purple
	Safari 447 Grand Luxe LC	Gold
	Formula SS	Brown

05-03-4

INSTALLATION

Preparation

36, Stopper strap

- Detach the front stopper strap.

50,54,55, Shock absorber, clevis pin & cotter pin

- Remove the cotter pin locking the shock absorber clevis pin and detach the shock absorber by removing the clevis pin.

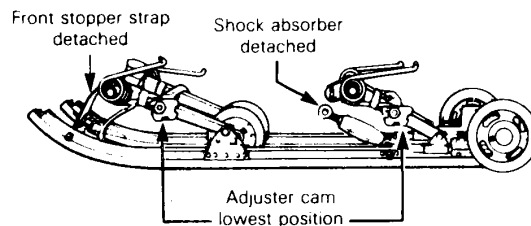
28, Adjustment cams

- Set the adjuster cam to the lowest position and fix the springs with a tape.

77, Rear idler wheel

- Push the rear idler wheel forward.

(TYPICAL)



A007005006

Installation

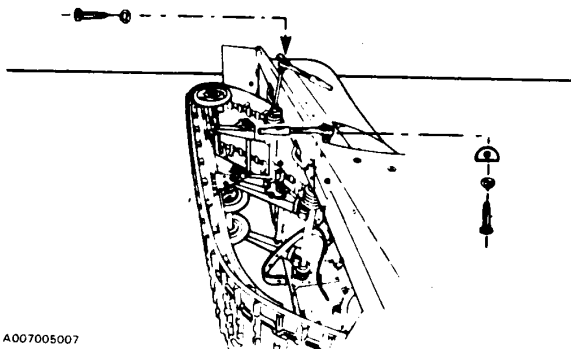
- Place a cardboard on the floor.
- Plug vent holes in chaincase filler cap and oil injection reservoir cap with a small wire to prevent leaks.
- Tilt vehicle on one side.

Section 05 SUSPENSION
Sub-section 03 (TRS 6 SUSPENSION)

25,60, Front arm & rear arm

- Attach front suspension and the rear suspension arm to the frame. Do not torque.

(TYPICAL)



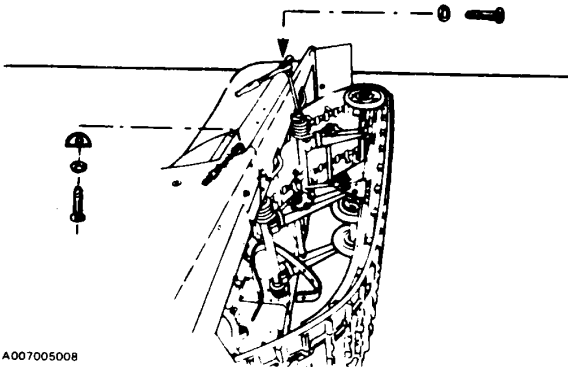
A007005007

- Tilt the vehicle on the other side.

25,60, Front & rear arm

- Attach the front then the rear suspension arm to frame.

(TYPICAL)



A007005008

- Reposition vehicle on the ground.

28, Adjuster cam

- Position adjustment cams at the lowest elevation.

35, Screws (front & rear arms)

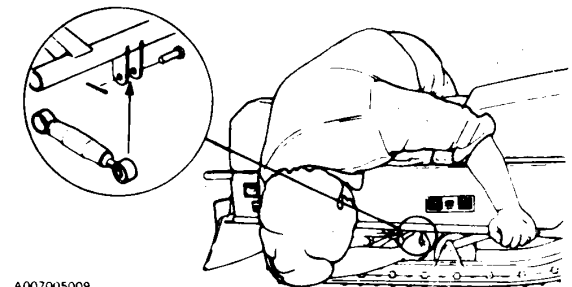
- Torque the four suspension retaining bolts to 41 N•m (30 lbf•ft).
- Apply downward pressure on the seat.

50,54,55, Shock absorber, clevis pin & cotter pin

○ NOTE: Install clevis pin head on right hand side of vehicle. To make future shock removal easier.

- Secure the extended shock with clevis pin and new cotter pin.

(TYPICAL)

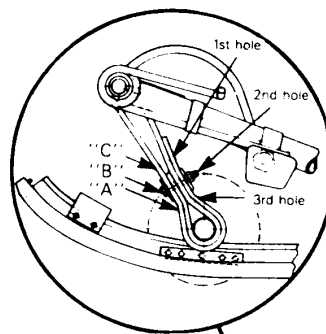


A007005009

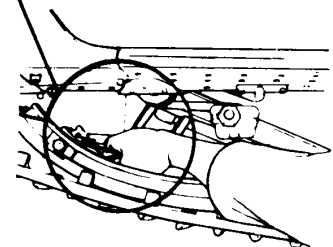
36, Stopper strap

- Attach front stopper strap through 2nd hole and its corresponding hole "B".
- Torque nut to 10 N•m (89 lbf•in).

(TYPICAL)



A007005010



Section 05 SUSPENSION

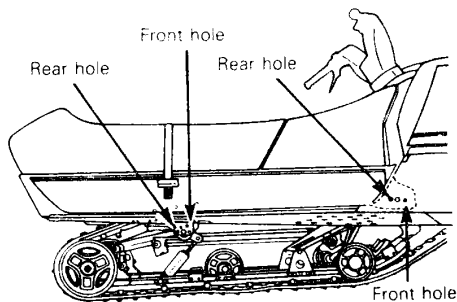
Sub-section 03 (TRS 6 SUSPENSION)

- Remove chaincase and oil injection reservoir vent hole plugs.

○ **NOTE:** On all models, the holes in the frame provide the possibility of locating the suspension arms for easier track tension adjustment 13 mm (1/2") clearance. It means that if the slide suspension adjustment screws are at the maximum adjustment and the suspension arms are at the front holes in the frame, you may move the suspension arms at the rear holes and obtain greater track tension adjustment.

▼ **CAUTION:** Ensure that suspension arms are at the same position on each side of the frame to avoid any damage to the suspension system and to the track.

▼ **CAUTION:** Ensure that front and rear suspension arms are at the same position on each end (front, rear) of the frame to avoid any damage to the suspension system and to the track.

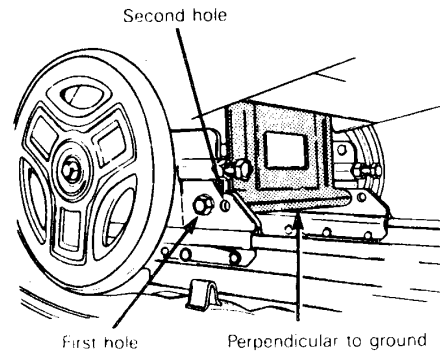


A000005001

○ **NOTE:** The front adjustment holes in the frame (near footrest) are not completely drilled. If you have to relocate the front and rear arms you have to drill these holes.

11,56, Adjustment plate & pivot arm

When repositioning front and rear suspension arms: ensure that the pivot arm is as perpendicular as possible by locating it in the first or second holes of the adjustment plate.



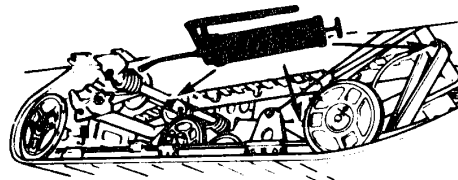
A000005002

19,43,77,22,46,80, Idler wheels, grease fittings

Even if there are grease fittings on idler wheels, do not lubricate, since ball bearings are sealed on both sides.

26,61, Grease fittings

Lubricate front and rear arms at grease fittings until grease appears at joints. Use low temperature grease only (P/N 413 7044 00).



A000005003

○ **NOTE:** To adjust the track tension and alignment, refer to section 05-08.

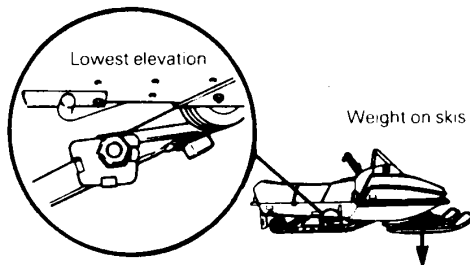
Section 05 SUSPENSION
Sub-section 03 (TRS 6 SUSPENSION)

RIDE ADJUSTMENT

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. At lower elevation is preferred when negotiating icy snow.

The rear adjuster blocks should be adjusted to rider preference.

(TYPICAL)



A007005013

▼ **CAUTION:** Always turn left side adjustment cams in a clockwise direction, the right side cams in a counterclockwise direction. Left and right adjustment cams of each adjustment (front and rear), must always be set at the same elevation.

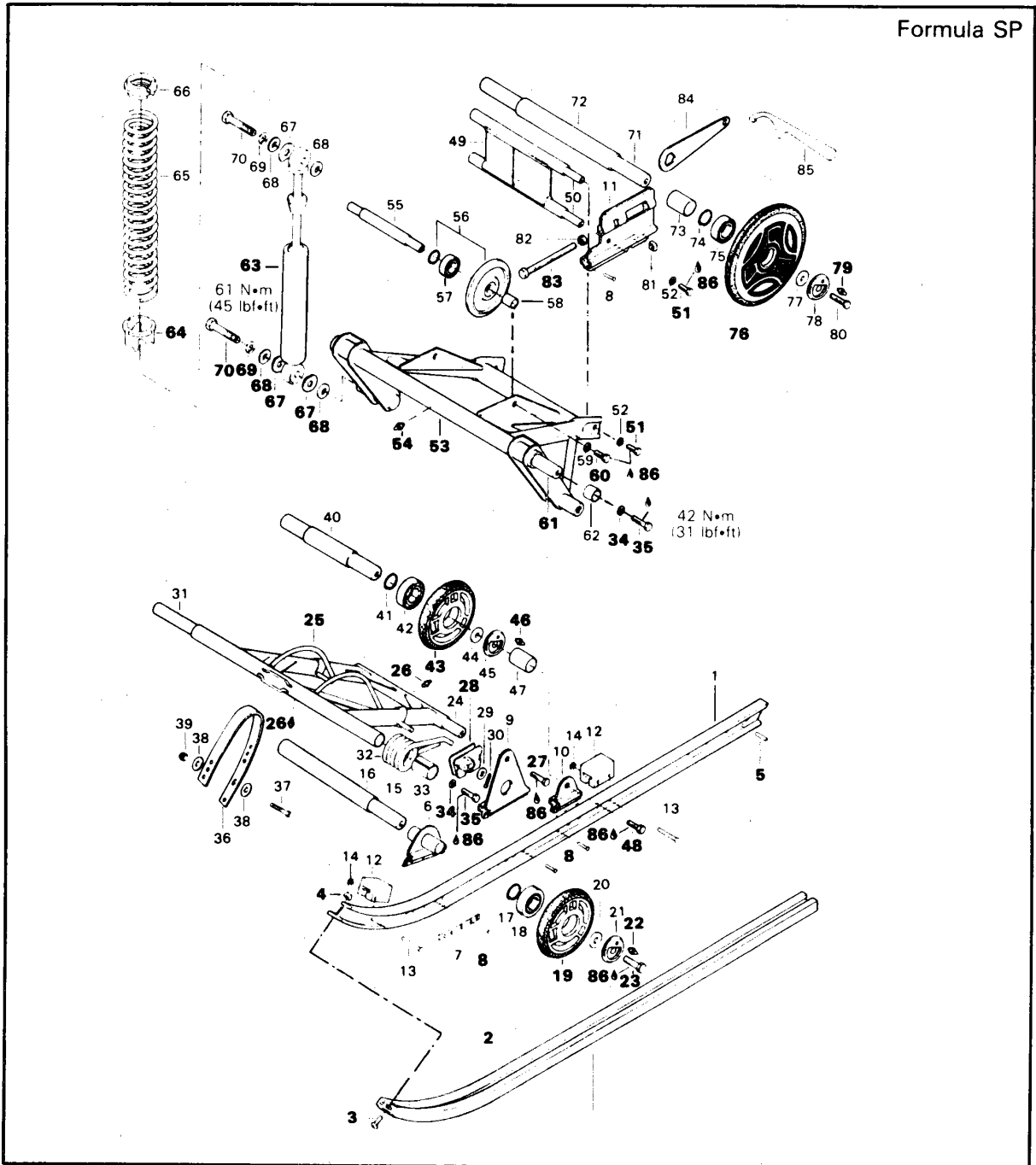


Section 05 SUSPENSION
Sub-section 04 (SP SUSPENSION)

SP SUSPENSION

SP SUSPENSION

Formula SP



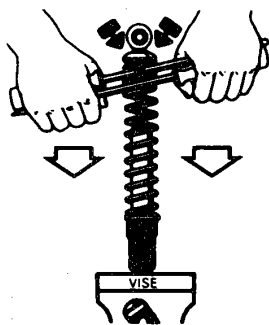
Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

SHOCK ABSORBER SPRINGS REPLACEMENT

To replace a shock spring proceed as follows:

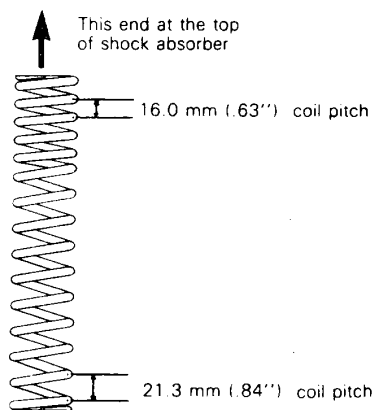
Clamp the shock absorber lower mount in a vise and press the spring down with a pair of screw drivers as illustrated, remove the spring collar and the spring.



A014005009

Install the new spring.

NOTE: The standard spring has different coil pitch at each end (see illustration). So, it is recommended to position the lower coil pitch end (16.0 mm (.62")) at the top of shock absorber.

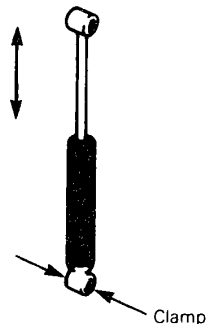


A014005010

SHOCK ABSORBER SERVICING

The shocks may be checked by partially creating the operating position. To do this, secure the proper shock end in a vise using the shock eye as a clamping point.

05-04-6



A014005011

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.

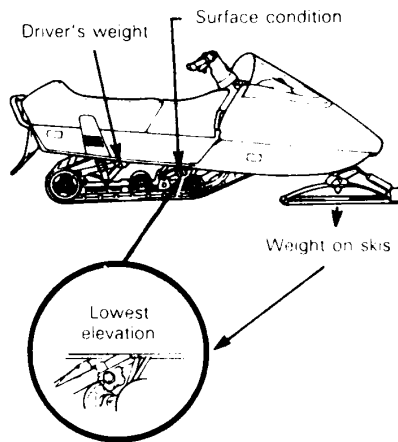
Pay attention to the following conditions that will denote a defective shock:

- A skip or a hand 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.

RIDE ADJUSTMENT

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.

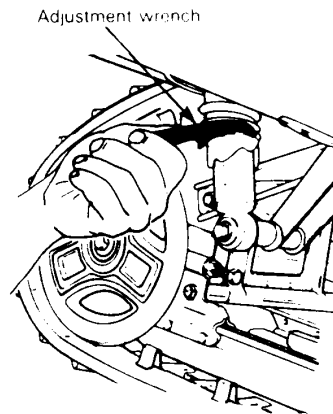
Section 05 SUSPENSION
Sub-section 04 (SP SUSPENSION)



A014005012

CAUTION: Always turn left side adjustment cams, in a clockwise direction, the right side cams in a counterclockwise direction. Left and right adjustment cams must always be set at the same position.

The rear adjuster cams should be adjusted to rider preference. The rear suspension may be adjusted by turning the shock absorber adjuster cam with the adjustment wrench.



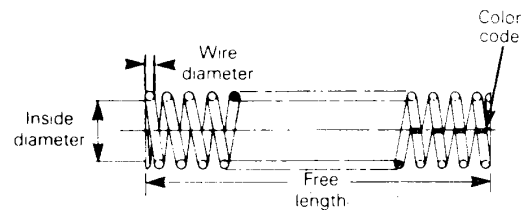
A014005013

- 1st position: for rider weight of 0 to 68 kg (0 to 150 lb).
- 2nd position: for rider weight of 68 to 82 kg (150 to 180 lb).
- 3rd position: for rider weight of 84 kg (180 lb) and higher.

CAUTION: Left and right adjuster cam must always be set at the same position.

SUSPENSION SPRING IDENTIFICATION

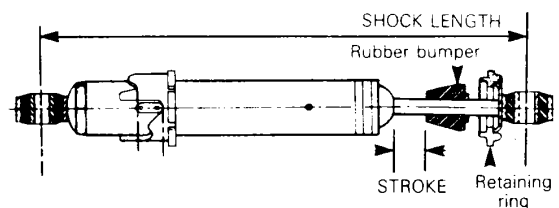
Shock springs



A014005014

Shock specifications

REAR SHOCK (without spring)	
Part number:	414 4764 00
Stroke:	13.20 cm (5.200'')
Length collapsed*:	23.78 cm (9.360'')
Length extended*:	36.98 ± 0.3 cm (14.560 ± 0.125'')
Color code:	Blue dot



A014005015

The collapsed length at bumper contact is: 26.87 cm (10.58''). And at retainer contact is: 24.18 cm (9.52'').

*The collapsed and extended lengths are measured center to center of shock eyes.

Section 05 SUSPENSION

Sub-section 04 (SP SUSPENSION)

Shock springs specifications

P/N	NUMBER OF COILS	FREE LENGTH	SPRING RATE	INSIDE DIAMETER	WIRE DIAMETER	COMPRESSED LENGTH	COLOR CODE
503 0694 00 Standard	15.6	290 ± 3 mm (11.42 ± .12")	19.3/28.0 ± 0.7 N/mm (110/160 ± 41 lbf/in)	38.4 ^{+0.76} ₋₀ mm (1.51 ^{+0.30"} ₋₀)	7.14 ± 0.05 mm (.281 ± .002")	109.0 mm (4.29")	Green/yellow
503 0696 00 Optional	13	289 ± 3 mm (11.39 ± 0.12")	16.6 ± 0.7 N/mm (95 ± 4 lbf/in)	38.4 ^{+0.76} ₋₀ mm (1.51 ^{+0.30"} ₋₀)	6.65 ± 0.05 mm (.262 ± .002")	83.8 mm (3.30")	Green/blue

OPTIONAL PARTS INSTALLATION

Lift the rear of the vehicle until the track is "off" the ground.

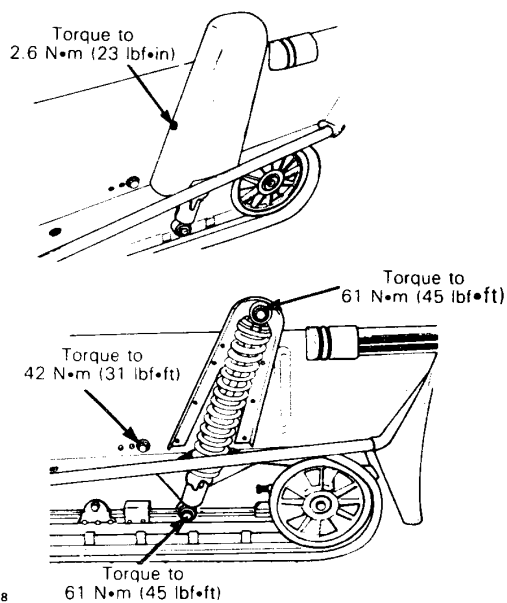
Remove the shock covers.

Remove the shock assemblies.

Remove the springs from the shocks.

Install the two (2) shock assemblies on vehicle, torque the retainer bolts to 61 N•m (45 lbf•ft). Refer to the illustration.

Install the shock covers and torque the retainer screws to 2.6 N•m (23 lbf•in) refer to illustration.



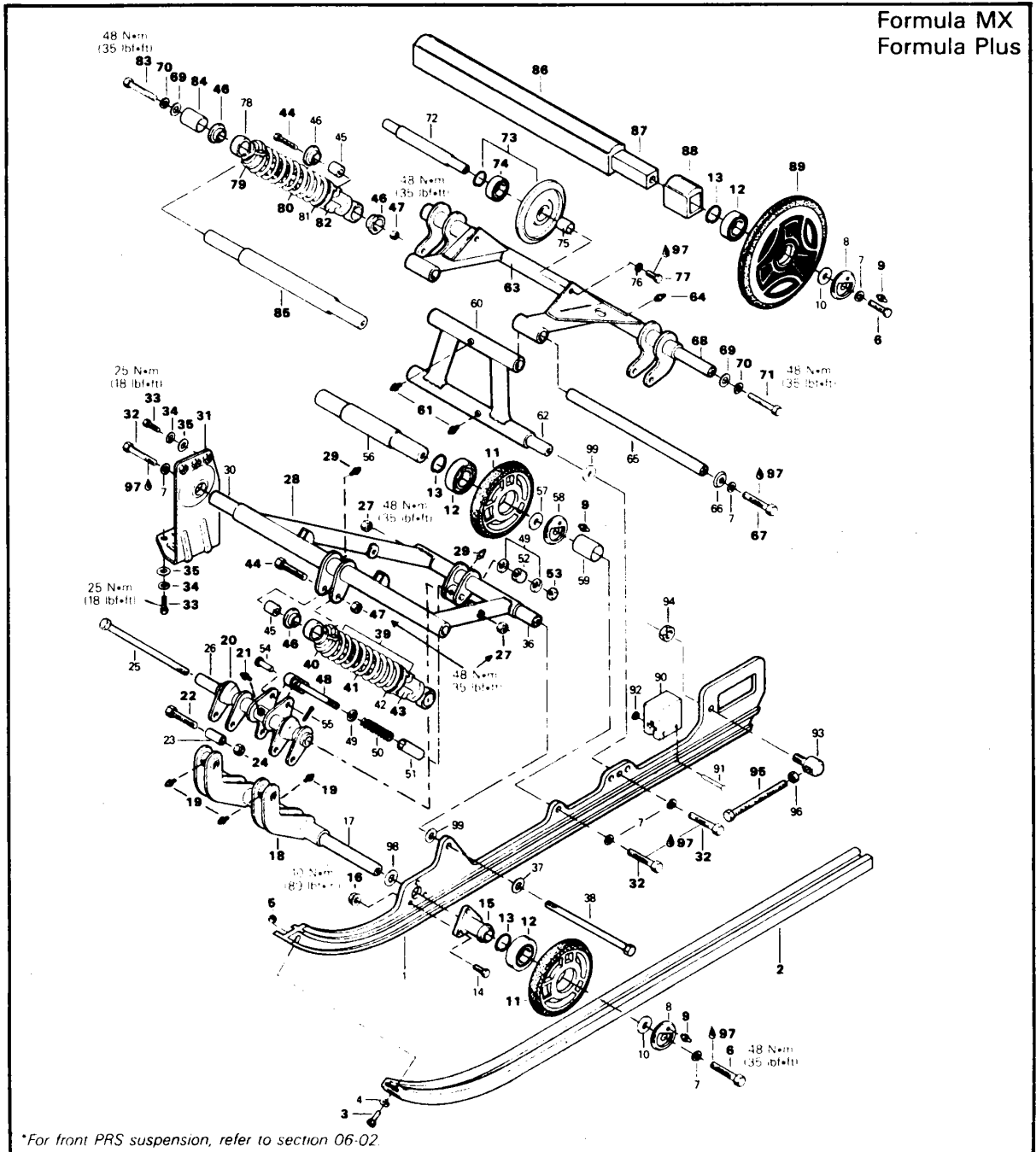
A014005018

NOTE: To adjust the track tension and alignment, refer to section 05-08.

Section 05 SUSPENSION
Sub-section 05 (PRS SUSPENSION)

PRS SUSPENSION

REAR PRS SUSPENSION



Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

1. Runner (2)
2. Slider shoe (2)
3. Hexagonal head cap screw M6 x 20 (2)
4. Flat washer (2)
5. Hexagonal elastic stop nut M6 (2)
6. Hexagonal head cap screw (4)
7. Spring lock washer 10 mm (12)
8. Wheel cap (4)
9. Grease fitting (6)
10. Washer (4)
11. Idler wheel (4)
12. Ball bearing 6205 (6)
13. Retaining ring (6)
14. Hexagonal head cap screw M6 x 20 (6)
15. Housing (2)
16. Hexagonal flanged elastic stop nut M6 (3)
17. Front axle
18. Front shackles
19. Grease fitting (3)
20. Front swing arm
21. Grease fitting
22. Hexagonal head cap screw M8 x 55 (2)
23. Spacer (2)
24. Hexagonal elastic stop nut M8 (2)
25. Long welded screw
26. Front swing arm axle
27. Hexagonal elastic stop nut M10 (2)
28. Front arm
29. Grease fitting (2)
30. Front arm upper axle
31. R.H. retainer plate
L.H. retainer plate
32. Hexagonal head cap screw M10 x 35 (6)
33. Hexagonal head cap screw M8 x 16 (4)
34. Spring lock washer M8 (4)
35. Flat washer 8.4 mm (4)
36. Front arm lower axle
37. Flat washer 10.5 mm
38. Short welded nut
39. Center shock body
40. Spring stopper
41. Shock spring
42. Thrust washer (2)
43. Adjuster ring
44. Hexagonal head cap screw M10 x 45 (4)
45. Spacer (4)
46. Bushing (12)
47. Hexagonal elastic stop nut M10 (4)
48. Welded stopper
49. Flat washer 13 mm (3)
50. Spring
51. Bushing
52. Stopper
53. Hexagonal elastic stop nut M12
54. Retainer pin
55. Cotter pin
56. Center axle
57. Washer (2)
58. Wheel cap (2)
59. Spacer (2)
60. Rear shackle
61. Grease fitting (2)
62. Rear shackle lower axle
63. Rear arm
64. Grease fitting
65. Rear shackle upper axle
66. Cup (2)
67. Hexagonal head cap screw M10 x 25 (2)
68. Cross pivot
69. Flat washer 10.5 mm (4)
70. Spring lock washer 10 mm (4)
71. Hexagonal head cap screw M10 x 35 (2)
72. Axle
73. Idler wheel and circlip (2)
74. Ball bearing (2)
75. Spacer (2)
76. Lock washer 8 mm (2)
77. Hexagonal head cap screw M8 x 25 (2)
78. Rear shock body (2)
79. Spring stopper (2)
80. Rear shock spring (2)
81. Thrust washer (4)
82. Adjuster ring (2)
83. Hexagonal head cap screw M10 x 25 (2)
84. Spacer (2)
85. Rear shock pivot
86. Inner spacer
87. Rear axle
88. Outer spacer (2)
89. Idler wheel (2)
90. Rubber stopper (2)
91. Rivet (4)
92. Push nut (4)
93. Tensioner stopper (2)
94. Hexagonal elastic stop nut M10 (2)
95. Hexagonal adjustment screw M10 x 85 (2)
96. Hexagonal nut M10 (2)
97. Loctite 271 (red, high strength)
98. Washer (2)
99. Washer (2)

REMOVAL

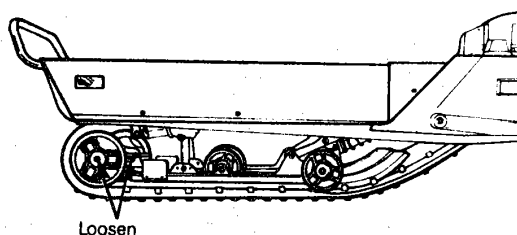
○ NOTE: Cross shafts are factory mounted with Loctite on screw threads. To prevent them from turning while unscrewing:

- Loosen one then retighten it.
- Loosen and remove the other one.
- Remove the first one that has been retightened.

