
SHOP MANUAL

1982

BOMBARDIER
snowmobiles



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SAFETY NOTICE

The Bombardier snowmobile Shop manual has been prepared in order to assist skilled mechanic's in the efficient repair and maintenance of Bombardier snowmobiles.

This Shop Manual covers only the procedures as of the manufacturing date.

Safety features may be impaired if other than genuine Bombardier parts are installed.

Torque wrench tightening specifications must be strictly adhered by. Locking devices 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.

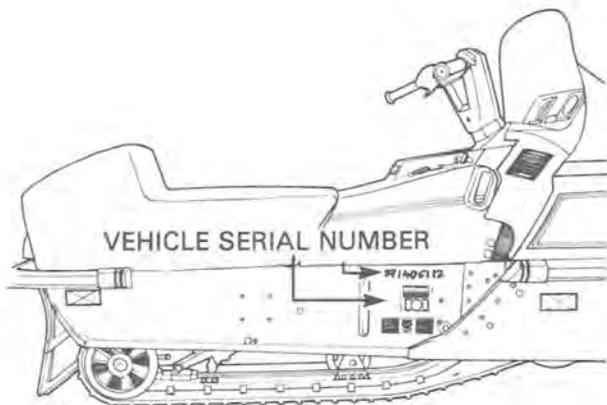
1982 BOMBARDIER SNOWMOBILES SHOP MANUAL

INTRODUCTION

This Shop Manual covers the following Bombardier made 1982 snowmobiles.

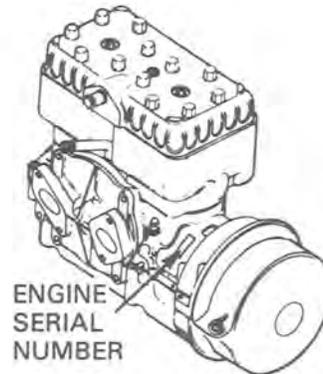
Elan	Spirit
Citation 3500	Mirage I
Citation 4500/E	Mirage II/E
Citation SS	Mirage Special
Nordik	Futura 300
Skandic	
Everest 500/E	Futura 500/E
Everest L/C	Futura L/C
Blizzard 5500 MX	Sonic MX
Blizzard 9500	Ultra Sonic
Alpine 640	
Elite 464 LC	

Furthermore, each vehicle has its particular vehicle serial number.

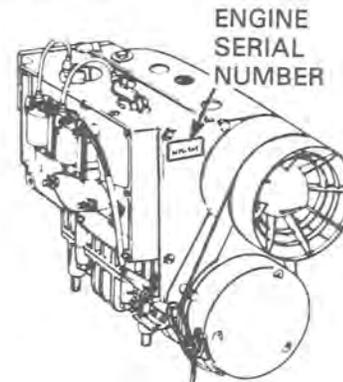


The engine also has a serial number.

Liquid cooled engines

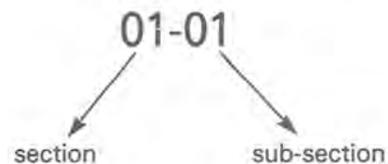


Fan cooled engines



DEFINITION OF NUMBERING SYSTEMS

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



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

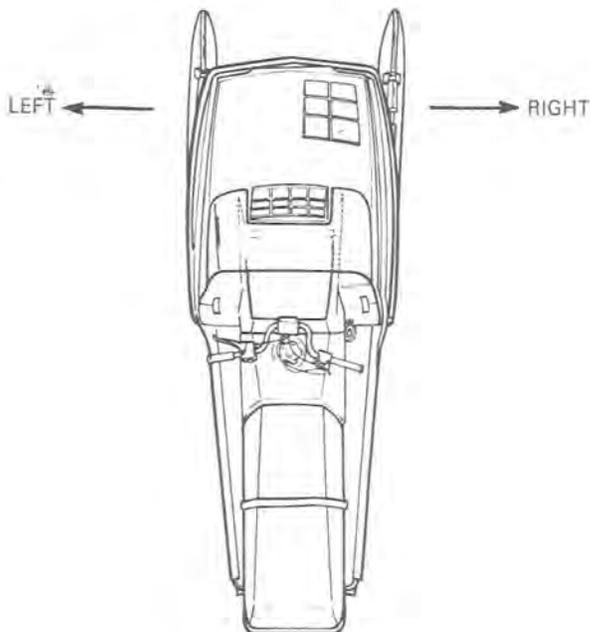
Each section is comprised of various sub-sections, and again, each sub-section has one or more division.

EX.: 02 ENGINE

05 Engine type 464 Everest - Futura - Elite

- Cooling system
- Magneto

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



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.), the specific parts are circled and referred to in the text.

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
Technical Publications
Bombardier Inc.
Valcourt, Quebec, Canada

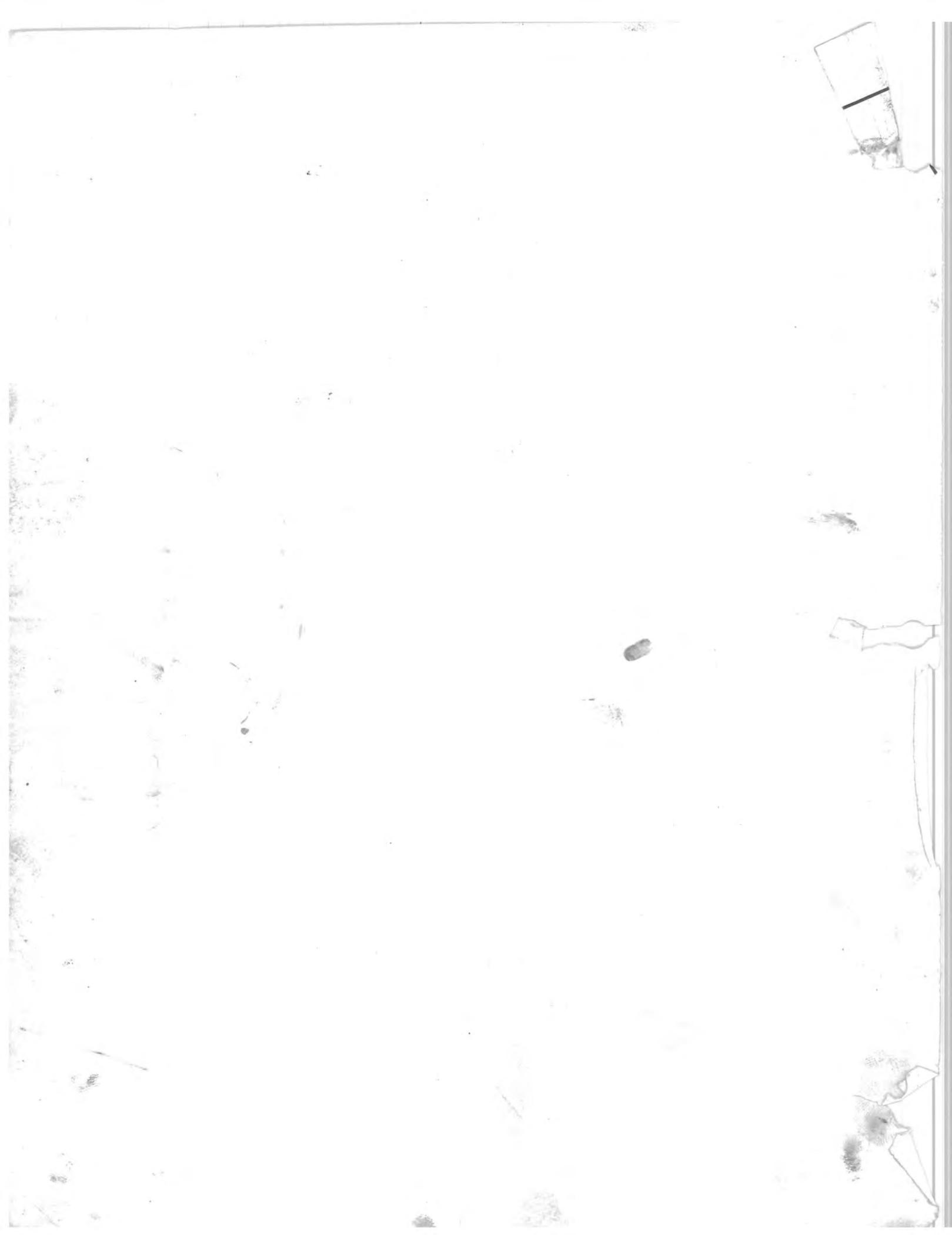


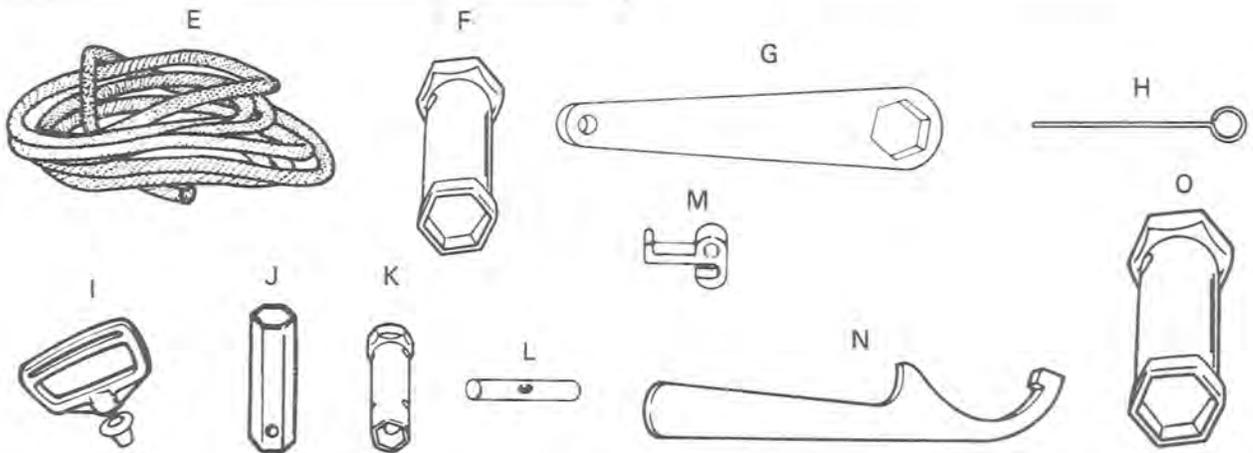
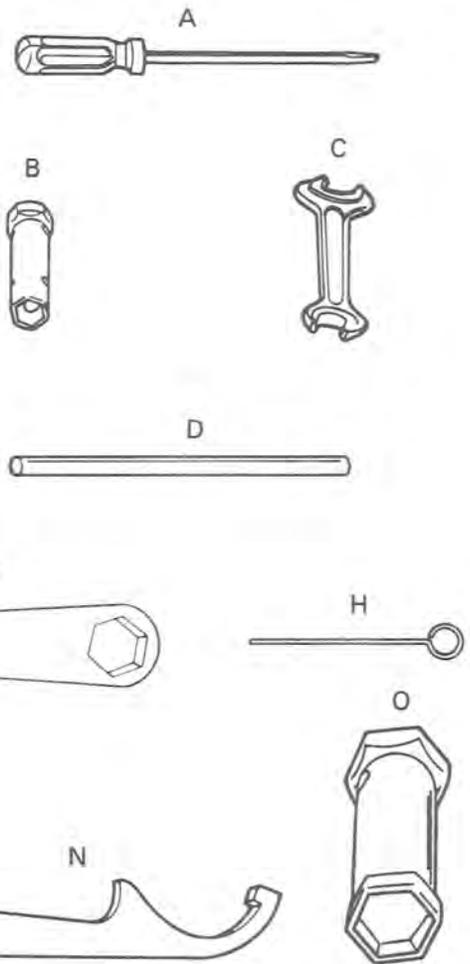
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BASIC TOOLS

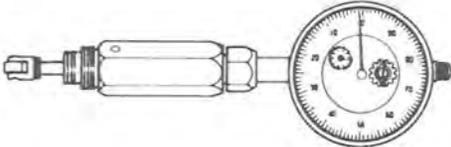
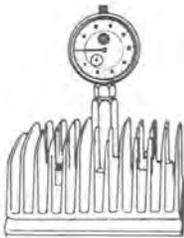
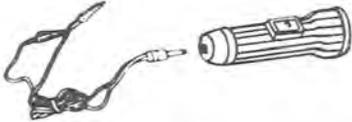
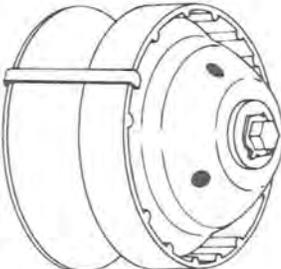
- A. Screwdriver
- B. Socket 10/13 mm
- C. Open end wrench 10/13 mm
- D. Socket wrench handle
- E. Starter rope
- F. Socket 17/21 mm
- G. Suspension adjustment key
- H. Oil gauge (gear box)
- I. Starter rope handle
- J. Extension bar
- K. Socket 11/13 mm
- L. Emergency starter rope handle
- M. Emergency starter clip
- (Citation 3500 & Mirage I only)
- N. Suspension adjustment key
- O. Socket 21/26 mm



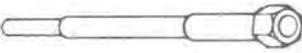
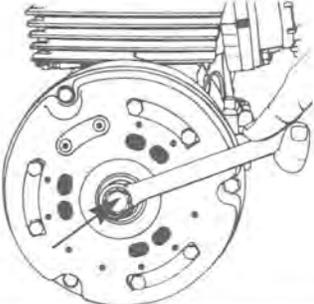
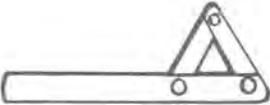
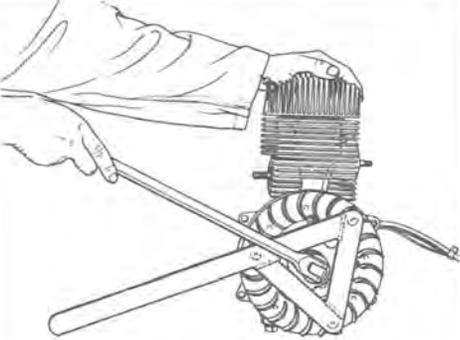
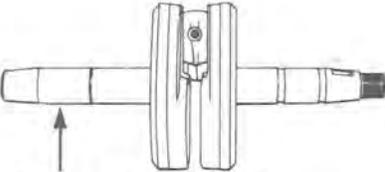
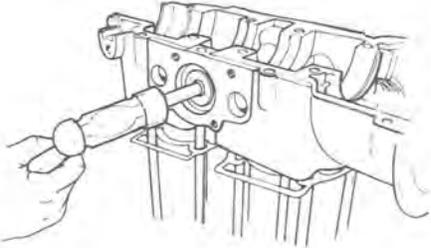
1982 MODELS	APPLICABLE TOOLS
Elan, Spirit Citation, Mirage (All) Nordik, Skandic, Futura 300 Blizzard 5500 MX, Sonic Blizzard 9500, Ultra Sonic Everest 500, E, L/C, Futura 500, E, L/C Elite Alpine	A, B, C, D, E, O. A, B, C, D, E, L, M, O. A, B, C, D, E, L, O. A, B, C, D, E, G, N, O. A, B, C, D, E, F, G. A, B, C, D, E, F, G. A, B, C, D, E, F, G, H, I. A, B, C, D, E, F, J, K.



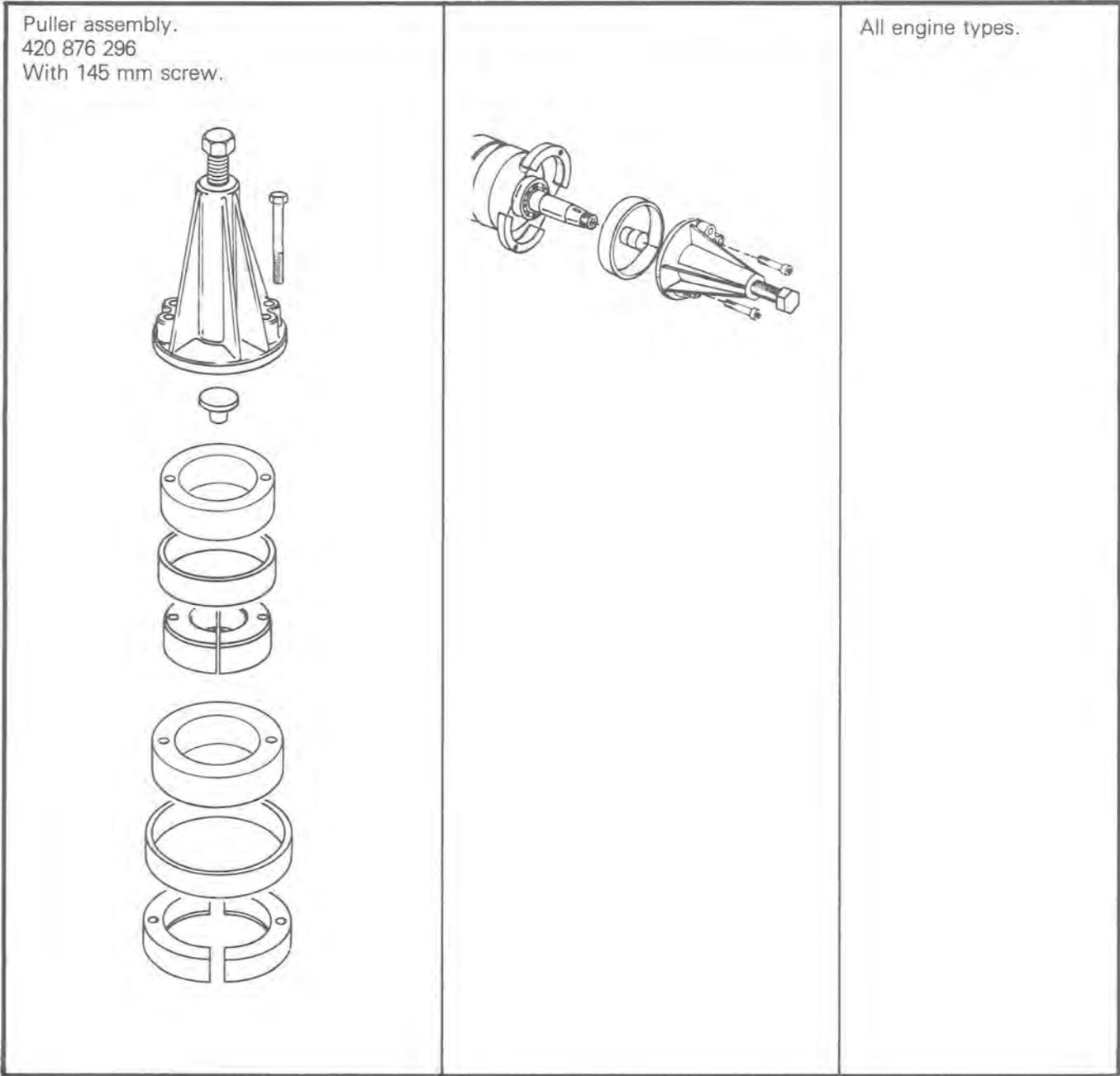
SERVICE TOOLS

ITEM	USE	APPLICABLE TO
Dial indicator (T.D.C. gauge). 414 1047 00 	Engine timing, to determine T.D.C. 	All engine types.
Circuit tester (continuity light). 414 0122 00 	Engine timing (static). Continuity tests.	All engine types.
Bombardier ignition tester. 419 0033 00 	Engine electrical components tests.	All engine types.
Drive pulley retainer. 529 0017 00 	For indexation of governor cup. 	Square shaft drive pulley.

SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

<p>Drive pulley puller. 529 0021 00</p>  <p>860 4142 00 (metric)</p> 	<p>To remove drive pulley from crankshaft.</p> 	<p>Taper shaft engines.</p>
<p>Magneto housing holder. 420 976 550</p> 		<p>Single cylinder engine types.</p>
<p>Seal sleeve 247 engines PTO 420 977 910 MAG 420 276 900</p>  <p>Water pump seal sleeve 354, 444, 454, 464 water pump 420 876 490 rotary valve 420 876 495</p>	<p>To avoid seal damage during crankshaft installation</p>  <p>Seal sleeve (on crankshaft)</p>	<p>All engines types except 277, 377, 503 and 640.</p>
<p>Rotary valve shaft pusher. 420 876 610</p> 		<p>Liquid cooled Rotary valve engines.</p>

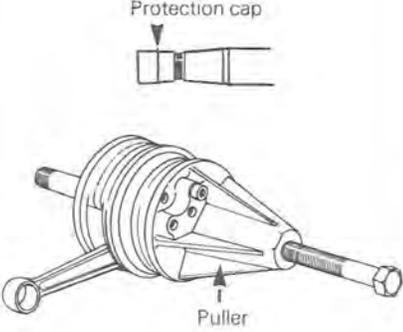
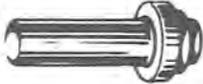
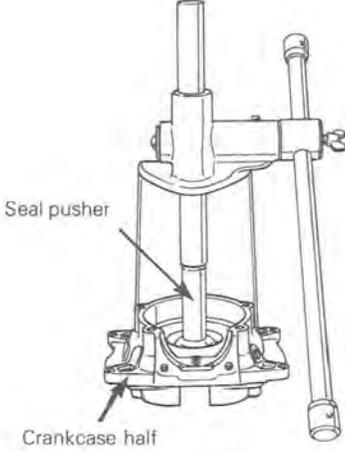
SECTION 01 TOOLS
 SUB-SECTION 02 (SERVICE TOOLS)



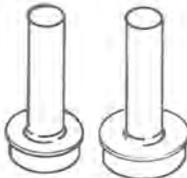
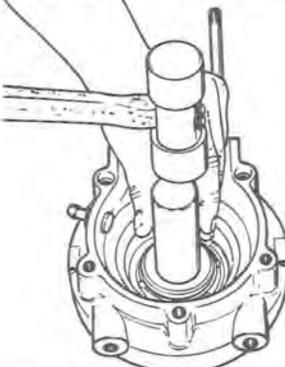
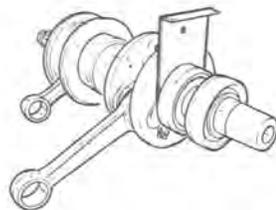
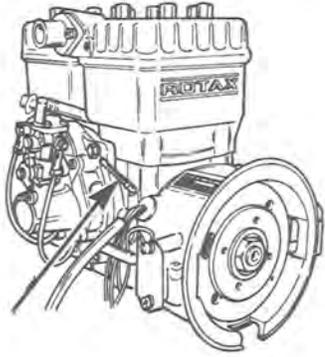
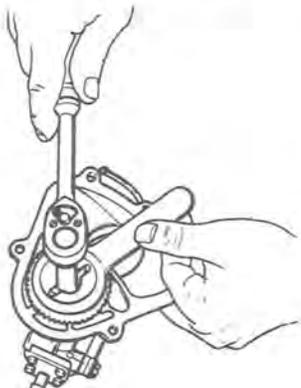
Screw M8 x 70 (2)	420 841 200	engine 377, 354, 454, 503
Screw M8 x 40 (2)	420 840 680	engine 247, 277, 444, 464, 640
Crankshaft protector PTO	420 876 550	All engines except 247, 640
Crankshaft protector Mag	420 876 555	377 engine only
Distance ring	420 876 560	all except 247 engine
Puller ring	420 977 480	all except 640 engine
Half ring ass'y	420 276 020	all except 640 engine
Distance ring	420 876 565	377, 464 engines only
Puller ring	420 977 490	377, 464, 640 engines only
Half ring ass'y	420 977 470	377, 464, 640 engines only



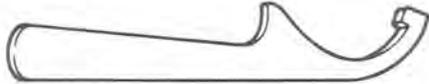
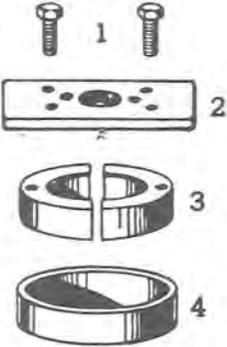
SECTION 01 TOOLS
 SUB-SECTION 02 (SERVICE TOOLS)

<p>Protection cap.</p>  <p>247, 277, 640 engines 18 mm 420 976 890 354, 377, 444, 454, 464, 503 22 mm 420 876 402</p>	<p>Protect crankshaft end, when using bearing puller.</p>  <p>Protection cap</p> <p>Puller</p>	<p>All engine types.</p>
<p>Engine seal pusher</p> <p>247 engine 420 977 920 277 engine 420 277 865 420 876 660</p> 	 <p>Seal pusher</p> <p>Crankcase half</p>	<p>247, 277 engine types</p>
<p>Seal pusher</p> <p>420 876 510 464 engine 420 876 500</p> 	<p>To install water pump seal</p>	<p>354, 444, 454, 464 engine types.</p>
<p>Rotary valve seal pusher</p> <p>420 876 600 - 354, 454 engine 420 876 605 - 464 engine</p> 	<p>To install rotary valve shaft seal.</p>	<p>354, 454, 464 engines.</p>

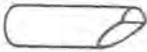
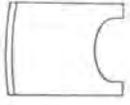
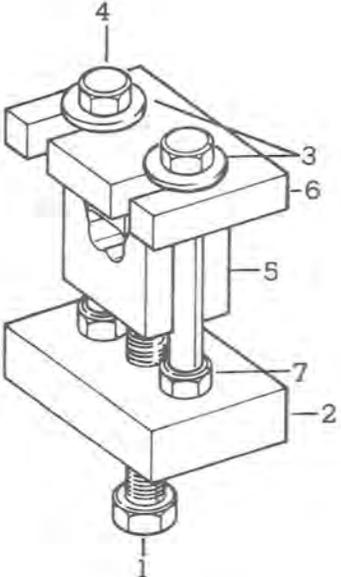
SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

<p>Polyamid ring pusher engine 277 MAG 420 273 930 PTO 420 273 940</p> 	<p>To install polyamid ring in crankcase.</p> 	<p>277 engine</p>
<p>Crankshaft feeler gauge. 503 engine *MAG 420 876 625 PTO 420 876 620</p> 		<p>*Mag side: All 503 engine up to no. 3 181 891 and engines no. 3 181 921 to 3 181 937 PTO: all 503 engines</p>
<p>Crankshaft locking tool 420 876 640</p> 	<p>To lock crankshaft</p> 	<p>277, 377, 454, 464, 503 engines</p>
<p>Injection pump gear holder 277, 377, 454, 503 Engine 420 876 690 464 engine 420 277 900</p> 		<p>All injection engines.</p>

SECTION 01 TOOLS
 SUB-SECTION 02 (SERVICE TOOLS)

<p>Magneto puller ring. 420 876 655</p> 	<p>To remove magneto.</p>	<p>277, 377, 454, 464, 503 engines.</p>
<p>Adjuster wrench. 529 003 800</p> 	<p>Front & rear suspension springs adjustment.</p>	<p>Blizzard 5500 MX Sonic</p>
<p>3 speeds transmission bearings extractor.</p> 	<p>To remove the bearings from the drive shaft and the lay shaft.</p> <ul style="list-style-type: none"> 1- screw M8 x 25 (2) 420 240 275 2- plate 420 977 700 3- half ring (2) 420 876 330 4- ring 420 977 480 	<p>Alpine 3 speeds transmission</p>

SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

<p>Transmission ball mounting bolt. 420 476 020</p> 	<p>Transmission cover index rod ball installation (Refer to section 03-08 – Gearbox)</p>	<p>Alpine 3 speeds transmission</p>
<p>Alignment tool 420 476 010</p> 	<p>Drive shaft and layshaft sprocket alignment. (Refer to section 03-08 Gearbox)</p>	<p>Alpine 3 speeds transmission</p>
<p>Nippondenso electronic ignition tester 490 084 000</p> 	<p>Engine ignition system components tests.</p>	<ul style="list-style-type: none"> - All Nippondenso electronic ignition systems - (All engine types except 247, 640)
<p>Clip-O-Matic 529 004 500</p> 	<p>For track inserts installation.</p> <ul style="list-style-type: none"> 1- screw 5/16 - 11 x 6'' 529 003 900 2- pressure plate 529 004 400 3- washer (2) 391 302 900 4- hexagonal screw (2) 1/2-20 x 6'' 391 717 200 5- bending block no. 1 529 004 100 bending block no. 2 529 004 200 bending block no. 3 529 004 300 6- male block 529 004 000 7- hexagonal nut (2) 389 804 000 	<p>All types of track.</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>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>A medium-strength adhesive for threadlocking and threadsealing. Vibration-proofs 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>Hi-strength threadlocking threadsealing adhesive for large parts.</p>	<p>Fasteners and studs under 1" dia.</p>
<p>GASKET ELIMINATOR 515 50 mL 413 7027 00</p> 	<p>Seals instantly. For metal to metal assembly. Replaces gaskets.</p>	<p>On all engine crankcases.</p>

SECTION 01 TOOLS
 SUB-SECTION 03 (SERVICE PRODUCTS)

<p>RETAINING COMPOUND (601) 10 mL 413 7031 00</p> 	<p>Restores fit between bearings and worn crankcase.</p>	<p>All engines except 247, 277.</p>
<p>PRIMER CRANKCASE SEALANT (SPRAY) 6 oz 413 7024 00</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 crankcase.</p>
<p>STRIPPER NO 57 413 7021 00</p> 	<p>For cleaning mating surfaces before assembly.</p>	<p>Used to clean mating surfaces before applying Loctite 515 (Gasket Eliminator).</p>
<p>ANTISEIZE LUBRICANT 413 7010 00</p> 	<p>Protects moving and stationary 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. 747 018 002</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 14 oz 498 0281 00</p> 	<p>Multi purpose Lithium based grease for use over a wide temperature range.</p>	<p>For idler bearings, ski legs, leaf spring cushion pads, seal interior lips, etc.</p>

SECTION 01 TOOLS
SUB-SECTION 03 (SERVICE PRODUCTS)

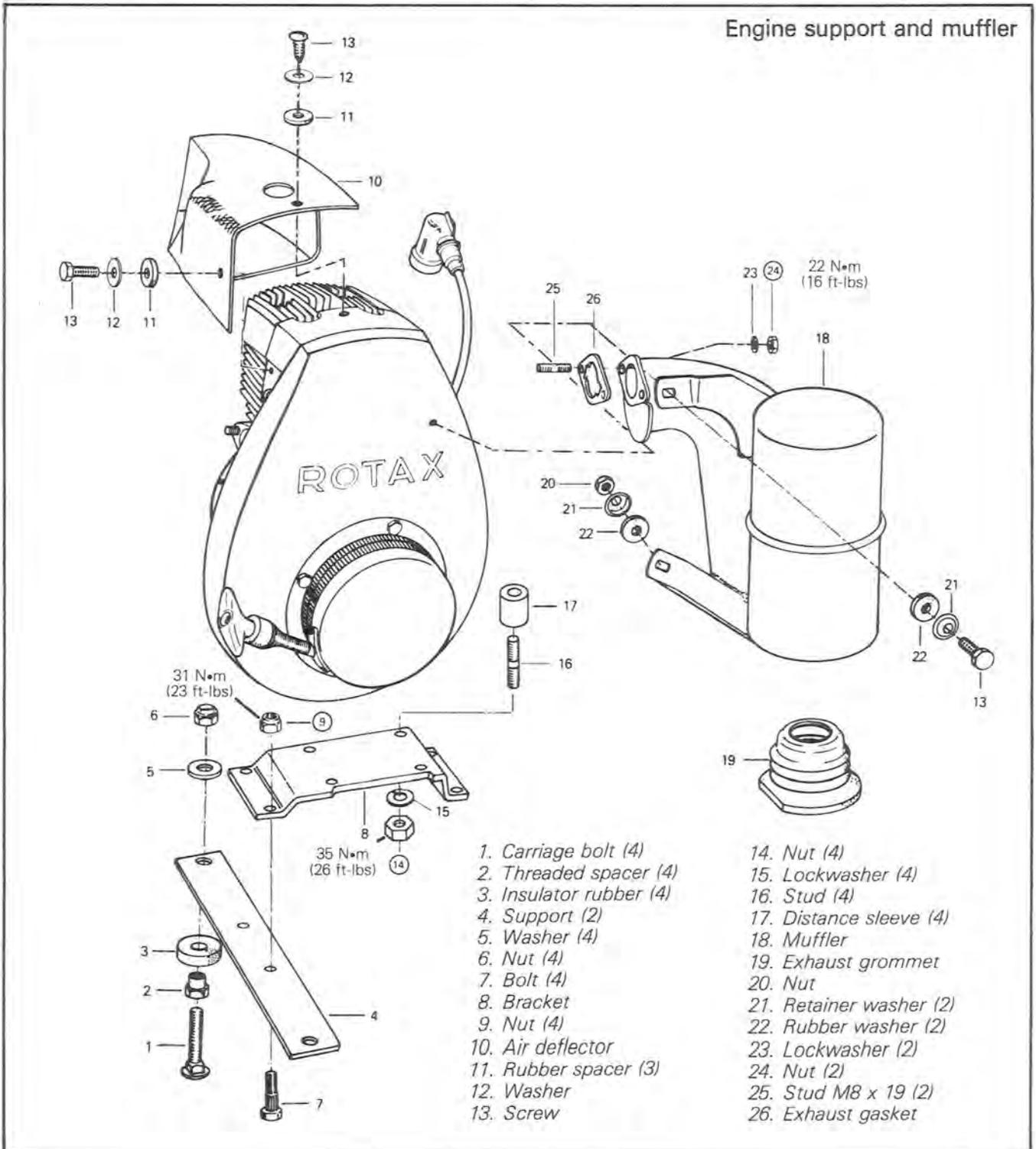
<p>CLUTCH LUBE 413 8007 00</p> 	<p>Special low temperature metallic lubricant for clutch shafts only.</p>	<p>Citation 3500, Citation 4500/E, Mirage I, Mirage II/E, Nordik, Skandic, Futura 300, Elan and Spirit drive pulley.</p>
<p>INJECTOR OIL 413 8015 00</p> 	<p>High quality lubricant with good resistance to high operating temperatures. Low foaming action.</p>	<p>Rotary valve lubricant on 354-444-454 and 464 engines.</p>
<p>CHAINCASE OIL 413 8019 00</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>BOMBARDIER OIL 50/1 496 0132 00</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</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. Fully efficient for: INJECTION, PRE-MIX, ROTARY VALVE.</p>	<p>All engine types.</p>
<p>INJECTION OIL 496 013 400 4 litres</p> 	<p>Same characteristics as 496 013 300 but in 4 litres size.</p>	<p>All engine types.</p>



247 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION

Engine support and muffler



- | | |
|-------------------------|-------------------------|
| 1. Carriage bolt (4) | 14. Nut (4) |
| 2. Threaded spacer (4) | 15. Lockwasher (4) |
| 3. Insulator rubber (4) | 16. Stud (4) |
| 4. Support (2) | 17. Distance sleeve (4) |
| 5. Washer (4) | 18. Muffler |
| 6. Nut (4) | 19. Exhaust grommet |
| 7. Bolt (4) | 20. Nut |
| 8. Bracket | 21. Retainer washer (2) |
| 9. Nut (4) | 22. Rubber washer (2) |
| 10. Air deflector | 23. Lockwasher (2) |
| 11. Rubber spacer (3) | 24. Nut (2) |
| 12. Washer | 25. Stud M8 x 19 (2) |
| 13. Screw | 26. Exhaust gasket |

SECTION 02 ENGINE

SUB-SECTION 01 (247 ENGINE TYPE)

REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle.

- Pulley guard.
- Drive belt.
- Muffler.
- Choke knob.
- Decompressor.
- Throttle cable.
- Fuel lines.
- Electrical connector.
- Separate steering column support at upper column.
- Engine mount nuts.

ENGINE SUPPORT AND MUFFLER DISASSEMBLY & ASSEMBLY

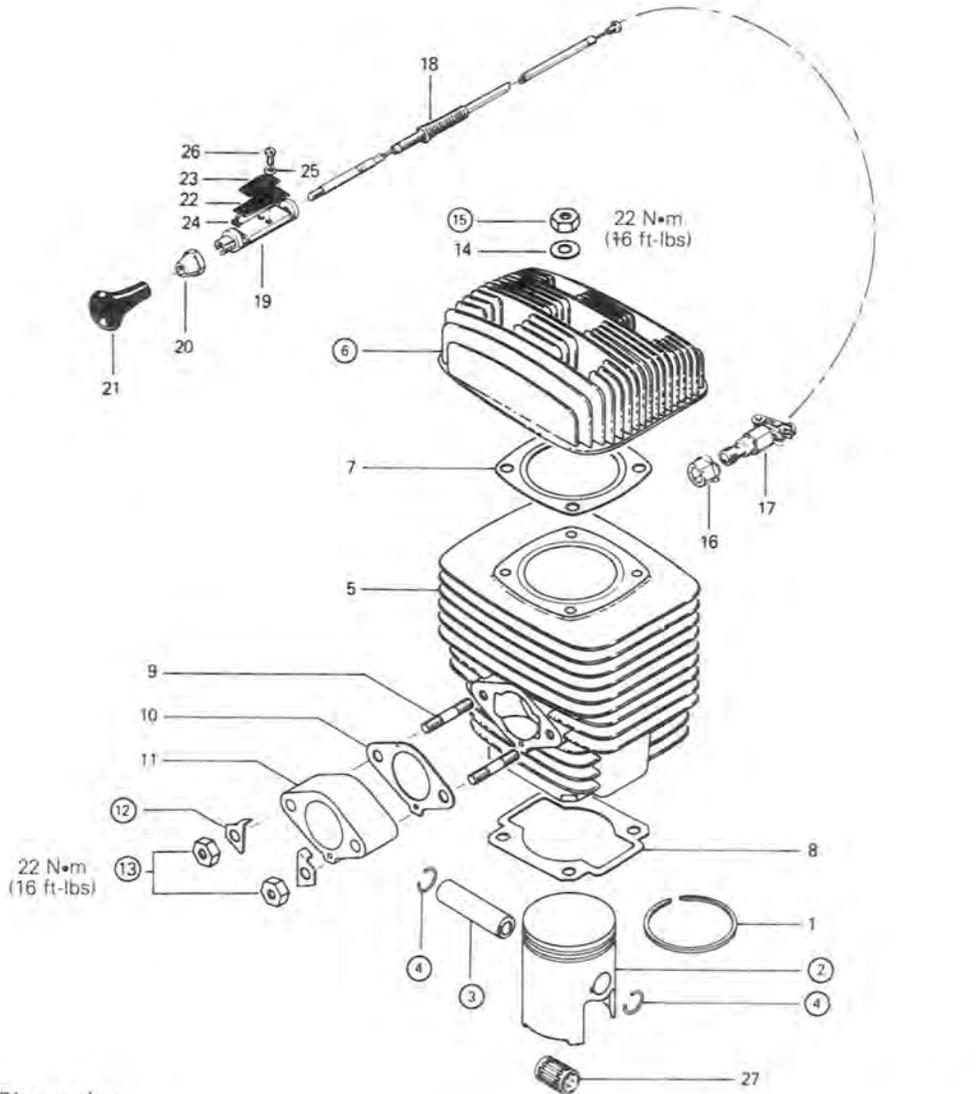
- ⑨ Torque to 31 N•m (23 ft-lbs).
- ⑭ Torque to 35 N•m (26 ft-lbs).
- ⑳ Torque to 22 N•m (16 ft-lbs).

INSTALLATION ON VEHICLE

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

- Check tightness of engine mount nuts, ⑭ and drive pulley bolt.
- After throttle cable installation, check maximum throttle slide opening.
- Check pulley alignment and drive belt tension.

TOP END



- 1. Piston ring
- 2. Piston
- 3. Gudgeon pin
- 4. Circlip (2)
- 5. Cylinder
- 6. Cylinder head
- 7. Gasket (head/cylinder)
- 8. Gasket (cylinder/crankcase)
- 9. Stud (2)
- 10. Gasket
- 11. Insulating flange
- 12. Locking tab (2)
- 13. Nut (2)
- 14. Flat washer (4)

- 15. Nut (head) (4)
- 16. Locking sleeve
- 17. Decompressor
- 18. Cable
- 19. Switch housing
- 20. Cap nut
- 21. Knob
- 22. Spring plate
- 23. Spring plate reinforcement
- 24. Spring lock
- 25. Lockwasher
- 26. Screw
- 27. Needle bearing

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

② ③ ④ Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Use a pointed tool to remove circlips from piston.

▼ **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

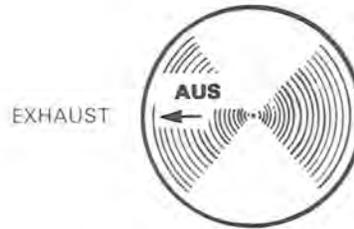
The inspection of the engine top end must include the following measurements:

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 (.0018")
Cylinder/piston clearance	.065 mm (.0026")	.20 mm (.0079")	.20 mm (.0079")
Ring/piston groove clearance	.04 mm (.0016")	.20 mm (.0079")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

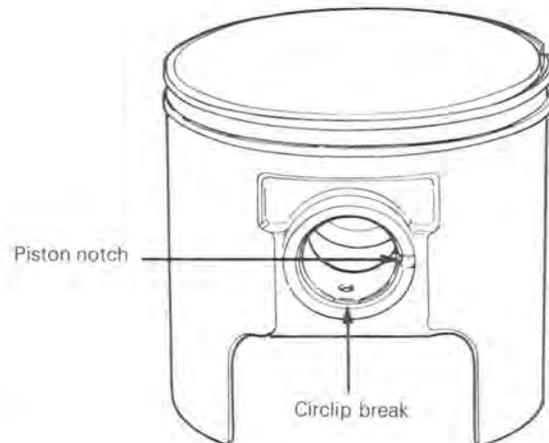
○ **NOTE:** For the measurement procedures, refer to "Engine Tolerances Measurement", section 02, sub-section 09.

ASSEMBLY

② 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.



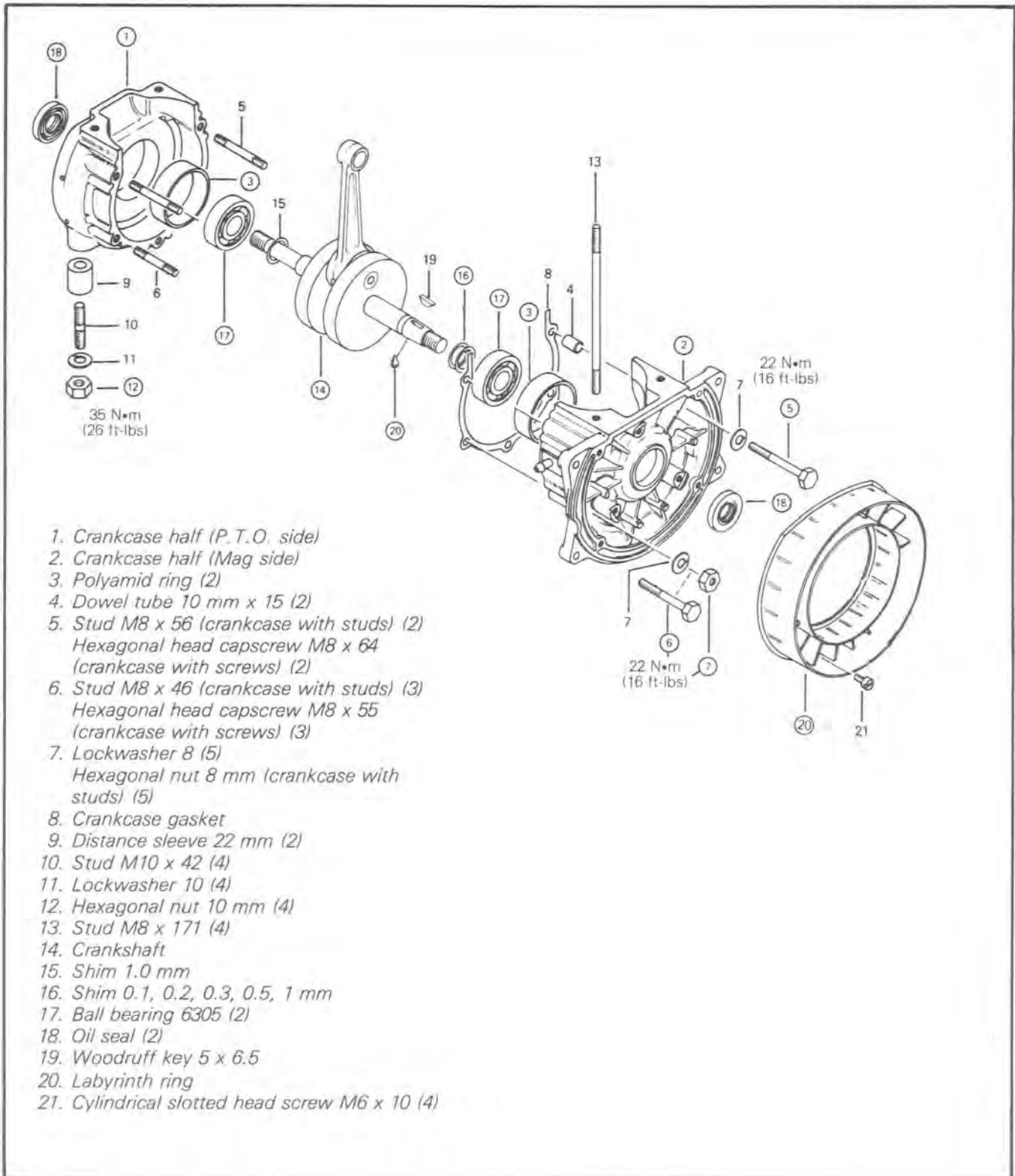
④ To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Remove any burrs on piston caused through circlip installation with very fine emery cloth.



⑤ ⑥ Position cylinder head on cylinder with fins in line with crankshaft center line. Cross torque retaining nuts to 22 N•m (16 ft-lbs).

⑫ Tab washer should be replaced if bent more than three (3) times. If in doubt replace.

BOTTOM END



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, sub-section 03.

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

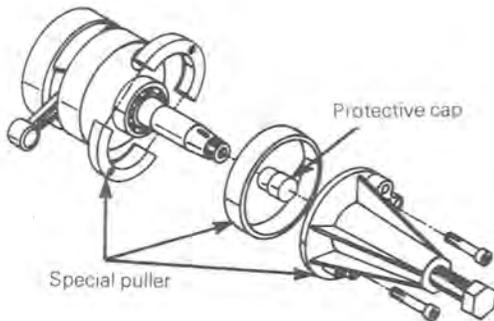
①② When disassembling crankcase halves, do not heat the crankcase. If heat is necessary, temperature must not exceed 55°C (130°F).

③ Do not remove polyamid rings unless necessary.

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

④ To remove seals, push from outside the crankcase towards the inside.

⑤ 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")
Connecting rod alignment	N.A.	N.A.	N.A.
Crankshaft end play	.20 mm (.0079")	.40 mm (.0158")	N.A.

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

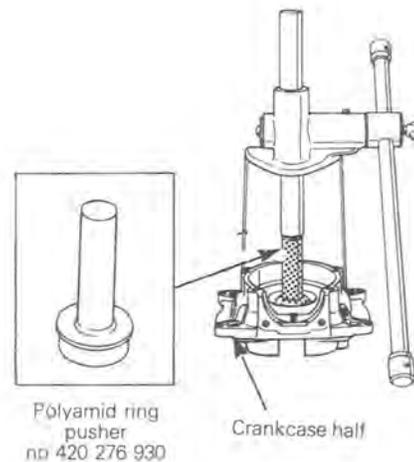
ASSEMBLY

① 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.

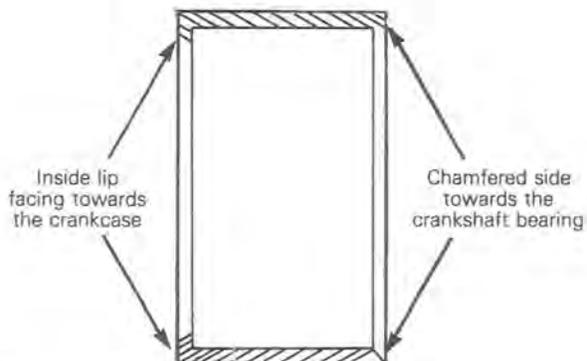
Install bearings with groove outward.

○ **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 Tolerances Measurement, section 02, sub-section 09.

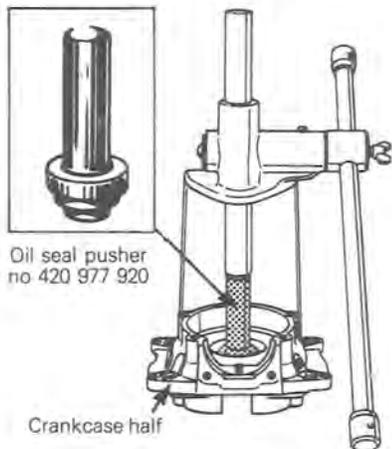
③ To install polyamid ring, apply oil on outside diameter then use a suitable pusher.



SECTION 02 ENGINE
SUB-SECTION 01 (247 ENGINE TYPE)



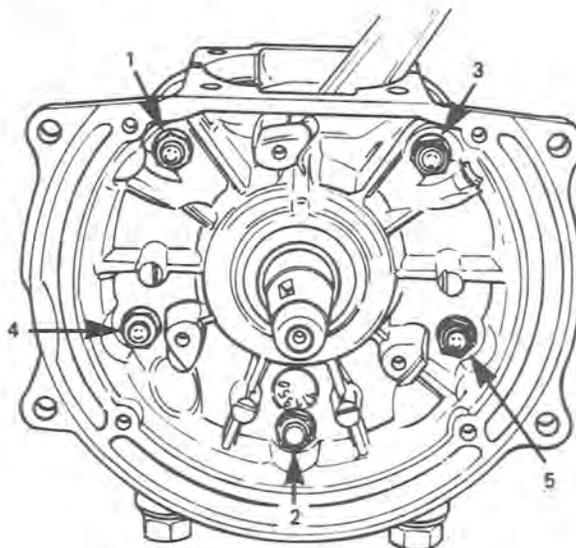
⑱ To install new seal into crankcase use an appropriate oil seal pusher as illustrated. (See Tools Section).



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.

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

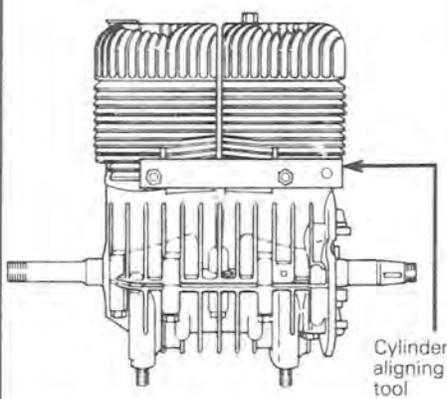
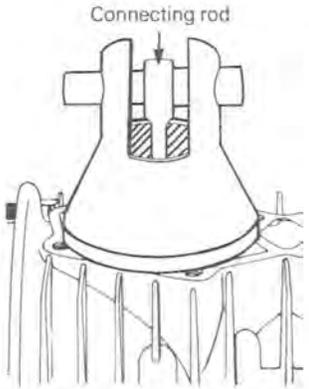
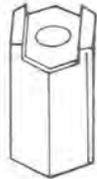
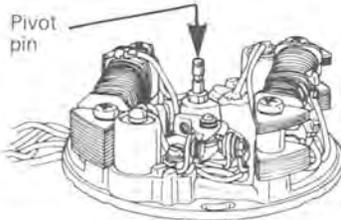
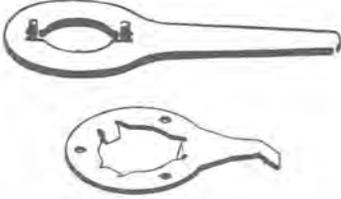
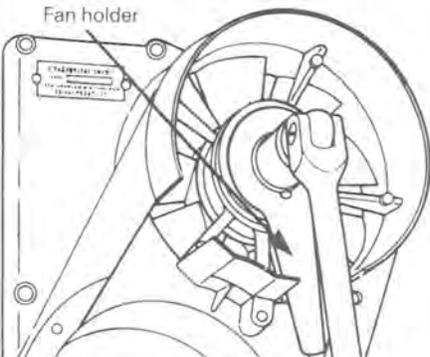
⑤|⑥|⑦ Torque to 22 N•m (16 ft-lbs) following illustrated sequence.



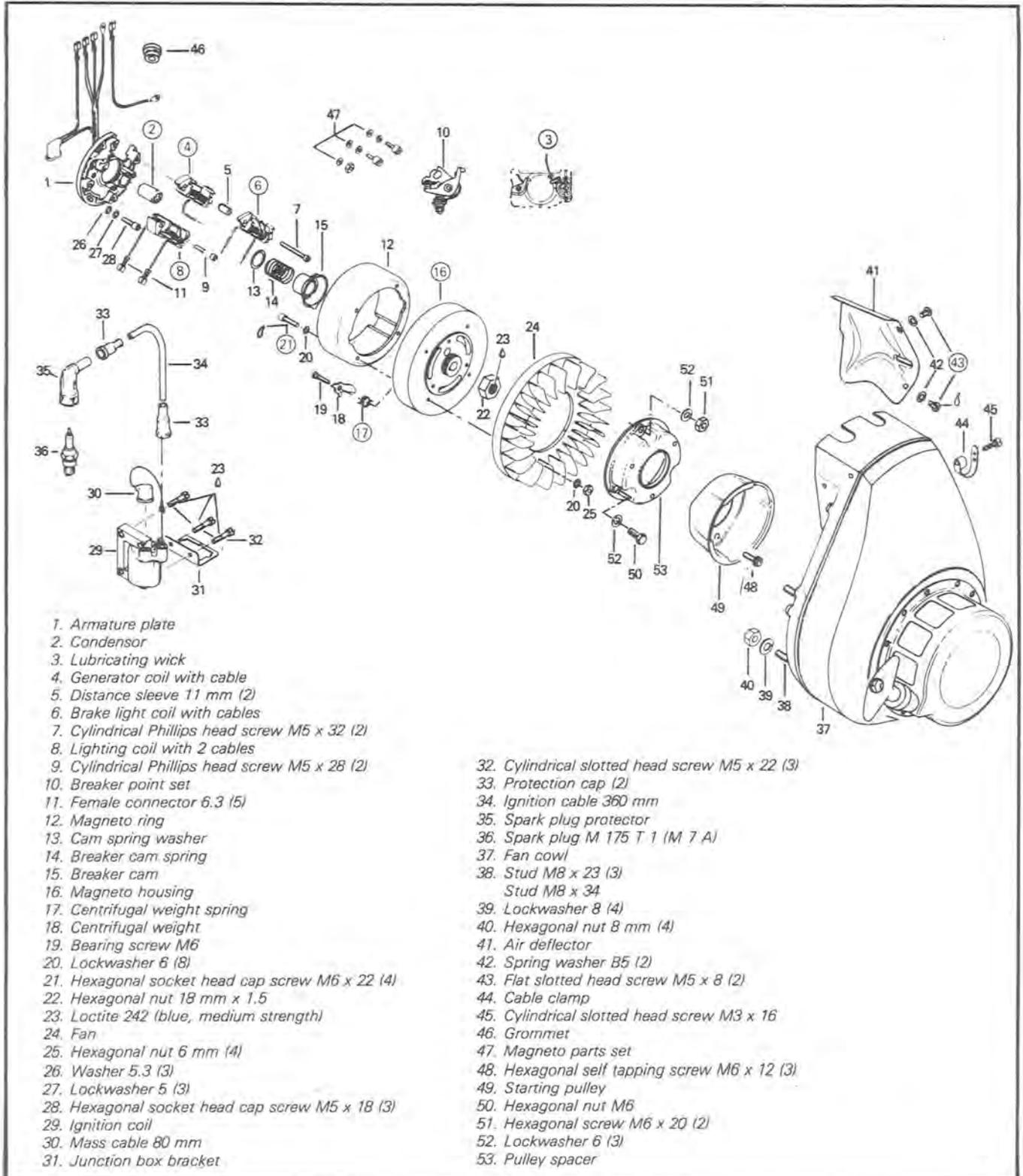
⑫ Torque to 35 N•m (26 ft-lbs).

⑳ Position labyrinth ring with bevelled side on top.
To install magneto, refer to "Magneto" in this section.

SECTION 01 TOOLS
SUB-SECTION 02 (SERVICE TOOLS)

<p>Cylinder aligning tool. 640 engine 420 876 170 503 engine 420 876 171 354-454 engines 420 876 575</p>  <p>503 engines 420 240 275</p>  <p>640 engine 420 842 160</p> 	 <p>Cylinder aligning tool</p>	<p>Twin cylinder engine types</p>
<p>Connecting rod holder. 420 977 900</p> 	<p>Connecting rod</p> 	<p>All single cylinder engines.</p>
<p>Armature plate contact set pivot pin remover (socket). 420 876 530</p> 	<p>To remove contact set pivot pin from armature plate.</p> <p>Pivot pin</p> 	<p>All engine types using breaker point type ignition.</p>
<p>Fan holder 640 engine 420 977 880 503 engine 420 876 355 377 engine 420 876 357</p> 	<p>Fan holder</p> 	<p>Twin cylinder fan-cooled engines</p>

MAGNETO AND COOLING SYSTEM



- 1. Armature plate
- 2. Condensor
- 3. Lubricating wick
- 4. Generator coil with cable
- 5. Distance sleeve 11 mm (2)
- 6. Brake light coil with cables
- 7. Cylindrical Phillips head screw M5 x 32 (2)
- 8. Lighting coil with 2 cables
- 9. Cylindrical Phillips head screw M5 x 28 (2)
- 10. Breaker point set
- 11. Female connector 6.3 (5)
- 12. Magneto ring
- 13. Cam spring washer
- 14. Breaker cam spring
- 15. Breaker cam
- 16. Magneto housing
- 17. Centrifugal weight spring
- 18. Centrifugal weight
- 19. Bearing screw M6
- 20. Lockwasher 6 (8)
- 21. Hexagonal socket head cap screw M6 x 22 (4)
- 22. Hexagonal nut 18 mm x 1.5
- 23. Loctite 242 (blue, medium strength)
- 24. Fan
- 25. Hexagonal nut 6 mm (4)
- 26. Washer 5.3 (3)
- 27. Lockwasher 5 (3)
- 28. Hexagonal socket head cap screw M5 x 18 (3)
- 29. Ignition coil
- 30. Mass cable 80 mm
- 31. Junction box bracket

- 32. Cylindrical slotted head screw M5 x 22 (3)
- 33. Protection cap (2)
- 34. Ignition cable 360 mm
- 35. Spark plug protector
- 36. Spark plug M 175 T 1 (M 7 A)
- 37. Fan cowl
- 38. Stud M8 x 23 (3)
Stud M8 x 34
- 39. Lockwasher 8 (4)
- 40. Hexagonal nut 8 mm (4)
- 41. Air deflector
- 42. Spring washer B5 (2)
- 43. Flat slotted head screw M5 x 8 (2)
- 44. Cable clamp
- 45. Cylindrical slotted head screw M3 x 16
- 46. Grommet
- 47. Magneto parts set
- 48. Hexagonal self tapping screw M6 x 12 (3)
- 49. Starting pulley
- 50. Hexagonal nut M6
- 51. Hexagonal screw M6 x 20 (2)
- 52. Lockwasher 6 (3)
- 53. Pulley spacer

SECTION 02 ENGINE

SUB-SECTION 01 (247 ENGINE TYPE)

CLEANING

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

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

DISASSEMBLY

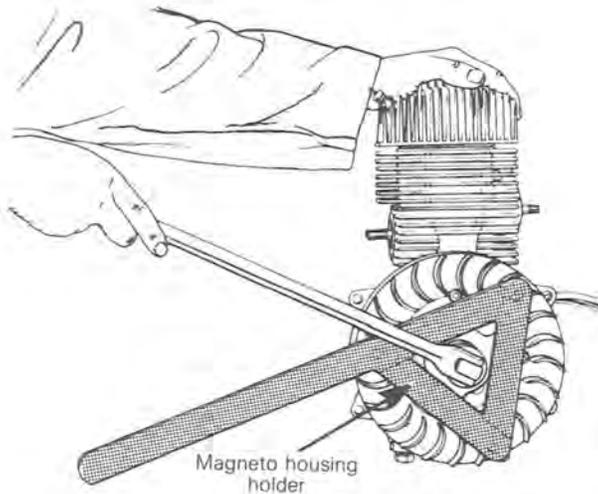
● To gain access to magneto assembly, remove:

- muffler
- upper column
- air duct
- air deflector (41)
- spark plug cable clamp (44)
- fan cowl (37)
- starting pulley (49)
- pulley spacer (53)

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

● (22) To remove magneto retaining nut:

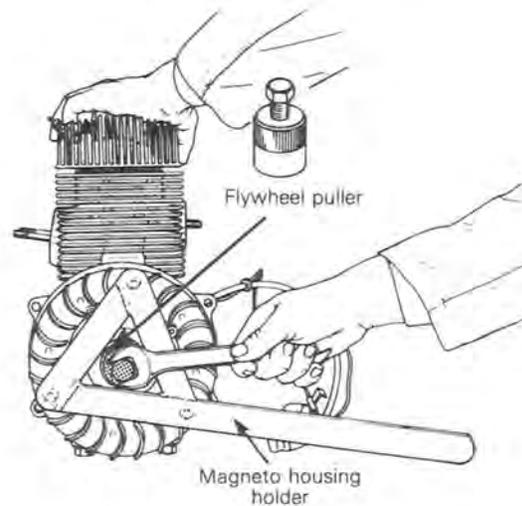
- Lock crankshaft with magneto housing holder (service tool) as illustrated.
- Remove magneto retaining nut.



○ **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(s).
- Bring magneto side piston at top dead center position.
- Rotate magneto 45° counterclockwise.
- Insert enough starter rope into cylinder to fill it completely.
- Remove magneto retaining nut.
- (16) To remove magneto housing (flywheel): use flywheel puller (service tool) and magneto housing holder (service tool) as illustrated.



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

REPAIR

● (2) To replace a condenser:

- Disconnect the two black leads using a soldering iron.
- Drive the condenser out of the armature plate using a suitable pusher.
- To reinstall, reverse procedure.

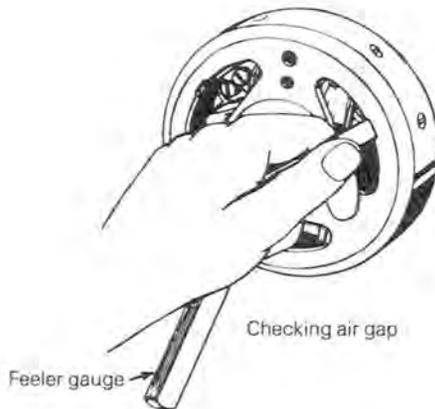
● (3) When replacing contact breaker,

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

● ④ ⑥ ⑧ 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.

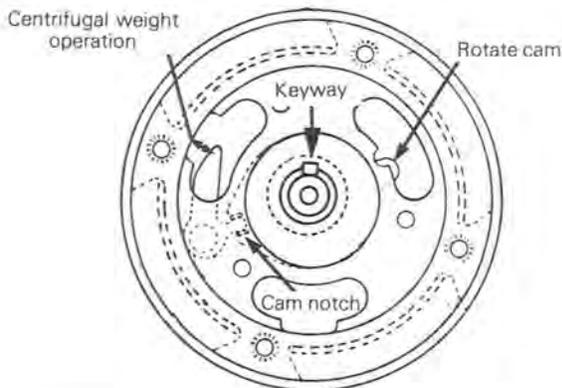
– ③⑩ ③③ At reassembly coat all electric connections with dielectric or lithium grease to prevent corrosion or moisture from penetrating.

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



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:



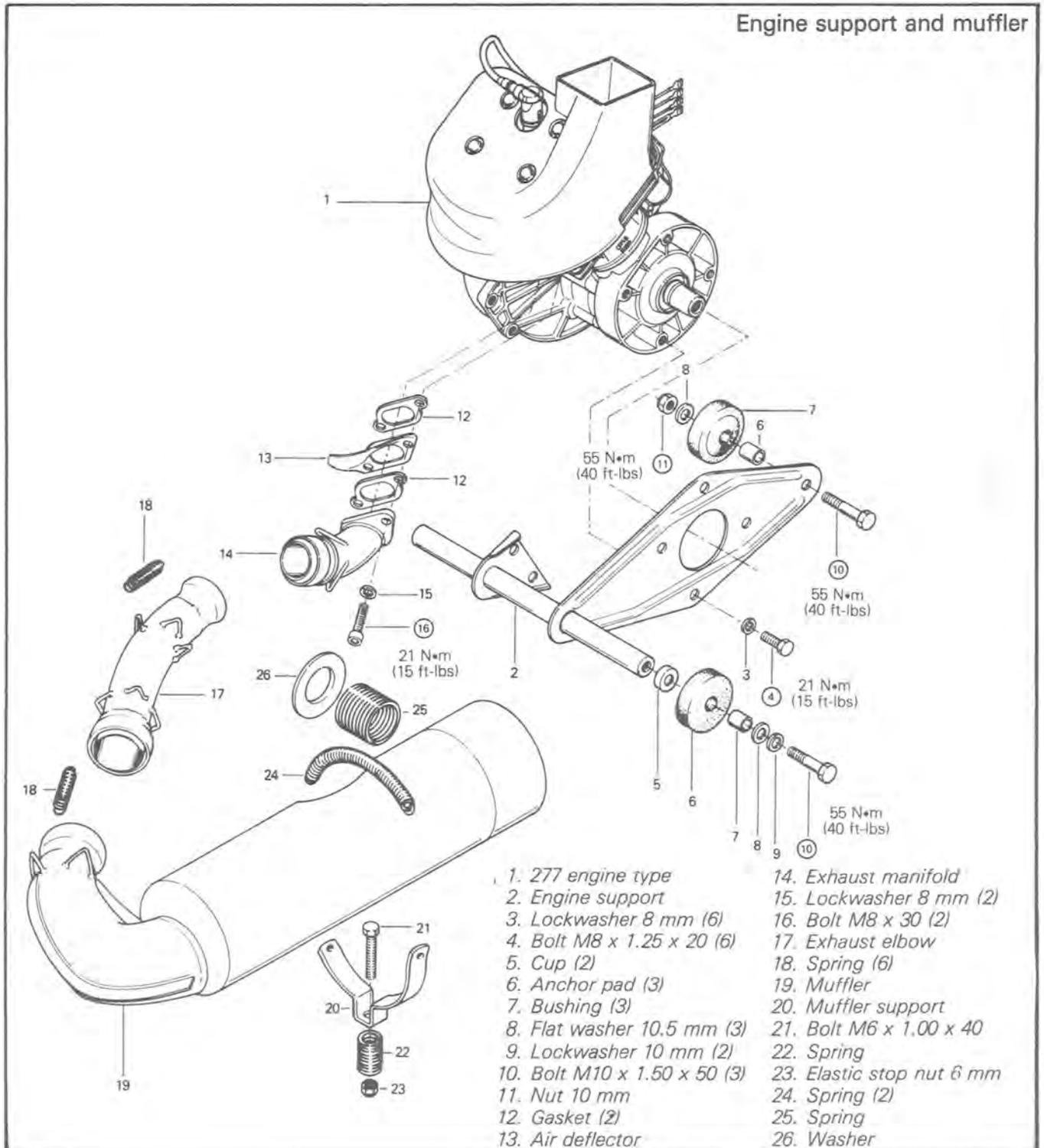
- ⑮ ⑱ Rotate breaker cam to check centrifugal weight operation.
- ⑰ At assembly, apply a small amount of grease into spring seating.
- ⑳ ④③ At assembly, apply "Loctite 242" on screw threads.
- ⑳ At assembly, thoroughly clean threads and apply "Loctite 242", then torque retaining nut to 85 N•m (63 ft-lbs).



277 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION

Engine support and muffler



- | | |
|------------------------------|---------------------------|
| 1. 277 engine type | 14. Exhaust manifold |
| 2. Engine support | 15. Lockwasher 8 mm (2) |
| 3. Lockwasher 8 mm (6) | 16. Bolt M8 x 30 (2) |
| 4. Bolt M8 x 1.25 x 20 (6) | 17. Exhaust elbow |
| 5. Cup (2) | 18. Spring (6) |
| 6. Anchor pad (3) | 19. Muffler |
| 7. Bushing (3) | 20. Muffler support |
| 8. Flat washer 10.5 mm (3) | 21. Bolt M6 x 1.00 x 40 |
| 9. Lockwasher 10 mm (2) | 22. Spring |
| 10. Bolt M10 x 1.50 x 50 (3) | 23. Elastic stop nut 6 mm |
| 11. Nut 10 mm | 24. Spring (2) |
| 12. Gasket (2) | 25. Spring |
| 13. Air deflector | 26. Washer |



REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle.

- Pulley guard and drive belt
- Muffler
- Throttle cable and intake silencer
- Oil and fuel lines
- Electrical connectors
- Hood retaining cable
- Bolts (3) securing engine support to chassis.

ENGINE SUPPORT AND MUFFLER DISASSEMBLY & ASSEMBLY

④ ⑯ Torque to 21 N•m (15 ft-lbs).

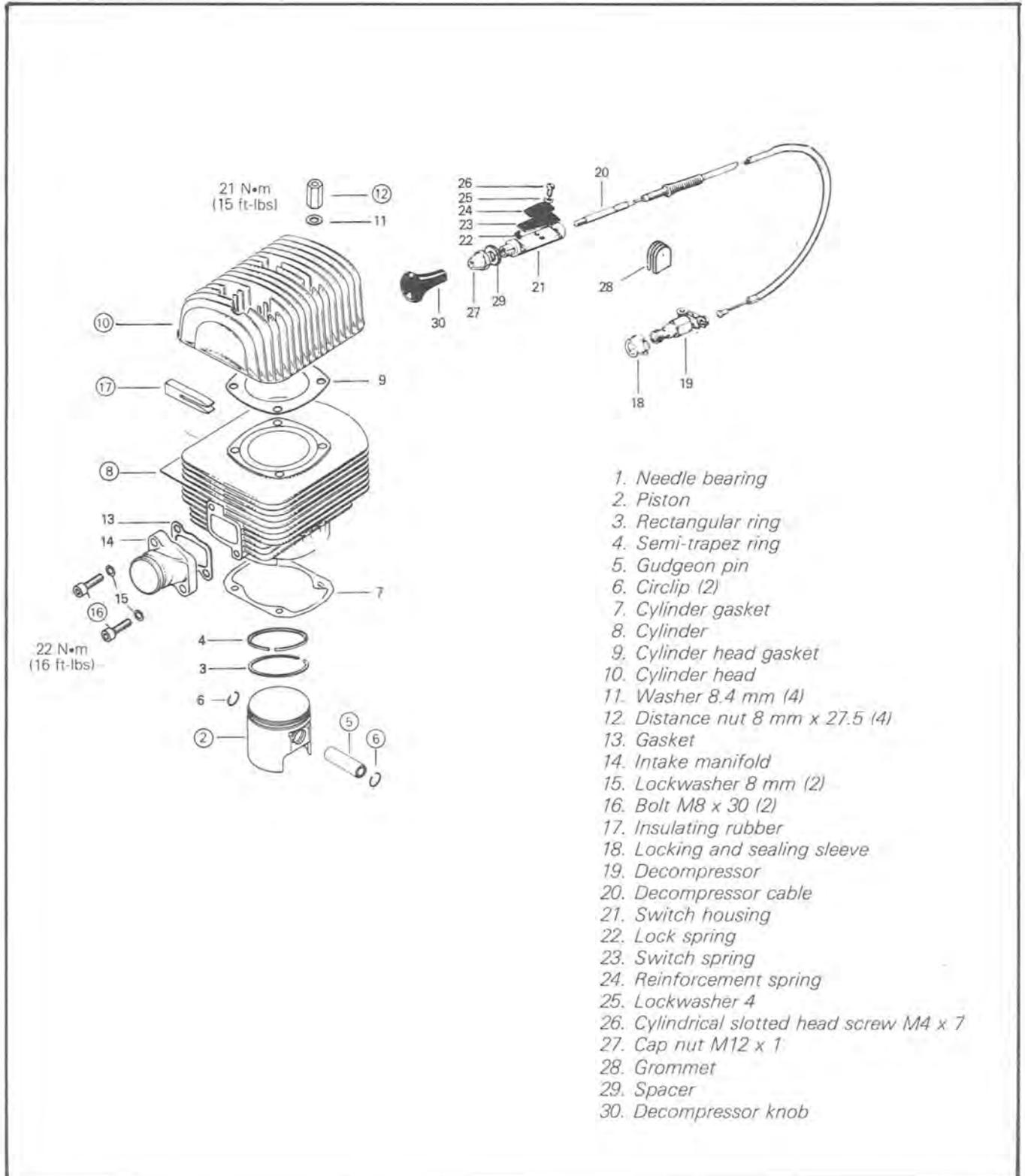
⑩ ⑪ Torque to 55 N•m (40 ft-lbs).

INSTALLATION ON VEHICLE

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

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

TOP END



SECTION 02 ENGINE
SUB-SECTION 02 (277 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

② ⑤ ⑥ Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Use a pointed tool to remove circlips from piston.

▼ **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

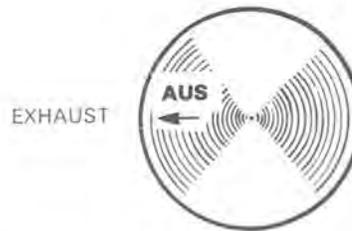
The inspection of the engine top end must include the following measurements:

MEASUREMENTS	TOLERANCES		
	FITTING NEW PARTS (MIN.)	(MAX.)	WEAR LIMIT
Cylinder taper	N.A.	N.A.	0.8 mm (.0031")
Cylinder out of round	N.A.	N.A.	.05 mm (.0018")
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")

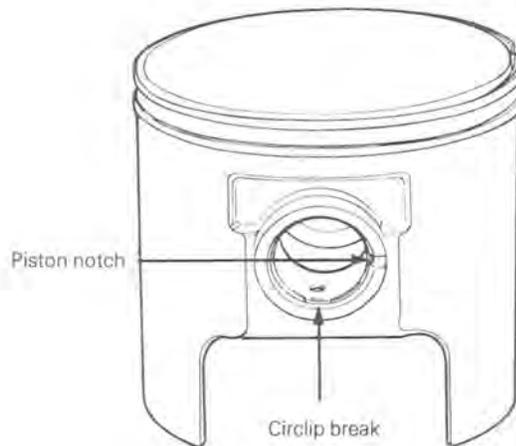
○ **NOTE:** For the measurement procedures, refer to "Engine Tolerances Measurement", section 02, sub-section 09.

ASSEMBLY

② 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.



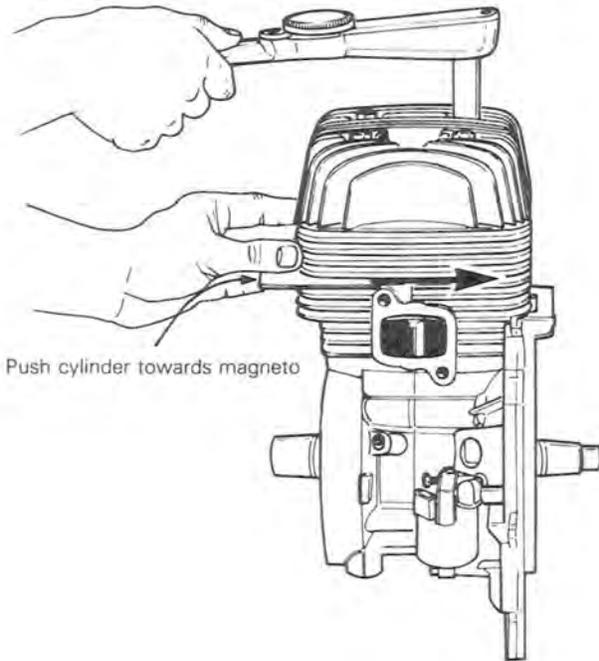
⑥ To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Remove any burrs on piston caused through circlip installation with very fine emery cloth.



⑦ Position insulating rubber as illustrated.