6,95, Adjustment screw

Release track tension by loosening wheel retaining screws and adjustment screws on inner side of rear idler wheels.

05-05-2



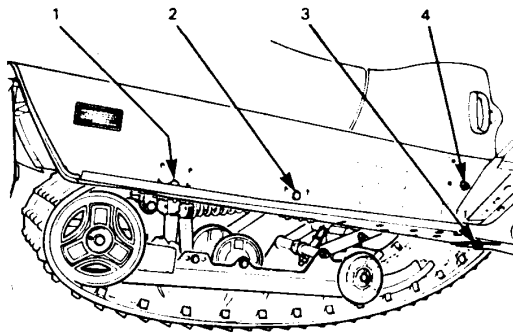
A015005001

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

31,33,68,71,83,85, Screws, retainer plate, cross pivot & rear shock pivot

- Lift the rear of vehicle off the ground.
- Remove screws (4 on each side) following this sequence.



A015005002

- Remove suspension system from vehicle.

DISASSEMBLY & ASSEMBLY

2,3,5, Screw, nut, & slider shoe

To replace a worn slider shoe, remove the screw and nut. Slide the shoe rearward out of the runner.

39,44,46,47,48,53, Center shock, screw, bushing, nut, welded stopper & nut

To remove shock:

- Loosen nut from welded stopper until free-play is felt.
- Unscrew shock screws and nuts.
- Inspect shock nylon bushings condition.

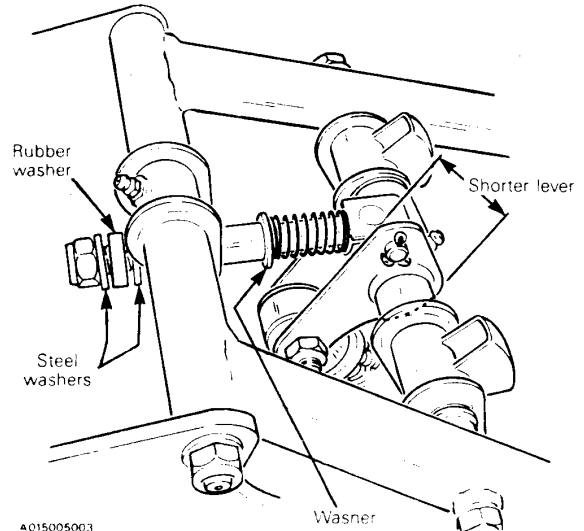
18,20,22,24,27,28,53, Front shackles, screw, nut, front swing arm & front arm

To remove:

- Unscrew screws and nuts from both shackles.
- Remove nut from welded stopper.
- Unscrew front swing arm nut then pull the bolt out.
- Unscrew front arm nut then pull the bolt out.

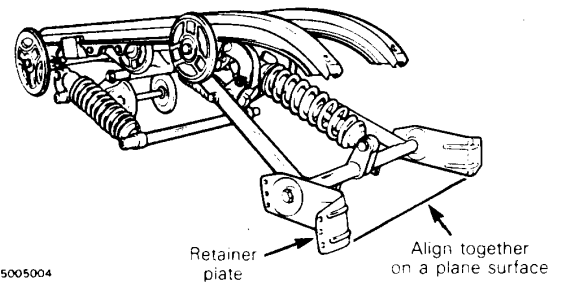
At assembly, reverse the procedure. However, pay attention to the following:

- Correctly position the longer bolt at the front arm pivot point and retainer pin into the shorter lever hole. Install washers, spring and bushing as shown.



A015005003

- Position both retainer plates at the same angle to fit properly in the frame.



A015005004

15,16, Housing & nut

Always torque nuts to 10 N•m (89 lbf•in).

6,11,12,13,32,73,74,77,89, Screw, idler wheel, snap ring & bearing

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.

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

— 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).

44,47,62,63,78,83,84, Screw, nut, rear shackle, rear arm, rear shock, screw & spacer

To remove rear shock:

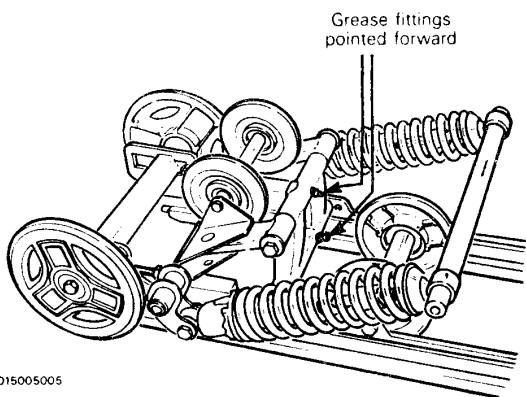
- Withdraw spacer from shock pivot.
- Unscrew bolt and nut.
- Inspect shock nylon bushings condition.

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 99 each end of the rear shackle lower axle.



A015005005

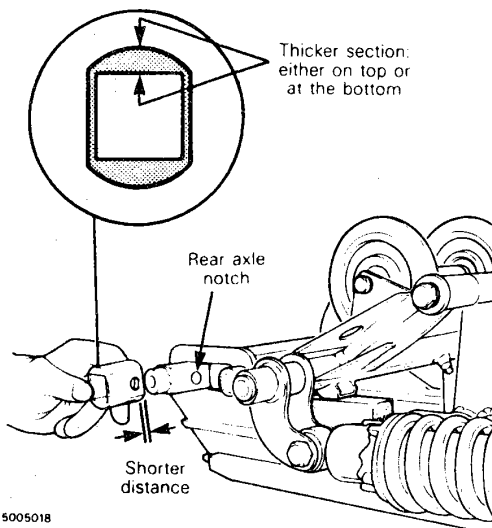
6,86,87,88, Screw, inner spacer, rear axle & outer spacer

To remove:

- Unscrew retaining screw.
- Pull idler wheel.
- Remove the runner to take the rear axle off.

At assembly, reverse the procedure. However pay attention to the following:

- Position inner and outer spacer as shown.



A015005018

▼ **CAUTION:** It is important to properly position the inner and outer spacers. Disregarding this notice might cause rear axle failure.

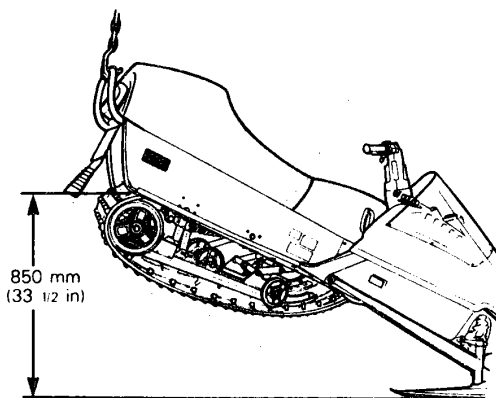
- Position notch on rear axle forward.
- Position hole in outer spacer forward and inward onto the rear axle.

6,32,67,77,83,97, Screws & Loctite 271

Clean all screw threads. Prior to assembly, apply a light coat of Loctite 271 or equivalent on threads.

INSTALLATION

- Lift the rear of vehicle off the ground about 850 mm (33 1/2").



A015005001

Section 05 SUSPENSION
Sub-section 05 (PRS SUSPENSION)

48,53, Welded stopper & nut

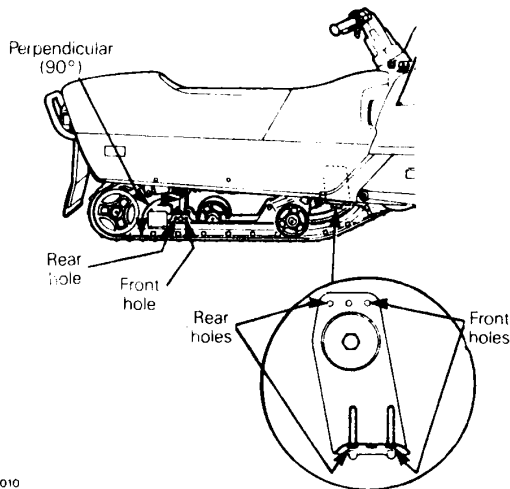
— Screw nut until the desired number of threads exceed it.

SNOW CONDITION	THREADS EXCEEDING NUT
Deep snow or hill climbing	3
Hard surface	11

87, Rear axle

- Unscrew track tension adjustment screws allowing the rear axle to be placed in its most forward position.
- There are 3 holes on the side and 3 holes underneath to fix retainer plate to the frame.
- There are 3 holes to fix runner to the rear shackle.

Usually the suspension is fixed on the vehicle at the second hole (rear shackle & retainer plate).



A015005010

To move suspension backward: Fix screws into front holes of the retainer plate (on side & underneath) and front hole of the runner.

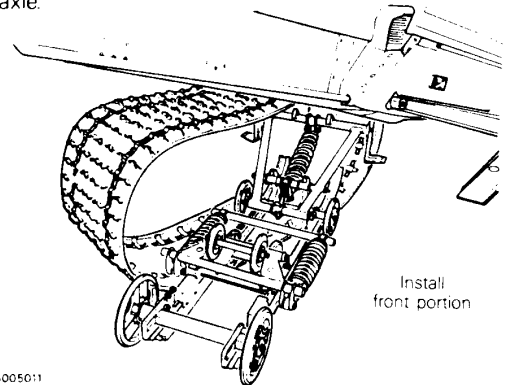
○ **NOTE:** Make sure to maintain rear shackle perpendicular (90°) to the ground, change its position if required.

▼ **CAUTION:** Make sure the retainer plate is secured at the same position on side and underneath 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

The rear of vehicle raised approximately to 850 mm (33 1/2").

- Enter the front portion of the suspension into front portion of track, raise it to its highest position under drive axle.



A015005011

- Slide the rear portion of suspension into rear portion of track.

31,33,34,35, Retainer plate, flat washer, lock washer & screw

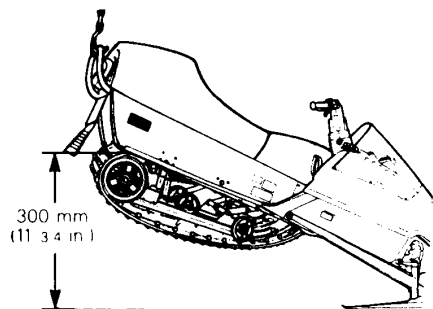
Refer to the illustration to see screw installation sequence. Raise front arm and align retainer plate holes with ones in frame. Install screws and washers, do not tighten.

69,70,83,84,85, Rear shock pivot, spacer, flat washer, lock washer & screw

Install the 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.

63,69,70,71, Rear arm, flat washer, lock washer & 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.



A015005001

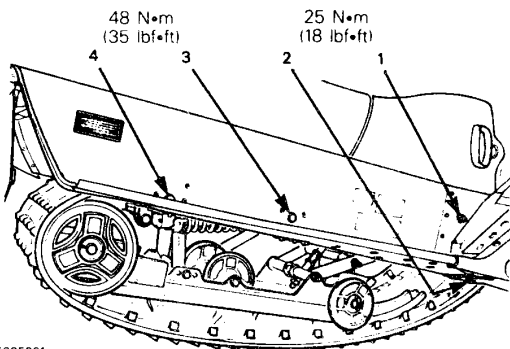
Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

Torque screws to these valves (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:

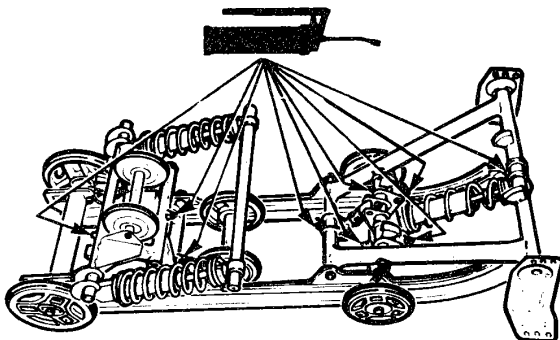


A015005001

19,21,29,61,64, Grease fittings

Lubricate until grease appears at joint using low temperature grease (P/N 413 7044 00):

- Front arm: upper and lower axle.
- Front swing arm: upper and lower axle.
- Front shackles.
- Rear arm: upper and lower axle.
- Rear shackle.



A015005012

05-05-6

9,11,89, Idler wheel & grease fitting

Even if there are grease fittings on idler wheels, **do not lubricate**, since ball bearings are sealed on both sides.

○ **NOTE:** To adjust the track tension and alignment, refer to section 05-08.

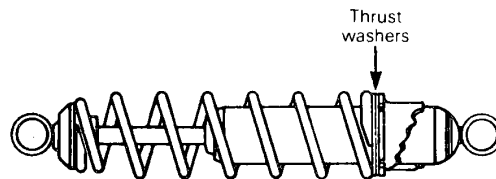
SHOCK ABSORBER SPRING REPLACEMENT

▼ **WARNING:** Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

40,41,79,80, Spring stopper & spring

Using a spring compressor, remove the spring and stopper ring.

○ **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.



A015005013

SHOCK ABSORBER SERVICING

Secure the shock body end in a vise.



A015005011

▼ **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.

Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

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 faults are present.

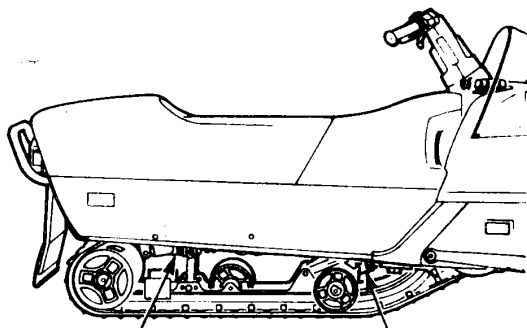
REAR SUSPENSION ADJUSTMENT

▼ **CAUTION:** Shock absorbers must be removed to adjust the preload.

43,82, Adjuster ring

The rear suspension has 2 preload adjustments:

- The center shock spring for surface condition.
- The rear shock spring (twin shocks) for driver's weight.



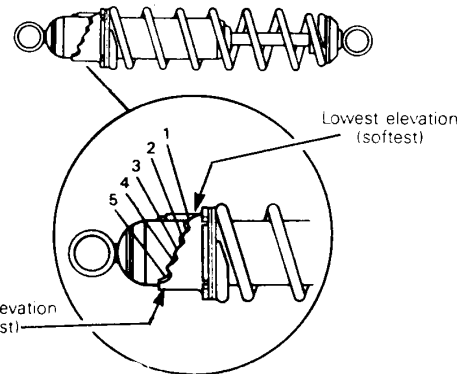
Driver's weight

Surface condition

A015005004

The shock absorber preload is adjusted by turning the adjuster ring.

Each shock absorber has a 5 position ring located at the bottom of the shock. If a stiffer or softer action is desired, the spring preload may be increased or decreased by adjusting the ring.



A015005015

Center spring

When the center 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 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:** Softer "optional" shock springs are available for shock absorbers. (See shock spring tables).

Center shock spring P/N 503 0904 00.

Rear shock spring P/N 509 0903 00.

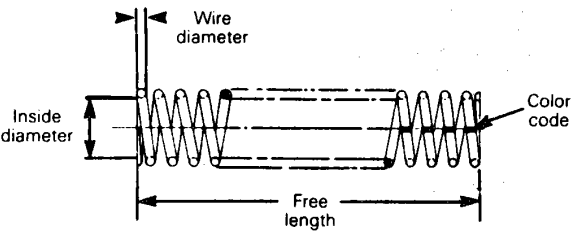
Section 05 SUSPENSION

Sub-section 05 (PRS SUSPENSION)

▼ CAUTION: Optional parts are calibrated to operate together. Failure to follow this recommendation may affect handling of the vehicle.

SPECIFICATIONS

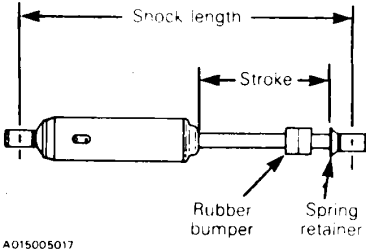
Shock spring specifications*

Location	Center (standard)	Rear (standard)	Center (optional)	Rear (optional)
Part number	414 5591 00	503 0804 00	503 0904 00	503 0903 00
Number of coils	12.6	15.3	15	15.6
Free length ± 3 mm (± .12'')	241.3 mm (9.50'')			247.6 mm (9.75'')
Spring rate ± 1.8 N/mm (± 10 lbf/in)	45.5 N/mm (260 lbf/in)	35.0 N/mm (200 lbf/in)	24.5 N/mm (140 lbf/in)	28.0 N/mm (160 lbf/in)
Inside diameter (big end)	46.7 + ^{0.8} ₀ mm (1.84 + ^{.03} ₀ '')			
Wire diameter ± 0.05 mm (± .002'')	9.19 mm (.362'')		8.25 mm (.325'')	8.71 mm (.343'')
Compressed length	107.7 mm (4.24'')	131.8 mm (5.19'')	116.3 mm (4.58'')	128.3 mm (5.05'')
Color code	Blue-blue	Green-green	Orange-orange	Yellow-yellow
Spring description	 <p>The diagram illustrates a shock spring with the following labeled dimensions and features: 'Wire diameter' at the top, 'Inside diameter' on the left, 'Free length' at the bottom, and 'Color code' on the right. A small reference number 'A015005016' is located in the bottom left corner of the diagram area.</p>			

*For front shock springs specifications, refer to section 06-02.

Section 05 SUSPENSION
Sub-section 05 (PRS SUSPENSION)

Shock absorber specifications*

Location		Center	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 description			

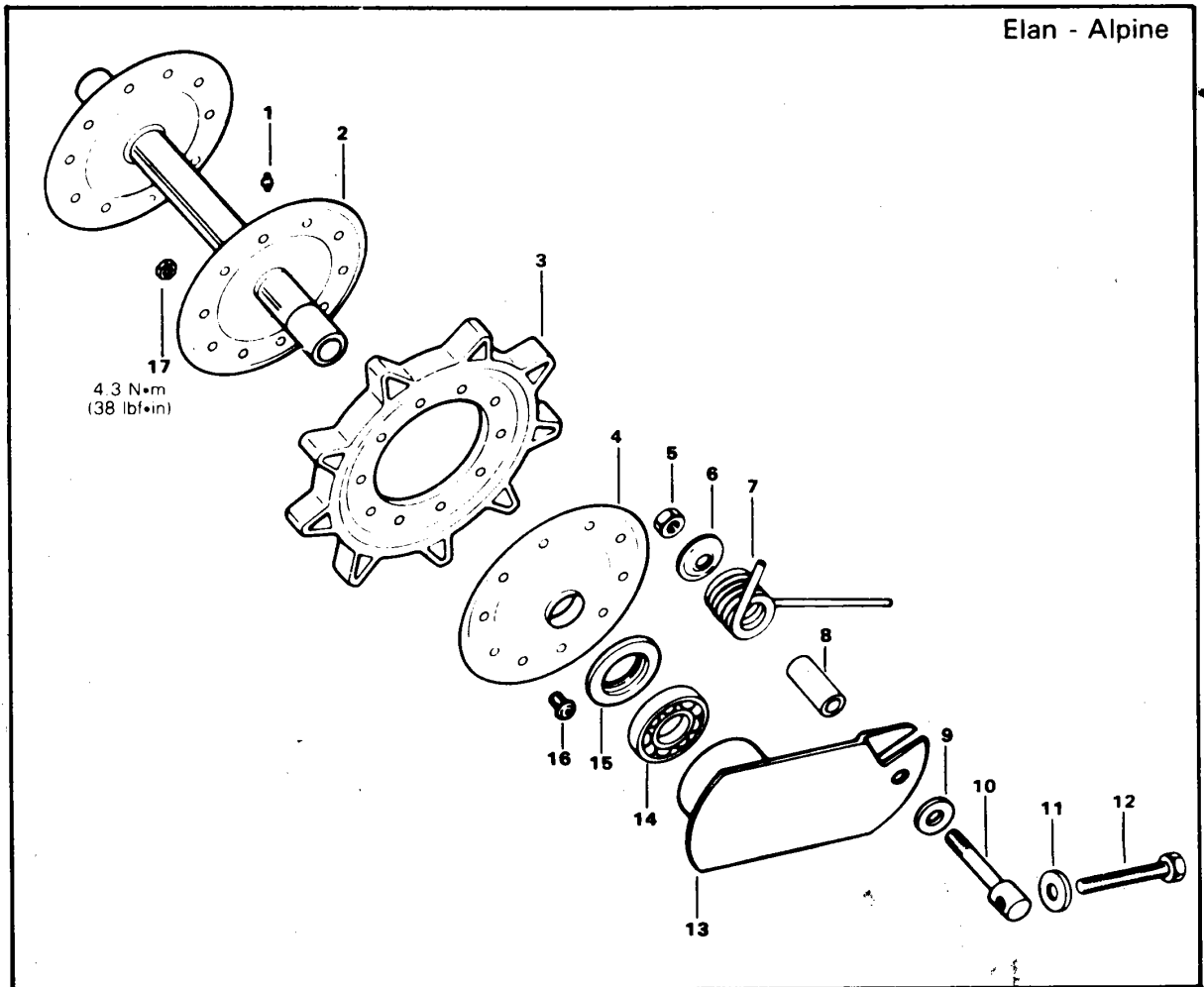
*For front shock absorber specifications, refer to section 06-02.

CAUTION: The center shock is different from the rear ones and must not be interchanged. Make sure they are properly positioned. Refer to the length, the center one is longer (about 12 mm (15/32'')) when fully extended. Also note that the part number for each shock is stamped on shock body.



Section 05 SUSPENSION
Sub-section 06 (REAR AXLE)

REAR AXLE



1. Grease fitting
2. Rear axle
3. Sprocket
4. Mobile flange
5. Lock nut
6. Retainer washer
7. Link plate spring
8. Sleeve
9. Hardened washer

10. Eye bolt
11. Washer (except for Alpine)
12. Adjuster bolt
13. Link plate
14. Bearing
15. Seal
16. Bolt (flange)
17. Nut (flange)

Section 05 SUSPENSION

Sub-section 06 (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 the link plate spring lock nuts and retainer washers.

8,9,10,11,12, Eye bolt, hardened washer, adjuster bolt, washer (Elan) & sleeve

Remove track adjuster bolts, eye bolts, hardened washers and adjuster sleeves.

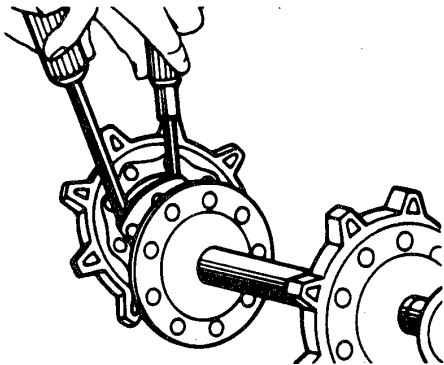
Withdraw rear axle from vehicle.

DISASSEMBLY & ASSEMBLY

3, Sprocket

Sprockets are factory riveted. When separation is necessary, remove rivets securing idler with a 1/4" dia. drill.

To remove sprocket, apply liquid soap or petroleum jelly on sprocket bead and flange then with two (2) screwdrivers (round bars), pass the sprocket over flange. Reverse change-over procedure to install sprockets.

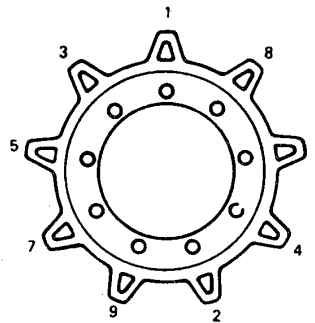


A002005006

2,3,4,16,17, Rear axle, sprocket, mobile flange bolt & nut

Secure idler wheels and flanges using bolts and nuts tightened in the following sequence to 4.3 N•m (38 lbf•in).

Torque sequence



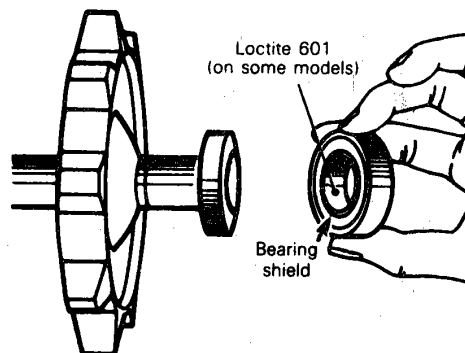
A002005007

14, Bearing

Always pull or push the bearing by inner race. Install bearing with shield facing the sprocket.

▼ **CAUTION:** On some models, bearings have been assembled to rear axle with "Loctite". Whenever these bearings are removed, always clean their inner race and the rear axle corresponding surface with Ethyl alcohol. Afterwards, when reassembling, make sure to apply "Loctite 601" (P/N 413 7031 00) on bearing inner race. Avoid applying too much "Loctite", it could run onto bearing balls.