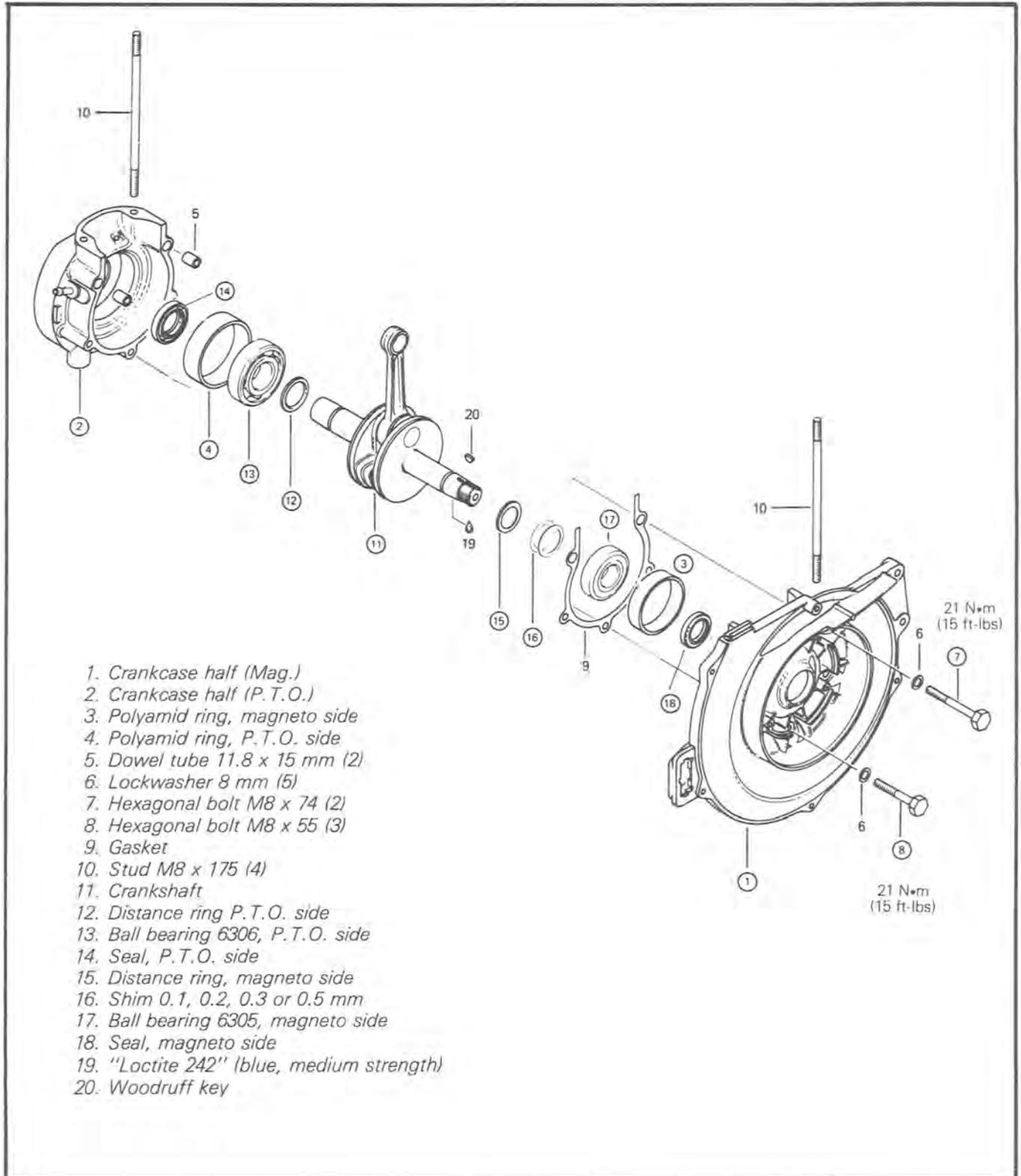


⑧⑩⑫ Position cylinder head on cylinder with nuts and push cylinder towards magneto while cross torquing nuts to 21 N•m (15 ft-lbs).





BOTTOM END



SECTION 02 ENGINE
SUB-SECTION 02 (277 ENGINE TYPE)



CLEANING

Discard all 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, sub-section 03.

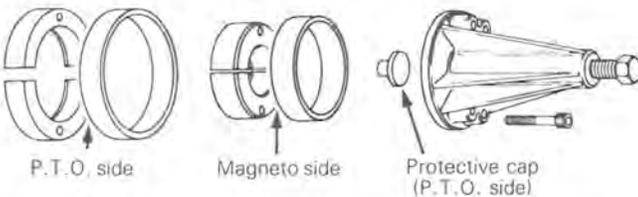
To remove magneto, refer to "Magneto" in this section.

③ ④ Do not remove polyamid rings unless necessary.

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

⑭ ⑱ To remove seals, push from outside the crankcase towards the inside.

⑬ ⑰ Use appropriate puller to remove ball bearings from crankshaft (see Tools section).



○ **NOTE:** Prior to magneto side bearing installation, install required shim(s) (crankshaft end-play) on crankshaft extension. At assembly, place bearings into an oil container heated to 100°C (210°F). This will expand the bearings and permit them to slide easily on the shaft.

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")
Connecting rod alignment	N.A.	N.A.	N.A.
Crankshaft end play	.20 mm (.0078")	.40 mm (.0156")	N.A.

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

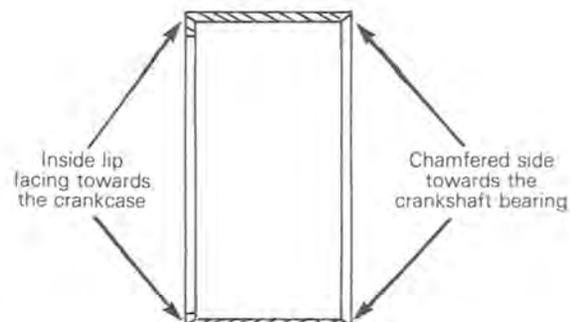
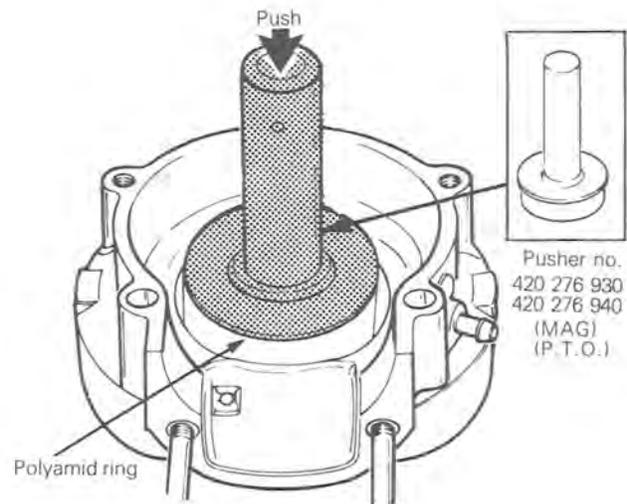
ASSEMBLY

⑬ ⑰ 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 shim(s) on crankshaft extension. For the crankshaft end-play adjustment procedure, refer to Engine Tolerances Measurement, section 02, sub-section 09.

③ ④ To install polyamid rings, apply oil on outside diameter then use no. 420 276 930 pusher for magneto side and no. 420 276 940 pusher for P.T.O. side.

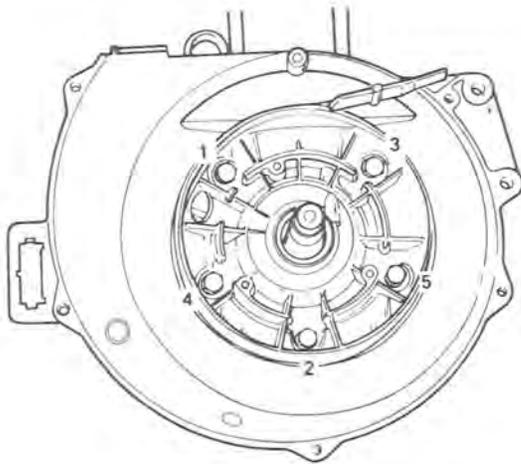


⑭ ⑱ Install a seal inside the crankcase, use no. 420 277 865 pusher for magneto side and no. 420 876 660 pusher for P.T.O. side.

○ NOTE: To install seals, push from inside towards the outside of the crankcase.



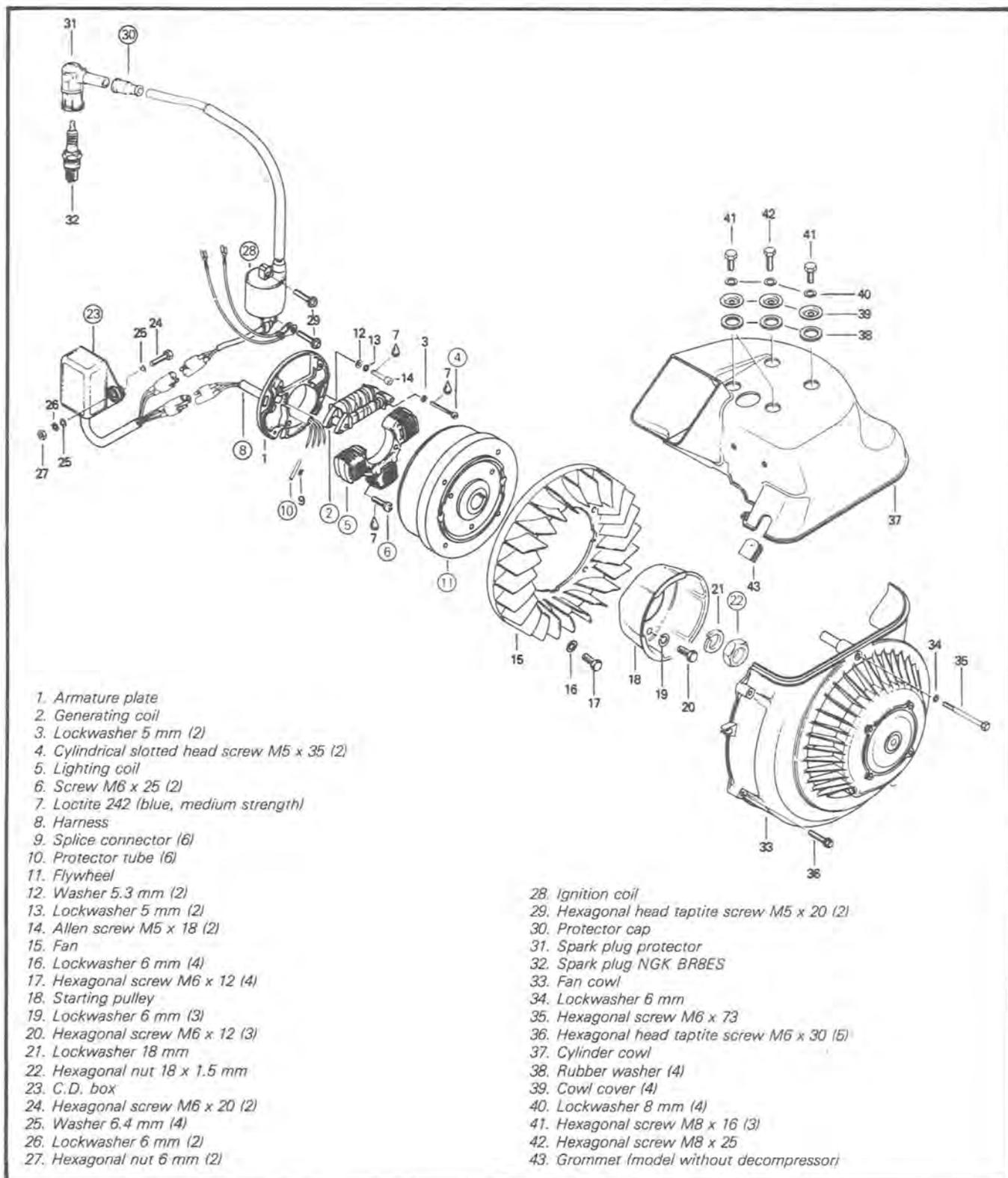
⑦ ⑧ At assembly, torque to 21 N•m (15 ft-lbs) following illustrated sequence.



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



MAGNETO AND COOLING SYSTEM



SECTION 02 ENGINE
SUB-SECTION 02 (277 ENGINE TYPE)

CLEANING

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

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

DISASSEMBLY

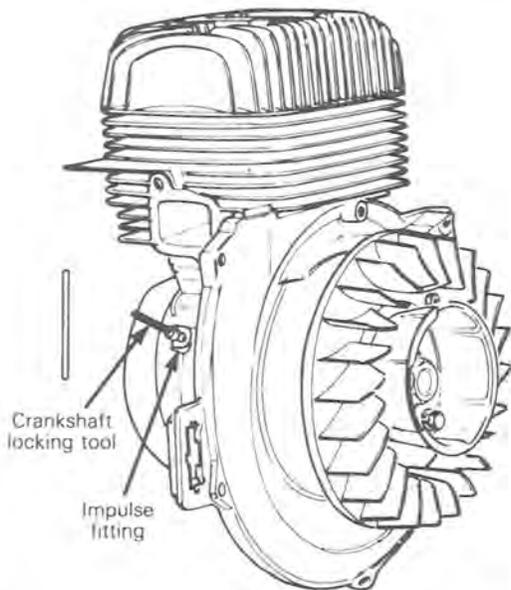
● To gain access to magneto assembly:

- disconnect engine block connector
- disconnect oil injection supply line
- loosen cylinder cowl bolts
- remove fan cowl.

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

● ② To remove magneto flywheel retaining nut:

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

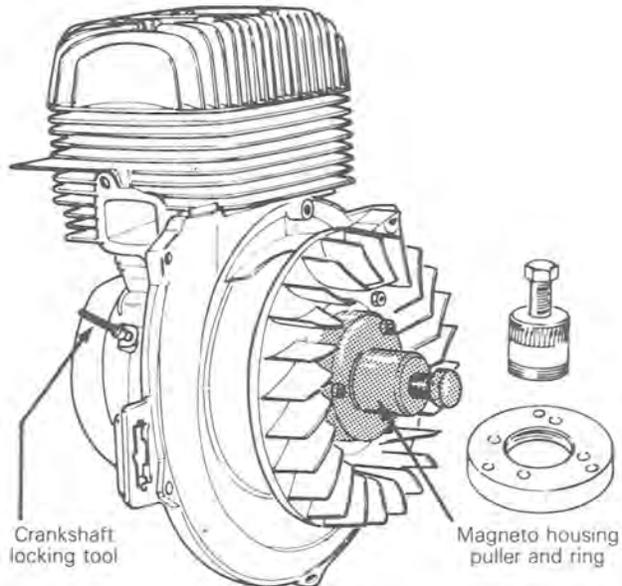


○ **NOTE:** It should be noted that to correctly remove a "Loctite" locked fastener it is first necessary to tap on the fastener to break "Loctite" bond. This will eliminate the possibility of thread breakage.

● ① To remove magneto housing (flywheel):

- lock crankshaft with crankshaft locking tool (service tool)

- adjust magneto housing puller and puller ring (service tools) as illustrated

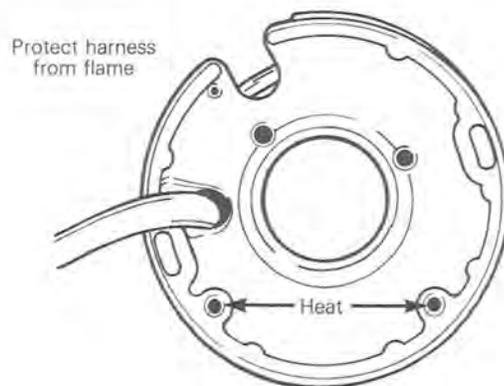


- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

● ② To replace generating coil:

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

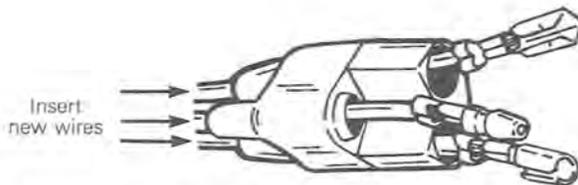


▼ **CAUTION:** Protect harness from flame.

- Remove screws (use Phillips no. 2 or suitable flat screw driver)

SECTION 02 ENGINE
SUB-SECTION 02 (277 ENGINE TYPE)

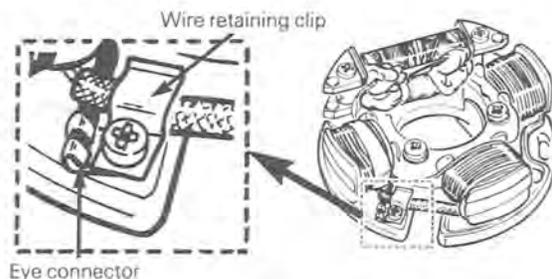
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector housing and install connectors.



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

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

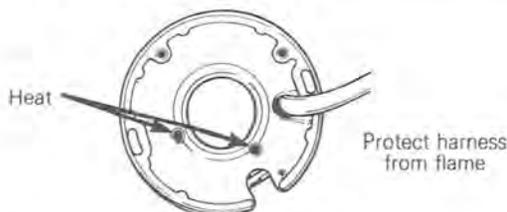
Solder an eye connector to the lead and fasten it under the wire retaining clip.



- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 blue (medium strength) to screws ④ before assembly.

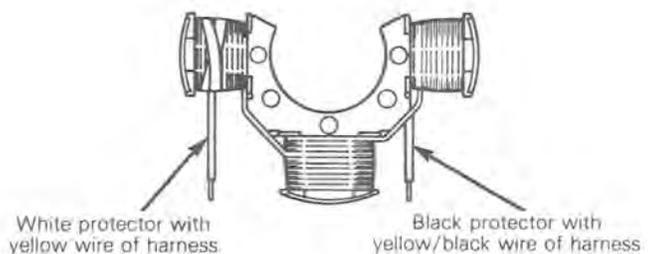
CAUTION: Before reinstalling the magneto, remove the loose epoxy from harness.

- ⑤ To replace lighting coil:
- Heat the armature plate around the screw holes to break the Loctite bond (200°F).



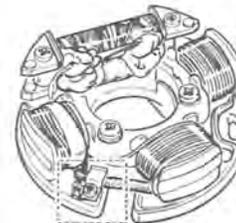
CAUTION: Protect harness from flame.

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



- ⑩ Position protector tubes over connections.
- ⑥ 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.



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

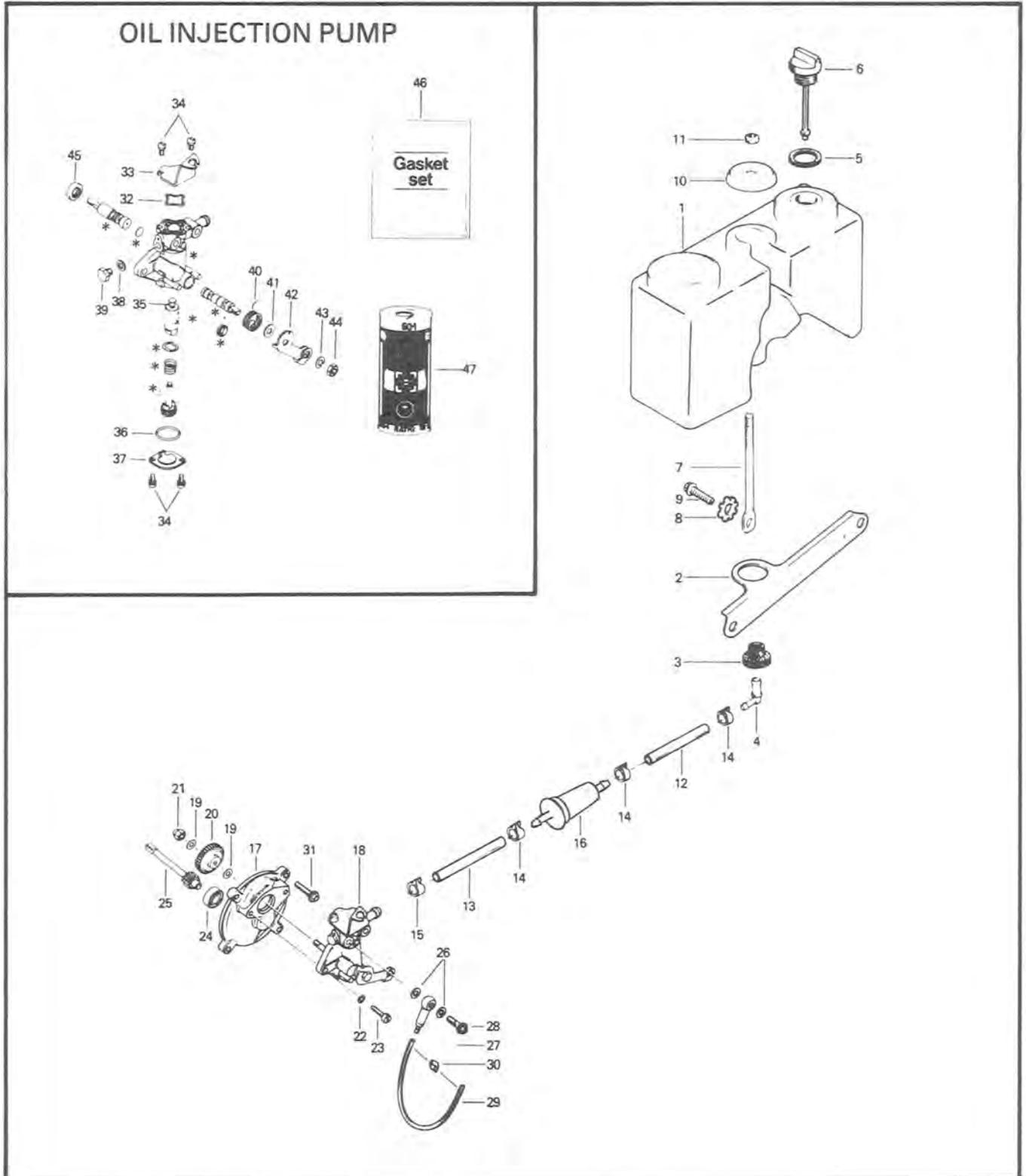
ASSEMBLY

- Clean crankshaft extension (taper).
- Apply "Loctite 242" on taper.
- Position key and magneto housing on crankshaft.
- ⑫ Clean nut threads and apply "Loctite 242" (blue, medium strength) before tightening nut to 85 N•m (63 ft-lbs).
- ⑧ ⑭ ⑲ ⑳ At reassembly coat all electric connections with dielectric or lithium grease to prevent corrosion or moisture penetration.

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



OIL INJECTION PUMP AND RESERVOIR



SECTION 02 ENGINE

SUB-SECTION 02 (277 ENGINE TYPE)

1. Injection oil tank
2. Support
3. Grommet
4. Male connector
5. Gasket
6. Oil tank cap
7. Retainer rod
8. External tooth lockwasher 1/4
9. Hexagonal washer head taptite screw M6 x 30
10. Retaining washer
11. Hexagonal elastic stop nut
12. Oil line 1.5" (38 mm)
13. Oil line 5" (127 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. Locwasher 5 (12)
23. Cylindrical slotted screw M5 x 16 (2)
24. Ball bearing
25. Gear 9 teeth
26. Oil banjo gasket (2)
27. Banjo
28. Banjo bolt
29. Oil line 380 mm (15")
30. Clamp (4)
31. Taptite screw M5 x 20 (4)
32. O'ring (4)
33. Plate
34. Screw with lockwasher
35. Retainer
36. O'ring
37. Cam casing plate
38. Washer
39. Hexagonal head cap screw M6 x 7
40. Spring
41. Washer
42. Lever
43. Lockwasher 6
44. Hexagonal nut 6 mm
45. Seal
46. Gasket set
47. Oil

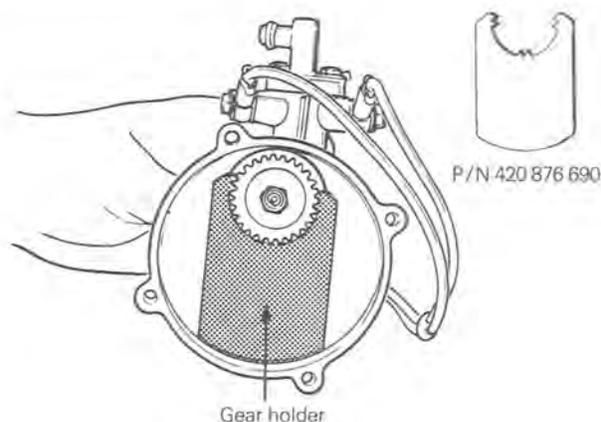
CLEANING

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

DISASSEMBLY

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

⑳ ㉑ To remove retaining nut, lock gear in place using no. 420 876 690 tool.



⑰ ㉔ To remove bearing, heat ⑰ mounting flange to approximately 175°-200°C (350°-400°F) using a propane torch. Then strike cover on hard flat surface and bearing will fall out.

◆ **WARNING:** Always wear protective gloves, to avoid burns while handling cover.

ASSEMBLY

⑰ ㉔ To install bearing, use a press to push bearing in mounting flange.

㉑ At gear assembly, apply a light coat of grease on gear teeth.

⑭ ㉓ Always check for spring clip and clamp tightness.

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

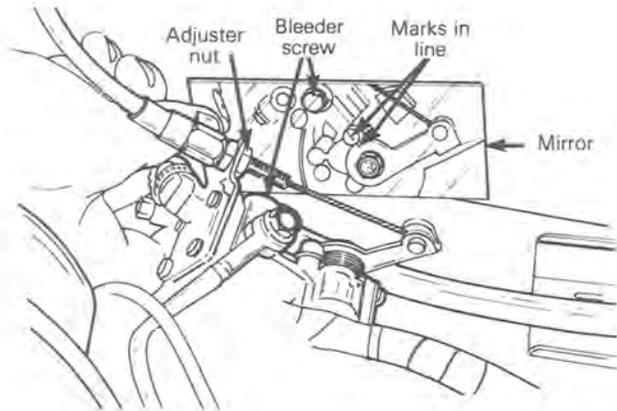
ADJUSTMENT

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

To synchronize pump with carburetor:

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

Retighten the adjuster nut.

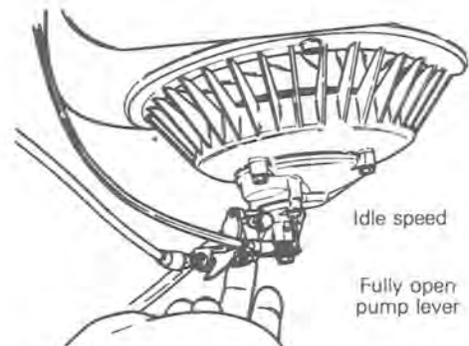


To bleed oil lines:

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

Make sure the tank is sufficiently filled.

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



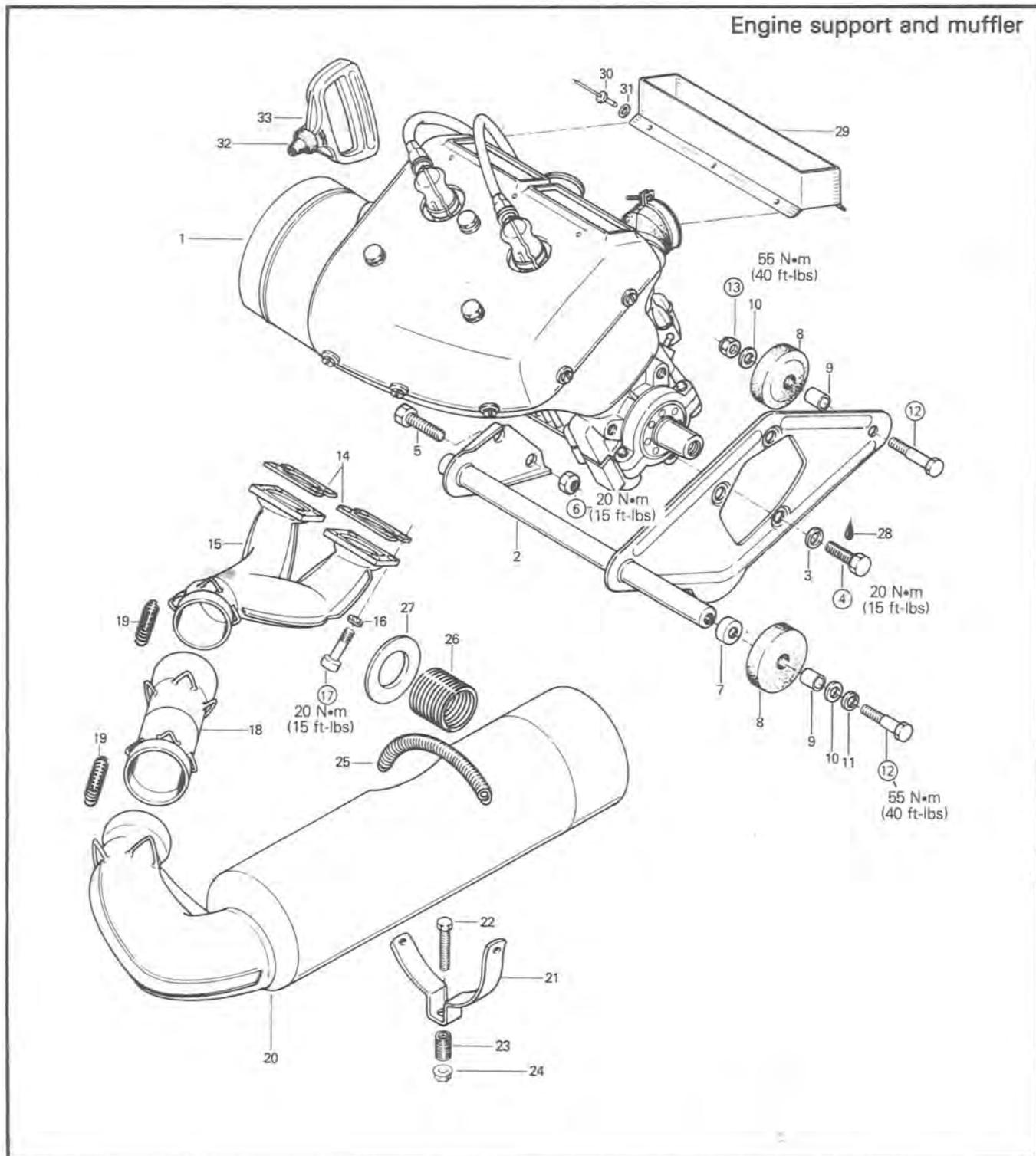
◆ **WARNING:** Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.



10/10/10

377 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION



SECTION 02 ENGINE

SUB-SECTION 03 (377 ENGINE TYPE)

1. Rotax engine 377
2. Engine bracket (electric)
3. Lockwasher 10 mm (3)
4. Hexagonal head cap screw M10 x 25 (3)
5. Hexagonal head cap screw M10 x 35 (2)
6. Hexagonal elastic stop nut 10 mm (2)
7. Cup (2)
8. Rubber mount (3)
9. Bushing (3)
10. Flat washer 10.5 x 21 x 2 (3)
11. Lockwasher 10 mm (2)
12. Hexagonal head cap screw M10 x 45 (3)
13. Hexagonal elastic stop nut 10 mm
14. Gasket (4)
15. Exhaust manifold
16. Lockwasher 8 mm (4)
17. Hexagonal socket head cap screw M8 x 30 (4)
18. Connector
19. Spring (6)
20. Muffler
21. Muffler support
22. Hexagonal head cap screw M6 x 1.00 x 40
23. Spring
24. Hexagonal flanged elastic stop nut 6 mm
25. Spring (2)
26. Spring
27. Washer
28. Loctite 242 blue medium strength
29. Air duct
30. Rivet (6)
31. Flat washer 7/32 x 5/8 x .060 (6)
32. Rubber buffer
33. Starter grip

REMOVAL FROM VEHICLE

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

- Pulley guard, drive belt
- Muffler
- Air intake silencer
- Throttle cable at carburetor
- Oil and fuel lines

 **NOTE:** Secure fuel lines so that the opened ends are higher than the fuel level in the tank.

- Hood retaining cable
- Rewind starter cable
- Wiring harness

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

- Engine support nuts

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

- ④ Apply "Loctite 222 or 242" on threads then torque to 20 N•m (15 ft-lbs).
- ⑥ ⑰ Torque to 20 N•m (15 ft-lbs).
- ⑫ ⑬ Torque to 55 N•m (40 ft-lbs).

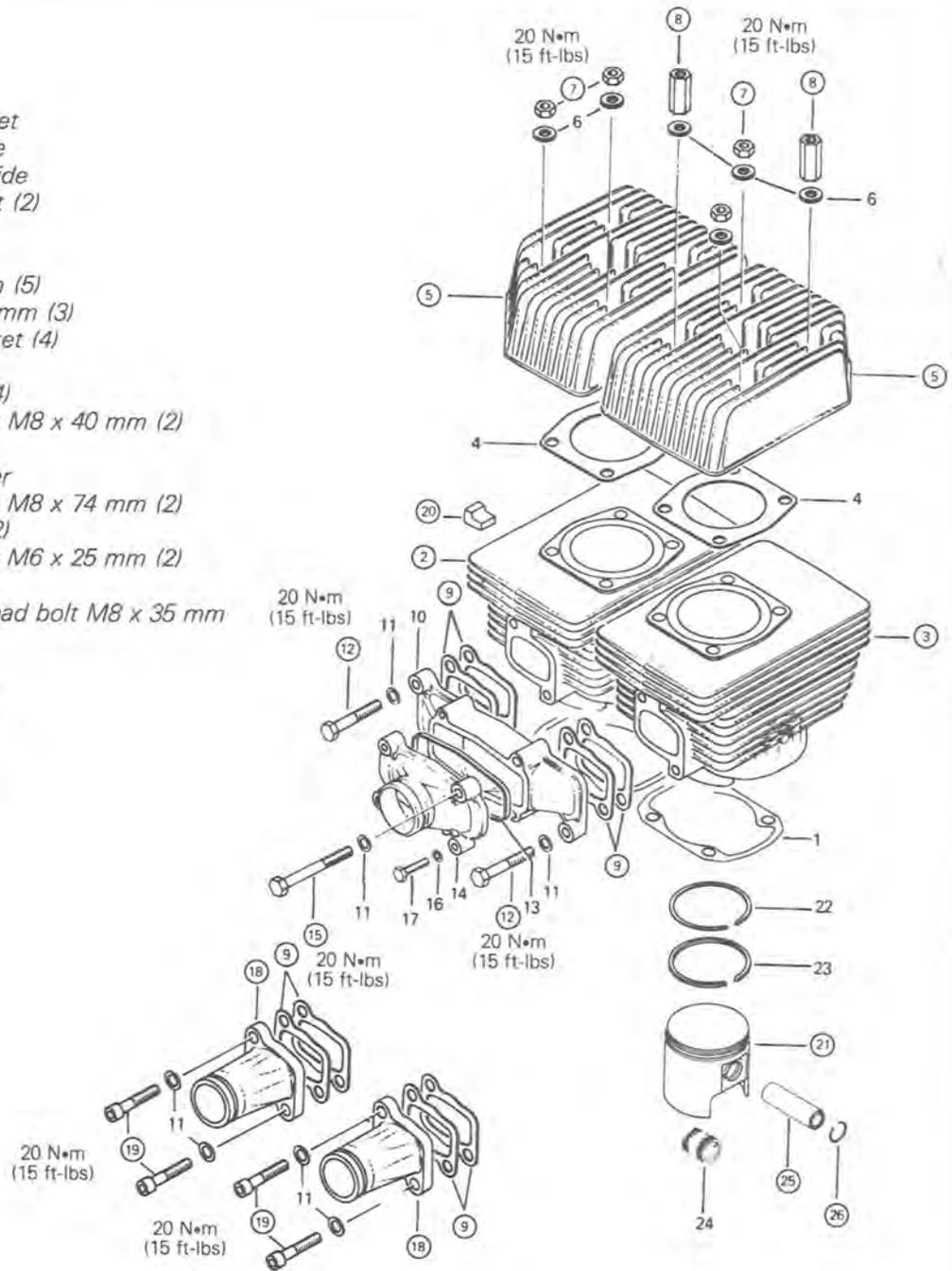
INSTALLATION ON VEHICLE

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

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

TOP END

1. Cylinder flange gasket
2. Cylinder, P.T.O. side
3. Cylinder, magneto side
4. Cylinder head gasket (2)
5. Cylinder head
6. Washer 8.4 mm (8)
7. Hexagonal nut 8 mm (5)
8. Distance nut 8 x 33 mm (3)
9. Intake manifold gasket (4)
10. Intake manifold
11. Lockwasher 8 mm (4)
12. Hexagonal head bolt M8 x 40 mm (2)
13. O'ring
14. Intake manifold cover
15. Hexagonal head bolt M8 x 74 mm (2)
16. Lockwasher 6 mm (2)
17. Hexagonal head bolt M6 x 25 mm (2)
18. Intake manifold (2)
19. Hexagonal socket head bolt M8 x 35 mm
20. Noise damper
21. Piston (2)
22. Rectangular ring (2)
23. Rectangular ring (2)
24. Needle bearing (2)
25. Gudgeon pin (2)
26. Circlip (4)



SECTION 02 ENGINE

SUB-SECTION 03 (377 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

21 25 26 Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Use a pointed tool to remove circlips from piston.

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

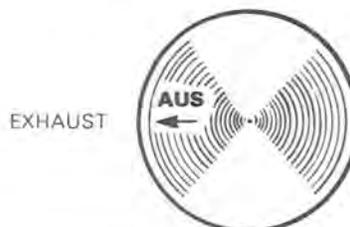
The inspection of the engine top end must include the following measurements:

MEASUREMENTS	TOLERANCES		WEAR LIMIT
	FITTING NEW PARTS (MIN.)	(MAX.)	
Cylinder taper	N.A.	N.A.	.08 mm (.0032")
Cylinder out of round	N.A.	N.A.	.050 mm (.0018")
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 Tolerances Measurement", section 02, sub-section 09.

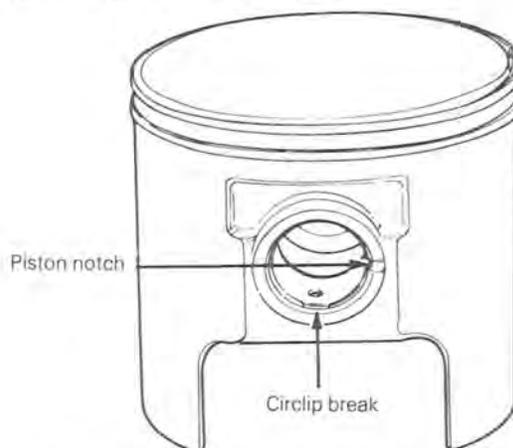
ASSEMBLY

21 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.

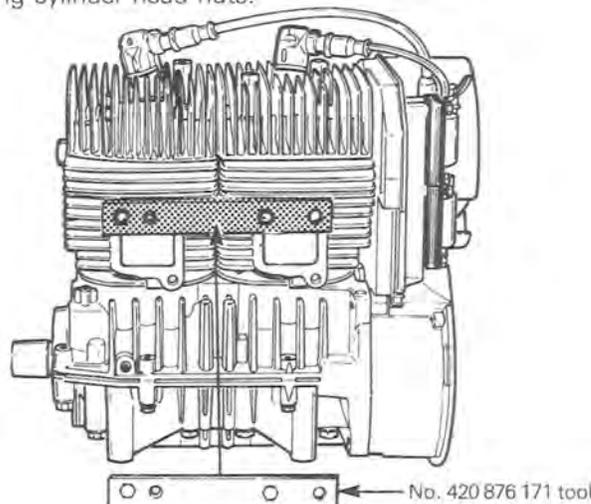


26 To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

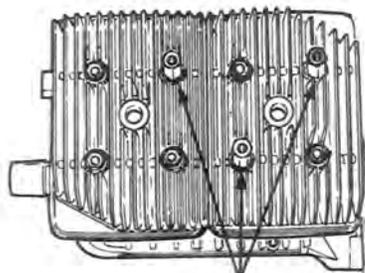
Remove any burrs on piston caused through circlip installation using very fine emery cloth.



2 3 5 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.



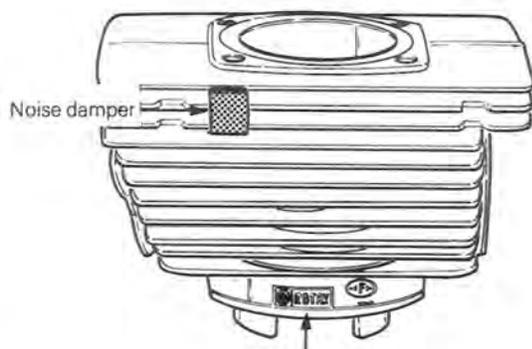
⑦ ⑧ Position nuts and distance nuts as illustrated.



Distance nuts

Cross torque cylinder head nuts to 20 N•m (15 ft-lbs); torque each cylinder head individually.

⑳ Position noise damper as per following illustration.



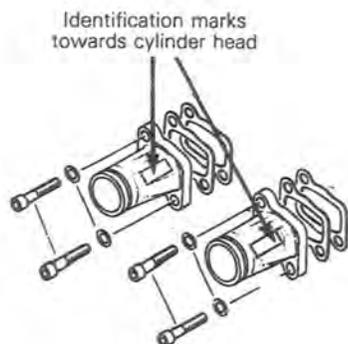
P.T.O. side cylinder

Install armature plate, fan housing and then air deflector.

⑨ Install a gasket on each side of the air deflector.

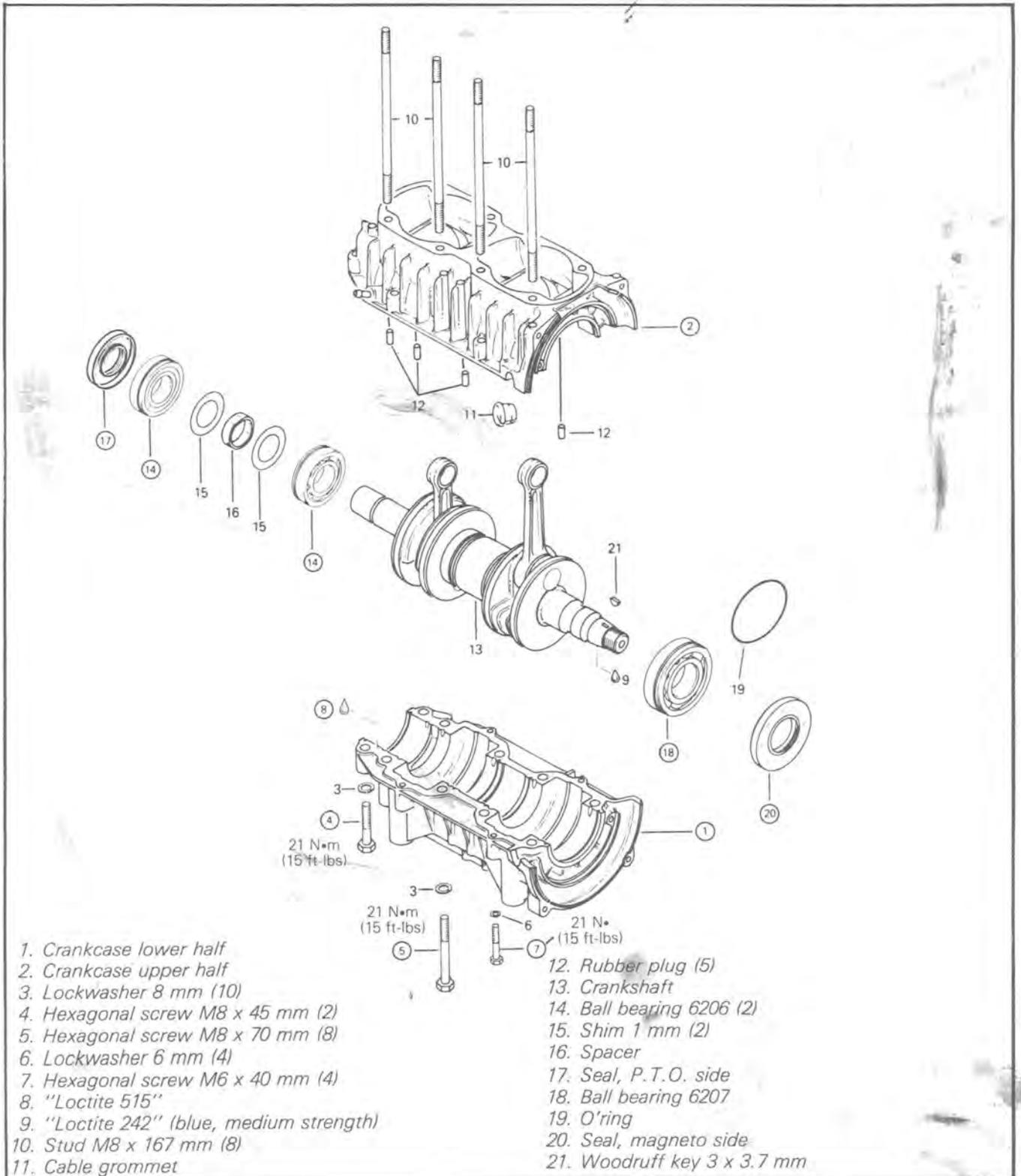
⑫ ⑮ ⑲ Torque to 20 N•m (15 ft-lbs).

⑳ Install intake manifold with identification marks towards cylinder head.





BOTTOM END



- 1. Crankcase lower half
- 2. Crankcase upper half
- 3. Lockwasher 8 mm (10)
- 4. Hexagonal screw M8 x 45 mm (2)
- 5. Hexagonal screw M8 x 70 mm (8)
- 6. Lockwasher 6 mm (4)
- 7. Hexagonal screw M6 x 40 mm (4)
- 8. "Loctite 515"
- 9. "Loctite 242" (blue, medium strength)
- 10. Stud M8 x 167 mm (8)
- 11. Cable grommet

- 12. Rubber plug (5)
- 13. Crankshaft
- 14. Ball bearing 6206 (2)
- 15. Shim 1 mm (2)
- 16. Spacer
- 17. Seal, P.T.O. side
- 18. Ball bearing 6207
- 19. O'ring
- 20. Seal, magneto side
- 21. Woodruff key 3 x 3.7 mm

SECTION 02 ENGINE
SUB-SECTION 03 (377 ENGINE TYPE)

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.

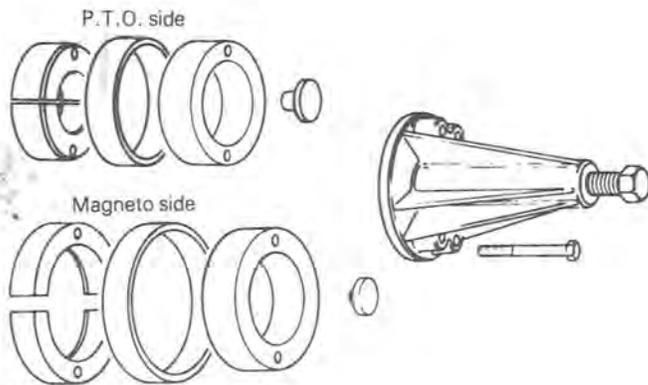
DISASSEMBLY

General

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

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

⑭⑱ 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.	.08 mm (.0032")
Connecting rod big end axial play	.20 mm (.0078")	.53 mm (.0208")	1.0 mm (.0394")
Connecting rod alignment	N.A.	N.A.	N.A.

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

ASSEMBLY

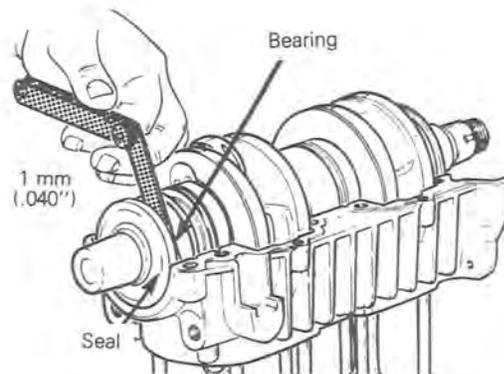
⑭⑱ Prior to installation, place bearings into an oil container heated to 100°C (210°F).

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 bearings lubrication.

⑰⑳ 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.

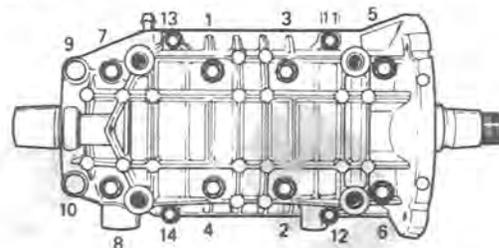


①②⑧ Crankcase halves are factory matched and therefore, are not interchangeable as single halves.

Prior to joining of crankcase halves, apply "Loctite 515" (no. 413 7027) on mating surfaces.

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.

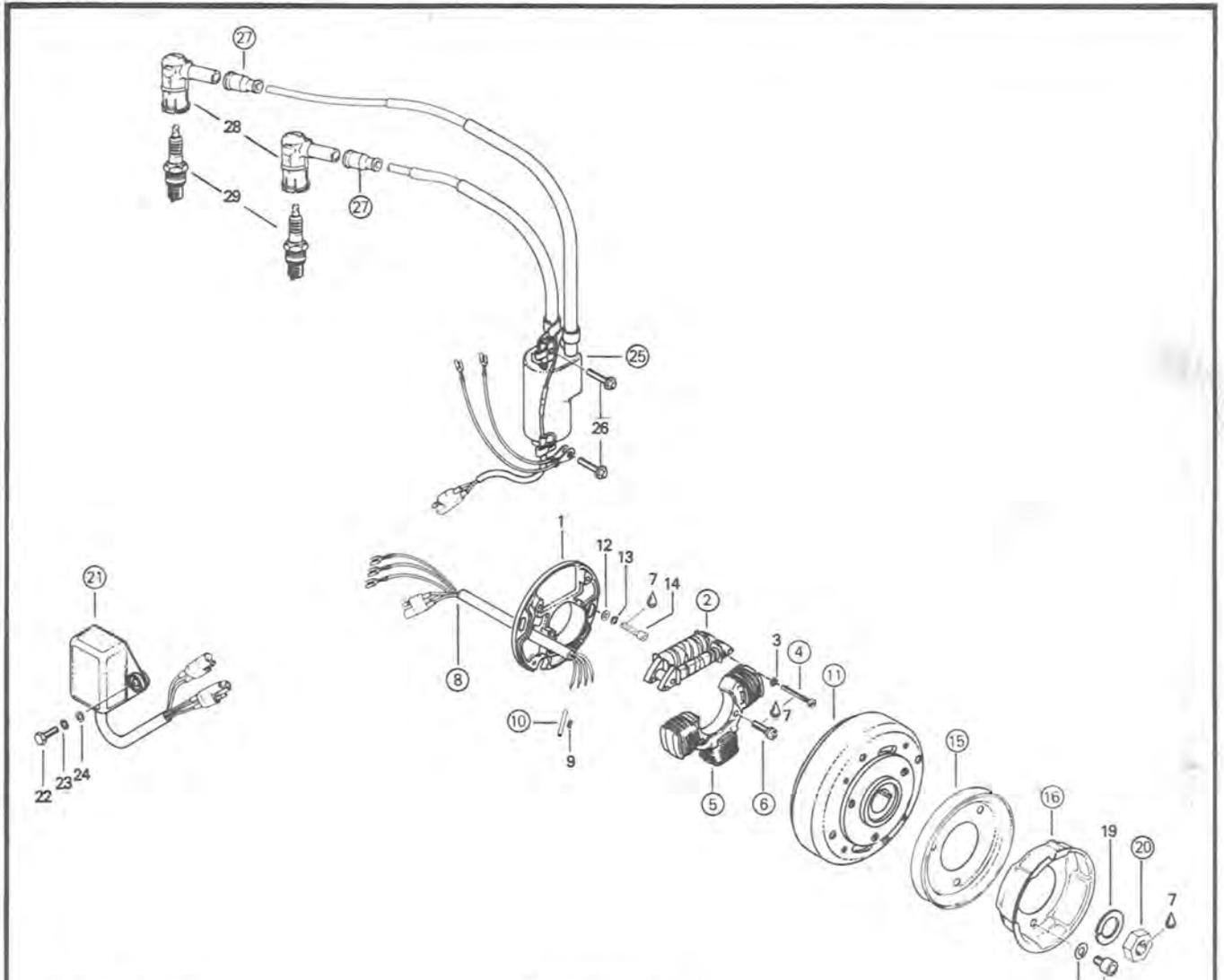
Torque bolts to 21 N•m (15 ft-lbs) following illustrated sequence.



④⑤⑦ Torque to 21 N•m (15 ft-lbs).

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

MAGNETO



- 1. Armature plate
- 2. Generating coil
- 3. Lockwasher 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. Washer 5.3 mm (2)
- 13. Lockwasher 5 mm (2)
- 14. Allen screw M5 x 18 (2)
- 15. V-belt pulley

- 16. Starting pulley
- 17. Lockwasher 8 mm (3)
- 18. Allen screw M8 x 12 (3)
- 19. Lockwasher 22 mm
- 20. Hexagonal nut 22 x 1.5 mm
- 21. C.D. box
- 22. Hexagonal screw M6 x 20 (2)
- 23. Lockwasher 6 mm (2)
- 24. Washer 6.4 mm (2)
- 25. Ignition coil
- 26. Hexagonal head taptite screw M5 x 25 (2)
- 27. Protector cap (2)
- 28. Spark plug protector (2)
- 29. Spark plug NGK BR-8ES (2)

SECTION 02 ENGINE
SUB-SECTION 03 (377 ENGINE TYPE)

CLEANING

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

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

DISASSEMBLY

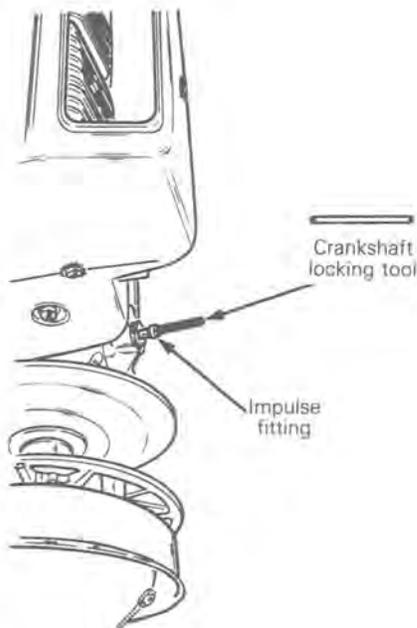
● To gain access to magneto assembly, remove:

- Injection oil reservoir
- starter housing
- starting and v-belt pulleys ⑯ ⑰

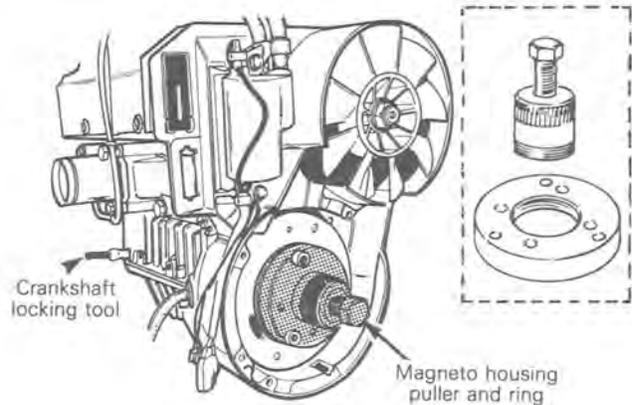
○ **NOTE:** Before disassembling magneto plate, indexing marks should be located to facilitate reassembly.

● ⑳ To remove magneto flywheel retaining nut:

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



- ⑲ 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



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

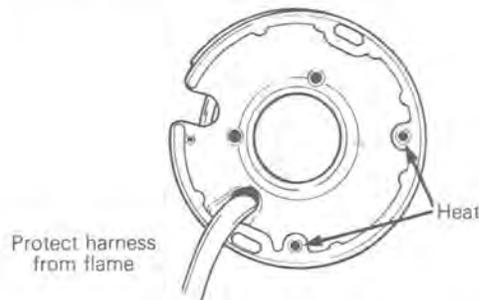


- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper

REPAIR

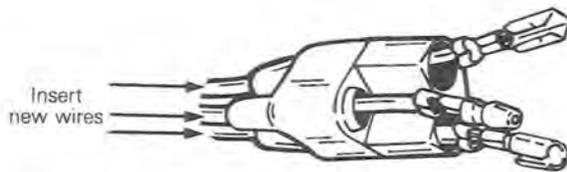
● ㉑ To replace generating coil:

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



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

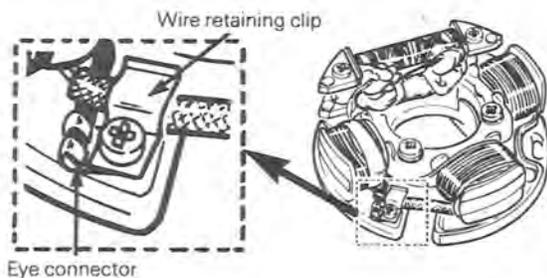
- Remove screws (use Phillips no. 2 or suitable flat screw driver)
- Cut the four wires as close as possible to the coil body
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube
- Insert the new wires into the old connector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



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

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

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

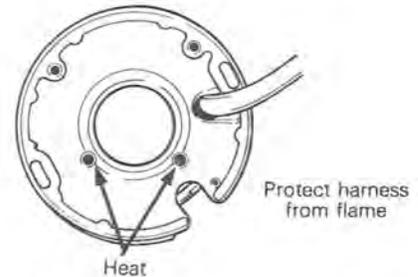


- To install the new coil on the armature plate, remove the shipping nuts from the coil and apply Loctite 242 (blue, medium strength) to screws ④ before assembly

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

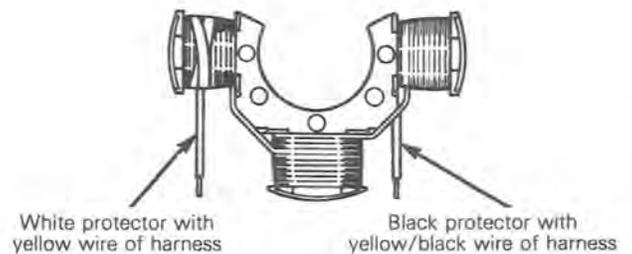
● ⑤ To replace lighting coil:

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



CAUTION: Protect harness from flame.

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

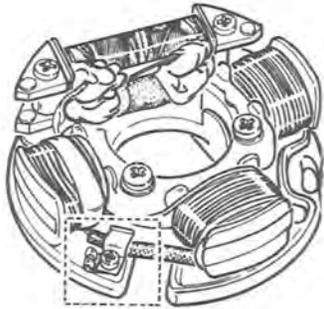


- ⑩ Position protector tubes over connections
- ⑥ Prior to assembly, apply "Loctite 242" (blue, medium strength)
- Fasten retaining clip onto protector tubes

SECTION 02 ENGINE

SUB-SECTION 03 (377 ENGINE TYPE)

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



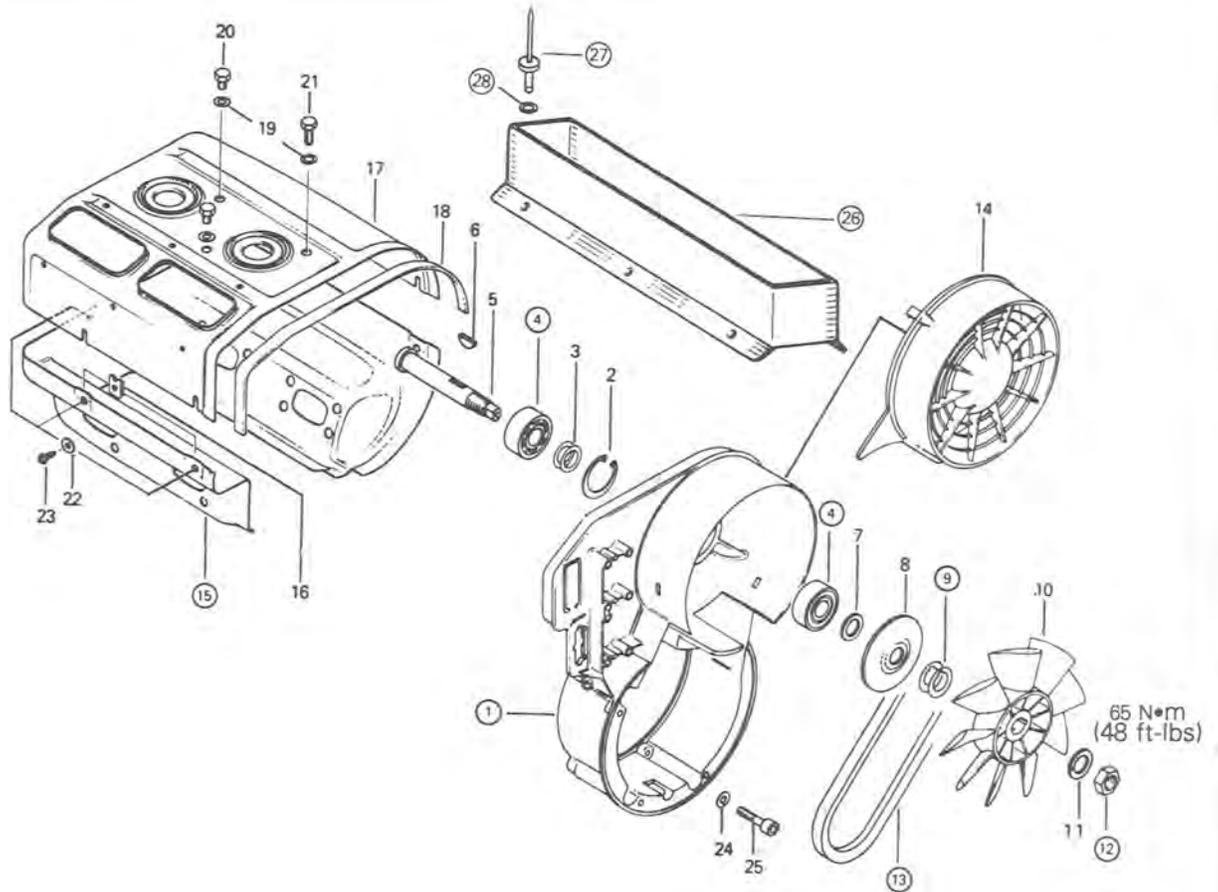
CAUTION: Before reinstalling magneto, remove the loose epoxy from harness.

ASSEMBLY

- Clean crankshaft extension taper
- Apply "Loctite 242" (blue, medium strength) on taper
- Position key and magneto housing on crankshaft
- ⑳ Clean nut threads and apply "Loctite 242" (blue, medium strength) before tightening nut to 85 N•m (63 ft-lbs)
- ⑧ ⑳ ㉑ ㉒ At reassembly coat all electric connections with dielectric or lithium grease to prevent corrosion or moisture penetration

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

COOLING SYSTEM



- | | |
|--------------------|------------------------|
| 1. Fan housing | 15. Cylinder cowl |
| 2. Circlip | 16. Speed nut |
| 3. Shim 1.0 mm | 17. Cylinder head cowl |
| 4. Ball bearing | 18. Cowl sealing strip |
| 5. Fan shaft | 19. Lockwasher 8 mm |
| 6. Woodruff key | 20. Hexagonal screw |
| 7. Distance sleeve | 21. Hexagonal screw |
| 8. Pulley half | 22. Washer |
| 9. Shim | 23. Screw |
| 10. Fan | 24. Lockwasher |
| 11. Lockwasher | 25. Allen screw |
| 12. Hexagonal nut | 26. Air duct |
| 13. Fan belt | 27. Rivet (closed end) |
| 14. Fan cover | 28. Washer |

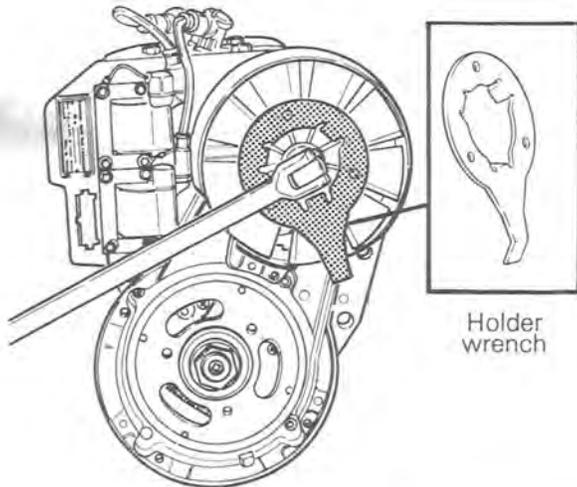
SECTION 02 ENGINE
SUB-SECTION 03 (377 ENGINE TYPE)

CLEANING

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

DISASSEMBLY AND ASSEMBLY

⑫ 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 ft-lbs).



⑨ ⑬ Fan belt free-play must be 6 mm (1/4"). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lockwasher.

① ④ It is first necessary to heat bearing housing to 65°C (150°F) to remove or install bearing.

⑳ ㉑ ㉒ Air duct can be removed by drilling out rivets.

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

⑮ A gasket must be placed on both sides (inner and outer) of intake and exhaust holes.

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

SECTION 02 ENGINE

SUB-SECTION 03 (377 ENGINE TYPE)

1. Injection oil tank
2. Support
3. Grommet
4. Male connector
5. Gasket
6. Oil tank cap
7. Retainer rod
8. External tooth lockwasher 1/4
9. Hexagonal washer head taptite screw M6 x 30
10. Retaining washer
11. Hexagonal elastic stop nut
12. Oil line 1.5" (38 mm)
12. Oil line 1.5" (38 mm)
13. Oil line 13" (330 mm)
13. Oil line 13" (330 mm)
14. Spring clip (3)
14. Spring clip (3)
15. Spring clip
15. Gear clamp
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. Lockwasher 5 (2)
23. Cylindrical slotted screw M5 x 16 (2)
24. Ball bearing
25. Gear 9 teeth
26. Oil banjo gasket (4)
27. Banjo (2)
28. Banjo bolt (2)
29. Oil line 325 mm (13")
29. Oil line 300 mm (12")
30. Oil line 325 mm (13")
30. Oil line 360 mm (14 1/4")
31. Clamp (4)
32. Taptite screw M5 x 16 (4)
33. Rubber ring
34. Retainer
35. O'ring
36. Plate
37. Screw with lockwasher (8)
38. Stop pin
39. Gasket
40. Cam casing plate
41. Washer
42. Hexagonal head screw M6 x 7
43. Spring
44. Washer
45. Lever
46. Lockwasher 6
47. Hexagonal nut 6 mm
48. Seal
49. Gasket set
50. Oil

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

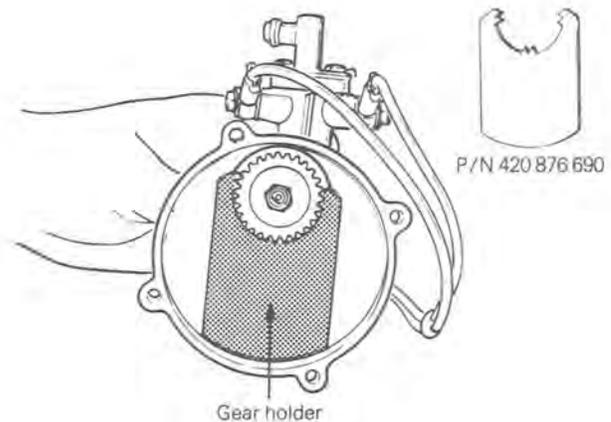
CLEANING

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

DISASSEMBLY

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

⑳㉑ To remove retaining nut, lock gear in place using no. 420 876 690 tool.



⑳㉑ To remove bearing, heat ⑰ mounting flange to approximately 175°-200°C (350°-400°F) using a propane torch. Then strike cover on hard flat surface and bearing will fall out.

◆ **WARNING:** Always wear protective gloves, to avoid burns while handling cover.

ASSEMBLY

⑰㉑ To install bearing, use a press to push bearing in mounting flange.

㉑ At gear assembly, apply a light coat of grease on gear teeth.

⑬㉑ Always check for spring clip and clamp tightness.

▼ ⑫⑬ **CAUTION:** On electric start models, it is recommended to install black rubber lines (P/N 414 2867 00) that will not be altered by battery fumes.

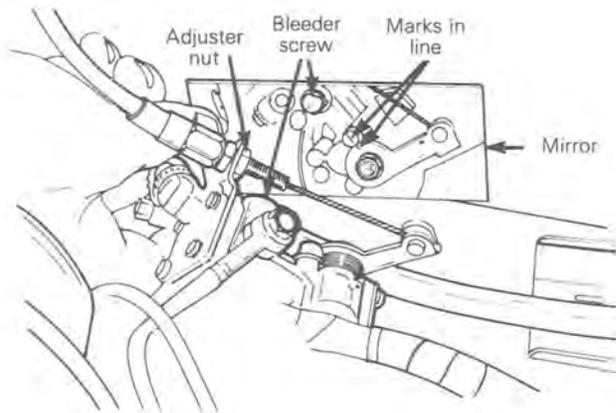
ADJUSTMENT

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

To synchronize pump with carburetor:

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

Retighten the adjuster nut.



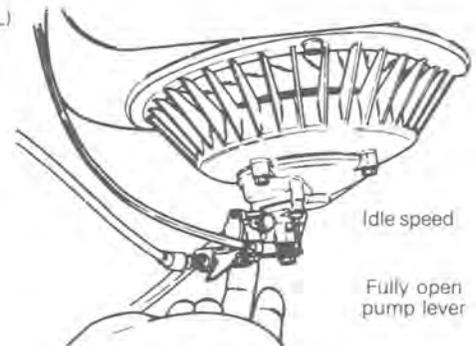
To bleed oil lines:

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

Make sure the 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)



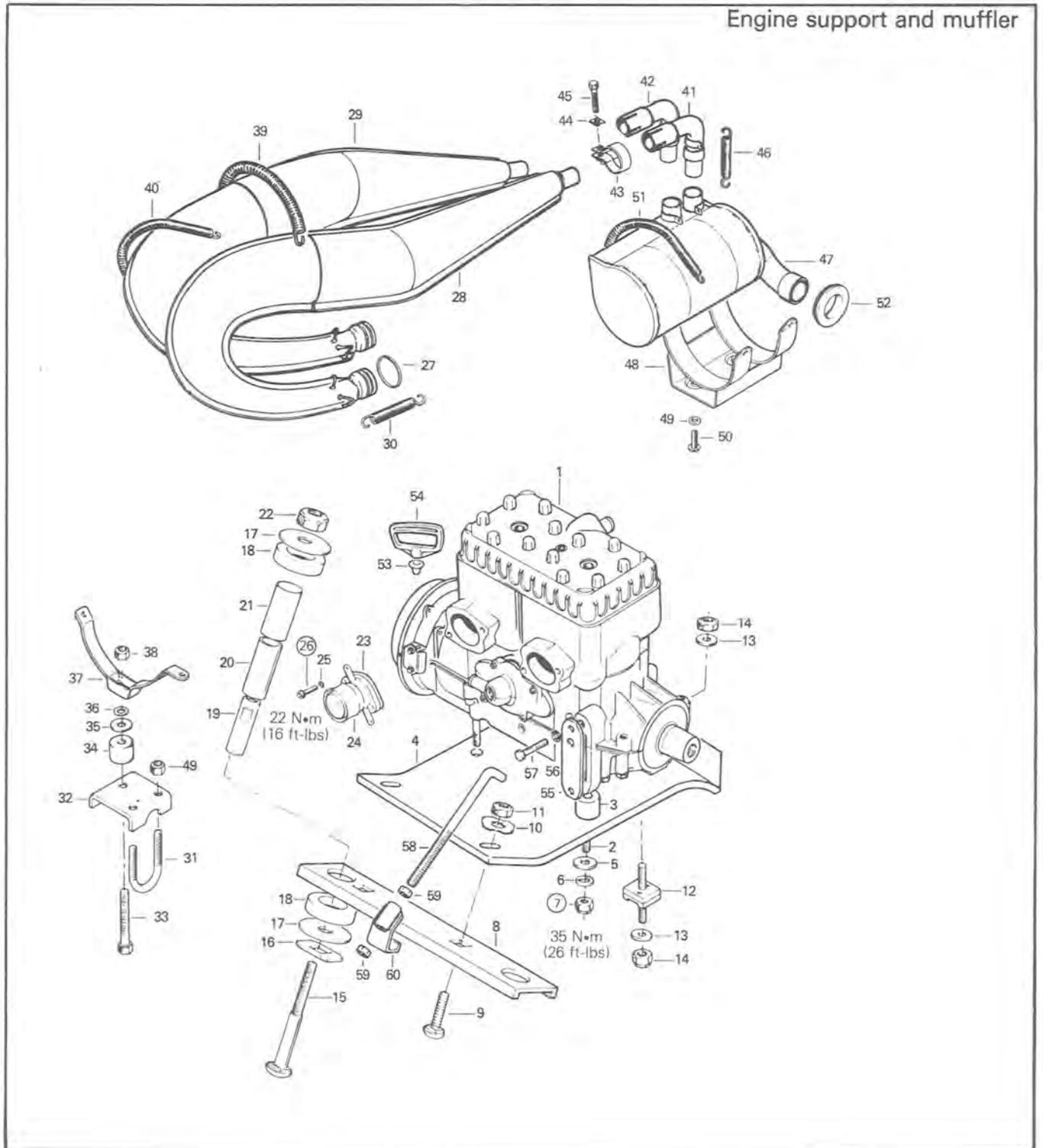
◆ **WARNING:** Ensure not to operate carburetor throttle mechanism. Secure the rear of the vehicle on a stand.



454 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION

Engine support and muffler



SECTION 02 ENGINE

SUB-SECTION 04 (454 ENGINE TYPE)

1. Engine Rotax 454
2. Stud M10 x 42 (4)
3. Distance sleeve (4)
4. Engine bracket
5. Flat washer 10.5 x 21 x 2 mm (4)
6. Lockwasher 10 (4)
7. Hexagonal nut 10 mm (4)
8. Cross support
9. Carriage bolt 3/8-16 x 1 1/4 (2)
10. Internal tooth dished washer (2)
11. Hexagonal elastic stop nut 3/8-16 (2)
12. Rubber mount
13. Washer (2)
14. Hexagonal elastic stop nut 3/8-16 (2)
15. Carriage bolt 7/16-14 x 2 3/4 (threaded 1 1/4") (2)
16. Retainer plate (2)
17. Washer (4)
18. Damper (4)
19. Threaded bushing (2)
20. Rubber sleeve (2)
21. Sleeve (2)
22. Hexagonal elastic stop nut 7/16-14 (2)
23. Gasket (2)
24. Exhaust socket (2)
25. Lockwasher 8 (4)
26. Allen screw M8 x 30 (4)
27. Sealing ring (4)
28. Tuned muffler P.T.O. side
29. Tuned muffler magneto side
30. Spring (4)
31. "U" bolt
32. Muffler support bracket
33. Hexagonal head cap screw 1/4-20 x 1 1/4
34. Rubber spacer
35. Asbestos washer
36. Flat washer 17/64 x 7/8 x .060
37. Muffler support
38. Hexagonal elastic stop nut 1/4-20 (3)
39. Spring
40. Spring
41. Tail pipe P.T.O. side
42. Tail pipe magneto side
43. Clamp (2)
44. Reinforcement plate (2)
45. Hexagonal head cap screw M8 x 1.25 x 20 (2)
46. Spring (4)
47. After muffler
48. Support
49. Flat washer 17/64 x 5/8 x .060 (3)
50. Truss slotted head power lock screw 1/4-20 x 1/2 (3)
51. Spring (2)
52. Exhaust grommet
53. Rubber buffer
54. Starter grip
55. Retainer plate
56. Lockwasher 8 (2)
57. Hexagonal head cap screw M8 x 1.25 x 20 (2)
58. Brace
59. Hexagonal nut 3/8-16 (2)
60. Hook

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- Pulley guard and drive belt
- Air silencer and throttle cable
- Fuel lines, primer and pulsation lines
- Muffler
- Electric wires
- Drain the cooling system and disconnect hoses at engine
- Rotary valve oil reservoir
- Disconnect rewind starter at engine

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

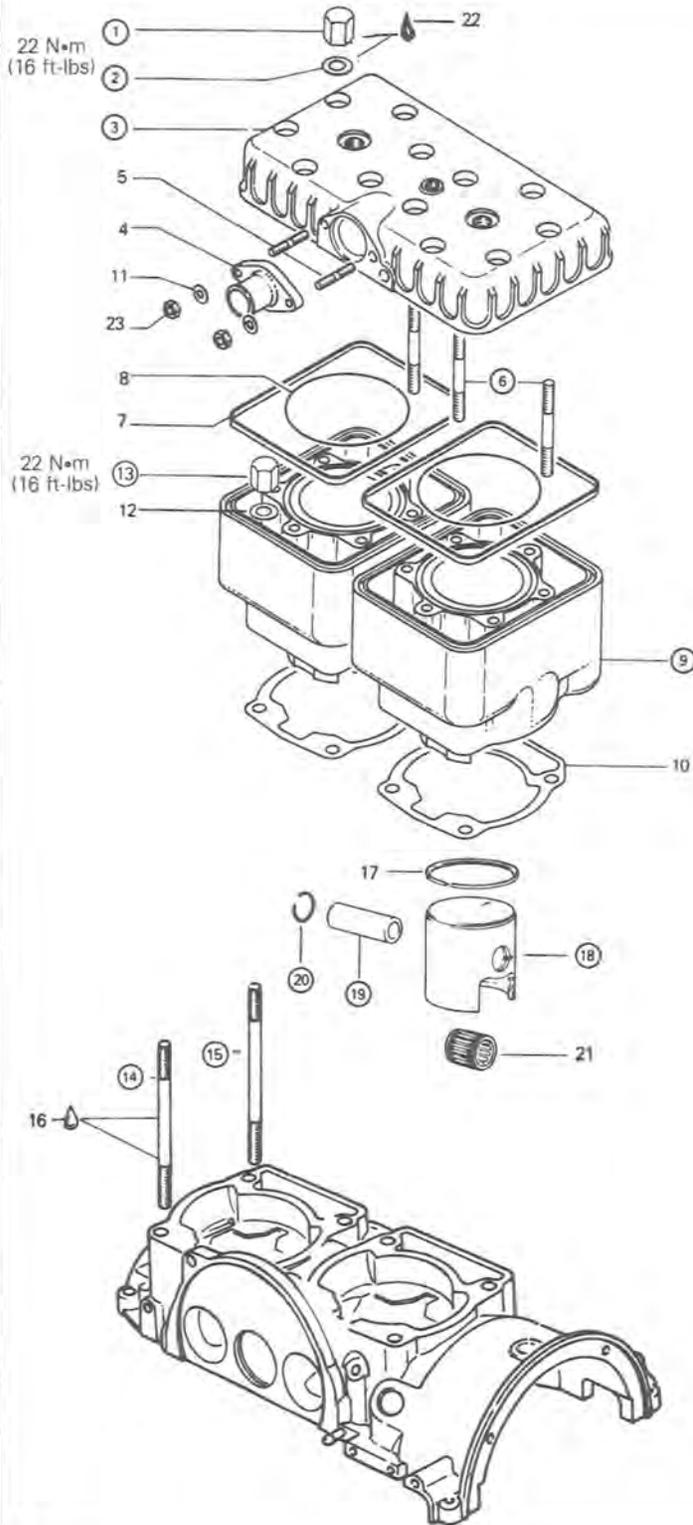
- ⑦ Torque to 35 N•m (26 ft-lbs).
- ⑳ Torque to 22 N•m (16 ft-lbs).

INSTALLATION ON VEHICLE

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

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

TOP END



1. Cap nut M8 (12)
2. Flat washer 8.4 mm (12)
3. Cylinder head
4. Coolant outlet collar
5. Stud M6 x 15 (2)
6. Stud (head) M8 x 44 (12)
7. Gasket (2)
8. Gasket ("O" ring) (2)
9. Cylinder (2)
10. Cylinder/ crankcase gasket (2)
11. Lockwasher 6 mm (2)
12. Flat washer 8.4 mm (8)
13. Cap nut M8 (8)
14. Cylinder stud (79 mm) (4)
15. Cylinder stud (104 mm) (4)
16. "Loctite 242"
17. "L" ring (2)
18. Piston (2)
19. Gudgeon pin (2)
20. Circlip (4)
21. Needle bearing (2)
22. Silicone sealant
23. Nut M6 (2)

SECTION 02 ENGINE
SUB-SECTION 04 (454 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

18 19 20 Place a clean cloth over crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

Drive gudgeon pins or out suing 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

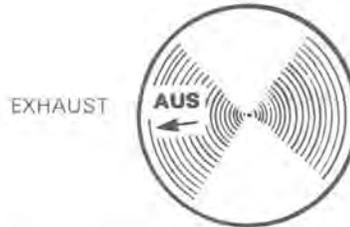
The inspection of the engine top end must include the following measurements:

MEASUREMENTS	TOLERANCES		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	.10 mm (.0039")	.12 mm (.0047")	.20 mm (.0079")
Ring end gap	.20 mm (.0079")	.35 mm (.0138")	1.0 mm (.0394")

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

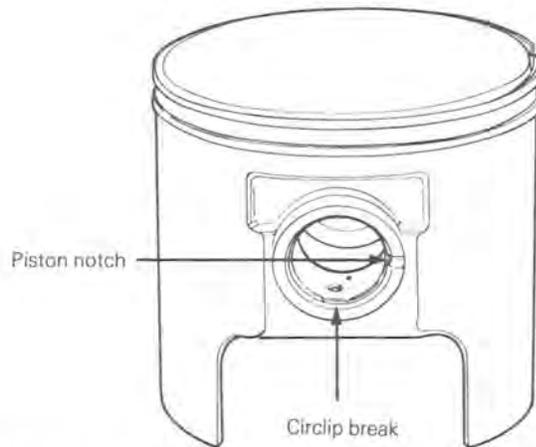
ASSEMBLY

18 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.

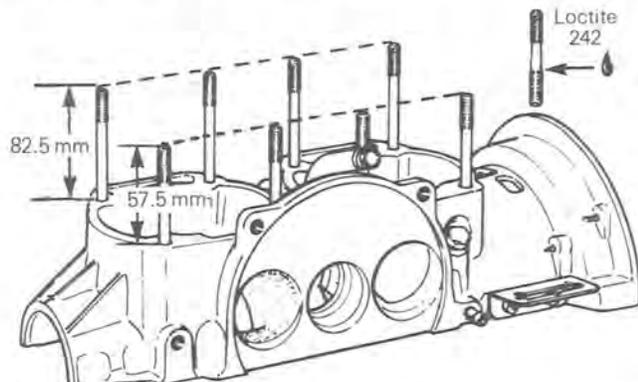


20 To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

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

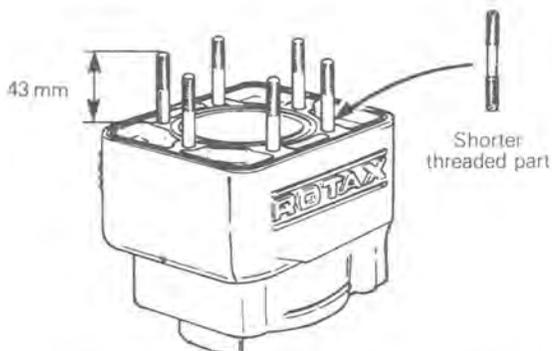


14 15 Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not protrude by more than 82.5 mm (3.250") on exhaust side and 57.5 mm (2.260") on intake side.



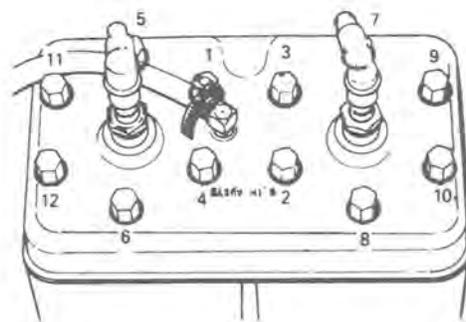
Apply "Loctite 242" on the threaded end of the studs going into the crankcase.

⑥ ⑨ 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.

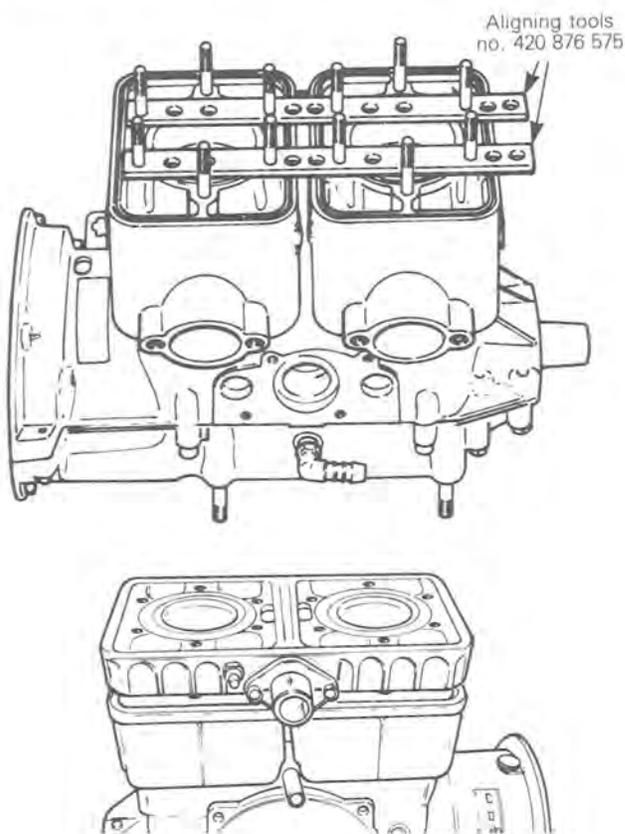


① ② ③ Prior to washer installation, apply silicone sealant around studs.

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

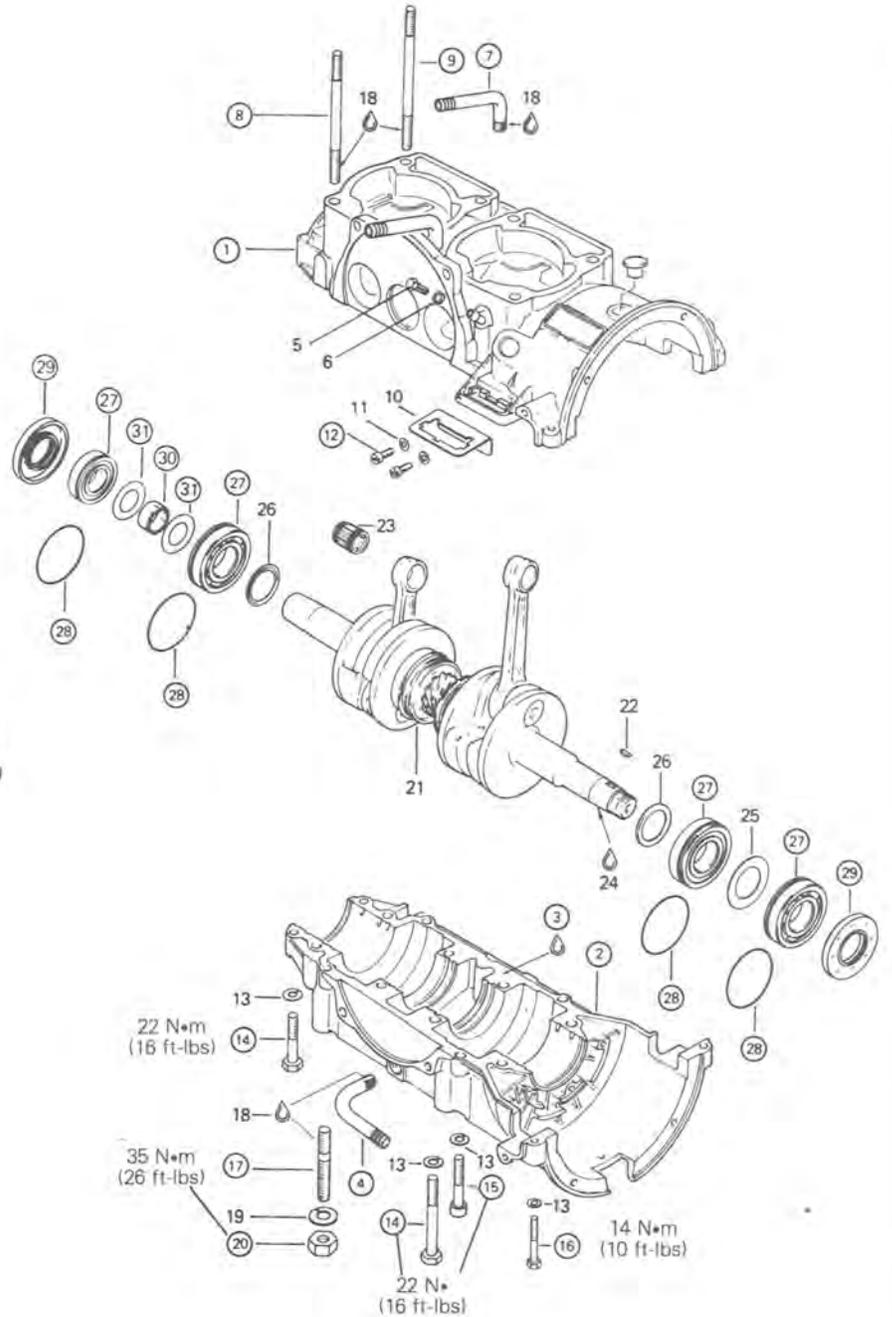


⑨ ⑬ When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. A special tool (as per illustration) (or cylinder head itself) can be used to align the cylinders. Cross torque cylinder nuts to 22 N•m (16 ft-lbs).





BOTTOM END



1. Crankcase upper half
2. Crankcase lower half
3. "Loctite 515"
4. Angular tube (oil inlet)
5. Bolt M8 x 16
6. Sealing ring
7. Angular tube (oil outlet)
8. Cylinder stud (79 mm) (4)
9. Cylinder stud (104 mm) (4)
10. Junction block support
11. Lockwasher (2)
12. Screw M5 x 12 (2)
13. Lockwasher 8 mm (10)
14. Bolt M8 x 45 (2)
15. Allen bolt M8 x 40 (4)
16. Bolt M6 x 35 (2)
17. Stud M10 x 42 (4)
18. "Loctite 242"
19. Lockwasher 10 mm (4)
20. Nut M10 (4)
21. Crankshaft
22. Woodruff key
23. Needle cage bearing (2)
24. "Loctite 242"
25. Shim (1 mm)
26. Distance ring (2)
27. Bearing (4)
28. "O" ring (5)
29. Oil seal (2)
30. Spacer (stop tube)
31. Shim 30.4/51/1 (3)

SECTION 02 ENGINE

SUB-SECTION 04 (454 ENGINE TYPE)

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.

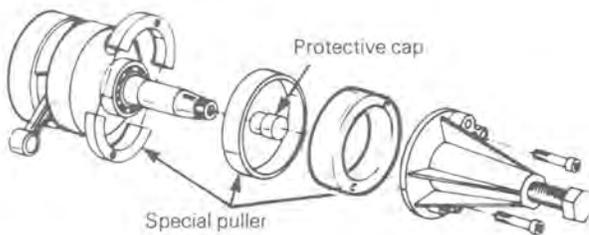
DISASSEMBLY

General

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

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

⑳ ㉑ ㉒ To remove bearings from crankshaft use a protective cap and special puller as illustrated.



INSPECTION

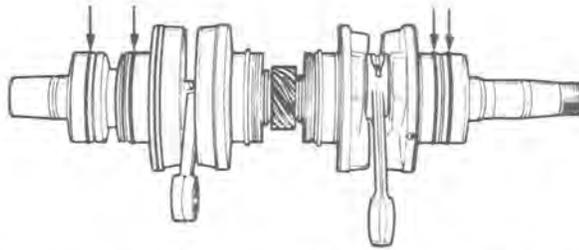
The inspection of the engine bottom end must include the following measurements:

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")
Connecting rod alignment	N.A.	N.A.	N.A.

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

ASSEMBLY

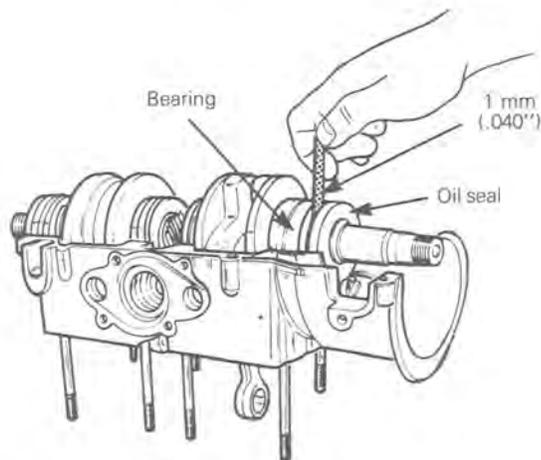
㉓ Prior to installation, place bearings into an oil container previously heated to 100°C (210°F). This will expand bearing and ease installation. Install bearings with groove as per the following illustration.



㉔ 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.

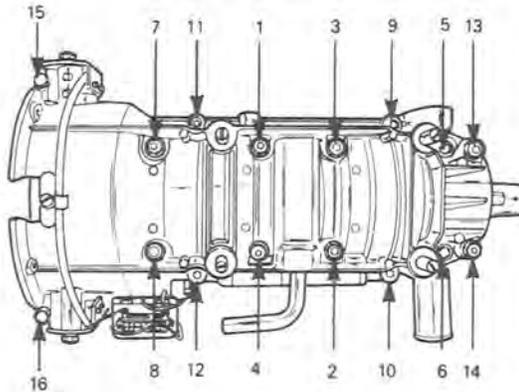


① ② ③ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of "Loctite 515" (413 7027 00) on mating surfaces.

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 to 22 N•m (16 ft-lbs) following illustrated sequence.

Follow sequence shown
 1 to 14 – 22 N•m (16 ft-lbs)
 15 & 16 – 14 N•m (10 ft-lbs)



○ NOTE: Torque the two smaller bolts (15 and 16) on magneto side to 14 N•m (10 ft-lbs).

④ ⑦ ⑫ Apply "Loctite 242" on threads prior to assembly.

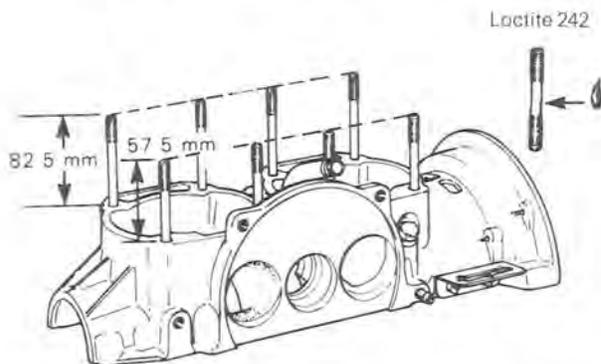
⑭ ⑮ Torque to 22 N•m (16 ft-lbs).

⑯ Torque to 14 N•m (10 ft-lbs).

⑰ At assembly on crankcase, apply "Loctite 242" on threads.

⑳ Torque to 35 N•m (26 ft-lbs).

⑧ ⑨ Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not exceed further than 82.5 mm (3.250") on exhaust side and 57.5 mm (2.260") on intake side.



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

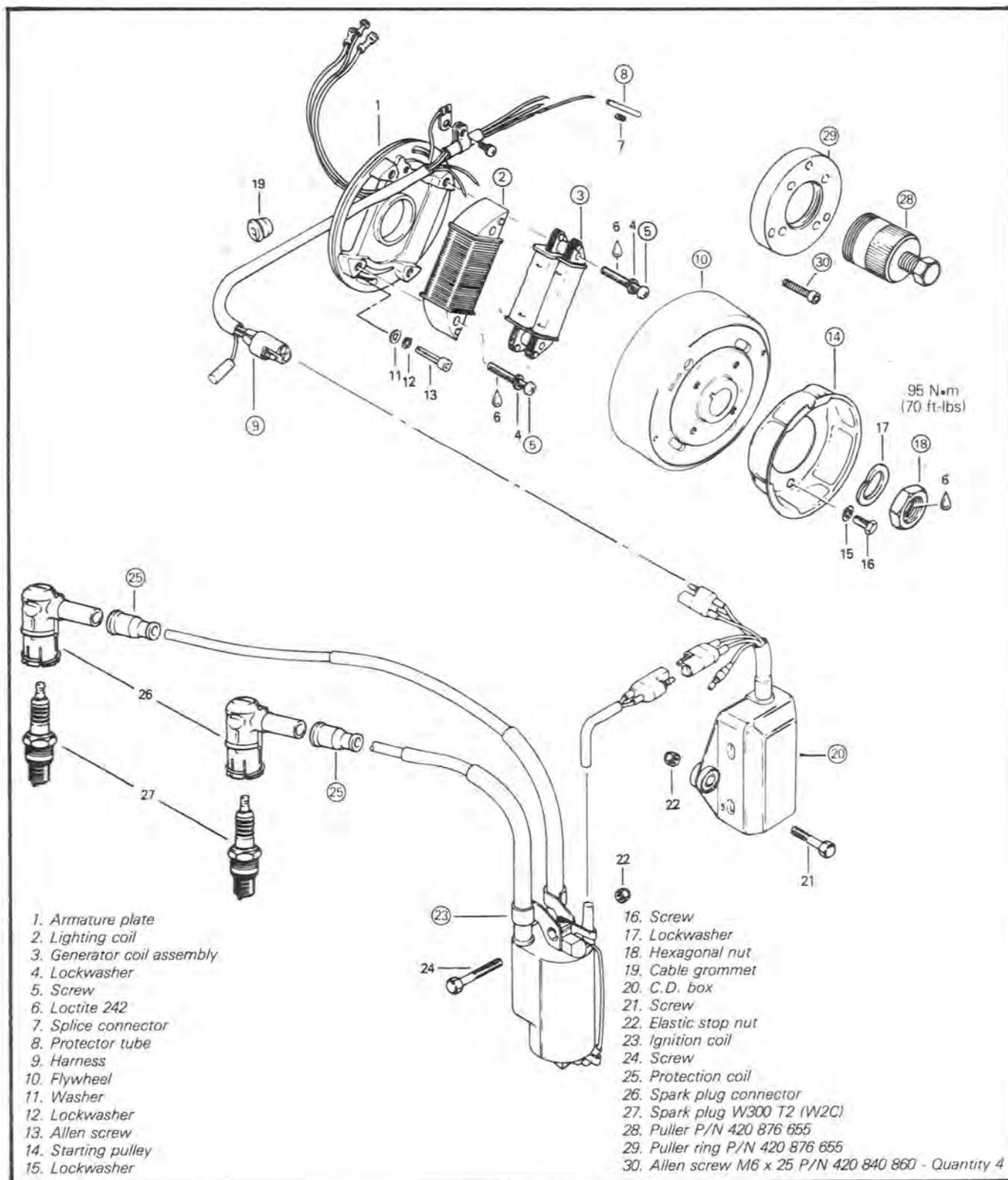
To install magneto, refer to "Magneto" in this section.

11-11-11

11-11-11

11-11-11

MAGNETO



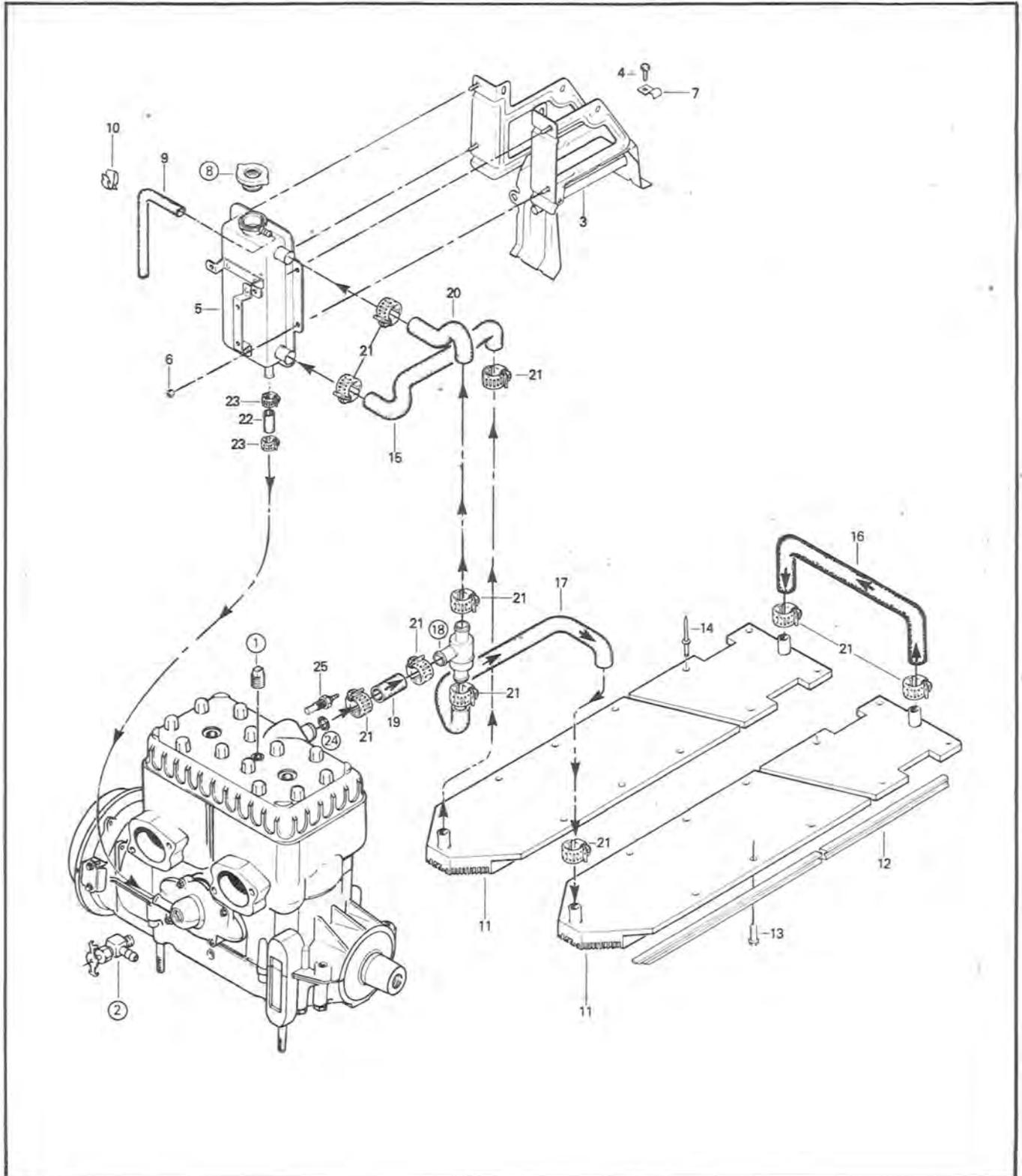


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1



COOLING SYSTEM



SECTION 02 ENGINE SUB-SECTION 04 (454 ENGINE TYPE)

1. Plug
2. Drain valve
3. Tank support
4. Hexagonal washer head powerlock screw
1/4-20 x 1/2 (4)
5. Coolant tank
6. Hexagonal elastic stop nut 10-24 (4)
7. Clip
8. Pressure cap
9. Overflow hose
10. Clip
11. Heat exchangers (2)
12. Radiator protector (2)
13. Hexagonal washer head self tapping screw
10-24 x 1/2 (2)
14. Rivet (38)
15. Hose
16. "U" hose
17. Hose
18. Thermostat
19. Hose 3.88" (98.6 mm)
20. Hose
21. Clamp (10)
22. Hose 19.5 (495 mm)
23. Clamp (2)
24. Grommet
25. Sender

INSPECTION

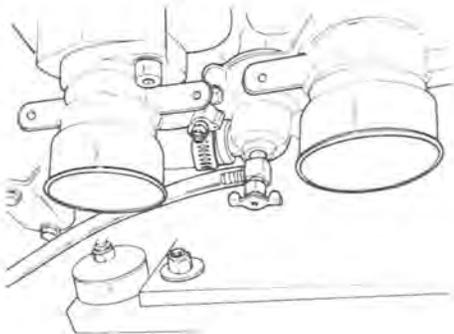
Check general condition of hoses and clamp tightness.

DRAINING SYSTEM

To drain the cooling system, remove the coolant tank cap.

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

Connect a drain hose to the drain valve at pump housing. Open valve and drain system.



○ **NOTE:** Open end of drain hose should be lower than engine base.

However, to completely drain the system, blow into the tank through the vent tube while blocking the tank filler neck with one hand to prevent air leakage.



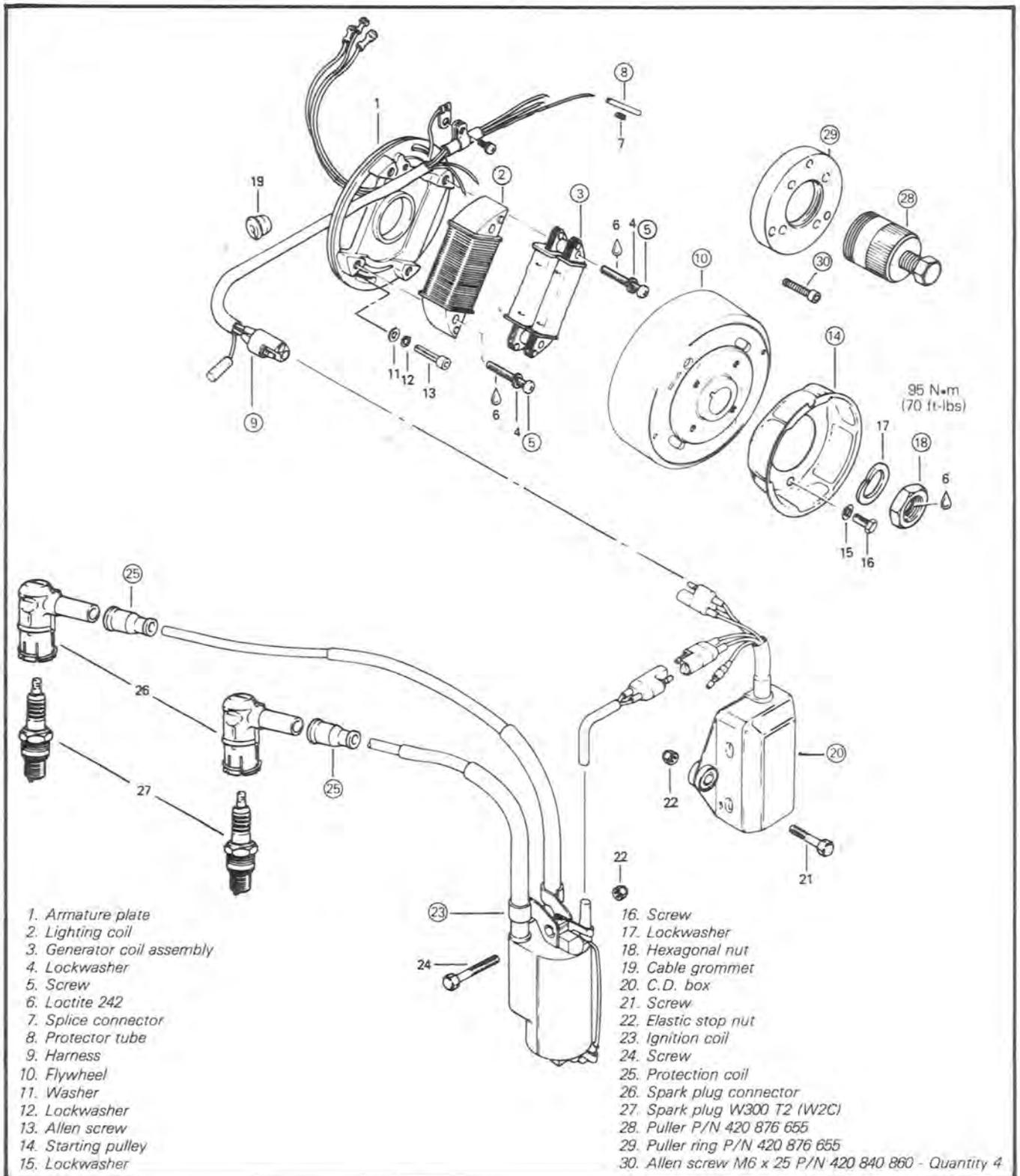
DISASSEMBLY & ASSEMBLY

- ① ② ②④ Apply pipe thread sealant to avoid leaks.
- ⑧ See if the cap pressurizes the system. If not, install a new 13 lbs cap, do not exceed 13 lbs of pressure.
- ⑱ To check thermostat, put it in water and heat water. Thermostat should open when water temperature reaches 50°C (122°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.
- B - When the liquid is warmed to 50°C (122°F), the thermostat opens the circuit, water pump - engine - heat exchangers - reservoir to keep the liquid at the desired temperature. (See the diagram on the first page).

MAGNETO



SECTION 02 ENGINE
SUB-SECTION 04 (454 ENGINE TYPE)

CLEANING

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

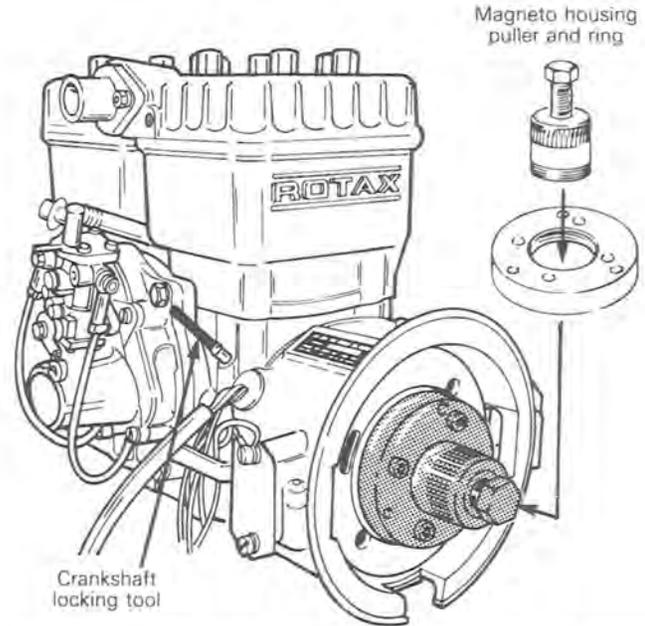
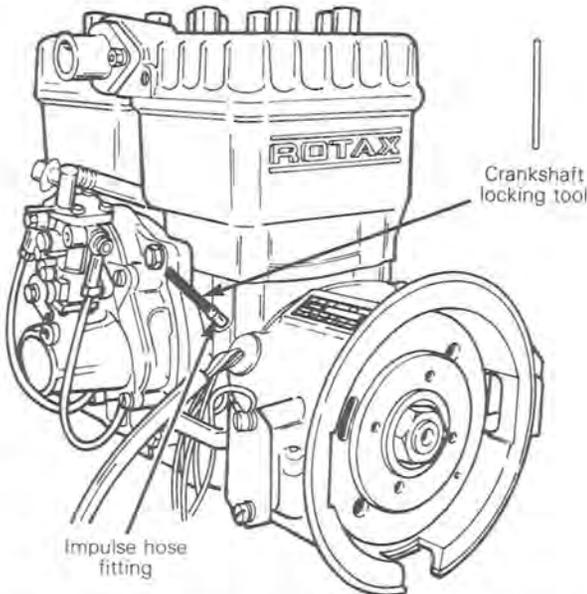
▼ **CAUTION:** Clean armature and magneto using only a clean cloth.

DISASSEMBLY

- To gain access to magneto assembly, remove:
 - muffler
 - rewind starter
 - starting pulley ⑭

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

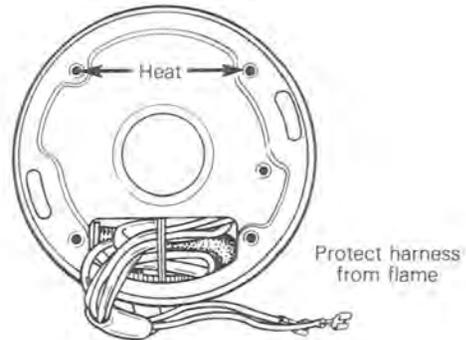
- ⑮ To remove magneto flywheel retaining nut:
 - lock crankshaft with crankshaft locking tool (service tool) as illustrated (magneto side piston must be at top dead center)
 - remove magneto retaining nut.



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

REPAIR

- ③ To replace generating coil:
 - Heat the armature plate around the screw holes to break the Loctite bond (200°F).



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

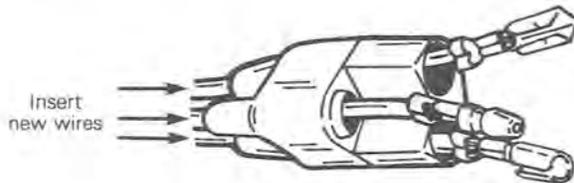
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.

○ **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.

- ⑩ To remove magneto housing (flywheel):
 - lock crankshaft with crankshaft locking tool (service tool) as illustrated;
 - adjust magneto housing puller and puller ring as illustrated;

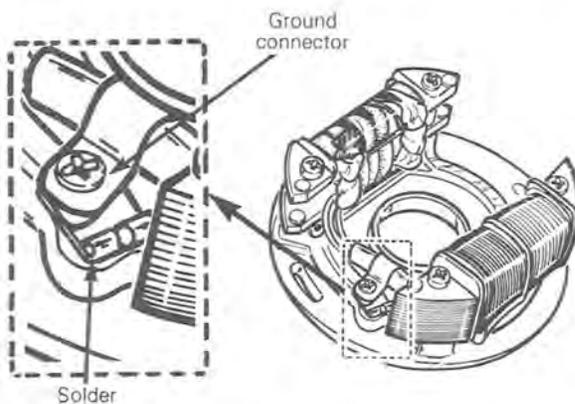
SECTION 02 ENGINE
SUB-SECTION 04 (454 ENGINE TYPE)

- Insert the new wires into the old connector housing and install connectors.



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

- Install a new receptacle connector to the red/black striped wire.
- Install the ground connector to the armature plate as illustrated.

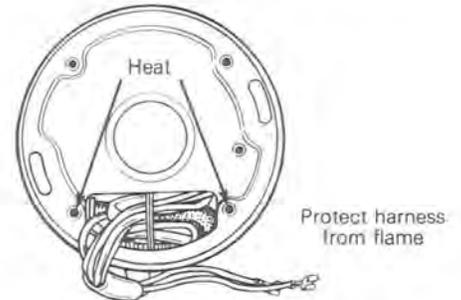


- To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws ⑤ before assembly.

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

● ⑤ To replace lighting coil:

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



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

- Remove screws (use Phillips no. 2 or suitable flat screwdriver).
- Pull out protector tubes and unsolder the splice connectors.
- Solder the two yellow wires in the harness to the leads of the lighting coil.
- Position protector tube over connection.
- Tie wires to the coil as illustrated.
- ⑤ Prior to assembly, apply "Loctite 242" (blue, medium strength).

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

ASSEMBLY

- Clean crankshaft extension (taper).
- Apply "Loctite 242" (blue, medium strength) on taper.
- Position key and magneto housing on crankshaft.
- ⑱ Clean nut threads and apply "Loctite 242" before tightening nut to 95 N•m (70 ft-lbs).
- ⑨ ⑳ ㉓ ㉕ At reassembly coat all electric connections with dielectric of lithium grease to prevent corrosion or moisture penetration.

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

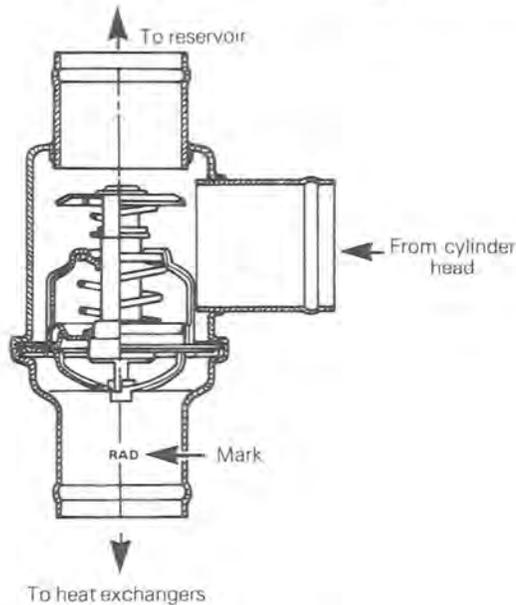


1

1



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



REFILLING THE SYSTEM

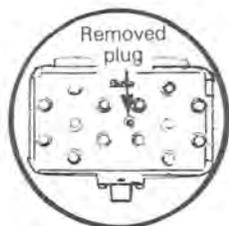
Capacity:

Approximately 5 liters

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

55% antifreeze + 45% water

To refill the cooling system, unscrew the plug on top of the cylinder head, then slowly pour the liquid into the coolant tank until it reaches the plug hole in the cylinder head. Reinstall the plug. Continue to pour the liquid in the coolant tank until the coolant level reaches 25 mm (1") below filler neck of reservoir.



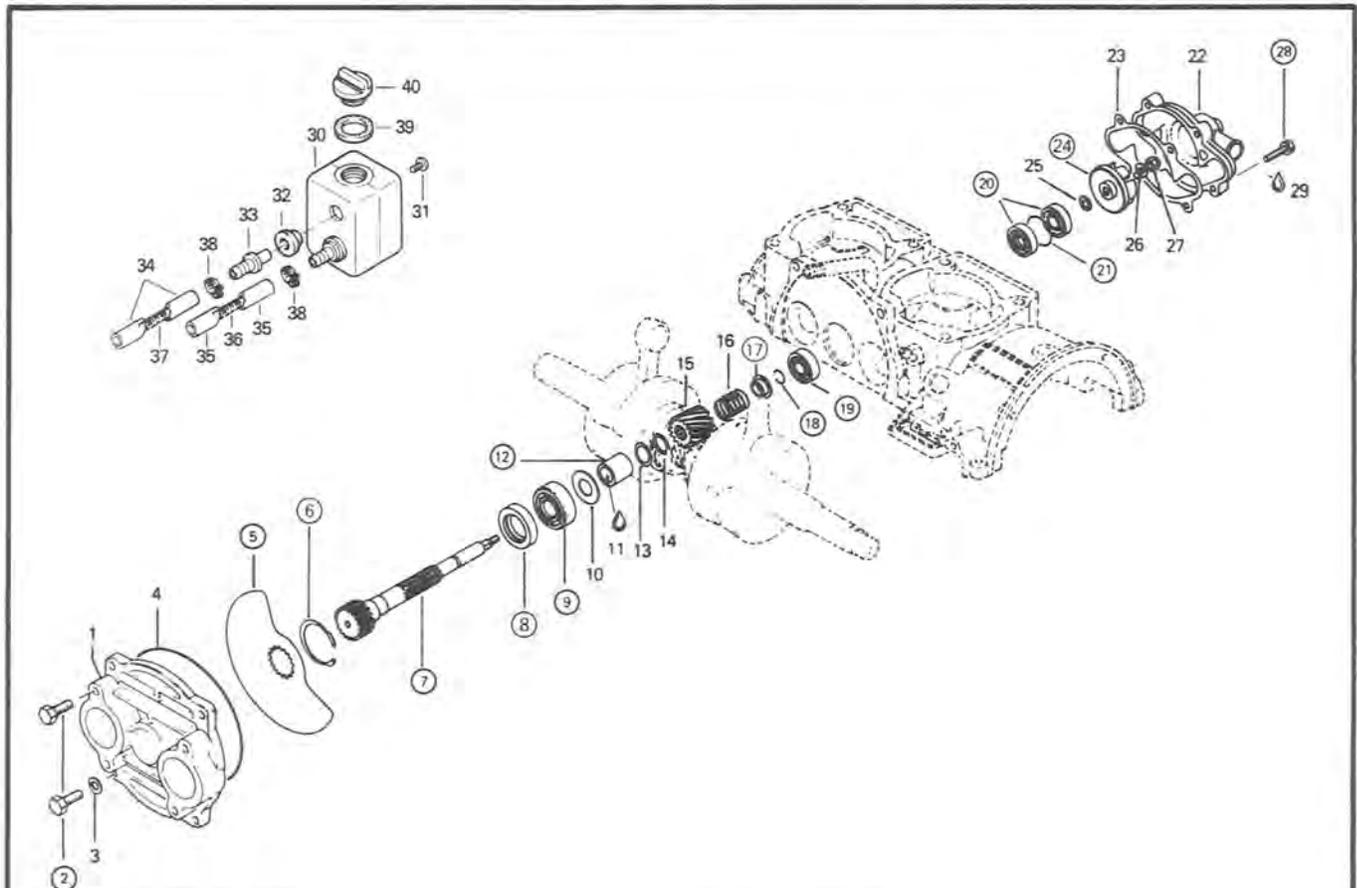
With the pressure cap removed, start engine to allow the coolant to circulate and let it run until normal temperature is reached. Stop engine.

Then recheck coolant level, ensuring that it is 25 mm (1") below filler neck of reservoir.

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



ROTARY VALVE, COOLANT PUMP AND RESERVOIR



- 1. Rotary valve cover
- 2. Bolt M8 x 20 (8)
- 3. Lockwasher 8 mm (4)
- 4. "O" ring
- 5. Rotary valve
- 6. Circlip
- 7. Rotary valve shaft
- 8. Seal
- 9. Bearing
- 10. Shim 0.5 mm
- 11. "Loctite 271"
- 12. Distance sleeve 24.5 mm
- 13. Shim 0.5 mm
- 14. "O" ring
- 15. Gear
- 16. Spring
- 17. Spring retaining cup
- 18. Circlip
- 19. Bearing
- 20. Seal (2)

- 21. Distance ring
- 22. Pump housing
- 23. Gasket
- 24. Pump impeller
- 25. Washer 8.4 mm
- 26. Washer 6.2 mm
- 27. Nut M6
- 28. Bolt M6 x 25 (4)
- 29. "Loctite 242"
- 30. Oil tank
- 31. Hexagonal washer head powerlock screw 1/4-20 x 1/2
- 32. Grommet (2)
- 33. Male connector (2)
- 34. Oil line 13" (330.2 mm)
- 35. Oil line 17" (432 mm)
- 36. Spring
- 37. Spring
- 38. Gear clamp (4)
- 39. Gasket
- 40. Oil tank cap

SECTION 02 ENGINE
SUB-SECTION 04 (454 ENGINE TYPE)

CLEANING

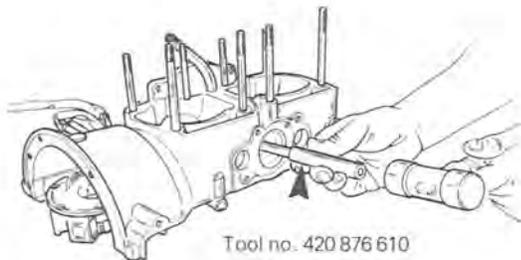
Discard all seals and "O" rings.

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

DISASSEMBLY & ASSEMBLY

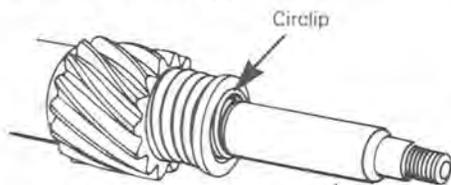
⑦ through ⑱ Rotary valve shaft assembly

To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller ⑳ and circlip ⑤. Using the suitable pusher (P/N 420 876 610) and a fiber hammer, push shaft assembly.

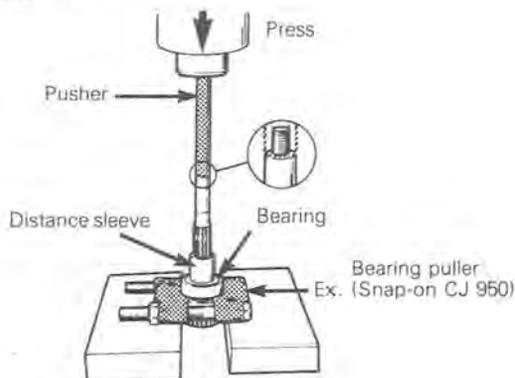


CAUTION: To prevent damage to the end of the rotary valve shaft, use pusher (tool P/N 420 876 610).

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup ⑰ in order to remove circlip ⑱.



⑫ To remove the distance sleeve use a bearing puller (Ex: Snap-on no. CJ 950) and pusher (P/N 420 876 610) as illustrated.

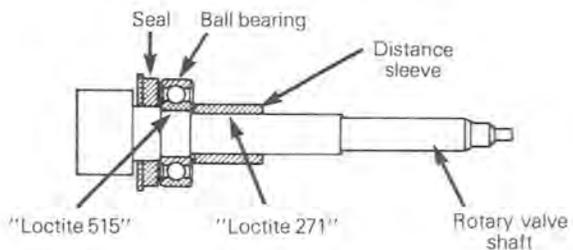


CAUTION: Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

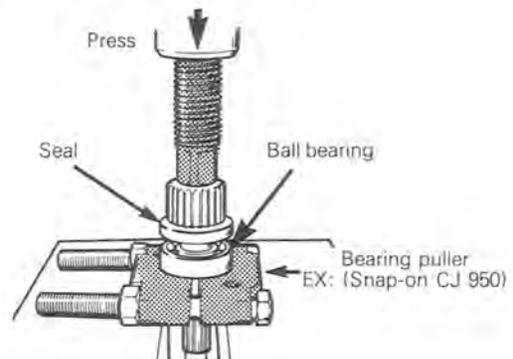
Clean rotary valve shaft and inside of distance sleeve. At assembly apply "Loctite 271" inside of distance sleeve.

⑦ ⑨ At assembly, apply crankcase sealant "Loctite 515" on bearing and rotary valve shaft mating surfaces.

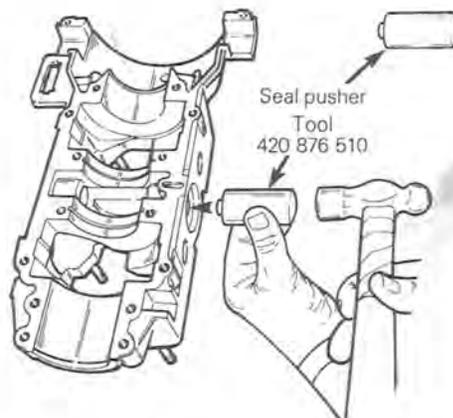
⑧ At assembly apply lithium grease on seal lips.



⑨ Install ball bearing as illustrated.

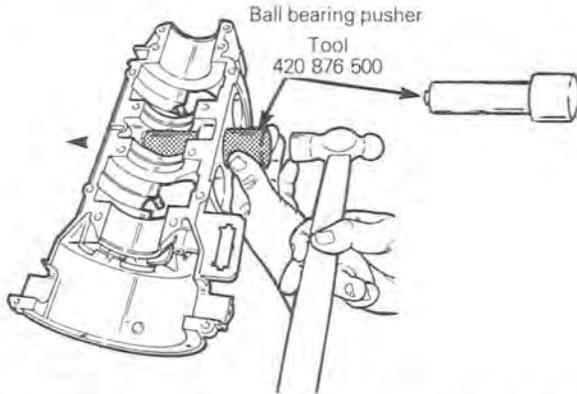


⑲ ⑳ ㉑ To remove seals and bearing.



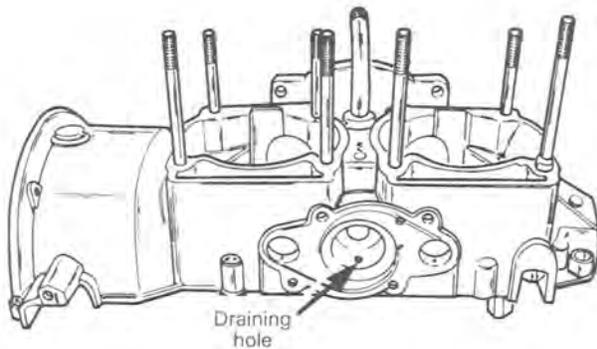
SECTION 02 ENGINE
SUB-SECTION 04 (454 ENGINE TYPE)

⑲ To install ball bearing.



○ NOTE: Ball bearing ⑲ shielded side must be facing water pump.

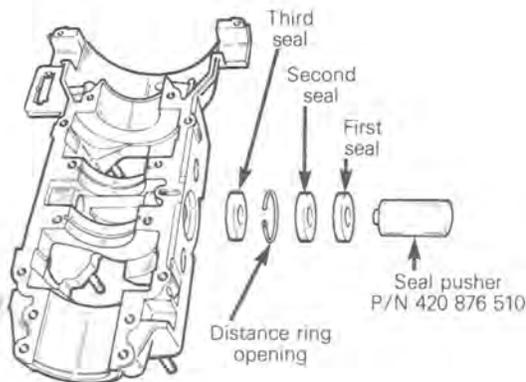
⑳ ㉑ To install seals proceed as follows:



35% of the distance between first and second seals (first seal being flush with crankcase) must be filled with lithium grease or equivalent.

Distance ring opening must be in line with crankcase half draining hole.

(Apply lithium grease on seal lips)



○ NOTE: After installation of seals ⑭ check if the bearing ⑬ is correctly positioned (use pusher P/N 420 876 500).

㉔ Apply "Loctite 242" on threads.

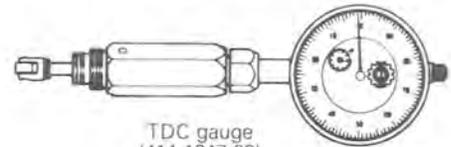
② Torque to 20 N•m (15 ft-lbs).

⑤ Rotary valve adjustment when replacing crankcase having no timing marks.

REQUIRED TOOLS



Angle finder
(414 3529 00)



TDC gauge
(414 1047 00)

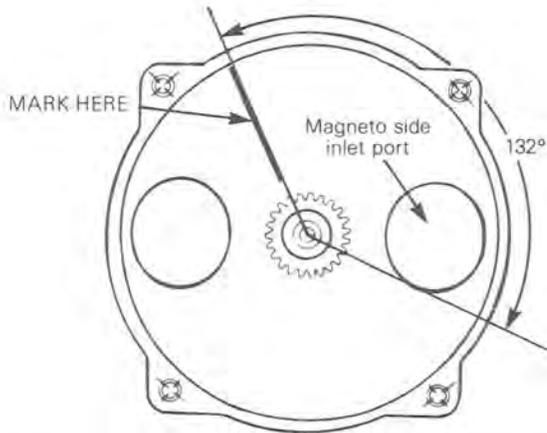
ENGINE TYPE	TIMING MARKS opening, closing
454	

139° 60°

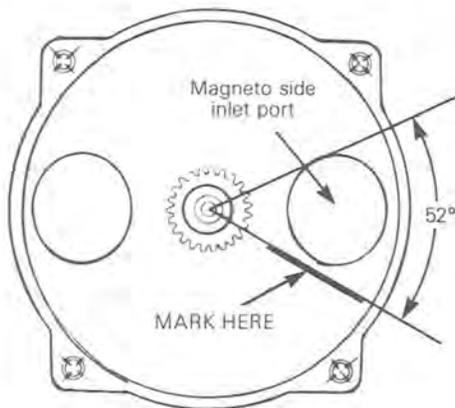
SECTION 02 ENGINE
SUB-SECTION 04 (454 ENGINE TYPE)

For example: 132° opening
 52° closing

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



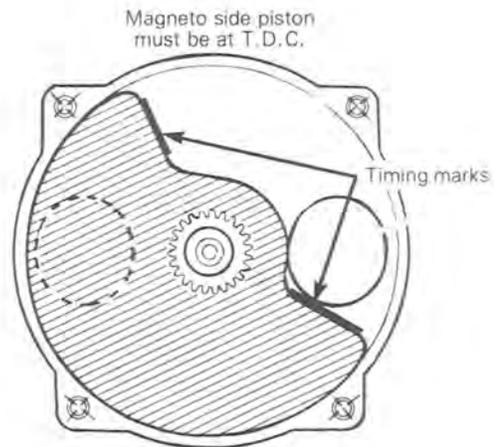
From top edge of magneto side inlet port, mark crankcase at 52°.



To correctly install the rotary valve disc proceed as follows:

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

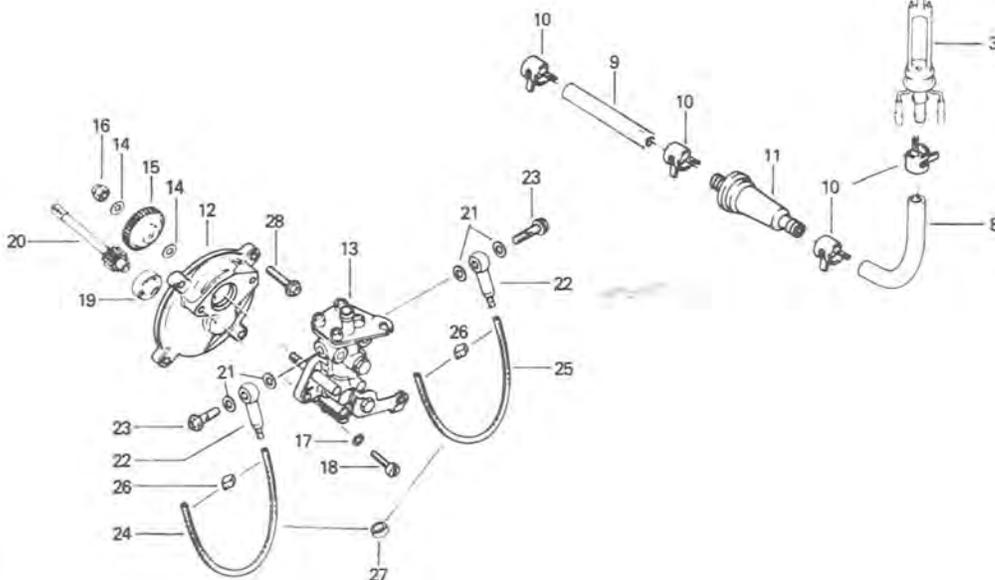
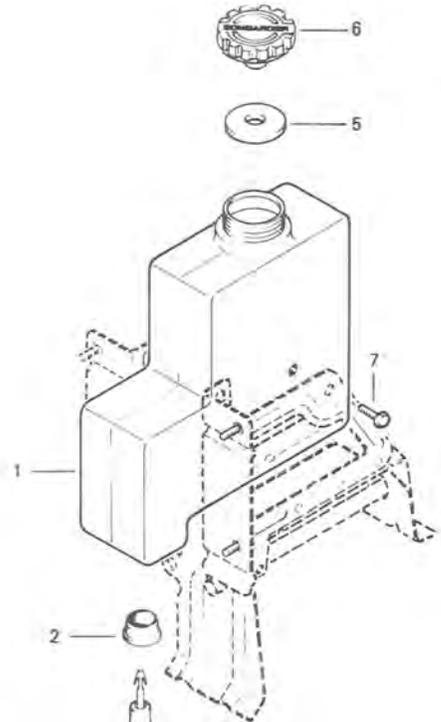
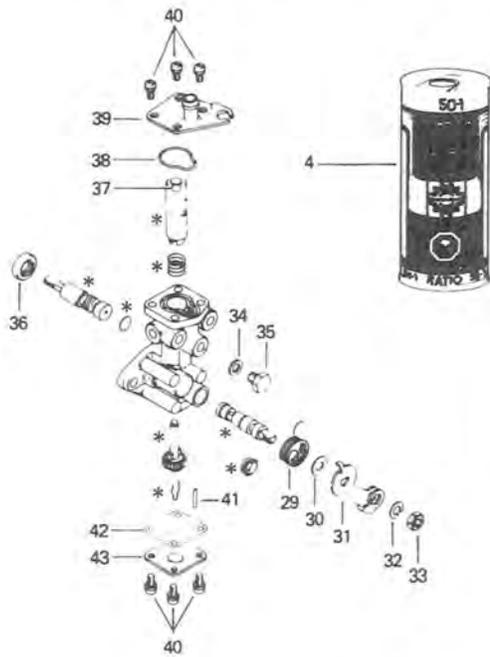
○ **NOTE:** The rotary valve disc is asymmetrical, therefore, at assembly, try positioning each side of disc on gear to determine best installation position.



Ⓜ Torque to 20 N•m (15 ft-lbs).

OIL INJECTION PUMP AND RESERVOIR

OIL INJECTION PUMP



SECTION 02 ENGINE SUB-SECTION 04 (454 ENGINE TYPE)

1. Injection oil tank
2. Grommet
3. Oil level sensor
4. Oil
5. Gasket
6. Oil tank cap
7. Hexagonal washer head powerlock screw
1/4-20 x 1/2 (2)
8. Oil line 4" (102 mm)
9. Oil line 4" (102 mm)
10. Spring clip (4)
11. Filter
12. Oil pump mounting flange
13. Oil pump
14. Washer 6.2 (2)
15. Oil pump gear 27 teeth
16. Lock nut 6 mm
17. Lockwasher 5 (2)
18. Cylindrical slotted screw M5 x 16 (2)
19. Ball bearing
20. Gear 9 teeth
21. Oil banjo gasket (4)
22. Banjo(2)
23. Banjo bolt (2)
24. Oil line 230 mm (9")
25. Oil line 360 mm (14")
26. Clamp (4)
27. Rubber ring
28. Tapite screw M5 x 16 (4)
29. Spring
30. Washer
31. Lever
32. Lockwasher 6 mm
33. Hexagonal nut M6
34. Washer
35. Hexagonal head screw M6 x 7
36. Seal
37. Retainer
38. O'ring
39. Plate
40. Screw with lockwasher (8)
41. Stop pin
42. Gasket
43. Cam casing plate

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

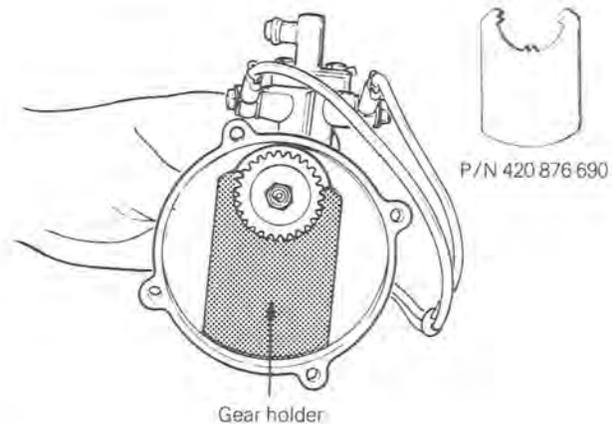
CLEANING

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

DISASSEMBLY

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

⑮⑯ To remove retaining nut, lock gear in place using no. 420 876 690 tool.



⑫⑰ To remove bearing, heat ⑫ mounting flange to approximately 175°-200°C (350°-400°F) using a propane torch. Then strike cover on hard flat surface and bearing will fall out.

◆ WARNING: Always wear protective gloves, to avoid burns while handling cover.

ASSEMBLY

⑫⑰ To install bearing, use a press to push bearing in mounting flange.

⑮ At gear assembly, apply a light coat of grease on gear teeth.

⑩⑳ Always check for spring clip and clamp tightness.

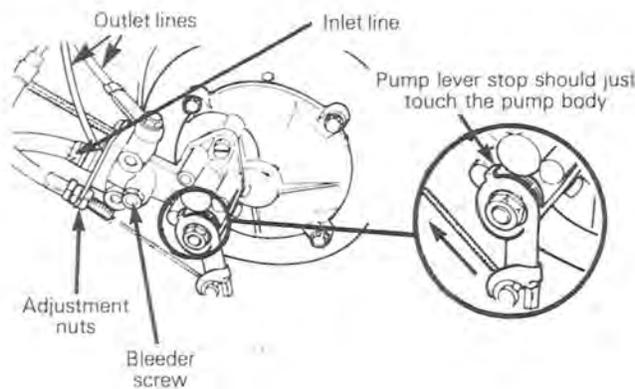
OIL INJECTION PUMP ADJUSTMENT

▼ **CAUTION:** The carburetors must be adjusted before adjusting the oil injection pump. Make sure the idle speed is 1800-2000 R.P.M. and that the pump lever stop is bent to 90° with the lever.

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 pump lever stop should just touch the pump body. If not, loosen the adjuster nut and adjust accordingly.

Tighten the adjuster nut.



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

To bleed oil lines:

All oil lines should be full of oil. To bleed the main oil line (between tank and pump), loosen the bleeder screw and let the air escape until oil starts to flow out.

Make sure tank has enough oil

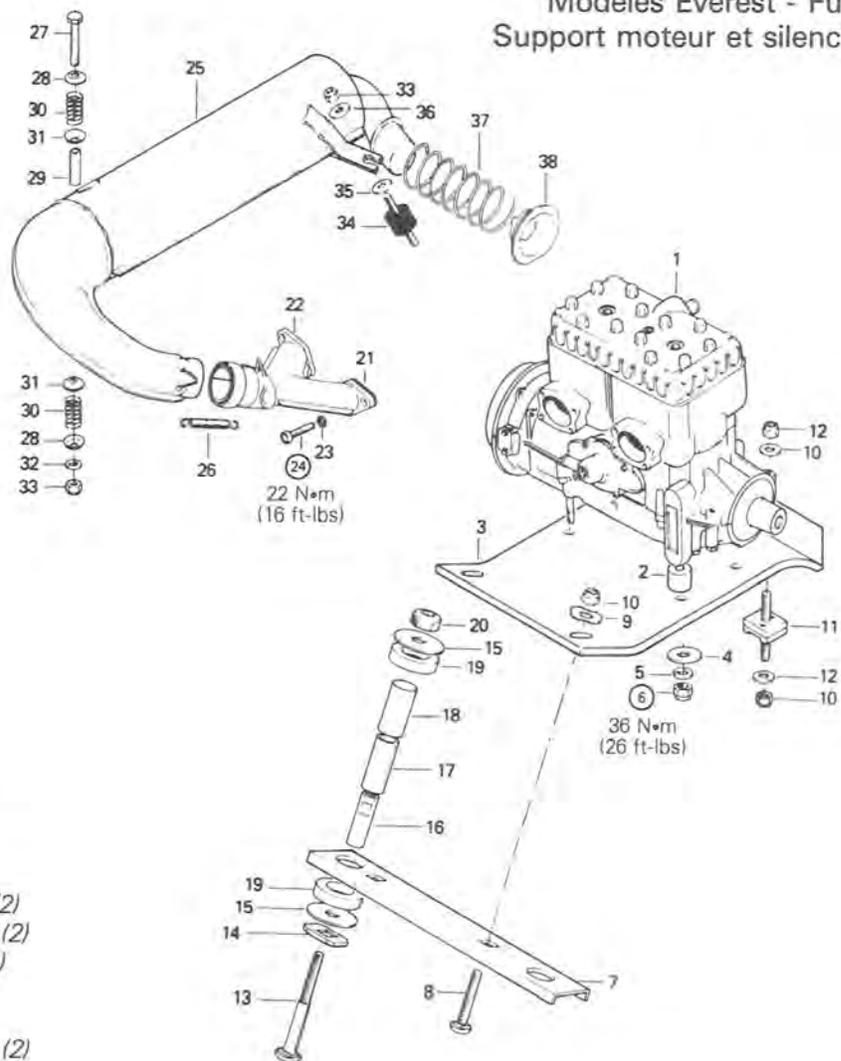
To bleed the small injector oil lines, start the engine and let it run at idle speed. Move injection pump lever to fully open position until lines are full of oil.



464 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION

Modèles Everest - Futura
Support moteur et silencieux



1. 464 Rotax engine
2. Distance sleeve (4)
3. Engine support
4. Flat washer 10.5 mm (4)
5. Lockwasher 10 mm (4)
6. Hexagonal nut 10 mm (4)
7. Cross support
8. Carriage bolt 3/8-16 x 1 1/4" (2)
9. Internal tooth dished washer (2)
10. Hexagonal elastic stop nut (4)
11. Rubber mount
12. Washer (2)
13. Carriage bolt 7/16-14 x 2 3/4" (2)
14. Retainer plate (2)
15. Washer (4)
16. Threaded bushing (2)
17. Rubber bushing (2)
18. Bushing (2)
19. Damper (4)
20. Elastic stop nut 7/16-14 (2)
21. Gasket (2)
22. Exhaust manifold
23. Lockwasher 8 mm (4)
24. Capscrew M8 x 30 (4)
25. Muffler
26. Spring (3)
27. Capscrew 5/16-18 x 2 3/4"

28. Retaining washer (2)
29. Bushing
30. Spring (2)
31. Retaining washer (2)
32. Flat washer 5/16 x 3/4 x .060
33. Elastic stop nut 5/16-18 (2)
34. Rubber mount
35. Insulating washer
36. Washer
37. Spring
38. Spring seat



REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- Pulley guard and drive belt
- Air silencer and throttle cable
- Fuel lines, primer, pulsation and oil injection lines
- Muffler and rewind starter
- Electric wires

 **WARNING:** Always disconnect ground cable first, before any other wire of the starting system.

- Drain the cooling system and disconnect hoses at engine
- Rotary valve oil reservoir
- Disconnect rewind starter at engine

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

⑥ Torque to 36 N•m (26 ft-lbs).

⑳ Torque to 22 N•m (16 ft-lbs).

INSTALLATION ON VEHICLE

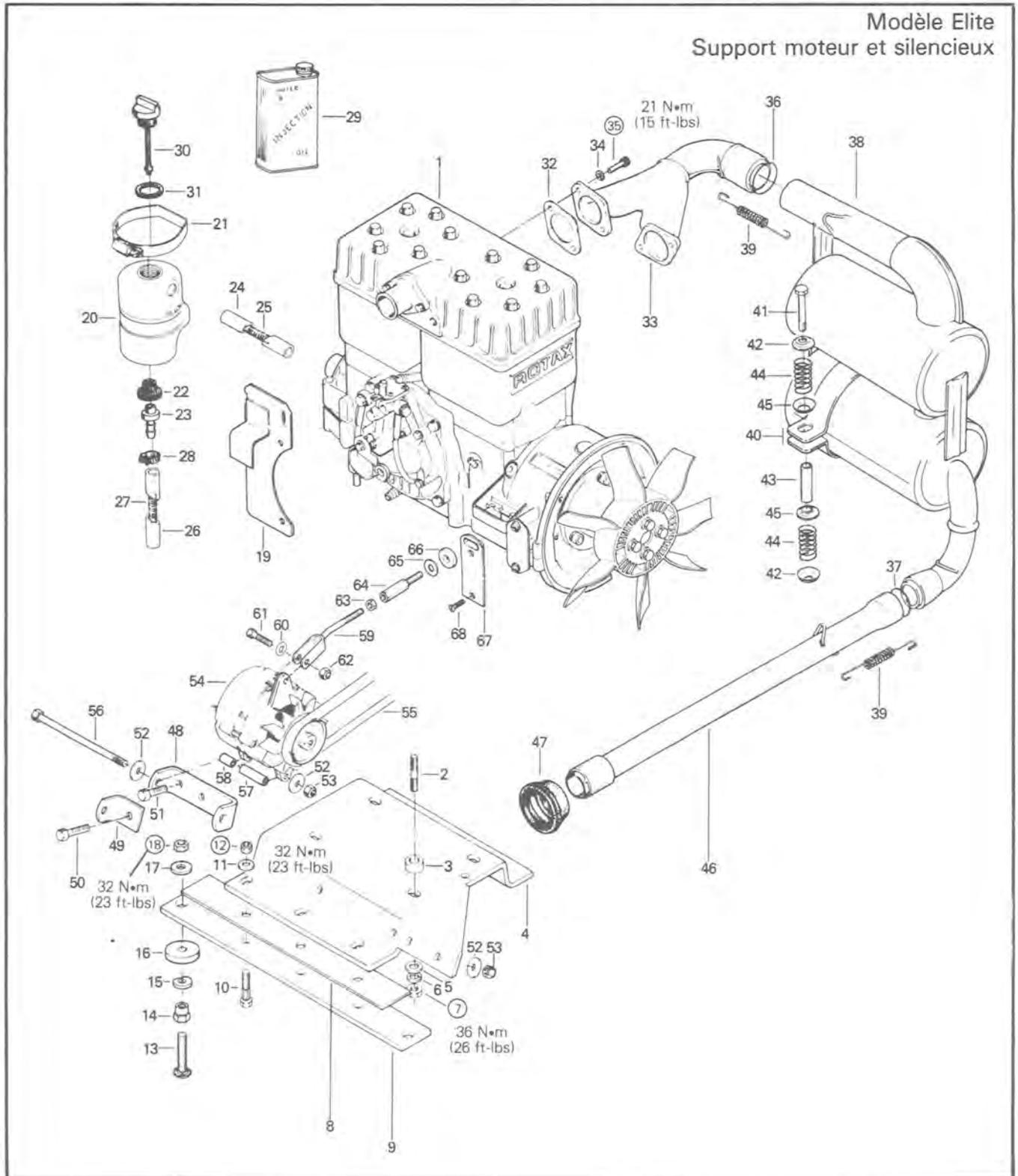
To install engine on vehicle, reverse removal procedure. However, pay attention to the following:

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



ENGINE REMOVAL & INSTALLATION

Modèle Elite
Support moteur et silencieux



SECTION 02 ENGINE

SUB-SECTION 05 (464 ENGINE TYPE)

1. Engine Rotax 464
2. Stud M10 x 45 (4)
3. Distance sleeve (4)
4. Engine bracket
5. Flat washer 15/32 x 59/64 x .060 (4)
6. Lockwasher 10 mm (4)
7. Hexagonal nut 10 mm (4)
8. Engine leaf spring (2)
9. Cross support (2)
10. Screw with knurling 5/16-24 x 13/16 (6)
11. Flat washer 13/32 x 11/16 x .060 (6)
12. Hexagonal elastic stop nut 5/16-24 (6)
13. Carriage bolt 3/8-24 x 1 1/2 (4)
14. Threaded spacer bushing (4)
15. Spacer (4)
16. Insulator rubber (4)
17. Flat washer 25/64 x 7/8 x .090 (4)
18. Hexagonal elastic stop nut 3/8-24 (4)
19. Oil tank support
20. Oil tank
21. Gear clamp
22. Grommet (2)
23. Male connector (2)
24. Tube (oil line) 4" (102 mm)
25. Spring
26. Tube (oil line) 8.5" (216 mm)
27. Spring
28. Gear clamp (4)
29. Injector oil
30. Oil tank cap
31. Gasket
32. Exhaust gasket (2)
33. Exhaust manifold
34. Lockwasher 8 (4)
35. Hexagonal head screw M8 x 30 (4)
36. String 50" (1270 mm)
37. String 20" (508mm)
38. Muffler
39. Spring (4)
40. Muffler clamp (2)
41. Hexagonal head cap screw 5/16-18 x 3 1/2 (2)
42. Cup (4)
43. Bushing (2)
44. Spring (4)
45. Cup (4)
46. Tail pipe
47. Exhaust grommet
48. Support
49. "L" support
50. Hexagonal head cap screw 3/8-16 x 1 1/2
51. Hexagonal head cap screw 3/8-16 x 1 1/4
52. Flat washer 13/32 x 7/8 x .060 (4)
53. Hexagonal elastic stop nut 3/8-16 (3)
54. Alternator
55. Fan belt
56. Hexagonal head cap screw 3/8-16 x 6"
57. Spacer
58. Spacer
59. Lever (adjustment)
60. Flat washer 8.4 mm x 20 x 2
61. Hexagonal head cap screw M8 x 1.25 x 30
62. Hexagonal elastic stop nut 8 mm x 1.25
63. Hexagonal nut 3/8-16
64. Threaded rod
65. Washer
66. Vibration damper
67. Support
68. Flat slotted head machine screw M6 x 16 (2)

REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle:

- air silencer
- battery connections
- pulley guard
- drive belt
- drain anti-freeze solution (6.2 liters, 1.37 imp. gal., 1.65 U.S. gal.)
- ignition coil, amplifier and rectifier with support
- fuel lines
- carburetor
- oil injection pump cable from oil injection pump
- oil injection tank
- exhaust manifold

- starter connections
- cooling system hoses from engine
- alternator
- engine connector housing

 **WARNING:** Always disconnect ground cable first, before any other wire of the starting system.

ENGINE SUPPORT & MUFFLER DISASSEMBLY & ASSEMBLY

- ⑦ Torque to 36 N•m (26 ft-lbs).
- ⑫⑱ Torque to 32 N•m (23 ft-lbs).
- ⑳ Torque to 21 N•m (15 ft-lbs).

INSTALLATION ON VEHICLE

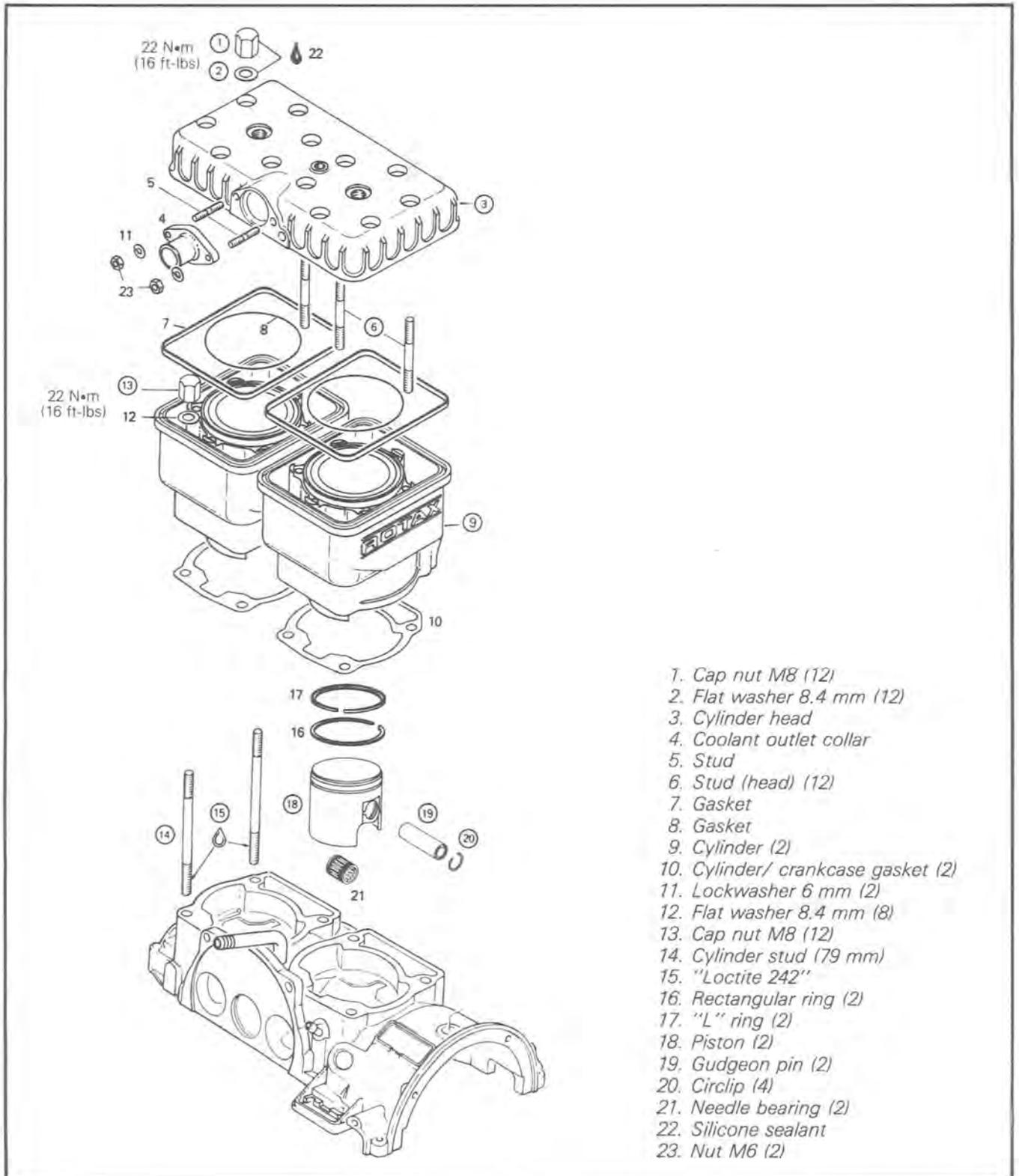
To install engine on vehicle, reverse removal procedure. However, pay attention to the following:

- Check tightness of engine mount nuts.
- After carburetor installation, check maximum throttle slide opening and oil pump adjustment.
- Check drive pulley alignment and adjust drive belt tension.
- Align alternator pulley with fan adaptor pulley: both pulleys must be in line within $1/32''$.
- Adjust alternator belt tension: V-belt must have $1/4''$ play with 5 lbs load.