Vehicles serial numbers involved: Alpine: up to 00502
Elan: up to 02102



A002005008

Section 05 SUSPENSION
Sub-section 06 (REAR AXLE)

13,15, Link plate & seal

When assembling, always position a new seal. When inserting seals into link plate, seal lip must sit correctly in groove of link plate. After lubricating the rear axle, ensure that seals remain in position.

INSTALLATION

2, Rear axle

With rear of vehicle off the ground, position the rear axle within the track.

8,9,10, Eye bolt, hardened washer & sleeve

Install sleeves, hardened washers and eye bolts.

12, Adjuster bolt

Partially screw-in the track adjuster bolts.

5,6, Retainer washer & lock nut

Install retainer washers and partially tighten the link plate spring lock nuts.

Carry out track tension and alignment.

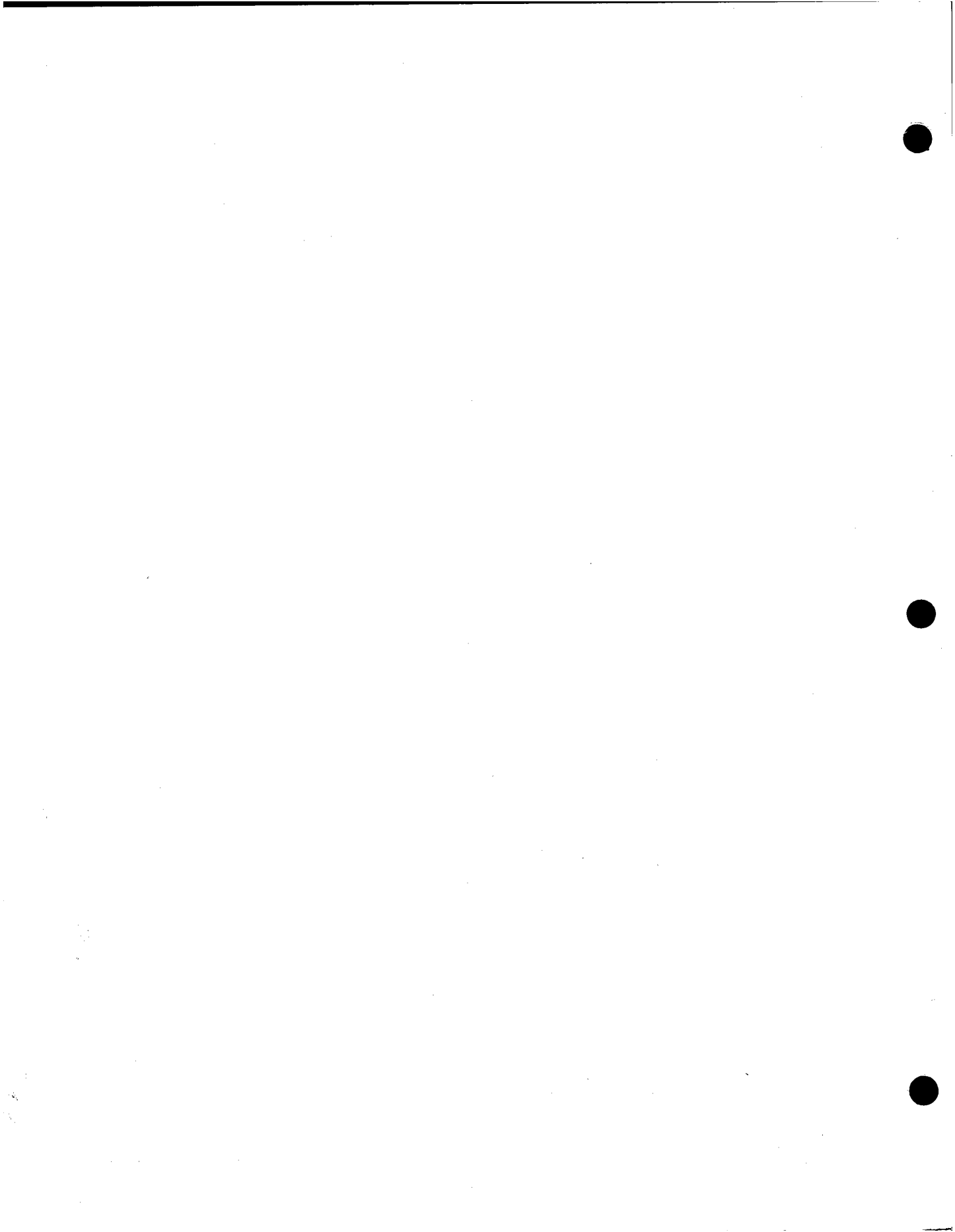
○ **NOTE:** To adjust the track tension and alignment, refer to section 05-08.

7, Link plate spring

Hook the link plate springs. If applicable, hook springs into middle position of 3 position anchors.

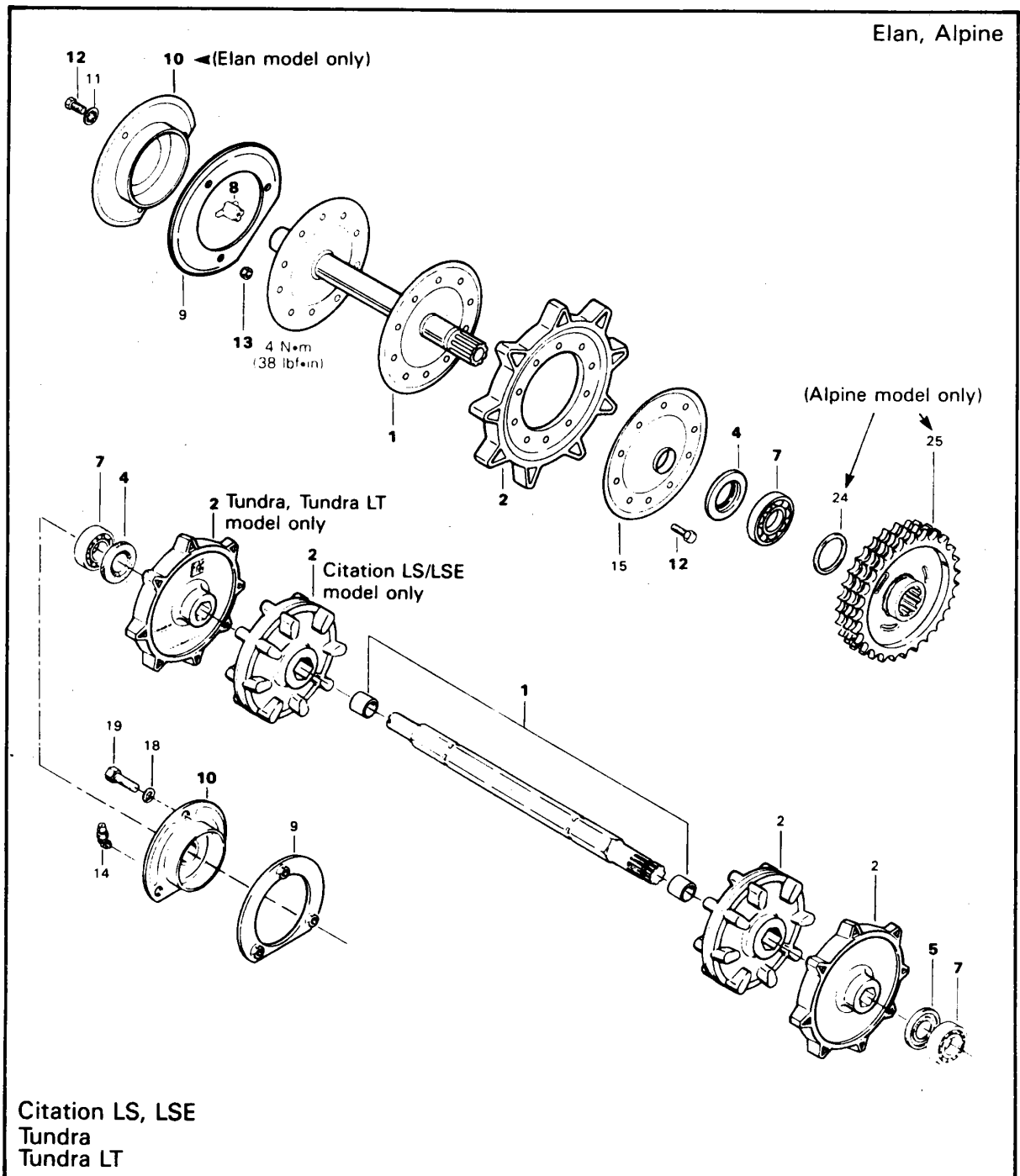
1, Grease fitting

If necessary, lubricate idler wheels at grease fittings until grease appears at joints. Use low temperature grease only (P/N 413 7044 00).

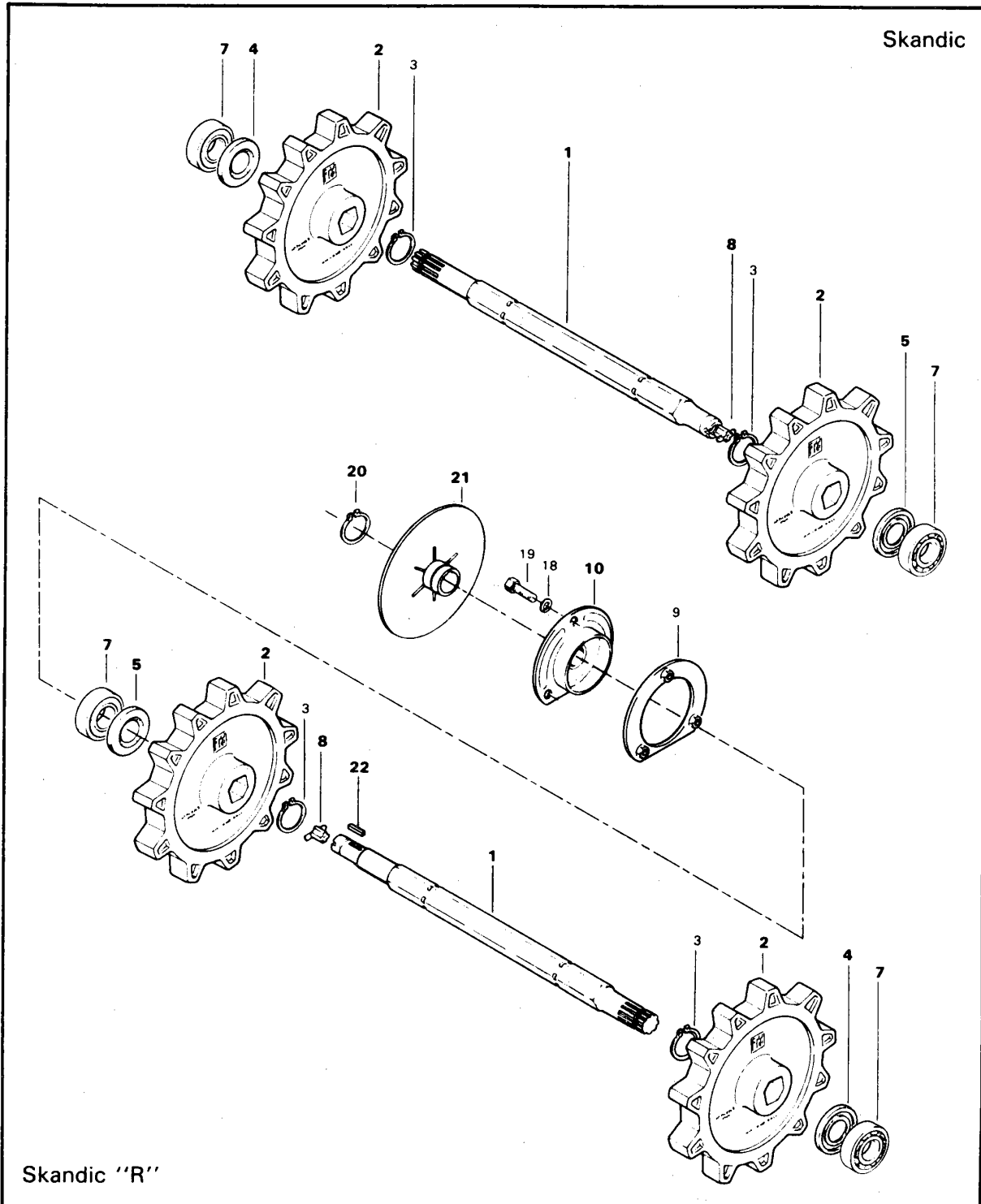


Section 05 SUSPENSION
Sub-section 07 (DRIVE AXLE)

DRIVE AXLE

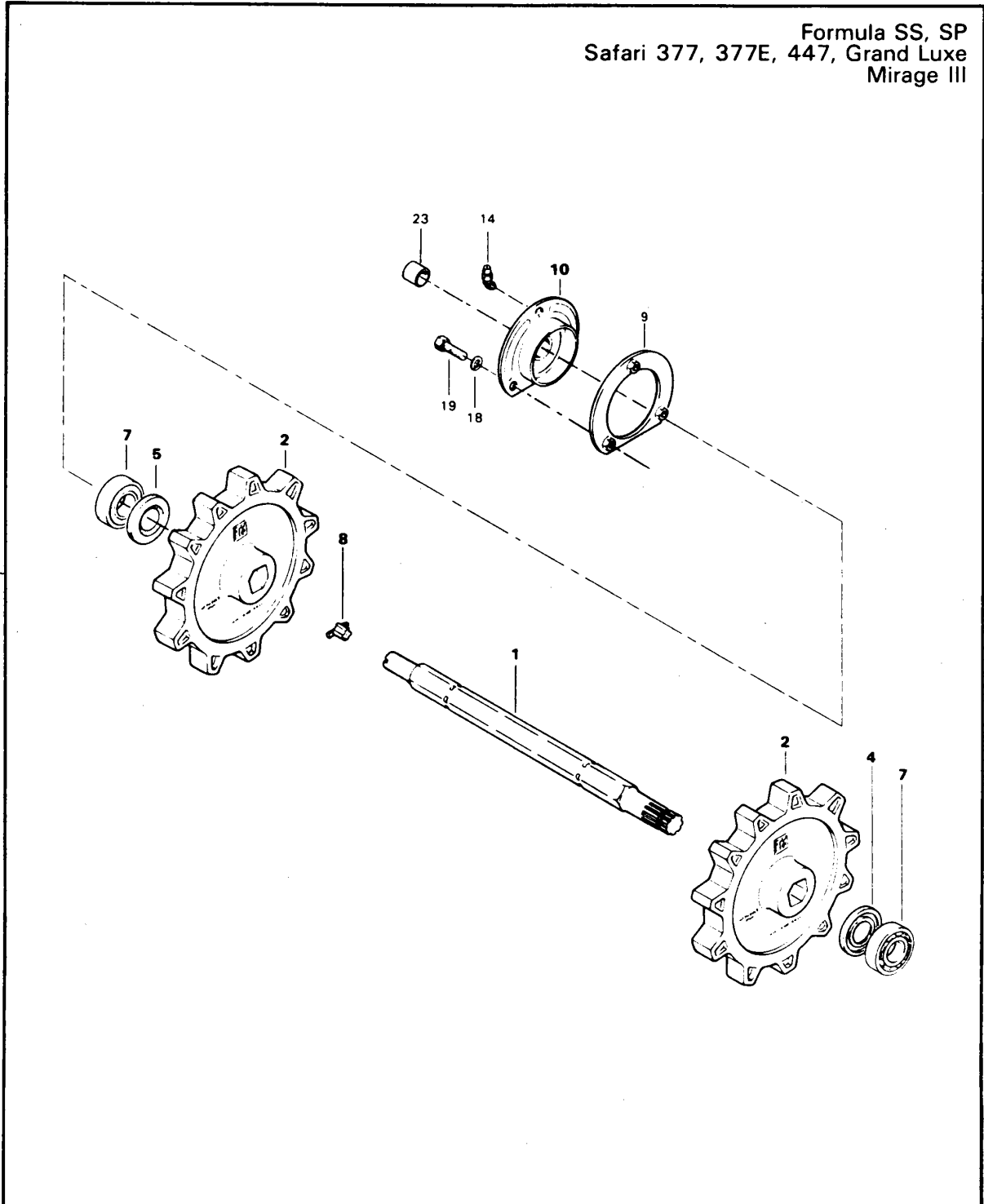


Section 05 SUSPENSION
Sub-section 07 (DRIVE AXLE)



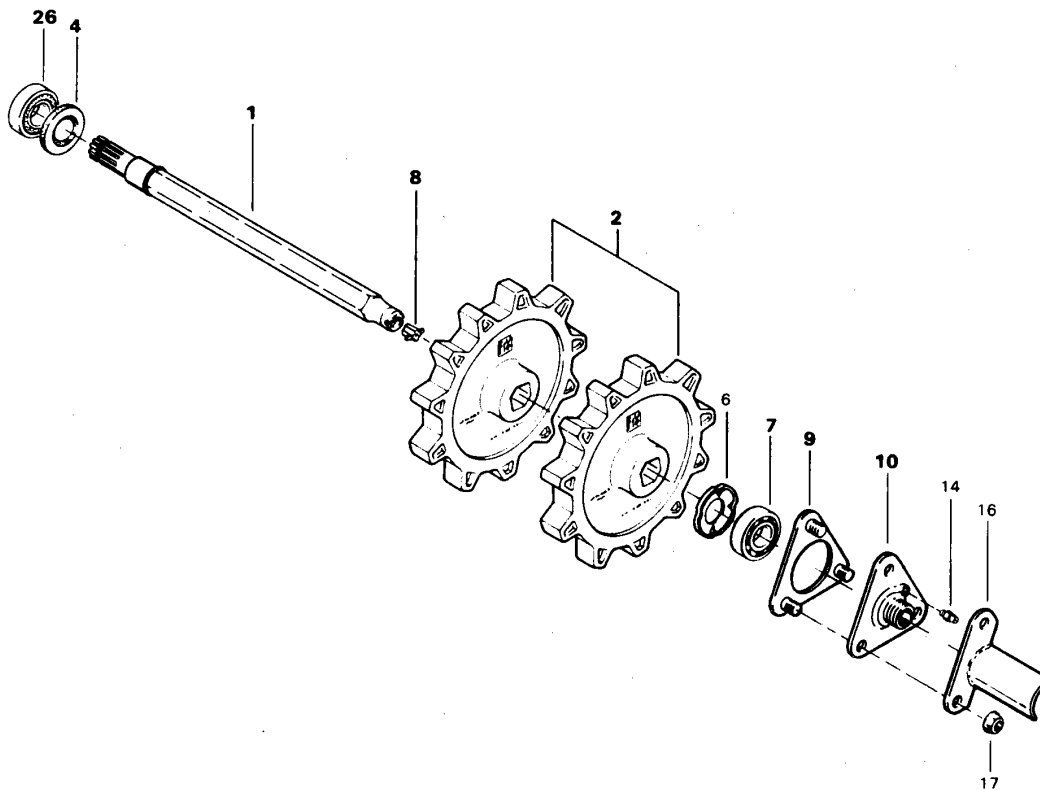
Section 05 SUSPENSION
Sub-section 07 (DRIVE AXLE)

Formula SS, SP
Safari 377, 377E, 447, Grand Luxe
Mirage III



Section 05 SUSPENSION
Sub-section 07 (DRIVE AXLE)

Formula MX, Plus



- | | |
|--|---|
| 1. Drive axle | 14. Grease fitting |
| 2. Sprocket | 15. Mobile flange |
| 3. Circlip | 16. Cable protector |
| 4. Seal | 17. Hexagonal flanged elastic stop nut M8 |
| 5. Seal | 18. Lock washer 6 mm |
| 6. Seal retainer | 19. Hexagonal head cap screw M6 x 16 |
| 7. Bearing | 20. Circlip |
| 8. Speedo drive insert | 21. Brake disc |
| 9. Retainer ring | 22. Key |
| 10. End bearing housing | 23. Cap |
| 11. Lock washer 5.16" | 24. Spacer |
| 12. Hexagonal head cap screw 1.4"-20 x 3.4" | 25. Sprocket |
| 13. Hexagonal flanged elastic stop nut 1.4"-20 | 26. Bearing |

Section 05 SUSPENSION

Sub-section 07 (DRIVE AXLE)

REMOVAL

Drain oil from chaincase or gear box. Remove chaincase cover. Release drive chain tension (if applicable).

Raise and block rear of vehicle off ground.

Remove suspension. (See section 05).

4,5,10, Seals & bearing housing

Pry oil seals from chaincase and end bearing housing.

Remove end bearing housing and unlock drive axle end sprocket (single track models).

○ **NOTE:** If applicable, remove battery and its seat. If vehicle is equipped with a speedometer, remove angle drive unit and coupling cable.

20,21,22, Circlip, brake disc & key

On Skandic "R" models, remove brake caliper, circlip, brake disc and key before removing end bearing housing.

1,2, Drive axle & sprockets

Release drive sprockets teeth from track notches, at the same time, pulling the drive axle towards the end bearing housing side of frame.

Remove drive axle from vehicle. If applicable, pull out shim located between bearing and lower chaincase sprocket.

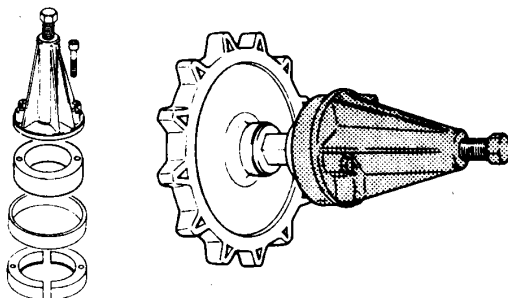
DISASSEMBLY

8, Speedo drive insert

Remove speedo drive insert (if applicable).

7,26, Bearings

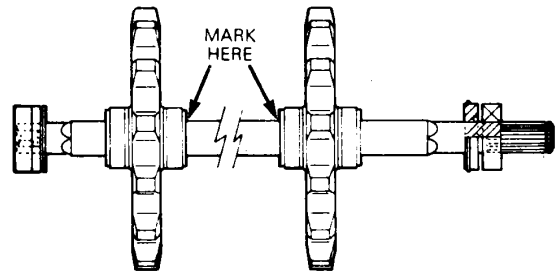
To remove bearings, use puller assembly, ring and half rings as illustrated. (Refer to tools section).



A000005004

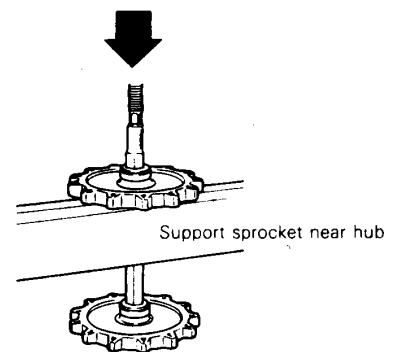
2, Sprockets

When replacing sprockets, make a reference mark on the axle to facilitate reassembly of the new sprockets.



A000005005

To remove, press fit sprockets (drive axle without flange), use a press and a suitable support as illustrated.



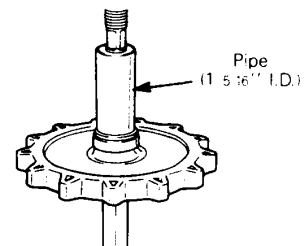
A000005006

○ **NOTE:** 1985 models have two different axle-sprocket press fits. Ensure to replace ring reinforced sprockets with the same type.

ASSEMBLY

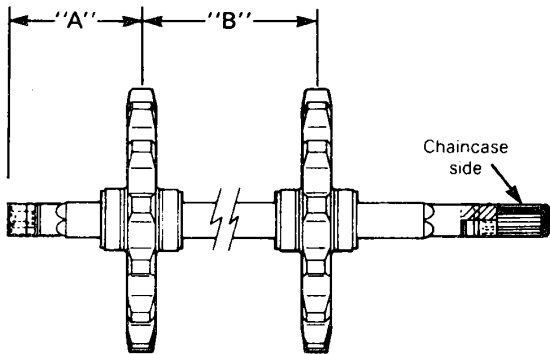
1,2, Drive axle & sprocket

To assemble press fit sprockets, use a press and a pipe (1 5/16" I.D.) as illustrated. Sprockets must be assembled with the following dimensions.



A000005007

Section 05 SUSPENSION
Sub-section 07 (DRIVE AXLE)



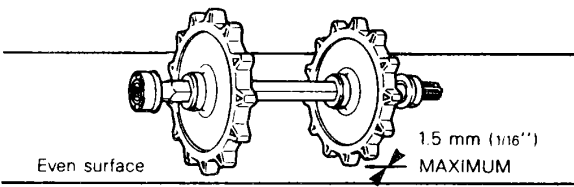
A000005008

APPLICABLE MODELS	"A" mm (in)	"B" mm (in)
Citation LS, LSE	135 (5 5/16)	138 (5 7/16)
Tundra, Tundra LT	83 (3 17/64)	242 (9 17/32)
Skandic	91.7 (3 39/64)	242 (9 17/32)
Skandic R	146 (5 3/4)	242 (9 17/32)
Safari 377, Mirage III, Formula SS	113 (4 29/64)	225.5 (8 7/8)
Safari 377 E, 447, Grand Luxe, Formula SP	104.5 (4 7/64)	242 (9 17/32)
Formula MX	114.5 (4 1/2)	226 (8 57/64)
Formula Plus	106.5 (4 3/16)	242 (9 17/32)

Ensure to align indexing marks on each sprocket before assembling the second sprocket.

The maximum synchronization tolerance for the sprockets is 1.5 mm (1/16").

To check this tolerance, place axle assembly on a plane surface and measure the gap between sprocket teeth and surface.



A000005010

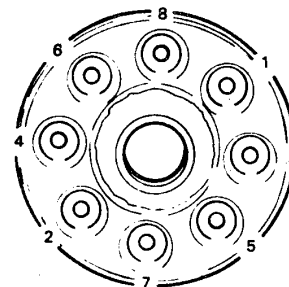
CAUTION: The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

12,13, Cap screws & elastic stop nut

On Elan and Alpine, tightening torque for axle flanges is 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.