○ **NOTE:** Alternator pulley alignment must be checked every time the drive pulley is aligned.



TOP END



- 1. Cap nut M8 (12)
- 2. Flat washer 8.4 mm (12)
- 3. Cylinder head
- 4. Coolant outlet collar
- 5. Stud
- 6. Stud (head) (12)
- 7. Gasket
- 8. Gasket
- 9. Cylinder (2)
- 10. Cylinder/ crankcase gasket (2)
- 11. Lockwasher 6 mm (2)
- 12. Flat washer 8.4 mm (8)
- 13. Cap nut M8 (12)
- 14. Cylinder stud (79 mm)
- 15. "Loctite 242"
- 16. Rectangular ring (2)
- 17. "L" ring (2)
- 18. Piston (2)
- 19. Gudgeon pin (2)
- 20. Circlip (4)
- 21. Needle bearing (2)
- 22. Silicone sealant
- 23. Nut M6 (2)

SECTION 02 ENGINE
SUB-SECTION 05 (464 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

18 19 20 Place a clean cloth over crankcase to prevent circlips from falling into crankcase then use a pointed tool to remove circlips from piston.

Drive the gudgeon pins in or 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

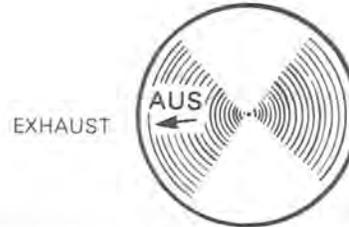
The inspection of the engine top end must include the following measurements:

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 Tolerances Measurement", section 02, sub-section 09.

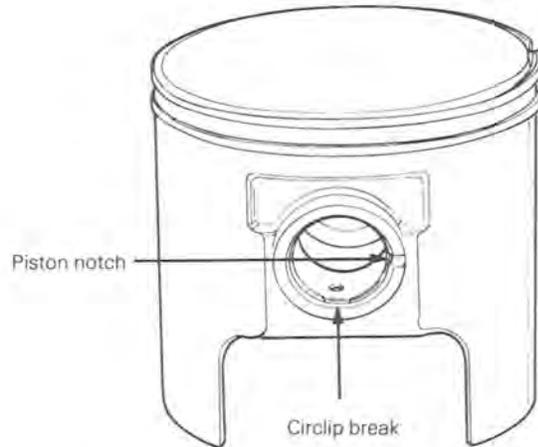
ASSEMBLY

18 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.

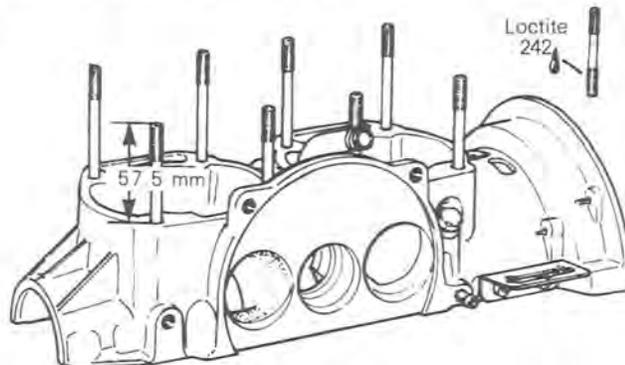


20 To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

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

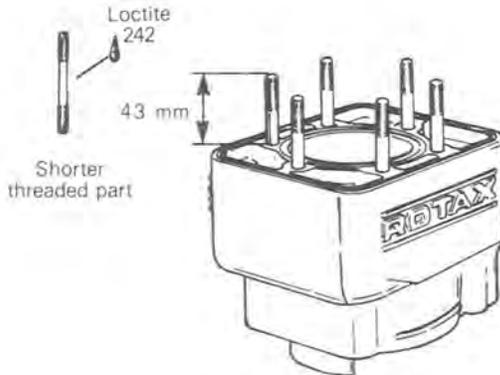


14 15 Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not protrude by more than 57.5 mm (2.260").

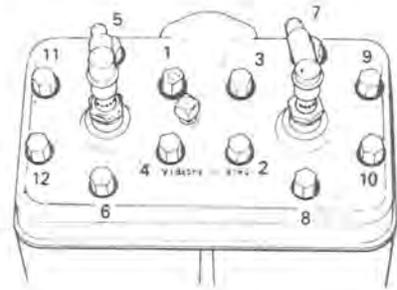


Apply "Loctite 242" on the threaded end of the studs going into the crankcase.

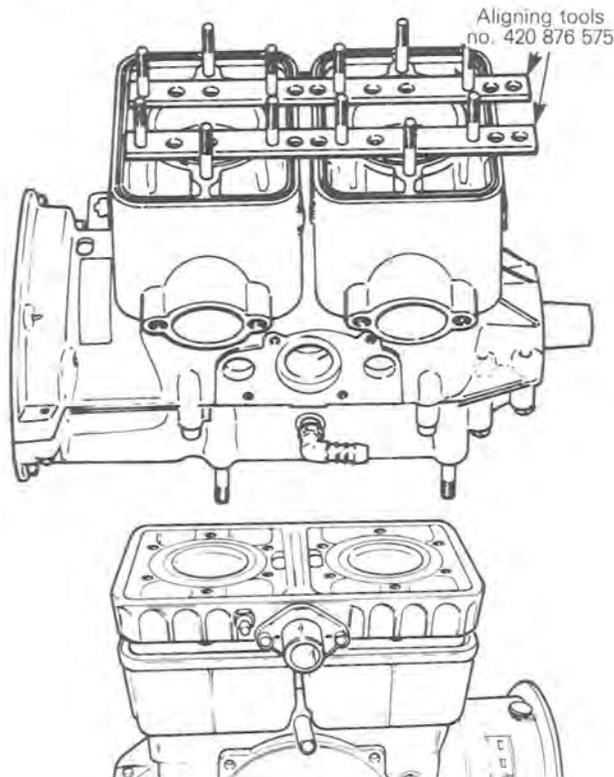
⑥ ⑨ ⑬ Because of cap nuts, cylinder head studs have to be screwed into the cylinder so that they do not protrude by more than 43 mm (1.700"). If it is not possible to obtain this length, add a washer between cylinder head and cap nut. Shorter threaded part of stud should be screwed into cylinder.



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



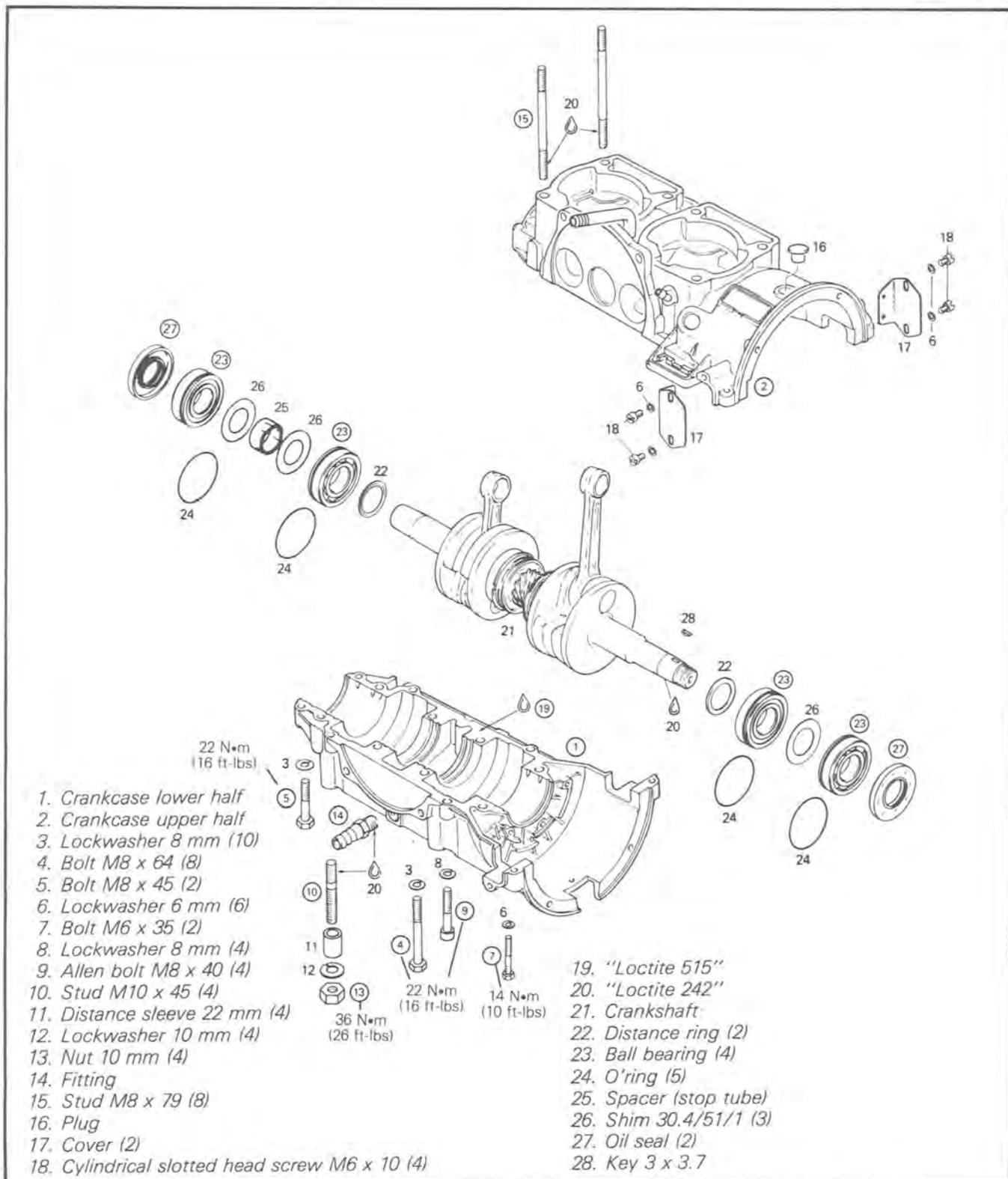
⑨ ⑬ When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. A special tool (as per illustration) (or cylinder head itself) can be used to align the cylinders. Cross torque cylinder nuts to 22 N•m (16 ft-lbs).



① ② ③ Prior to washer installation, apply silicone sealant around studs.



BOTTOM END



SECTION 02 ENGINE
SUB-SECTION 05 (464 ENGINE TYPE)

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.

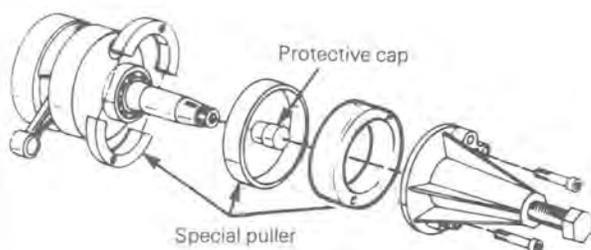
DISASSEMBLY

General

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

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

⑳ To remove bearings from crankshaft use a protective cap special puller as illustrated.



INSPECTION

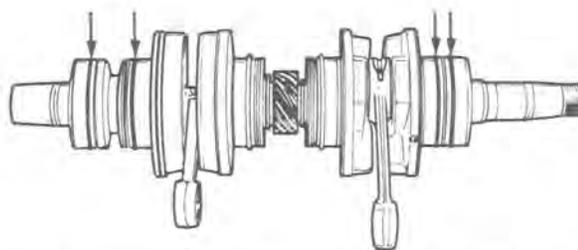
The inspection of the engine bottom end must include the following measurements:

MEASUREMENTS	TOLERANCES		WEAR LIMIT
	FITTING NEW PARTS (MIN.)	(MAX.)	
Crankshaft deflection	N.A.	N.A.	.08 mm (.0031")
Connecting rod big end axial play	.40 mm (.0157")	.73 mm (.0287")	1.20 mm (.0468")
Connecting rod alignment	N.A.	N.A.	N.A.

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

ASSEMBLY

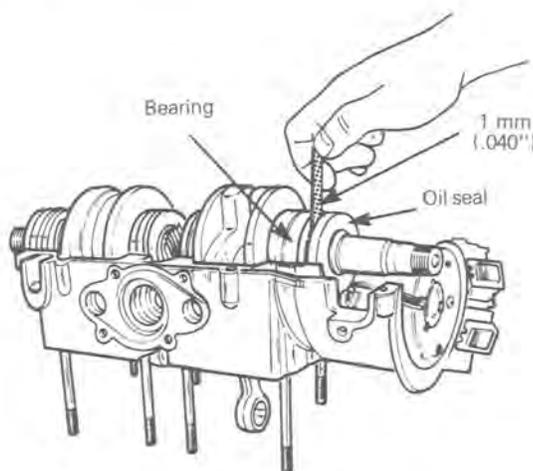
㉓ Prior to installation, place bearings into an oil container previously heated to 100°C (210°F). This will expand bearing and ease installation. Install bearings with oil seal groove as per the following illustration.



㉗ 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.

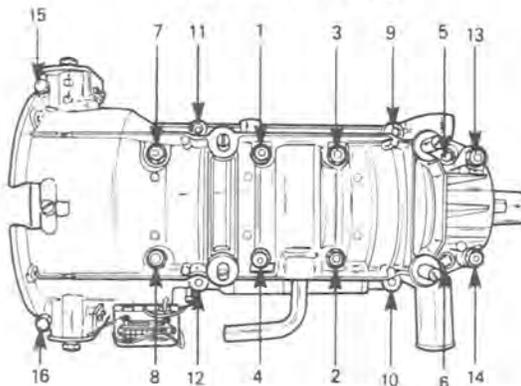


① ② ㉙ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves. Prior to joining of crankcase halves, apply a light coat of "Loctite 515" (413 7027 00) on mating surfaces.

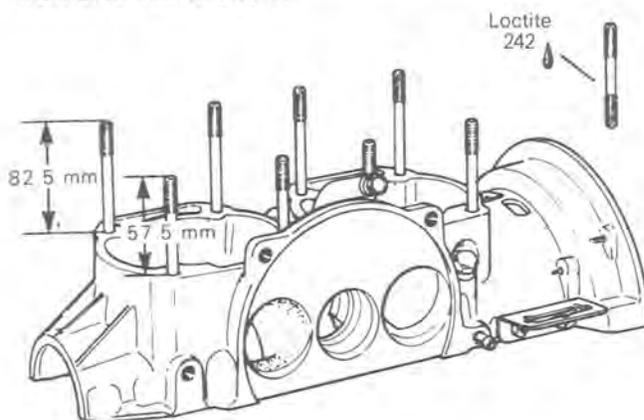
CAUTION: Before joining of crankcase halves be sure that crankshaft rotary valve gear is well engaged with rotary valve shaft gear.

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 to 22 N•m (16 ft-lbs) following illustrated sequence.

Follow sequence shown
1 to 14 – 22 N•m (16 ft-lbs)
15 & 16 – 14 N•m (10 ft-lbs)



- **NOTE:** Torque the two smaller bolts (15 and 16) on magneto side to 14 N•m (10 ft-lbs).
- ④ ⑤ ⑨ Torque to 22 N•m (16 ft-lbs).
- ⑦ Torque to 14 N•m (10 ft-lbs).
- ⑩ At assembly on crankcase, apply "Loctite 242" on threads.
- ⑬ Torque to 36 N•m (26 ft-lbs).
- ⑭ Apply "Loctite 242" on threads prior to assembly.
- ⑮ Because of cap nuts, cylinder studs have to be screwed into the crankcase so that they do not exceed further than 57.5 mm (2.260").



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

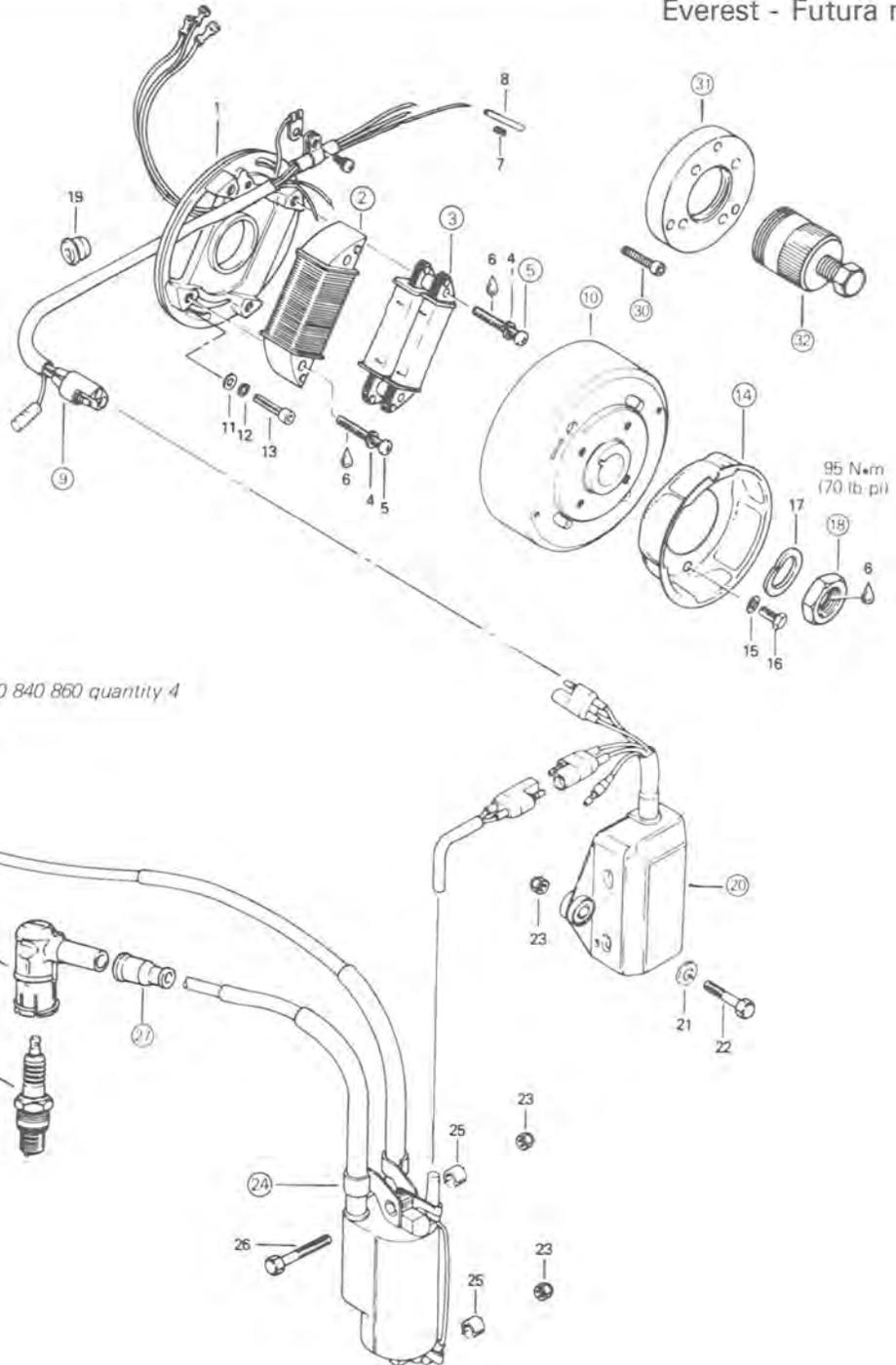
To install magneto, refer to "Magneto" in this section.



MAGNETO

Everest - Futura models

1. Armature plate
2. Generator coil assembly
3. Lighting coil
4. Lockwasher
5. Screw
6. Loctite 242
7. Splice connector
8. Protector tube
9. Harness
10. Flywheel
11. Washer
12. Lockwasher
13. Allen screw
14. Starting pulley
15. Lockwasher
16. Screw
17. Lockwasher
18. Nut
19. Grommet
20. C.D. box
21. Flat washer
22. Screw
23. Elastic stop nut
24. Ignition coil
25. Spacer
26. Screw
27. Protection cap
28. Spark plug protector
29. Spark plug NGK BR-8ES
30. Allen screw M6 x 25 P/N 420 840 860 quantity 4
31. Puller ring P/N 420 876 655
32. Puller ring P/N 420 876 065



SECTION 02 ENGINE
SUB-SECTION 05 (464 ENGINE TYPE)

CLEANING

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

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

DISASSEMBLY

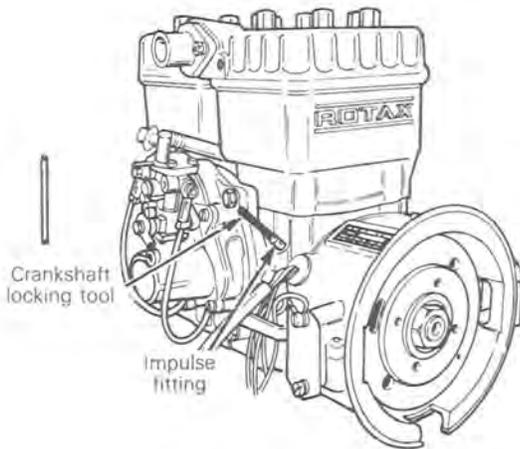
● To gain access to magneto assembly, remove:

- rewind starter
- starting pulley ⑭

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

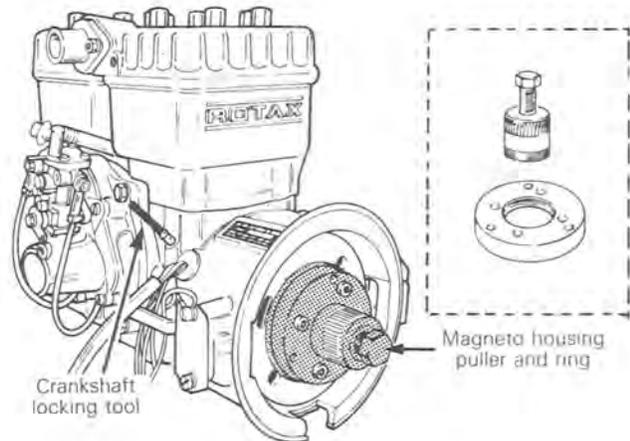
● ⑮ To remove magneto flywheel retaining nut:

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



○ **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.

- ⑩ To remove magneto housing (flywheel):
 - lock crankshaft with crankshaft locking tool (service tool) as illustrated
 - adjust magneto housing puller and puller ring as illustrated

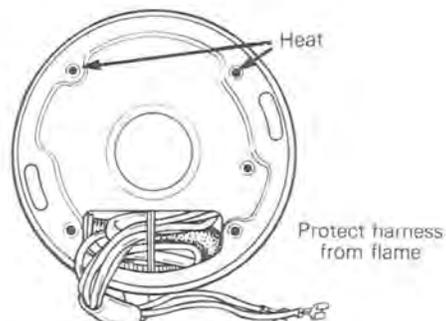


- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

● ③ To replace generating coil:

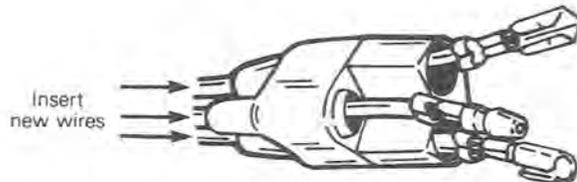
- Heat the armature plate around the screw holes to break the Loctite bond (200°F)



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

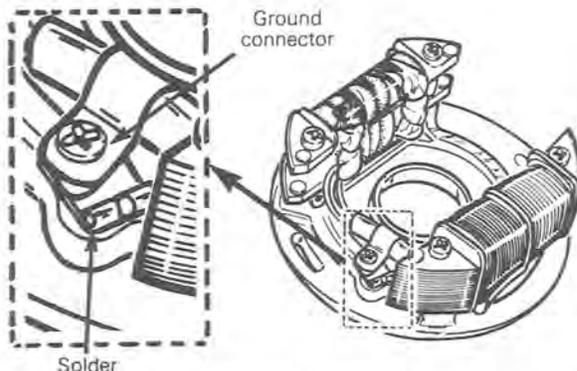
- Remove screws (use Phillips no. 2 or suitable flat screw driver)
- Cut the four wires as close as possible to the coil body

- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube
- Insert the new wires into the old connector housing and install connectors



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

- Install a new receptacle connector to the red/black striped wire
- Install the ground connector to the armature plate as illustrated

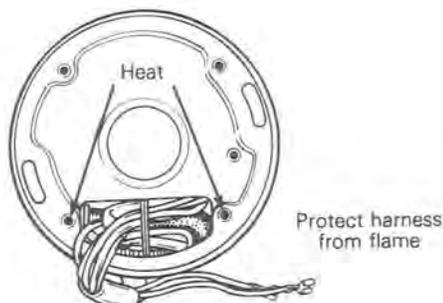


- To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws ⑤ before assembly

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

● ② To replace lighting coil:

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



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

- Remove screws (use Phillips no. 2 or suitable flat screwdriver)
- Pull out protector tubes and unsolder the splice connectors
- Solder the two yellow wires in the harness to the leads of the lighting coil
- Position protector tube over connection.
- Tie wires to the coil as illustrated
- ⑤ Prior to assembly, apply "Loctite 242" (blue, medium strength)

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

ASSEMBLY

- Clean crankshaft extension taper
- Apply "Loctite 242" (blue, medium strength) on taper
- Position key and magneto housing on crankshaft
- ⑱ Clean nut threads and apply "Loctite 242" before tightening nut to 95 N•m (70 ft-lbs)
- ⑨ ⑳ ㉔ ㉗ At reassembly coat all electric connections with dielectric of lithium grease to prevent corrosion or moisture penetration

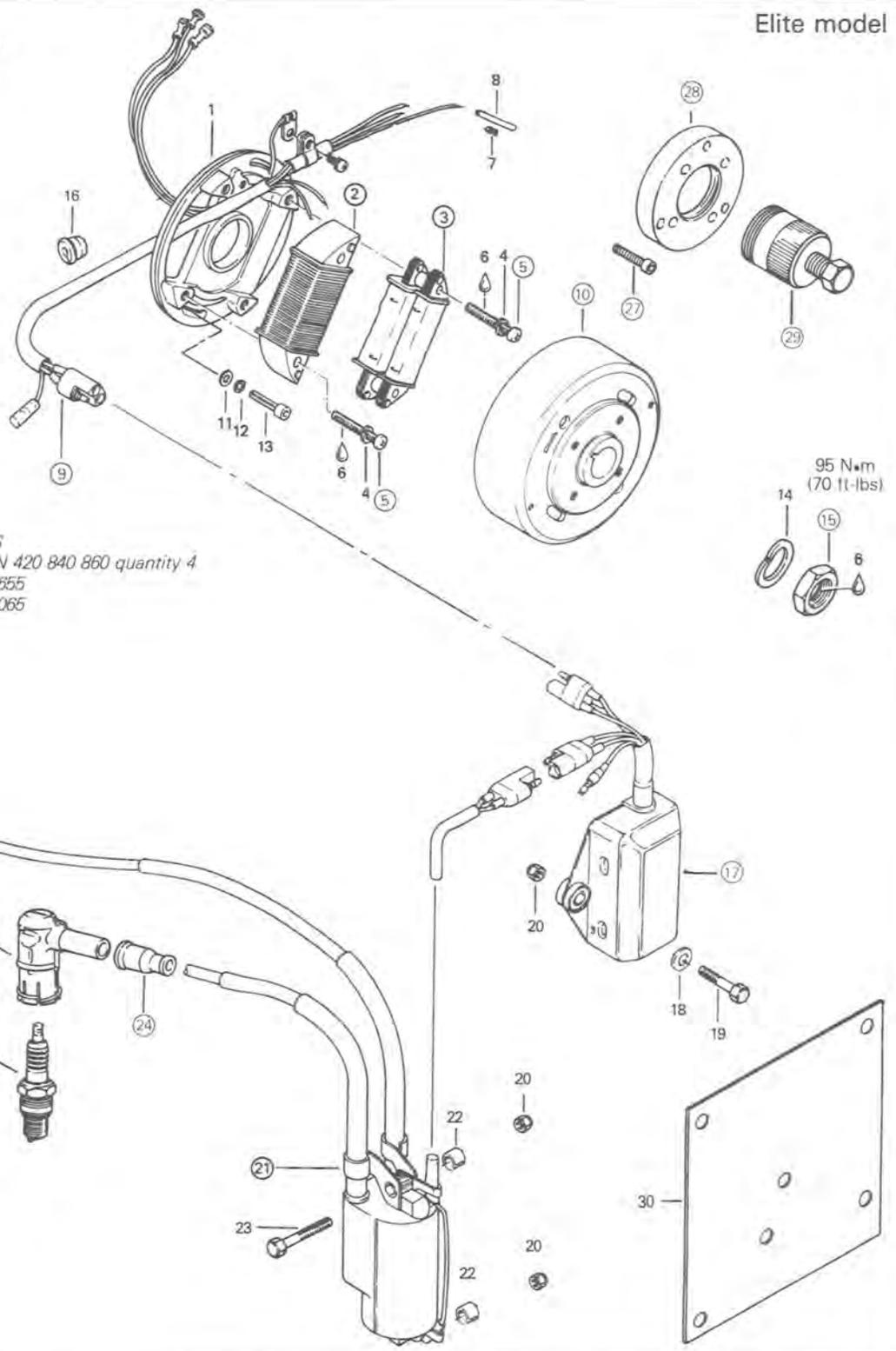
▼ **CAUTION:** Do not use silicone sealant, this product will corrode contacts.



MAGNETO

Elite model

1. Armature plate
2. Generator coil assembly
3. Lighting coil
4. Lockwasher
5. Screw
6. Loctite 242
7. Splice connector
8. Protector tube
9. Harness
10. Flywheel
11. Washer
12. Lockwasher
13. Allen screw
14. Lockwasher
15. Nut
16. Grommet
17. C.D. box
18. Flat washer
19. Screw
20. Elastic stop nut
21. Ignition coil
22. Spacer
23. Screw
24. Protection cap
25. Spark plug protector
26. Spark plug NGK BR-8ES
27. Allen screw M6 x 25 P/N 420 840 860 quantity 4
28. Puller ring P/N 420 876 655
29. Puller ring P/N 420 876 065
30. Accessory plate



95 N•m
 (70 ft-lbs)

SECTION 02 ENGINE SUB-SECTION 05 (464 ENGINE TYPE)

CLEANING

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

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

DISASSEMBLY

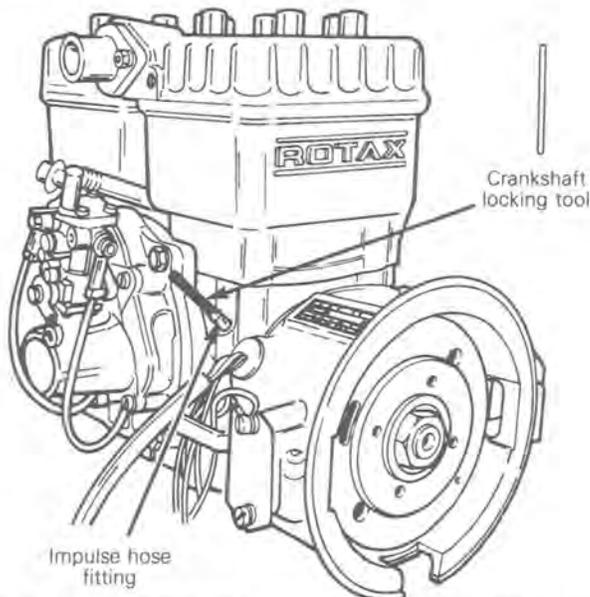
● To gain access to magneto assembly, remove:

- air silencer
- injection oil reservoir
- fan belt
- fan and fan adaptor.

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

● 15 To remove magneto flywheel retaining nut:

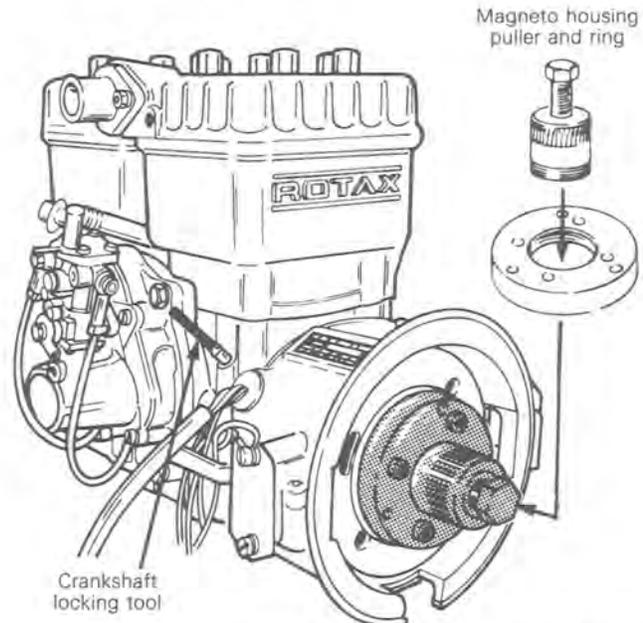
- lock crankshaft with crankshaft locking tool (service tool) as illustrated (magneto side piston must be at top dead center);
- remove magneto retaining nut.



○ **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.

● 10 To remove magneto housing (flywheel):

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

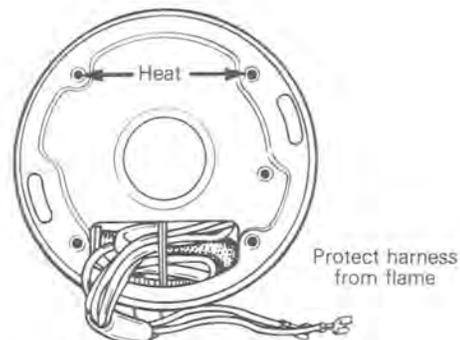


- tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto from its taper.

REPAIR

● 3 To replace generating coil:

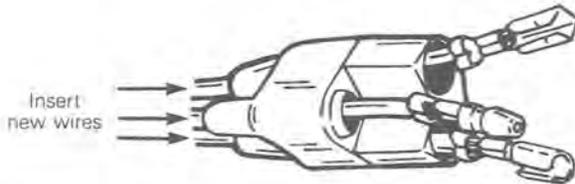
- Heat the armature plate around the screw holes to break the Loctite bond (200°F).



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

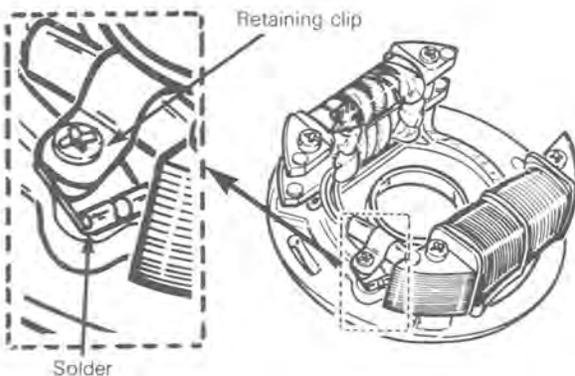
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.

- Insert the new wires into the old connector housing and install connectors.



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

- Install a new receptacle connector to the red/black striped wire.
- Install the ground connector to the armature plate as illustrated.

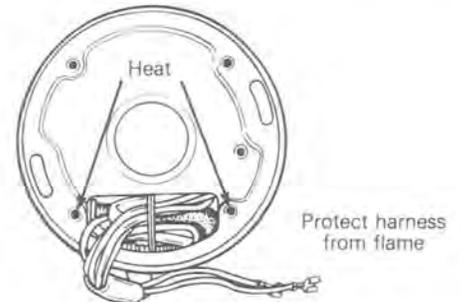


- To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws ⑤ before assembly.

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

● ② To replace lighting coil:

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



CAUTION: Protect harness from flame.

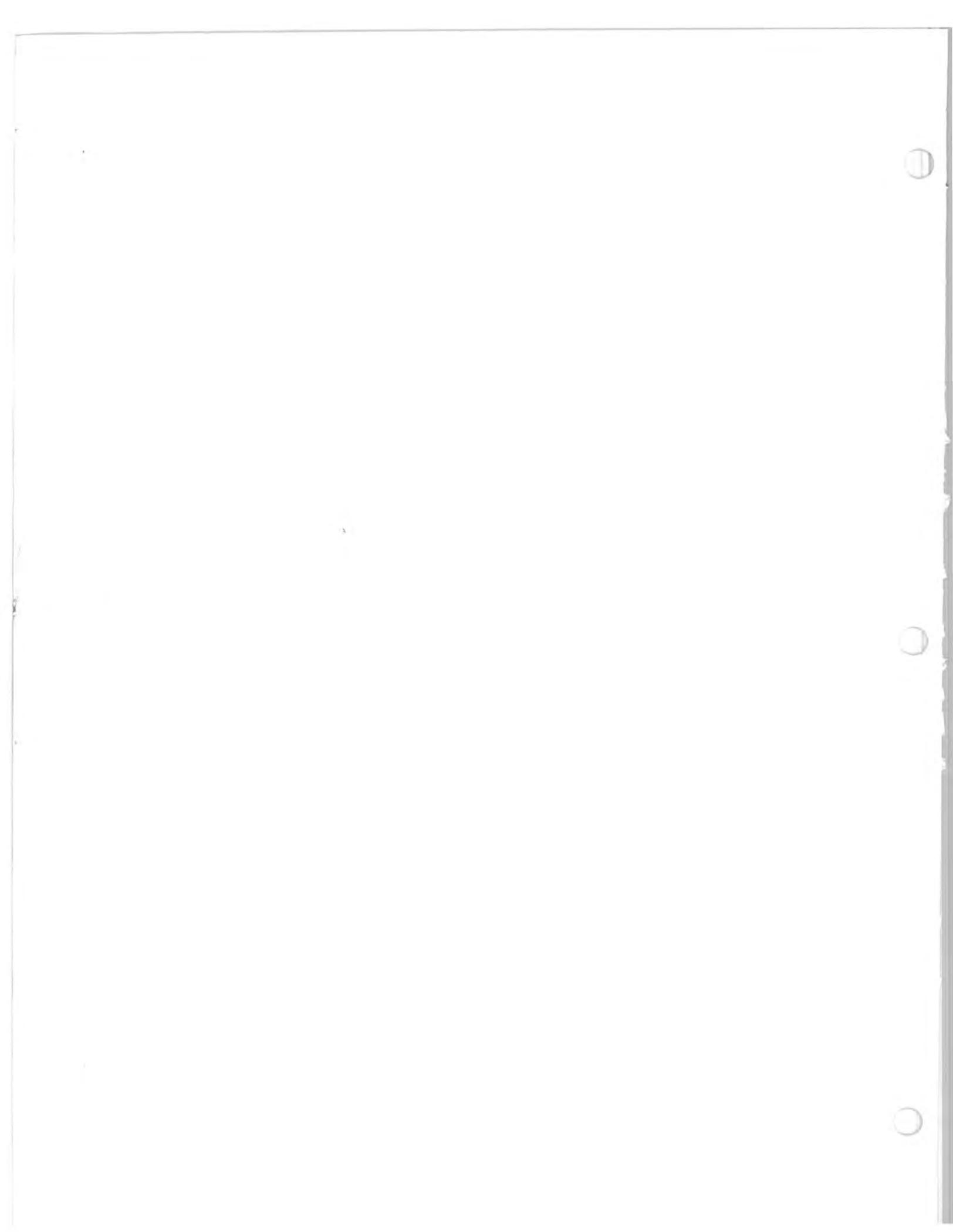
- Remove screws (use Phillips no. 2 or suitable flat screwdriver).
- Pull out protector tubes and unsolder the splice connectors.
- Solder the two yellow wires in the harness to the leads of the lighting coil.
- Position protector tube over connection.
- Tie wires to the coil as illustrated.
- ⑤ Prior to assembly, apply "Loctite 242" (blue, medium strength).

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

ASSEMBLY

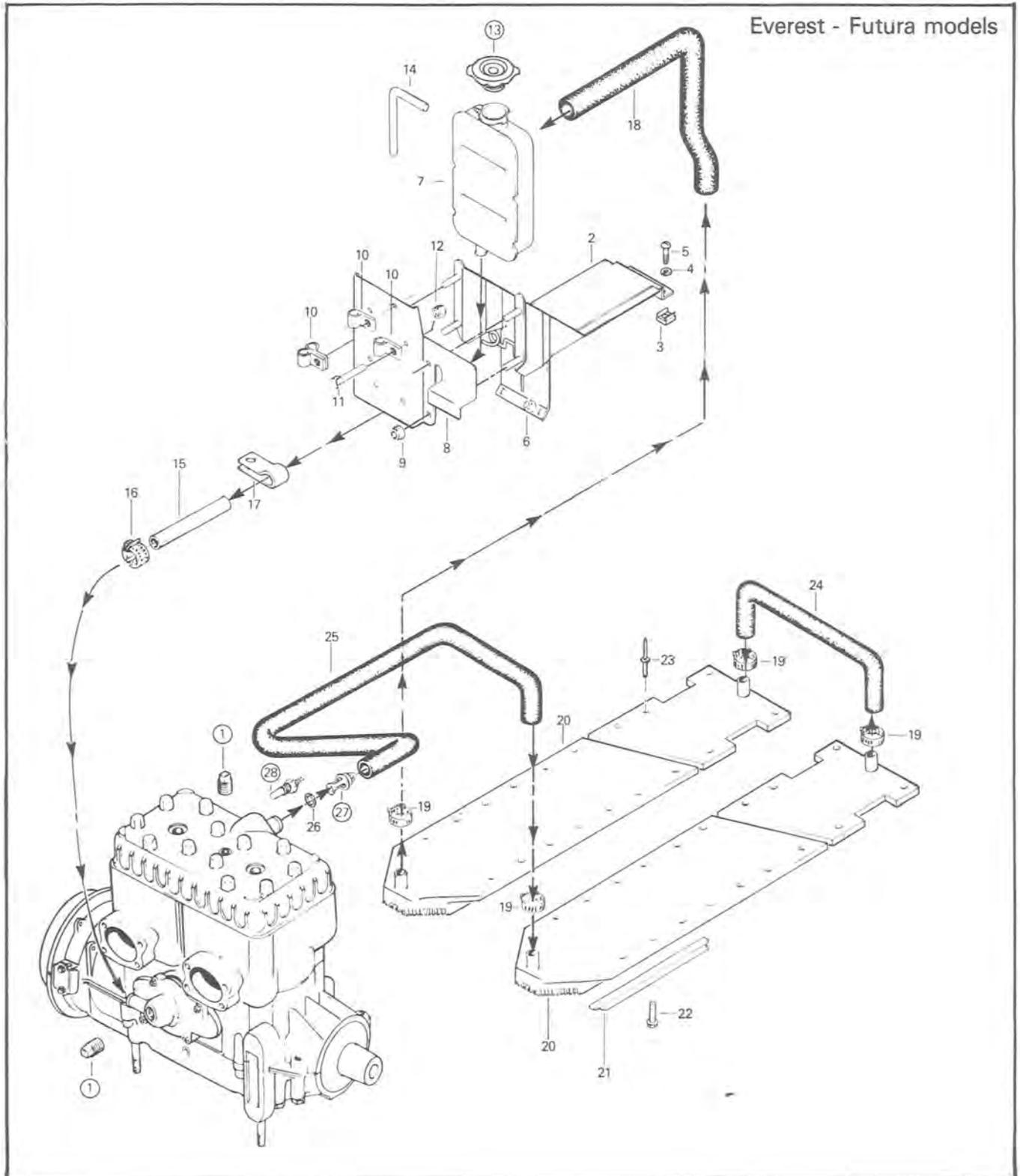
- Clean crankshaft extension (taper).
- Apply "Loctite 242" (blue, medium strength) on taper.
- Position key and magneto housing on crankshaft.
- ⑮ Clean nut threads and apply "Loctite 242" before tightening nut to 95 N•m (70 ft-lbs).
- ⑨ ⑰ ⑳ ㉔ At reassembly coat all electric connections with dielectric grease to prevent corrosion or moisture penetration.

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



COOLING SYSTEM

Everest - Futura models



SECTION 02 ENGINE

SUB-SECTION 05 (464 ENGINE TYPE)

1. Plug
2. Plate (battery)
3. Clip nut (2)
4. Lockwasher 1/4 (2)
5. Round slotted head machine screw 1/4-20 x 1/2 (2)
6. Hexagonal elastic stop nut 1/4-20 (2)
7. Coolant tank
8. Bracket
9. Hexagonal flanged elastic stop nut 1/4-20 (4)
10. Clip (4)
11. Hexagonal head cap screw M6 x 1.00 x 16 (2)
12. Hexagonal elastic stop nut 6 x 1.00 (2)
13. Pressure cap
14. Overflow hose 16" (406 mm)
15. Hose 23" (584 mm)
16. Gear clamp (2)
17. Clip
18. Inlet hose
19. Gear clamp (6)
20. Heat exchanger (2)
21. Radiator protector (2)
22. Hexagonal washer head self-tapping screw 10-24 x 1/2 (2)
23. Rivet (42)
24. "U" hose
25. Outlet hose
26. Grommet
27. Thermostat
28. Sensor

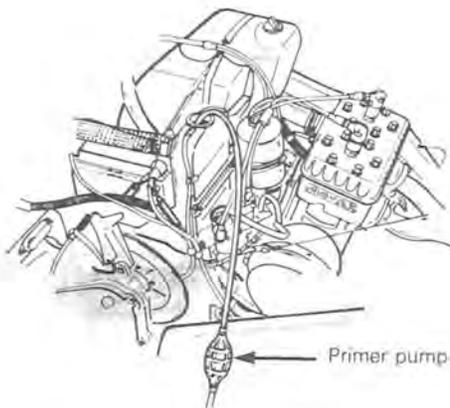
INSPECTION

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, remove the coolant tank cap and siphon the coolant mixture using a primer pump, a length of plastic hose and steel tubing inserted as deep as possible into the lower hose of the tank.



DISASSEMBLY & ASSEMBLY

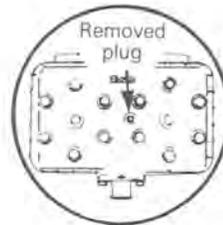
- ① ②⑧ Apply pipe thread sealant to avoid leaks.
- ⑬ See if the cap pressurizes the system. If not, install a new 13 lbs cap, do not exceed 13 lbs of pressure.
- ⑳ To check thermostat, put it in water and heat water thermostat should open when water temperature reaches 43°C (110°F).

REFILLING THE SYSTEM

Capacity:

Approximately 5 liters
(1.1 Imp. gal.) (1.3 U.S. gal.)
55% antifreeze + 45% water

To refill the cooling system, unscrew the plug on top of the cylinder head, then slowly pour the liquid into the coolant tank until it reaches the plug hole in the cylinder head. Reinstall the plug. Continue to pour the liquid in the coolant tank until the coolant level reaches 25 mm (1") below filler neck of reservoir.



With the pressure cap removed, start engine to allow the coolant to circulate and let it run until normal temperature is reached. Stop engine.

Then recheck coolant level, ensuring that it is 25 mm (1") below filler neck of reservoir.

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

SECTION 02 ENGINE

SUB-SECTION 05 (464 ENGINE TYPE)

1. Fan adaptor
2. Fan
3. Bushing (4)
4. Hexagonal head cap screw
1/4-20 x 1 (4)
5. Flat washer 17/64 x 7/8 x .060 (4)
6. Hexagonal flanged elastic stop nut
1/4-20 (4)
7. Lockwasher 6 (4)
8. Allen screw M6 x 1.00 x 16 (4)
9. Radiator case
10. Coolant tank
11. Hexagonal flanged elastic stop nut
1/4-20 (4)
12. Hexagonal head cap screw
5/16-18 x 3 1/2 (4)
13. Vibration damper (8)
14. Radiator
15. Bushing (4)
16. Washer (4)
17. Hexagonal elastic stop nut 5/16-18 (4)
18. Flat washer 13/32 x 11/16 x .060 (4)
19. Hexagonal elastic stop nut 5/16-18 (4)
20. Drain valve
21. Pressure cap
22. Hose (overflow) 25" (635 mm)
23. Hose
24. Gear clamp (4)
25. Thermostat
26. Grommet
27. Sensor
28. Hose
29. Hose 15" (381 mm)
30. Clamp (2)
31. Cover plate (top)
32. Cover plate (side) (2)
33. Square washer 1/8 x 5/8 (7)
34. Rivet (7)
35. Plug (2)

INSPECTION

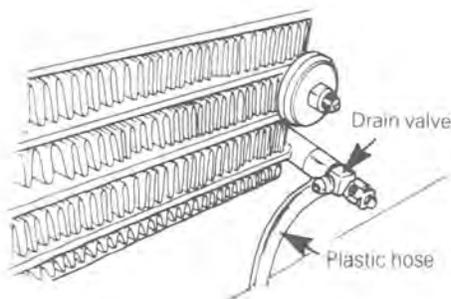
Check general condition of hoses and clamps tightness.

DRAINING THE SYSTEM

To drain the cooling system, remove the coolant tank cap.

Remove the R.H. access grill, and connect a length of plastic hose to the radiator drain valve in order to drain the cooling system outside of the body.

⑳ Open the drain valve.



REFILLING THE SYSTEM

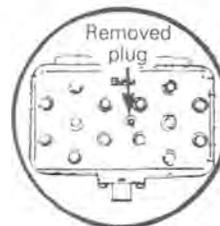
Capacity:

6.25 liters

(1.4 Imp. gal.) (1.7 U.S. gal.)

55% antifreeze + 45% water

To refill the cooling system, unscrew the plug on top of the cylinder head, then slowly pour the liquid into the coolant tank until it reaches the plug hole in the cylinder head. Reinstall the plug. Continue to pour the liquid in the coolant tank until the coolant level reaches 25 mm (1") below filler neck of reservoir.



DISASSEMBLY & ASSEMBLY

㉕ To check thermostat, put it in water and heat water. Thermostat should open when water temperature reaches 43°C (110°F).

㉗ ㉞ Apply pipe thread sealant to avoid leaks.

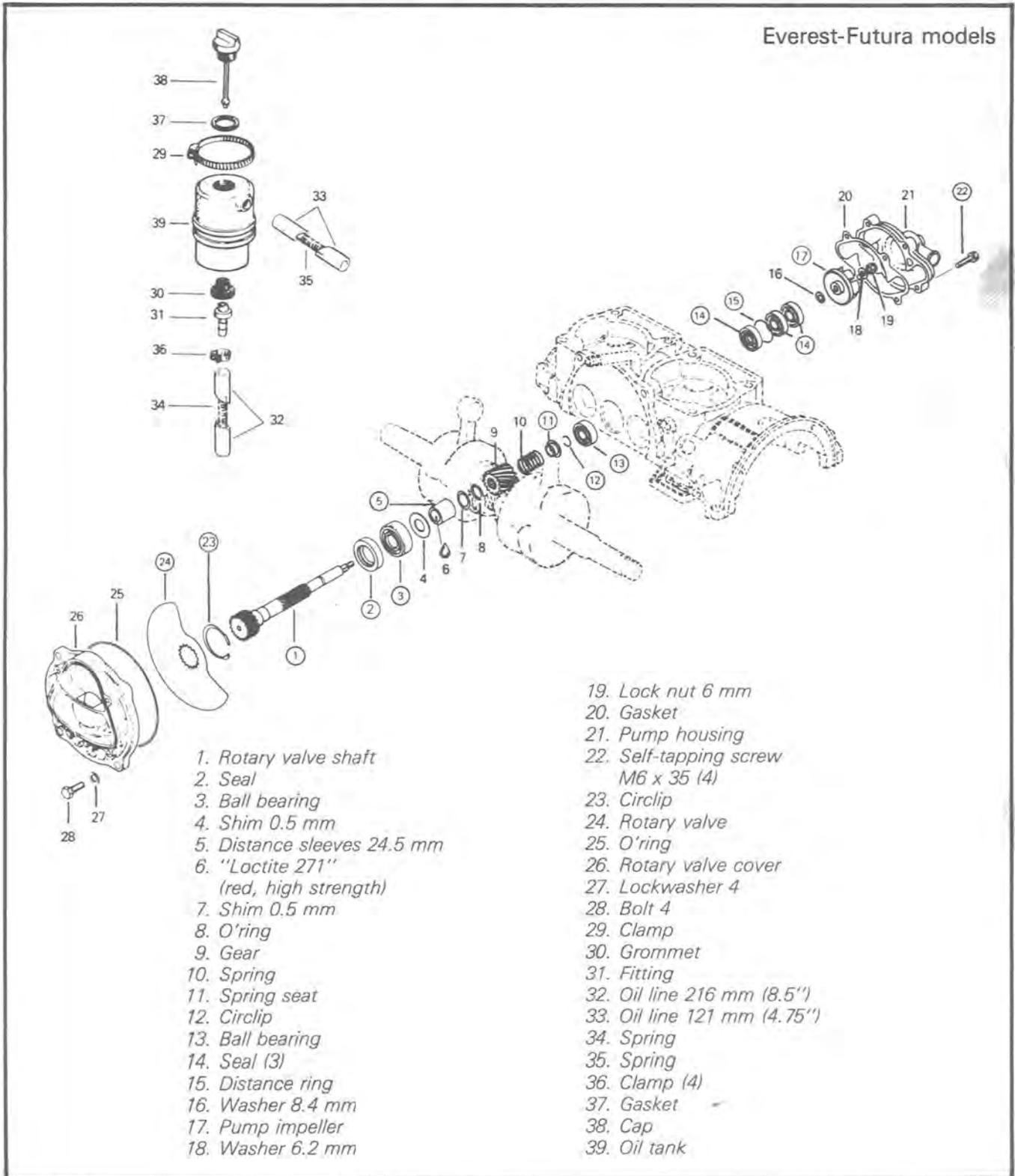
With the pressure cap removed, start engine to allow the coolant to circulate and let it run until normal temperature is reached. Stop engine.

Then recheck coolant level, ensuring that it is 25 mm (1") below filler neck of reservoir.

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

ROTARY VALVE, COOLANT PUMP AND RESERVOIR

Everest-Futura models



- 1. Rotary valve shaft
- 2. Seal
- 3. Ball bearing
- 4. Shim 0.5 mm
- 5. Distance sleeves 24.5 mm
- 6. "Loctite 271"
(red, high strength)
- 7. Shim 0.5 mm
- 8. O'ring
- 9. Gear
- 10. Spring
- 11. Spring seat
- 12. Circlip
- 13. Ball bearing
- 14. Seal (3)
- 15. Distance ring
- 16. Washer 8.4 mm
- 17. Pump impeller
- 18. Washer 6.2 mm

- 19. Lock nut 6 mm
- 20. Gasket
- 21. Pump housing
- 22. Self-tapping screw
M6 x 35 (4)
- 23. Circlip
- 24. Rotary valve
- 25. O'ring
- 26. Rotary valve cover
- 27. Lockwasher 4
- 28. Bolt 4
- 29. Clamp
- 30. Grommet
- 31. Fitting
- 32. Oil line 216 mm (8.5")
- 33. Oil line 121 mm (4.75")
- 34. Spring
- 35. Spring
- 36. Clamp (4)
- 37. Gasket
- 38. Cap
- 39. Oil tank

SECTION 02 ENGINE
SUB-SECTION 05 (464 ENGINE TYPE)

CLEANING

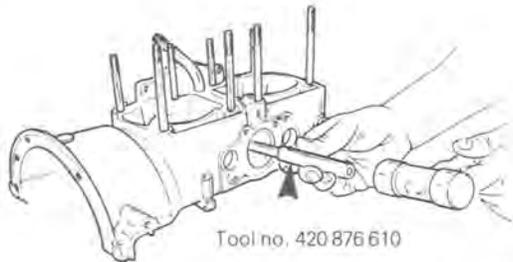
Discard all seals and "O" rings.

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

DISASSEMBLY & ASSEMBLY

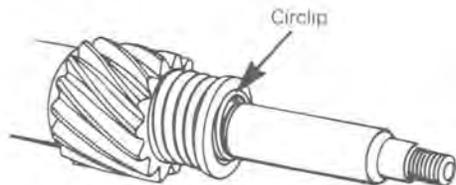
① through ⑫ Rotary valve shaft assembly

To remove rotary valve shaft assembly from crankcase, first remove coolant pump impeller ⑦ and circlip ③. Using the suitable pusher (P/N 420 876 610) and a fiber hammer, push shaft assembly.

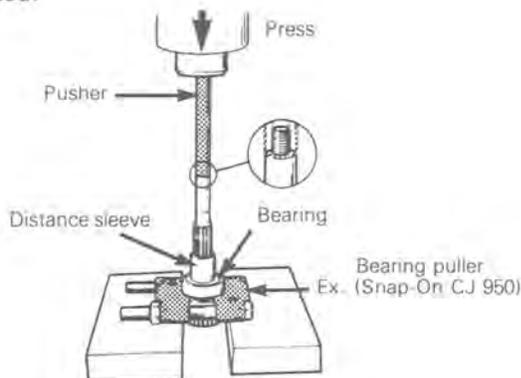


CAUTION: To prevent damage to the end of the rotary valve shaft, use pusher (tool P/N 420 876 610).

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup ⑪ in order to remove circlip ⑫.



⑮ To remove the distance sleeve use a bearing puller (Ex: Snap-on no. CJ 950) and pusher (P/N 420 876 610) as illustrated.

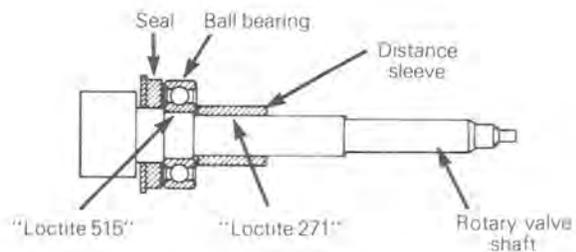


CAUTION: Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

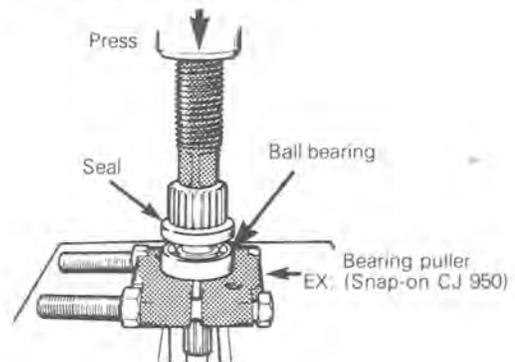
Clean rotary valve shaft and inside of distance sleeve. At assembly apply "Loctite 271" inside of distance sleeve.

①③ At assembly, apply crankcase sealant "Loctite 515" on bearing and rotary valve shaft mating surfaces.

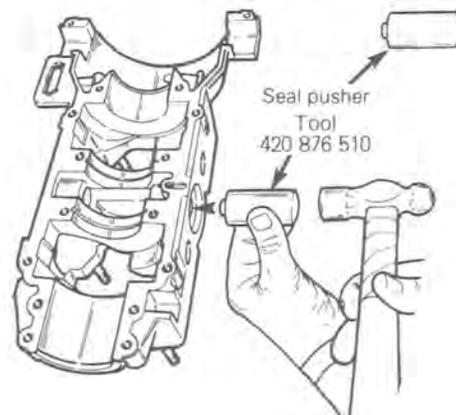
② At assembly apply lithium grease on seal lips.



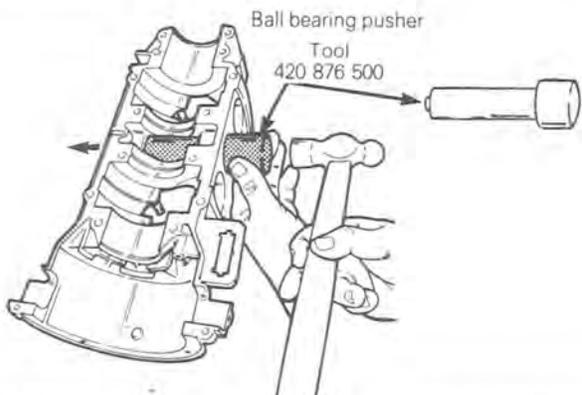
③ Install ball bearing as illustrated.



⑬⑭⑮ To remove seals and bearing:

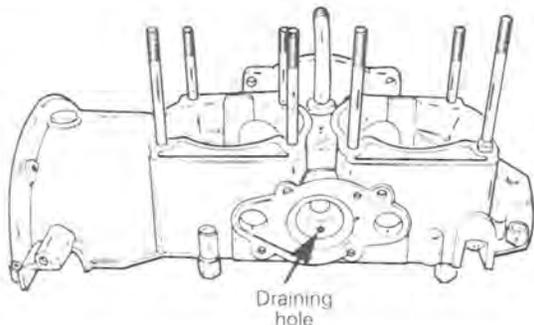


⑬ To install ball bearing.



○ NOTE: Ball bearing ⑬ shielded side must be facing water pump.

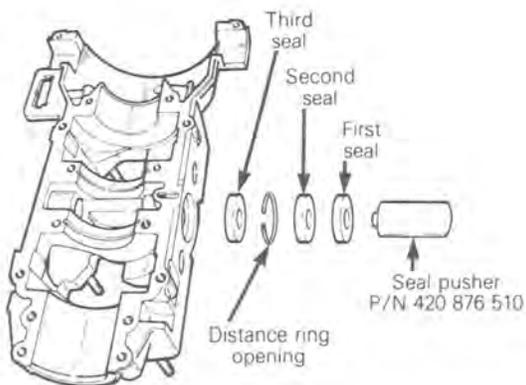
⑭ ⑮ To install seals proceed as follows:



35% of the distance between first and second seals (first seal being flush with crankcase) must be filled with lithium grease or equivalent.

Distance ring opening must be in line with crankcase half draining hole.

(Apply lithium grease on seal lips).



○ NOTE: After installation of seals ⑭ check if the bearing ⑬ is correctly positioned (use pusher P/N 420 876 500).

⑳ Apply "Loctite 242" on threads.

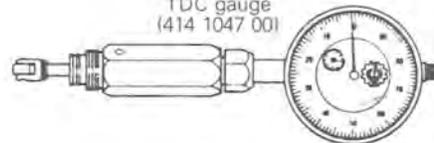
㉑ Rotary valve adjustment when replacing crankcase having no timing marks.

REQUIRED TOOLS

Angle finder
(414 3529 00)



TDC gauge
(414 1047 00)

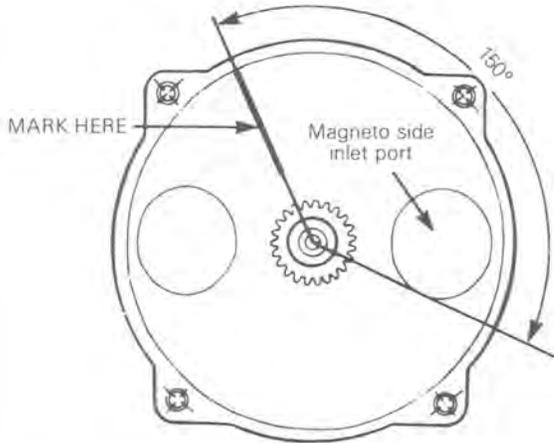


ENGINE TYPE	TIMING MARKS opening, closing
Everest/Futura	150°, 49°
Elite	125°, 60°

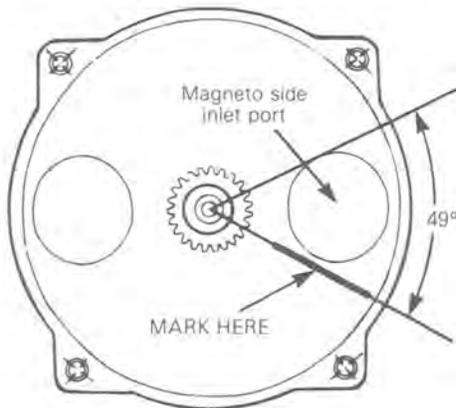
SECTION 02 ENGINE
 SUB-SECTION 05 (464 ENGINE TYPE)

For example: 150° opening
 49° closing

Using angle finder, mark crankcase at 150° from bottom edge of magneto side inlet port.



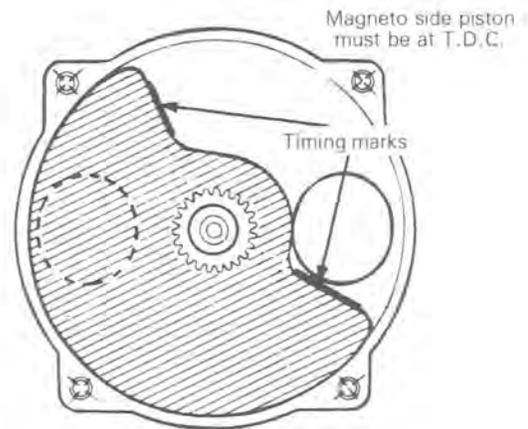
From top edge of magneto side inlet port, mark crankcase at 49°.



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.



Ⓜ Torque to 20 N•m (15 ft-lbs).

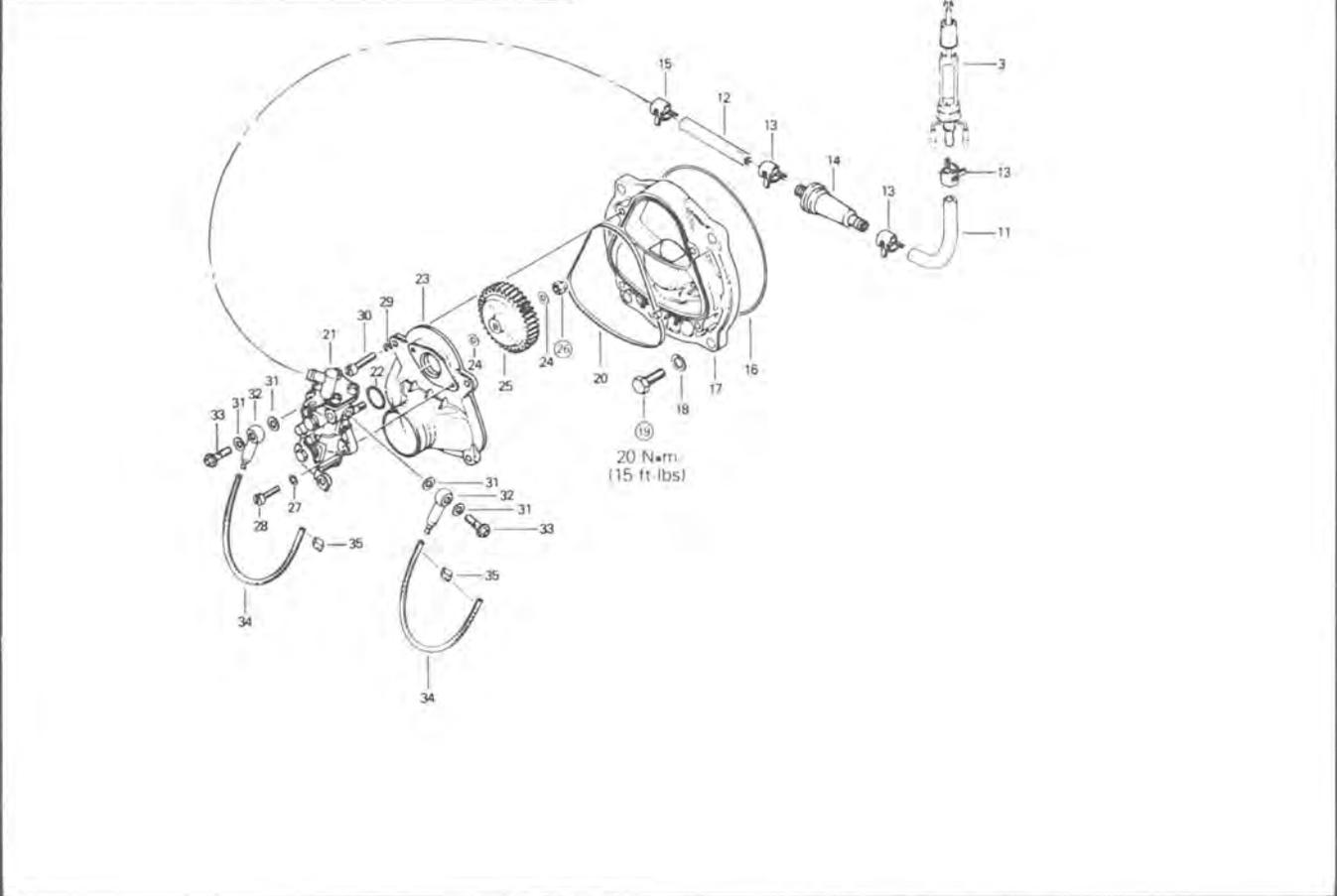
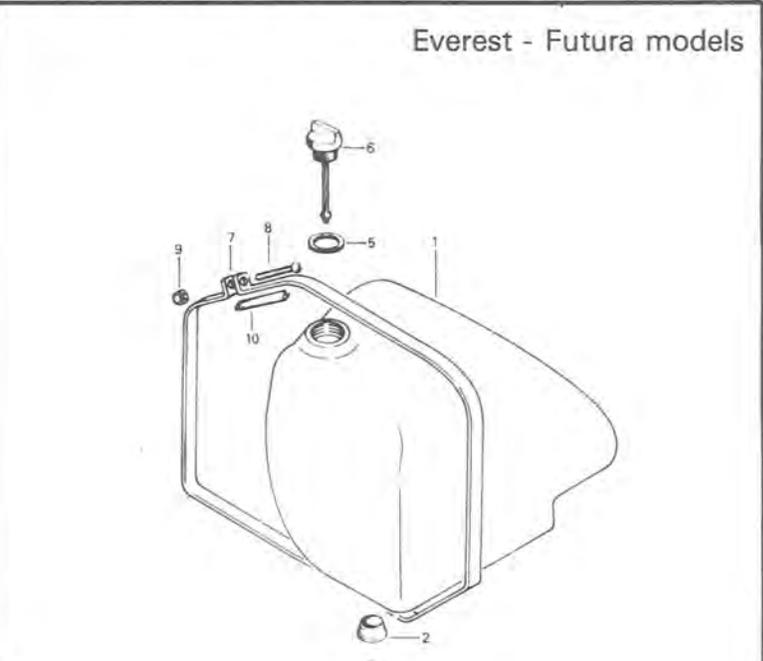
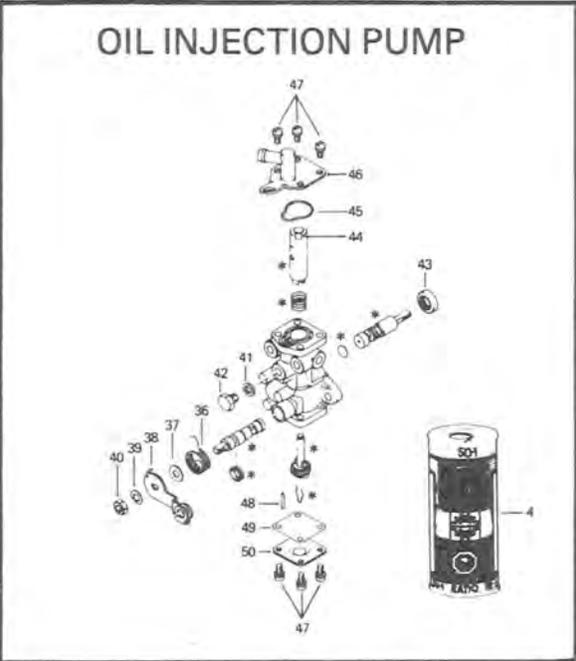
ROTARY VALVE & COOLANT PUMP

For the following 1982 model: Elite

Refer to section 02-05 (Rotary valve & coolant pump).



OIL INJECTION PUMP AND RESERVOIR



SECTION 02 ENGINE

SUB-SECTION 05 (464 ENGINE TYPE)

1. Injection oil tank
2. Grommet
3. Oil level sensor
4. Oil
5. Gasket
6. Oil tank cap
7. Retainer strip
8. Screw
9. Elastic stop nut
10. Trim
11. Oil line 127 mm (5")
12. Oil line 60 mm (2 3/8")
13. Spring clip
14. Filter
15. Spring clip
16. O'ring
17. Rotary valve cover
18. Lockwasher
19. Screw
20. Rubber ring
21. Oil pump
22. O'ring
23. Intake cover
24. Washer
25. Oil pump gear
26. Lock nut
27. Lockwasher
28. Screw
29. Lockwasher
30. Screw
31. Gasket
32. Banjo
33. Screw
34. Oil line 170 mm (6 3/4")
35. Clamp
36. Spring
37. Washer
38. Lever
39. Lockwasher
40. Nut
41. Washer
42. Screw
43. Seal
44. Retainer
45. O'ring
46. Plate
47. Screw with lockwasher
48. Stop pin
49. Gasket
50. Cam casing plate

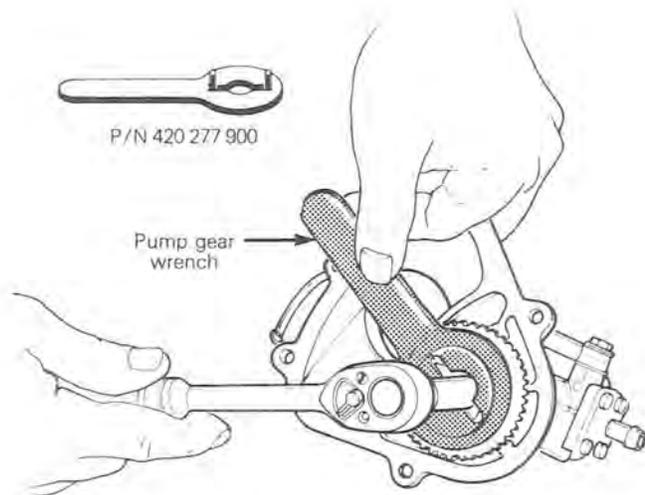
Parts in illustration marked with * are not available as spare parts.

CLEANING

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

DISASSEMBLY

- NOTE: Oil pump is not available in single parts.
- ②⑤ ②⑥ To remove retaining nut, lock gear using no. 420 277 900 tool.



ASSEMBLY

- ⑲ Torque to 20 N•m (15 ft-lbs).

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.

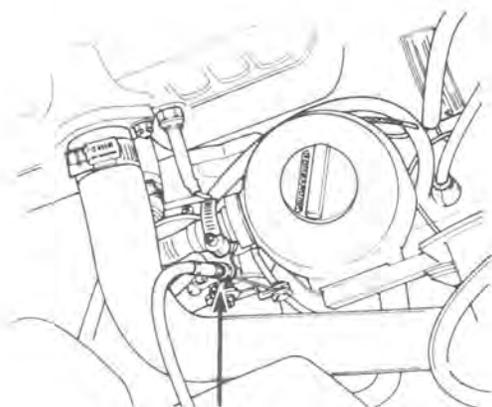
Tighten the adjuster nut.

To bleed oil lines:

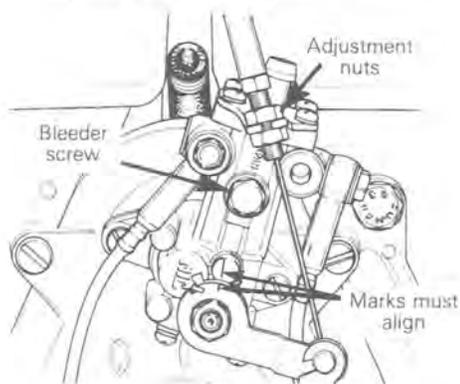
All oil lines should be full of oil. To bleed the main oil line (between tank and pump), loosen the bleeder screw and let the air escape until oil starts to flow out.

Make sure tank has enough oil

To bleed the small injector 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.