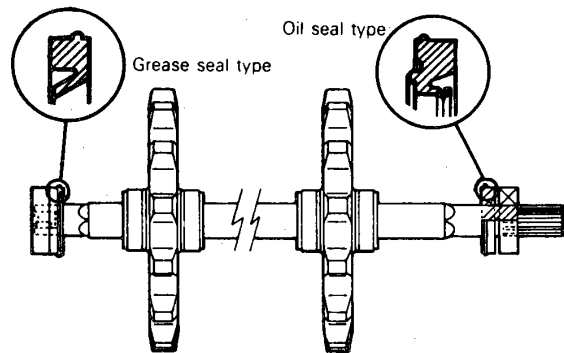
Torque sequence



A000005011

1,4,5, Drive axle & seal

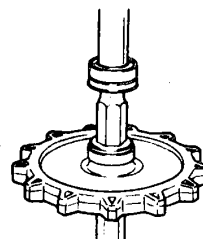
When assembling drive axle, always position a new seal on each end of drive axle (if applicable). The seal lip must face sprocket as illustrated.



A000005012

7,26, Bearings

Always push bearing by inner race.

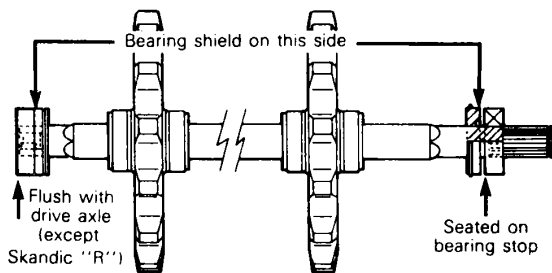


A000005013

Section 05 SUSPENSION
Sub-section 07 (DRIVE AXLE)

The bearing on the splined side of axle must be pushed until it is seated on bearing stop. The end bearing housing bearing must be flush with end of drive axle. Each bearing must have its shield facing the sprocket.

○ **NOTE:** On Skandic "R" model, the two bearings on drive axle must be seated against bearing stop. The completely sealed bearing must be install on disc brake side.



A000005015

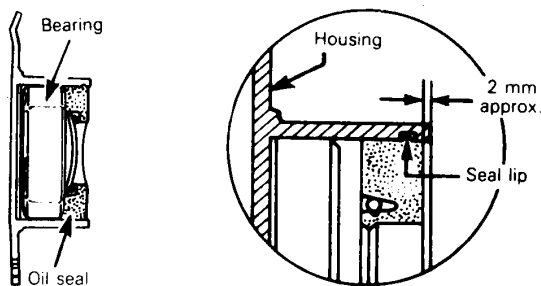
INSTALLATION

8, Speedo drive insert

If the drive axle to be installed is a new component 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.

Position drive axle assembly into location. Install shim(s) between bearing and lower chaincase sprocket. Install end bearing housing.

Install chaincase and position seals, making sure that a gap of approximately 2 mm (1/16") exists between end of bearing housing and each seal.



A000005016

Lock drive axle sprocket with a new cotter pin (Elan model) or circlip (other single track models).

Reinstall the chaincase cover.

Refill with chaincase oil. (See technical data, section 09).

Install the suspension. Apply track tension and carry out track alignment procedure. (See section 05-08).



TRACK

TRACK TYPE APPLICATION

Refer to the "Technical Data" section 09.

INSPECTION

Visually inspect track for cuts and abnormal wear. Inspect track for broken rods. If excessive damage is evident and rods are broken, replace track. Inspect track for damaged or missing inserts. Replace damaged insert(s).

◆ **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
- The two drive axle seals
- End bearing housing
- Drive axle
- Track

Skandic, Skandic "R"

Remove the following items:

- Pulley guard and drive belt
- Air silencer
- Chaincase cover, sprockets and chain
- Suspension
- Brake caliper (Skandic "R")
- Circlip (Skandic "R")
- Brake disc (Skandic "R")
- Key (Skandic "R")
- Drive axle shaft bearing housing (left side)
- Drive axle (outwards from left side)
- Upper center idler(s) assembly
- Track

Formula MX, Plus

Remove the following items:

- Speedometer cable and protector
- Muffler
- Chaincase cover, sprockets and chain
- Suspension
- Drive axle seal
- End bearing housing
- Drive axle (toward end bearing housing)
- Track

Alpine

Remove the following items:

- Release the chain tensioner of the transmission chain
- Bogie wheels
- Rear axle(s) assembly(ies)
- Drain the transmission oil
- Drive axle seal(s)
- End bearing(s) housing
- Drive axle(s) (outwards from end bearing(s) housing)
- Track(s)

Formula SS, SP, Safari 377, 377E, 447 Mirage III, Grand Luxe LC

Remove the following items:

- Speedometer cable
- Battery and battery support (if so equipped)
- Chaincase cover, sprockets and chain
- Suspension
- Two drive axle seals
- Drive axle (outwards from end bearing housing)
- Track

Section 05 SUSPENSION

Sub-section 08 (TRACK)

Citation LS, LSE, Tundra, Tundra LT

Remove the following items:

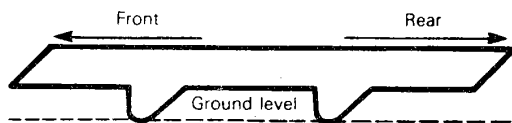
- Battery (if so equipped)
- Chaincase cover, sprockets, chain
- Muffler
- Upper center idler ass'y
- Suspension
- End bearing housing
- Both drive axle seals
- Drive axle (outwards from end bearing housing)
- Track

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.



A001005001

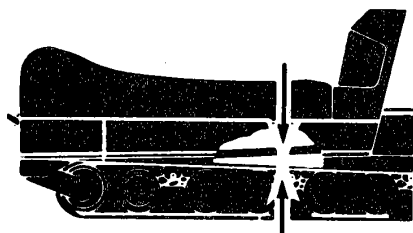
Track tension & alignment

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.

▼ **CAUTION:** Each item must be installed following the procedure detailed in this manual.

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") between top inside edge of track and bottom of foot board.



A002005009

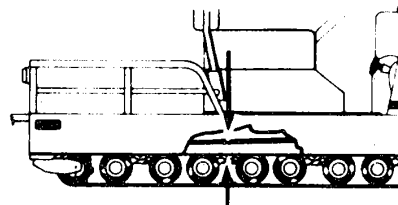
05-08-2

If applicable, ensure that the link plate springs are in the middle position of the 3 position slotted anchors.

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 counterclockwise to slacken.

Tension (bogie wheel), Alpine

With rear of vehicle blocked off the ground, check the tension of each track: 57 mm (2 1/4") between top inside edge and bolt of center wheel set retaining bolt.



A017005002

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 counterclockwise to slacken.

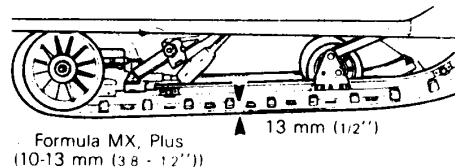
Tighten link plate spring lock nuts.

▼ **CAUTION:** Too much or too little tension will result in power loss and excessive stress on suspension components.

○ **NOTE:** If the track tension is too loose, the track will have a tendency to thump.

Tension (for all slide suspension models)

Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap 13 mm (1/2") (10-13 mm (3/8" - 1/2")) on Formula MX Plus between the slider shoe and the bottom inside of the track.



Formula MX, Plus
(10-13 mm (3/8" - 1/2"))

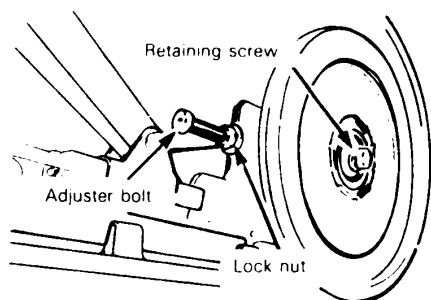
A001005002

▼ **CAUTION:** Too much or too little tension will result in power loss and excessive stress on suspension components.

Section 05 SUSPENSION

Sub-section 08 (TRACK)

To adjust loosen the rear idler wheel retaining screw (not required on Citation LS, LSE, models) and the adjuster bolt lock nut; then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



A001005003

○ **NOTE:** If the track tension is too loose, the track will have a tendency to thump.

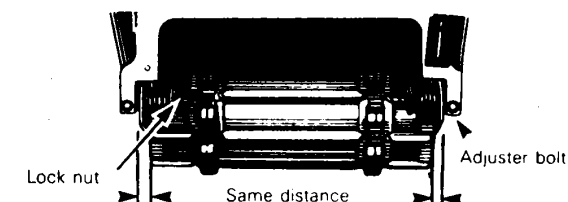
Alignment (bogie wheel all models)

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. (If applicable, ensure link plate springs are in the middle position of the 3 position slotted anchors).

◆ **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.

(TYPICAL)



A001005004

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.

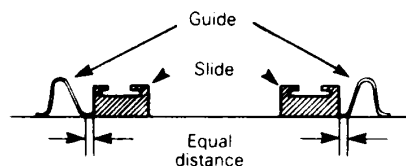
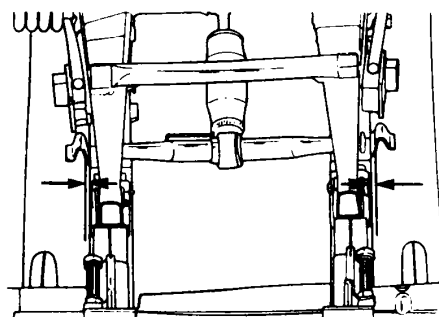
Tighten link plate spring lock nut.

Alignment (slide suspension all models)

With rear of vehicle supported off the ground, start engine and allow the track to rotate slowly.

Check that track is well centered and turns evenly. 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.

(TYPICAL)



A001005005

◆ **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.

TRACK INSERT INSTALLATION

Using #529 004 500 tool (with two standard jigs)

Tilt vehicle on its side to expose the track notches then place insert into position.

○ **NOTE:** Keep the same actual pitch between cleat guides.

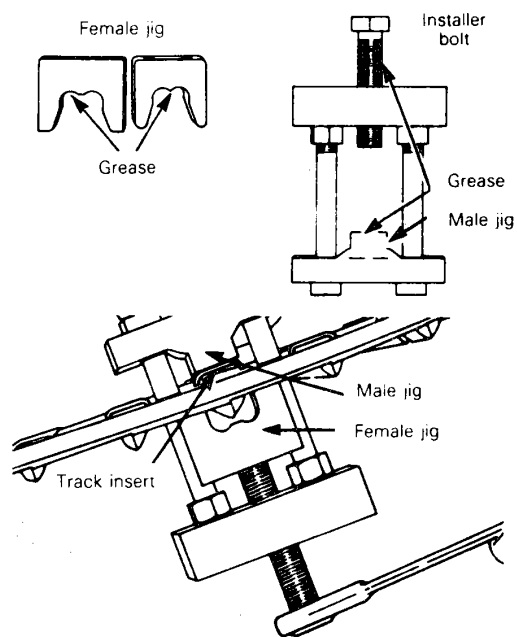
Section 05 SUSPENSION

Sub-section 08 (TRACK)

Place the track insert installer into track notches and position male jig on top of track insert.

Tighten installer bolt until track insert is locked in place.

▼ **CAUTION:** To prevent damages and for an easier operation of the tool, apply grease on male jig, female jig and to the installer bolt threads.

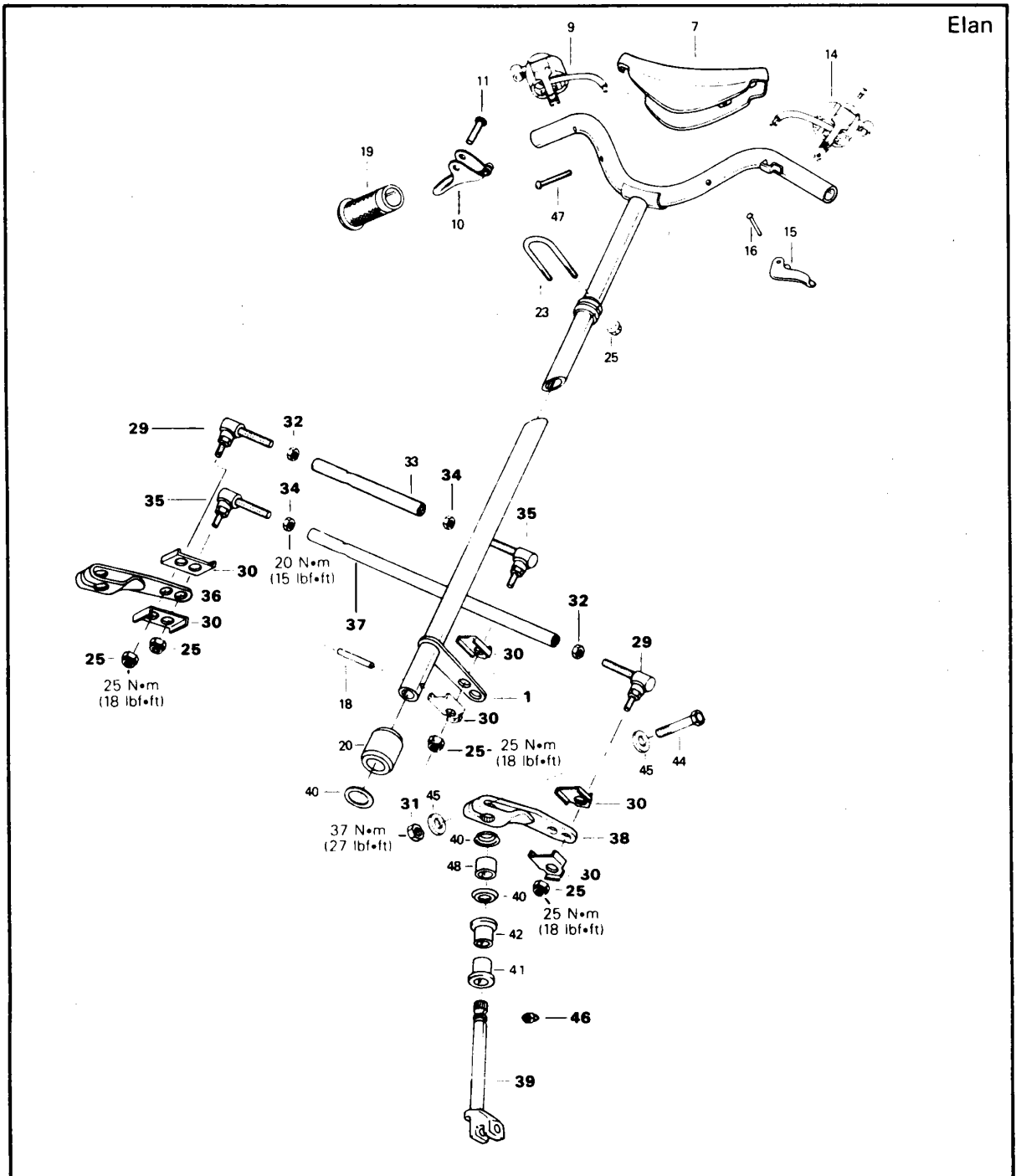


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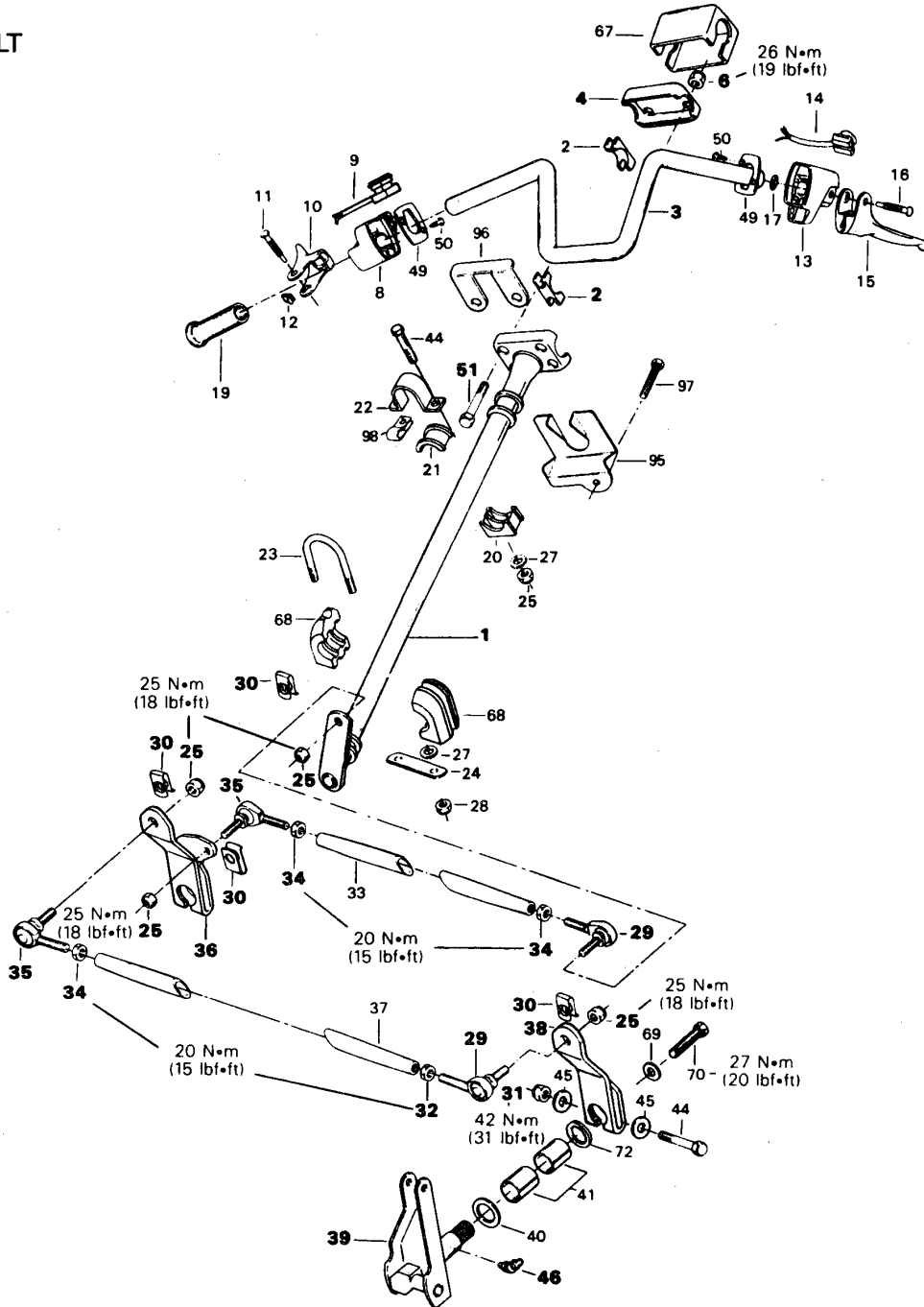
Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)

STEERING SYSTEM

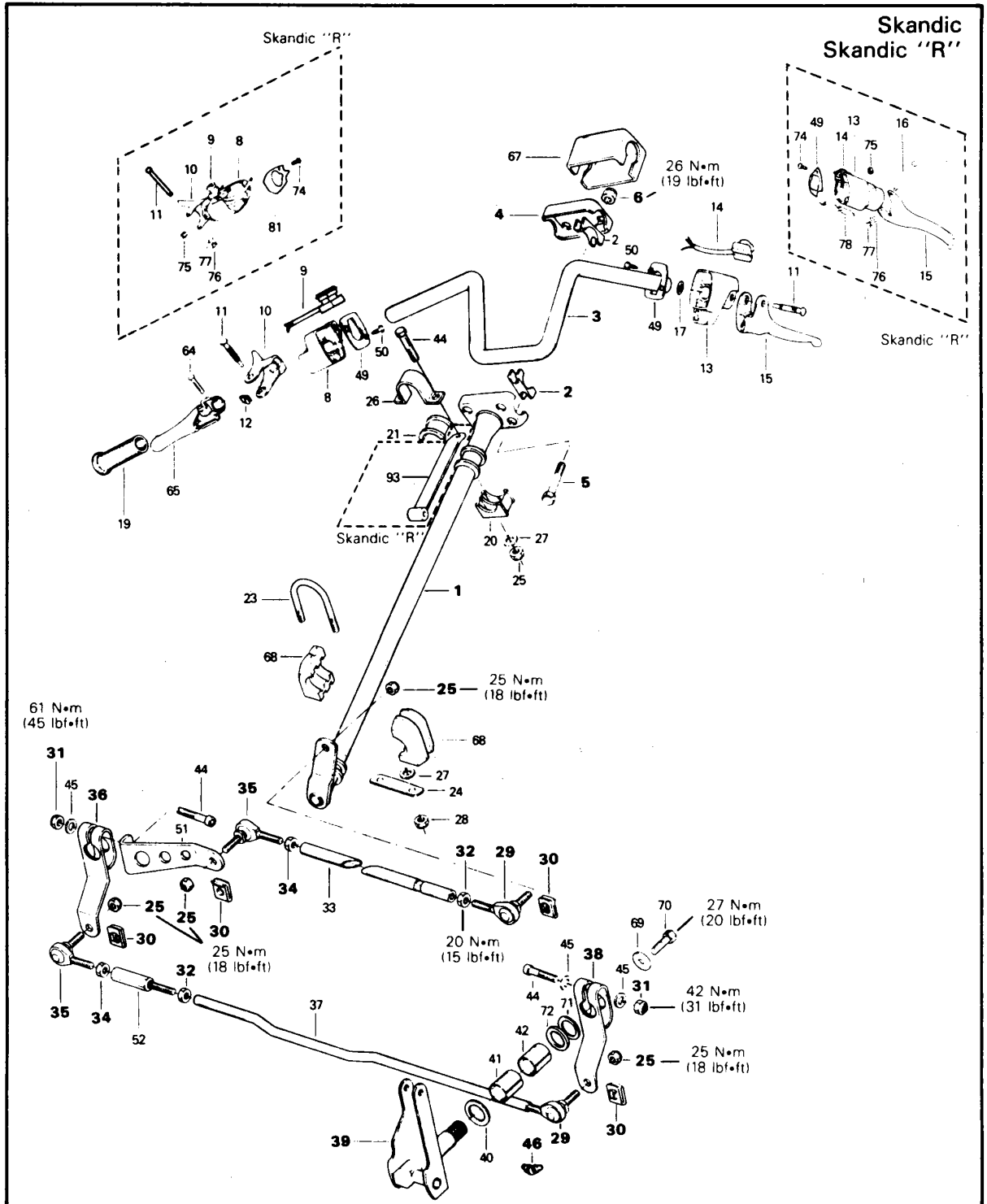


Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)

Citation LS/LSE
Tundra
Tundra LT



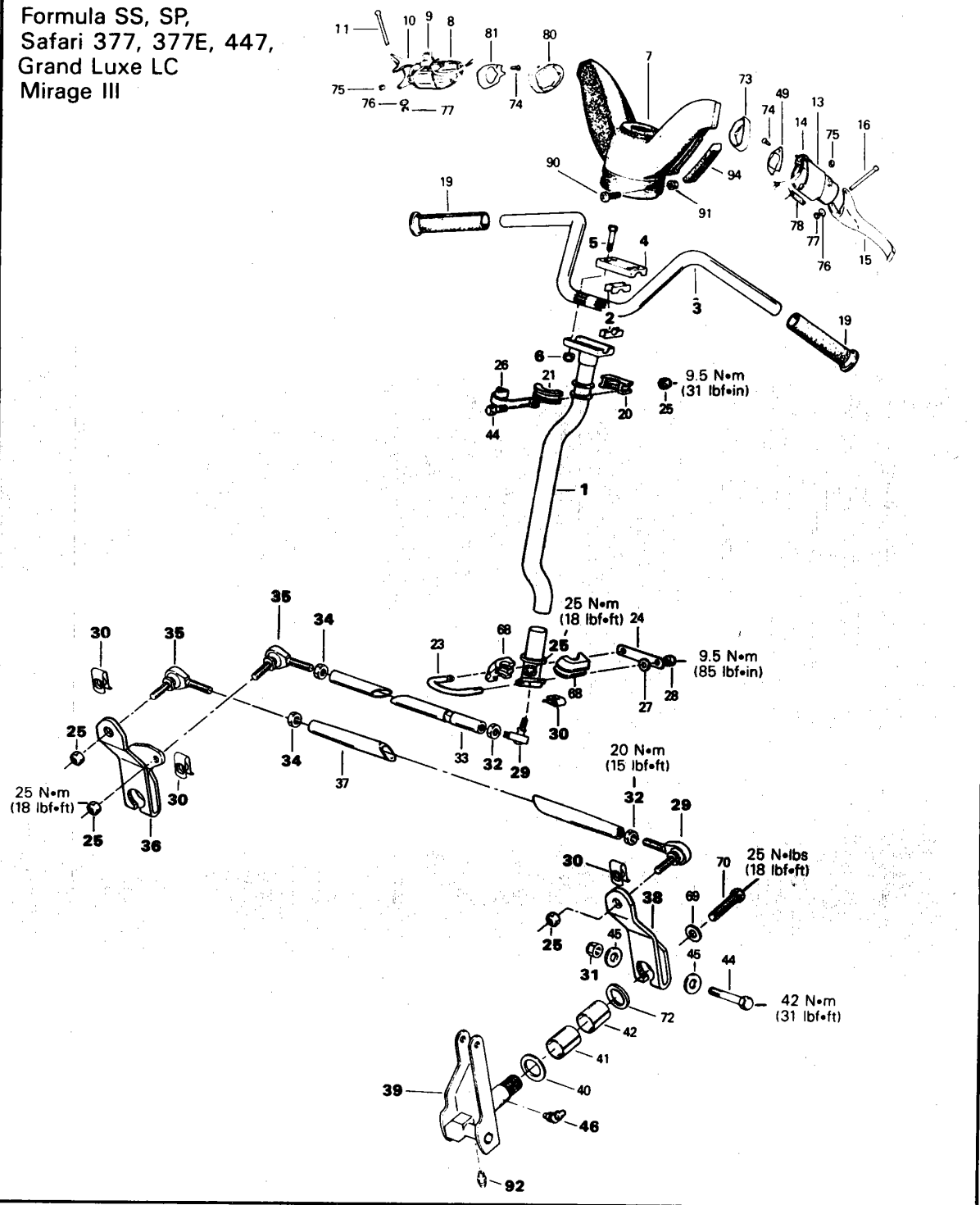
Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)