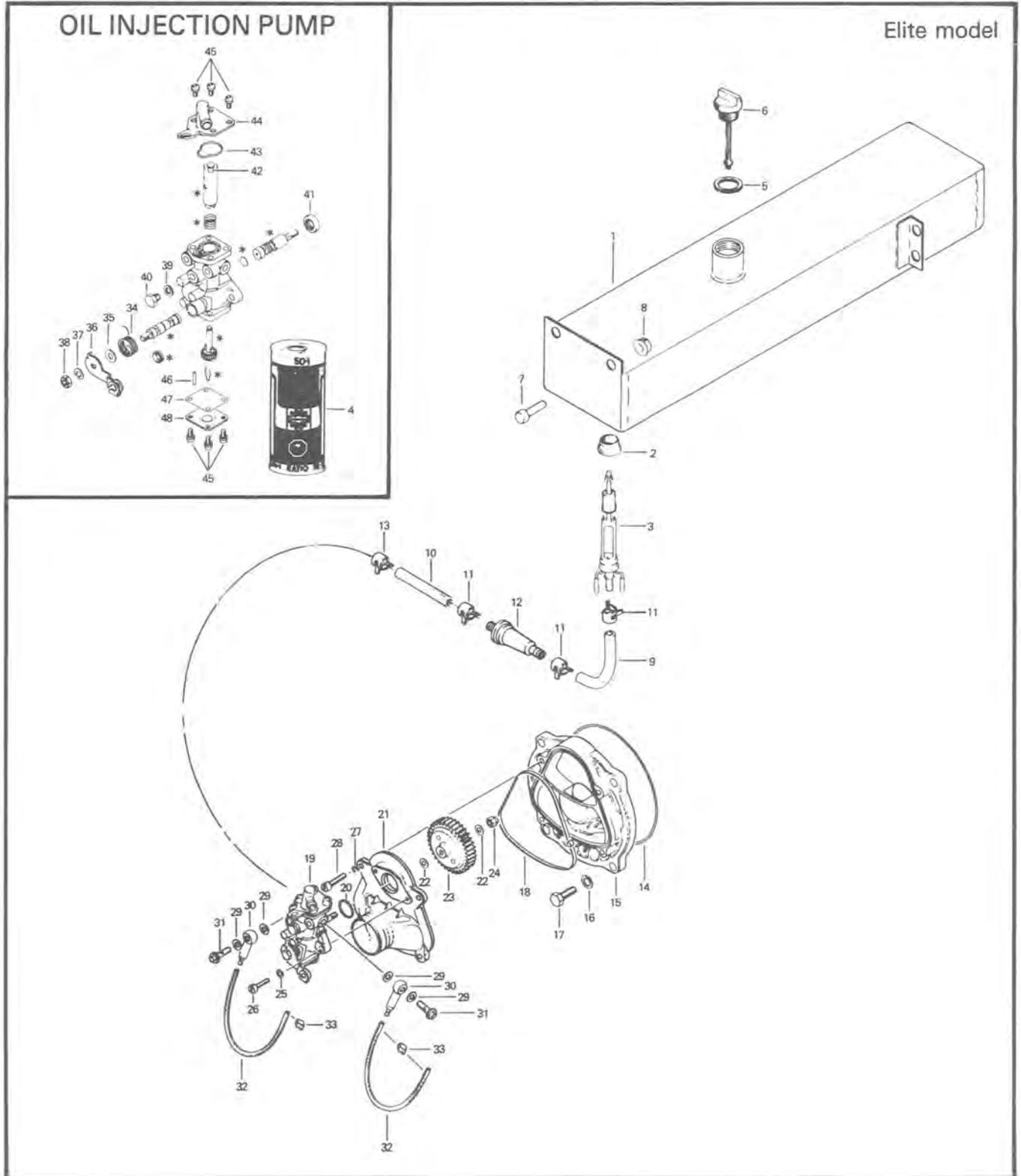
Injection pump cable adjustment



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



OIL INJECTION PUMP AND RESERVOIR



SECTION 02 ENGINE

SUB-SECTION 05 (464 ENGINE TYPE)

1. Injection oil tank
2. Grommet
3. Oil lever sensor
4. Oil
5. Gasket
6. Oil tank cap
7. Hexagonal head cap screw 1/4-20 x 3/4 (4)
8. Hexagonal flanged elastic stop nut 10-24 (4)
9. Oil line 4" (102 mm)
10. Oil line 3" (76 mm)
11. Spring clip (3)
12. Filter
13. Spring clip
14. O'ring
15. Rotary valve cover
16. Lockwasher 8 (4)
17. Hexagonal screw M8 x 20 (4)
18. Rubber ring
19. Oil pump
20. O'ring
21. Intake cover
22. Washer 6.2 (2)
23. Oil pump gear 44 teeth
24. Lock nut 6 mm
25. Lockwasher 5 (2)
26. Cylindrical slotted screw M5 x 16 (2)
27. Lockwasher 6 (4)
28. Cylindrical slotted screw M6 x 20 (4)
29. Oil banjo gasket (4)
30. Banjo (2)
31. Banjo bolt (2)
32. Oil line 6.7" (170 mm) x 2
33. Clamp (4)
34. Spring
35. Washer
36. Lever
37. Lockwasher 6
38. Hexagonal nut 6
39. Washer
40. Hexagonal head screw M6 x 7
41. Seal
42. Retainer
43. O'ring
44. Plate
45. Screw with lockwasher (8)
46. Stop pin
47. Gasket
48. Cam casing plate

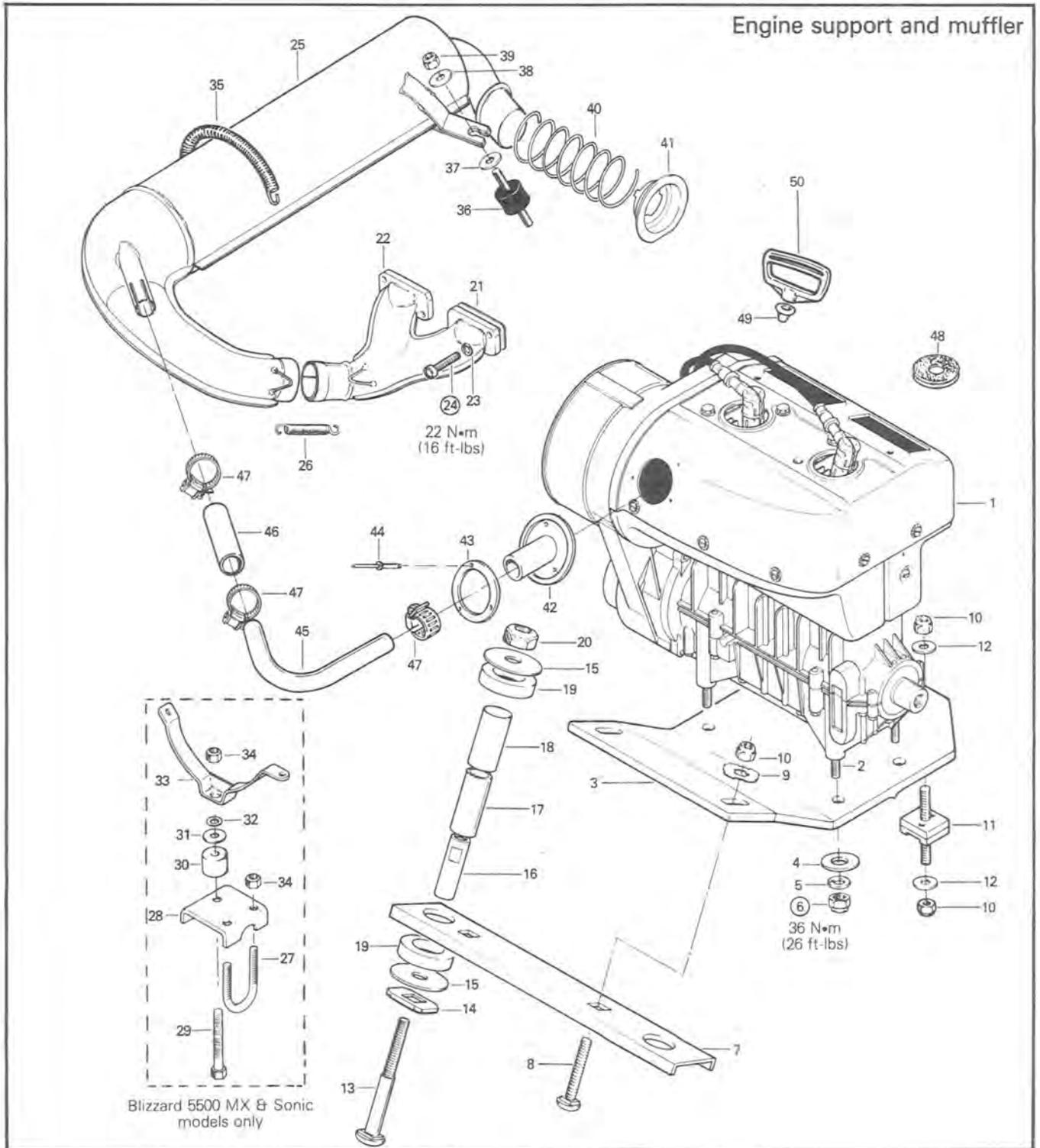
ELITE MODEL

For oil injection pump service procedure and adjustments, refer to page 5 in this section.

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

503 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION



SECTION 02 ENGINE

SUB-SECTION 06 (503 ENGINE TYPE)

1. Engine Rotax type 503
2. Stud M10 x 25 (4)
3. Engine bracket
4. Flat washer 10.5 mm x 21 x 2 (4)
5. Lockwasher 10 mm (4)
6. Hexagonal nut 10 mm (4)
7. Cross support
8. Carriage bolt 3/8-16 x 1 1/4 (2)
9. Internal tooth dished washer (2)
10. Hexagonal elastic stop nut 3/8-16 (4)
11. Rubber mount
12. Washer (2)
13. Carriage bolt 7/16-14 x 2 3/4 (threaded 1 1/4) (2)
14. Retainer plate (2)
15. Washer (4)
16. Threaded bushing (2)
17. Rubber sleeve (2)
18. Sleeve (2)
19. Damper (4)
20. Hexagonal elastic stop nut 7/16-14 (2)
21. Gasket (4)
22. Exhaust manifold
23. Lockwasher 8 mm (4)
24. Hexagonal socket head cap screw M8 x 30 (4)
25. Muffler
26. Spring (3)
27. "U" bolt
28. Muffler support bracket
29. Hexagonal head cap screw 1/4-20 x 1 1/4
30. Rubber spacer
31. Asbestos washer
32. Flat washer 17/64 x 7/8 x .060
33. Muffler support
34. Hexagonal elastic stop nut 1/4-20 (3)
35. Spring
36. Rubber mount
37. Isolating washer
38. Washer
39. Hexagonal elastic stop nut 5/16-18
40. Spring
41. Spring seat
42. Connector
43. Connector ring
44. Rivet (3)
45. Elbow
46. Hose 4" (102 mm)
47. Clamp (3)
48. Grommet (spark plug) (2)
49. Rubber buffer
50. Starter grip

REMOVAL FROM VEHICLE

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

- Pulley guard, drive belt.
- Muffler.
- Air intake silencer.
- Throttle cable at carburetor.
- Fuel lines and pulsation line.

 **NOTE:** Secure fuel lines so that the opened ends are higher than the fuel level in the tank.

- Hood retaining cable.
- Rewind starter cable.
- Wiring harness and starter wires.

 **WARNING:** Always disconnect battery ground cable prior to any other wire of the starting system.

- Engine support and reinforcing cross support nuts (3).

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

- ⑥ Torque to 36 N•m (26 ft-lbs).
- ⑳ Torque to 22 N•m (16 ft-lbs).

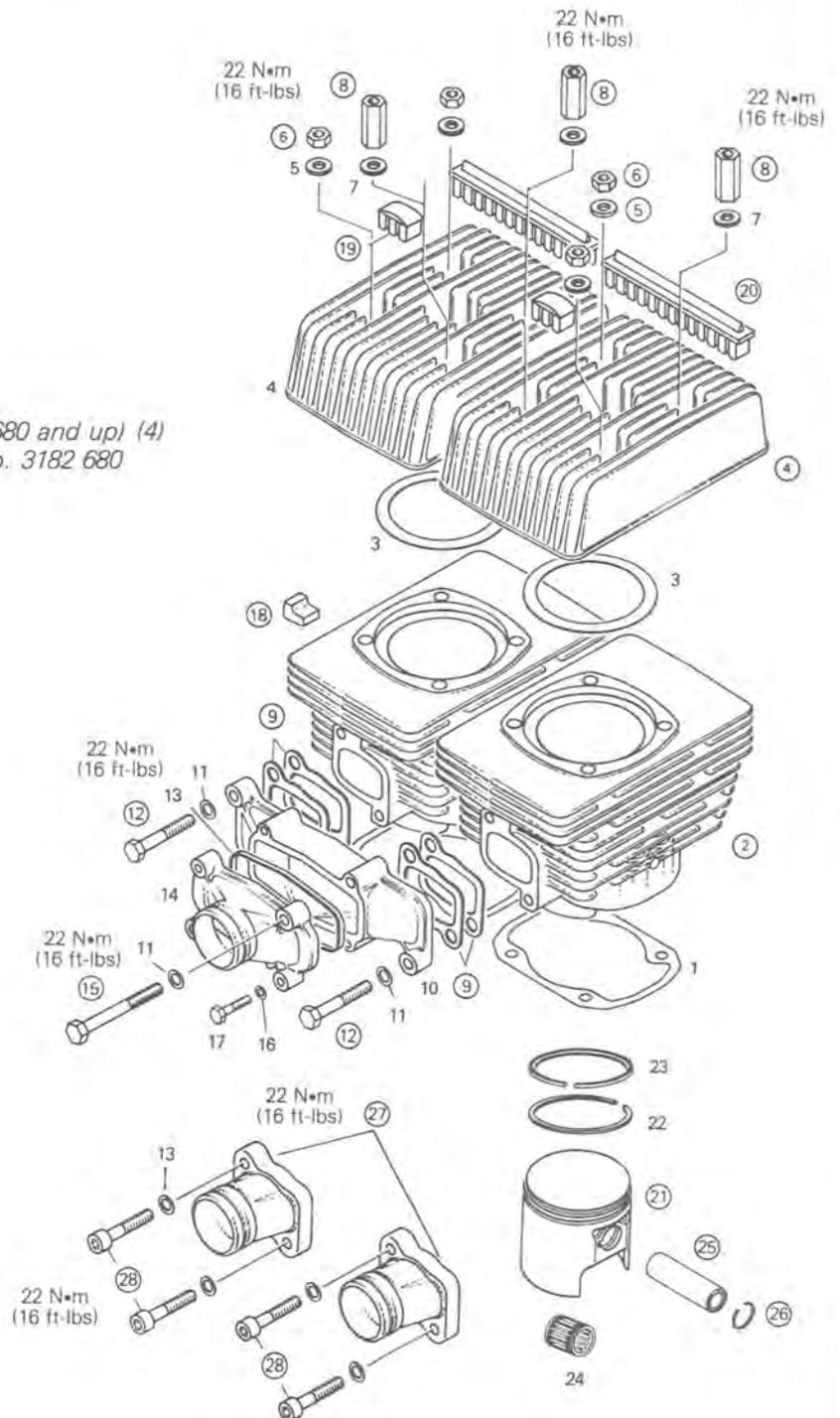
INSTALLATION ON VEHICLE

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

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

TOP END

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 (serial no. 3182 680 and up) (4)
8. Distance nut 8 x 37 mm (serial no. 3182 680 and up) (4)
9. Intake manifold gasket (4)
10. Intake manifold
11. Lockwasher 8 mm (4)
12. Hexagonal bolt M8 x 40 mm (4)
13. O'ring
14. Intake manifold cover
15. Hexagonal bolt M8 x 64 mm (2)
16. Lockwasher 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)
27. Intake manifold (2)
28. Allen screw M8 x 40 mm (4)



**SECTION 02 ENGINE
SUB-SECTION 06 (503 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

⑳ ㉓ ㉔ ㉕ Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Use a pointed tool to remove circlips from piston.

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

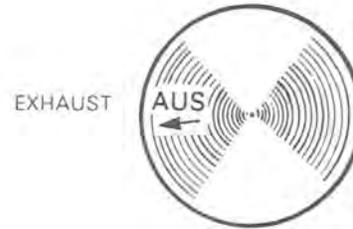
INSPECTION

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")

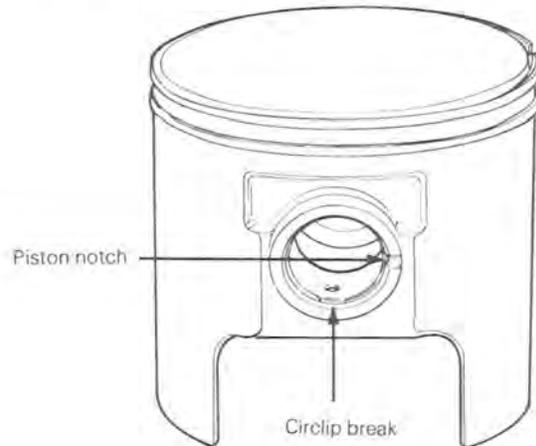
○ **NOTE:** For the measurement procedures, refer to "Engine Tolerances Measurement", section 02, sub-section 09.

㉖ 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.



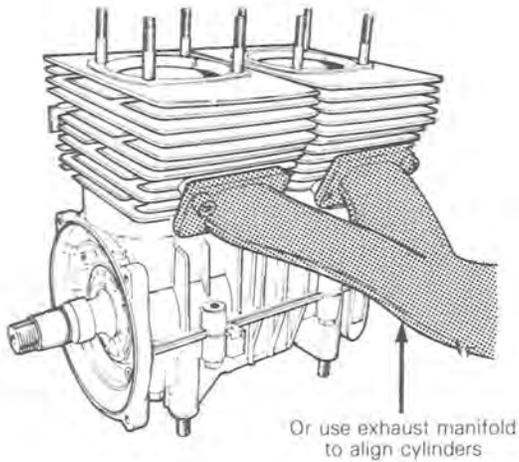
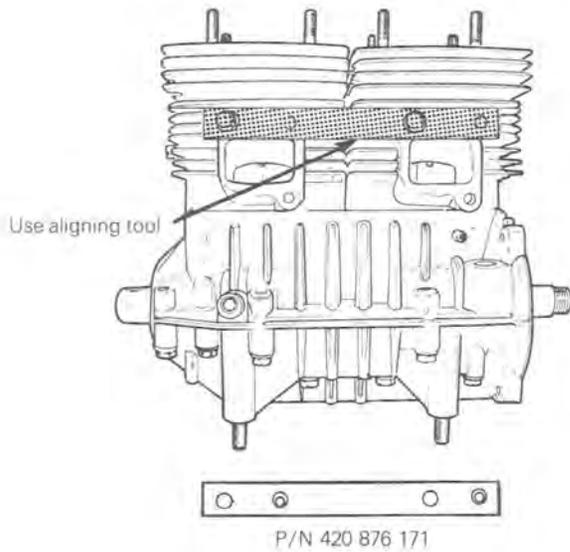
㉗ To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated.

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

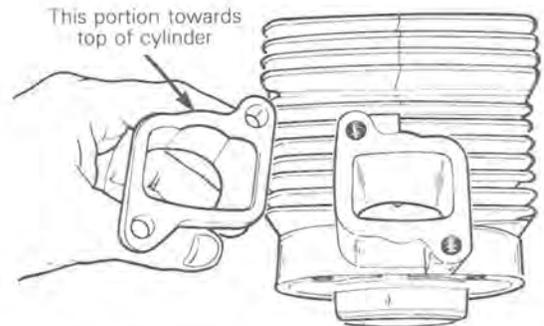


ASSEMBLY

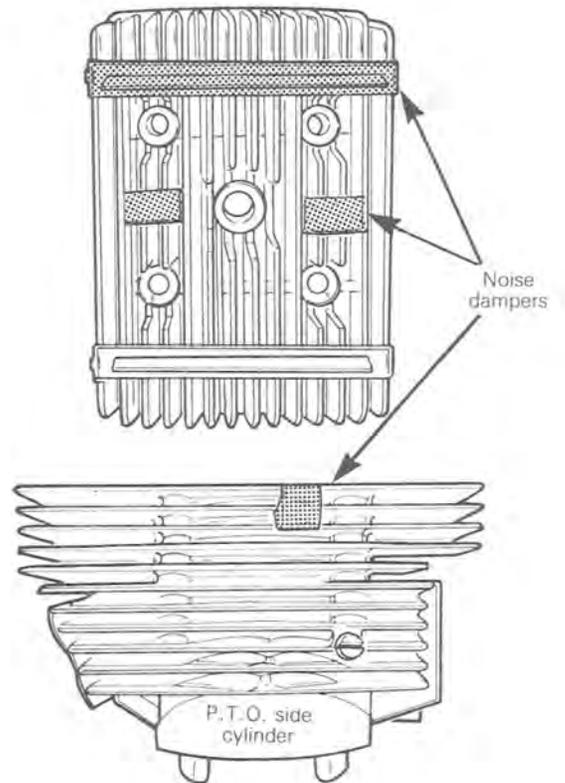
②④ At cylinder and/or cylinder head installation, use P/N 420 876 171 aligning tool (or exhaust manifold) to ensure sealing of intake manifold and exhaust (See Tools Section), before tightening cylinder head nuts.



⑲ Install intake manifold as per the following illustration.

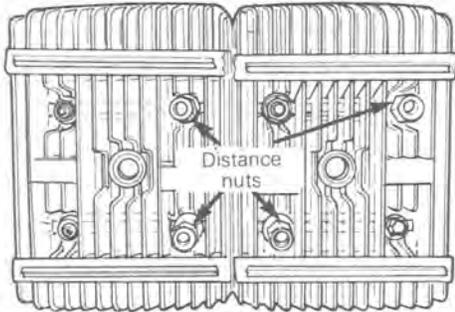


⑳㉑㉒ For proper position of noise dampers, refer to the following illustrations.



SECTION 02 ENGINE
SUB-SECTION 06 (503 ENGINE TYPE)

- ⑥ ⑧ Position nuts and distance nuts as illustrated.

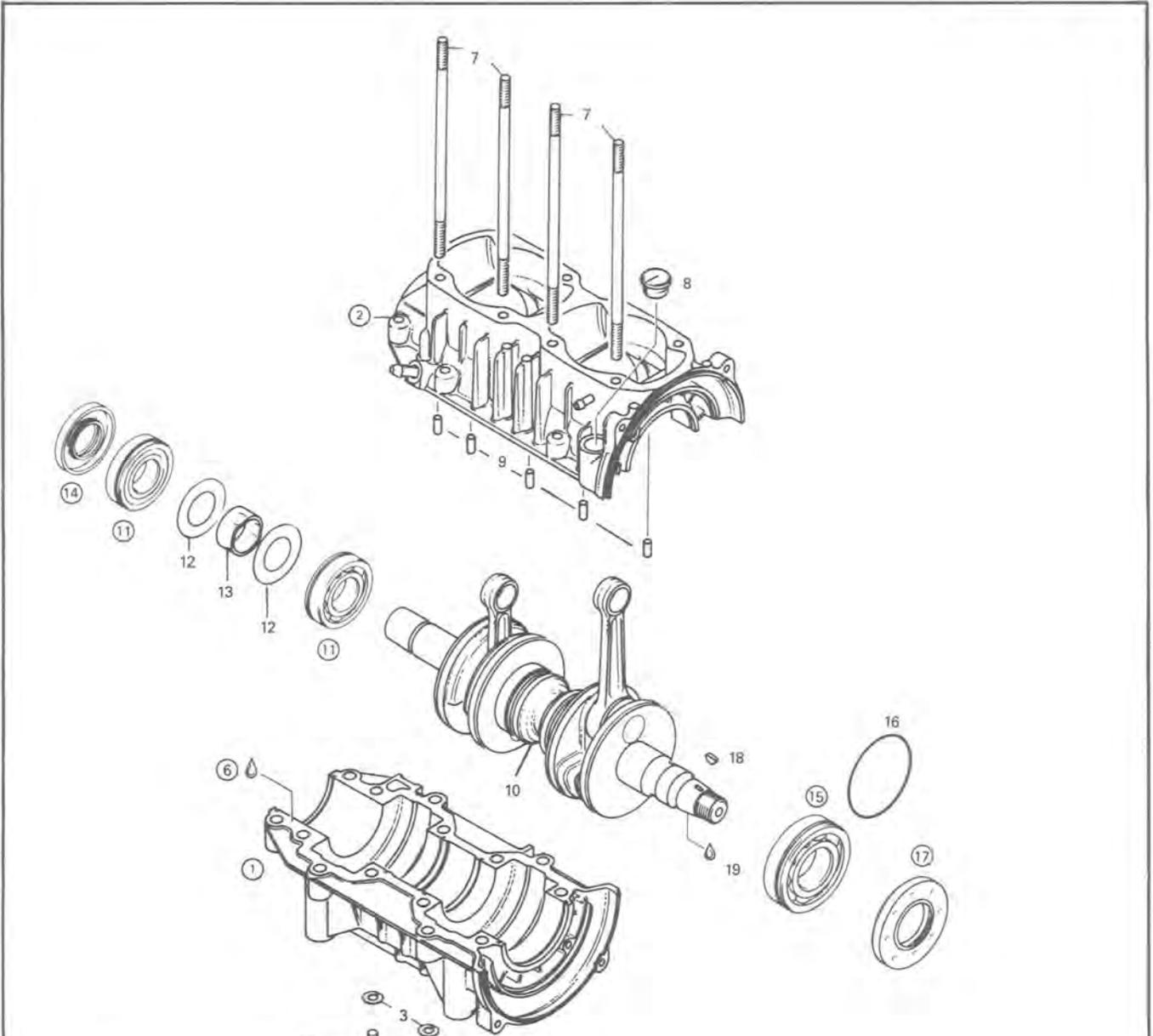


Cross torque cylinder head nuts to 22 N•m (16 ft-lbs); torque each cylinder head individually.

Install armature plate, fan housing and then air deflector.

- ⑨ Install a gasket on each side of the air deflector.
- ⑫ ⑮ ⑳ Torque intake manifold bolts to 22 N•m (16 ft-lbs).

BOTTOM END



- 1. Crankcase lower half
- 2. Crankcase upper half
- 3. Lockwasher
- 4. Screw M8 x 45
- 5. Screw M8 x 70
- 6. Loctite 515
- 7. Stud
- 8. Cable grommet
- 9. Rubber plug
- 10. Crankshaft

22 N•m
 (16 ft-lbs)

22 N•m
 (16 ft-lbs)

- 11. Ball bearing
- 12. Shim 1 mm
- 13. Spacer
- 14. Seal P.T.O. side
- 15. Ball bearing
- 16. O'ring
- 17. Seal mag side
- 18. Woodruff key
- 19. Loctite 242

SECTION 02 ENGINE
SUB-SECTION 06 (503 ENGINE TYPE)

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.

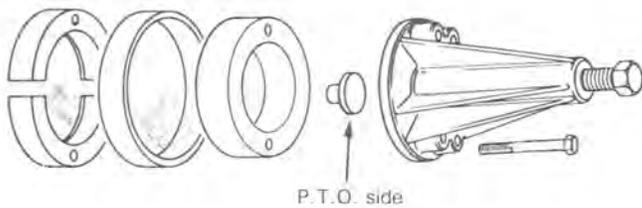
DISASSEMBLY

General

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

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

⑪ ⑮ To remove ball bearings from crankshaft, use a special puller (see Tools).



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")
Connecting rod alignment	N.A.	N.A.	N.A.

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

ASSEMBLY

⑪ ⑮ Prior to installation, place bearings into an oil container heated to 100°C (212°F).

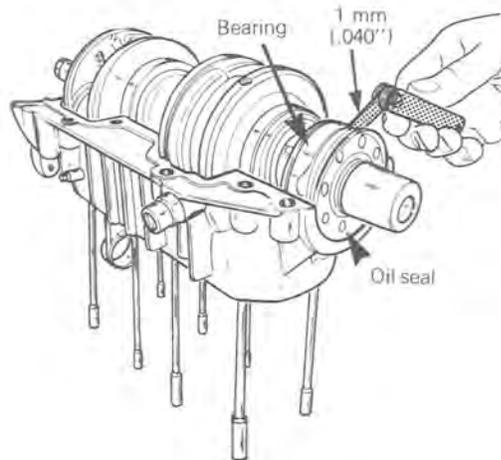
This will expand bearings and ease installation. Install bearings with groove as per exploded view.

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

⑭ ⑰ 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.

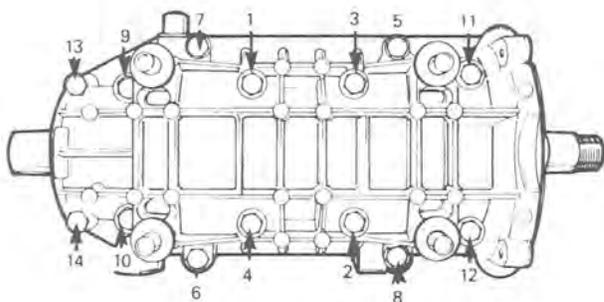


① ② Crankcase halves are factory matched and therefore, are not interchangeable as single halves.

⑥ Prior to joining of crankcase halves, apply "Loctite 515" (413 7027) on mating surfaces.

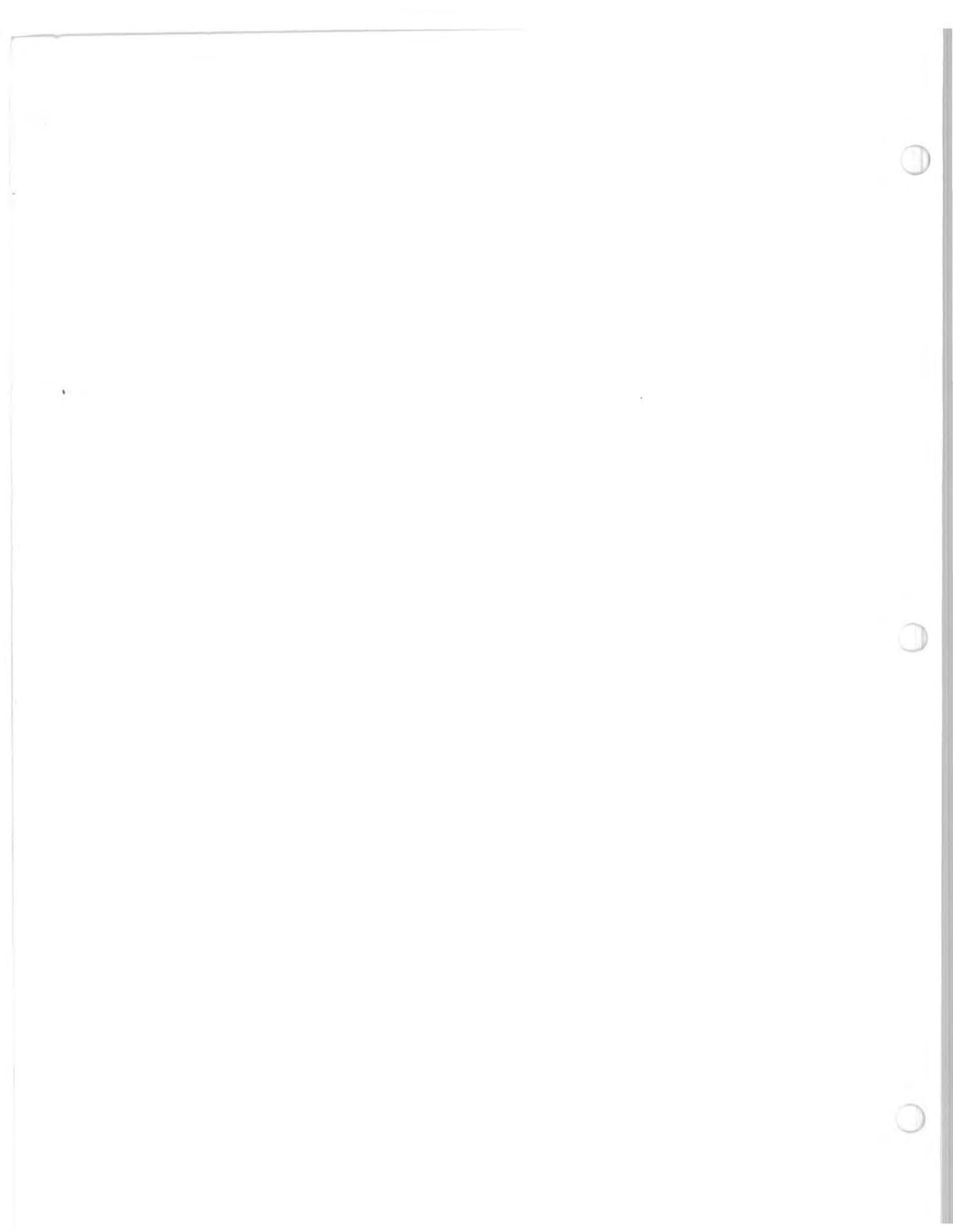
Position the crankcase halves together and tighten nuts (or bolts) by hand then install armature plate (tighten) on magneto side to correctly align the crankcase halves.

Torque nuts (or bolts) to 22 N•m (16 ft-lbs) following illustrated sequence.

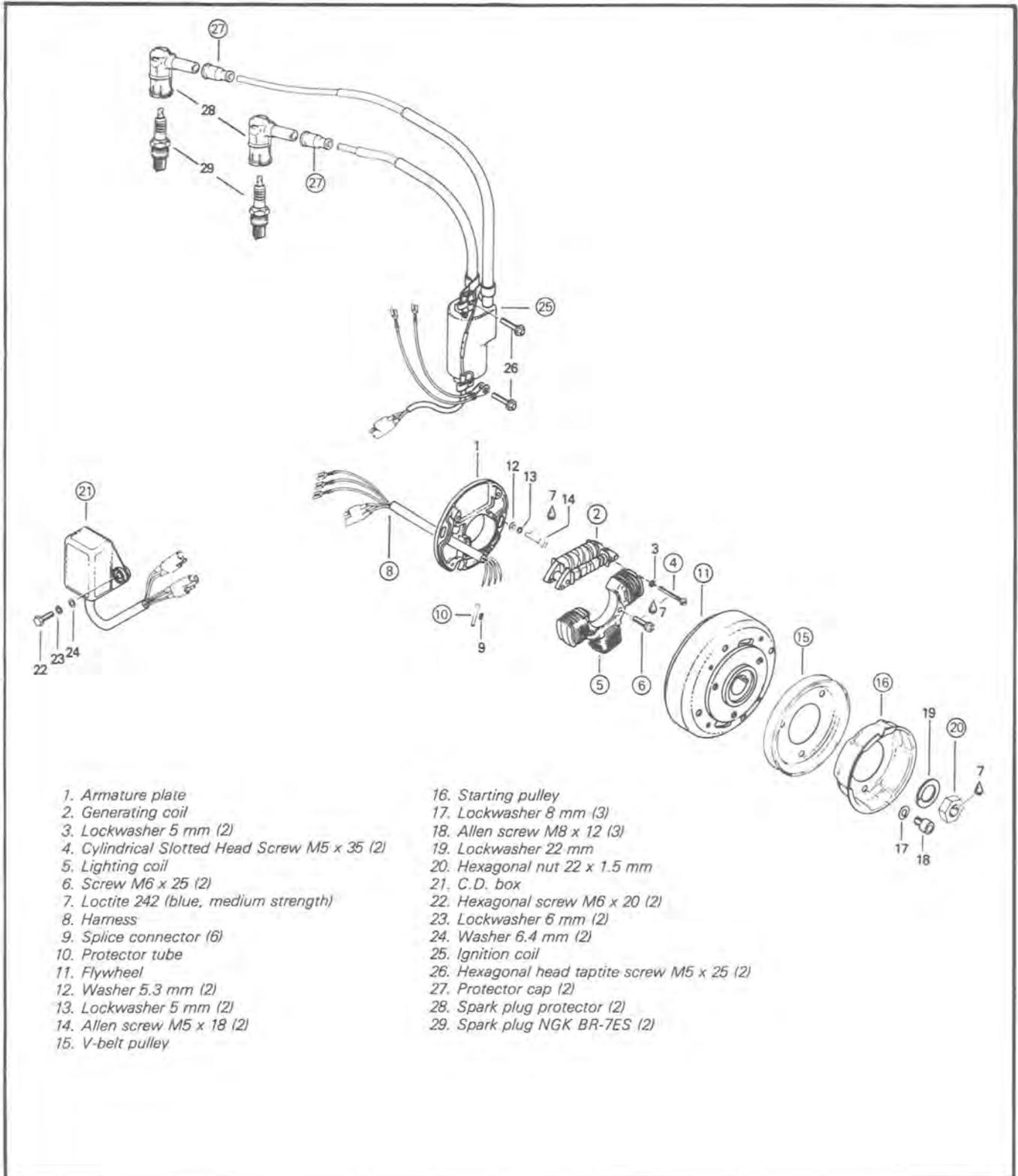


④ ⑤ Torque to 22 N•m (16 ft-lbs).

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



MAGNETO



- 1. Armature plate
- 2. Generating coil
- 3. Lockwasher 5 mm (2)
- 4. Cylindrical Slotted Head Screw M5 x 35 (2)
- 5. Lighting coil
- 6. Screw M6 x 25 (2)
- 7. Loctite 242 (blue, medium strength)
- 8. Harness
- 9. Splice connector (6)
- 10. Protector tube
- 11. Flywheel
- 12. Washer 5.3 mm (2)
- 13. Lockwasher 5 mm (2)
- 14. Allen screw M5 x 18 (2)
- 15. V-belt pulley

- 16. Starting pulley
- 17. Lockwasher 8 mm (3)
- 18. Allen screw M8 x 12 (3)
- 19. Lockwasher 22 mm
- 20. Hexagonal nut 22 x 1.5 mm
- 21. C.D. box
- 22. Hexagonal screw M6 x 20 (2)
- 23. Lockwasher 6 mm (2)
- 24. Washer 6.4 mm (2)
- 25. Ignition coil
- 26. Hexagonal head taptite screw M5 x 25 (2)
- 27. Protector cap (2)
- 28. Spark plug protector (2)
- 29. Spark plug NGK BR-7ES (2)

SECTION 02 ENGINE
SUB-SECTION 06 (503 ENGINE TYPE)

CLEANING

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

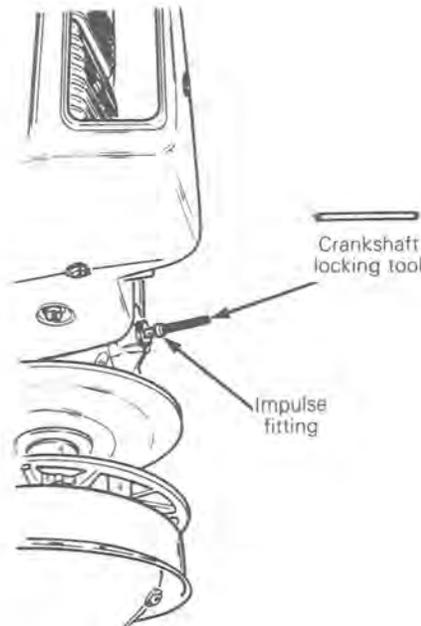
▼ CAUTION: Clean armature and magneto using only a clean cloth.

DISASSEMBLY

- To gain access to magneto assembly, remove:
 - rewind starter;
 - starting and V-belt pulleys ⑮ ⑯.

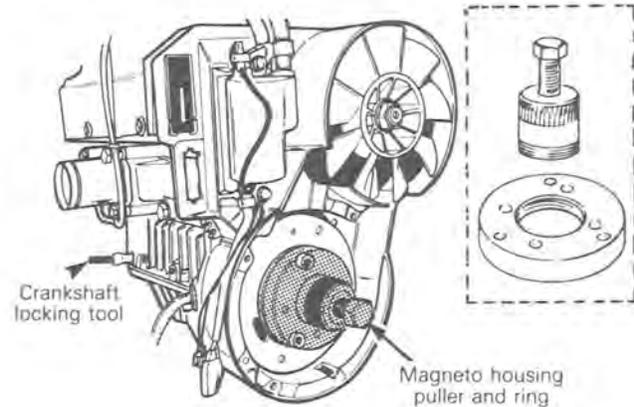
○ NOTE: Before disassembling magneto plate, indexing marks should be located to facilitate re-assembly.

- ⑳ To remove magneto flywheel retaining nut:
 - lock crankshaft with crankshaft locking tool (service tool) as illustrated (magneto side piston must be be at top dead center);
 - remove magneto retaining nut.



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

- ⑪ 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;



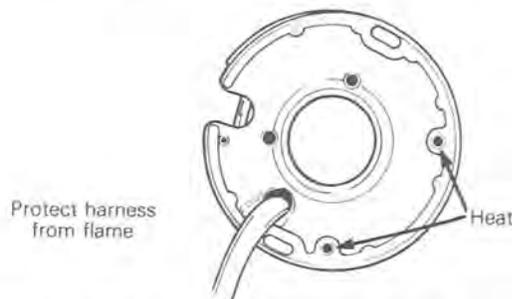
○ NOTE: For the above procedure, the locking type puller can be used without crankshaft locking tool.



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

REPAIR

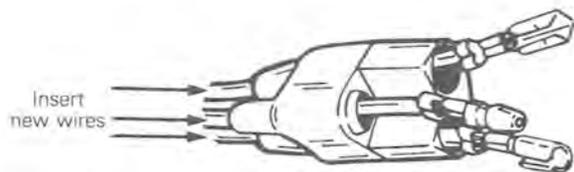
- ⑫ To replace generating coil:
 - Heat the armature plate around the screw holes to break the Loctite bond (200°F).



▼ CAUTION: Protect harness from flame.

SECTION 02 ENGINE
SUB-SECTION 06 (503 ENGINE TYPE)

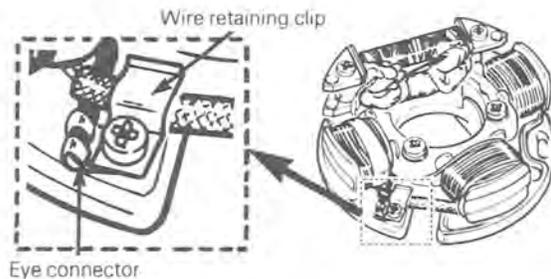
- Remove screws (use Phillips no. 2 or suitable flat screw driver).
- Cut the four wires as close as possible to the coil body.
- To pass new coil wires in harness, tape the old wires to the end of new wires and pull them through the harness protector tube.
- Insert the new wires into the old connector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



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.

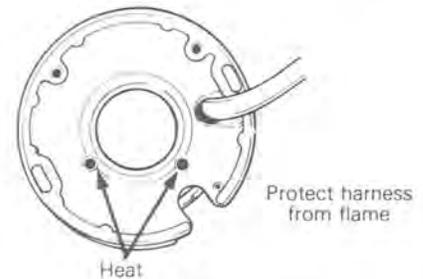


- To install the new coil on the armature plate, remove the shipping nuts from the new coil and apply Loctite 242 (blue, medium strength) to screws ④ before assembly.

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

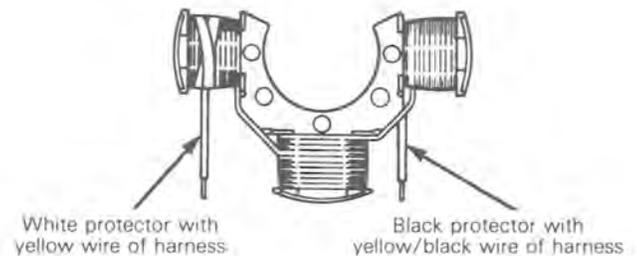
● ⑤ To replace lighting coil:

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



CAUTION: Protect harness from flame.

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

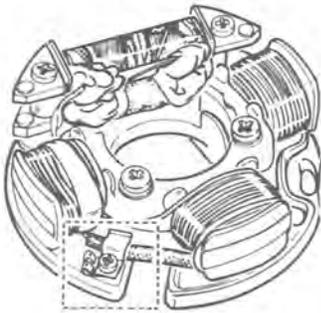


- ⑩ Position protector tubes over connections.
- ⑥ Prior to assembly, apply "Loctite 242" (blue, medium strength).
- Fasten retaining clip onto protector tubes.

SECTION 02 ENGINE

SUB-SECTION 06 (503 ENGINE TYPE)

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



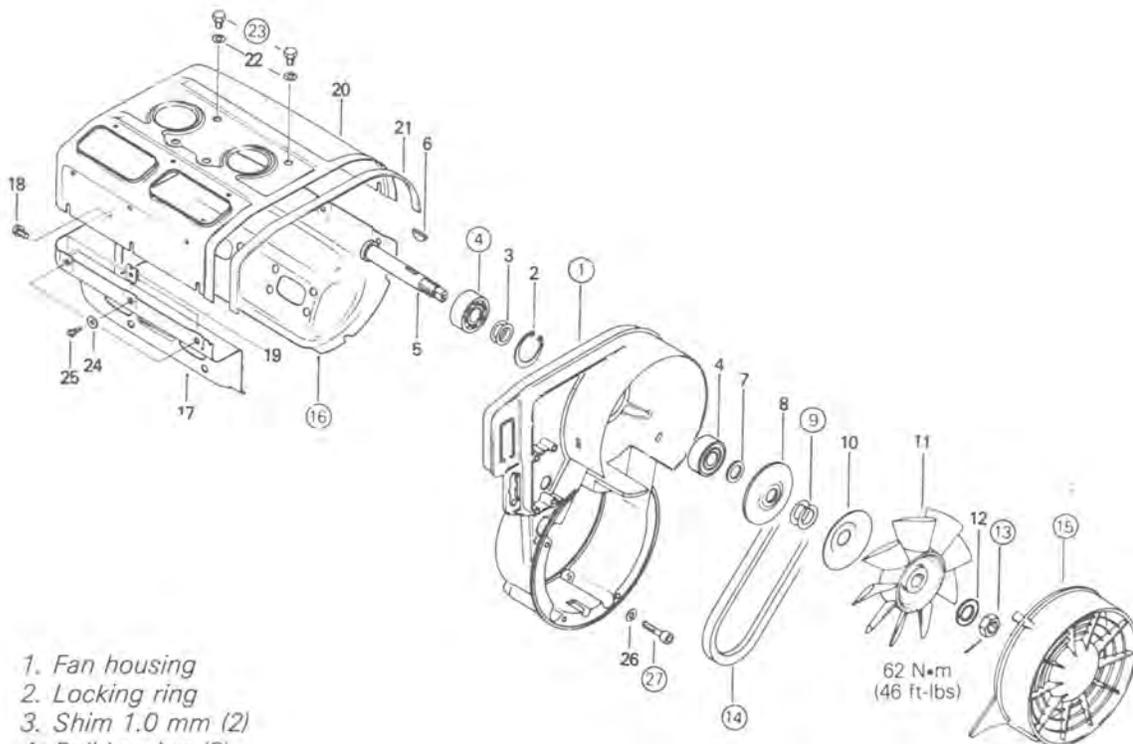
CAUTION: Before reinstalling magneto remove the loose epoxy from harness.

ASSEMBLY

- Clean crankshaft extension (taper).
- Apply "Loctite 242" on taper.
- Position key and magneto housing on crankshaft.
- ⑳ Clean nut threads and apply "Loctite 242" (blue, medium strength) before tightening nut to 85 N•m (63 ft-lbs).
- ⑧ ⑳ ㉑ ㉒ ㉓ At reassembly coat all electric connections with dielectric or lithium grease to prevent corrosion or moisture penetration.

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

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. Locking 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. Lockwasher 8 (4)
23. Hexagonal screw M8 x 16 (4)
24. Washer 4 x 15.8 (8)
25. Screw B4.8 x 16 (8)
26. Lockwasher 6 (4)
27. Cylindrical screw M6 x 30 (4)

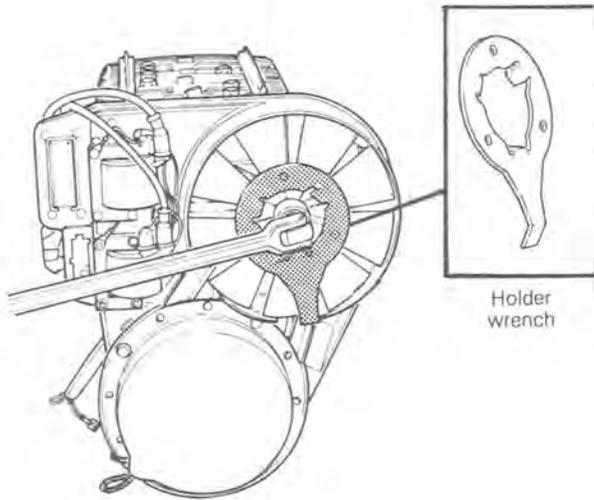
SECTION 02 ENGINE
SUB-SECTION 06 (503 ENGINE TYPE)

CLEANING

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

DISASSEMBLY AND ASSEMBLY

⑬ 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 nut to 62 N•m (46 ft-lbs).



Holder
wrench

⑨ ⑭ Fan belt free-play must be 6 mm (1/4"). To adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between fan and lockwasher.

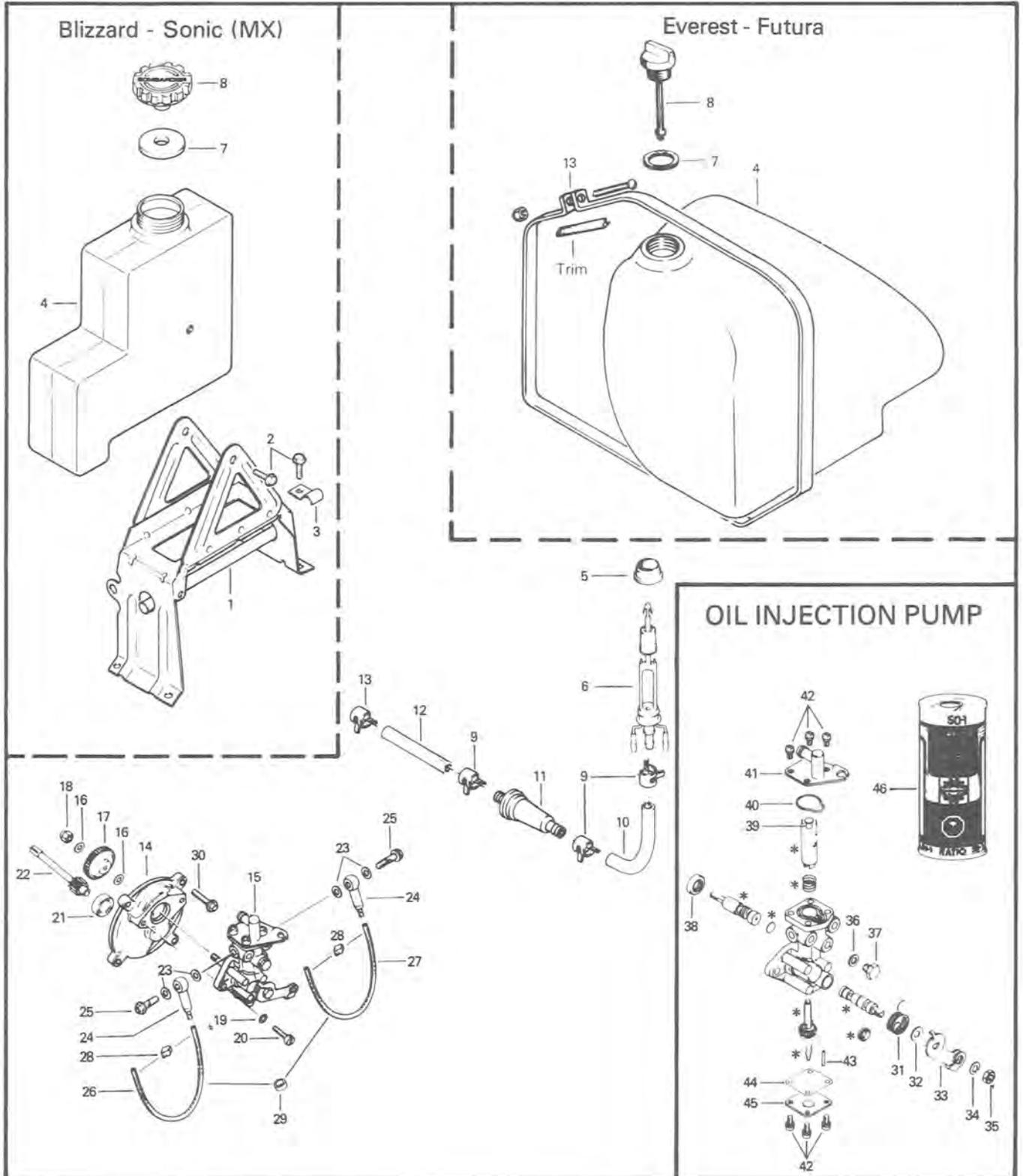
① ④ It is first necessary to heat bearing housing to 65°C (150°F) to remove or install bearing.

⑮ ⑳ ㉑ 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 A gasket must be placed on both sides (inner and outer) of intake and exhaust holes.

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

OIL INJECTION PUMP AND RESERVOIR



SECTION 02 ENGINE

SUB-SECTION 06 (503 ENGINE TYPE)

1. Support
2. Hexagonal washer head powerlock screw
1/4-20 x 1/2 (6)
3. Clip
4. Injection oil tank
5. Grommet
6. Oil level switch
7. Gasket
8. Oil tank cap
9. Spring clip (3)
10. Oil line 4" (102 mm)
11. Filter
12. Oil line 4" (102 mm)
13. Retaining strip
14. Oil pump mounting flange
15. Oil pump (with inlet elbow)
16. Washer 6.2 (2)
17. Oil pump gear 27 teeth
18. Lock nut 6 mm
19. Lockwasher 5 (2)
20. Cylindrical slotted screw M5 x 16 (2)
21. Ball bearing
22. Gear 9 teeth
23. Oil banjo gasket (4)
24. Banjo(2)
25. Banjo bolt (2)
26. Oil line 230 mm (9")
27. Oil line 360 mm (14")
28. Clamp (4)
29. Rubber ring
30. Taptite screw M5 x 16 (4)
31. Spring
32. Washer
33. Lever
34. Lockwasher 6 mm
35. Hexagonal nut 6
36. Washer
37. Hexagonal head screw M6 x 7
38. Seal
39. Retainer
40. O'ring
41. Plate (with inlet elbow)
42. Screw with lockwasher (8)
43. Stop pin
44. Gasket
45. Cam casing plate
46. Oil

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

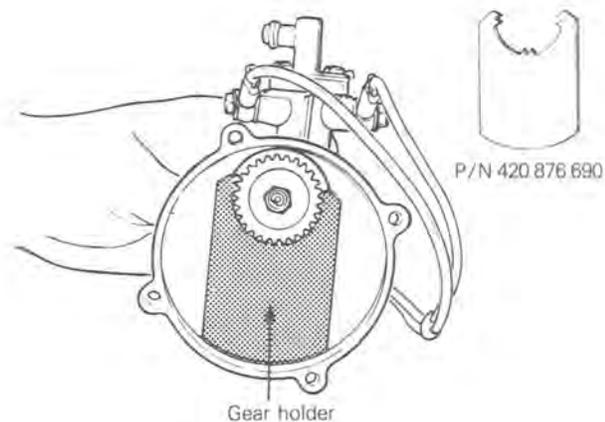
CLEANING

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

DISASSEMBLY

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

⑰ ⑱ To remove retaining nut, lock gear in place using no. 420 876 690 tool.



⑭ ⑲ To remove bearing, heat ⑭ mounting flange to approximately 175°-200°C (350°-400°F) using a propane torch. Then strike cover on hard flat surface and bearing will fall out.

◆ WARNING: Always wear protective gloves, to avoid burns while handling cover.

ASSEMBLY

⑭ ⑰ To install bearing, use a press to push bearing in mounting flange.

⑰ At gear assembly, apply a light coat of grease on gear teeth.

⑨ ⑬ ⑳ Always check for spring clip and clamp tightness.

ADJUSTMENT

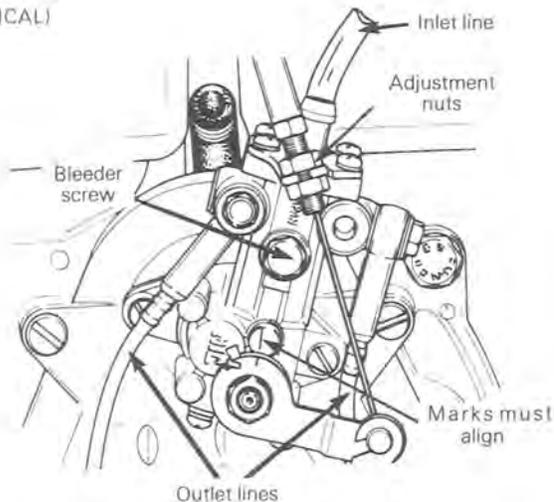
▼ **CAUTION:** The carburetors must be adjusted before adjusting the oil injection pump. Make sure the idle speed is 1800-2000 R.P.M.

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 adjuster nut.

(TYPICAL)



▼ **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:

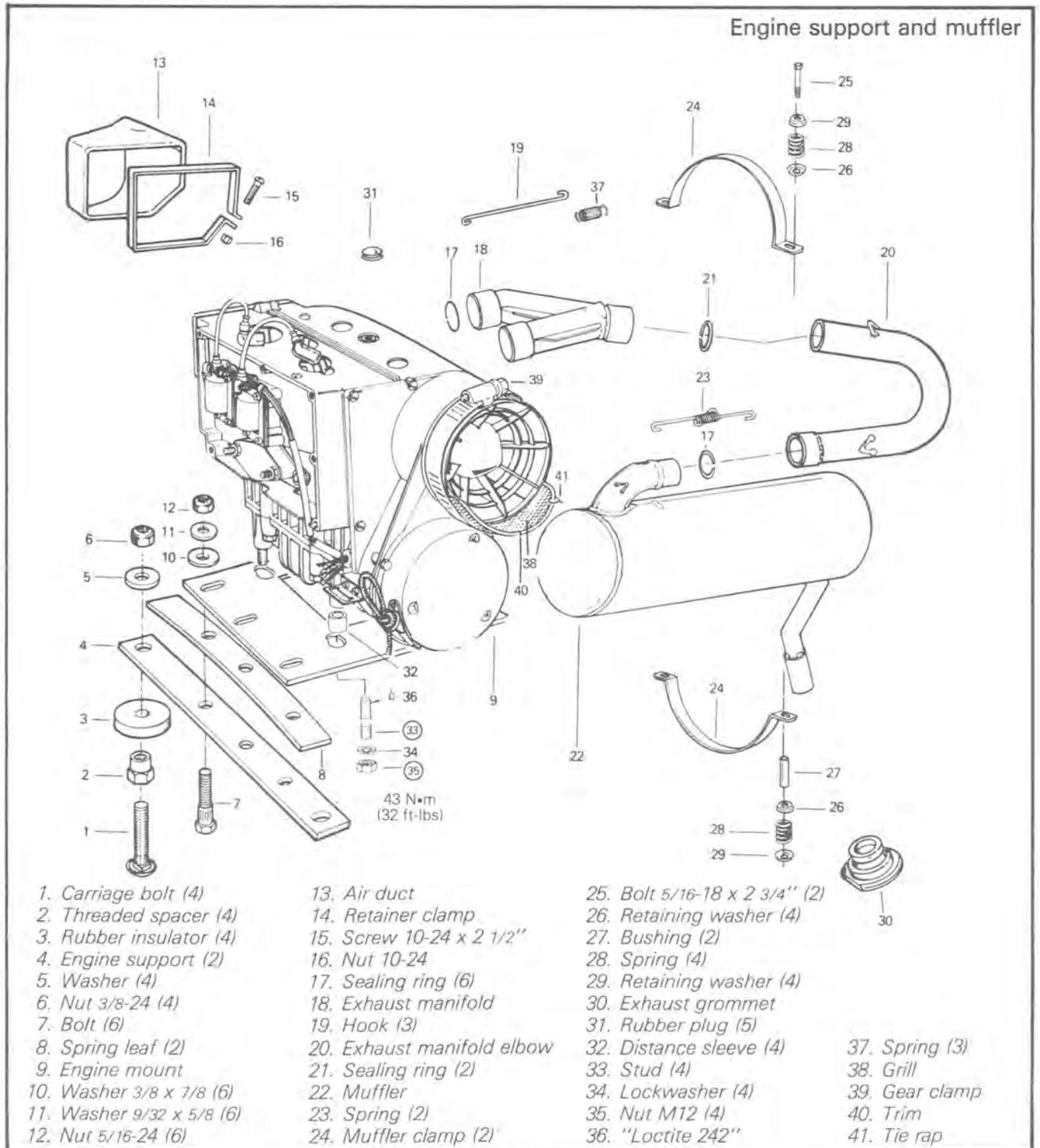
IMPORTANT: Make sure all oil lines are full. If required, bleed the inlet line and the pump by loosening the bleeder screw. To bleed the outlet lines, hold the pump lever in a fully open position with the engine at idle speed until the air is bleed off.

◆ **WARNING:** Perform this operation in a well ventilated area.



640 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION



SECTION 02 ENGINE

SUB-SECTION 07 (640 ENGINE TYPE)

REMOVAL FROM VEHICLE

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

- Drive belt.
- Muffler.
- Air intake silencer tube.
- Choke cable at carburetor.
- Throttle cable at carburetor.
- Fuel lines at carburetor.

○ **NOTE:** Secure fuel lines so that the opened ends are higher than the fuel level in the tank.

- Disconnect negative cable (ground) from battery, then disconnect electrical connections leading to engine.
- Console.
- Engine mount nuts.

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

③③ At assembly on crankcase, apply "Loctite 242" or equivalent on threads.

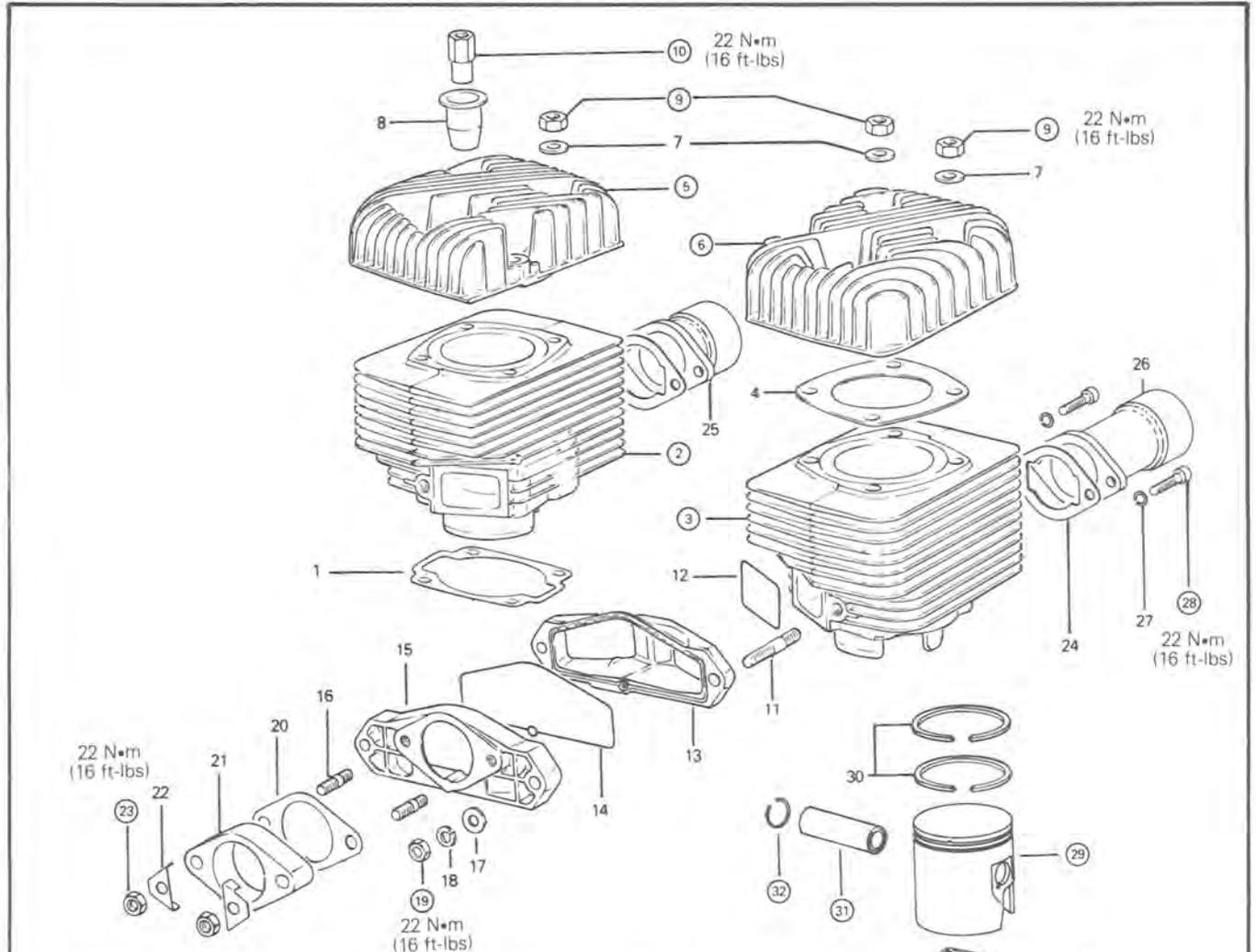
③⑤ Torque to 43 N•m (32 ft-lbs).

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 cable installation, check carburetor maximum throttle slide opening.
- Check pulley alignment and drive belt tension.

TOP END



- | | |
|------------------------------------|--------------------------------|
| 1. Gasket (cylinder/crankcase) (2) | 18. Lockwasher (2) |
| 2. Cylinder (P.T.O.) | 19. Nut M8 (2) |
| 3. Cylinder (Mag) | 20. Gasket |
| 4. Gasket (head cylinder) (2) | 21. Insulating flange |
| 5. Cylinder head (P.T.O.) | 22. Locking tab (2) |
| 6. Cylinder head (Mag) | 23. Nut M8 (2) |
| 7. Flat washer (7) | 24. Exhaust gasket (2) |
| 8. Support sleeve | 25. Exhaust socket (P.T.O.) |
| 9. Nut M8 (7) | 26. Exhaust socket (Mag) |
| 10. Distance nut | 27. Lockwasher (4) |
| 11. Stud M8 (2) | 28. Allen screw M8 x 30 mm (4) |
| 12. Gasket (2) | 29. Piston (2) |
| 13. Intake manifold | 30. Ring |
| 14. Gasket | 31. Gudgeon pin (2) |
| 15. Intake cover | 32. Circlip (4) |
| 16. Stud M8 x 38.5 (2) | 33. Needle bearing (2) |
| 17. Washer | |

SECTION 02 ENGINE
SUB-SECTION 07 (640 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

②⑨ ③① ③② Place a clean cloth over crankcase to prevent circlips from falling into crankcase. Use a pointed tool to remove circlips from piston.

▼ **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

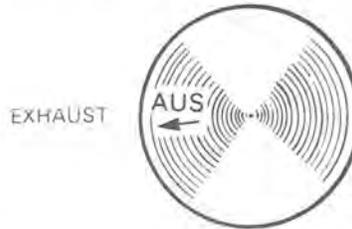
The inspection of the engine top end must include the following measurements:

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 (.0019")
Cylinder/piston clearance	.08 mm (.0031")	.10 mm (.0039")	.22 mm (.0086")
Ring/piston groove clearance	.04 mm (.0016")	.11 mm (.0043")	1.0 mm (.0394")
Ring end gap	.25 mm (.0098")	.40 mm (.0157")	1.2 mm (.0472")

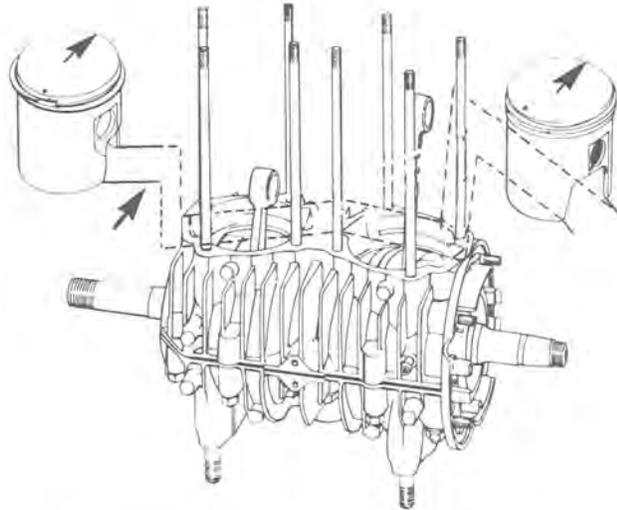
○ **NOTE:** For the measurement procedures, refer to "Engine Tolerances Measurement", section 02, sub-section 09.

ASSEMBLY

②⑨ 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.

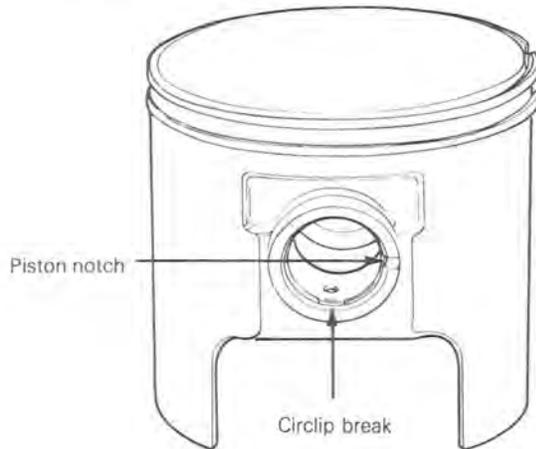


Also make sure that the piston windows are aligned with the crankcase transfer passages when the gudgeon pin orifice is in-line with the connecting rod bore.



③② 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.

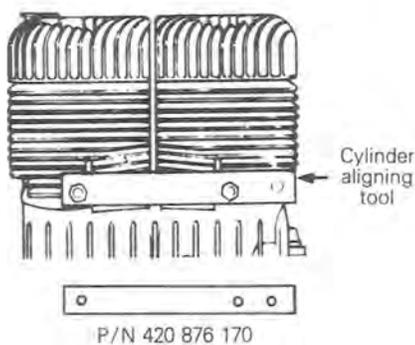


○ **NOTE:** Refer to Technical Data for component fitted tolerance and wear limit.

② ③ ⑤ ⑥ When installing cylinder and/or cylinder head, the cylinder aligning tool must be used to ensure sealing of intake manifold and exhaust. (See Tools Section).

Install muffler on exhaust socket then install aligning bar. Cross torque cylinder head nuts to 20 N•m (15 ft-lbs).

○ **NOTE:** Torque each cylinder head individually.

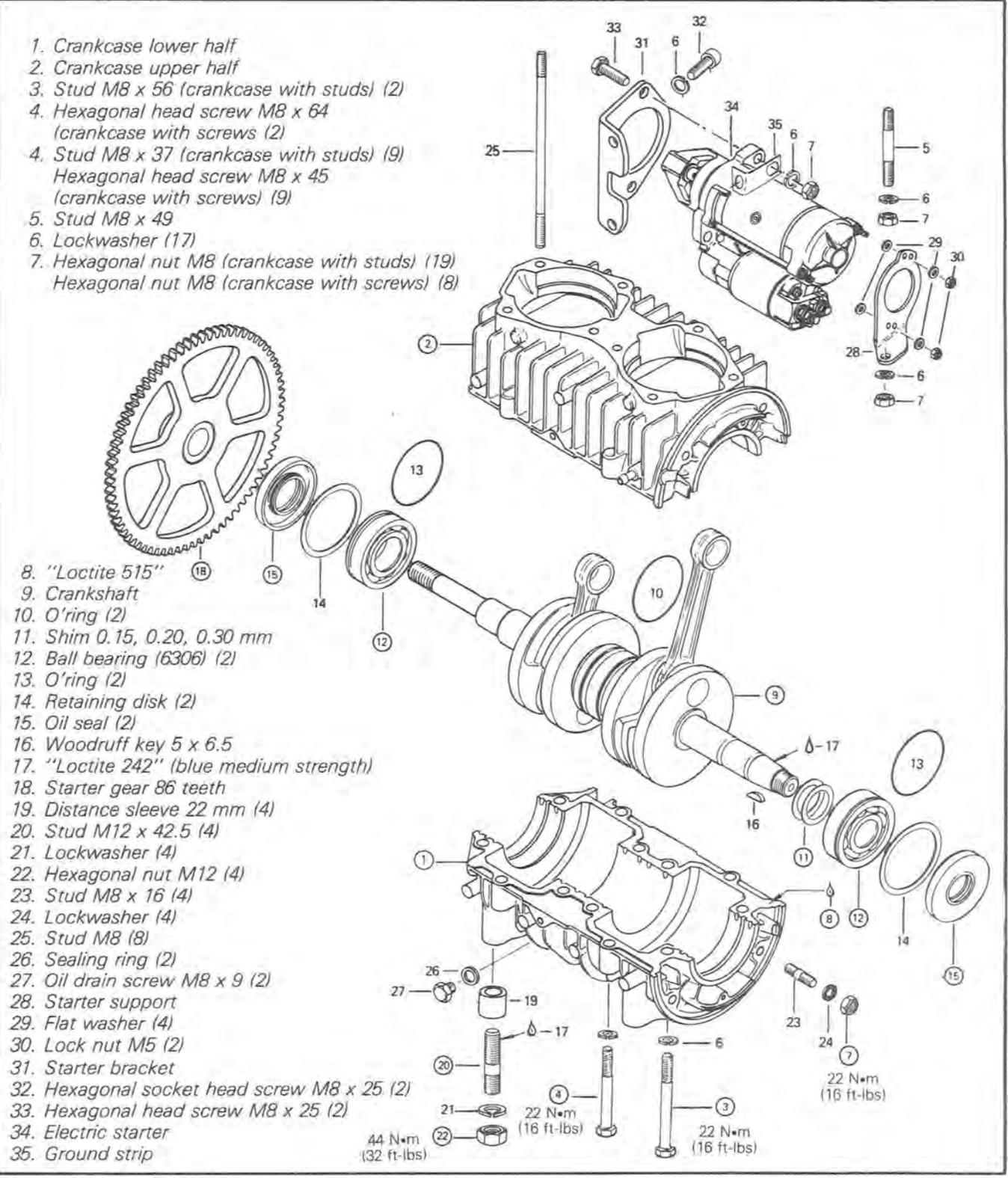


⑨ ⑩ Torque cylinder head nuts to 22 N•m (16 ft-lbs).

⑱ ⑲ ⑳ Torque to 22 N•m (16 ft-lbs).



BOTTOM END



1. Crankcase lower half
2. Crankcase upper half
3. Stud M8 x 56 (crankcase with studs) (2)
4. Hexagonal head screw M8 x 64 (crankcase with screws) (2)
4. Stud M8 x 37 (crankcase with studs) (9)
Hexagonal head screw M8 x 45 (crankcase with screws) (9)
5. Stud M8 x 49
6. Lockwasher (17)
7. Hexagonal nut M8 (crankcase with studs) (19)
Hexagonal nut M8 (crankcase with screws) (8)

8. "Loctite 515"
9. Crankshaft
10. O'ring (2)
11. Shim 0.15, 0.20, 0.30 mm
12. Ball bearing (6306) (2)
13. O'ring (2)
14. Retaining disk (2)
15. Oil seal (2)
16. Woodruff key 5 x 6.5
17. "Loctite 242" (blue medium strength)
18. Starter gear 86 teeth
19. Distance sleeve 22 mm (4)
20. Stud M12 x 42.5 (4)
21. Lockwasher (4)
22. Hexagonal nut M12 (4)
23. Stud M8 x 16 (4)
24. Lockwasher (4)
25. Stud M8 (8)
26. Sealing ring (2)
27. Oil drain screw M8 x 9 (2)
28. Starter support
29. Flat washer (4)
30. Lock nut M5 (2)
31. Starter bracket
32. Hexagonal socket head screw M8 x 25 (2)
33. Hexagonal head screw M8 x 25 (2)
34. Electric starter
35. Ground strip

44 N•m
(32 ft-lbs)

22 N•m
(16 ft-lbs)

22 N•m
(16 ft-lbs)

22 N•m
(16 ft-lbs)

**SECTION 02 ENGINE
SUB-SECTION 07 (640 ENGINE TYPE)**

CLEANING

Discard all oil seals, gaskets, "O" rings and sealing 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.

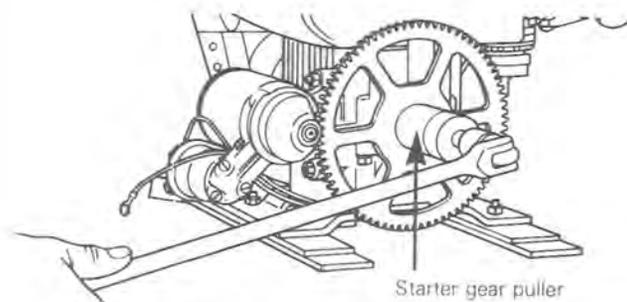
DISASSEMBLY

General

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

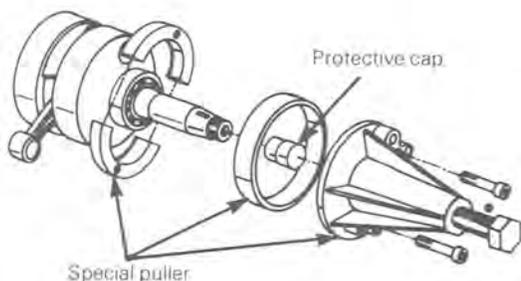
To remove magneto, refer to "Magneto" in this section.

⑮ To remove starter gear from crankshaft it may be necessary to use a special puller as illustrated. (See Tools Section).



Starter gear puller

⑫ To remove bearing from crankshaft, use a protective cap and special puller, as illustrated. (See Tools Section).



Special puller

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")
Connecting rod alignment	N.A.	N.A.	N.A.
Crankshaft end play	.20 mm (.0079")	.40 mm (.0158")	N.A.

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

ASSEMBLY

⑫ 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 Tolerances Measurement, section 02, sub-section 09.

⑮ At seal assembly, apply a light coat of lithium grease on seal lip. To ensure adequate bearing lubrication, seal outer surface should be flush with crankcase.

⑳ At assembly on crankcase, apply "Loctite 242" or equivalent on threads.