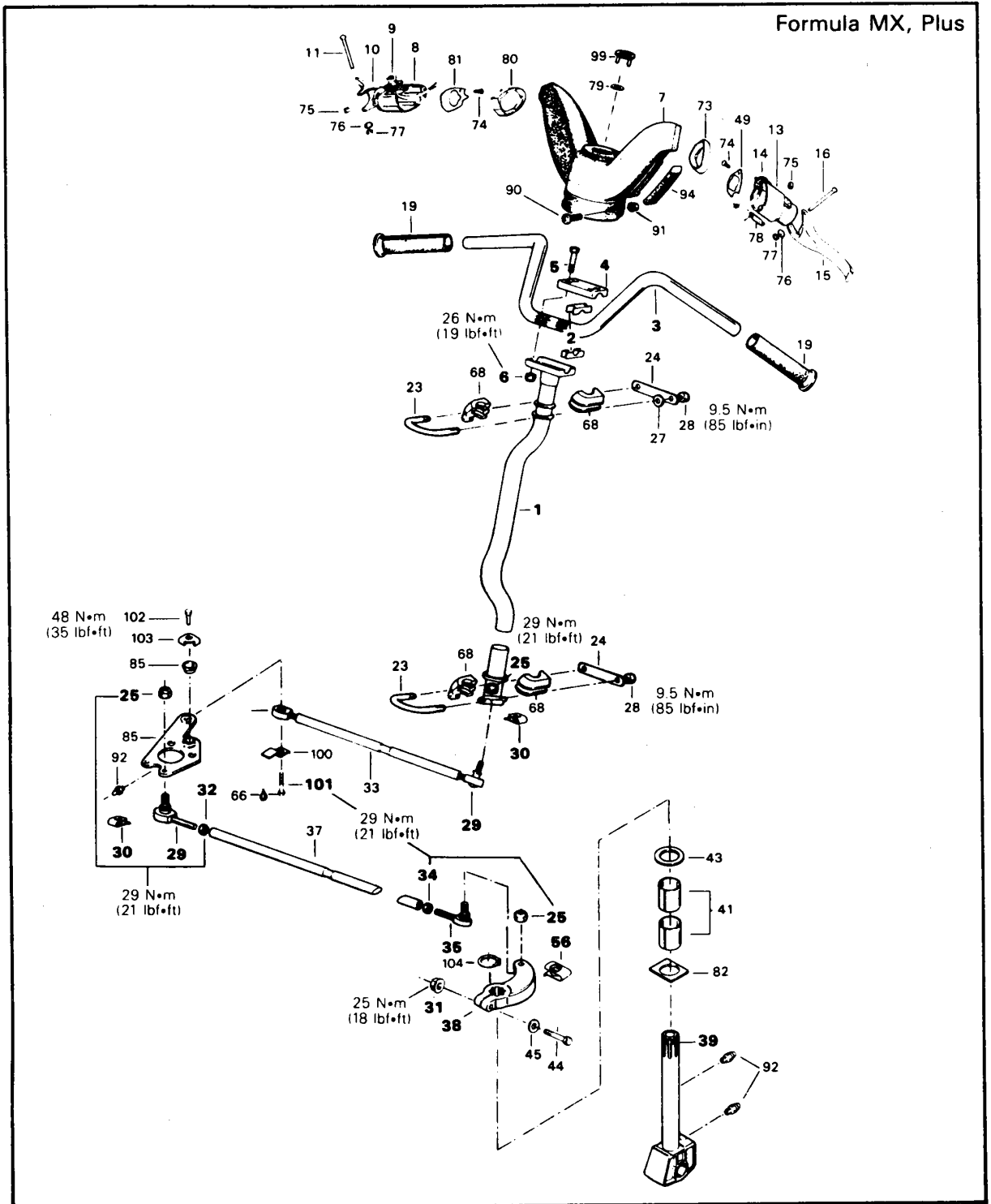
Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

Formula SS, SP,
Safari 377, 377E, 447,
Grand Luxe LC
Mirage III

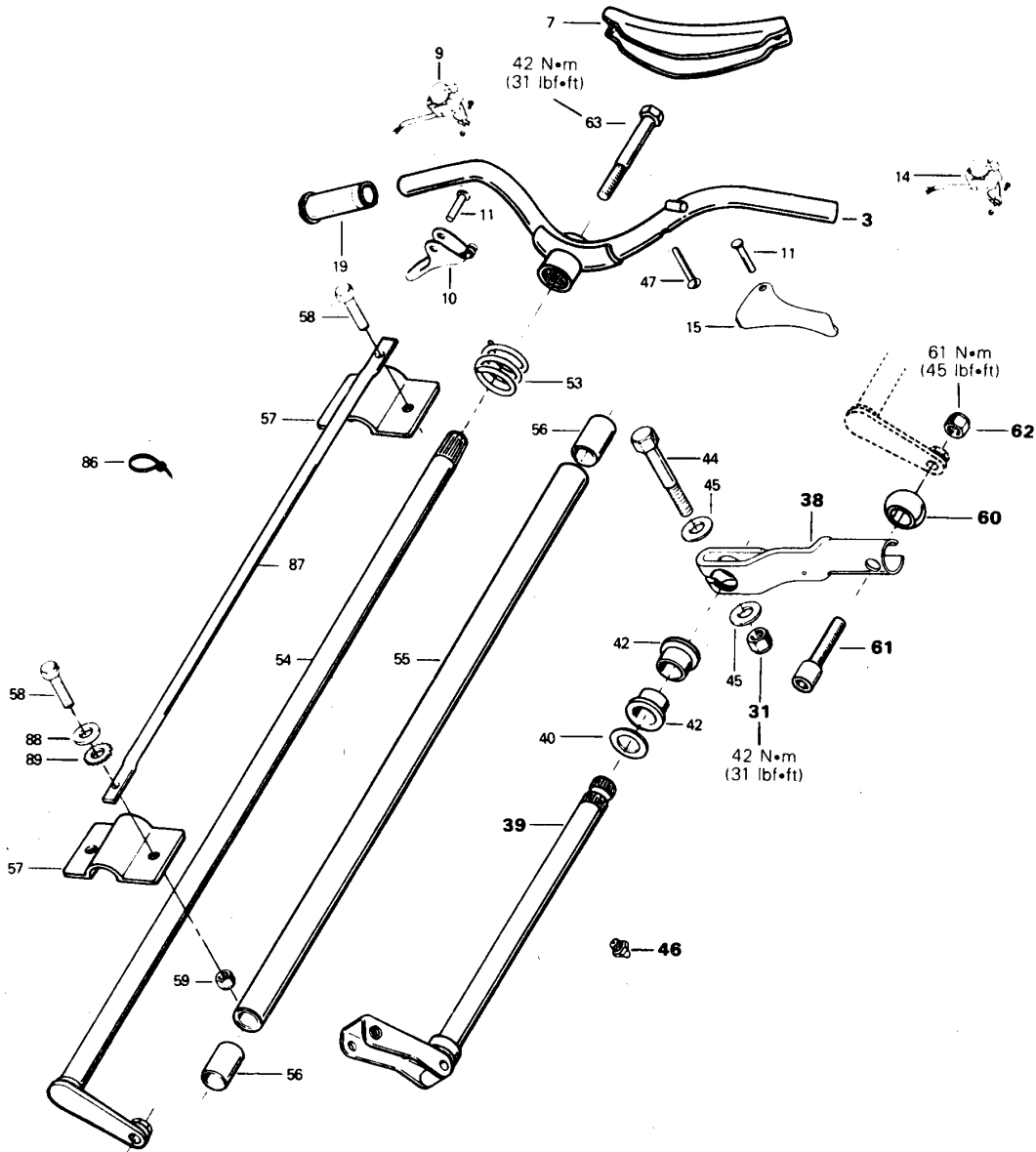


Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)



Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)

Alpine



Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

- | | |
|------------------------------------|---------------------------------------|
| 1. <i>Steering column</i> | 53. <i>Spring</i> |
| 2. <i>Handlebar support</i> | 54. <i>Steering shaft (main)</i> |
| 3. <i>Handlebar</i> | 55. <i>Steering housing</i> |
| 4. <i>Steering clamp</i> | 56. <i>Bushing</i> |
| 5. <i>Cap screw</i> | 57. <i>Retainer bracket</i> |
| 6. <i>Elastic stop nut</i> | 58. <i>Bolt</i> |
| 7. <i>Steering pad</i> | 59. <i>Nut</i> |
| 8. <i>Throttle handle housing</i> | 60. <i>Ball bushing</i> |
| 9. <i>Emergency cut-out switch</i> | 61. <i>Allen bolt</i> |
| 10. <i>Throttle handle</i> | 62. <i>Nut</i> |
| 11. <i>Pin</i> | 63. <i>Cap screw</i> |
| 12. <i>Retainer</i> | 64. <i>Rivet</i> |
| 13. <i>Brake handle housing</i> | 65. <i>Parking handle</i> |
| 14. <i>Dimmer switch</i> | 66. <i>Loctite 271</i> |
| 15. <i>Brake handle</i> | 67. <i>Steering cover</i> |
| 16. <i>Pin</i> | 68. <i>Bushing</i> |
| 17. <i>Push nut</i> | 69. <i>Flat washer 8.4 x 25</i> |
| 18. <i>Spiral pin</i> | 70. <i>Cap screw</i> |
| 19. <i>Grip</i> | 71. <i>Spring washer</i> |
| 20. <i>Lower bushing</i> | 72. <i>Washer 7/8"</i> |
| 21. <i>Upper bushing</i> | 73. <i>Brake adaptor</i> |
| 22. <i>Retainer bracket</i> | 74. <i>Self tapping screw</i> |
| 23. <i>U-clamp</i> | 75. <i>Set screw</i> |
| 24. <i>Lock tab</i> | 76. <i>Washer</i> |
| 25. <i>Elastic Stop Nut</i> | 77. <i>Circlip</i> |
| 26. <i>Retainer bracket</i> | 78. <i>Brake light switch</i> |
| 27. <i>Flat washer</i> | 79. <i>Push nut</i> |
| 28. <i>Elastic stop nut</i> | 80. <i>Throttle adaptor</i> |
| 29. <i>Ball joint L.H.</i> | 81. <i>Throttle cover</i> |
| 30. <i>Lock tab</i> | 82. <i>Brass washer</i> |
| 31. <i>Elastic stop nut</i> | 83. <i>Pivot (stud)</i> |
| 32. <i>Jam nut L.H.</i> | 84. <i>Tie rod</i> |
| 33. <i>Tie rod</i> | 85. <i>Flange</i> |
| 34. <i>Jam nut R.H.</i> | 86. <i>Tie rap</i> |
| 35. <i>Ball joint R.H.</i> | 87. <i>Retainer brace</i> |
| 36. <i>Steering arm</i> | 88. <i>Flat washer</i> |
| 37. <i>Tie rod</i> | 89. <i>External tooth lockwasher</i> |
| 38. <i>Steering arm</i> | 90. <i>Bolt</i> |
| 39. <i>Ski leg</i> | 91. <i>Nut</i> |
| 40. <i>Washer</i> | 92. <i>Grease fitting</i> |
| 41. <i>Bushing</i> | 93. <i>Driven pulley holder clamp</i> |
| 42. <i>Bushing</i> | 94. <i>Clip</i> |
| 43. <i>Shim</i> | 95. <i>Plate</i> |
| 44. <i>Cap screw</i> | 96. <i>Retainer bracket</i> |
| 45. <i>Flat washer</i> | 97. <i>Screw</i> |
| 46. <i>Grease fitting</i> | 98. <i>Clip</i> |
| 47. <i>Screw</i> | 99. <i>Bombardier logo</i> |
| 48. <i>Rubber spacer</i> | 100. <i>Screw stopper</i> |
| 49. <i>Housing cap</i> | 101. <i>Screw</i> |
| 50. <i>Screw</i> | 102. <i>Screw</i> |
| 51. <i>Steering arm extension</i> | 103. <i>Screw stopper</i> |
| 52. <i>Turnbuckle</i> | 104. <i>Snap ring</i> |

INSPECTION

Check skis and runner shoes for excessive wear, replace as necessary. (See section 06-02.)

36,38,39, Steering arms & ski legs

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.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY & ASSEMBLY

19, Grips

Grips can be removed and installed without any damage by injecting compressed air into the handlebar.

Another way to install grips consists in soaking them in soapy water (detergent for dishes) and in pushing them onto the handlebar with a soft hammer.

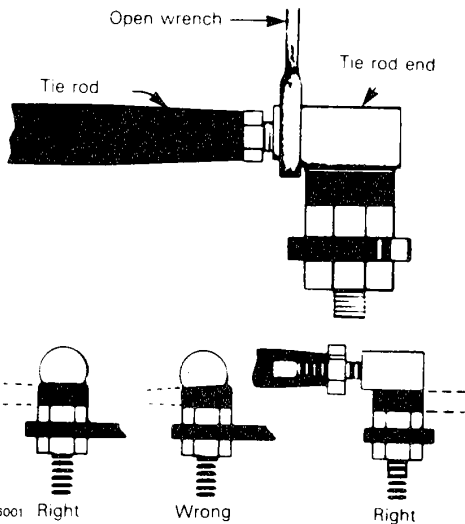
Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)

29,35, Ball joints

Inspect ball joint ends for wear or looseness, if excessive, replace.

NOTE: Screw the longest threaded end of ball joint into the tie rod, ensure that half of the total number of threads are inserted into the tie rod.

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 tie rod end should be restrained when tightening tie rod end lock nut. For torque specifications see illustrations.



30,100,103, Lock tabs & screw stopper

When assembling components, always position new lock tabs and screw stoppers.

36,38, Steering arms

The steering arm angles should be equal on both sides when skis are parallel with vehicle.

25,30,100, Ball joint nuts, lock tabs & screw stopper

Tighten ball joint nuts to specified torque and bend lock tabs over nuts. (See illustration.)

30,31, Steering arm nuts & lock tabs

Tighten steering arm nuts to specified torque and bend lock tabs over nuts. (See illustration.)

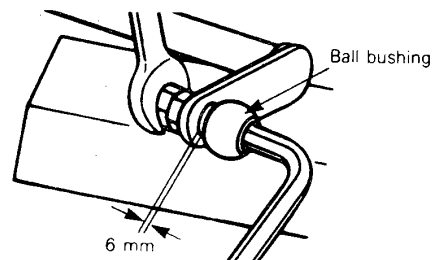
66,100,101, Screw stopper, screw & Loctite 271

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.

Alpine

60,61,62, Ball bushing, Allen bolt & nut

Affix the ball bushing to steering shaft using appropriate Allen head bolt. Tighten bolt until there is approximately 6 mm (1/4") free-play existing between ball bushing and steering shaft.



Torque nut to 61 N•m (45 lbf•ft)

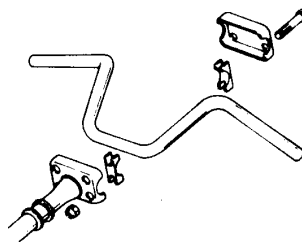
ADJUSTABLE HANDLEBAR

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, bolts & nuts

Install the four (4) handlebar support, steering clamp, the four (4) screws and nuts to the column, as illustrated.



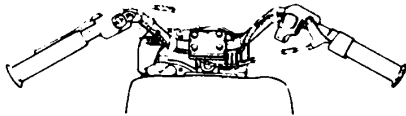
Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)

On all vehicles, 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.



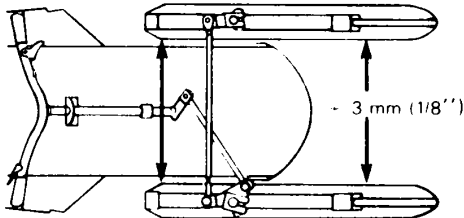
A001006003

◆ **WARNING:** Do not adjust the handlebar too high to avoid contact between the brake lever 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, levers, console, etc. can be cleaned using mild detergents or isopropyl alcohol. Do not use strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc.

STEERING ADJUSTMENT (SKIS)



A001006004

Skis should have a toe out of 3 mm (1/8"). To check, measure distance between each ski at front and rear of skis. The front distance should be 3 mm (1/8") more than the rear when the handlebar is horizontal. If adjustment is required:

32,34, Tie rods jam nuts

Loosen the jam nuts locking the tie rod(s) in place. Turn tie rod(s) manually until alignment is correct. Tighten jam nuts firmly.

IMPORTANT: Close front of skis manually to take all slack from steering mechanism.

All models (except Alpine, Formula MX, Formula Plus)

Check that handlebar is horizontal while skis are parallel with the vehicle. To correct loosen shorter tie rod jam nuts.

Turn tie rod manually until handlebar is horizontal.

Tighten jam nuts firmly.

Alpine

38,39, Steering arm & ski leg

When assembling steering arm and ski leg the handlebar must be horizontal with the ski in line with the vehicle.

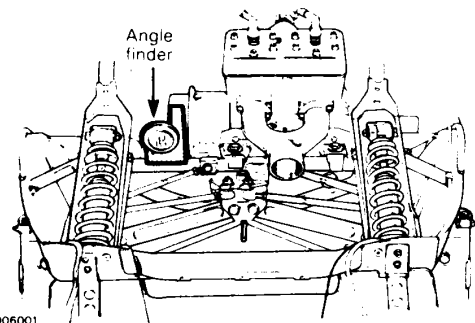
Formula MX, Plus

These models require skis toe out of 3 mm (1/8") max. and a camber angle of $0^\circ \pm 0.5^\circ$ (vertical).

The camber angle is the inclination of the ski leg from the vertical. It is measured in degrees with an angle finder and adjusted by increasing or reducing the distance between upper control arm ball joints.

Procedure

- Using the appropriate equipment, raise and block the vehicle so that the skis are about 25 mm (1") from the ground. The camber angle must be measured when the suspension is fully extended.
- Make sure the vehicle is leveled by placing an angle finder on the main horizontal frame member in front of the engine.

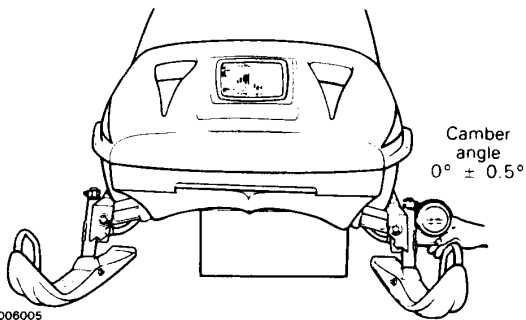


A015006001

- Place the angle finder on the ski leg housing and adjust the upper control arm to the specified angle. Check both ski legs.

Section 06 STEERING/SKIS

Sub-section 01 (STEERING SYSTEM)



A015006005

— Close front of skis manually to take all slack from steering mechanism.

Adjust toe out as per others models.

LUBRICATION

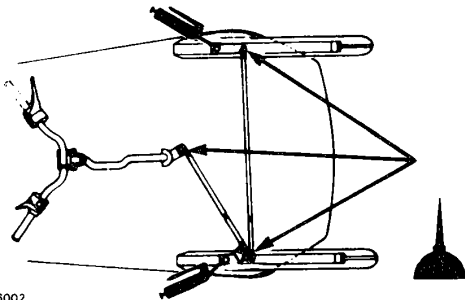
◆ **WARNING:** Do not lubricate throttle and/or brake cable and housings, and spring coupler bolts.

46,92, Ski leg & grease fittings

Using low temperature grease only.

Lubricate the ski legs at grease fittings until new grease appears at joints. Lubricate tie rod end ball joints.

(TYPICAL)



A015006002

Formula MX, Plus

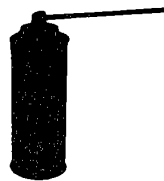
Lubricate regularly, every month or 800 km (500 mi.). Penetrating lubricant is recommended on ball joints and moving parts.

Example:

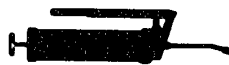
- chain lube from Bardahl (BCS 362 dry)
- WD-40

Other grease fittings require low temperature grease (P/N 413 7044 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.



Chain lube
or
WD-40



Grease
gun

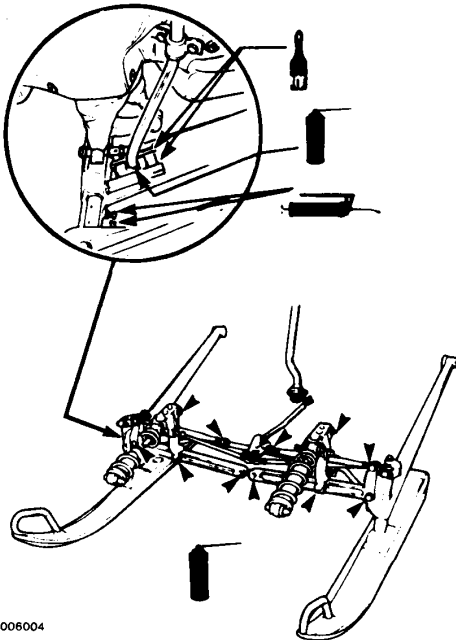
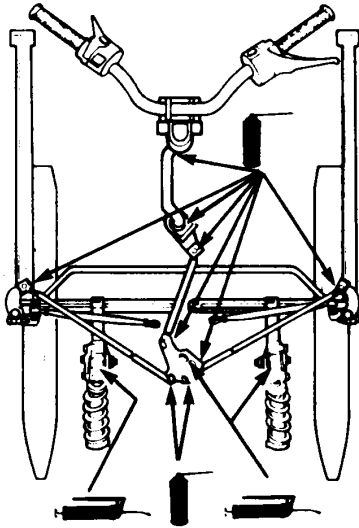
A000006001

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.

Section 06 STEERING/SKIS
Sub-section 01 (STEERING SYSTEM)

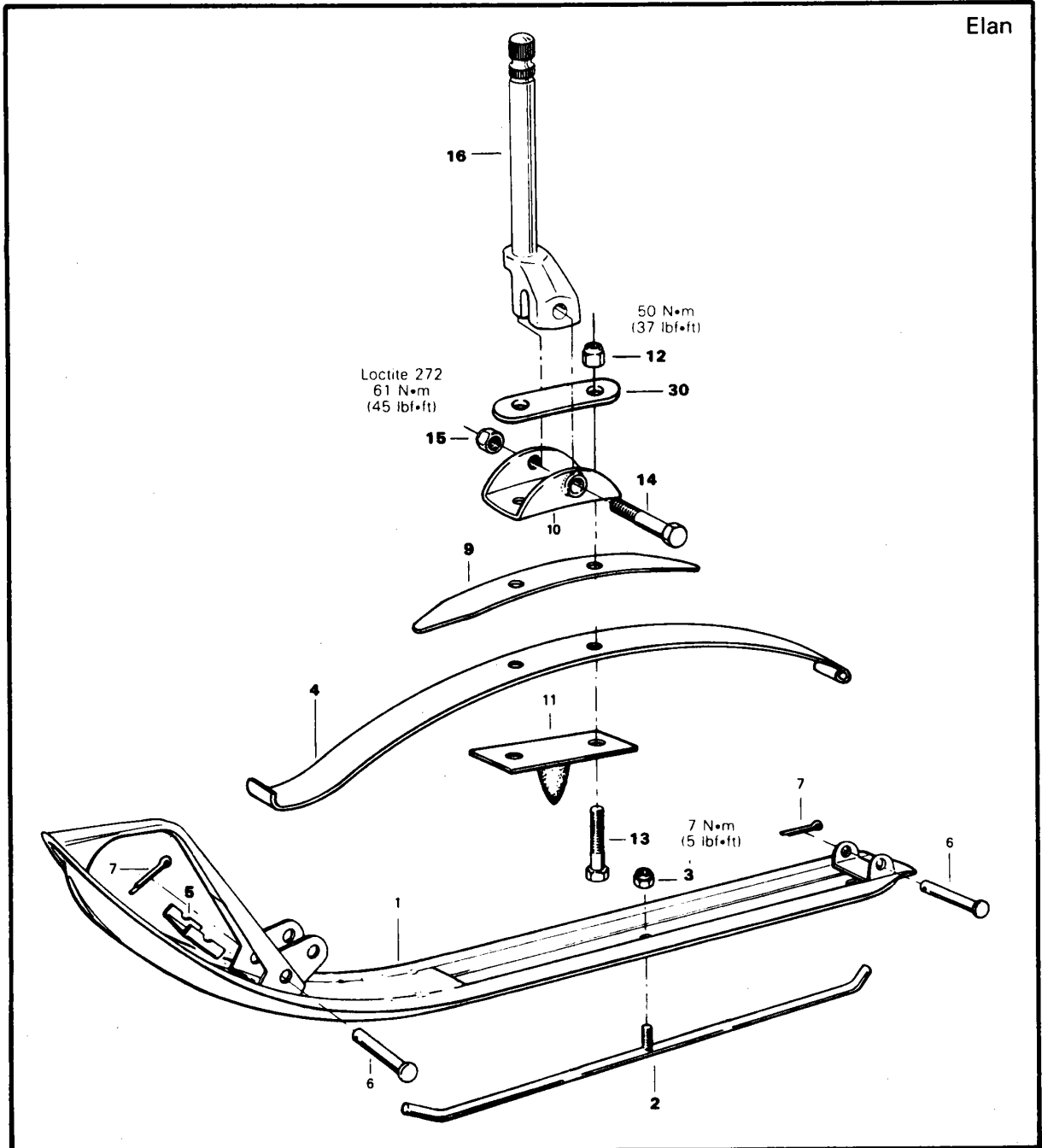
○ NOTE: There are 33 places to lubricate.





SKI SYSTEM

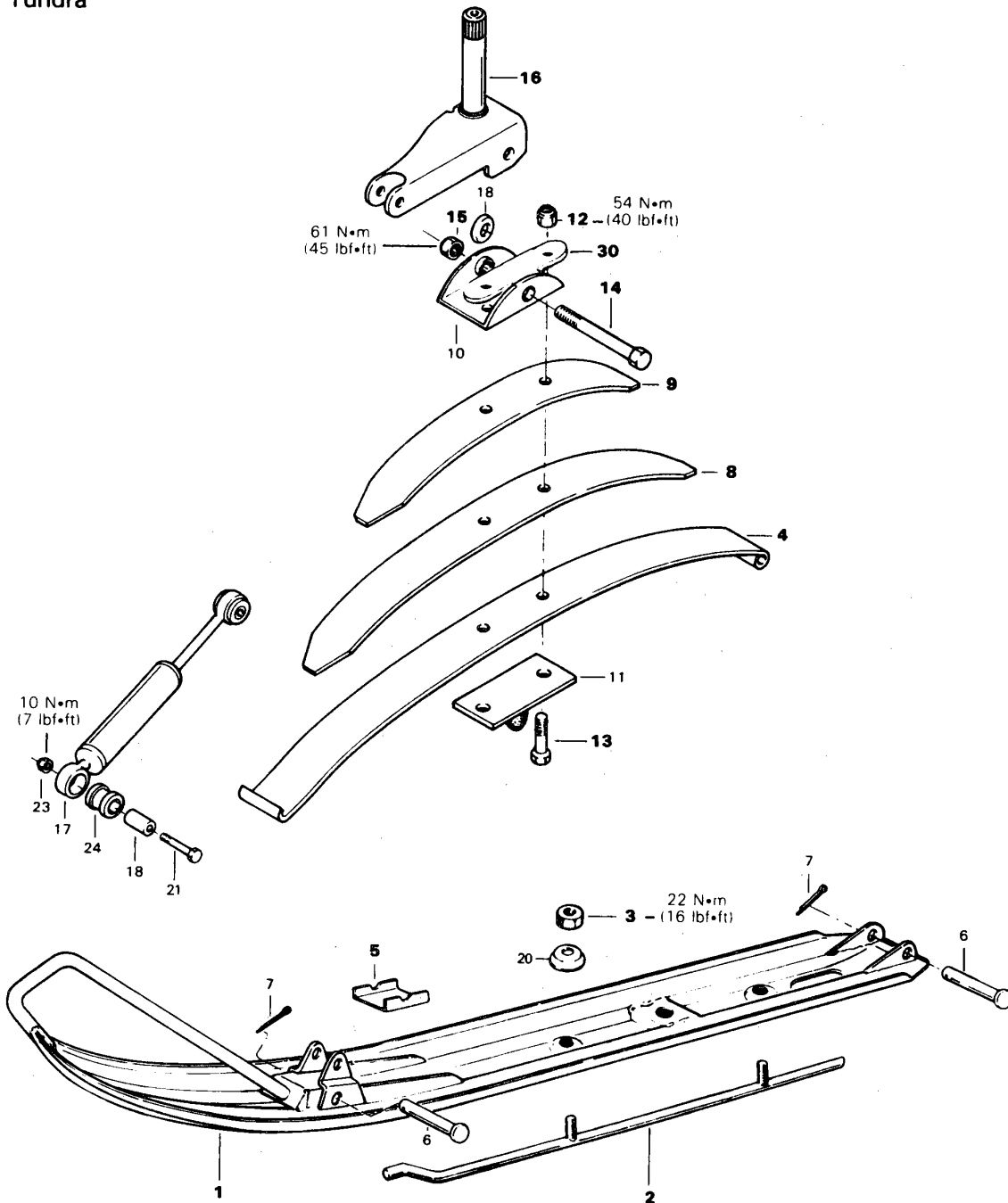
LEAF SPRING SUSPENSION



Section 06 STEERING/SKIS

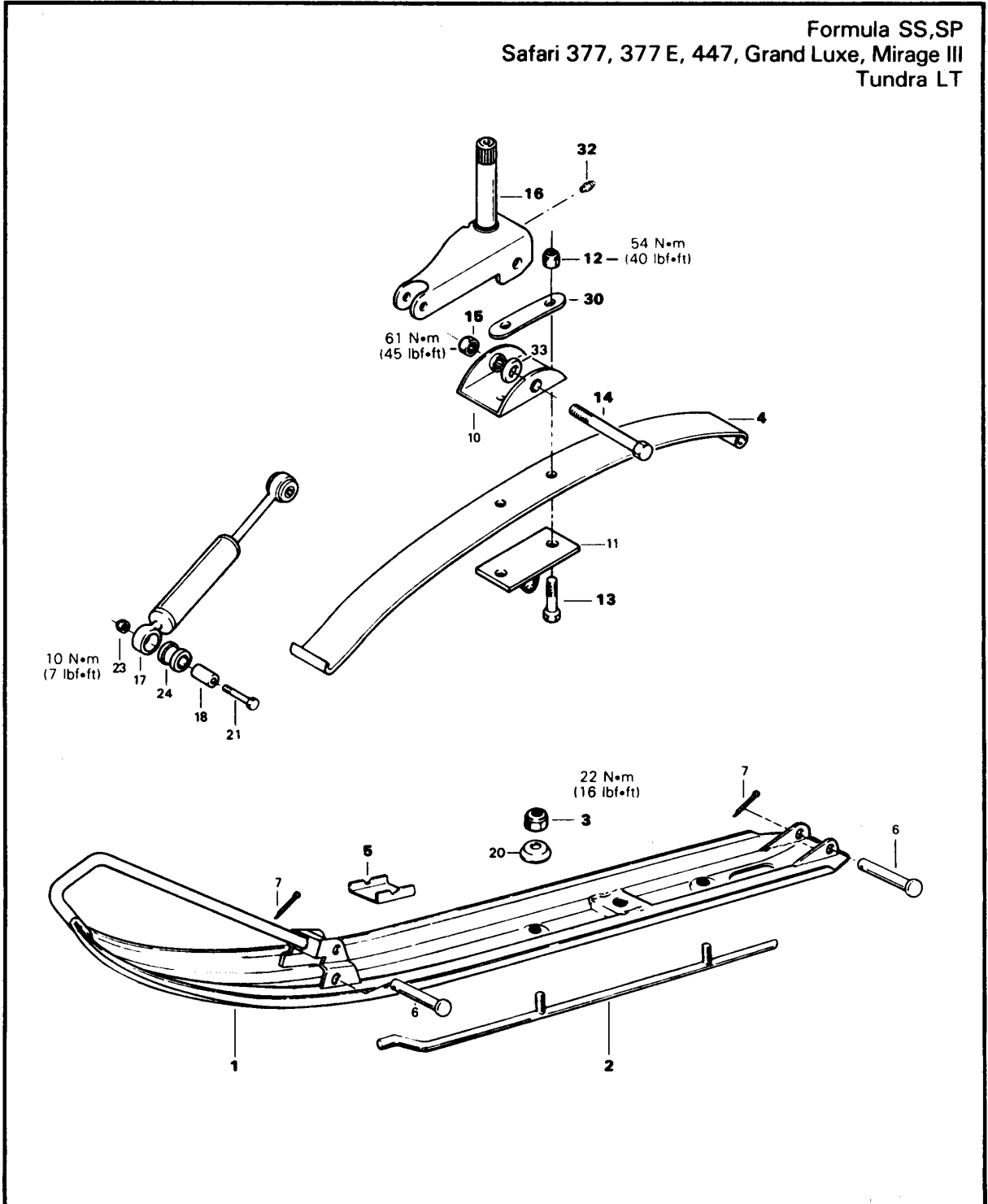
Sub-section 02 (SKI SYSTEM)

Skandic, Skandic "R",
Citation LS/LSE
Tundra

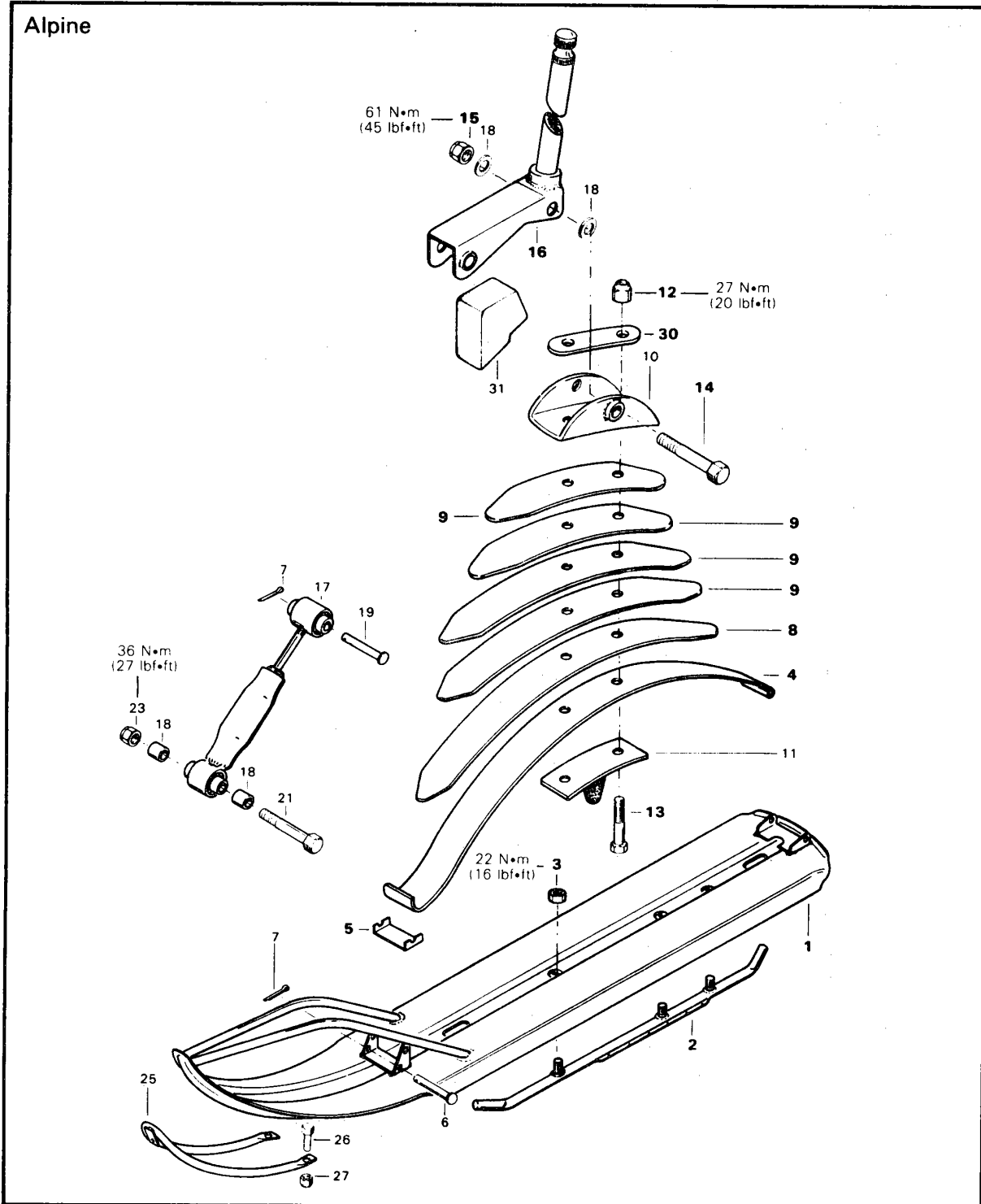


Section 06 STEERING/SKIS
Sub-section 02 (SKI SYSTEM)

Formula SS,SP
Safari 377, 377 E, 447, Grand Luxe, Mirage III
Tundra LT



Section 06 STEERING/SKIS
Sub-section 02 (SKI SYSTEM)



Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

1. Ski
2. Runner shoe
3. Nut
4. Main spring leaf
5. Spring slider cushion
6. Retainer pin
7. Cotter pin
8. Auxiliary spring leaf
9. Auxiliary spring leaf
10. Spring leaf coupler
11. Rebound stopper
12. Nut
13. Bolt
14. Bolt
15. Nut
16. Ski leg
17. Shock

18. Spacer
19. Retainer pin
20. Cup
21. Bolt
22. Washer
23. Nut
24. Rubber bushing
25. Protector tube
26. Screw
27. Nut
28. Rubber bumper
29. Rivet
30. Tab lock
31. Ski bumper
32. Grease fitting
33. Friction cup

INSPECTION

1,2, Skis & runner shoes

Check skis and runner shoes for excessive wear, replace if 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 shoes

◆ **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 nuts

On Elan vehicle, torque to 7 N•m (5 lbf•ft). On all other vehicles, torque to 22 N•m (16 lbf•ft).

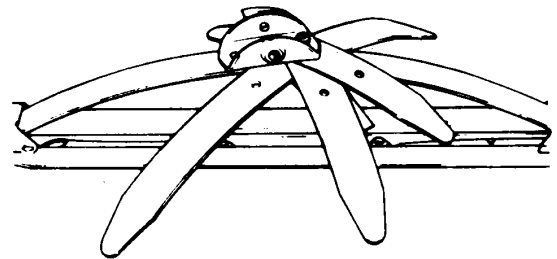
4,8,9, Main and auxiliary leaf springs

▼ **CAUTION:** When disassembling leaf coupler from spring leaves be careful of leaf tension.

12,13,30, 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.



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5, Spring slider cushions

Apply lithium grease on spring slider cushions at least once a year.

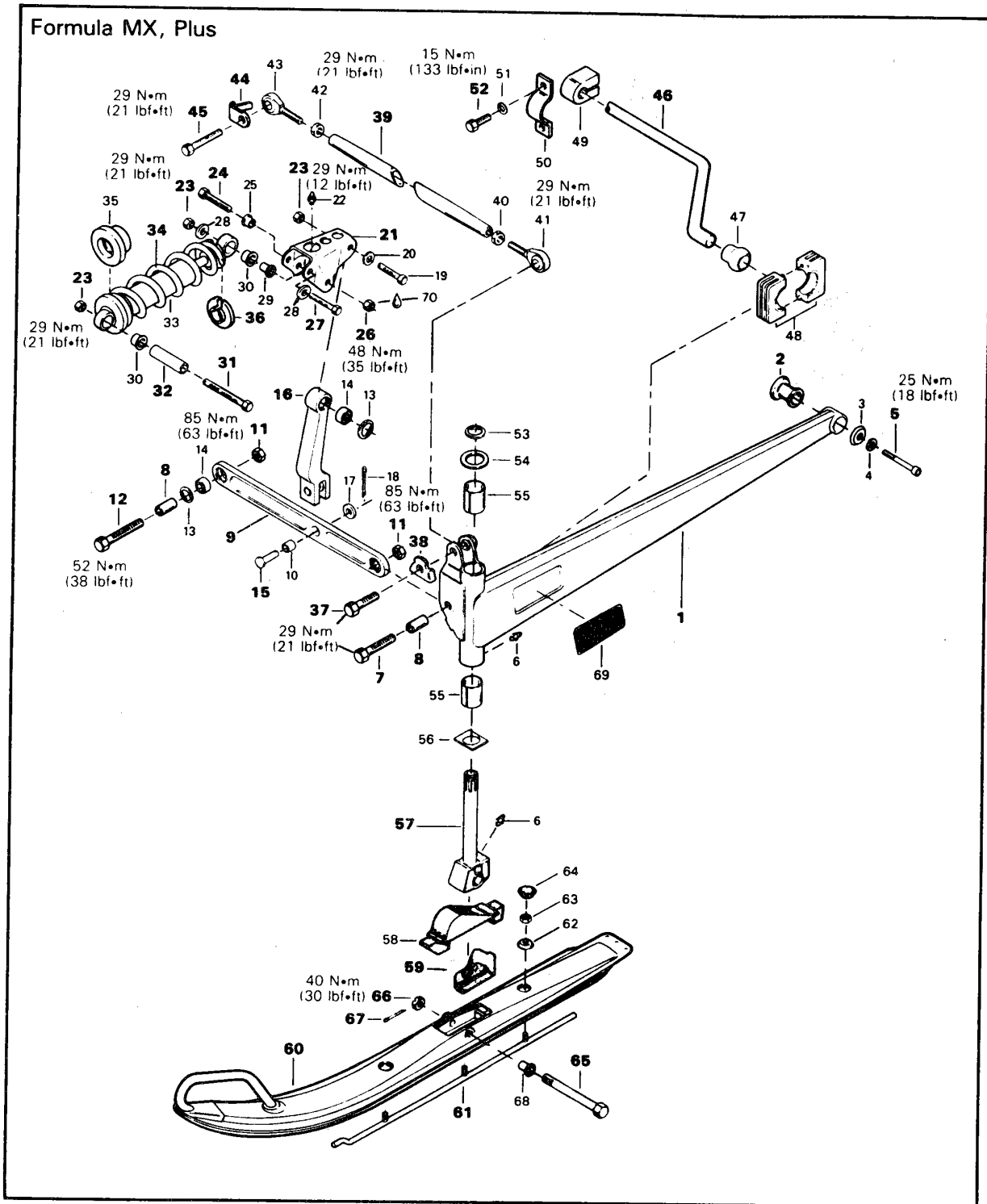
14,15, Spring coupler bolt & nut

Torque bolt and move ski by hand to check that it pivots on ski leg. Torque locking nut to 61 N•m (45 lbf•ft). For all models.

32, Grease fitting

On models with grease fitting on ski leg, lubricate it.

Section 06 STEERING/SKIS
Sub-section 02 (SKI SYSTEM)



Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

1. Swing arm
2. Rubber damper
3. Bowl
4. Spring lock washer M8
5. Allen screw M8 x 25
6. Grease fitting
7. Hexagonal screw M12 x 70
8. Stopper bushing
9. Lower control arm
10. Housing
11. Hexagonal elastic stop nut M12
12. Hexagonal screw M12 x 90
13. Circlip
14. Radial ball joint
15. Clevis pin
16. Bell crank rod
17. Special washer
18. Cotter pin
19. Flanged screw
20. Shim
21. Rocker arm
22. Grease fitting
23. Hexagonal elastic stop nut M10
24. Hexagonal head screw M10 x 110
25. Housing
26. Hexagonal elastic stop nut M10
27. Hexagonal head cap screw M10 x 60
28. Flat washer
29. Bushing
30. Housing
31. Hexagonal head cap screw M10 x 95
32. Spacer
33. Front shock body
34. Front shock spring
35. Spring stopper ring
36. Spring stopper
37. Hexagonal head cap screw M10 x 45
38. Screw stopper
39. Upper control arm
40. L.H. Jam nut
41. L.H. Ball joint
42. R.H. Jam nut
43. R.H. Ball joint
44. Screw stopper
45. Hexagonal head cap screw M10 x 45
46. Stabilizer
47. Slider joint
48. Slider
49. Flange
50. Clamp
51. Lock washer 8 mm
52. Hexagonal head cap screw M8 x 20
53. Circlip
54. Thrust washer
55. Housing
56. Wear plate
57. Ski leg
58. Ski boot
59. Stop bounding
60. Ski
61. Carbide runner shoe
62. Cup
63. Hexagonal elastic stop nut M10
64. Plug
65. Bolt
66. Slotted nut M12
67. Cotter pin
68. Slider cushion
69. "PRS" decal
70. Loctite 271

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, Swing arm, Allen screw, nut screw, screw stopper & stopper bushing

Detach steering arm, 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 screw 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.

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 take lower control arm off.

Section 06 STEERING/SKIS

Sub-section 02 (SKI SYSTEM)

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 and play, if excessive replace them.

60,61, Ski & runner shoe

Check skis and runner shoes for excessive wear, replace 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•ft) 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 29 N•m (21 lbf•ft).

Bend tab of stopper screw 44 over a flat of screw head.

21,26, Rocker arm & nut

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 29 N•m (21 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 arms)

Torque nut 11 to 85 N•m (63 lbf•ft).

Torque screws 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.

59, Stop bounding

Install with the molded indication "front" forward.

60,66,67, Ski, slotted nut & cotter pin

Torque nut to 40 N•m (30 lbf•ft). Make sure ski moves easily. Install cotter pin.

LUBRICATION

Refer to "Steering" section 06-01.

**ALIGNMENT & CAMBER
 ADJUSTMENT**

After assembly, always perform ski alignment and ski leg camber adjustment. Refer to "Steering" section 06-01.

SHOCK ABSORBER SERVICING

Spring replacement

WARNING: Do not attempt to dismantle a shock absorber spring without using the proper spring compressor.

34,36, Spring stopper & spring

Using a spring compressor, remove the spring stopper and the spring.

Shock absorber servicing

Secure the shock body end in a vise.



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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.

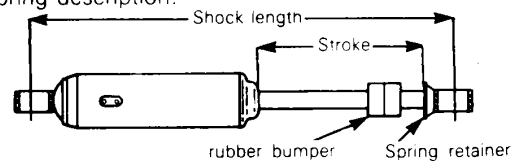
Replace if defective.

SPECIFICATIONS

Shock spring specifications

PART NUMBER:	503 0803 00
Number of coils:	12.1
Free length ± 3 mm (± .12")	215.9 mm (8.50")
Spring rate ± 1.8 N/mm (+ 10 lbf/in.)	48.9 N/mm (279 lbf/in.)
Inside diameter (big end)	46.7 N/mm (1.84 ± .030")
Wire diameter ± 0.05 mm (± .002")	9.19 mm (.362")
Compressed length	102.4 mm (4.03")
Color code:	White-white

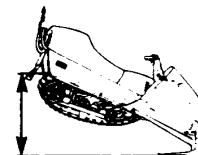
Spring description:



Shock absorber specifications

PART NUMBER:	414 5355 00
Full stroke:	80.1 mm (3.15")
Length collapsed: -at bumper contact -at spring retainer contact	200.8 mm (7.91") 175.4 mm (6.91")
Length extended	255.5 mm (10.06")

Shock description:

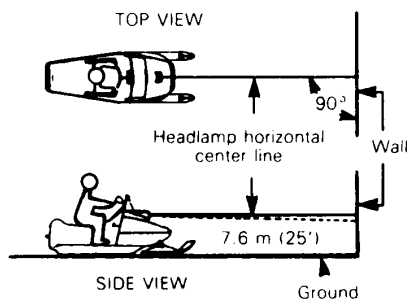




HOOD

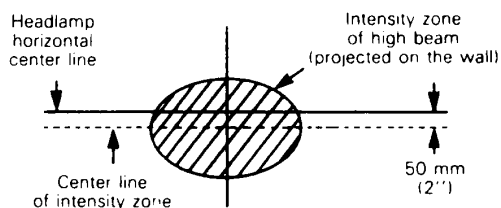
HEADLAMP BEAM AIMING

Place the vehicle on a flat surface 7.6 m (25') from a wall or screen.



A000007001

With the suspension correctly adjusted, the rider seated on the vehicle and the high beam ON (engine must be running on manual start models), check that the center of the high intensity zone of the high beam is 50 mm (2'') below the horizontal line of the headlamp height.



A001007001

To adjust, remove headlamps ring or adjusting screw caps, turn the upper or lower adjusting screws to obtain the desired beam position.

BULB REPLACEMENT

If headlamp is burnt, tilt cab, unplug the connector from the headlamp. Remove the rubber boot and unfasten the bulb retainer clips. Detach the bulb and replace. If the tailing bulb is burnt, expose the bulb by removing red plastic lens. To remove, unscrew the two (2) Phillips head screws. Verify all lights after replacement.

▼ **CAUTION:** Never touch glass portion of an halogen bulb with bare fingers, it shortens it's operating life. If by any mistake you have touched the glass portion clean it with a glass cleaner that does not leave a film on the bulb.

HOOD MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

▼ **CAUTION:** Plastic alloy components such as fuel tank, windshield, hood, etc. can be cleaned using mild detergents or isopropyl alcohol. Do not use strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc.

○ **NOTE:** Apply wax on glossy finish of hood 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 necessary to cover it with an opaque tarpaulin. This caution will prevent the sun rays affecting the plastic components and the vehicle finish.

BOTTOM PAN MAINTENANCE

To remove dirt, grease or glue from a bottom pan, use isopropyl alcohol or acetone.

HOOD, CAB NOSE & BOTTOM PAN REPAIR

Hood, cab nose and bottom pan are made of fiberglass or different plastic products. Refer to table below to see what parts are repairable or not.

▼ **CAUTION:** All plastic parts made of polycarbonate are not compatible with Loctite.

Section 07 CHASSIS
Sub-section 01 (HOOD)

MODELS	PARTS	REPARABLE		IRREPARABLE	
		Fiberglass	R.I.M.	Polycarbonate	Surlyn
Elan	Cab			X	
Citation LS/E, Tundra LT	Cab Bottom pan		X X		
Skandic 377/R	Cab			X	
Safari 377, 377E, 447, GL, LC	Cab Cab nose Bottom pan			X	X X
Formula SS Formula SP	Cab Cab nose Bottom pan	X	X X		
Formula MX Formula Plus	Cab Cab nose (both parts) Bottom pan		X X X		
Alpine	Cab Bottom pan	X X			
Mirage III	Cab Cab nose Bottom pan	X	X X		

NOTE: Surlyn is stiffer than R.I.M. Coloration is from one side to the other. R.I.M. is painted outside only the inside is more grey.

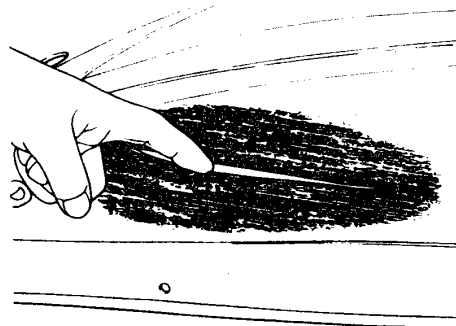
For fiberglass parts different repair kits are available at your authorized dealer.

For R.I.M. urethane parts you can use two 3M products:

- 3M structural adhesive tube kit P/N 8101
- 3M flexible parts repair material P/N 05900
- for deeply scratched or tears R.I.M. surface.