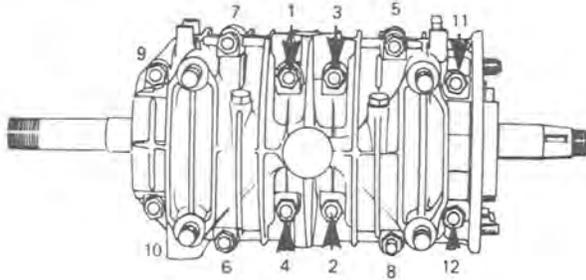
㉑ Torque to 44 N•m (32 ft-lbs).

① ② ⑧ Crankcase halves are factory matched and therefore, are not interchangeable or available as single halves.

Prior to joining of crankcase halves, apply "Loctite 515" (no. 413 7027) on mating surfaces.

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 nuts (or bolts) to 22 N•m (16 ft-lbs) following illustrated sequence.



③ ④ Torque to 22 N•m (16 ft-lbs).

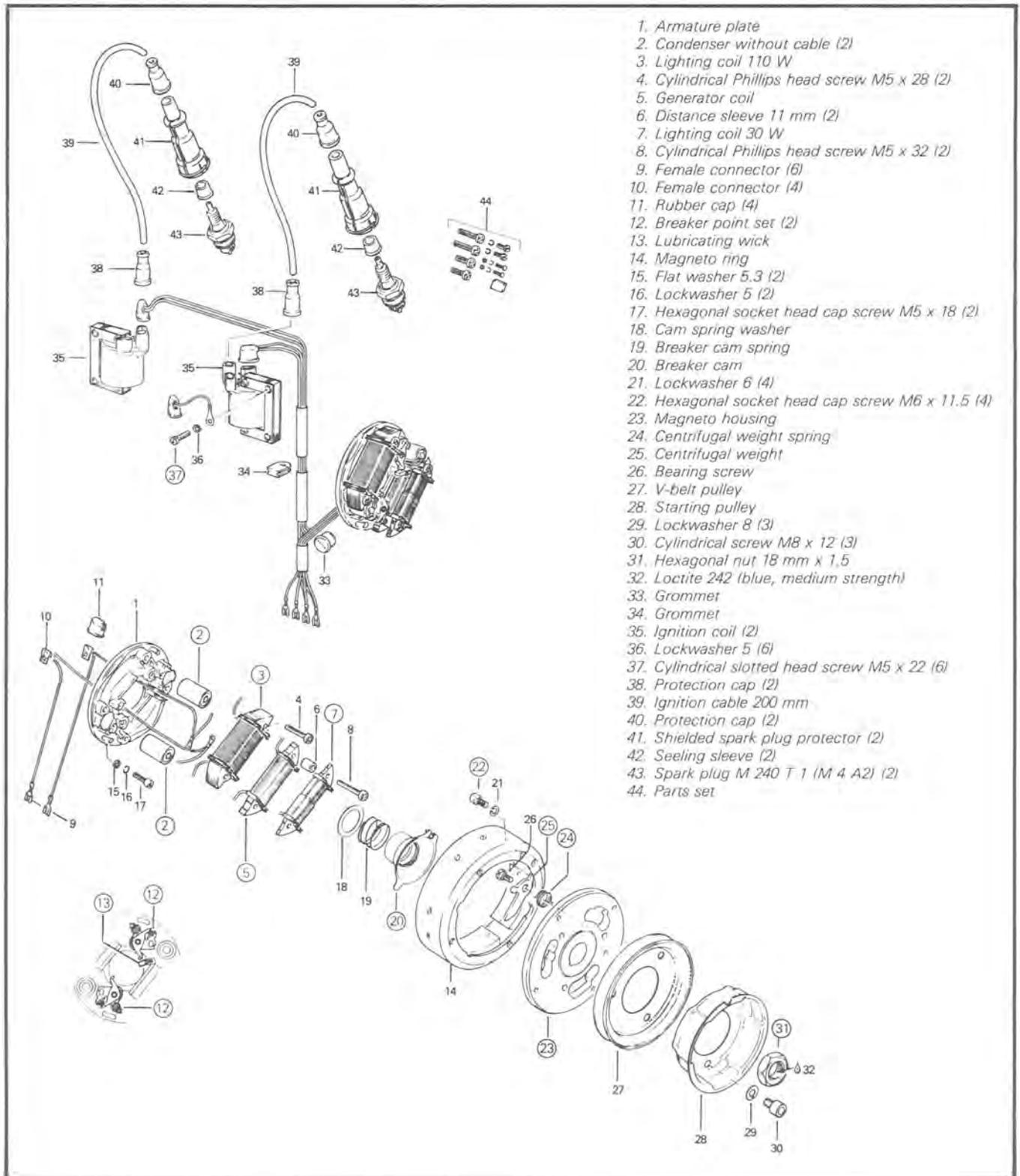
⑦ Torque to 22 N•m (16 ft-lbs).

⑱ At starter gear assembly, apply a light coat of anti-seize compound on crankshaft extension nearest starter gear.

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



MAGNETO



SECTION 02 ENGINE
SUB-SECTION 07 (640 ENGINE TYPE)

CLEANING

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

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

DISASSEMBLY

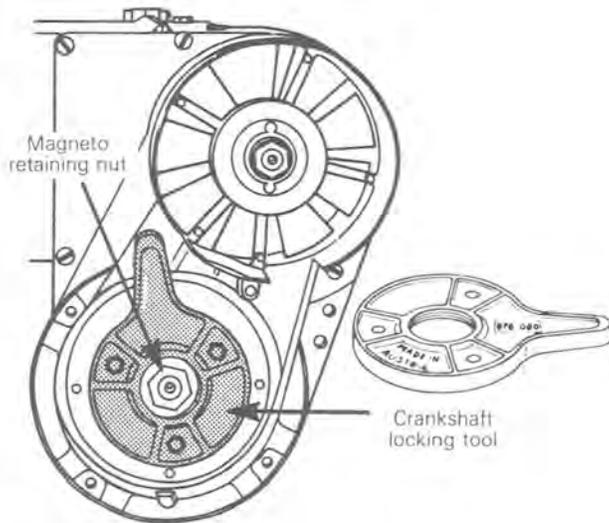
● To gain access to magneto assembly, remove:

- fan grill
- rewind starter
- starting and V-belt pulleys

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

● ③ To remove magneto flywheel retaining nut:

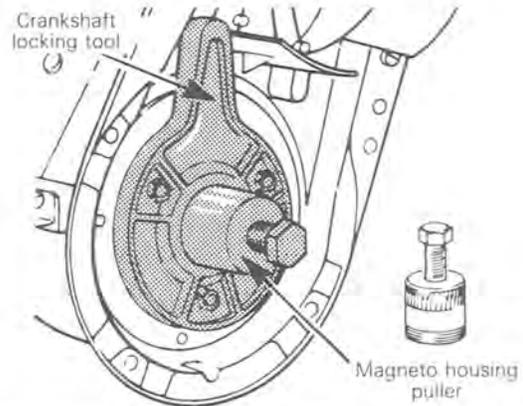
- lock crankshaft with crankshaft locking tool (service tool) as illustrated
- remove magneto retaining nut



○ **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.

● ②③ To remove magneto housing (flywheel):

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



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

REPAIR

● ② To replace a condenser:

- Disconnect the two black leads using a soldering iron.
- Drive the condenser out of the armature plate using a suitable pusher.
- To reinstall, reverse procedure.

● ⑫⑬ When replacing breaker point set:

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

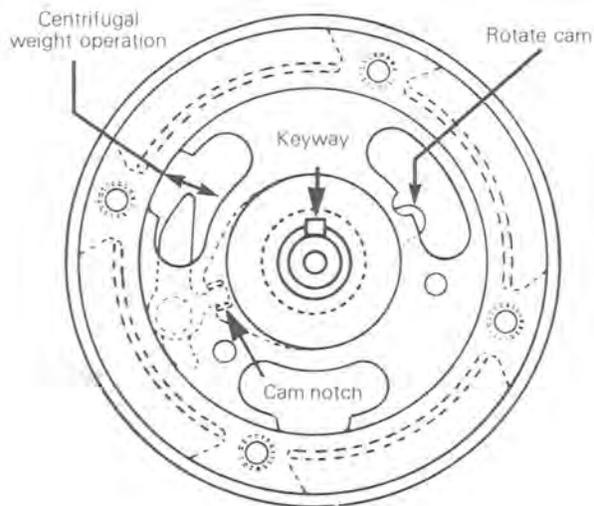
● ③⑤⑦ Whenever a coil is replaced, the air gap (distance between coil end and magnet) must be adjusted:

To check air gap, insert a feeler gauge of 0.30-0.45 mm (.012"-.018") between magnet and coil ends. If necessary to adjust, slacken coil retaining screws and relocate coil.



ASSEMBLY

- Clean crankshaft extension (taper).
- Apply "Loctite 242" (blue, medium strength).
- Position magneto on crankshaft with the keyway and the cam notch indexed as illustrated.

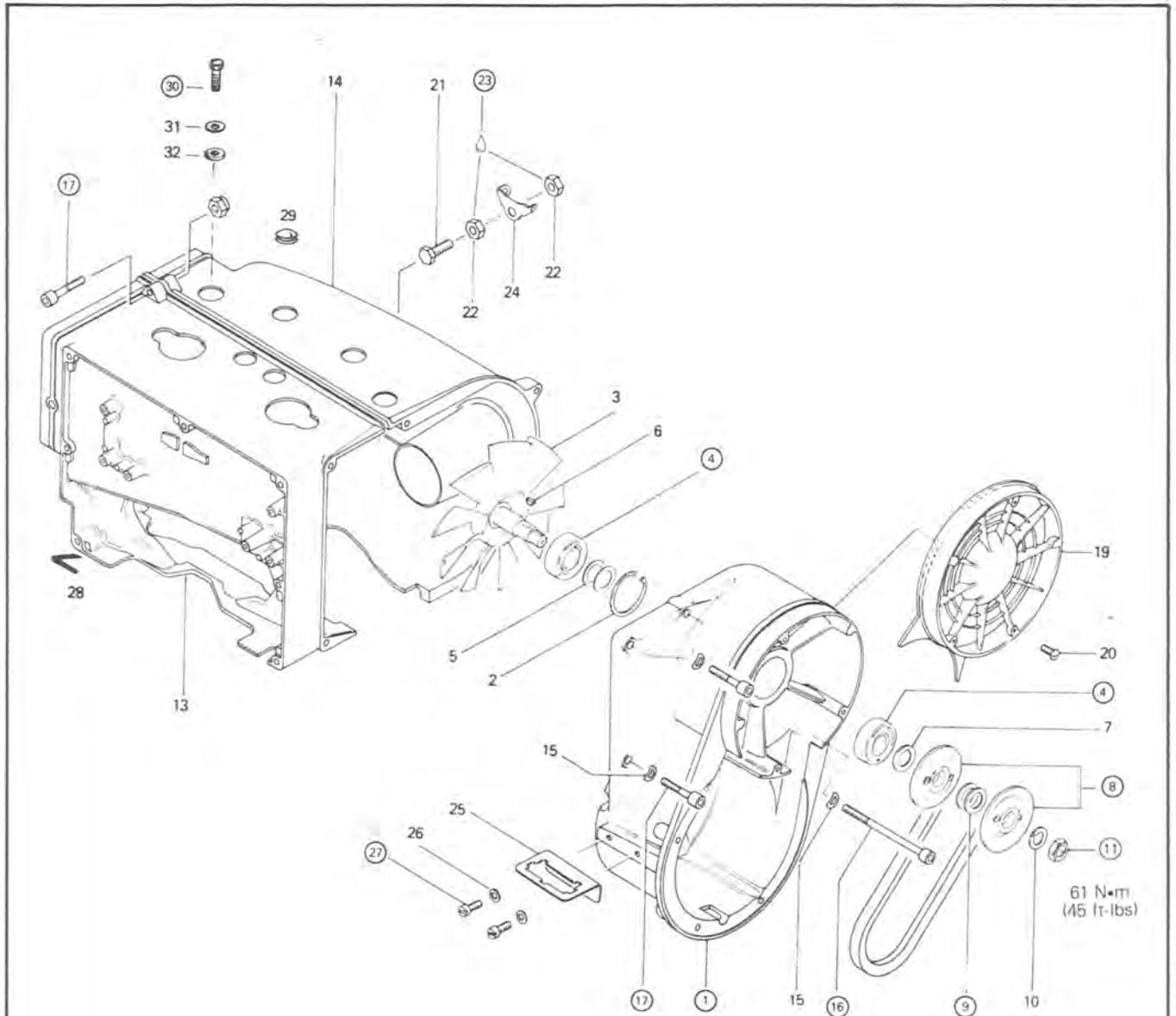


- ⑳ ㉕ Rotate breaker cam to check centrifugal weight operation.
- ㉔ At assembly, apply a small amount of grease into spring seating.
- ㉒ At assembly, apply "Loctite 242" on screw threads.
- ㉓ At assembly, thoroughly clean threads and apply "Loctite 242", then torque retaining nut to 85 N•m (63 ft-lbs).
- ㉖ ㉘ ㉚ At reassembly, coat all electric connections with dielectric of lithium grease to prevent corrosion or moisture penetration.

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



COOLING SYSTEM



- 1. Fan housing
- 2. Circlip
- 3. Fan
- 4. Bearing (2)
- 5. Washer (2)
- 6. Woodruff key
- 7. Washer
- 8. Pulley half (2)
- 9. Shim(s)
- 10. Lockwasher
- 11. Nut M14 x 1.5

- 12. Belt
- 13. Air deflector (intake)
- 14. Air deflector (exhaust)
- 15. Spring washer (4)
- 16. Allen screw M6 x 80
- 17. Allen screw M6 x 30 (5)
- 18. Nut M6
- 19. Fan cover
- 20. Screw M5 x 12 (3)
- 21. Bolt M8 x 25
- 22. Nut M8 (2)

- 23. "Loctite 242"
- 24. Spring bracket
- 25. Junction block bracket
- 26. Lockwasher (2)
- 27. Cylindrical head screw M5 x 12 (2)
- 28. Sealer (intake/deflector)
- 29. Plug (5)
- 30. Bolt 5/16-18 x 3/4"
- 31. Washer
- 32. Rubber washer

61 N·m
 (45 ft-lbs)

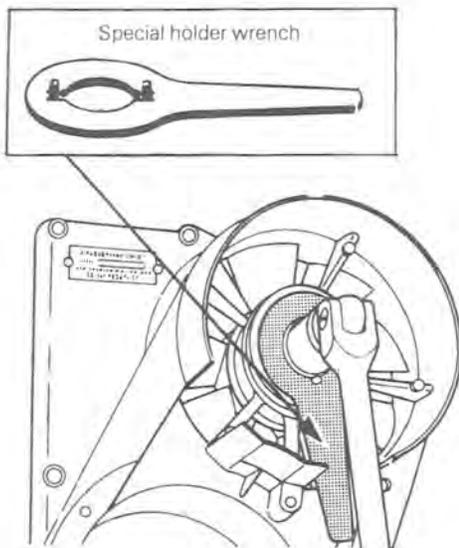
SECTION 02 ENGINE
SUB-SECTION 07 (640 ENGINE TYPE)

CLEANING

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

DISASSEMBLY & ASSEMBLY

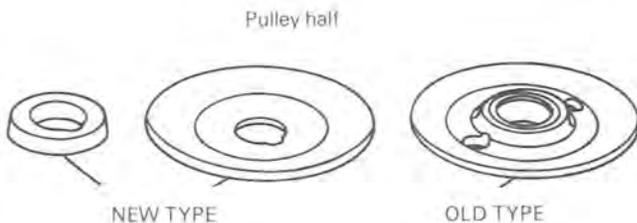
① Lock fan pulley with special holder wrench to remove or install pulley retaining nut. (Use tool P/N 420 977 880).



⑩ ⑪ ⑫ ⑬ ⑭ ⑮ 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 screw head 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.

⑯ Newer pulley half does not have a shoulder on its inner face so it is installed with a 6 mm (0.236") spacer.



⑰ Shim(s) located between pulley halves are used to adjust fan belt free-play. Correct free-play is 6 mm (1/4"). If necessary to adjust, install or remove shim(s) between pulley halves. Install excess shim(s) between outer pulley half and washer.

⑱ ⑲ It is first necessary to heat bearing housing to 65°C (150°F) to remove or install bearing.

At assembly, torque to 61 N•m (45 ft-lbs).

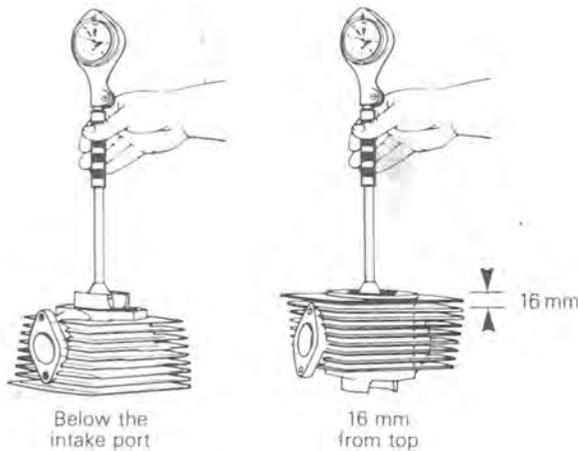
ENGINE TOLERANCES MEASUREMENT

CYLINDER TAPER

Maximum: 0.08 mm (.003")

Compare cylinder diameter 16 mm (5/8") from top of cylinder to just below its intake port area.

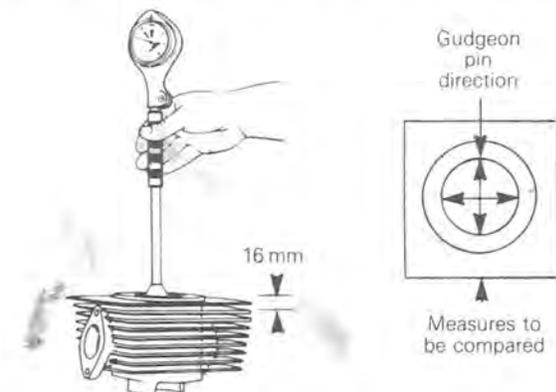
On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds 0.08 mm (.003") the cylinder should be rebored and honed or should be replaced.



CYLINDER OUT OF ROUND

Maximum: 0.05 mm (.002")

Measuring 16 mm (5/8") from top of cylinder with a cylinder gauge, check if the cylinder out of round is more than 0.05 mm (.002"). If larger, cylinder should be rebored and honed or should be replaced.



CYLINDER/PISTON CLEARANCE

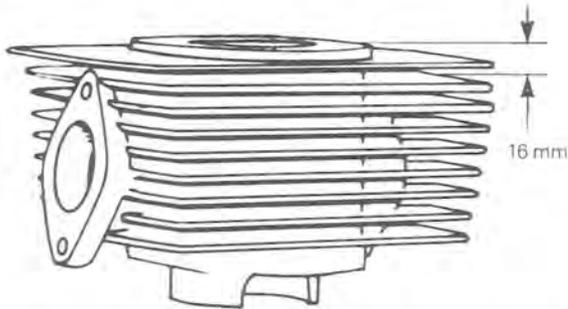
ENGINE TYPE	PISTON TO WALL CLEARANCE MINIMUM – MAXIMUM
247	0.065 – 0.200 mm (.0026 – .008")
277	0.070 – 0.200 mm (.0028 – .008")
354	0.080 – 0.180 mm (.0031 – .007")
377	0.070 – 0.200 mm (.0028 – .008")
454	0.10 – 0.200 mm (.004 – .008")
464	0.080 – 0.200 mm (.0031 – .008")
503	0.070 – 0.200 mm (.0028 – .008")
640	0.080 – 0.220 mm (.0031 – .0086")

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.



SECTION 02 ENGINE
 SUB-SECTION 08 (ENGINE TOLERANCES MEASUREMENT)

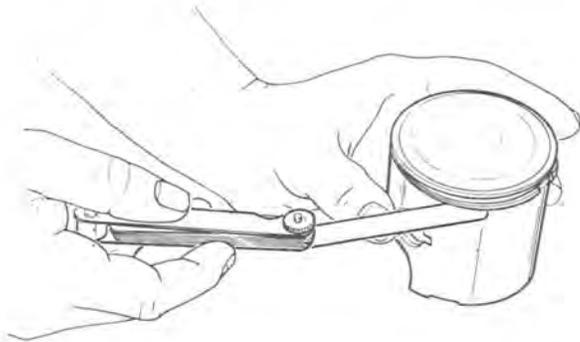


The difference between these two measurements should be within specified tolerance.

RING PISTON GROOVE CLEARANCE

MINIMUM	—	MAXIMUM (wear limit)
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.



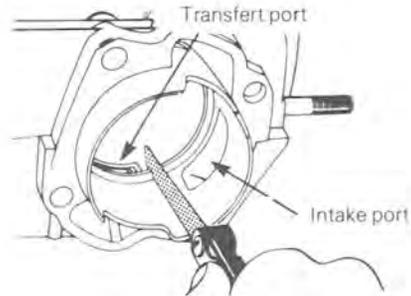
RING END GAP

ENGINE TYPE	RING END GAP (new ring)	MAXIMUM RING END GAP (worn ring)
247,277 377,454 464,503	0.20 – 0.35 mm (.008 – .014")	1.0 mm (.039")
640	0.25 – 0.40 mm (.010 – .016")	1.2 mm (.047")

Position ring half way between transfer ports and intake port. On rotary valve engines, position ring just below transfer ports.

NOTE: In order to correctly position the ring in the cylinder, use piston as a pusher.

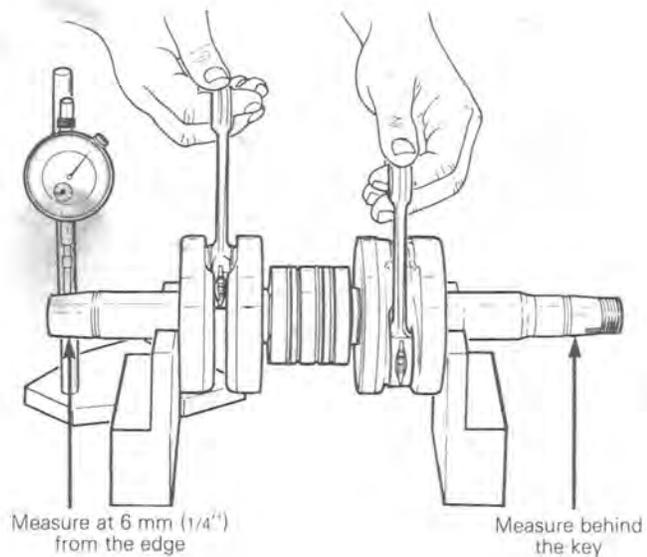
Using a feeler gauge, check ring end gap. If gap exceeds specified tolerance the ring should be replaced.



CRANKSHAFT DEFLEXION

TYPE	MAXIMUM
247,277	1.0 mm (0.039")
377,454,464 503,640	0.08 mm (0.031")

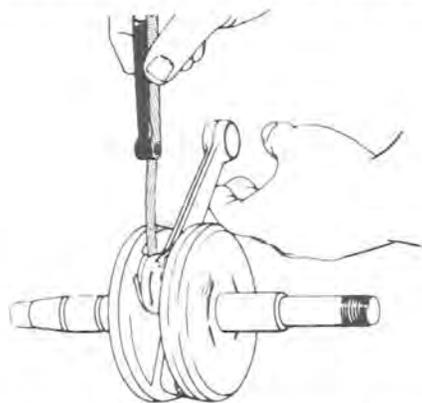
Turn crankshaft on "V" shaped blocks; using a dial indicator measure deflection on each side as illustrated. If deflection exceeds specified tolerance, the crankshaft should be repaired or replaced.



CONNECTING ROD BIG END AXIAL PLAY

TYPE	MINIMUM — MAXIMUM
247,277,377 503,640	0.20 — 1.00 mm (.008 — .039")
454,464	0.40 — 1.20 mm (.016 — .047")

Using a feeler gauge measure distance between thrust washer and crankshaft balancer. If the distance exceeds specified tolerance, repair or replace the crankshaft.



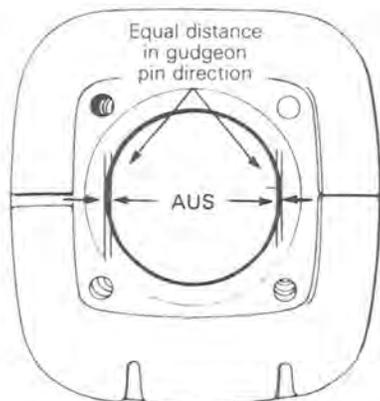
CONNECTING ROD ALIGNMENT

Check if connecting rod is bent as follows:

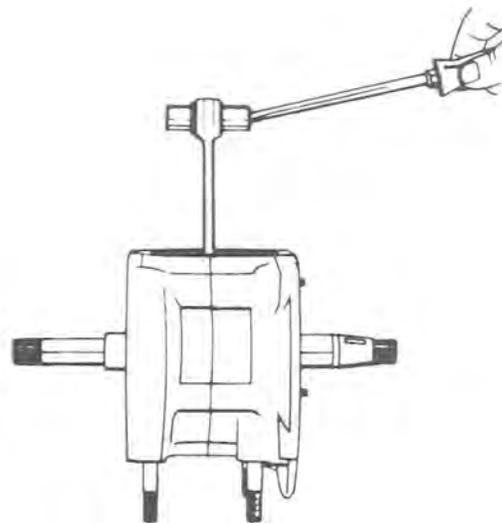
- Once engine crankcase is assembled with the piston mounted on connecting rod without its piston rings, position cylinder on piston.

○ **NOTE:** The cylinder/crankcase gasket must not be installed.

- Rotate crankshaft slowly and at the same time observe piston movement within the cylinder. If piston bears against one side (PTO or mag. side), the connecting rod is bent.



- To correct position needle bearing and gudgeon pin on connecting rod then pry connecting rod as illustrated.



CRANKSHAFT END-PLAY — 247 & 277 ENGINE TYPE

Specification:

MINIMUM	—	MAXIMUM
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 blade.

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") - 247 only

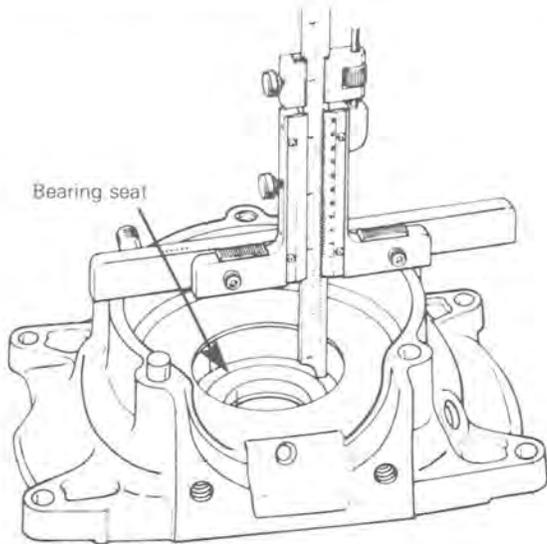
- micrometer
- vernier

- Total shim thickness needed for the end-play adjustment is determined with the following procedure:

SECTION 02 ENGINE
SUB-SECTION 08 (ENGINE TOLERANCES MEASUREMENT)

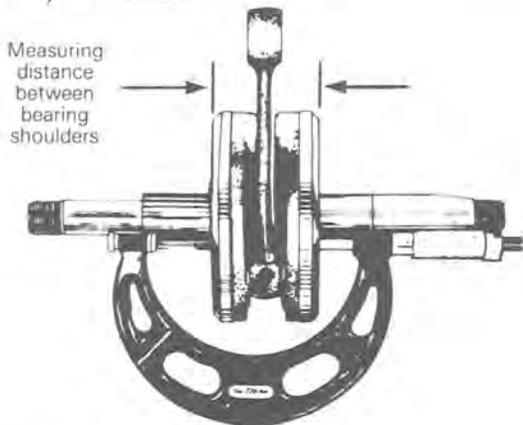
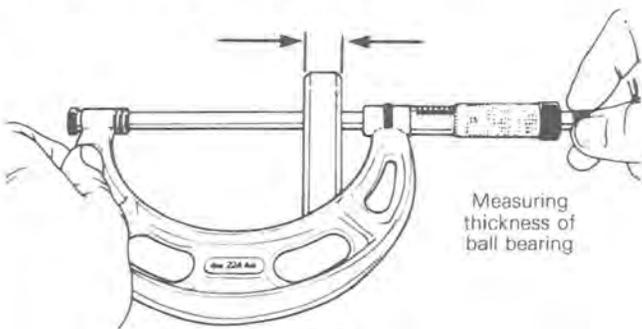
a) Measure crankcase halves as illustrated (M_1 and M_2).

A standard compressed crankcase gasket will have a 0.30 mm (.012") thickness (M_3). Add these measurements to obtain dimension "A".



b) Measure the thickness of each ball bearing (M_4 and M_5).

Measure distance between bearing shoulders on crankshaft (M_6). Measure the distance ring and adjustment shims thickness (M_7 and M_8). Add these measurements to obtain dimension B.



○ **NOTE:** The 247 engine type has one distance ring on PTO side and adjustment shims on MAG side. The 277 engine type has one distance ring on PTO side and one distance ring and adjustment shims on MAG side.

c) 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).

If the result is under specification, remove adjustment shim(s).

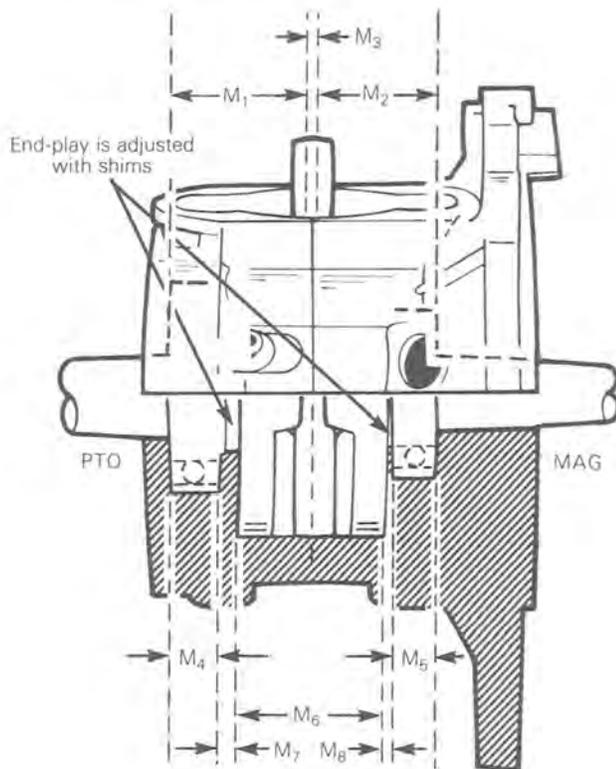
TO SUMMARIZE: (247 & 277 engine type)

$$A = M_1 + M_2 + M_3$$

$$B = M_4 + M_5 + M_6 + M_7 + M_8$$

A-B = actual end-play that must be within specification.

M_8 is the dimension that must be adjusted to obtain the specified crankshaft end-play.



CRANKSHAFT END-PLAY — 640 ENGINE TYPE

Specification:

MINIMUM MAXIMUM

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 reinstall end-play adjustment shim(s) on the magneto side between bearing and crankshaft blade.

The following is required for the adjustment procedure:

- adjustment shims (refer to parts catalog)
(thickness available)

0.15 mm (.006")

0.20 mm (.008")

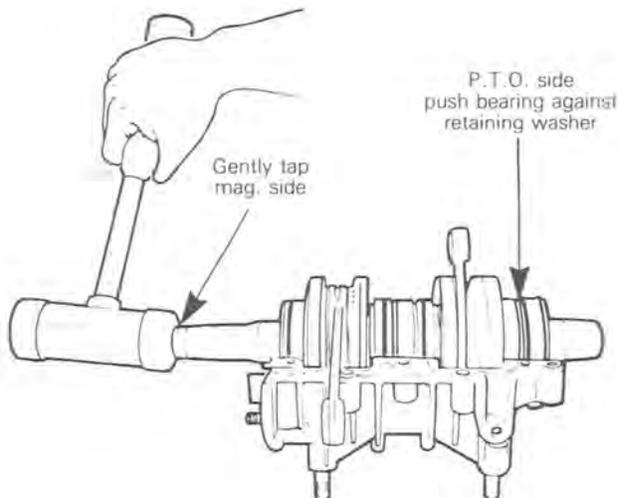
0.30 mm (.012")

- bearing simulator P/N 420 876 160

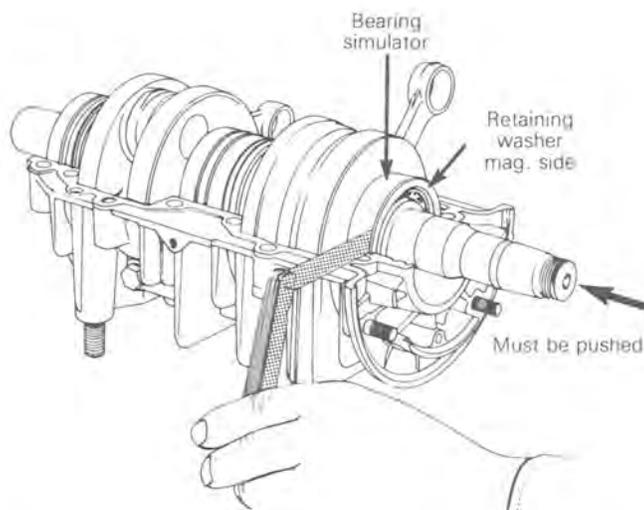
- feeler gauge

● Total shim thickness needed for the end-play adjustment is determined with the following procedure:

- Remove magneto side bearing and existing shim(s).
- Slide the appropriate bearing simulator (see Tool section) and retaining washer on the crankshaft.
- Position crankshaft assembly into crankcase lower half, making sure that retaining washers are correctly seated into the grooves.
- Gently tap crankshaft mag. side blade until P.T.O. side bearing bears against retaining washer.



- Measure distance between bearing simulator and retaining washer.



This measurement is the actual crankshaft end-play that must be within specification. If the result is over specification, add adjustment shim(s).

CRANKSHAFT END-PLAY — 377, 454, 464, 503 ENGINE TYPES

These engine types do not have end-play adjustment.

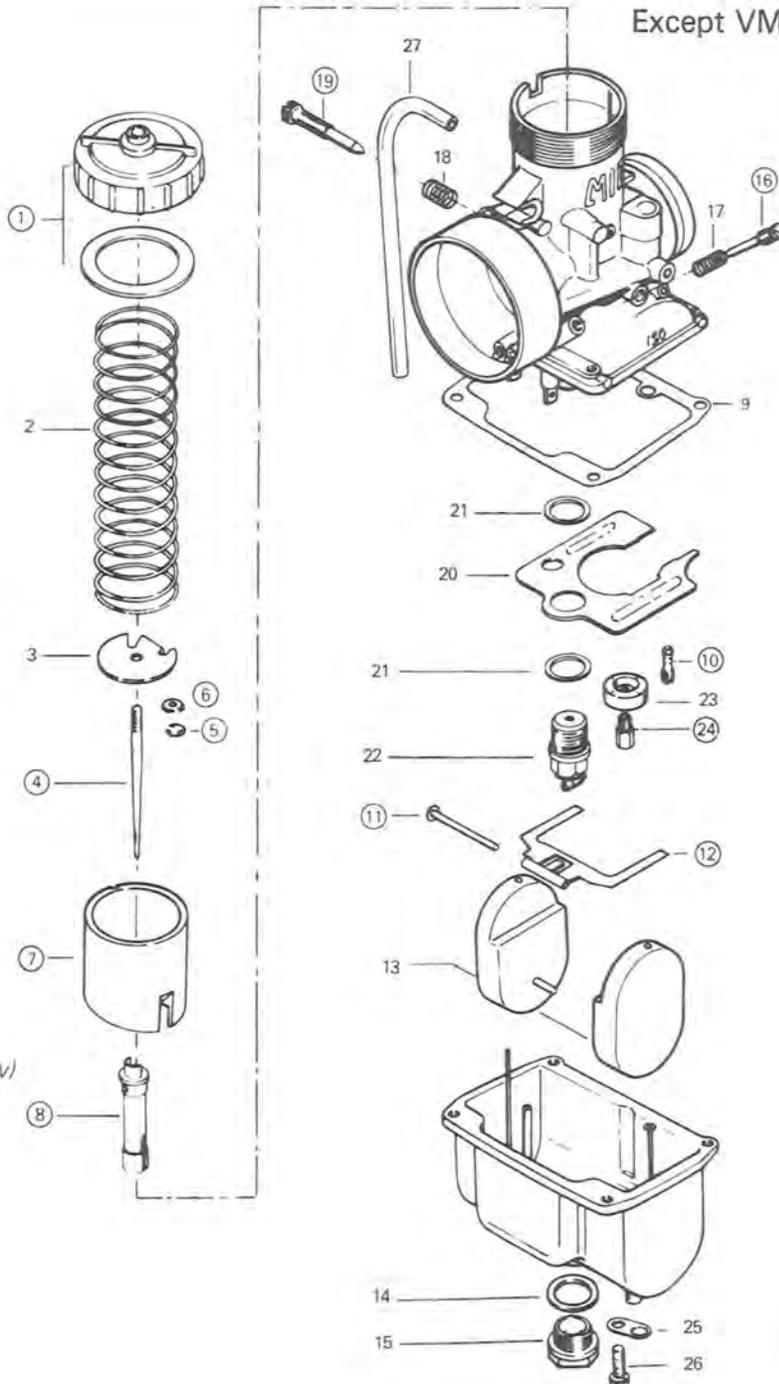


CARBURETOR AND FUEL PUMP

MIKUNI CARBURETOR

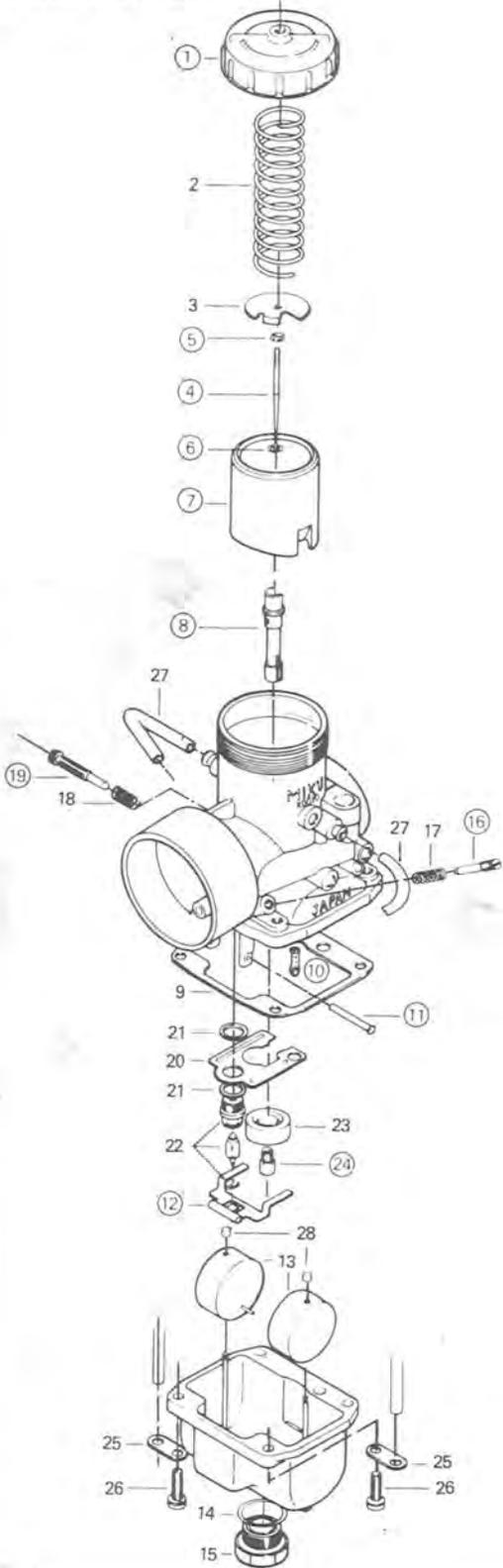
(ALL MODELS)
 Except VM 28 & VM 36

1. Cover
2. Spring (throttle valve)
3. Needle retainer plate
4. Jet needle
5. Circlip
6. Packing
7. Throttle valve
8. Needle
9. Gasket
10. Pilot jet
11. Float arm pin
12. Float arm
13. Float
14. O'ring
15. Plug screw
16. Idle 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 lockwasher
27. Vent tube
28. Cap

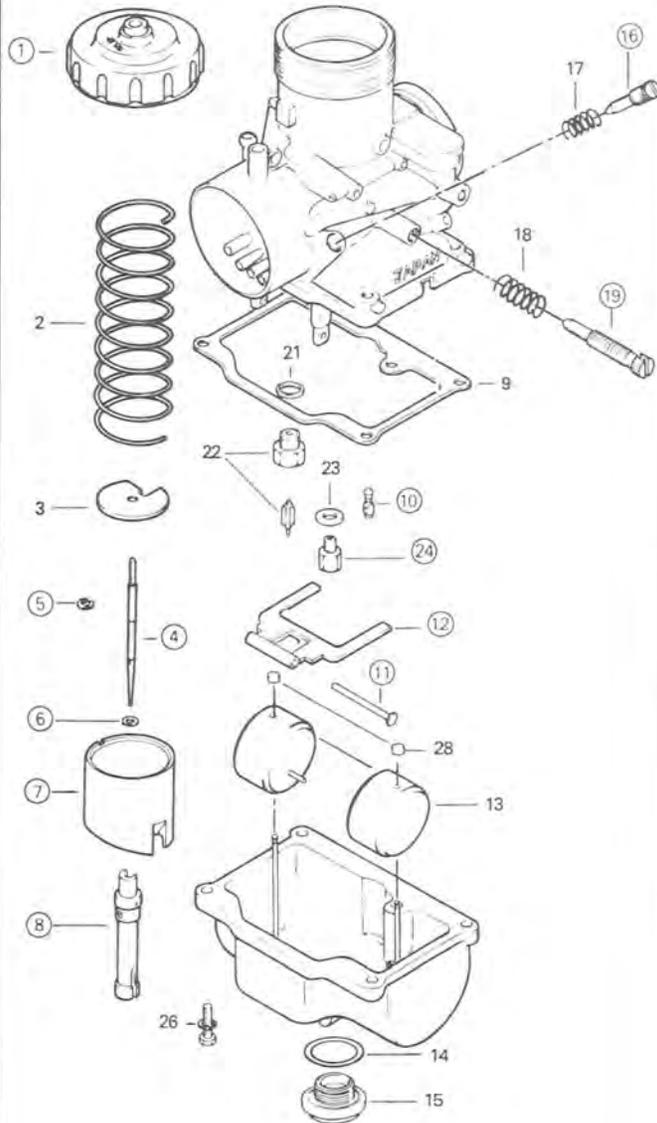


SECTION 02 ENGINE
 SUB-SECTION 09 (CARBURETOR AND FUEL PUMP)

Carburetor VM 36-114



Carburetor VM 28-242



REMOVAL

Remove air silencer box, fuel inlet line and primer line. Unscrew carburetor cover then pull out throttle slide ass'y from carburetor.

CAUTION: Exercise care when handling throttle slide. Scratches incurred may cause throttle slide to stick open in operation.

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.

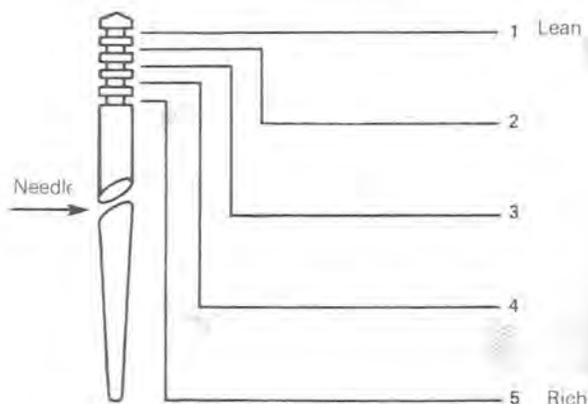
CAUTION: Heavy duty carburetor cleaner may be harmful to the float material and to the rubber parts, O'ring, etc. Therefore, it is recommended to remove those parts prior to cleaning.

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 404 112 000.



④ ⑤ 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.



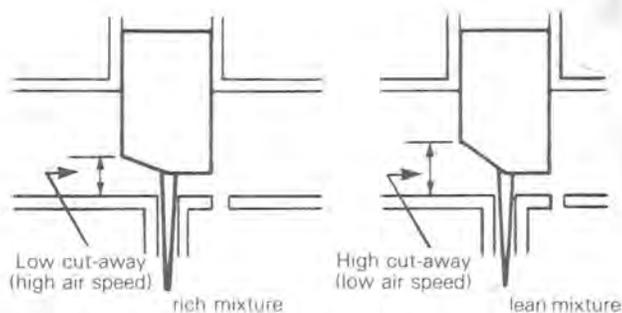
Example:

Needle identification

6DH4-2

Position of the "E" clip from top.

⑦ The size of the throttle slide cut-away affects the fuel mixture between 1/8 to 1/2 throttle opening. A certain amount of richness is needed for that particular range because this is where the transition from the low speed to the high speed circuit takes place.



②④ 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.

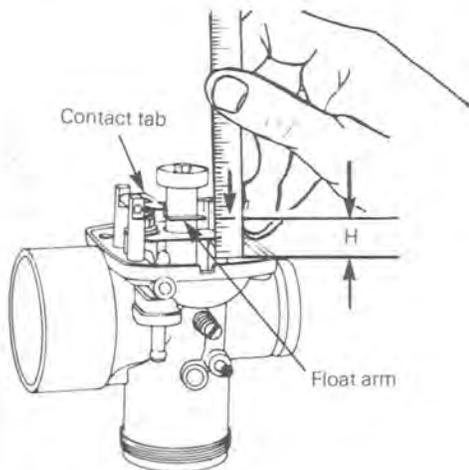
SECTION 02 ENGINE
SUB-SECTION 09 (CARBURETOR AND FUEL PUMP)

MIKUNI CARBURETOR FLOAT LEVEL ADJUSTMENT

① ② 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



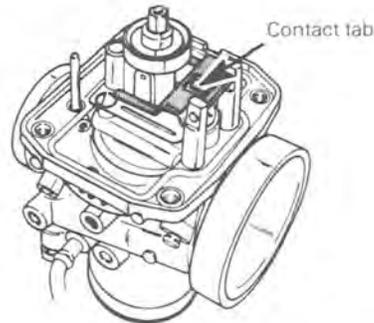
Float arm height dimensions:

CARBURETOR DIMENSION	VM 28	VM 30 VM 34	VM 36
H (inch)	.59 ≈ .66	.86 ≈ .94	.66 ≈ .74
(mm)	15 ≈ 17	22 ≈ 24	17 ≈ 19

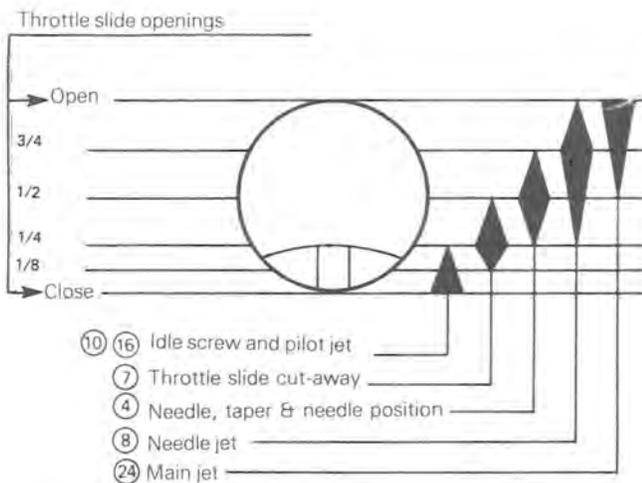
○ NOTE: As a general rule, the float arm must be parallel with the flange rib.

To adjust height "H":

- Bend the contact tab of float arm until the specified height is reached.



The illustration below shows which part of the carburetor begins to function at different throttle slide openings.



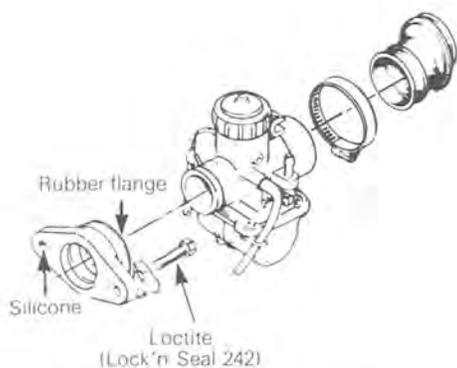
○ NOTE: For fine tuning refer to Section 09-02 technical data (Altitude VS Temperature Charts) and to Section 04-03 (Spark Plug).

INSTALLATION

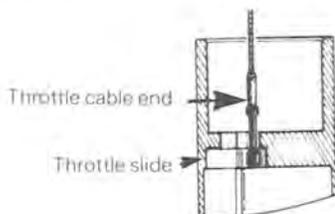
To install carburetor(s) on engine, inverse removal procedure.

However, pay attention to the following:

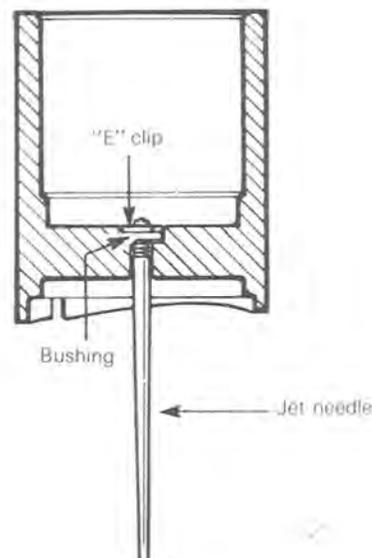
- Apply a thin layer of silicone sealant between carburetor rubber flange and intake cover on engine.
- Apply Loctite Lock'n Seal 242 on bolts retaining rubber flange to intake cover.
- When installing throttle cable end in throttle slide, hook up cable by using the stopper at the extremity of the cable.



▼ **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.



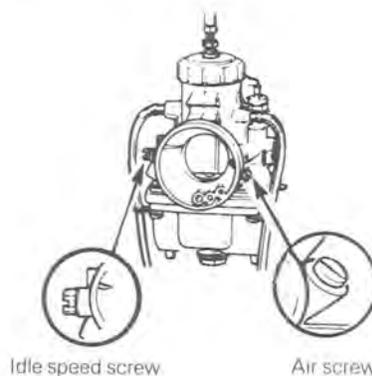
⑥ ⑦ Mikuni carburetors are equipped with a new throttle slide. The new design has a deeper "E" clip seat, to permit the installation of a nylon bushing between the "E" clip and its seat.



Make sure the bushing is installed on all applicable throttle slides.

▼ **CAUTION:** Serious engine damage can occur if this notice is disregarded.

CARBURETOR ADJUSTMENTS



⑩ Air screw adjustment

Completely close the air screw (until a slight seating resistance is felt) then back off as specified.

(Refer to Section 09-02 "Technical Data" for the specifications).

Throttle slide adjustment

◆ **WARNING:** Ensure the engine is turned **OFF**, prior to the throttle slide adjustment.

SECTION 02 ENGINE

SUB-SECTION 09 (CARBURETOR AND FUEL PUMP)

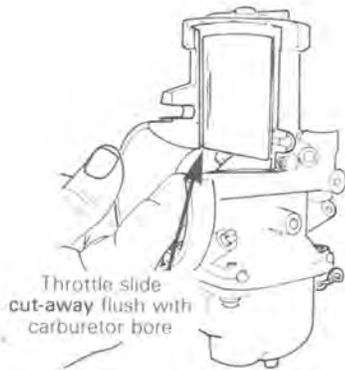
For maximum performance, correct carburetor throttle slide adjustment is critical.

① Tighten carburetor cover.

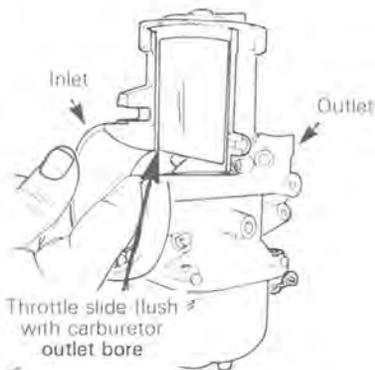
With the throttle cable adjuster jam nut unlocked, press the throttle lever against the handle grip.

By turning the cable adjuster, adjust the carburetor slide cut away so that it is flush with the top of the carburetor bore.

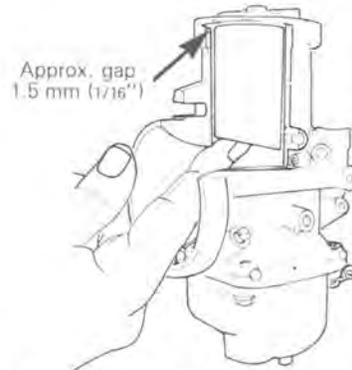
(For all models except Blizzard 9500 and Ultra Sonic).



(For Blizzard 9500 and Ultra Sonic adjust the throttle slide flush with the top of carburetor outlet bore).



Once both carburetors are adjusted, check that with the throttle lever fully depressed, there is a free-play of $1/16''$ (approx.) between the cover and throttle slide. Readjust accordingly.

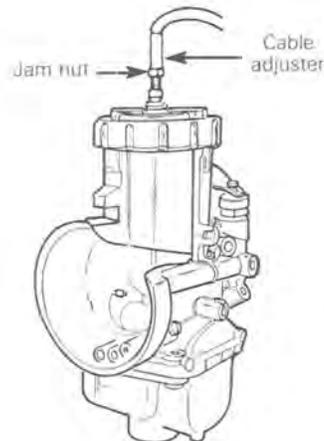


◆ **WARNING:** This gap is very important. If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable.

Recheck carburetors synchronization.

Tighten the cable adjuster jam nut.

Release the throttle lever.



▼ **CAUTION:** On twin carburetor models, make sure both carburetors start to operate simultaneously.

▼ **CAUTION:** On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted.

◆ **WARNING:** It is important that the throttle slide adjustment be performed to ensure proper functioning of throttle mechanism.

① Idle speed 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 up then adjust idle speed to specifications by turning idle speed screw clockwise or counter-clockwise.

(Refer to Section 09-02 "Technical Data" for the specifications).

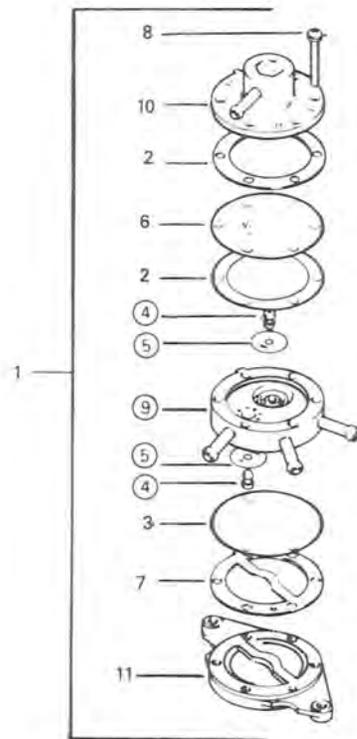
▼ **CAUTION:** Do not attempt to set the idle speed by using the air screw. Severe engine damage can occur.

100



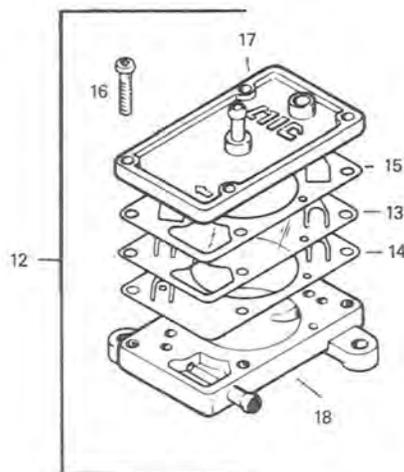
MIKUNI FUEL PUMP

FIG. (A)



- 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

FIG (B)



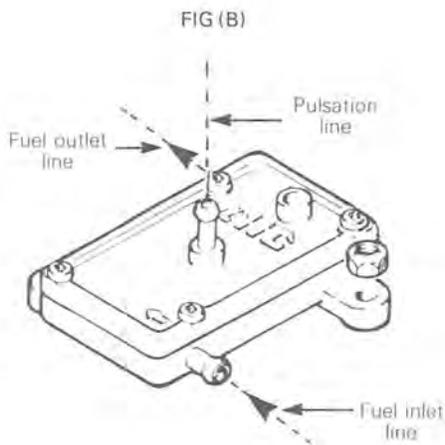
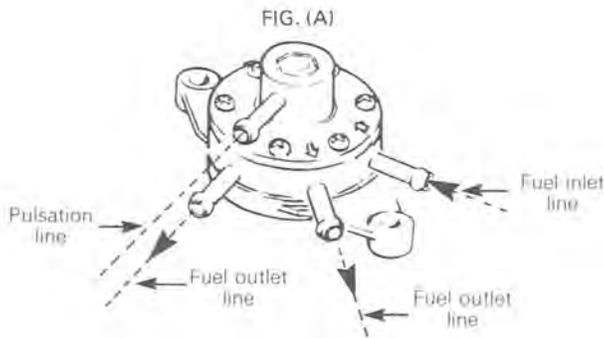
ONE OUTLET
 PUMP

SECTION 02 ENGINE

SUB-SECTION 09 (CARBURETOR AND FUEL PUMP)

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(s).
- Remove nuts and bolts securing fuel pump.



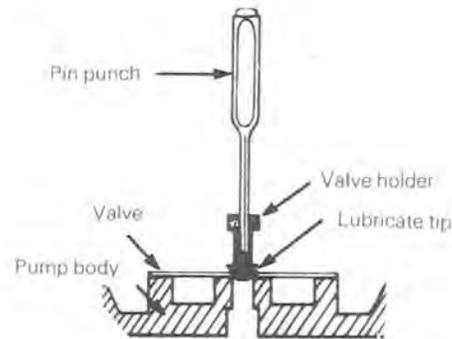
DISASSEMBLY & ASSEMBLY

④ ⑤ ⑨ 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 carburetor body as illustrated.



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.

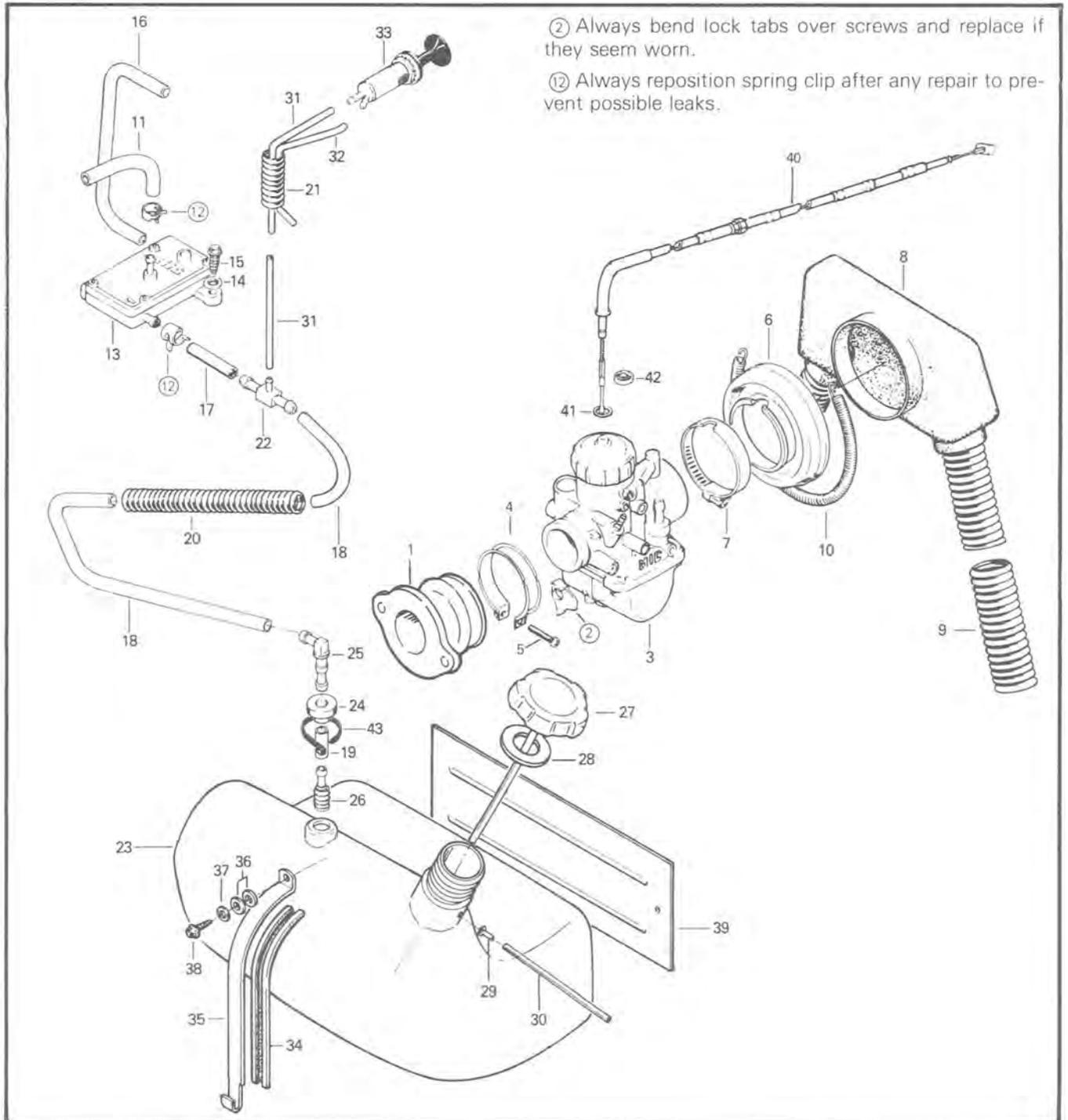
○ **NOTE:** On model fitted with two outlets, plug one outlet with finger while checking outlet valve.

INSTALLATION

To install, inverse removal procedure.

AIR INTAKE SILENCER AND FUEL TANK

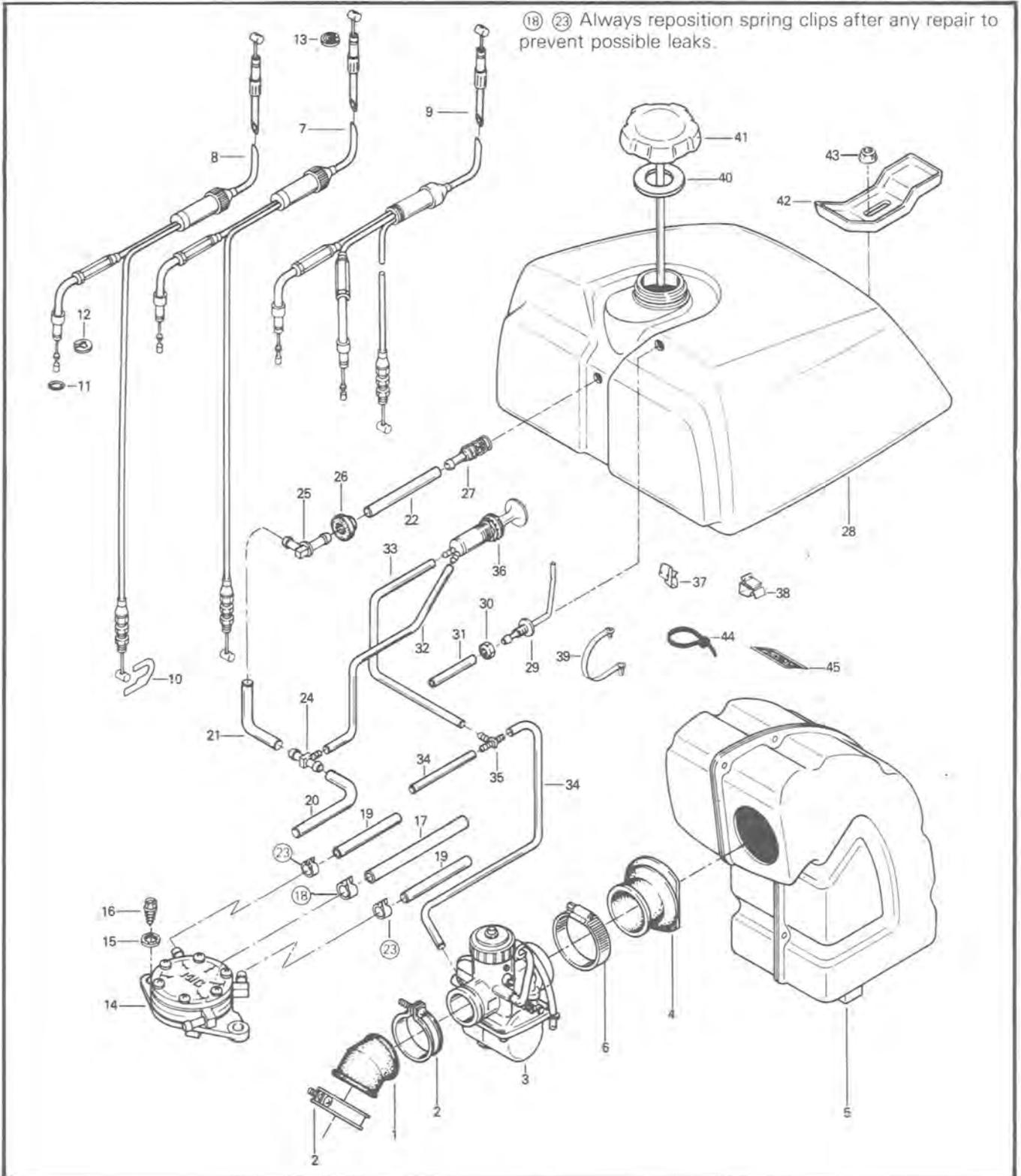
ELAN AND SPIRIT MODELS



SECTION 02 ENGINE
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. *Carburetor adaptor*
2. *Tab lock (2)*
3. *Carburetor VM 28-242*
4. *Clamp*
5. *Screw (clamp)*
6. *Adaptor*
7. *Clamp*
8. *Air intake box*
9. *Tube (2)*
10. *Spring*
11. *Impulse hose 7 1/4" (184 mm)*
12. *Spring clip*
13. *Fuel pump*
14. *Internal tooth lockwasher 1/4 (2)*
15. *Hexagonal washer head metal screw 12 x 3/4 (2)*
16. *Fuel line 17" (332 mm)*
17. *Fuel line 1 1/2" (38 mm)*
18. *Fuel line 36 1/2" (927 mm)*
19. *Fuel line 14 " (356 mm)*
20. *Isolating line 29 1/2" (750 mm)*
21. *Isolating line 4" (102 mm)*
22. *Tee*
23. *Fuel tank*
24. *Grommet*
25. *Male connector*
26. *Fuel filter*
27. *Fuel tank cap*
28. *Gasket*
29. *Air vent fitting*
30. *Air vent tube 27" (586 mm)*
31. *Primer tube 18 1/2" (470 mm)*
32. *Primer tube 7" (178 mm)*
33. *Primer valve*
34. *Protector strip 9" (229 mm)*
35. *Retainer strip*
36. *Rubber spacer (2)*
37. *Flat washer 7/32 x 5/8 x .060*
38. *Hexagonal washer head self tapping screw 12 x 1"*
39. *Heat shield*
40. *Throttle cable & housing*
41. *O-Ring*
42. *Retaining ring*
43. *Tie wrap*

CITATION AND MIRAGE MODELS

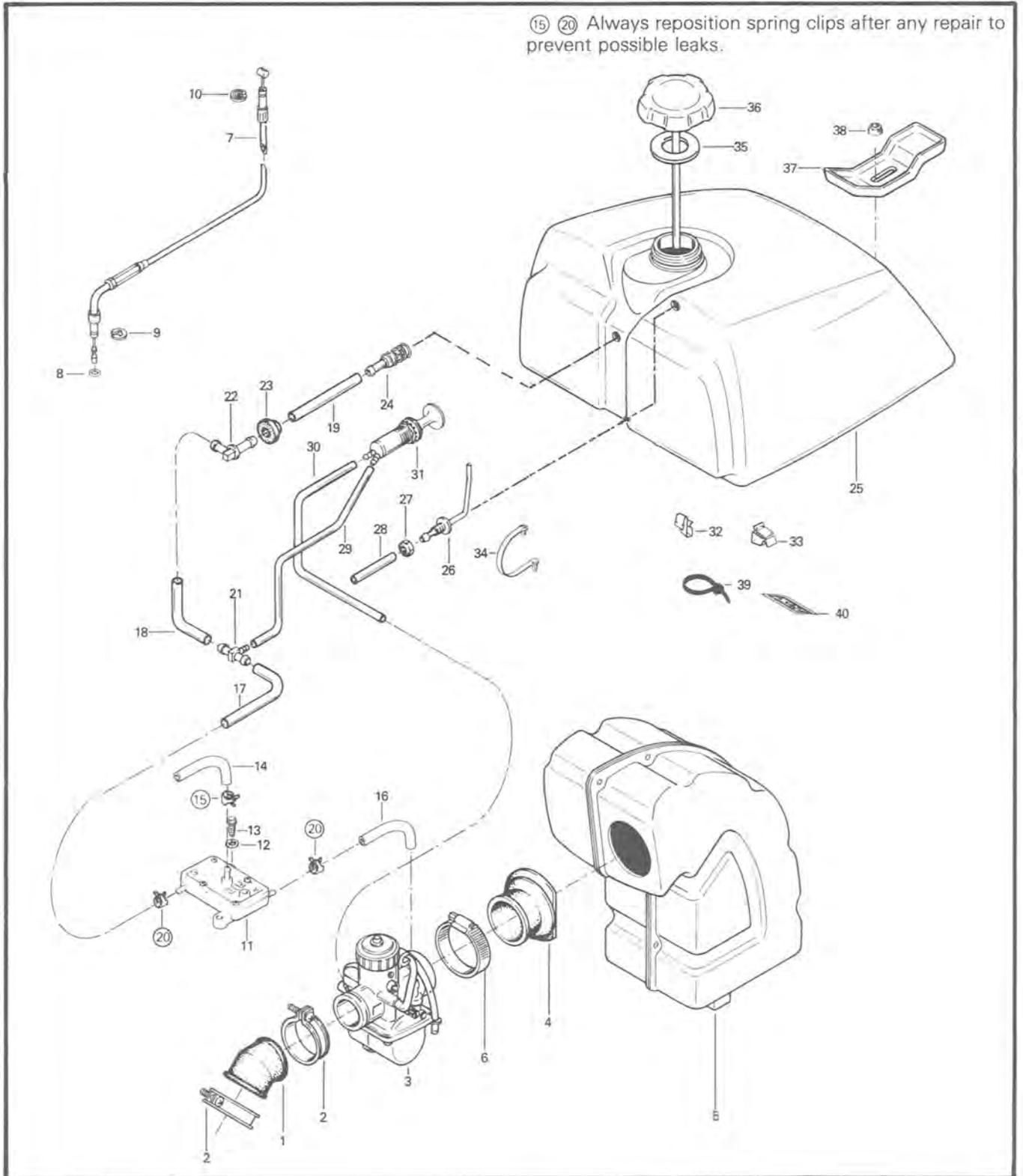


SECTION 02 ENGINE
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. Rubber flange
2. Clamp
3. Carburetor
4. Adaptor
5. Air silencer
6. Clamp
7. Throttle cable & housing
8. Throttle cable & housing
9. Throttle cable & housing
10. Tab lock
11. O-Ring
12. Retaining ring
13. Circlip
14. Fuel pump
15. Internal tooth lockwasher 1/4"
16. Hexagonal washer head self-tapping screw 12 x 3/4
17. Impulse hose 11" (280 mm)
18. Spring clip
19. Fuel line 20" (510 mm)
20. Fuel line 20" (510 mm)
Fuel line 12" (300 mm)
21. Fuel line 15" (380 mm)
22. Fuel line 14" (356 mm)
23. Spring clip
24. Tee
25. Male connector
26. Grommet
27. Fuel filter
28. Fuel tank
29. Air vent fitting
30. Hexagonal nut 5/16-18
31. Air vent tube
32. Primer tube 7" (178 mm)
33. Primer tube 20" (508 mm)
Primer tube 17" (432 mm)
34. Primer tube 8" (204 mm)
35. Tee
36. Primer valve
37. Clip
38. Clip
39. Cable clip
40. Gasket
41. Cap
42. Retainer
43. Hexagonal flanged elastic stop nut 6 mm
44. Tie rap
45. Warning Label

NORDIK, SKANDIC AND FUTURA 300 MODELS

⑮ ⑳ Always reposition spring clips after any repair to prevent possible leaks.

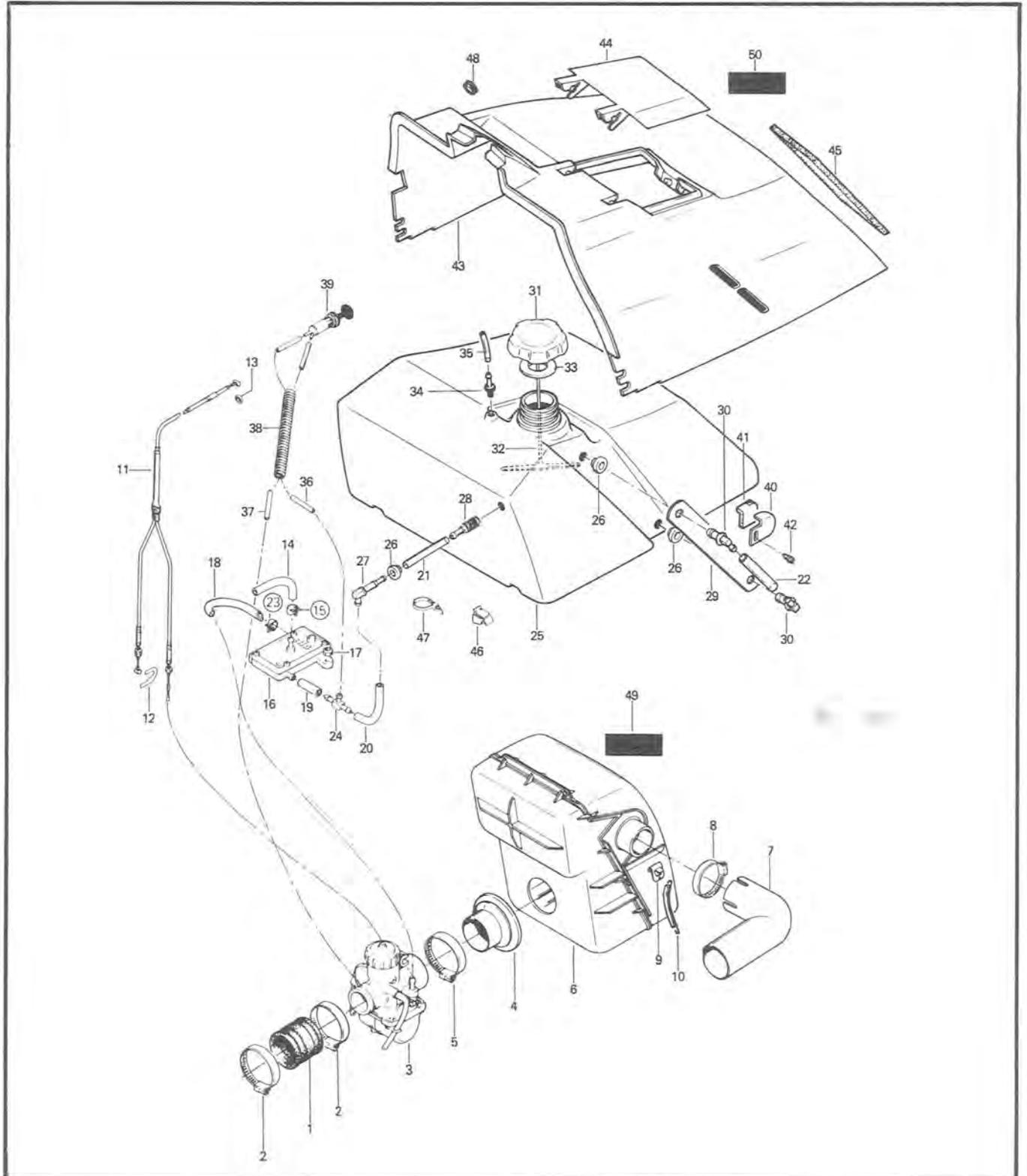


SECTION 02 ENGINE
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. Rubber flange
2. Clamp
3. Carburetor VM 34-276
4. Adaptor
5. Air silencer
6. Clamp
7. Throttle cable & housing
8. O-Ring
9. Retaining ring
10. Circlip
11. Fuel pump
12. Internal tooth lockwasher 1/4"
13. Hexagonal washer head self-tapping screw
M6 x 1 x 20
14. Impulse hose 11" (280 mm)
15. Spring clip
16. Fuel line 20" (510 mm)
17. Fuel line 20" (510 mm)
18. Fuel line 15" (380 mm)
19. Fuel line 14" (356 mm)
20. Spring clip
21. Tee
22. Male connector
23. Grommet
24. Fuel filter
25. Fuel tank
26. Air vent fitting
27. Hexagonal nut 5/16-18
28. Air vent tube 62" (1575 mm)
29. Primer tube 7" (178 mm)
30. Primer tube 20" (508 mm)
31. Primer valve
32. Clip
33. Clip
34. Cable clip
35. Gasket
36. Cap
37. Retainer
38. Hexagonal flanged elastic stop nut 6 mm
39. Tie rap
40. Warning label

SECTION 02 ENGINE
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

EVEREST AND FUTURA



SECTION 02 ENGINE

SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. Carburetor adaptor
2. Clamp
3. Carburetor VM 36-114
Carburetor VM 34-227
4. Adaptor
5. Gear clamp
6. Air silencer
7. Elbow
8. Clamp
9. Hook
10. Spring
11. Throttle cable & housing
12. Cable lock
13. Circlip
14. Impulse hose 9" (229 mm)
Impulse hose 10" (254 mm)
15. Spring clip
16. Fuel pump
17. Hexagonal Elastic Stop Nut 10-24
18. Fuel line 18" (457 mm)
19. Fuel line 1.25" (32 mm)
20. Fuel line 20" (508 mm)
Fuel line 23" (584 mm)
21. Fuel line 20" (508 mm)
22. Fuel gauge 7.37" (187 mm)
23. Spring clip
24. Tee
25. Fuel tank
26. Grommet
27. Male connector
28. Fuel filter
29. Back plate
30. Male connector
31. Fuel tank cap
32. Cap holder
33. Gasket
34. Air vent fitting
35. Air vent tube 58" (1473 mm)
36. Primer tube 28" (712 mm)
37. Primer tube 28" (712 mm)
38. Isolating line 20" (508 mm)
39. Primer valve
40. Tank retainer
41. Felt strip 1.75" x 2 (45 mm x 2)
42. Hexagonal washer head self-tapping screw
12 x 3/4
43. Tank cover
44. Access door
45. Foam
46. Clip
47. Tie rap
48. Plug
49. Warning label
50. Verification label

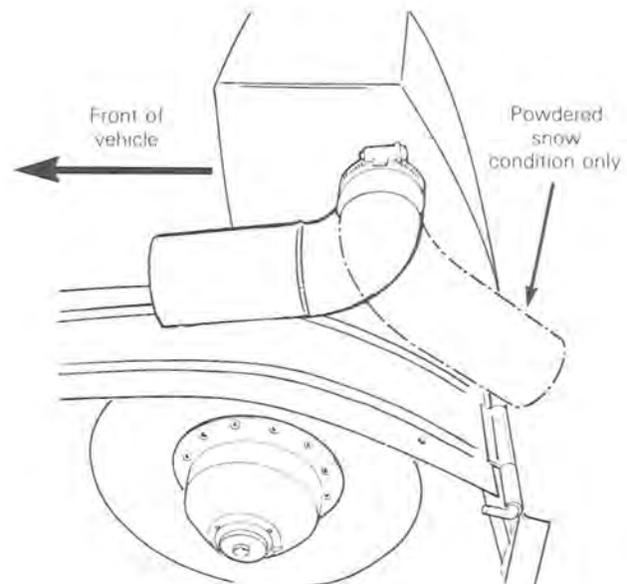
⑮ ⑲ Always reposition spring clips after any repair to prevent possible leaks.