Example:

A 100 mm (4'') x 6 mm (1/4'') tear to be repaired use the following procedures:



A001007002

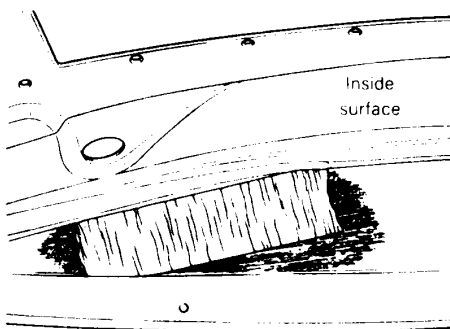
Section 07 CHASSIS

Sub-section 01 (HOOD)

Damaged area have to be sanded 25 mm (1") to 35 mm (1 1/2") all around using 180 grit sand paper.

Check surface for proper smoothness.

Using chloronated solvent, remove any dirt or oil spills from the inside area then sand or scuff with 80 grit sand paper at least 50 mm (2") all around damaged area on the inside surface. Apply 3M - autobody repair tape.



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Using filler:

— Structural adhesive tube kit

Part number: 8101

3M brand

Or:

— Flexible parts repair material

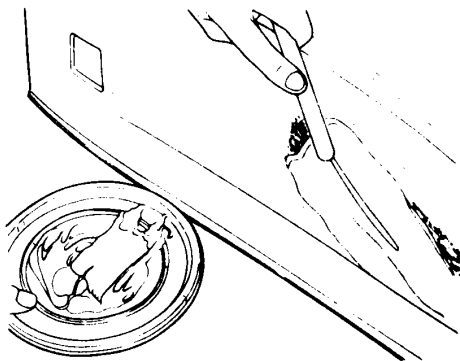
Part number: 05900

3M brand

○ **NOTE:** Either fillers can be used for repairs.

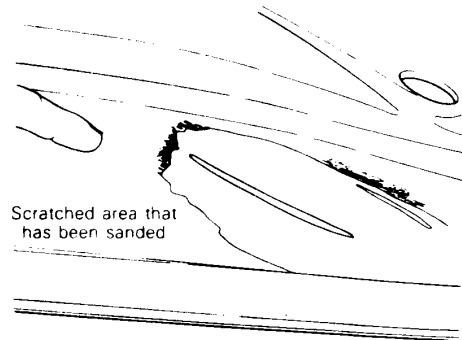
Properly mix the two components.

Apply mixed filler with a spatula.



A001007004

Let filler set and dry for 20 to 30 minutes. If required, sand and apply finishing coat and allow to dry.



A001007005

Use one of these two lacquers:

1. Lucite high gloss acrylic lacquer from Dupont for all bright surfaces.

○ **NOTE:** This lacquer can also be purchased in a satin finish. Lucite Plastic Resin no. 1555 can be added in amounts not to exceed 5% by volume.

2. SICO polyurethane paint no. 585183 with SICO catalyst 581004. Mix 3 parts of paint for 1 part of catalyst.

Use conventional spray equipment for touch-up.

After painting, apply Acrypol Polish Compound from C-I-L only on Lucite high gloss acrylic lacquer.

After a 30 to 60 minutes drying period, apply a suitable polishing compound to paint on the outer edge of repaired area in order to remove fumes.

Apply lacquer clear no. 300S from Dupont to blend the general surface only when using Lucite high gloss lacquer. Allow to dry.

Use Fill'n Glaze pink from 3M on surface to fill swirls and to produce a high luster finish.

For lightly scratched R.I.M. surface:

Scuff surface area with medium to fine steel wool.

Textured surface finish will be easily duplicated by applying satin finish acrylic lacquer.

Section 07 CHASSIS
 Sub-section 01 (HOOD)

PAINT CODES

Frame

MODELS	COLOR	BRAND NAME & MIXTURE	SPRAY CAN P/N
Elan, Apline	Black semi gloss 20 gloss units	Sico 338-182 Lacquer acrylic	413 4010 00
All models except Elan, Alpine	Black high gloss 90 gloss units	Enamel R.-M. Inmont "Super max": 01 = 100 41 = 500 42 = 700 43 = 1000	413 4026 00

Cab

MODELS	COLOR	BRAND NAME & MIXTURE	PAINT P/N
Citation LS/E Tundra Tundra LT Formula SS Formula MX	Yellow	Lacquer acrylic: R.-M. Inmont: 01 = 100 94 = 350 72 = 950 79 = 1000	413 4072 00 (1 liter)
Formula SP	White	Enamel R.-M. Inmont "Super max": 01 = 100 94 = 1000	N.A.
Formula Plus	Silver	Enamel R.-M. Inmont "Super max": 01 = 100 14 = 350 17 = 600 67 = 620 27 = 631 10 = 1000	413 4073 00 (1 liter)
Alpine	Orange ice	Enamel R.-M. Inmont "Super max": 02 = 100 72 = 738 79 = 963 94 = 1000	413 4013 00 (Spray can 16 oz)
Mirage III	Orange	Enamel R.-M. Inmont "Super-max": 01 = 100 94 = 150 72 = 550 79 = 1000	413 4062 00 (Spray can 13 oz)

DECAL

To remove a decal, pull it off.
 Clean the surface.
 Apply liquid soap on the new decal. Position the decal and pass a sponge over it to remove air bubbles and water. Allow to air dry.

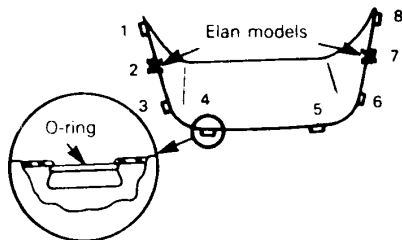
WINDSHIELD INSTALLATION

CAUTION: Plastic alloy components such as fuel tank, windshield, hood, etc. can be cleaned using mild detergents or isopropyl alcohol. Do not use strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc.

All models except Skandic 377/R

Peel off protective film from windshield.
 Position the windshield on the hood then push it down until the tabs are fully inserted into the hood slots. Lock the windshield tabs in position using the applicable O-rings supplied in the kit.

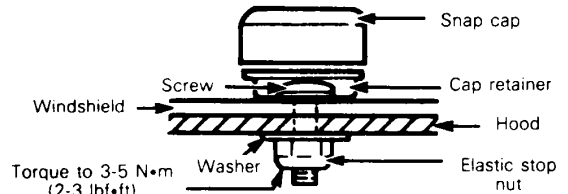
NOTE: ELAN models: do not install O-rings on second and seventh tabs.



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Skandic 377/R

Position windshield on the hood then push down until tabs are fully inserted into hood slots.
 Lock windshield tabs in position using the applicable O-rings supplied in the kit.
 Properly seat the windshield in place.
 Using windshield holes as a guide, drill 5 mm dia. (3/16") holes through the hood.
 Clean the hood.
 Peel off protective film from windshield.
 Install the applicable windshield fixtures.



A007007001

CAB NOSE INSTALLATION

Safari 377/E, 447, Grand Luxe LC, Formula SS, SP

Put cab nose attachment in cab nose.
 Install it on cab torquing the nuts to 1.2 to 2.0 N•m (11 to 18 lbf•in).

CAUTION: Torque is important, it prevents cab deformation.

Formula MX, Plus

Torque bolt to 2.0 to 2.8 N•m (18 to 25 lbf•in).

CAUTION: Torque is important, it prevents cab nose insert to come off.

Section 07 CHASSIS

Sub-section 01 (HOOD)

RETRACTABLE HEADLAMP ADJUSTMENT

Safari 377/E, 447, Grand Luxe LC

Assemble all retractable headlamp mechanism without bolting gear cover.

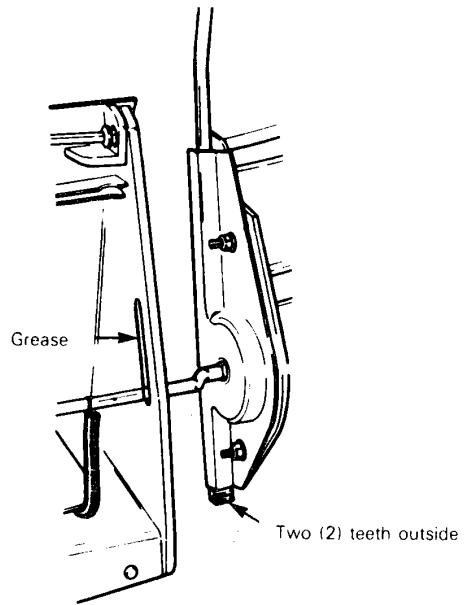
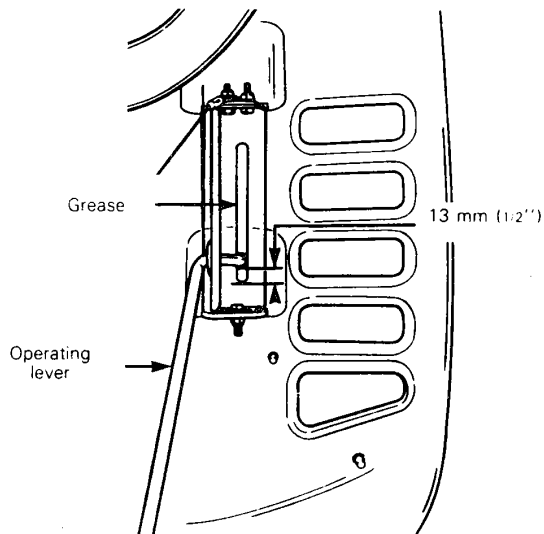
Place the rack on the pinion.

Rack and pinion adjustment is correct when at the headlamp housing opening a second step is felt which locks the housing in place.

Two reference points are necessary to achieve that adjustment (see illustration below):

- Operating lever must be located 13.0 mm (1/2 inch) before cab slot end when headlamp housing is open.
- Rack must have two teeth outside gear cover when headlamp housing is open.

Tighten gear cover.



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▼ **CAUTION:** Make sure that headlamp housing is locked in place when it is opened.

Lubricate the two headlamp housing slot, rack and pinion, and lever guide with low temperature grease.

FRAME

FRAME CLEANING

Clean frame. For aluminum frame use only "Aluminum cleaner" and follow instructions on container. (Dursol cleaner or equivalent).

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 1985 models, it is recommend to clean the seat with a solution of **soft soap/warm water** and a soft cloth.

▼ **CAUTION:** Avoid use of harsh detergent such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc...they may cause damage to the seat cover.

Bottom pan repair

Some bottom pans are made of fiberglass or plastic products, to know if they are reparable or not and how to repair them refer to section 07 sub-section 01.

FRAME WELDING

Steel frame:

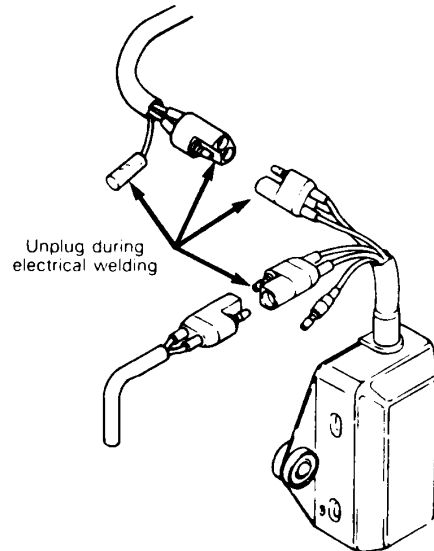
- Electric Welding
- Amperage: 70-110 Amp.
- Voltage: 20-24 volts
- Rod: E-7014 (3/32")

Aluminum frame: (refer to specialized welding shop)

- Argon-oxygen/acetylen welding
- Rod: ER-4043 (3/32")

▼ **CAUTION:** When electrical welding is to be performed anywhere on the vehicle, unplug the multiple connector at the electronic box prior to connecting the welding wire to the vehicle. This will protect the electronic box against damage caused by flowing current when welding.

○ **NOTE:** This procedure applies to all electronic ignition systems.



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▼ **CAUTION:** When welding is to be performed near bottom pan of Citation LS/E, Tundra/LT, Safari (all), Formula SS, SP, MX and Plus and Mirage III, protect bottom pan against fire, sparks and excessive heat. R.I.M. bottom pans are flammable.



FUEL LINE, WIRING HARNESS & CABLE ROUTING

WIRING HARNESS (ALL MODELS)

◆ **WARNING:** Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Ensure to protect them from any rotating parts, moving parts, heating parts and vibrating parts.

CABLE (ALL MODELS)

◆ **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.

FUEL LINE (ALL MODELS)

◆ **WARNING:** Always ensure that the fuel lines are properly fixed to the connectors, that they are not perforated or kinked and that they are properly routed, away from any rotating, moving, heating or vibrating parts. Replace if perforated or deteriorated.

○ **NOTE:** For the fixation of the fuel lines, use as required the following **spring clips**:

- Impulse hose to fuel pump and engine: 414 4152 00.
- Fuel line to carburetor and fuel pump: 414 2786 00.

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SECTION 09 TECHNICAL DATA

TECHNICAL DATA

SI * METRIC INFORMATION CHART

BASE UNITS		
DESCRIPTION	UNIT	SYMBOL
length	meter	m
mass	kilogram	kg
liquid	liter	l
temperature	celsius	°C
pressure	kilopascal	kPa
torque	Newton meter	N•m
speed	kilometer per hour	km/h

PREFIXES			
PREFIX	SYMBOL	MEANING	VALUE
kilo	k	one thousand	1,000
centi	c	one hundredth of a	0.01
milli	m	one thousandth of a	0.001

CONVERSION TABLE		
MULTIPLY	BY	TO OBTAIN
meter	39.370	inch
kilogram	2.205	pound
milliliter	0.0352	imperial oz
milliliter	0.0338	U.S. oz
liter	0.264	U.S. gallon
liter	0.220	Imperial gallon
kilopascal	0.145	PSI
Newton meter	0.738	lbf•ft
kilometer	0.621	mile
$\text{Degrees Celsius} = \frac{5 \times (\text{degrees Fahrenheit} - 32)}{9}$		

*THE INTERNATIONAL SYSTEM OF UNITS (SYSTÈME INTERNATIONAL) ABBREVIATES "SI" IN ALL LANGUAGES.

SECTION 09 TECHNICAL DATA

BOMBARDIER ROTAX TYPE VEHICLE MODEL		247 ELAN®	503 ALPINE®	253 CITATION® LSE	253 TUNDRA/LT	377 SKANDIC/R	377 MIRAGE III	377/E SAFARI
ENGINE	No. of cylinders	1	2	1	1	2	2	2
	Bore mm (inch)	69.5 (2.736)	72 (2.835)	72 (2.835)	72 (2.835)	62 (2.440)	62 (2.440)	62 (2.440)
	Stroke mm (inch)	66 (2.598)	61 (2.402)	61 (2.402)	61 (2.402)	61 (2.402)	61 (2.402)	61 (2.402)
	Displacement cm ³ (in. 3)	250.4 (15.28)	496.7 (30.31)	248.4 (15.15)	248.4 (15.15)	368.3 (22.5)	368.3 (22.5)	368.3 (22.5)
	Compression ratio (effective)	5.6	6.3	6.25	6.25	6.9	6.9	6.9
	Maximum operating R.P.M.	6000	6500	7500	7500	7500	7500	7500
	Type of piston ring	2R	1 ST 1R	1 ST 1R	1 ST 1R	1 ST 1R	1 ST 1R	1 ST 1R
	Ring end gap <small>mm (inch) max (new) mm (inch) max (wear limit)</small>	0.20 (.008) 1.0 (.039)	0.20 (.008) 1.0 (.039)	0.20 (.008) 1.0 (.039)	0.20 (.008) 1.0 (.039)	0.20 (.008) 1.0 (.039)	0.20 (.008) 1.0 (.039)	0.20 (.008) 1.0 (.039)
	Piston/cylinder wall clearance <small>mm (inch) max (new) mm (inch) max (wear limit)</small>	0.066 - 0.203 (.0026 - .0079)	0.070 - 0.090 (.0027 - .0035)	0.09 - 0.11 (.0035 - .0043)	0.09 - 0.11 (.0035 - .0043)	0.080 - 0.100 (.0031 - .0039)	0.080 - 0.100 (.0031 - .0039)	0.080 - 0.100 (.0031 - .0039)
	Crankshaft end-play <small>mm (inch) max (new) mm (inch) max (wear limit)</small>	0.20 - 0.40 (.008 - .016)	N.A.	0.20 - 0.40 (.008 - .016)	0.20 - 0.40 (.008 - .016)	N.A.	N.A.	N.A.
	Rotary valve/crankcase clearance <small>mm (inch) max (new) mm (inch) max (wear limit)</small>	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Rotary valve timing (marks position)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
CARBURETION	Mikuni carburetor	VM 28-242	VM 34-297	VM 34-319	VM 34-319	VM 34-276	VM 34-309	VM 34-309
	Main jet (sea level)	160	250	160	160	260	210	210
	Needle jet	182 O-8	159 P-2	159 P-0	159 P-0	159 P-2	159 P-6	159 P-6
	Pilot jet	30	30	40	40	35	30	30
	Needle identification	6DP1-3	6DH3-3	6DH2-3	6D12-3	6DH4-3	6DH4-3	6DH4-3
	Needle setting from top	3rd	3rd	3rd	3rd	3rd	3rd	3rd
	Slide cut-away	2.0	2.0	2.0	2.0	3.0	3.0	3.0
	Air screw adjustment (turn) ± 1/8	1 1/2	1 1/2	1	1	1 1/2	1 1/2	1 1/2
	Idle speed R.P.M.	1300-1500	1800-2000	1100-1300	1100-1300	1800-2000	1800-2000	1800-2000
	Fuel grade			Regular - leaded or unleaded				Regular leaded
Fuel oil ratio	50:1	50:1	oil injection	oil injection	50:1	oil injection	oil injection	

N.A.: Not applicable

R: Rectangular

ST: Semi-trapez

PTO: Power take off

MAG: Magneto

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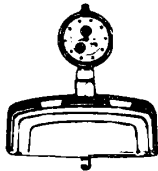
SECTION 09 TECHNICAL DATA

447 SAFARI	532 SAFARI GL LC	462 FORMULA SS	462 FORMULA SP	467 FORMULA MX	537 FORMULA PLUS
2	2	2	2	2	2
67.5 (2.657)	72 (2.835)	69.5 (2.736)	69.5 (2.736)	69.5 (2.736)	72 (2.835)
61 (2.402)	64 (2.520)	61 (2.402)	61 (2.402)	61 (2.402)	64 (2.520)
436.6 (26.6)	521.2 (31.8)	462.8 (28.2)	462.8 (28.2)	462.8 (28.2)	521.2 (31.8)
6.3	6.8	6.7	6.7	7.5	6.5
7500	7500	7200	7200	8500	9000
1 ST 1R	1 ST 1R	1 ST 1R	1 ST 1R	1 ST 1R	1 ST 1R
0.20 (0.08) 1.0 (0.39)	0.20 (0.08) 1.0 (0.39)	0.20 (0.08) 1.0 (0.39)	0.20 (0.08) 1.0 (0.39)	0.20 (0.08) 1.0 (0.39)	0.20 (0.08) 1.0 (0.39)
0.080 - 0.100 (0.031 - 0.039)	0.07 - 0.09 (0.028 - 0.035)	0.080 - 0.100 (0.031 - 0.039)	0.080 - 0.100 (0.031 - 0.039)	0.080 - 0.100 (0.031 - 0.039)	0.09 - 0.11 (0.035 - 0.043)
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
N.A.	0.27 - 0.48 (0.11 - 0.19)	0.27 - 0.48 (0.11 - 0.19)	0.27 - 0.48 (0.11 - 0.19)	0.27 - 0.48 (0.11 - 0.19)	0.27 - 0.48 (0.11 - 0.19)
N.A.	Opening: 132° Closing: 52°	Opening: 140° Closing: 51°	Opening: 140° Closing: 51°	Opening: 132° Closing: 52°	Opening: 132° Closing: 52°
VM 34-310	VM 34-312	VM 34-334	VM 34-334	PTO VM 34-320 MAG VM 34-321	PTO VM 40-28 MAG VM 40-30
230	270	270	270	PTO 240 MAG 250	PTO 330 MAG 380
159 P.8	159 P.4	159 P.4	159 P.4	159 P.4	224 - AA5
30	30	40	40	40	40
6EJ1-3	6EJ1-3	6EJ1-3	6EJ1-3	6DH4-3	7DH2-3
3rd	3rd	3rd	3rd	3rd	3rd
3.0	2.5	3.0	3.0	2.5	2.5
1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2
1800-2000	1800-2000	1800-2000	1800-2000	1800-2000	1800-2000
Regular - leaded	Regular - leaded	Regular leaded or unleaded	Regular leaded or unleaded	Premium	Premium
oil injection	oil injection	oil injection	oil injection	oil injection	oil injection

SECTION 09 TECHNICAL DATA

		ELAN®	ALPINE®	CITATION® LS	CITATION® LSE	TUNDRA/LT	SKANDIC 377/R	MIRAGE III	
ELECTRICAL	Magneto generator output (watts)	75/23	160	160	160	160	160	160	
	Ignition type	BP	CD	CD	CD	CD	CD	CD	
	Spark plug no	Bosch M 175 T 1 (W 7 A)	NGK BR 7ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	
	Spark plug gap	mm inch	0.50 (.020)	0.40 (.016)	0.40 (.016)	0.40 (.016)	0.40 (.016)	0.40 (.016)	
	TUNING B.T.D.C.	Direct ①	mm inch	3.98 (.157)	2.29 (.090)	2.31 (.090)	2.31 (.090)	2.31 (.090)	2.31 (.090)
		Indirect ①	mm inch	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	DIM	Breaker point gap	mm inch	0.35 - 0.40 (.014 - .016)	N.A.	N.A.	N.A.	N.A.	N.A.
		Generating coil		3 - 3.07	L.S. 120 - 180 H.S. 2.8 - 4.2	L.S. 120 - 180 H.S. 2.8 - 4.2	L.S. 120 - 180 H.S. 2.8 - 4.2	L.S. 120 - 180 H.S. 2.8 - 4.2	L.S. 120 - 180 H.S. 2.8 - 4.2
		Lighting coil - large		0.38 - 0.58	0.21 - 0.31	0.21 - 0.31	0.21 - 0.31	0.21 - 0.31	0.21 - 0.31
		Lighting coil - small		1.85 - 2.35	N.A.	N.A.	N.A.	N.A.	N.A.
H.T. coil primary			1.65 - 2.05	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	
H.T. coil secondary			4.85 - 5.85 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	
FUSE	Battery	V, a h	N.A.	12.22	N.A.	12.22	N.A.	N.A.	
	Headlamp bulb	watt	60/60	60/60	60/60	60/60	60/60	60/60	
	Tail & stop bulb	watt	5/21	5/21	5/21	5/21	5/21	5/21	
	Tacho - speedo & temp bulb	watt	N.A.	N.A.	N.A.	N.A.	5	N.A.	
	Fuel gauge bulb	watt	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
	Starter solenoid	amp	N.A.	30	N.A.	30	N.A.	N.A.	
	Tachometer	amp	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
Ignition switch	amp	N.A.	15	N.A.	N.A.	N.A.	N.A.		

DIRECT MEASUREMENT B.T.D.C.



A000001090

BP: Breaker points
 CD: Solid state ignition
 L.S.: Low speed
 H.S.: High speed
 N.A.: Not applicable
 HAL.: Halogen

①At 6000 R.P.M. (engine cold)

*Trademark of Bombardier Inc.

SECTION 09 TECHNICAL DATA

SAFARI 377	SAFARI 377E	SAFARI 447	SAFARI GL LC	FORMULA SS	FORMULA SP	FORMULA MX	FORMULA PLUS
160	160	160	160	160	160	160	160
CD	CD	CD	CD	CD	CD	CD	CD
NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES	NGK BR 9ES
0.40 (.015)	0.40 (.016)	0.40 (.016)	0.40 (.016)	0.40 (.016)	0.40 (.016)	0.40 (.016)	0.40 (.016)
2.31 (.090)	2.31 (.090)	2.31 (.090)	1.75 (.069)	1.76 (.069)	1.76 (.069)	2.50 (.098)	1.75 (.069)
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
LS 120 - 180 HS 2.8 - 4.2	LS 120 - 180 HS 2.8 - 4.2	LS 120 - 180 HS 2.8 - 4.2	LS 120 - 180 HS 2.8 - 4.2	LS 120 - 180 HS 2.8 - 4.2	LS 120 - 180 HS 2.8 - 4.2	LS 125 - 235 HS 1.4 - 2.6	LS 125 - 235 HS 1.4 - 2.6
0.21 - 0.31	0.21 - 0.31	0.21 - 0.31	0.09 - 0.20	0.09 - 0.20	0.09 - 0.20	0.09 - 0.20	0.09 - 0.20
N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43	0.23 - 0.43
2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K	2.45 - 4.55 K
N.A.	12.22	N.A.	12.22	N.A.	N.A.	N.A.	N.A.
60/60	60/60	60/60	60/55 hal	60/55 hal	60/55 hal	60/60	60/55 hal
5/21	5/21	5/21	5/21	5/21	5/21	5/21	5/21
N.A.	N.A.	5	5	5	5	5	5
N.A.	N.A.	N.A.	2	2	2	N.A.	2
N.A.	30	N.A.	30	N.A.	N.A.	N.A.	N.A.
N.A.	N.A.	N.A.	0.1	0.1	0.1	0.1	0.1
N.A.	15	N.A.	15	N.A.	N.A.	N.A.	N.A.

SECTION 09 TECHNICAL DATA

DIMENSIONS	MODEL	ÉLAN [®] 250	ALPINE [®] 503	CITATION [®] LS	CITATION [®] LSE	TUNDRA	TUNDRA LT	SKANDIC 377	SKANDIC 377 R	MIRAGE III			
	Engine type	247	503	253	253	253	253	377	377	377	377		
Overall length	cm (inch)	224.8 (88.5)	288.3 (113.5)	242 (95.3)	242 (95.3)	272 (99.6)	287 (113)	289.5 (114)	289.5 (114)	266.7 (105)			
Overall width	cm (inch)	77.5 (30.5)	90.17 (35.5)	84.5 (33.3)	84.5 (33.3)	84.5 (33.3)	84.5 (33.3)	96.5 (38)	96.5 (38)	96.5 (38)			
Overall height	cm (inch)	106.7 (42)	123.2 (48.5)	91.5 (36)	91.5 (36)	111 (43.7)	111 (43.7)	108 (42.5)	108 (42.5)	99 (39)			
Ski stance	cm (inch)	64.7 (25.5)	N.A.	72.5 (28.5)	72.5 (28.5)	72.5 (28.5)	72.5 (28.5)	81.9 (32.2)	81.9 (32.2)	81.9 (32.2)			
Mass weight	kg (lb)	129.5 (285)	291.4 (642.5)	133.8 (295)	147 (324)	148.8 (328)	162.4 (358)	186 (416)	194 (428)	176.9 (390)			
Bearing area	cm ² (inch ²)	6916 (1072)	13936.3 (2160)	4748 (736)	4748 (736)	6603 (1023)	7579 (1175)	7579 (1175)	7579 (1175)	6645 (1030)			
Ground pressure	kPa (lb/sq in)	1.87 (1.263)	2.09 (1.297)	2.82 (1.401)	3.10 (1.440)	2.25 (1.321)	2.14 (1.305)	2.44 (1.354)	2.51 (1.364)	2.66 (1.379)			
Frame material		Steel	Steel	Steel	Steel	Steel	Steel	Alu. & steel	Alu. & steel	Alu. & steel			
Cab material		Poly	Fib.	R.I.M.	R.I.M.	R.I.M.	R.I.M.	Poly	Poly	Fib.			
POWER TRAIN	Gear ratio (driven pulley to drive axle)	10/25	19/42	15/27	15/27	12/27	12/27	14/35	17/40	16/34			
	Chain pitch	1.2" single	3/8" triple	1.2" single	1.2" single	1.2" single	1.2" single	3/8" double	3/8" silent	3/8" double			
	Type of drive pulley	R.R.S.	R.S.S.R.B.	R.R.S.	R.R.S.	R.R.S.	R.R.S.	R.S.S.	R.S.S.	R.S.S.			
	Drive pulley retaining N.m screw torque	62 (45)	85 (63)	85 (63)	85 (63)	85 (63)	85 (63)	80 (59)	80 (59)	85 (63)			
	Pressure lever identification	E4	A3S (double)	C4LS	C4LS	C4LS	C4LS	B3KSH	B3KSH	C6LH			
	Spring color	Bronze	Purple	Orange	Orange	Orange	Orange	Yellow	Yellow	Olive			
	Spring length	mm ± 1.5 (in ± 0.060)	81.3 (3.200)	73.6 (2.90)	81 (3.188)	81 (3.188)	81 (3.188)	81 (3.188)	100 (3.938)	100 (3.938)	106 (4.173)		
	Clutch engagement R.P.M.	2000-2200	2000-2200	3100-3300	3100-3300	3100-3300	3100-3300	3700-3900	3700-3900	3400-3600			
	Driven pulley spring preload	kg ± 0.4 (lb) ± 1	3.6 (8)	5.9 (13)	4 (9)	4 (9)	4 (9)	4 (9)	5.4 (12)	5.4 (12)	5.9 (13)		
	Pulley distance	mm (inch)	43.65 ± 0.8 (1.723 ± 0.032)	46.04 ± 1.6 (1.813 ± 0.063)	36.6 mm ± 1.5 (1.441 ± 0.060)			41.27 ± 0.1 (1.58 ± 0.004)	41.27 ± 0.1 (1.58 ± 0.004)	36.6 ± 0.5 (1.437 ± 0.019)			
	Offset (dimension X & Y)	mm ± 0.8 (in ± 0.032)	34 (1.337)	34 (1.337)	34.03 (1.340)*	45.30 (1.783)*	34.03 (1.340)*	34.03 (1.340)*	34 (1.337)	34 (1.337)	Refer to Safari 377		
	Drive belt number		570 0411 00	414 3758 00	414 5234 00	414 5234 00	414 5234 00	414 5234 00	414 3758 00	414 3758 00	414 5233 00		
	Drive belt width	mm (inch)	30 (1.181)	33.33 (1.312)	33.33 (1.312)	33.33 (1.312)	33.33 (1.312)	33.33 (1.312)	33.33 (1.312)	33.33 (1.312)	34.92 (1.375)		
	Drive belt tension & deflection	N (lbf) mm (inch)	67 N (15 lbf) pressure on belt between pulleys must produce 32 mm (1.26 in) of deflection										
	Track	Track width	cm (inch)	38.1 (15)	2 × 38.1 (2 × 15)	38.1 (15)	38.1 (15)	38.1 (15)	38.1 (15)	38.1 (15)	38.1 (15)		
		Track length	cm (inch)	289.5 (114)	2 × 353 (2 × 139)	260 (102.4)	260 (102.4)	315 (124)	353 (139)	353 (139)	289.5 (114)		
	Bogie suspension	Suspension type		Bogie	Bogie	Slide	Slide	Slide	Slide	Slide	Slide		
		Track tension	mm (inch)	ÉLAN [®] 35 mm (1.38 in) distance between top inside edge of track and the bottom of the footboard									
	Slide suspension	Track alignment		Equal distance between edges of track guides and slider shoes									
		Track tension	mm (inch)	13 mm (0.51 in) gap should exist between slider shoe and the bottom inside of track									
	Track alignment		Equal distance between edges of track guides and slider shoes										

Alu.: Aluminum

Poly.: Polycarbonate

Fib.: Fiberglass

R.I.M.: Reaction injection molding

R.R.S.: Roller round shaft

R.S.S.: Roller square shaft

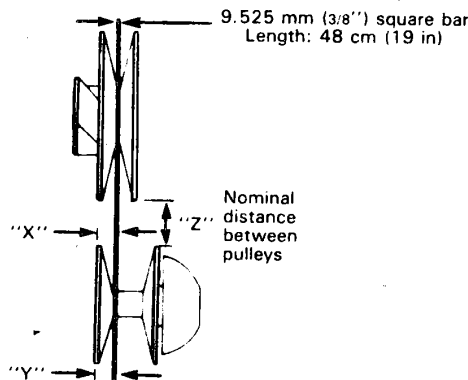
R.S.S.R.: Roller square shaft with 3 ramps

R.S.S.R.B.: Roller square shaft with 3 ramps & bearing

*Trademark of Bombardier Inc.

*Tolerances on x measurements are:
± 0.38 mm (± 0.015")

y must exceed x by 0.75 to 1.5 mm (0.030 to 0.060")



A000003002

SECTION 09 TECHNICAL DATA

SAFARI 377	SAFARI 377E	SAFARI 447	SAFARI GRAND LUXE LC	FORMULA SS	FORMULA SP	FORMULA MX	FORMULA PLUS
377	377	447	532	462	462	467	537
266.7 (105)	266.7 (105)	279.4 (105)	279.4 (110)	266.7 (105)	266.7 (105)	271.8 (107)	271.8 (107)
96.5 (38)	96.5 (38)	96.5 (38)	96.5 (38)	96.5 (38)	96.5 (38)	104.1 (41)	104.1 (41)
96.5 (38)	96.5 (38)	96.5 (38)	96.5 (38)	99 (39)	99 (39)	91.4 (36)	91.4 (36)
81.9 (32.2)	81.9 (32.2)	81.9 (32.2)	81.9 (32.2)	81.9 (32.2)	81.9 (32.2)	92.1 (36.3)	92.1 (36.3)
176.9 (390)	188.7 (416)	182.7 (402)	211.8 (467)	190.5 (420)	196.8 (434)	198.7 (438)	203.2 (448)
8645 (1030)	7064 (1095)	7593 (1177)	7593 (1177)	8645 (1030)	7064 (1095)	5968 (925)	6348 (984)
2.88 (.379)	2.62 (.379)	2.41 (.341)	2.73 (.396)	2.87 (.408)	2.73 (.396)	3.26 (.474)	3.14 (.455)
Alu. & steel	Alu. & steel	Alu. & steel	Alu. & steel	Alu. & steel	Alu. & steel	Alu. & steel	Alu. & steel
Poly.	Poly.	Poly.	Poly.	Fib.	Fib.	Fib.	Fib.
16/34	16/34	19/39	21/37	21/37	21/37	26/40	26/40
3/8" double	3/8" double	3/8" double	3/8" triple	3/8" triple	3/8" triple	3/8" silent	3/8" silent
R.S.S.	R.S.S.	R.S.S.	R.S.S.R.	R.S.S.R.	R.S.S.R.	R.S.S.R.	R.S.S.R.
85 (63)	85 (63)	85 (63)	85 (63)	85 (63)	85 (63)	85 (63)	85 (63)
C8LH	C8LH	C7LH	ABS	ABS	ABS	ABS	ABS
Olive	Olive	Blue	Yellow	Black	Black	Black	Orange
106 (4.173)	106 (4.173)	119 (4.685)	100 (3.938)	77.7 (3.059)	77.7 (3.059)	77.7 (3.059)	96.5 (3.799)
3400-3600	3400-3600	3500-3700	3300-3500	3300-3500	3300-3500	3100-3400	3600-3900
4 (9)	4 (9)	4 (9)	4 (9)	4 (9)	4 (9)	5.9 (13)	5.9 (13)
36.6 \pm .15 (1.716 \pm .004)	36.6 \pm .15 (1.716 \pm .004)	36.8 \pm .15 (1.718 \pm .004)	36.6 \pm .15 (1.716 \pm .004)	36.6 \pm .15 (1.716 \pm .004)	36.6 \pm .15 (1.716 \pm .004)	34.9 \pm .15 (1.36 \pm .004)	34.9 \pm .15 (1.36 \pm .004)
x = 34.5 \pm 0.4 (1.72/64 \pm .1/64) y = 35.30 \pm .075 (1.72/64 \pm .075)						x = 33 \pm .75 (1.19/64 \pm .075) y = 35.10 \pm .15 (1.32/10 \pm .004)	
414 5233 00	414 5233 00	414 5233 00	414 5233 00	414 5233 00	414 5233 00	414 5233 00	414 5233 00
34.92 (1.36)	34.92 (1.36)	34.92 (1.36)	34.92 (1.36)	34.92 (1.36)	34.92 (1.36)	34.92 (1.36)	34.92 (1.36)
Citation LS E, Tundra LT 67 N (15 lbf) pressure on belt between pulleys must produce 30.2 to 38.1 mm (1.316" to 1.12") of deflection							
38.1 (15)	41.9 (16.5)	41.9 (16.5)	41.9 (16.5)	38.1 (15)	41.9 (16.5)	38.1 (15)	41.9 (16.5)
289.5 (114)	289.5 (114)	315 (124)	315 (124)	289.5 (114)	289.5 (114)	289.5 (114)	289.5 (114)
Slide	Slide	Slide	Slide	Slide	Slide	Slide	Slide
*ALPINE: 57mm (2 1/4") distance between top inside edge of track and the center of the bogie wheel set retaining bolt.							
FORMULA MX - PLUS 10-33 mm (3/8" - 1/2") gap should exist between slider shoe and bottom inside of track.							

SECTION 09 TECHNICAL DATA

	MODEL		ELAN 250	ALPINE [‡] 503	CITATION [‡] LS/E	TUNDRA TUNDRA LT	SKANDIC 377	SKANDIC [®] 377 R	MIRAGE III	SAFARI 377/E	SAFARI 447	
	LIQUID CAPACITIES	Fuel tank	SI L	13.6	22.7	26	26	28.4	28.4	28.6	28.6	28.6
Imperial gal			3	5	5.7	5.7	6.25	6.25	6.3	6.3	6.3	
U.S. gal			3.6	6	6.9	6.9	7.5	7.5	7.6	7.6	7.6	
Chamcase		mL (oz)	200 (7)	454 (16)	200 (7)	200 (7)	200 (7)	450 (16)	200 (7)	200 (7)	200 (7)	
Rotary valve reservoir		mL (oz)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
Cooling system		SI L										
		Imperial oz										
	U.S. oz											
Injection oil reservoir	L imp. oz U.S. oz	N.A.	N.A.	1.5 53 51	1.5 53 51	N.A.	N.A.	2.55 90 86	2.55 90 86	2.55 90 86		
COOLING	Cooling type		Radial fan	Axial fan	Axial fan	Axial fan	Axial fan	Axial fan	Axial fan	Axial fan	Axial fan	
	Thermostat °C/°F		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
	Radiator pressure cap KPa (lb/in ²)		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
	Coolant mixture (by volume) antifreeze/water		N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	
TORQUE SPECIFICATIONS (engine cold) N·m (lbf-ft)	Magneto ring nut		85 (62)	85 (62)	85 (62)	85 (62)	85 (62)	85 (62)	85 (62)	85 (62)	85 (62)	
	Crankcase nuts or screws		21 (15)	21 (15)	9 (7)	9 (7)	M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)	
	Cylinder head nuts (cold)		21 (15)	21 (15)	N.A.	N.A.	21 (15)	21 (15)	21 (15)	23 (17)	23 (17)	
	Crankshaft Engine support nuts or screws		38 (28)	38 (28)	21 (15)	21 (15)	38 (28)	38 (28)	38 (28)	38 (28)	38 (28)	
	Crankcase cylinder nuts		N.A.	N.A.	21 (15)	21 (15)	N.A.	N.A.	N.A.	N.A.	N.A.	
	Fan shaft nut		N.A.	65 (48)	65 (48)	65 (48)	65 (48)	65 (48)	65 (48)	65 (48)	65 (48)	

N.A.: Not applicable

[‡]: Trademarks of Bombardier Inc.

Bombardier Inc. reserves the right to make changes in design and specifications and/or to make additions to, or improvements in its product without imposing any obligation upon itself to install them on its products previously manufactured.

SECTION 09 TECHNICAL DATA

SAFARI® GRAND LUXE LC	FORMULA SS	FORMULA SP	FORMULA MX	FORMULA PLUS
28.6	28.6	28.6	40.9	40.9
6.3	6.3	6.3	9	9
7.6	7.6	7.6	10.9	10.9
200 (17)	200 (17)	200 (17)	256 (19)	256 (19)
568 (19)	568 (19)	568 (19)	454 (16)	454 (16)
4.89	4.60	4.60	4.21	4.21
172	162	162	148	148
165	156	156	142	142
2.55 90 86	2.55 90 86	2.55 90 86	2.90 102 98	2.90 102 98
Liquid cooled	Liquid cooled	Liquid cooled	Liquid cooled	Liquid cooled
43 (110)	43 (110)	43 (110)	43 (110)	42 (108)
90 (13)	90 (13)	90 (13)	90 (13)	90 (13)
60.40	60.40	60.40	55.45	55.45
95 (70)	95 (70)	95 (70)	100 (74)	100 (74)
M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)	M6 9 (7) M8 21 (15)
21 (15)	23 (17)	23 (17)	20 (15)	20 (15)
38 (28)	38 (28)	38 (28)	M10 11 (8)	M10 11 (8)
21 (15)	21 (15)	21 (15)	20 (15)	20 (15)
N.A.	N.A.	N.A.	N.A.	N.A.



LIMITED WARRANTY

THE 1985 LIMITED WARRANTY

1 - PERIOD

BOMBARDIER® INC. as manufacturer, warrants FROM THE DATE OF FIRST CONSUMER SALES, every 1985 BOMBARDIER® snowmobile predelivered and sold as NEW AND UNUSED, by an authorized BOMBARDIER dealer for a period of:

- 12 consecutive months.

2 - WHAT BOMBARDIER WILL DO

BOMBARDIER will repair and/or replace, at its option, components defective in material and/or workmanship (under normal use and service,) with a genuine BOMBARDIER component without charge for parts or labour, at any authorized BOMBARDIER dealer during said warranty period.

3 - CONDITION TO HAVE WARRANTY WORK PERFORMED

Present to the servicing dealer, the hard copy of the BOMBARDIER Warranty Registration card received by the customer from the selling dealer at time of purchase.

4 - WARRANTY TRANSFER

This warranty is transferable to subsequent owner(s) for remainder of warranty period from original date of sale.

5 - EXCLUSIONS - ARE NOT WARRANTED

- Normal wear on all items such as, but not limited to:
 - drive belts
 - slider shoes
 - spark plugs
 - bulbs
 - runners on skis
- Replacement parts and/or accessories which are not genuine BOMBARDIER parts and/or accessories.
- Damage resulting from installation of parts other than genuine BOMBARDIER parts.
- Damage caused by failure to provide proper maintenance as detailed in the Operator Manual. The labour, parts and lubricants costs of all maintenance services, including tune-ups and adjustments will be charged to the owner.
- Wet cells battery.
- Vehicles designed and/or used for racing purposes.
- All optional accessories installed on the vehicle.
(The normal warranty policy for parts and accessories, if any, applies).
- Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.

SECTION 10

- Damage resulting from operation of the snowmobile on surfaces other than snow.
- Damage resulting from modification to the snowmobile not approved in writing by BOMBARDIER.
- Losses incurred by the snowmobile owner other than parts and labour, such as, but not limited to, transportation, towing, telephone calls, taxis, or any other incidental or consequential damages.

6 - BATTERY WARRANTY:

- 12 consecutive months. (Pro-rated.)
100% warranty coverage will start on the date the snowmobile was purchased and run to the following April 30th. The remainder of the 12 months period will be pro-rated as follows:
 - 50% from April 30th to December 1st.
 - 40% from December 1st to December 31st.
 - 30% from January 1st to end of warranty.

7 - EXPRESSED OR IMPLIED WARRANTIES

This warranty gives you specific rights, and you may also have other legal rights which may vary from state to state, or province to province. Where applicable this warranty is expressly in lieu of all other expressed or implied warranties of BOMBARDIER, its distributors and the selling dealer, including any warranty of merchantability of fitness for any particular purpose; otherwise the implied warranty is limited to the duration of this warranty. However, some states or provinces do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply.

Neither the distributor, the selling dealer, nor any other person has been authorized to make any affirmation, representation or warranty other than those contained in this warranty, and if made, such affirmation, representation or warranty shall not be enforceable against BOMBARDIER or any other person.

Some states or provinces do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply.

BOMBARDIER INC. reserves the right to modify its warranty policy at any time, being understood that such modification will not alter the warranty conditions applicable to vehicles sold while the above warranty is in effect.

8 - CONSUMER ASSISTANCE

If a servicing problem or other difficulty occurs, we suggest the following:

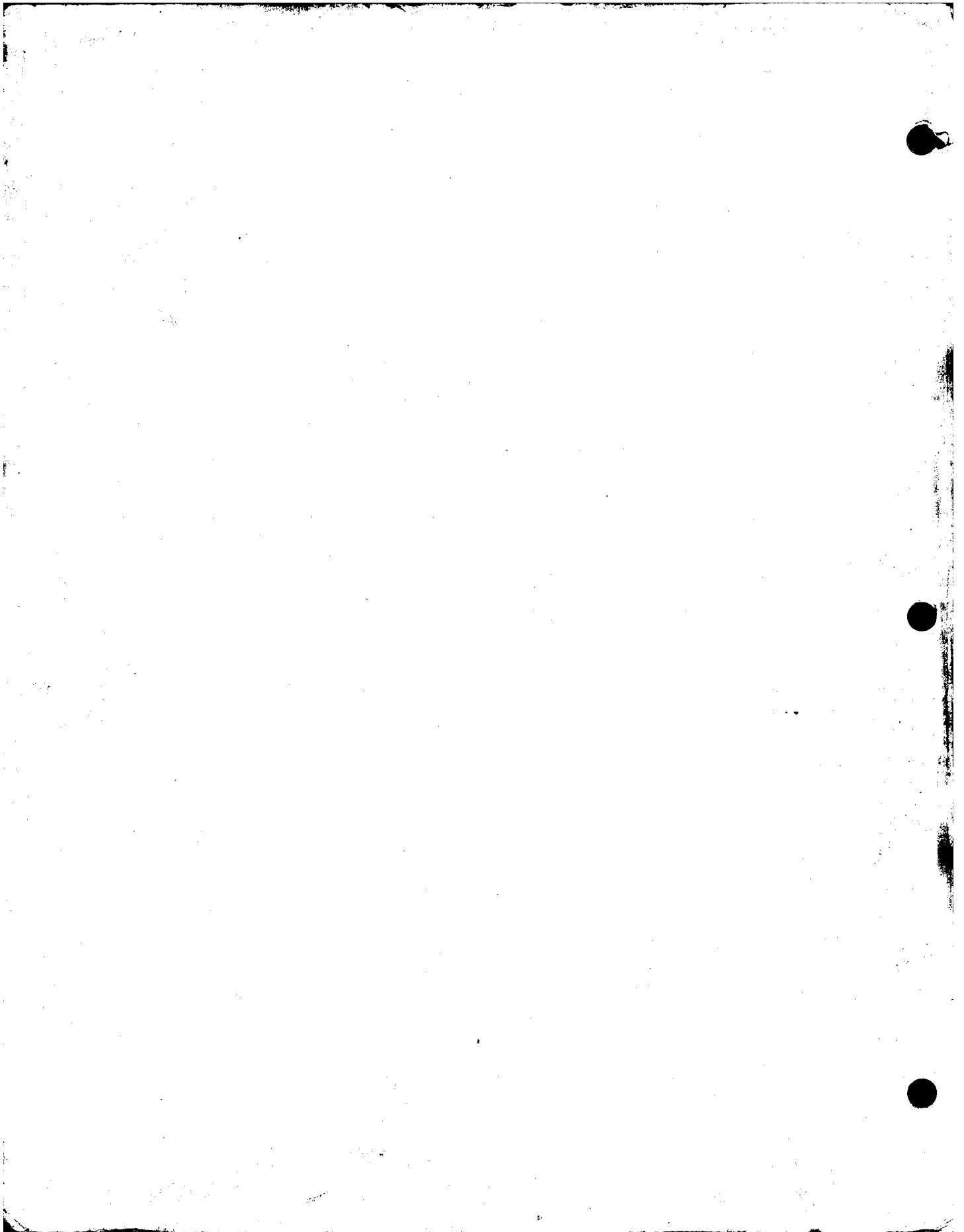
1. Try to resolve the problem at the dealership with the Service Manager or Owner.
2. If this fails, contact your area distributor listed in the Operator Manual.
3. Then if your grievance still remains unsolved, you may write to us:

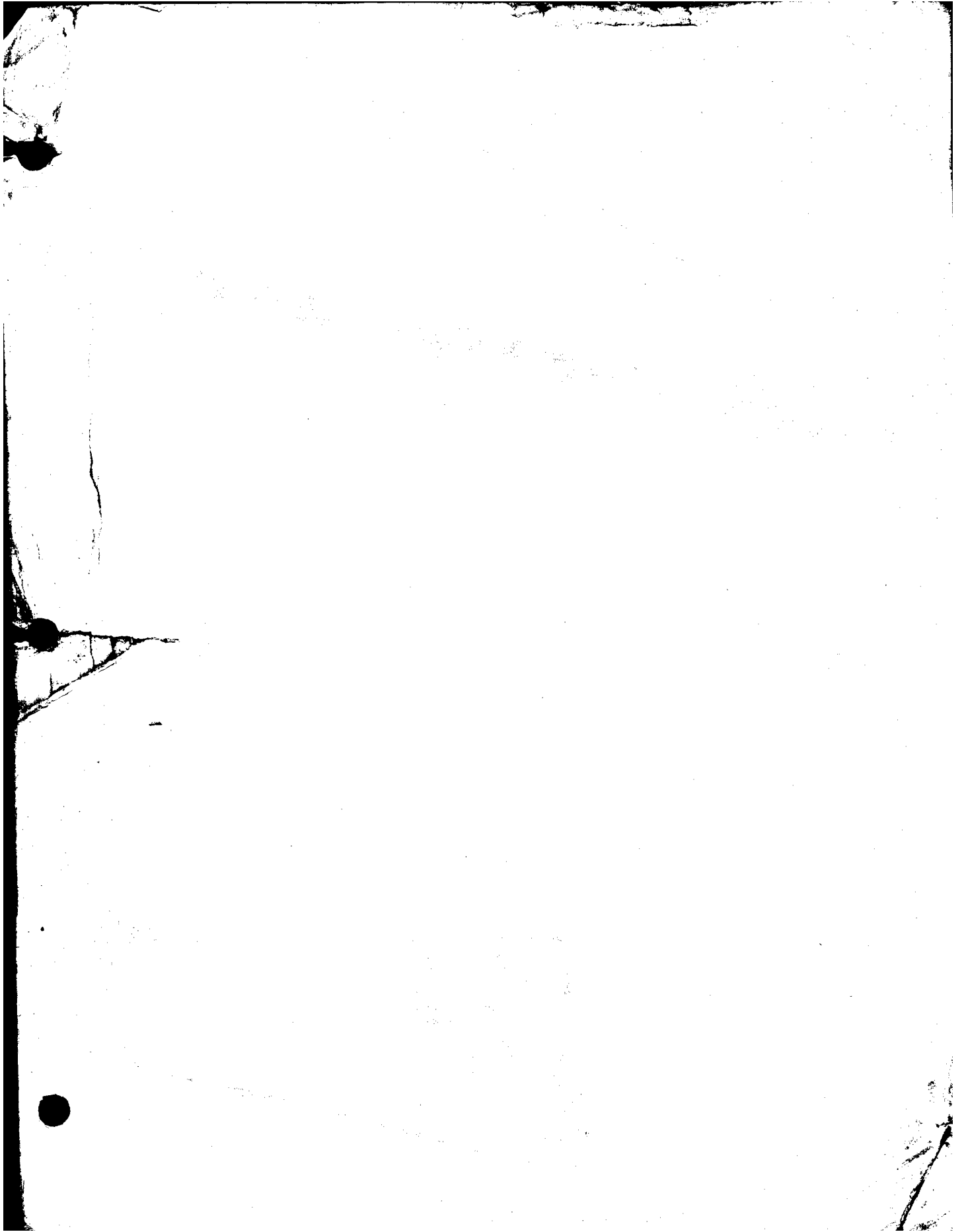
Bombardier Inc.
Service Department
Recreational Products Division
Valcourt, Quebec, Canada, JOE 2L0

October 1984

Bombardier Inc.
Valcourt, Quebec, Canada, JOE 2L0

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AFTER SALES SERVICE
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VALCOURT, QUEBEC
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