AIR SILENCER

CAUTION: Never operate your snowmobile with the air intake silencer disconnected. Serious engine damage will occur if this notice is disregarded.

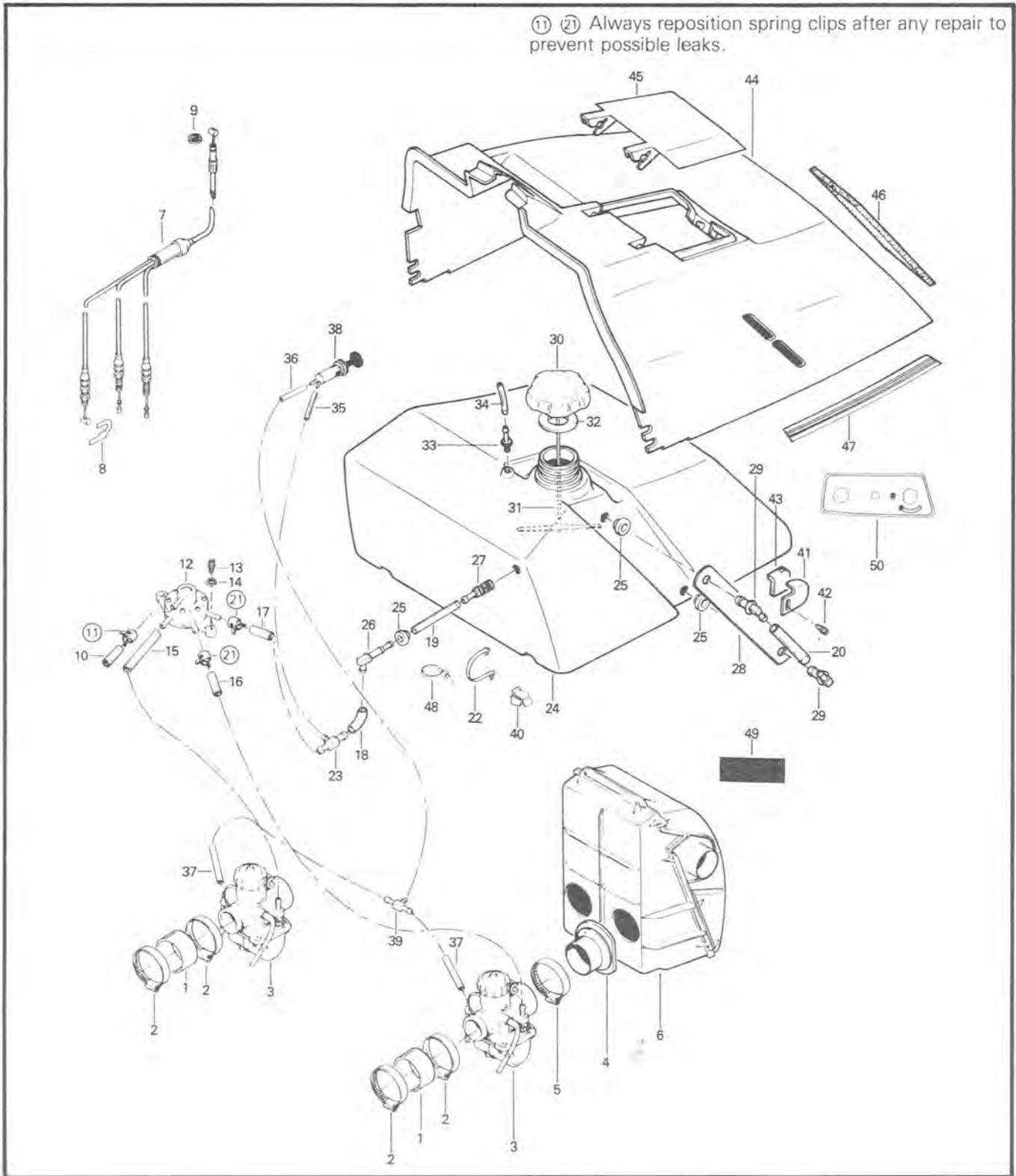
The air intake silencer elbow must always be turned to the front of the vehicle when operated in cold, warm temperature.

If the vehicle is to be operated in deep powdered snow it is recommended to turn the elbow towards the rear of the vehicle.



BLIZZARD 5500 MX AND SONIC MX MODELS

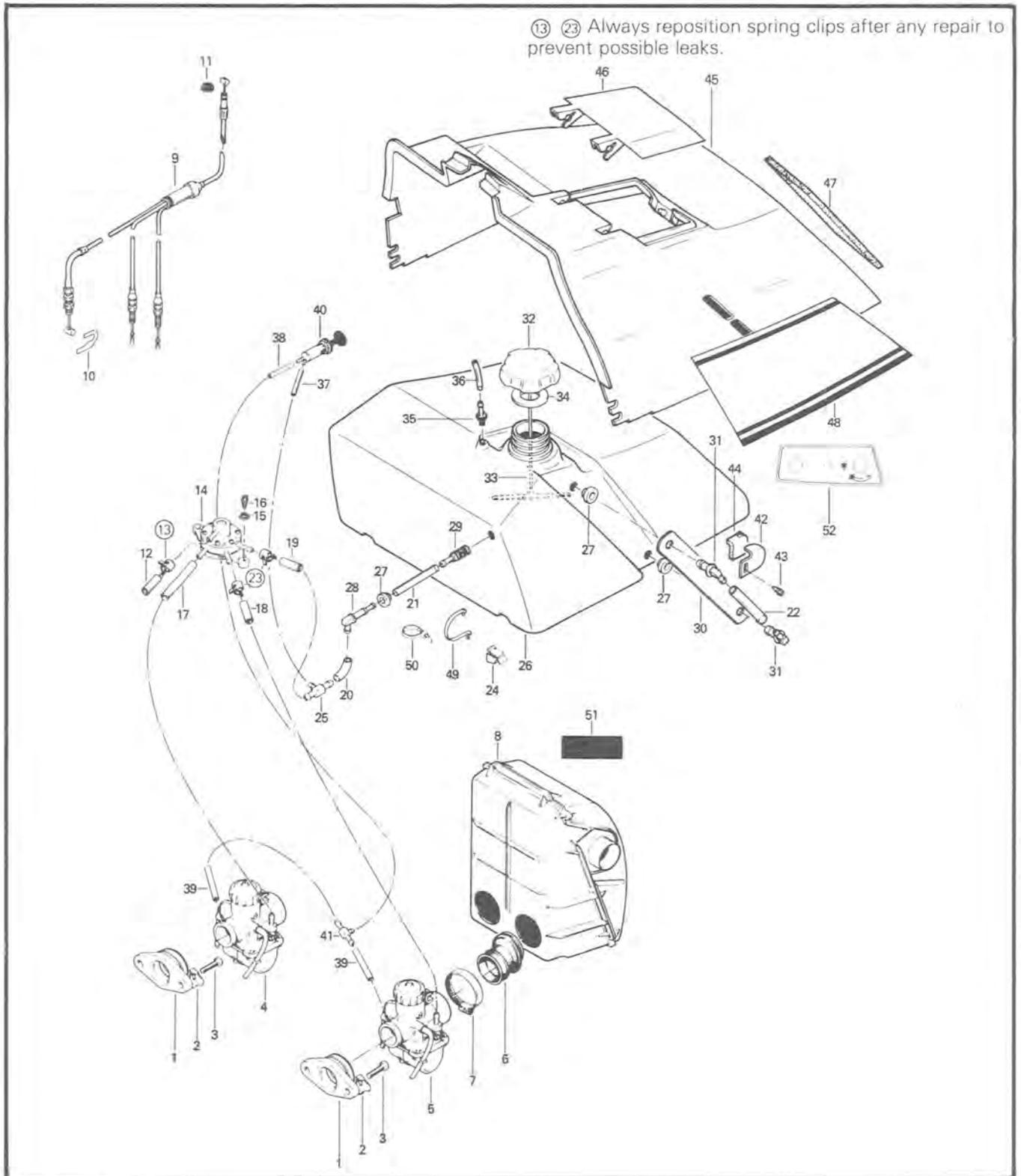
⑪ ⑳ Always reposition spring clips after any repair to prevent possible leaks.



SECTION 02 ENGINE
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. Rubber flange
2. Clamp
3. Carburetor VM 34-203
4. Adaptor
5. Gear clamp
6. Air intake
7. Throttle cable & housing
8. Cable lock
9. Circlip
10. Impulse hose 11" (280 mm)
11. Clamp
12. Fuel pump
13. Hexagonal washer head self-tapping screw
12 x 3/4
14. Internal tooth lockwasher 1/4
15. Fuel line 15" (381 mm)
16. Fuel line 15" (381 mm)
17. Fuel line 16" (407 mm)
18. Fuel line 6" (153 mm)
19. Fuel line 20" (508 mm)
20. Fuel gauge 7.37" (187 mm)
21. Spring clip
22. Cable clip
23. Tee
24. Fuel tank
25. Grommet
26. Male connector
27. Fuel filter
28. Back plate
29. Male connector
30. Fuel tank cap
31. Cap holder
32. Gasket
33. Air vent fitting
34. Air vent tube 58" (1473 mm)
35. Primer tube 24" (610 mm)
36. Primer tube 31" (788 mm)
37. Primer tube 4.5" (115 mm)
38. Primer valve
39. Tee
40. Clip
41. Tank retainer
42. Hexagonal washer head self-tapping screw
12 x 3/4
43. Felt strip 1.75" x 2 (45 mm x 2)
44. Tank cover
45. Access door
46. Foam
47. Decal set
48. Tie rap
49. Warning label
50. Verification plate

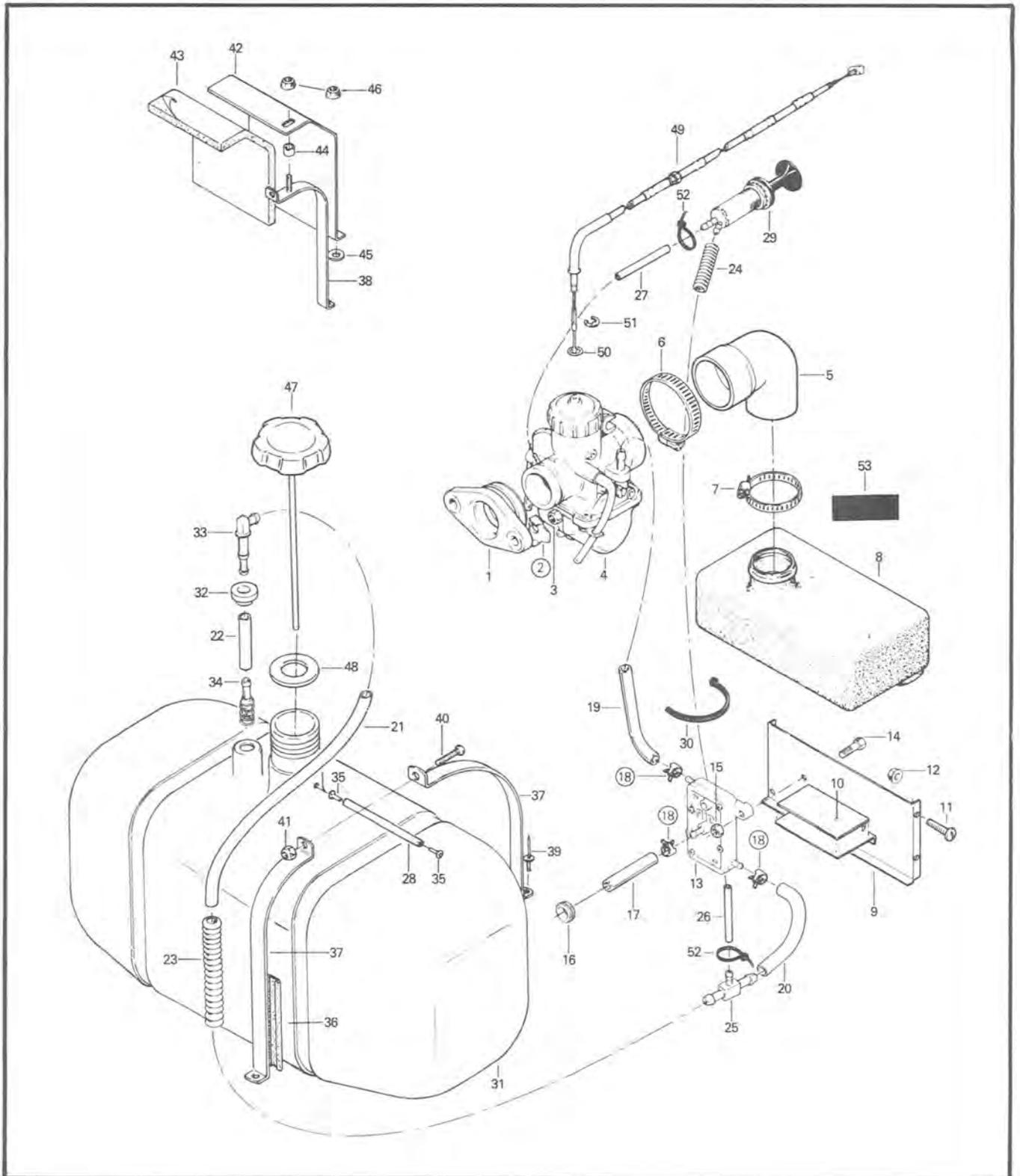
BLIZZARD 9500 AND ULTRA SONIC



SECTION 02 ENGINE
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. Rubber flange
2. Tab lock
3. Hexagonal head cap screw M8 x 20
4. Carburetor magneto side VM 36-118
5. Carburetor P.T.O. side VM 36-119
6. Adaptor
7. Gear clamp
8. Air silencer
9. Throttle cable & housing
10. Cable lock
11. Circlip
12. Impulse hose 11' (280 mm)
13. Spring clip
14. Fuel pump
15. Internal tooth lockwasher 1/4
16. Hexagonal washer head self-tapping screw 12 x 3/4
17. Fuel line 13.5" (343 mm)
18. Fuel line 13.5" (343 mm)
19. Fuel line 16" (407 mm)
20. Fuel line 6" (153 mm)
21. Fuel line 20" (508 mm)
22. Fuel gauge 7.37" (187 mm)
23. Spring clip
24. Clip
25. Tee
26. Fuel tank
27. Grommet
28. Male connector
29. Fuel filter
30. Back plate
31. Male connector
32. Fuel tank cap
33. Cap holder
34. Gasket
35. Air vent fitting
36. Air vent tube 58" (1473 mm)
37. Primer tube 24" (610 mm)
38. Primer tube 31" (788 mm)
39. Primer tube 4.5" (115 mm) x 2
40. Primer valve
41. Tee
42. Tank retainer
43. Hexagonal washer head self-tapping screw 12 x 3/4
44. Felt strip 1.75" x 2 (45 mm x 2)
45. Tank cover
46. Access door
47. Foam
48. Decal set
49. Cable clip
50. Tie rap
51. Warning label
52. Verification label

ALPINE MODEL



SECTION 02 ENGINE

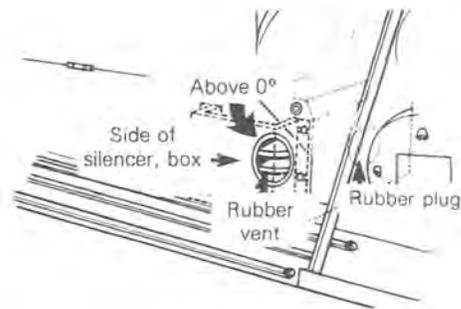
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. Rubber flange with clamp
2. Tab lock
3. Hexagonal nut 8 mm
4. Carburetor VM 34-215
5. Air intake elbow
6. Gear clamp
7. Hose clamp
8. Air intake
9. Baffle
10. Foam for baffle
11. Pan slotted head machine screw 1/4-20 x 3/4
12. Hexagonal Flanged elastic stop nut 1/4-20
13. Fuel pump
14. Hexagonal head cap screw 1/4-20 x 3/4
15. Hexagonal elastic stop nut 1/4-20
16. Grommet
17. Impulse hose 15" (381 mm)
18. Spring clip
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
38. Retainer strip
39. Rivet
40. Round slotted head machine screw 10-24 x 3"
41. Hexagonal elastic stop nut 10-24
42. Tank deflector
43. Foam
44. Rubber spacer
45. Rubber washer
46. Hexagonal flanged elastic stop nut 1/4-20
47. Fuel tank cap
48. Gasket
49. Throttle cable & housing
50. O-Ring
51. Retainer ring
52. Tie rap
53. Warning label (air silencer)

② Always bend lock tabs over screws and replace if they seem worn.

⑱ Always reposition spring clips after any repair to prevent possible leaks.

When operating the vehicle in temperature exceeding 0° C (32° 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.



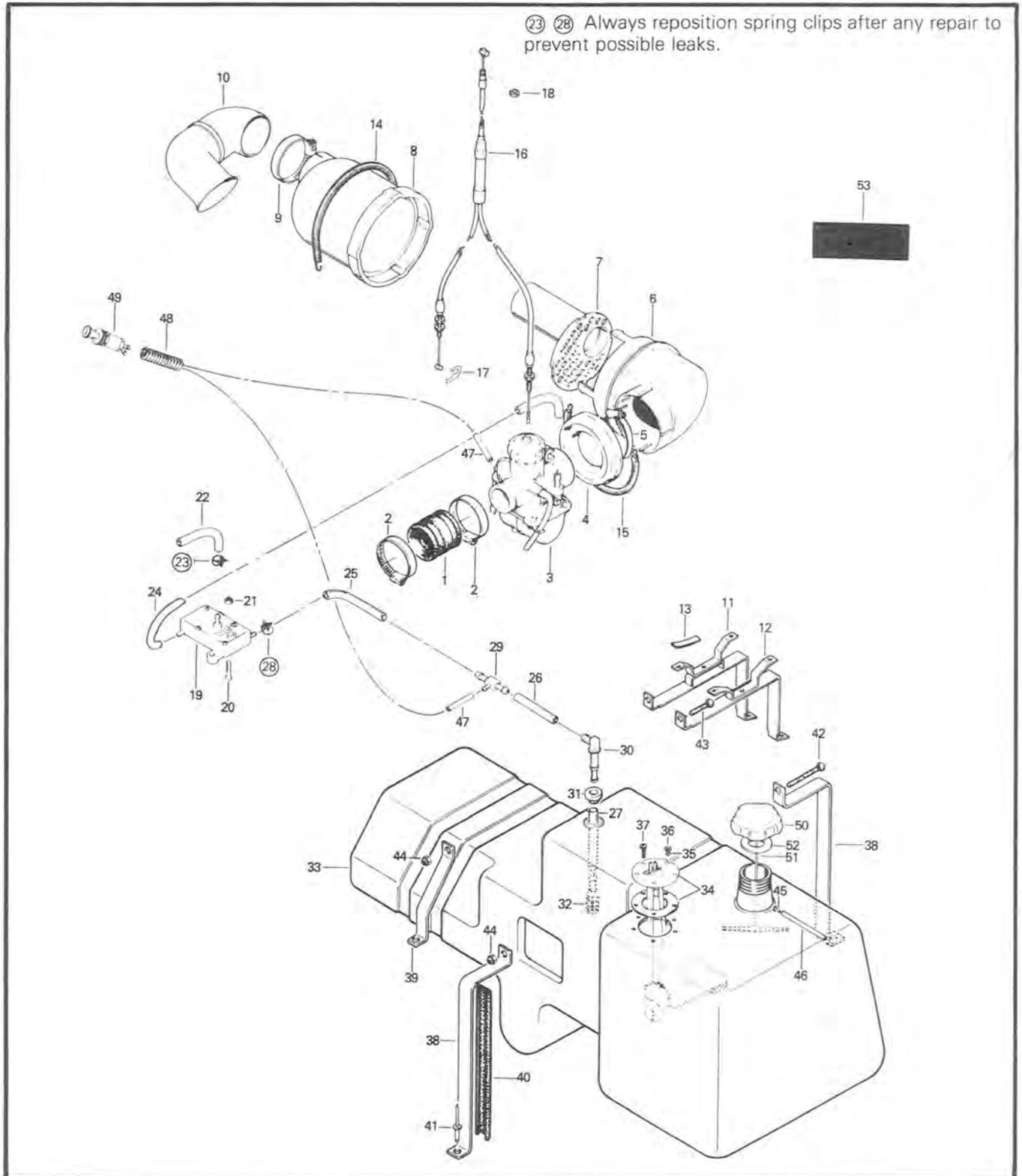
In temperatures below 0° C (32° F) and/or powder snow, the rubber plug must block the entry of fresh air on the side of the silencer box and the rubber vent must allow the warm air being emitted from the engine to be directed over the carburetor.

CAUTION: Observe temperature changes and locate plugs accordingly. Incorrect location of plugs may cause carburetor ice-up or engine overheating.

SECTION 02 ENGINE
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

ELITE MODEL

Ⓜ 23 Ⓜ 28 Always reposition spring clips after any repair to prevent possible leaks.



SECTION 02 ENGINE

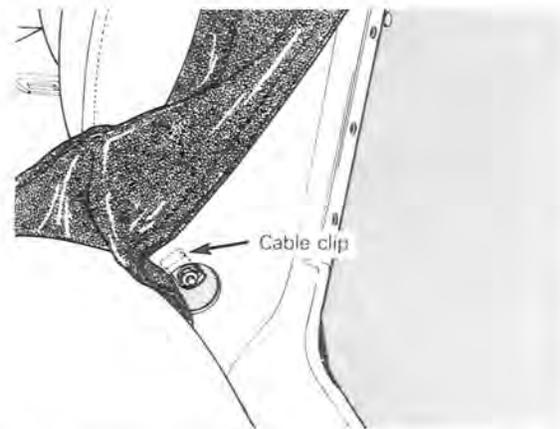
SUB-SECTION 10 (AIR INTAKE SILENCER AND FUEL TANK)

1. Carburetor adaptor
2. Clamp
3. Carburetor VM 34-258
4. Rubber flange
5. Clamp
6. Filter shell
7. Baffle
8. Resonator shell
9. Clamp
10. Elbow
11. Retainer strip
12. Retainer strip
13. Felt strip 3.5" (89 mm) x 2
14. Spring
15. Spring
16. Throttle cable & housing
17. Cable lock
18. Circlip
19. Fuel pump
20. Hexagonal head cap screw 1/4-20 x 1"
21. Hexagonal flanged elastic stop nut 1/4-20
22. Impulse hose 18" (457 mm)
23. Clamp
24. Fuel line 26" (661 mm)
25. Fuel line 18" (457 mm)
26. Fuel line 8" (204 mm)
27. Fuel line 15 1/2" (394 mm)
28. Spring clip
29. Tee
30. Male connector
31. Grommet
32. Fuel filter
33. Fuel tank
34. Sensor
35. Pad
36. Flat washer 7/32 x 1/2 x .060
37. Pan slotted head machine screw 8-32 x 3/4
38. Retainer strip
39. Retainer strip
40. Protector strip 49.6" (1260 mm)
41. Rivet
42. Round slotted head machine screw 10-24 x 2 1/2
43. Round slotted head machine screw 10-24 x 1
44. Hexagonal Elastic stop nut 10-24
45. Air vent fitting
46. Air vent tube 36" (815 mm)
47. Primer tube 124" (3150 mm)
48. Isolating line 113" (2870 mm)
49. Primer valve
50. Fuel tank cap
51. Cap holder
52. Gasket
53. Warning label

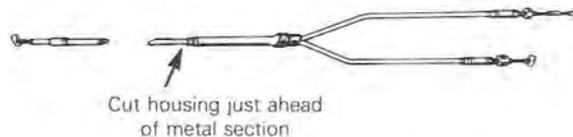
THROTTLE CABLE REPLACEMENT (ELITE)

Removal & installation

First remove cable clip located between seats (driver's side). To do so, remove driver seat backrest (2 wing nuts inside engine compartment), drill out rivet and fold back covering. Remove clip. If required, retaining screw can be held from opposite side by repeating procedure on passenger's side.



Cut-off throttle cable housing just ahead of the metal section (engine compartment), pull out cable as much as possible and cut it.



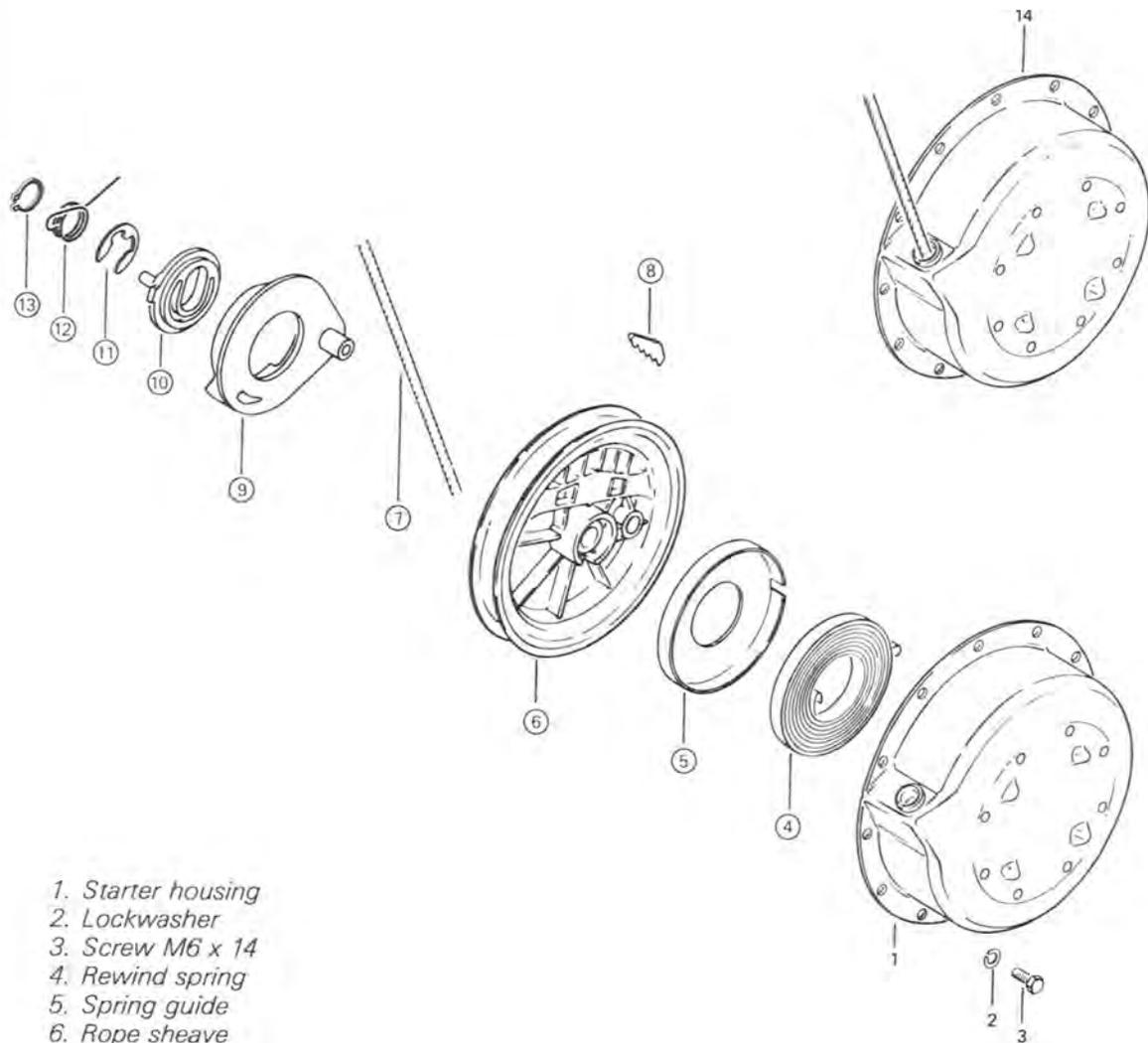
Attach new cable (throttle lever end) to old cable end previously cut and pull new cable through proper routing.

○ **NOTE:** Wrap tape around cable end to prevent interference with rotating or hot parts. Reinstall cable clip and seat backrest.

▼ **CAUTION:** After the installation of a new throttle cable, the throttle slide and the oil pump must be adjusted as specified or engine damage will occur.

REWIND STARTER

(All models)



1. Starter housing
2. Lockwasher
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 11 (REWIND STARTER)**

REMOVAL

Remove bolts and washers securing rewind starter to engine, then remove rewind starter.

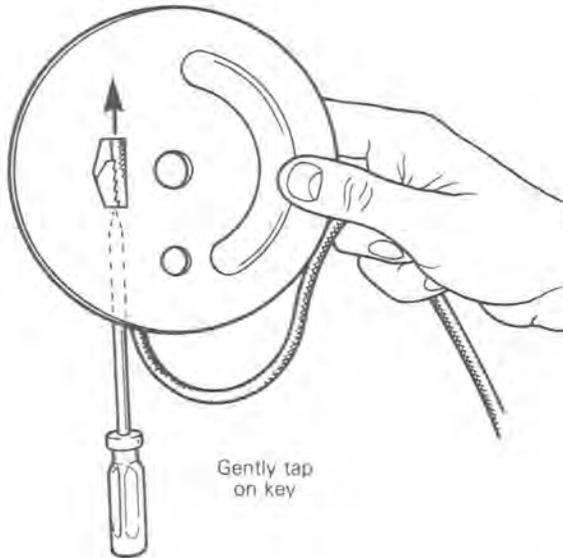
NOTE: On some models the hood requires supporting before removing starter housing. The retaining cable is attached to one of the rewind starter attaching bolts.

On oil injection models, remove oil injection pump from rewind starter cover.

DISASSEMBLY

⑥ ⑦ ⑧ To remove rope from rewind starter mechanism:

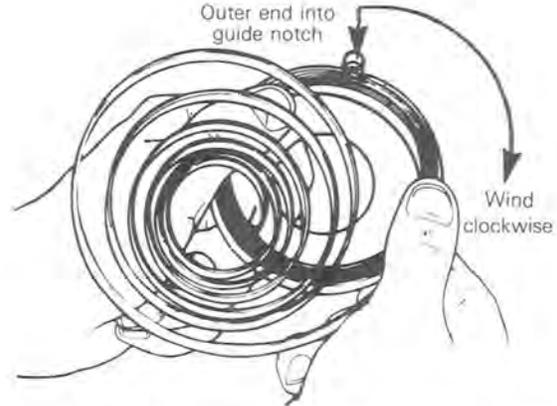
- First remove lock ring, lock spring, circlip, pawl lock and pawl.
- Remove sheave from starter housing.
- Disengage key and pull out rope.



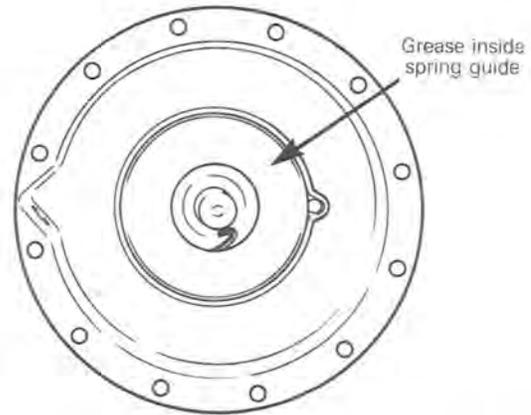
ASSEMBLY

④ ⑤ 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.

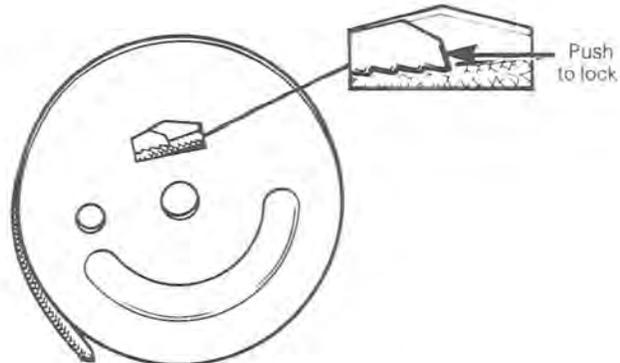


Lubricate spring assembly with low temperature grease P/N 413 7039 00 and position into starter housing as illustrated.



CAUTION: The use of standard multi-purpose grease could result in starter malfunction.

⑥ ⑦ ⑧ To install a new rope: insert rope into sheave orifice and lock it with the key as illustrated.

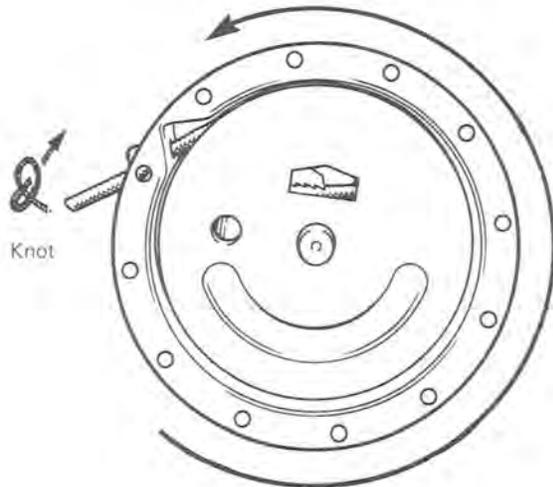


To adjust rope tension:

Wind rope on sheave and place rope sheave into starter housing making sure that the sheave hub notch engages in the spring hook.

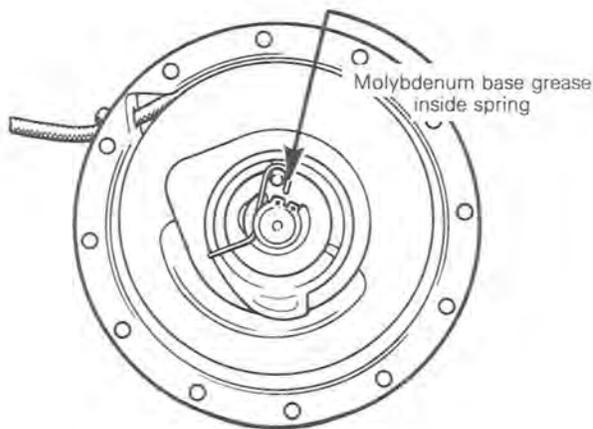
Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

Pull the rope out of the starter housing and temporarily make a knot to hold it.



1 turn preload will give
7 turns of tension when fully extended

- ⑨ ⑩ ⑪ Position pawl, pawl lock and circlip.
- ⑫ Install lock spring and lubricate with Molybdenum base grease.



Install lock ring.

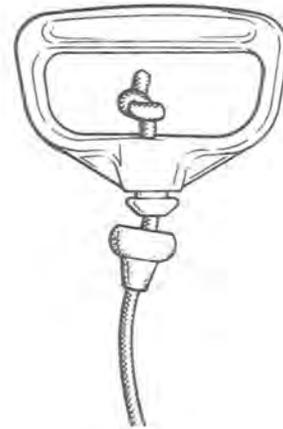
INSTALLATION

On oil injection models, 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 starter grip, and tie a knot in the rope end. Fuse the knot with a lit match then turn the knot down and pull the starter grip over the knot.





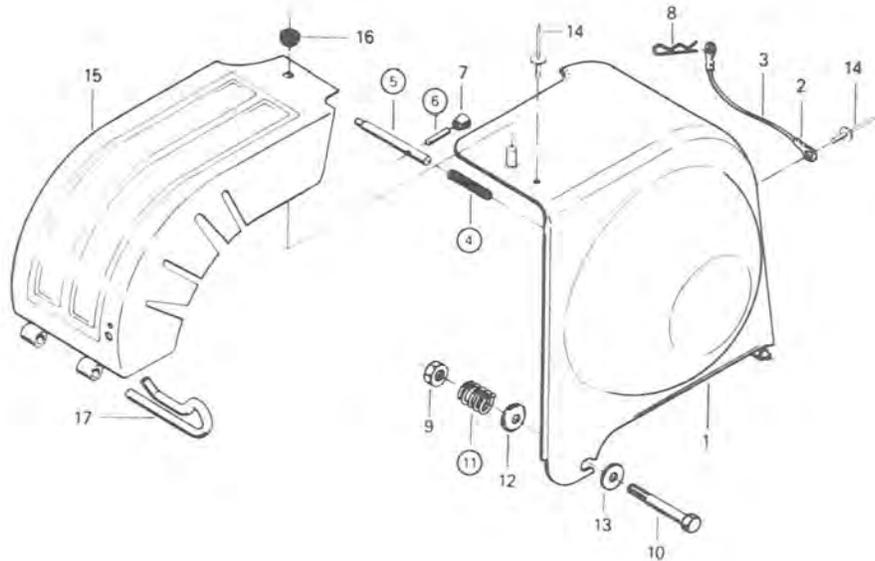
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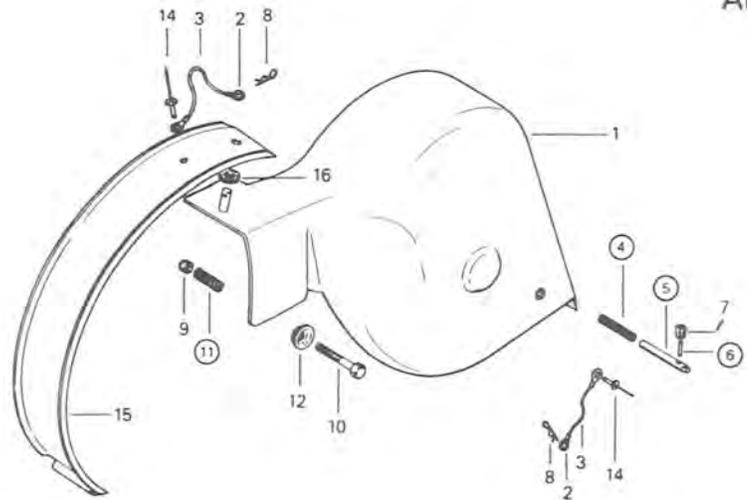
PULLEY GUARD

Elan and Spirit



Alpine

1. Drive pulley guard
2. Open barrel
3. Wire
4. Spring (pin)
5. Pin
6. Spirol pin
7. Cap
8. Hair pin cotter
9. Clip nut
10. Bolt
11. Spring
12. Retainer washer
13. Flat washer
14. Rivet
15. Driven pulley guard
16. Grommet
17. Hair pin



SECTION 03 TRANSMISSION

SUB-SECTION 01 (PULLEY GUARD)

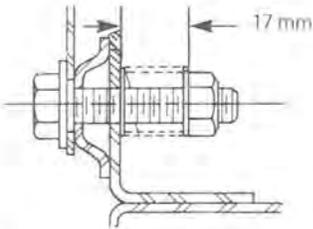
REMOVAL

Pull out hair pin and remove driven pulley guard. Pull on spring to disengage pin from frame bracket, in order to disengage drive pulley guard.

◆ **WARNING:** Engine should be running only when pulley guard is well secured in place.

④ The length of uncompressed pin spring should not be less than 47 mm (1 7/8").

① An uncompressed front guard spring should not be less than 20 mm (13/16"). When assembling adjust length to 17 mm (11/16").

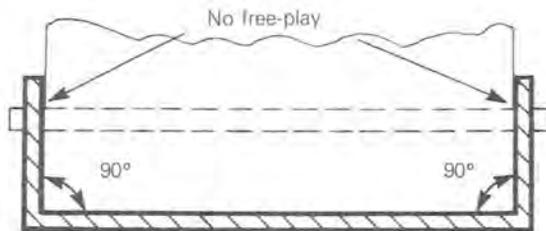


INSPECTION

⑤ ⑥ Check condition of coil pin. Replace any damaged parts.

INSTALLATION

Prior to installation, ensure that pulley guard and frame bracket are 90° with frame.



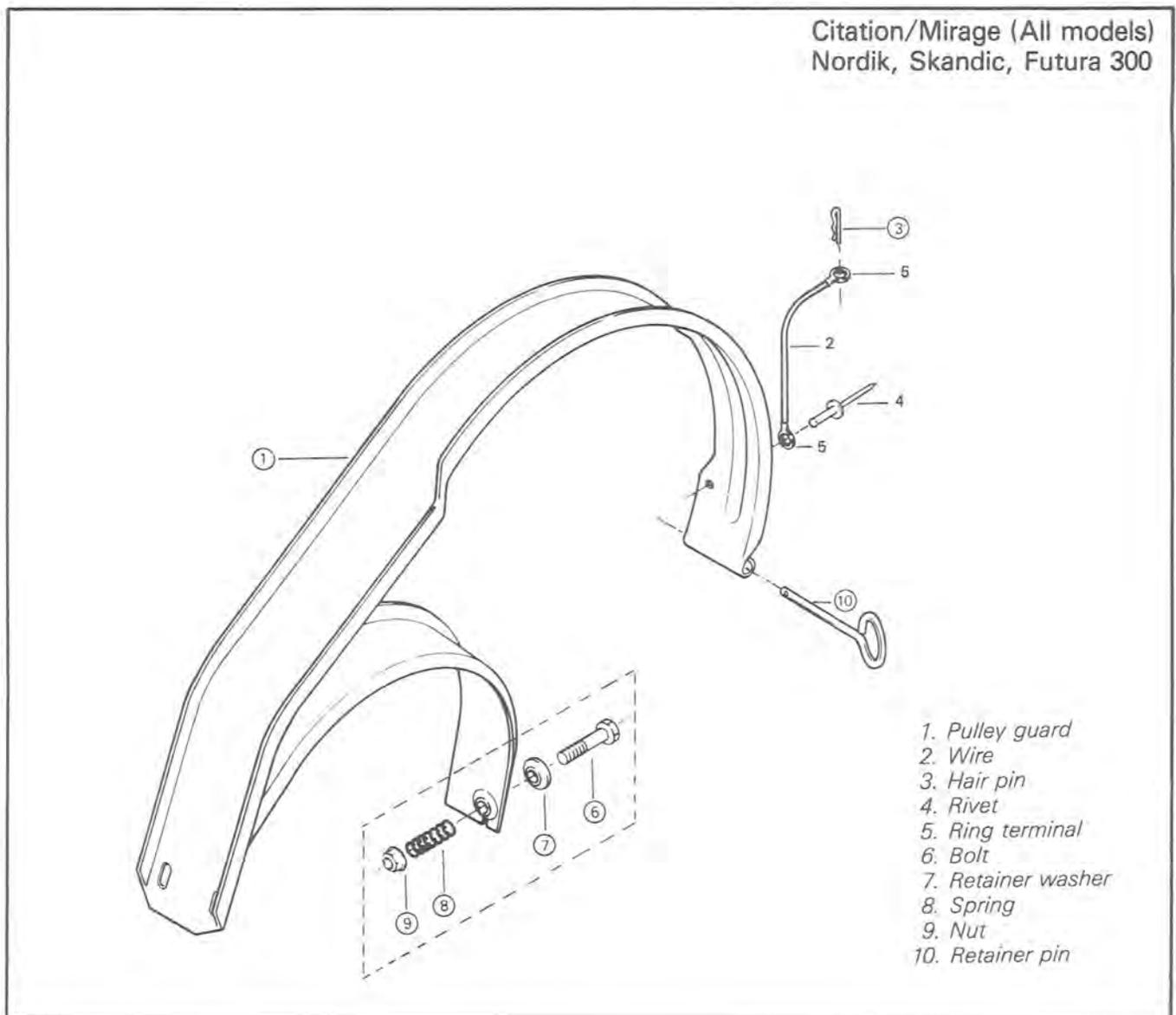
◆ **WARNING:** No lateral free-play should exist between drive pulley guard and frame bracket.

Slide pulley guard into bracket.

Pull on lower spring bolt, engage pin into frame bracket and install hair pin.

Install driven pulley guard.

Citation/Mirage (All models)
Nordik, Skandic, Futura 300



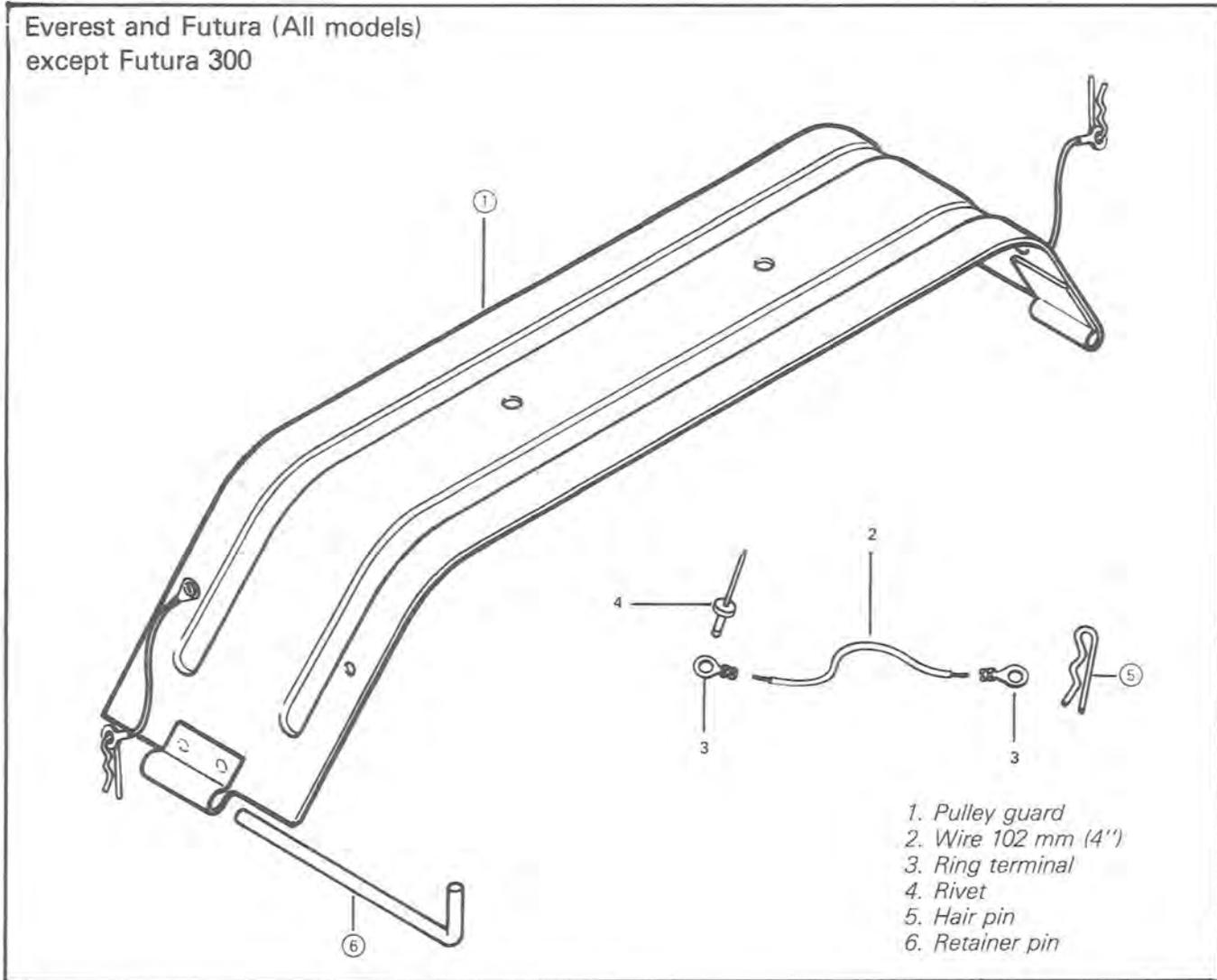
REMOVAL

- ③ ⑩ Remove the hair pin and the retainer pin.
- ① ⑦ With a forward movement pull out the guard from the center retainer clip, then unhook the front portion. To install reverse the removal procedure.
- ⑥ ⑦ ⑧ ⑨ Assemble the center retainer clip as illustrated. The spring tension is correct when two or three threads of the bolt are protruding outside of the nut.

◆ **WARNING:** Engine should be running only when pulley guard is well secured in place.

SECTION 03 TRANSMISSION
SUB-SECTION 01 (PULLEY GUARD)

Everest and Futura (All models)
except Futura 300



REMOVAL

① ⑤ ⑥ Remove the two hair pins and the retainer pins, then remove the pulley guard.

To install, reverse the removal procedure.

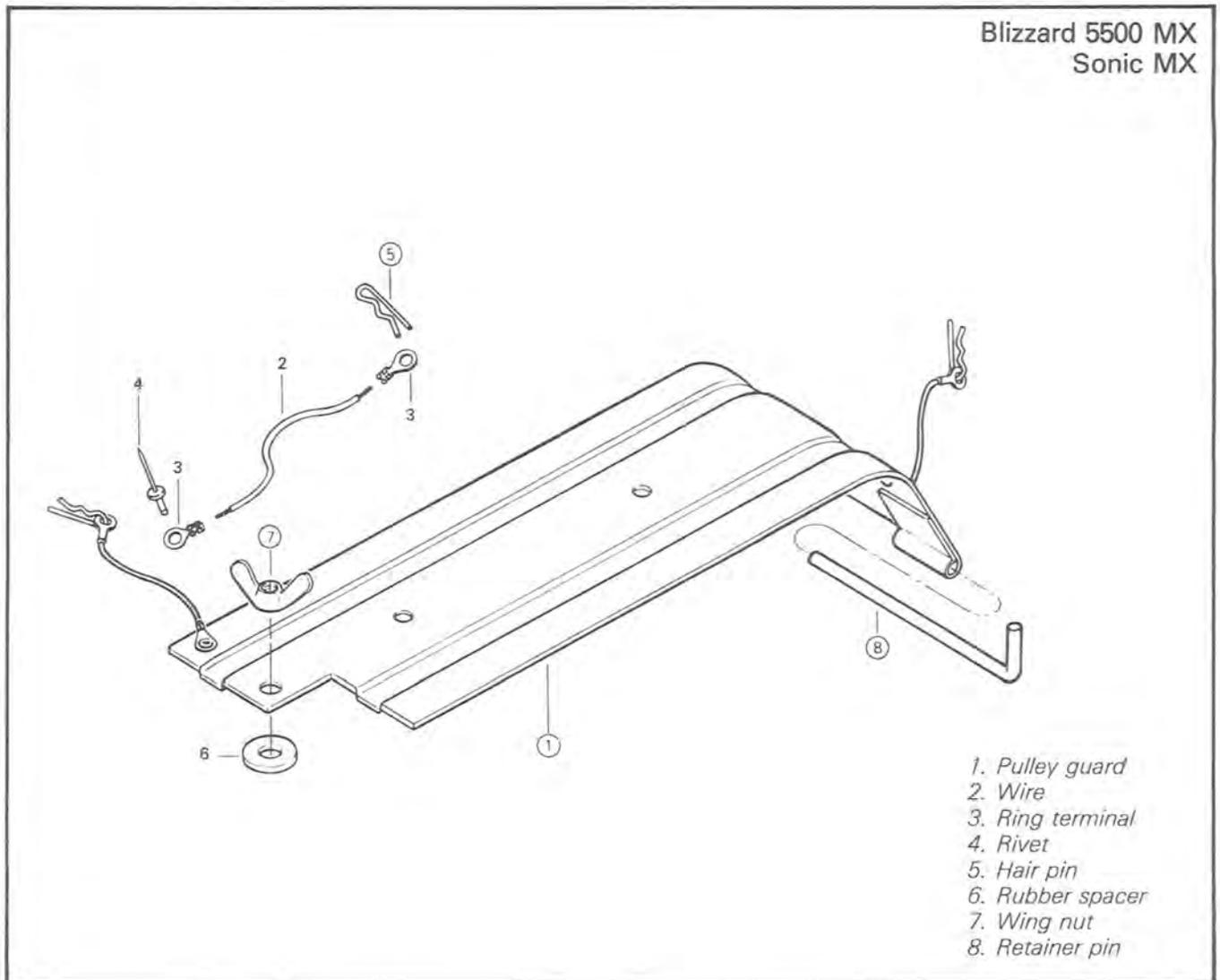
◆ **WARNING:** Engine should be running only when pulley guard is well secured in place.

INSPECTION

Check all parts for damage. Replace as required.

SECTION 03 TRANSMISSION
SUB-SECTION 01 (PULLEY GUARD)

Blizzard 5500 MX
Sonic MX



REMOVAL

- ⑤ ⑧ Remove the two hair pins and the retainer pin.
- ① ⑦ Unscrew the wing nut, then remove the pulley guard.

To install, reverse the removal procedure.

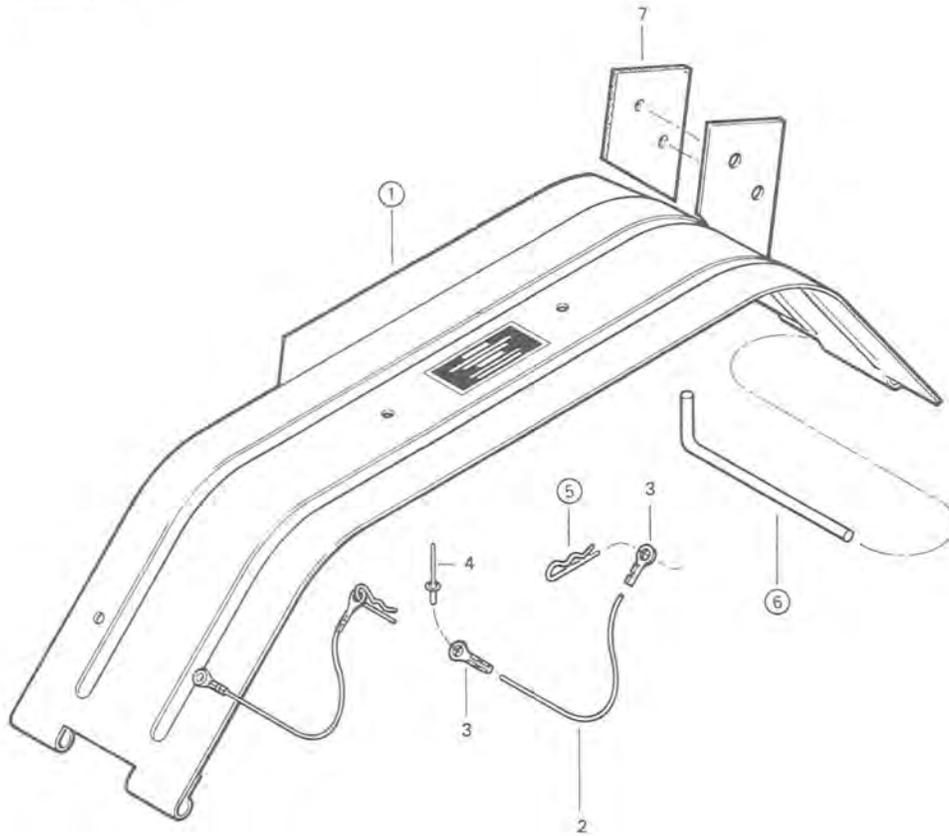
◆ **WARNING:** Engine should be running only when pulley guard is well secured in place.

INSPECTION

Check all parts for damage. Replace as required.

SECTION 03 TRANSMISSION
SUB-SECTION 01 (PULLEY GUARD)

Blizzard 9500
Ultra Sonic



1. Pulley guard
2. Wire
3. Ring terminal
4. Rivet
5. Hair pin
6. Retainer pin
7. Foam

REMOVAL

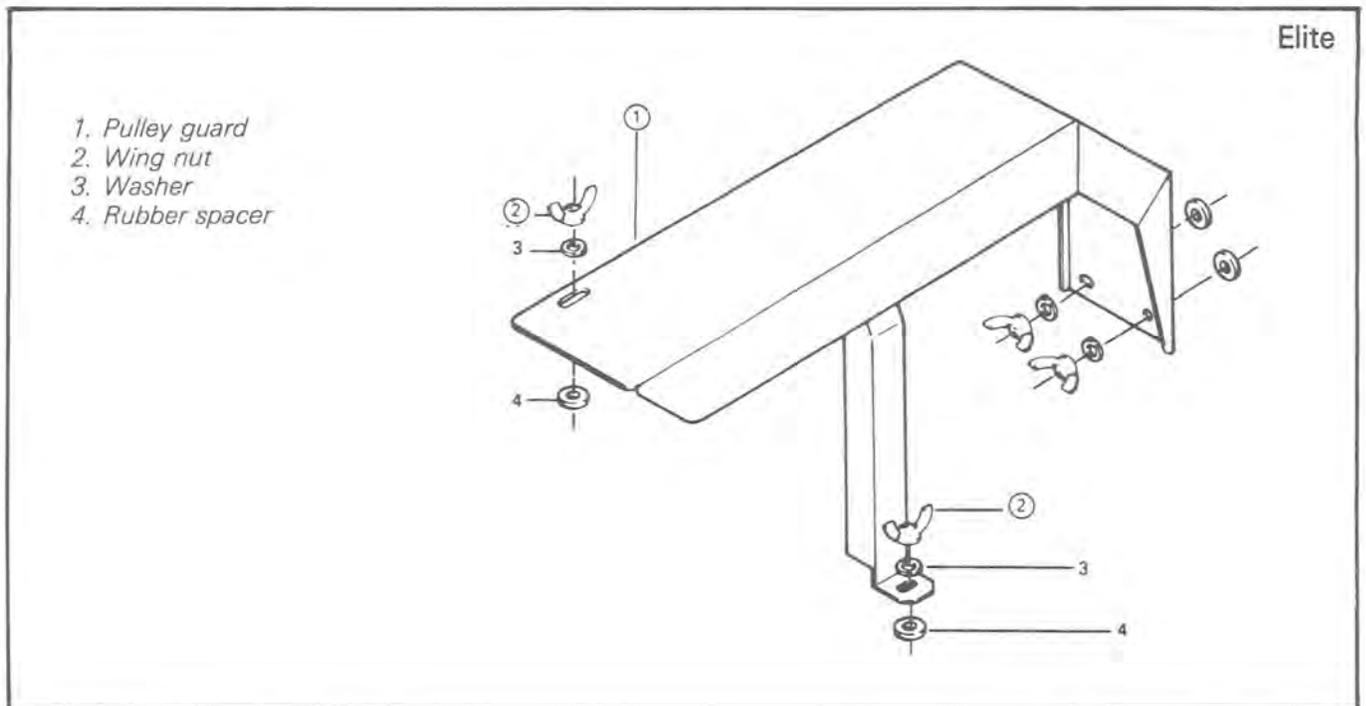
① ⑤ ⑥ Remove the two hair pins and the retainer pins, then remove the pulley guard.

To install, reverse the removal procedure.

◆ **WARNING:** Engine should be running only when pulley guard is well secured in place.

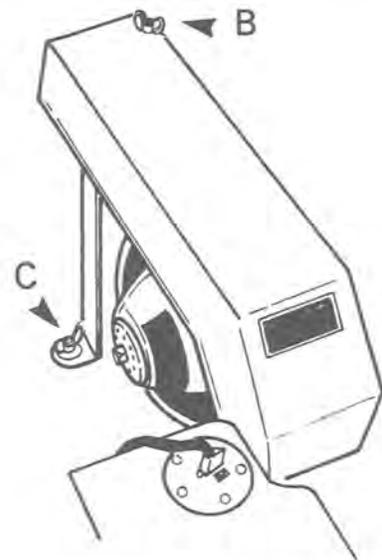
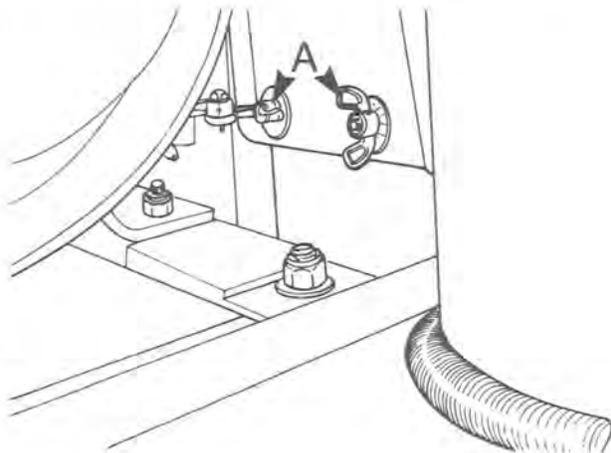
INSPECTION

Check all parts for damage. Replace as required.



REMOVAL

① ② Lift and support the engine compartment hood. Unscrew the wing nuts (A) located behind the drive pulley, the wing nut (B) on top of pulley guard and the wing nut (C) at the pulley guard center support.



Disengage guard with a forward movement and remove complete assembly.

◆ **WARNING:** Engine should be running only when pulley guard is secured in place.

To install, reverse the removal procedure.

INSPECTION

Check general condition of parts. If damaged, replace.



DRIVE BELT

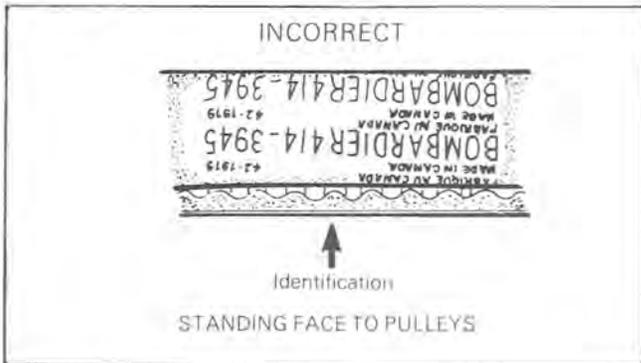
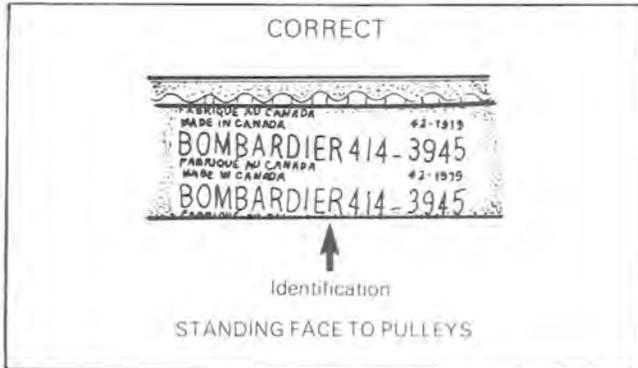
APPLICATION CHART (1982 MODELS)

MODEL	NUMBER	MAX. WIDTH (NEW)	MIN. WIDTH (WEAR LIMIT)
ELAN SPIRIT	570 0411 00	30 mm (1 3/16")	27 mm (1 1/16")
CITATION 3500 MIRAGE I CITATION 4500(E) MIRAGE II(E)	414 3945 00 414 3758 00	33 mm (1 5/16")	30 mm (1 3/16")
CITATION SS MIRAGE SP NORDIK FUTURA 300 SKANDIC EVEREST 500(E) FUTURA 500(E) EVEREST L/C FUTURA L/C BLIZZARD 5500 MX SONIC BLIZZARD 9500 ULTRA SONIC ALPINE ELITE	414 3758 00	33 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

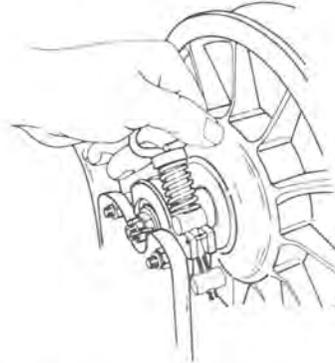
▼ CAUTION: Do not force or use tools to pry the belt into place, as this could cut or break the cords in the belt.

◆ 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.

● For Citation, Mirage, Nordik, Futura 300 and Skandic models, to remove belt from pulleys and vehicle.

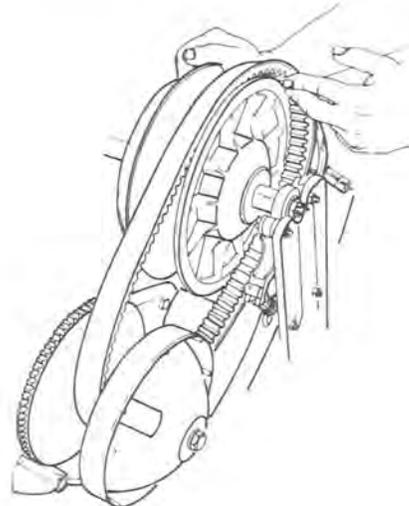
- Loosen the countershaft bearing retaining screw and open the bearing cage.



- Open the driven pulley by twisting and pushing the sliding half. Hold in fully open position.

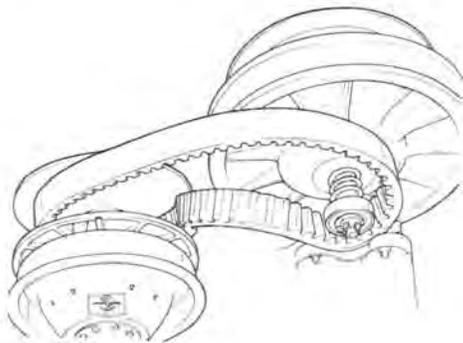


- Slip the belt over the top edge of the sliding half.

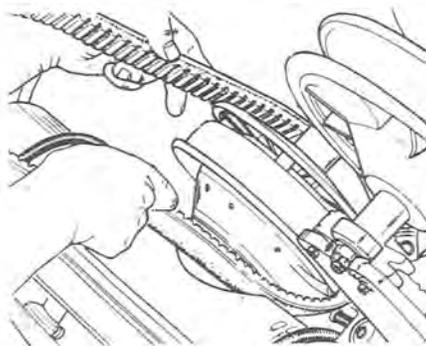


SECTION 03 TRANSMISSION SUB-SECTION 02 (DRIVE BELT)

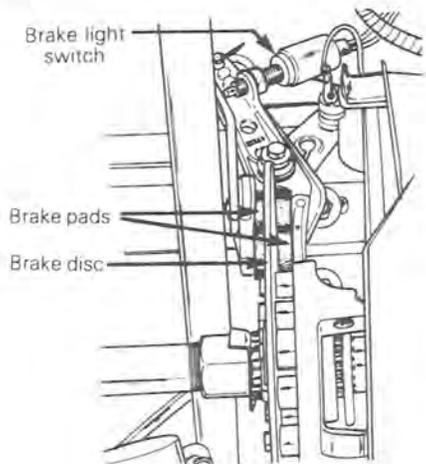
- Lift the countershaft upward approx. 50 mm (2 in.) and slip the belt between the shaft and the bearing cage to remove completely.



- **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.



- ◆ **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.

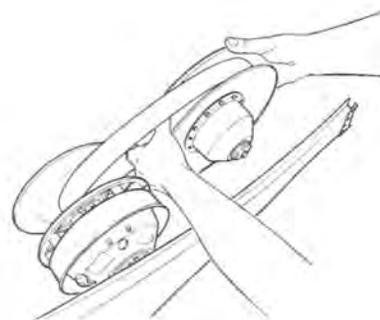


- To install the drive belt, reverse the procedure.

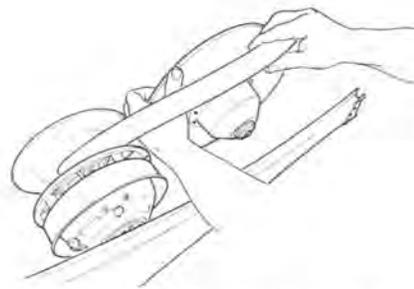
▼ **CAUTION:** Once belt is installed, be sure to secure the countershaft bearing by closing the bearing cage and firmly tightening the retaining screw.

- For Elan, Spirit, Futura, Blizzard 5500 MX, Sonic, Blizzard 9500 and Ultra Sonic, to remove belt from pulleys and vehicle:

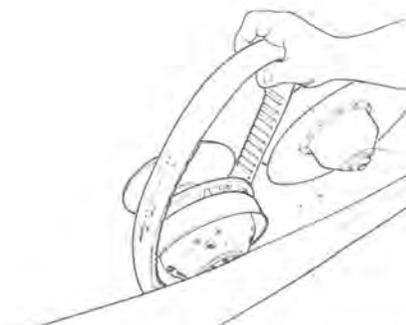
- Open the driven pulley by twisting and pushing the sliding half. Hold in fully open position.



- Slip the belt over the top edge of the sliding half.



- Slip the belt out from the drive pulley and remove completely from the vehicle.

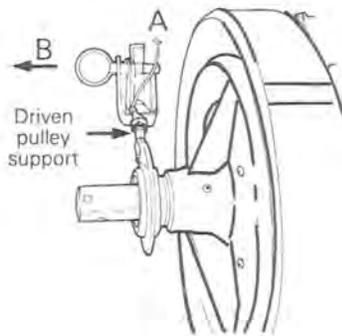


- To install the drive belt reverse procedure.

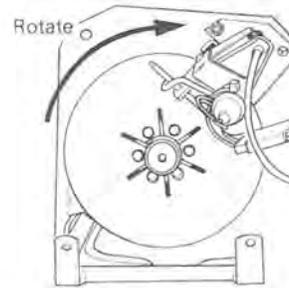
SECTION 03 TRANSMISSION SUB-SECTION 02 (DRIVE BELT)

● For Elite model:

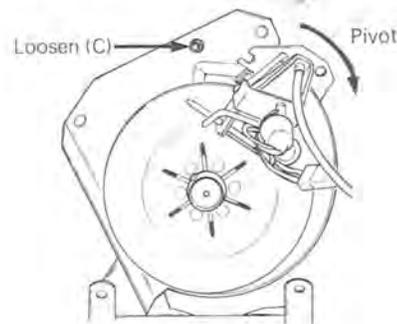
- To remove belt from pulleys, follow the Elan model procedure.
- To remove belt from vehicle, unlock the driven pulley support by:
 - A) Removing the hair pin cutter.
 - B) Pulling out the locking pin.



- B) Rotate the brake support on the transmission shaft.



- C) Loosen the nut holding the brake caliper to brake bracket and pivot the brake assembly half a turn.

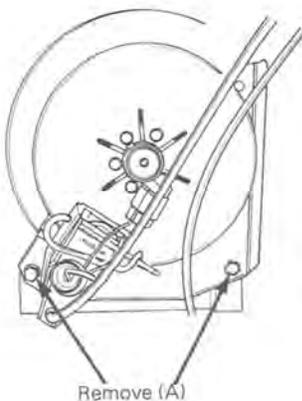


- C) Slipping the belt over the transmission shaft.

- To install drive belt, reverse procedure.

● For Alpine model:

- To remove belt from pulleys, follow the Elan procedure.
- To remove belt from vehicle:
 - A) Remove the two bolts holding brake support to the frame.



- D) Slip the belt over the transmission shaft.

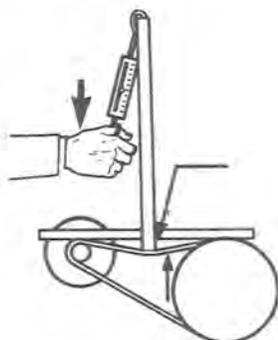
- To install drive belt, reverse procedure.

TENSION CHECKING

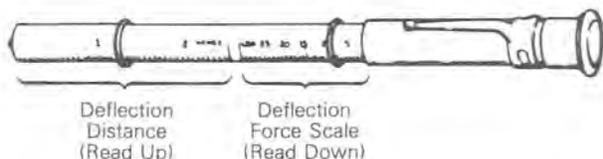
Before checking the belt tension, ensure vehicle has its proper belt number and correct belt width. (Refer to the application chart, page 1).

To obtain maximum vehicle performance, the belt tension must be adjusted to 6.8 kg (15 pounds) with a deflection of 32 mm (1 1/4").

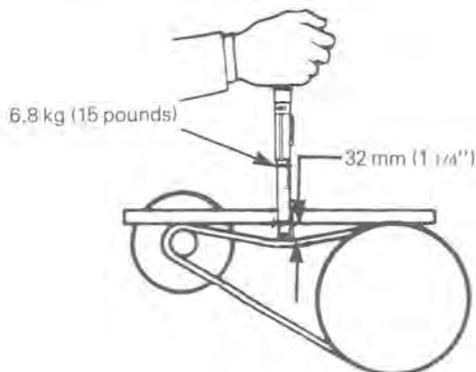
- To check tension
 - Position a reference rule on drive belt.
 - Using a wooden stick and fish scale, apply a 6.8 kg (15 pounds) pressure on drive belt. Deflection must be 32 mm (1 1/4").



- Using the belt tension tester P/N 414 3482 00 (service tool),



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.

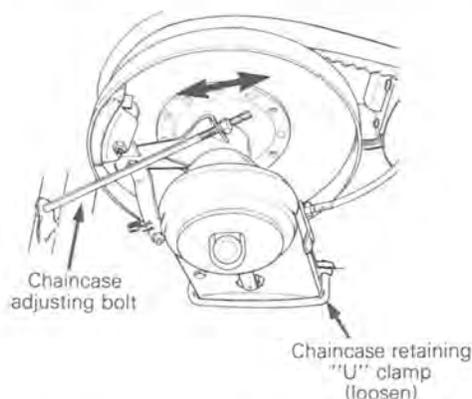


TENSION ADJUSTMENT

○ **NOTE:** Prior to final adjustment, the drive belt must have a break-in period time of one to two minutes of rotation on vehicle.

- **Elan model:** adjust tension by moving chaincase.

To do so, loosen the chaincase retaining "U" clamp and screw or unscrew the chaincase adjusting bolt.



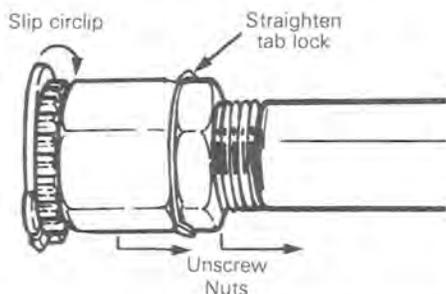
- **Citation/Mirage, Nordik/Futura 300 & Skandic models:** adjust tension by adding or removing shim between the two driven pulley halves.

1. Remove air intake silencer and drive belt.
2. Remove brake assembly as illustrated.

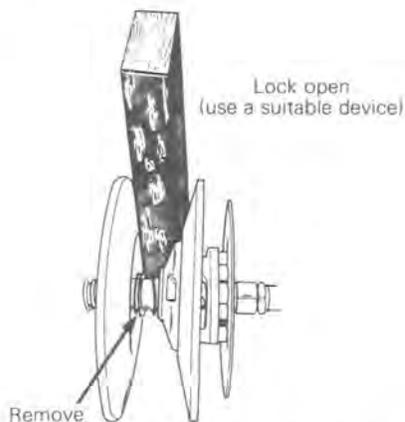


SECTION 03 TRANSMISSION SUB-SECTION 02 (DRIVE BELT)

3. Straighten the tab lock and unscrew the two nuts on the countershaft.
4. Slip the circlip against the adjuster nut.



5. This will allow to open and lock in place the two sliding halves.



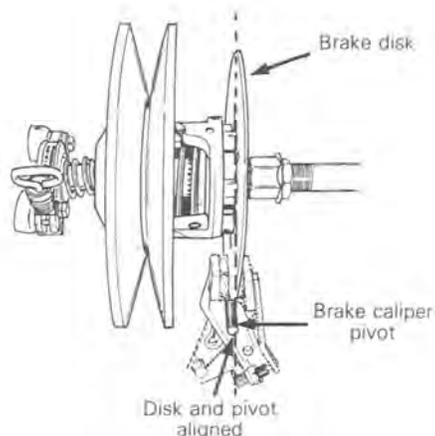
6. To increase tension, cut and remove one shim.

○ **NOTE:** On some models, shims will not need to be cut since the driven pulley is assembled with slit shims.

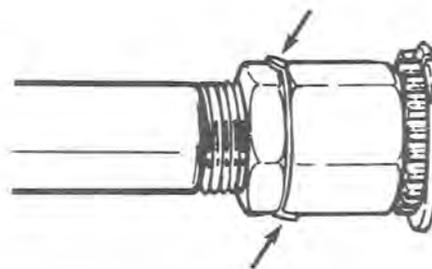
7. To decrease tension, add one slit shim.

○ **NOTE:** A slit shim must always be installed in between two standard shims.

8. Reinstall circlip and screw the adjuster nut until the brake disk and the brake caliper pivot are aligning. This will provide a preliminary pulley alignment.



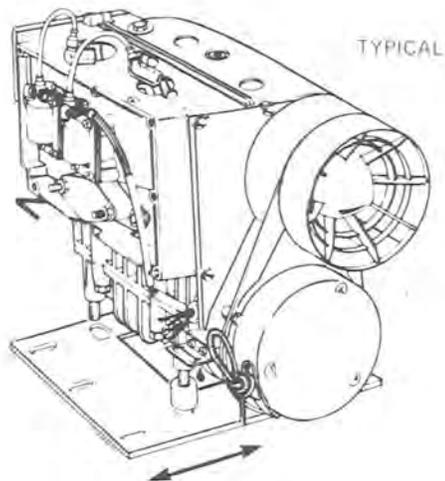
9. Reinstall belt and check tension. If tension need to be changed, add or remove one more shims.
10. If tension is correct, align pulleys with a rule or square bar (refer to pulley alignment, section 03-05).
11. To lock driven pulley, hold the adjuster nut, torque thin nut against adjuster nut to 65 N•m (48 ft-lbs) and bend the tab lock.



12. Reinstall brake caliper, washer and nut. Torque to 12 N•m (8 ft-lbs).
13. Reinstall the air silencer.

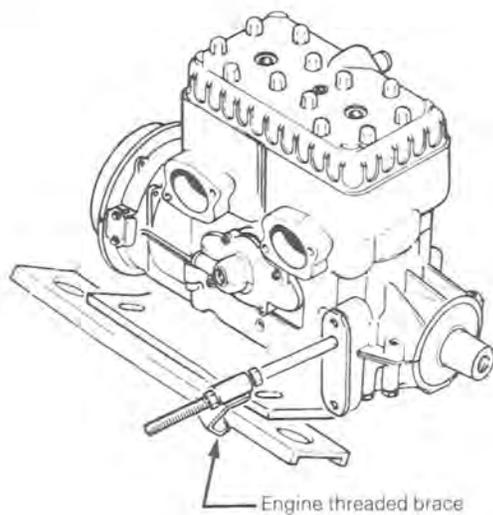
● Everest/Futura, Blizzard 5500 MX/Sonic, Elite et Alpine models: adjust tension by moving engine bracket.

To do so, loosen engine bracket nuts and adjust distance between pulleys.



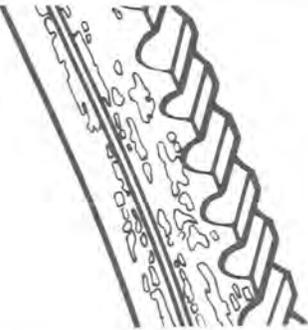
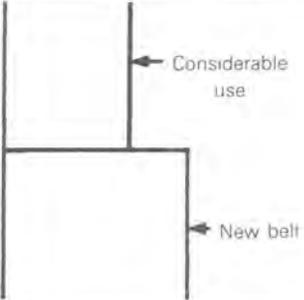
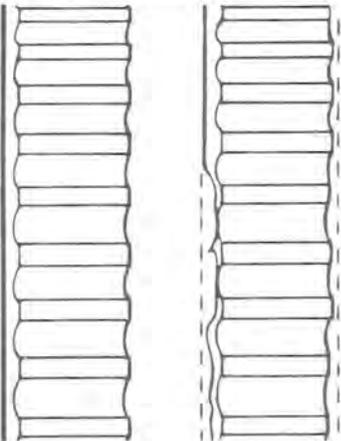
● Blizzard 9500/Ultra Sonic models: adjust tension by moving engine bracket.

To do so, loosen engine bracket nuts and adjust distance between pulleys using the engine threaded brace.

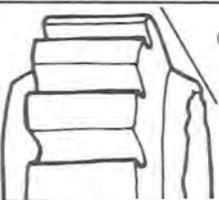
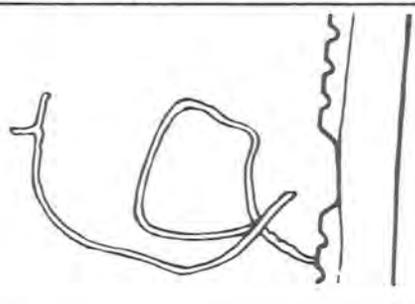
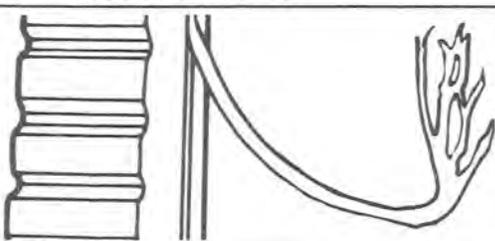
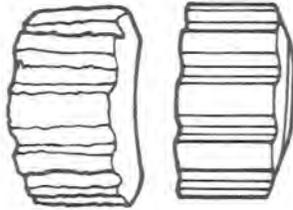
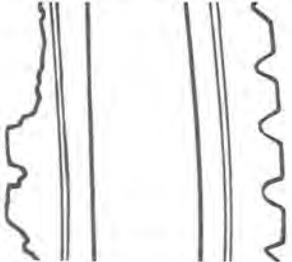


SECTION 03 TRANSMISSION
SUB-SECTION 02 (DRIVE BELT)

TROUBLE SHOOTING

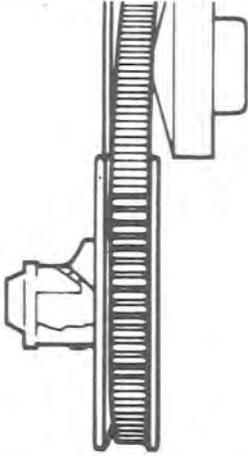
1. Uneven belt wear on one side only.		
	<p>CAUSE</p> <ul style="list-style-type: none"> a) Loose engine mount. b) Pulley misalignment. c) Rough or scratched pulley surfaces. 	<p>REMEDY</p> <ul style="list-style-type: none"> a) Tighten engine mount nuts equally. b) Align pulleys. c) Repair or replace pulley half.
2. Belt glazed excessively or having baked appearance.		
	<p>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>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 ($\frac{1}{8}$"') less than recommended width (see Technical Data).
4. Belt worn narrow in one section.		
	<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 RPM. d) Using unspecified type of belt. Replace belt with correct Bombardier belt. e) Readjust to specifications.

**SECTION 03 TRANSMISSION
SUB-SECTION 02 (DRIVE BELT)**

5. Belt sides worn concave.		
	<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>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>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>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.
9. Sheared cogs, compression section fracture or torn.		
	<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.

SECTION 03 TRANSMISSION
SUB-SECTION 02 (DRIVE BELT)

10. Belt "Flip-Over" at high speed.



CAUSE

- a) Pulley misalignment.
- b) Using unspecified type of belt.

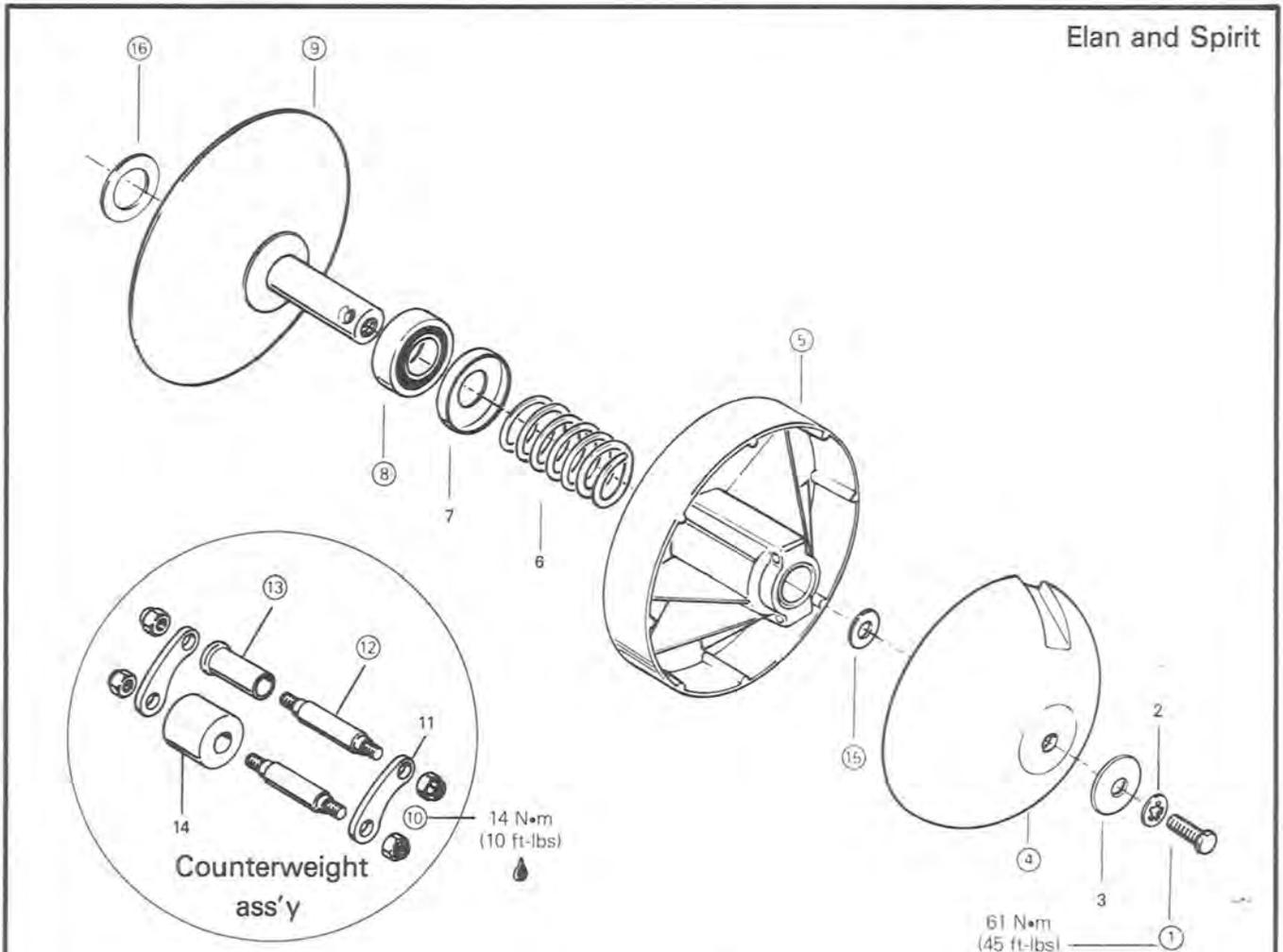
REMEDY

- a) Align pulleys.
- b) Replace belt with correct Bombardier belt.

DRIVE PULLEY

ROLLER ROUND SHAFT TYPE

Elan and Spirit



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.

1. Cap screw
2. Lockwasher
3. Washer
4. Governor cup
5. Outer half
6. Spring
7. Spring seat
8. Bearing
9. Inner half
10. Nut "Loctite 242"
11. Counterweight
12. Shouldered pin
13. Bushing
14. Roller
15. Shim
16. Shim

SECTION 03 TRANSMISSION SUB-SECTION 03 (DRIVE PULLEY)

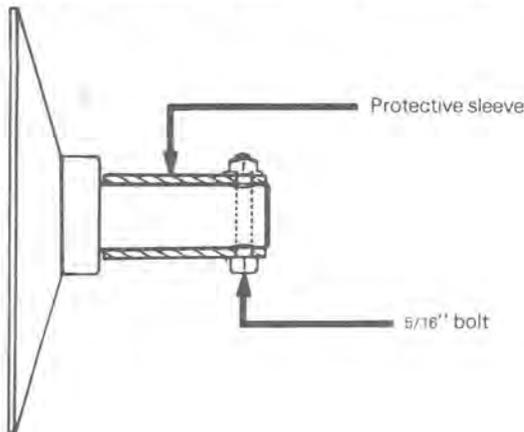
REMOVAL

① ⑨ 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.

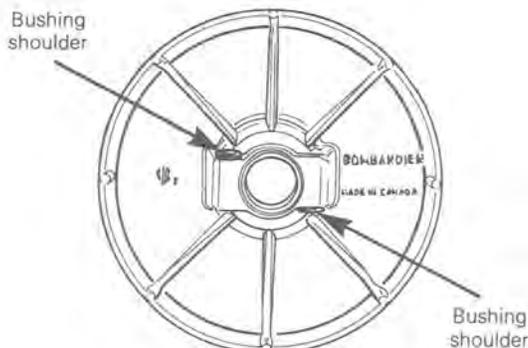
If it is necessary to remove the inner half, slide a length of steel pipe over shaft. Attach with a 5/16" nut and bolt, as illustrated. The inner half can then be removed with a pipe wrench. (Uncrew counterclockwise.)



DISASSEMBLY & ASSEMBLY

⑧ At assembly, torque bolt to 61 N•m (45 ft-lbs).

⑤ ⑬ Shouldered pin bushings must be installed in outer half as per illustration.



⑩ ⑫ Apply Loctite 242 or equivalent on threads then torque nuts to 14 N•m (10 ft-lbs).

CAUTION: Do not disassemble counterweights unless replacement is necessary.

⑮ Use as required, maximum of two (2). Used to obtain a neutral function of the drive pulley when engine is idling; refer to INSTALLATION.

⑯ Used to obtain correct pulley alignment, refer to section 03-05.

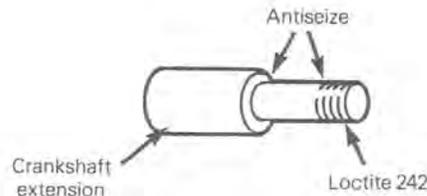
CLEANING

Clean pulley faces and shaft with fine steel wool and dry cloth. Clean outer half bushing with clean dry cloth.

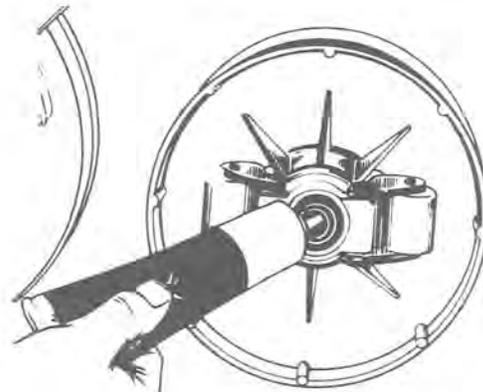
INSTALLATION

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 antiseize on the unthreaded portion and Loctite 242 or equivalent on threads, (as illustrated) then install inner half on extension.

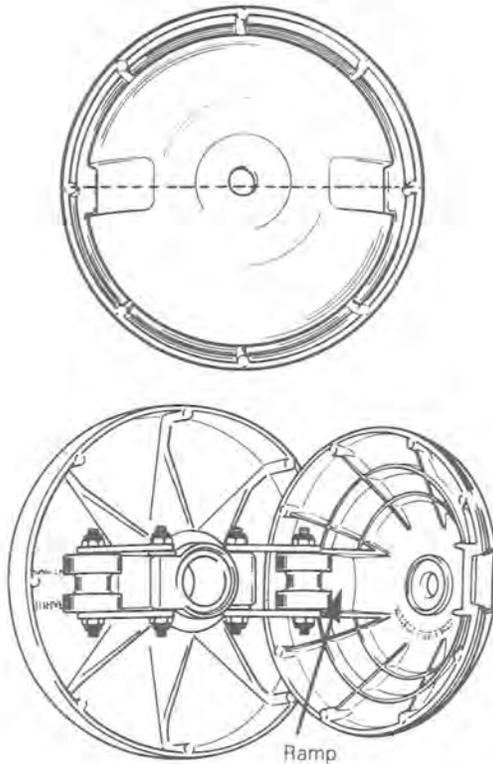


Pack inside of pulley shaft with High Performance Drive Pulley Lubricant P/N 413 800 700.



SECTION 03 TRANSMISSION
SUB-SECTION 03 (DRIVE PULLEY)

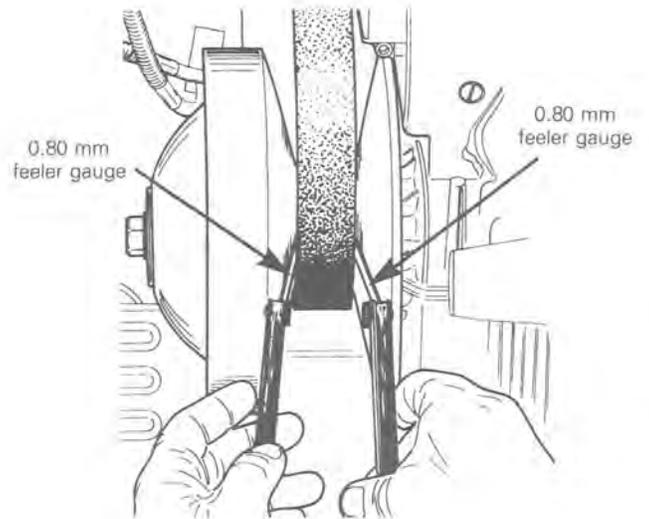
④ Install governor cup correctly as per illustration making sure that the rollers are sliding on their ramp.



Position the cap screw then lube torque to 61 N•m (45 ft-lbs).

◆ **WARNING:** Shim(s) ⑮ 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 when pushing drive belt to sit on bearing.



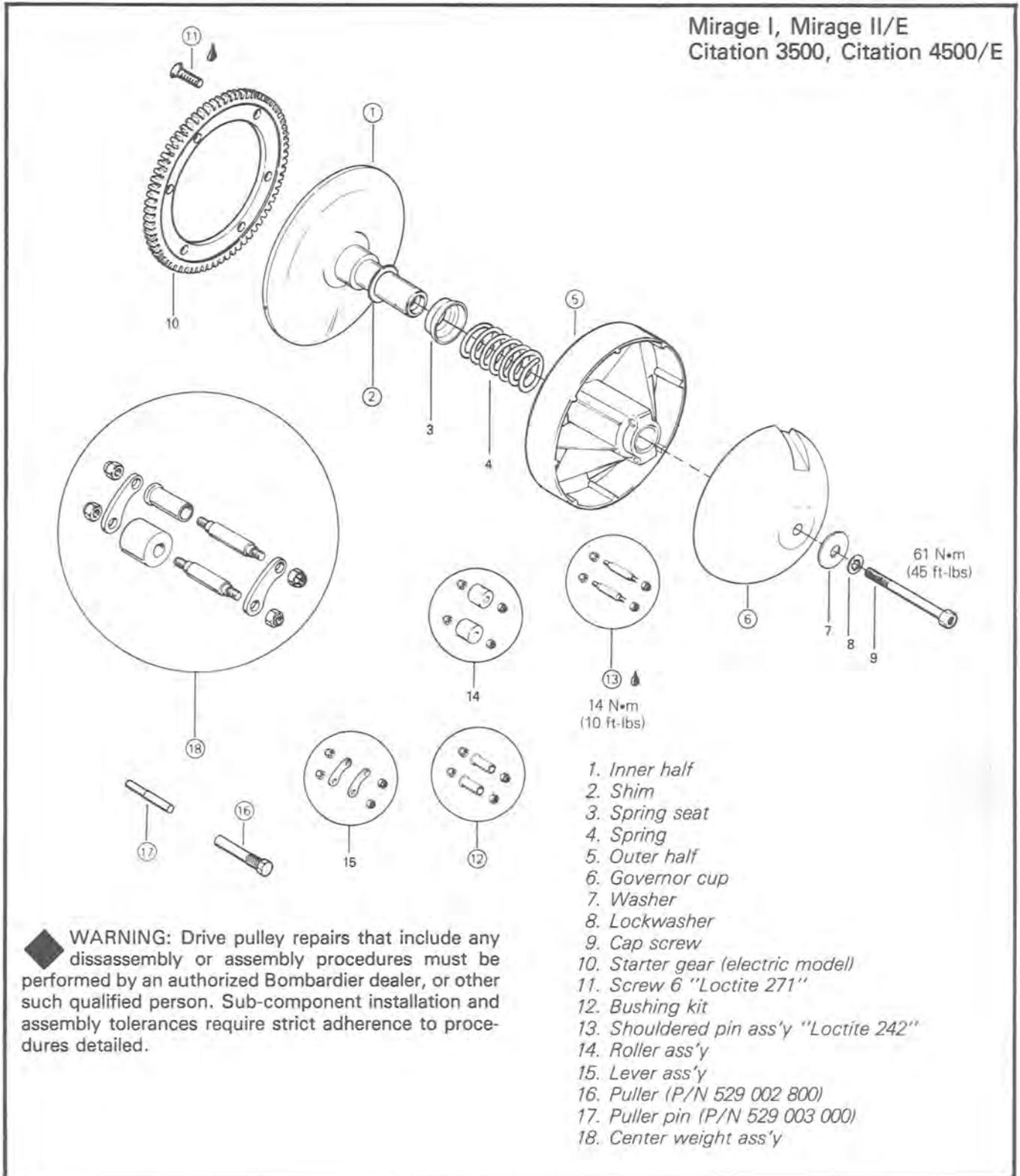
Shim ⑮ located between governor cup and drive pulley shaft will help you to obtain correct adjustment. Use not more than two (2) shims.



10/1/20

ROUND SHAFT (TAPER) TYPE

Mirage I, Mirage II/E
Citation 3500, Citation 4500/E



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.

SECTION 03 TRANSMISSION SUB-SECTION 03 (DRIVE PULLEY)

▼ **CAUTION:** Mirage and Citation models are equipped with drive pulleys of METRIC dimensions.

REMOVAL:

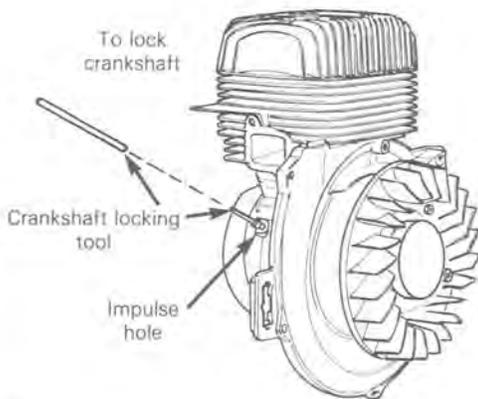
To remove drive pulley, proceed as follows:

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.

◆ **WARNING:** Spring pressure can force assembly apart; therefore, it is imperative that the governor cup be held firmly during governor retaining bolt removal.

⑯ ⑰ If it is necessary to remove inner half, use drive pulley puller no. 529 002 800, 529 003 000.

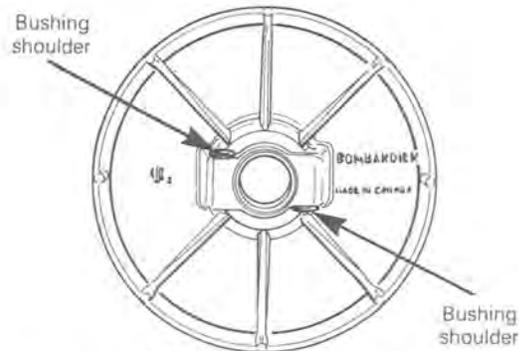
▼ **CAUTION:** This pulley has metric threads. Do not use standard thread puller.

Remove starter rope blocking piston, then reblock piston after having turned 45° counter-clockwise from T.D.C. position; or install crankshaft locking tool.

Install puller in pulley shaft then tighten, at the same time knock slightly on puller head to disengage pulley from engine crankshaft.

DISASSEMBLY & ASSEMBLY

⑫ Shouldered pin bushings must be installed in outer half as per illustration.



⑬ ⑱ Apply Loctite 242 or equivalent on threads then torque nuts to 14 N•m (10 ft-lbs).

▼ **CAUTION:** Do not disassemble counterweights unless replacement is necessary.

⑩ Apply "Loctite 271" or equivalent on threads then torque the screws to 14 N•m (10 ft-lbs) or tighten with an impact screwdriver.

CLEANING

Clean pulley faces and shaft with fine steel wool and dry cloth. Clean outer half bushing with clean dry cloth.

Using cleaner such as acetone, clean crankshaft tapered end and the taper inside the inner half of the drive pulley.

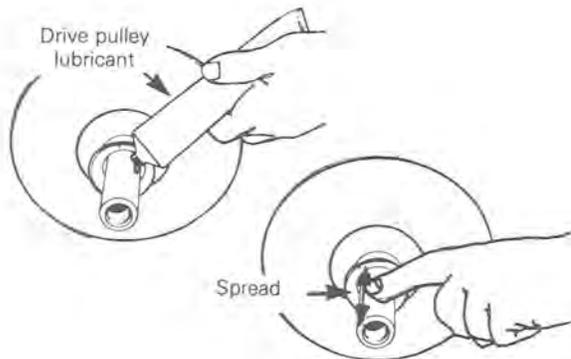
◆ **WARNING:** This procedure must be performed in a well ventilated area.

▼ **CAUTION:** Avoid contact between crankshaft seal and acetone because damage may occur.

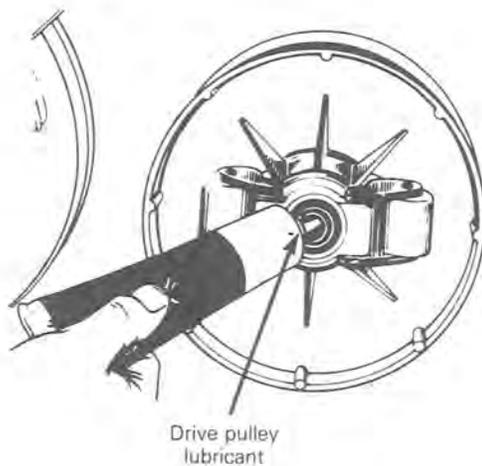
INSTALLATION

Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° **counterlockwise** from T.D.C. position and that cylinder is completely filled with a starter rope.

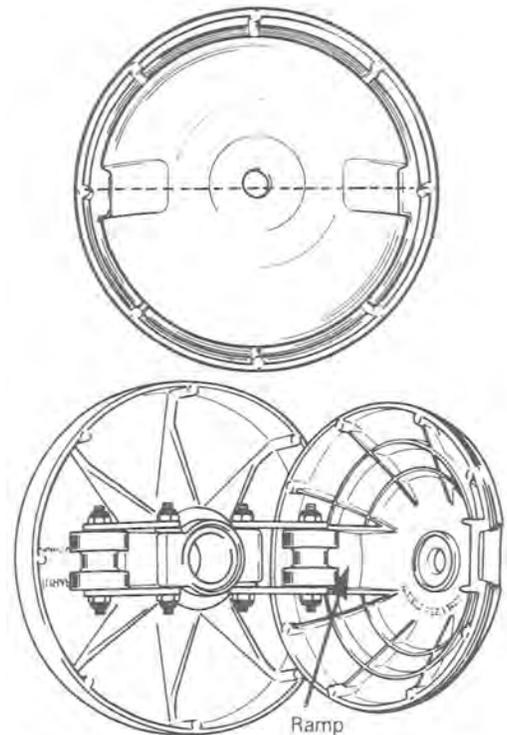
① Lubricate lightly pulley shaft with drive pulley lubricant P/N 413 800 700.



⑤ Pack inside of pulley shaft with drive pulley lubricant P/N 413 800 700.



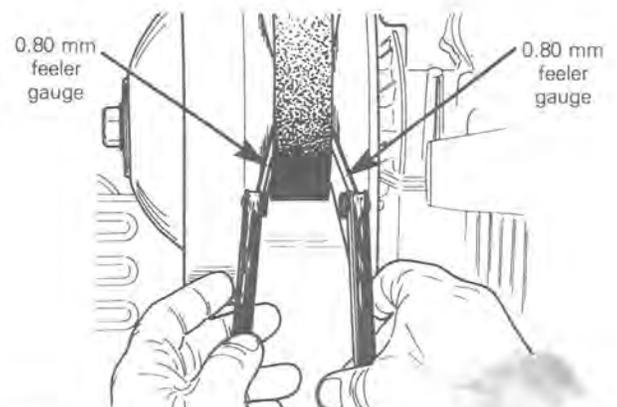
⑥ Install governor cup correctly as per illustration making sure that the rollers are sliding on their ramp.



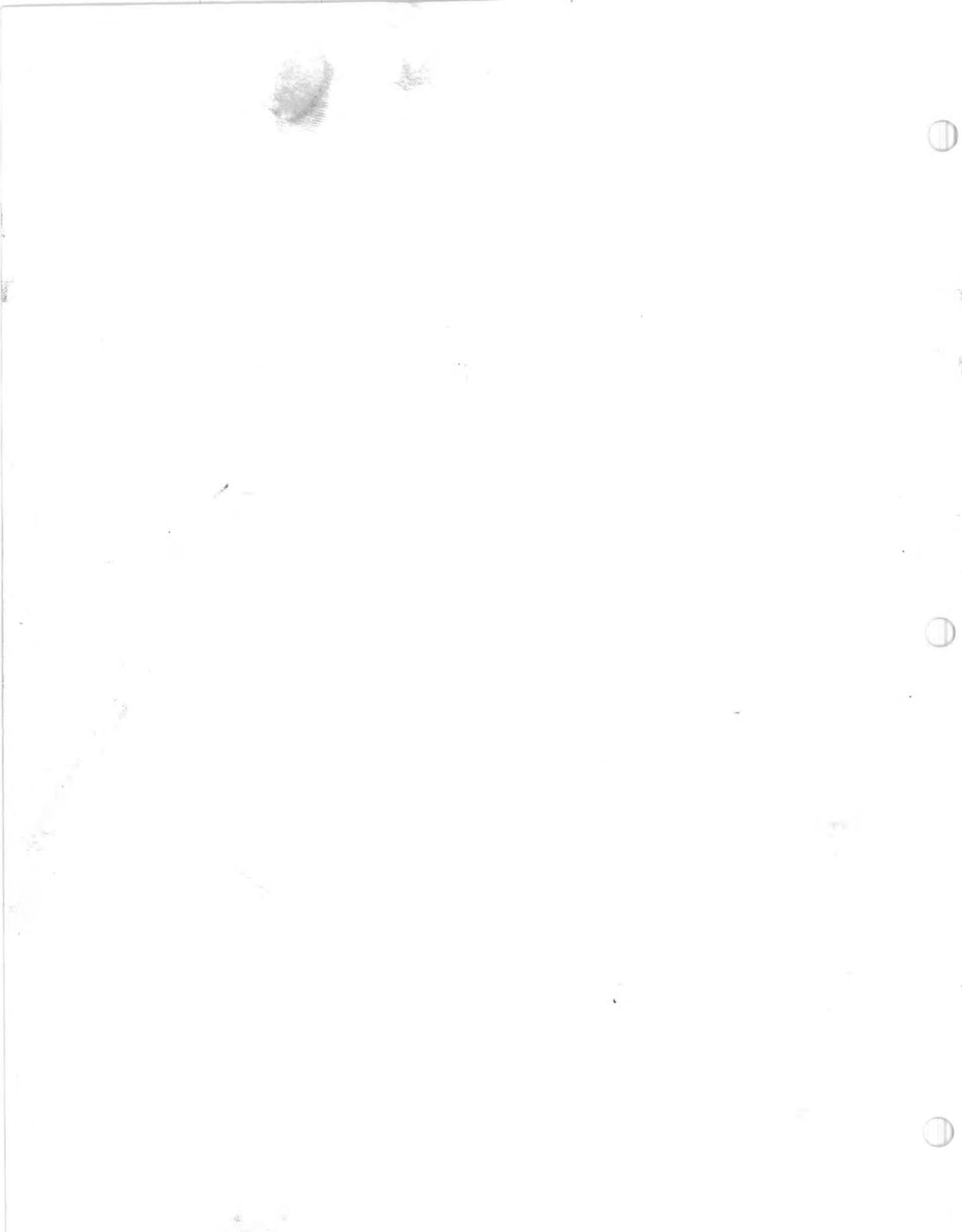
Position the cap screw then lube and torque to 61 N•m (45 ft-lbs).

◆ **WARNING:** Shim(s) ② is(are) used to obtain a neutral function of the drive pulley when engine is idling. Proceed as follows when retaining bolt is torqued:

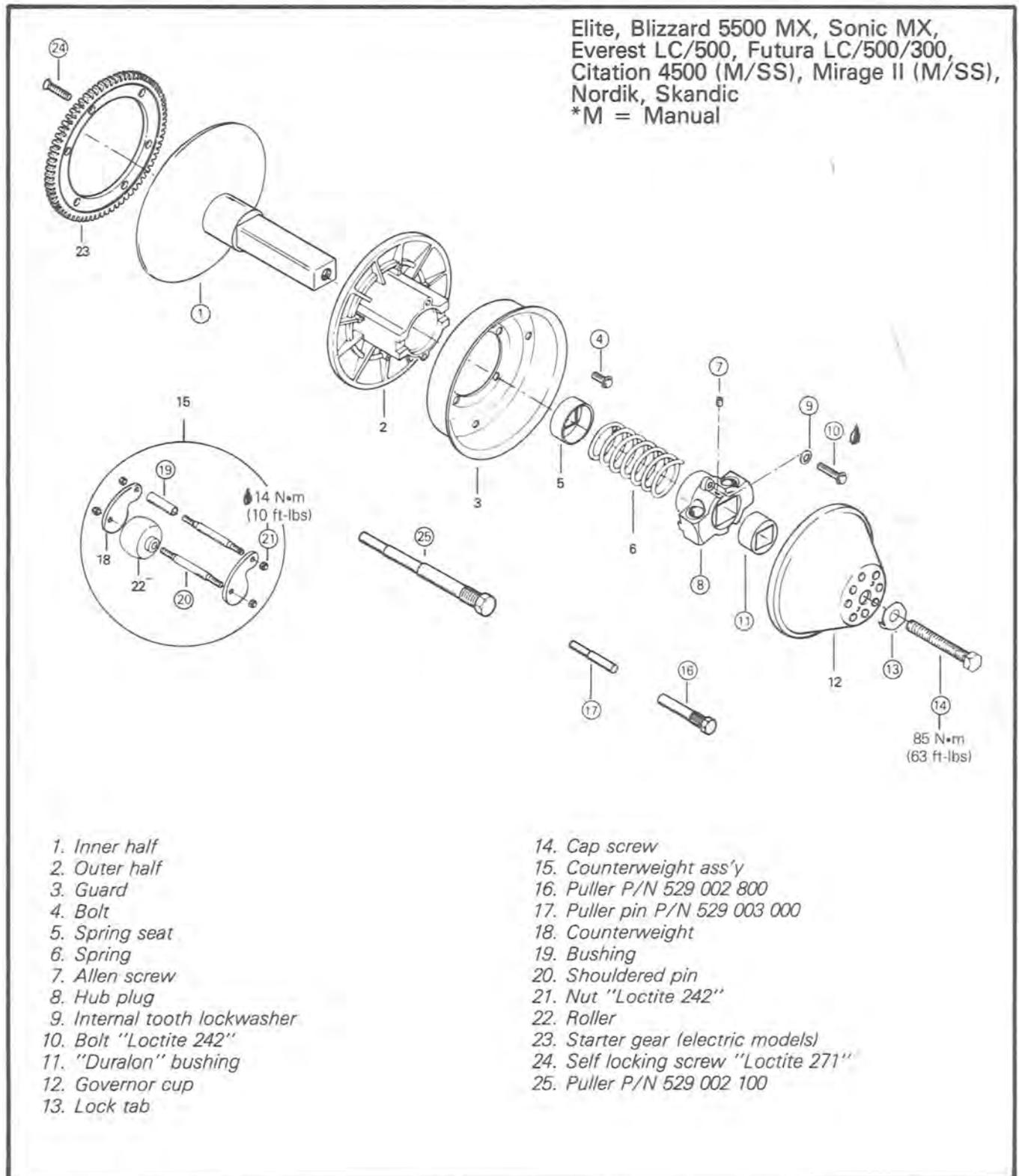
With a **new** drive belt installed, you should be able to insert a minimum of 0.80 mm (.030") thick feeler gauge on each side of the drive belt simultaneously when pushing drive belt to sit on bearing.



Shim ② located between governor cup and drive pulley shaft will help you to obtain correct adjustment. Use not more than two (2) shims.



ROLLER SQUARE SHAFT WITH DURALON BUSHING



- 1. Inner half
- 2. Outer half
- 3. Guard
- 4. Bolt
- 5. Spring seat
- 6. Spring
- 7. Allen screw
- 8. Hub plug
- 9. Internal tooth lockwasher
- 10. Bolt "Loctite 242"
- 11. "Duralon" bushing
- 12. Governor cup
- 13. Lock tab

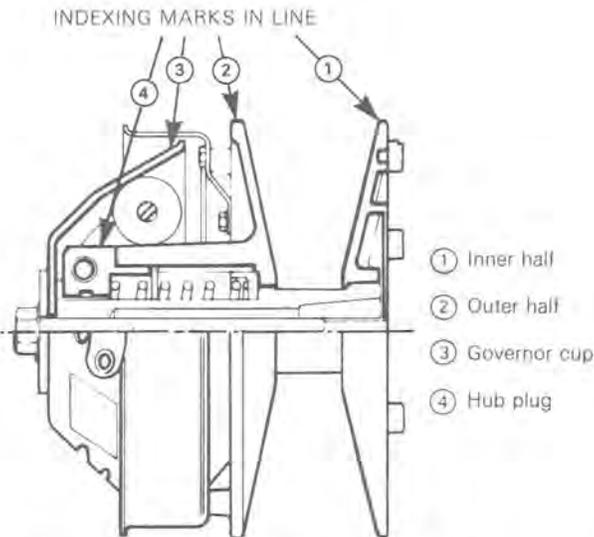
- 14. Cap screw
- 15. Counterweight ass'y
- 16. Puller P/N 529 002 800
- 17. Puller pin P/N 529 003 000
- 18. Counterweight
- 19. Bushing
- 20. Shouldered pin
- 21. Nut "Loctite 242"
- 22. Roller
- 23. Starter gear (electric models)
- 24. Self locking screw "Loctite 271"
- 25. Puller P/N 529 002 100

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. If components lack such marks, marking should be done manually before disassembly, as per illustration.

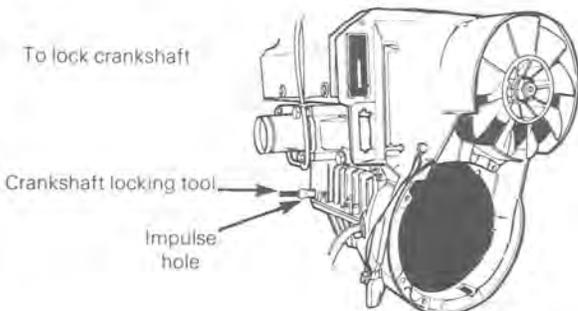


To remove drive pulley, proceed as follows:

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

If it is necessary to remove inner half, proceed as follows:

⑯ ⑰ On models Citation 4500 (M/SS), Mirage II (M/SS), Nordik and Skandic use metric threads puller (P/N 529 002 800 & P/N 529 003 000).

CAUTION: This pulley has metric threads. Do not use standard threads puller.

⑳ On other models use a standard thread puller (P/N 529 002 100).

Remove starter rope blocking piston, then reblock piston after having turned 45° counter-clockwise from T.D.C. position; or install crankshaft locking tool.

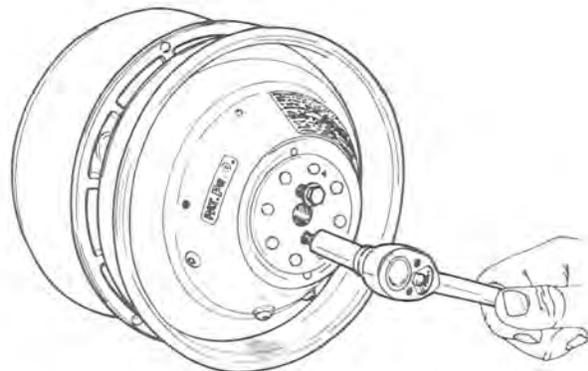
Install puller in pulley shaft then tighten, at the same time knock slightly on puller head to disengage pulley from engine crankshaft.

DISASSEMBLY & ASSEMBLY

Remove outer half assembly and governor cup.

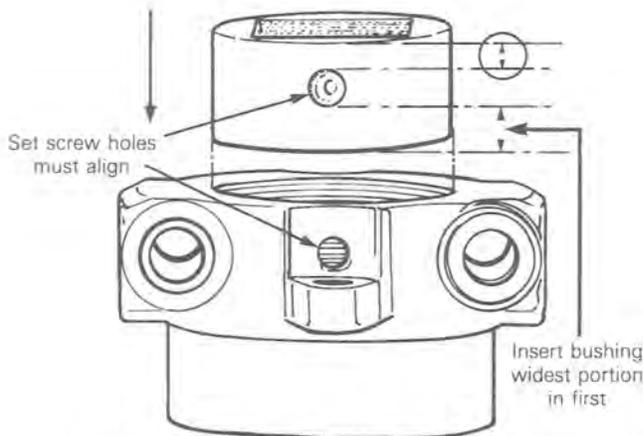
CAUTION: Do not tap on the governor cup.

The governor cup can be easily removed by inserting two (2) 1/4" x 1" NC bolts and tightening alternately until cup pulls out.



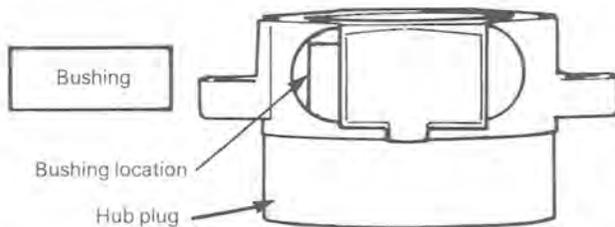
Some bolts of the drive pulley having "Loctite" on their threads, it is advisable to use a tool such as an impact to break the "Loctite" seal before attempting to unscrew.

- ④ Torque to 7 N•m (5 ft-lbs).
- ⑦ Apply "Loctite 242" on threads then screw in until head is flush with hub plug. Do not allow head to bite into hub plug.
- ⑧ ⑨ ⑩ 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. At assembly, apply "Loctite 242" on threads of bolts then torque to 16 N•m (12 ft-lbs).
- ⑭ Apply "Loctite 271" or equivalent on threads then torque the screws to 14 N•m (10 ft-lbs) or tighten with an impact screwdriver.
- ⑰ To install or remove "Duralon" bushing from hub plug, use suitable pusher and hammer or press. Install bushing as per illustration.



▼ **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.

- ⑱ ⑧ Install shouldered pin bushing as shown.



- ⑳ ㉑ Apply "Loctite 242" on threads and torque to 14 N•m (10 ft-lbs).

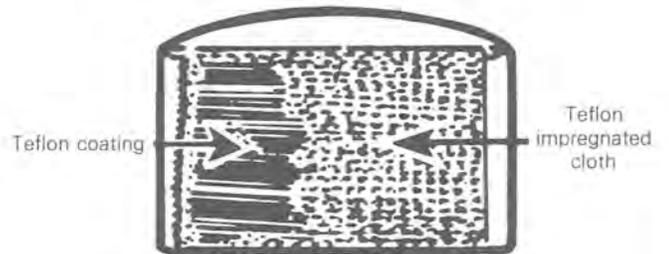
▼ **CAUTION:** Do not disassemble counterweights unless replacement is necessary.

INSPECTION & CLEANING

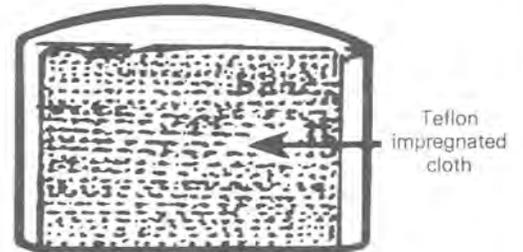
Drive pulley should be inspected annually.

Check general condition of pulley and inspect "Duralon" bushing faces, as per illustrations.

GOOD



GOOD



WORN (must be changed)



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.

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.

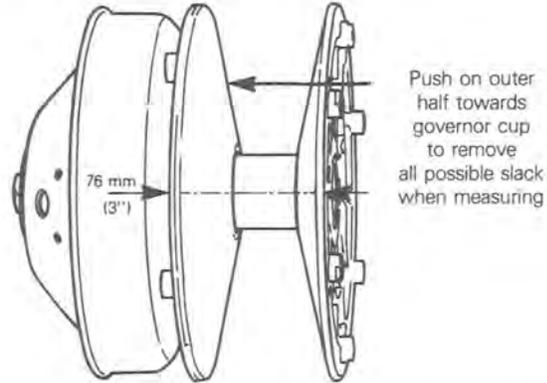
Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° **counterclockwise** from T.D.C. position and that cylinder is completely filled with a starter rope or use crankshaft locking tool.

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.

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 ft-lbs).

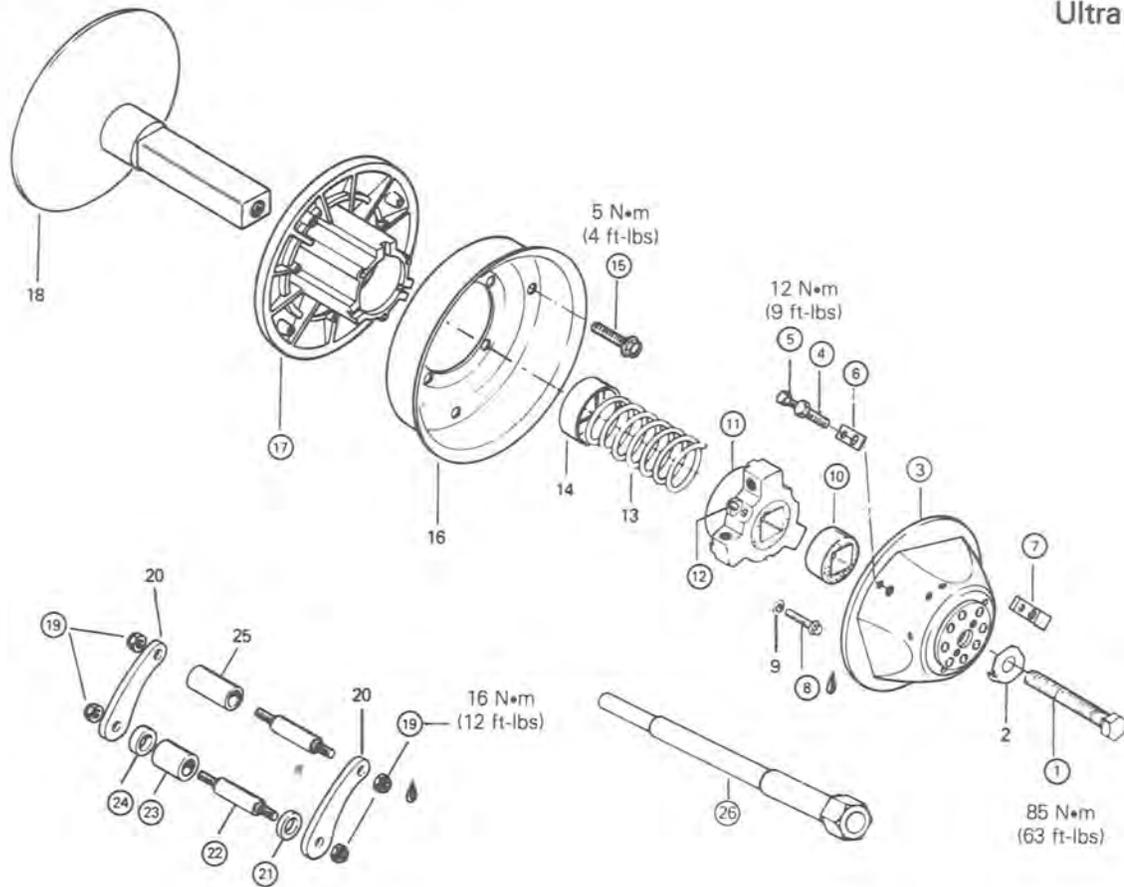
▼ **CAUTION:** Incorrect seating of shaft end in governor cup can cause crankshaft bending. When pulley is completely assembled always measure distance of both pulley halves to make sure that the pulley is properly installed. Distance must be 76 mm (3").



Lift rear of vehicle off the ground. Install drive belt and pulley guard 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.

SQUARE SHAFT WITH THREE COUNTERWEIGHT ASSEMBLIES

Blizzard 9500
Ultra Sonic



1. Cap screw
2. Tab lock
3. Governor cup
4. Bolt
5. Bolt
6. Tab lock
7. Ramp
8. Bolt "Loctite 242"
9. Internal tooth lockwasher
10. "Duralon" bushing
11. Hub plug
12. Allen screw
13. Spring

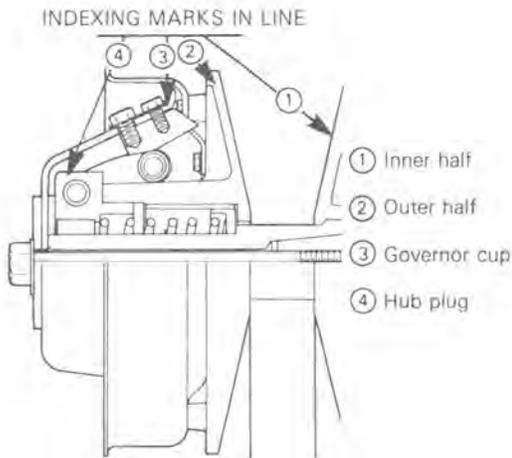
14. Spring seat
15. Bolt
16. Guard (rollers)
17. Outer half
18. Inner half
19. Nut "Loctite 242"
20. Counterweight
21. Nylon washer 5.1 mm (.200")
22. Shouldered pin
23. Roller
24. Nylon washer 3.3 mm (.130")
25. Bushing
26. Puller P/N 529 002 100

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. If components lack such marks, marking should be done manually before disassembly, as per illustration.

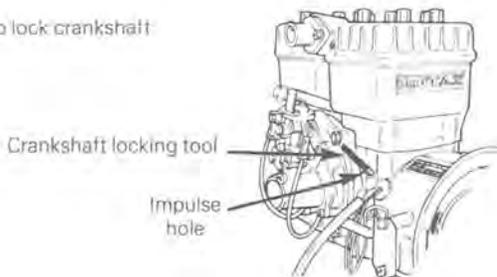


To remove drive pulley, proceed as follows:

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.

To lock crankshaft



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.

② 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.

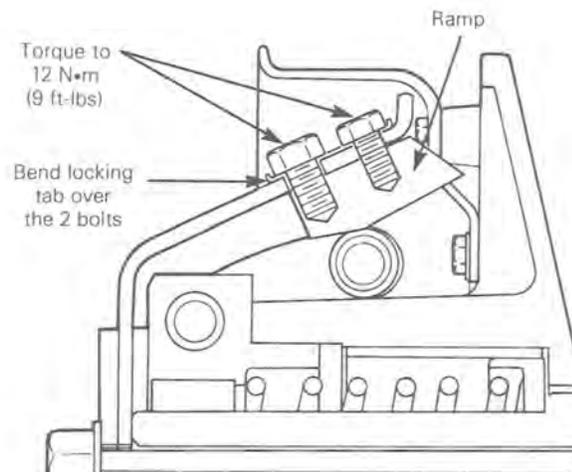
Remove starter rope blocking piston, then reblock piston after having turned 45° counter-clockwise from T.D.C. position; or install crankshaft locking tool.

Install puller in pulley shaft then tighten, at the same time knock slightly on puller head to disengage pulley from engine crankshaft.

DISASSEMBLY & ASSEMBLY

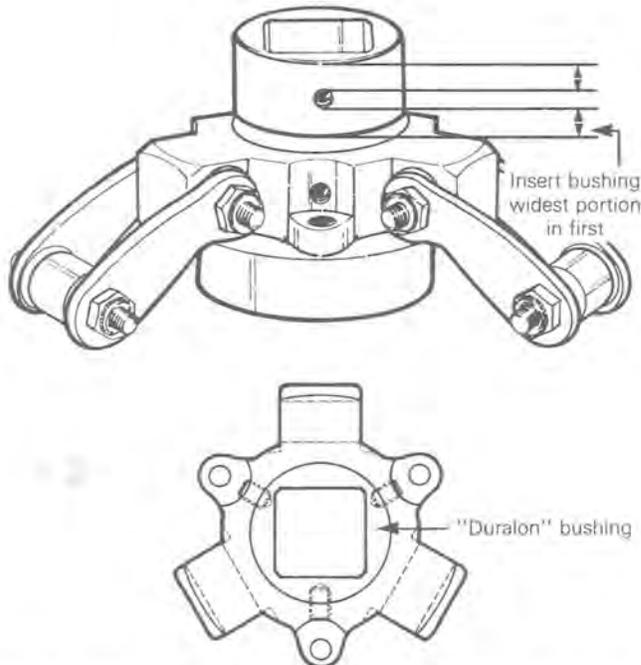
Some bolts of the drive pulley having "Loctite" on their threads, it is advisable to break the "Loctite" seal before attempting to unscrew.

④ ⑤ ⑥ ⑦ Install ramps and torque bolts as per illustration.



⑧ ⑪ ⑰ 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. At assembly, apply "Loctite 242" on threads of bolts then torque to 16 N•m (12 ft-lbs).

⑩ ⑪ ⑫ To install or remove "Duralon" bushing from hub plug, use suitable pusher and hammer or press. Install bushing as per illustration.



Apply "Loctite 242" on threads, then tighten until screw slightly rests against bottom of "Duralon" bushing hole.

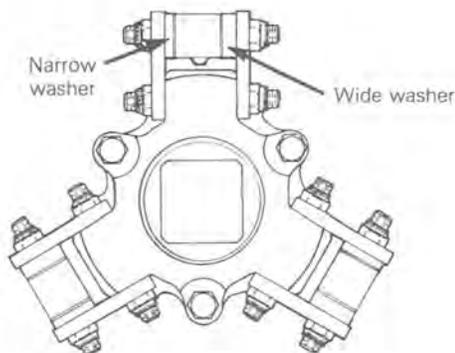
▼ **CAUTION:** Be careful when installing outer half assembly on square shaft of drive pulley to avoid scratches on "Duralon" bushing caused by square shaft edge.

⑮ Torque to 5 N•m (4 ft-lbs).

⑲ ⑳ At reassembly, apply "Loctite 242" on threads and torque to 16 N•m (12 ft-lbs).

▼ **CAUTION:** Do not disassemble counterweights unless replacement is necessary.

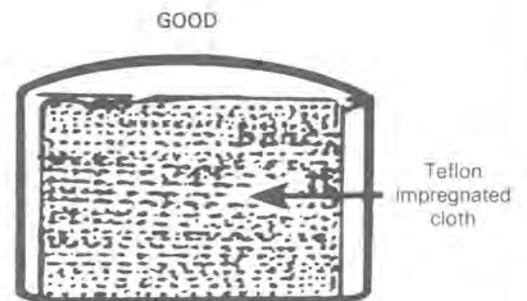
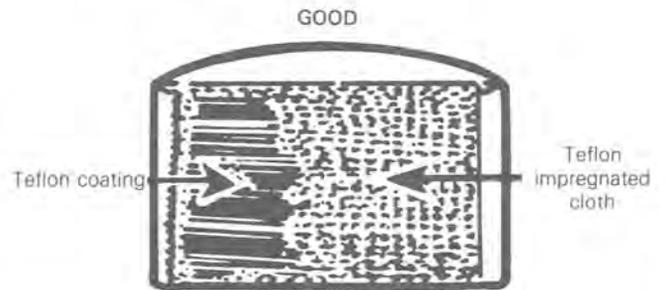
㉑ ㉒ ㉓ Rollers and nylon washers must move freely; install them as per illustration.



INSPECTION & CLEANING

Drive pulley should be inspected annually.

Check general condition of pulley and inspect "Duralon" bushing faces, as per illustrations.



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.

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.

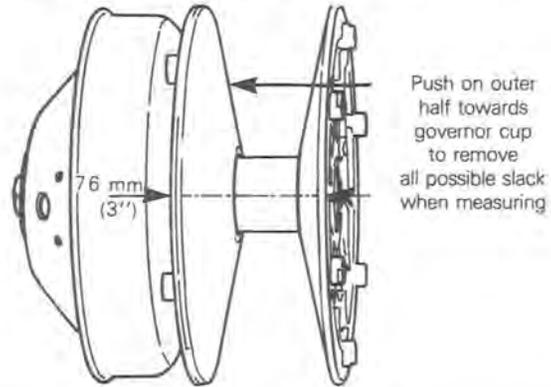
Lock crankshaft in position as explained in removal procedure. Make sure crankshaft is rotated 45° **counterclockwise** from T.D.C. position and that cylinder is completely filled with a starter rope or use crankshaft locking tool.

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.

① ③ 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 ft-lbs).

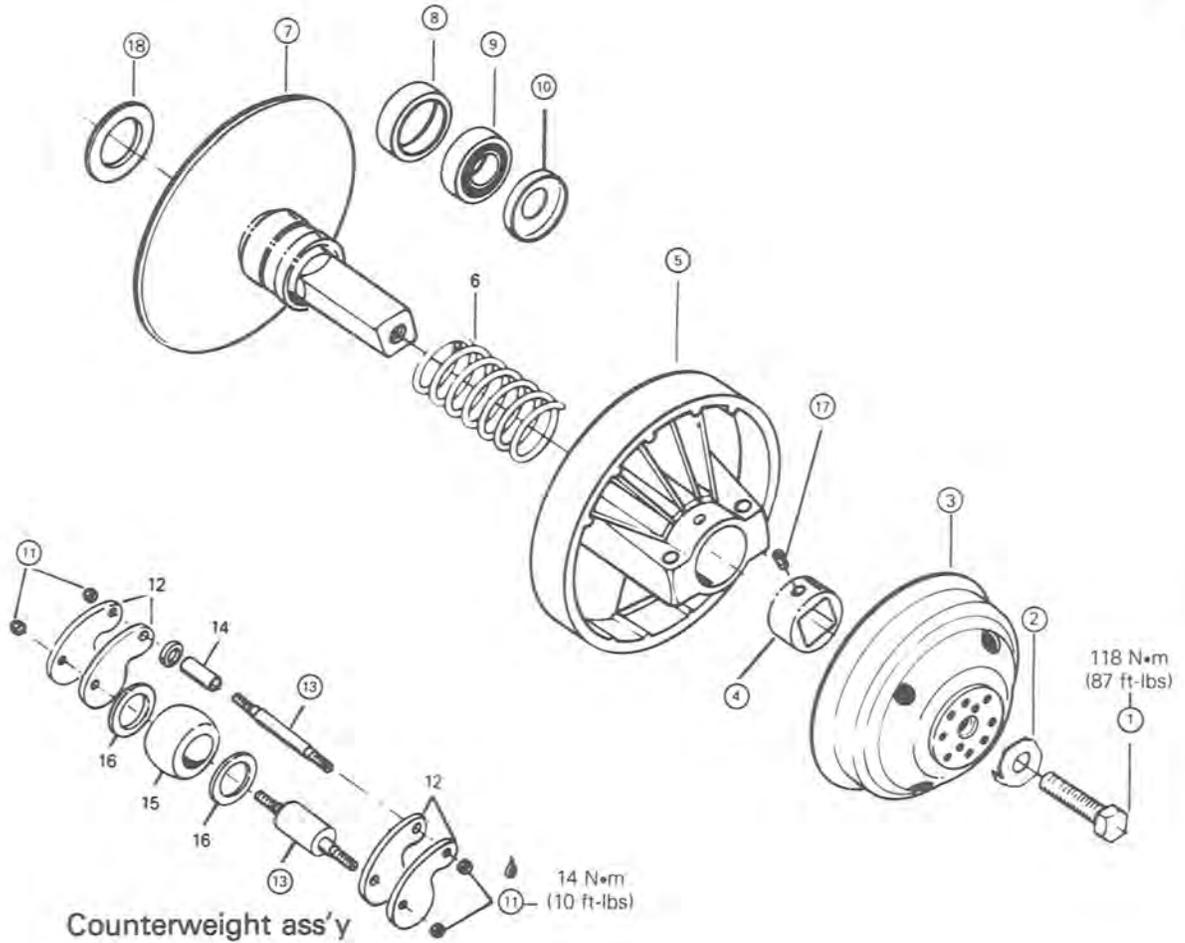
▼ **CAUTION:** Incorrect seating of shaft end in governor cup can cause crankshaft bending. When pulley is completely assembled always measure distance of both pulley halves to make sure that the pulley is properly installed. Distance must be 76 mm (3").



① Lift rear of vehicle off the ground. Install drive belt and pulley guard 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.

ROLLER SQUARE SHAFT BEARING TYPE WITH DURALON BUSHING

Alpine



- 1. Cap screw
- 2. Tab lock
- 3. Governor cup
- 4. "Duralon" bushing
- 5. Outer half
- 6. Spring
- 7. Inner half
- 8. Ring
- 9. Bearing

- 10. Spring seat
- 11. Stop nut "Loctite 242"
- 12. Counterweight
- 13. Shouldered pin
- 14. Bushing
- 15. Roller
- 16. Spacer
- 17. Set screw
- 18. Shim

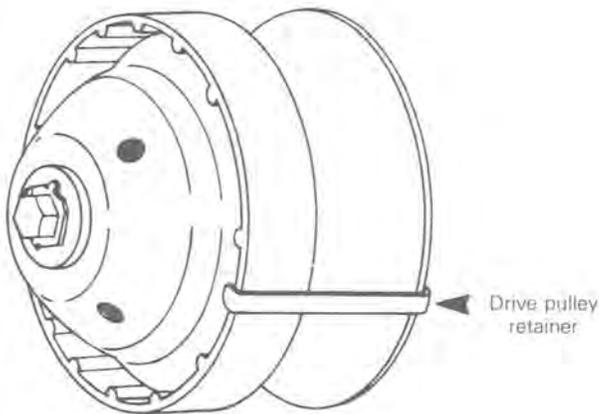
SECTION 03 TRANSMISSION SUB-SECTION 03 (DRIVE PULLEY)

◆ **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

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. Install drive pulley retainer P/N 529 001 700 over pulley halves. Open locking tab and remove cap screw.



⑤ Push and turn drive pulley to disengage drive pulley retainer then carefully remove outer half.

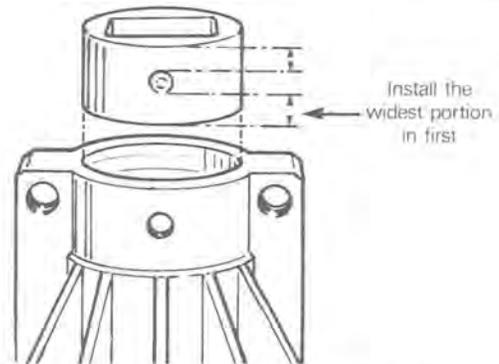
◆ **WARNING:** Spring pressure can force assembly apart; therefore, it is imperative that the governor cup be held firmly during outer half removal.

⑦ If it is necessary to remove the inner half; use a 1 1/8" open end wrench on the square section. Hold it closely against hub then unscrew counterclockwise.

DISASSEMBLY & ASSEMBLY

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.

④ ⑤ To install or remove "Duralon" bushing from hub plug use a suitable pusher and hammer or press. Install bushing as per illustration.



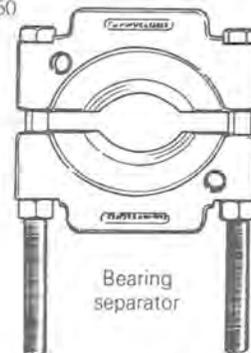
⑰ Apply "Loctite 242" on threads then screw in until head is flush with outer half.

▼ **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.

⑧ ⑨ ⑩ To remove and install use a bearing separator and afterwards a standard puller and pusher.

○ **NOTE:** Items ⑧ ⑨ should be press-fitted together. Do not remove inner half bearing unless damaged and replacement is necessary.

Ex: Snap-on CJ 950



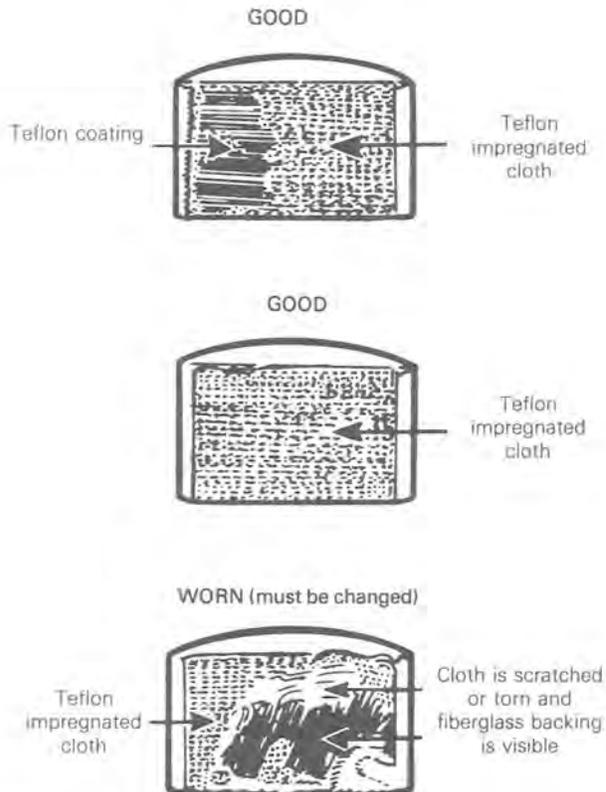
⑪ ⑬ Torque shouldered pin lock nut to 14 N•m (10 ft-lbs) after having applied "Loctite 242" or equivalent on threads.

▼ **CAUTION:** Do not disassemble counterweights unless replacement is necessary.

INSPECTION & CLEANING

Drive pulley should be inspected annually.

Check general condition of pulley and inspect "Duralon" bushing faces, as per illustrations.



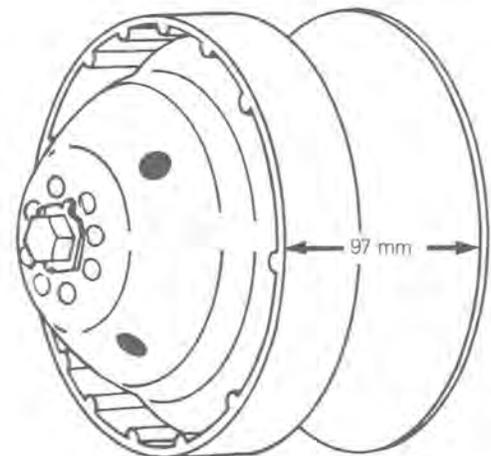
Inside of outer half should be cleaned with a clean cloth. The square shaft can be cleaned with fine steel wool and a clean cloth.

INSTALLATION

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.

⑱ Used to obtain correct pulley alignment, refer to section 03-05.

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.

③ Install governor cup making sure that the shaft end rests in governor cup seating.

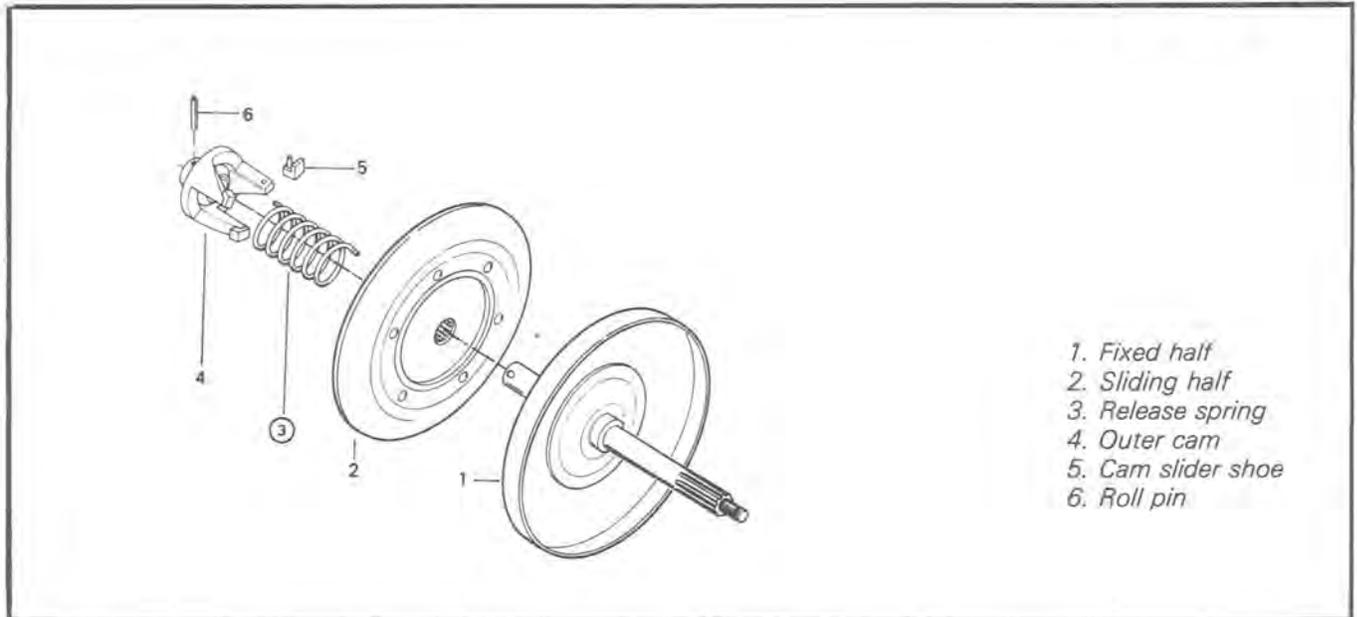
▼ **CAUTION:** Incorrect seating of shaft end in governor cup can cause crankshaft bending. When pulley is completely assembled always measure distance of both pulley halves to make sure that the pulley is properly installed. Distance must be 97 mm (3 3/16").

① ② Lubricate threads of retaining bolt with antiseizing lubricant. Position cap screw with a **new** locking tab then torque to 118 N•m (87 ft-lbs). Bend one side of locking tab over cap screw head.



DRIVEN PULLEY

Elan and Spirit



REMOVAL

Remove pulley guard, drive belt and muffler.

Slacken steering column bolts.

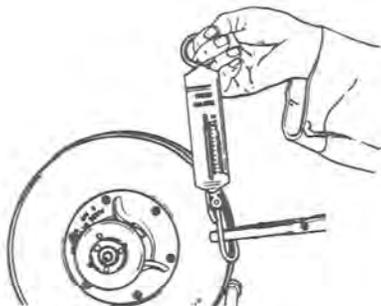
Release chain tension. Remove cotter pin and nut securing pulley drive shaft to chaincase.

○ **NOTE:** Attach to frame to prevent it falling inside of chaincase.

Pull driven pulley toward engine and remove from vehicle.

DISASSEMBLY & ASSEMBLY

③ In order to measure driven pulley spring tension, 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.



Spring tension pre-load should be 3.6 kg (8 lbs).

To correct spring tension, either relocate spring end in sliding pulley half or gradually rotate outer cam.

INSTALLATION

With drive chain tension released, hold upper sprocket and chain in position then insert assembled driven pulley shaft through chaincase and sprocket.

Install spring washer and castellated nut.

Tighten castellated nut fully then back off nut 1/6 of a turn.

Lock in position with a new cotter pin.

▼ **CAUTION:** It is important that nut is backed off or damage may occur due to a burnt or seized bearing.

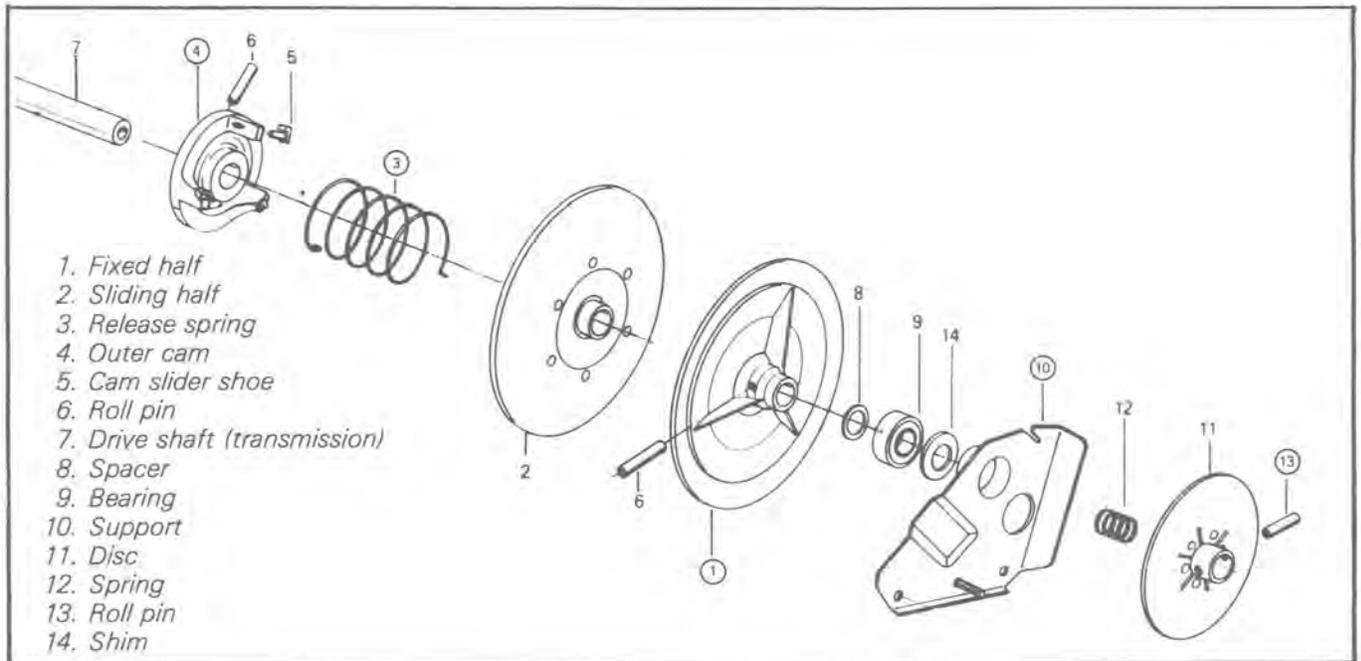
Apply chain tension.

Install muffler and tighten steering column bolts.

Install drive belt and pulley guard.



ALPINE



REMOVAL

Remove pulley guard and drive belt.

Remove disc brake assembly.

Position a wooden block under the drive shaft then using a hammer and a pin punch, remove roll in (13) locking disc in position. Tap on inner side of brake and bracket assembly (10) disengage it from bearing.

Remove exhaust manifold from engine.

Remove lower bracket of steering column attached to the gearbox. Slacken upper bracket of steering column. Disconnect transmission rod from gearbox.

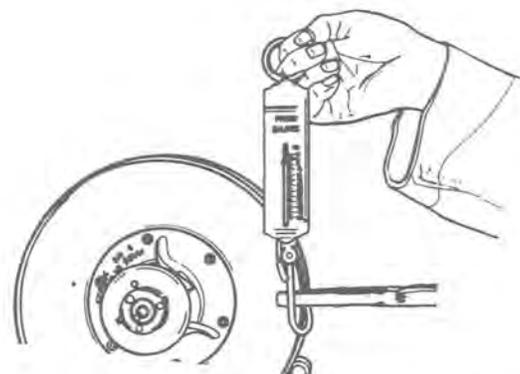
Remove gearbox upper housing.

Release chain tension then separate chain.
Withdraw driven pulley.

DISASSEMBLY & ASSEMBLY

① ④ If necessary heat hub of fixed pulley and outer cam to facilitate removal.

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. (Refer to Technical Data for correct spring tension).



To correct spring tension either relocate spring end in sliding pulley half, or gradually rotate outer cam.

SECTION 03 TRANSMISSION

SUB-SECTION 04 (DRIVEN PULLEY)

Connect the drive chain using a connecting link.

Reinstall the gearbox cover (refer to section 03-08 (gearbox) for complete gearbox information).

Adjust the chain tension and check the gearbox oil level.

Install the gearbox rod and adjust (see section 03-08).

Install the exhaust manifold to the engine.

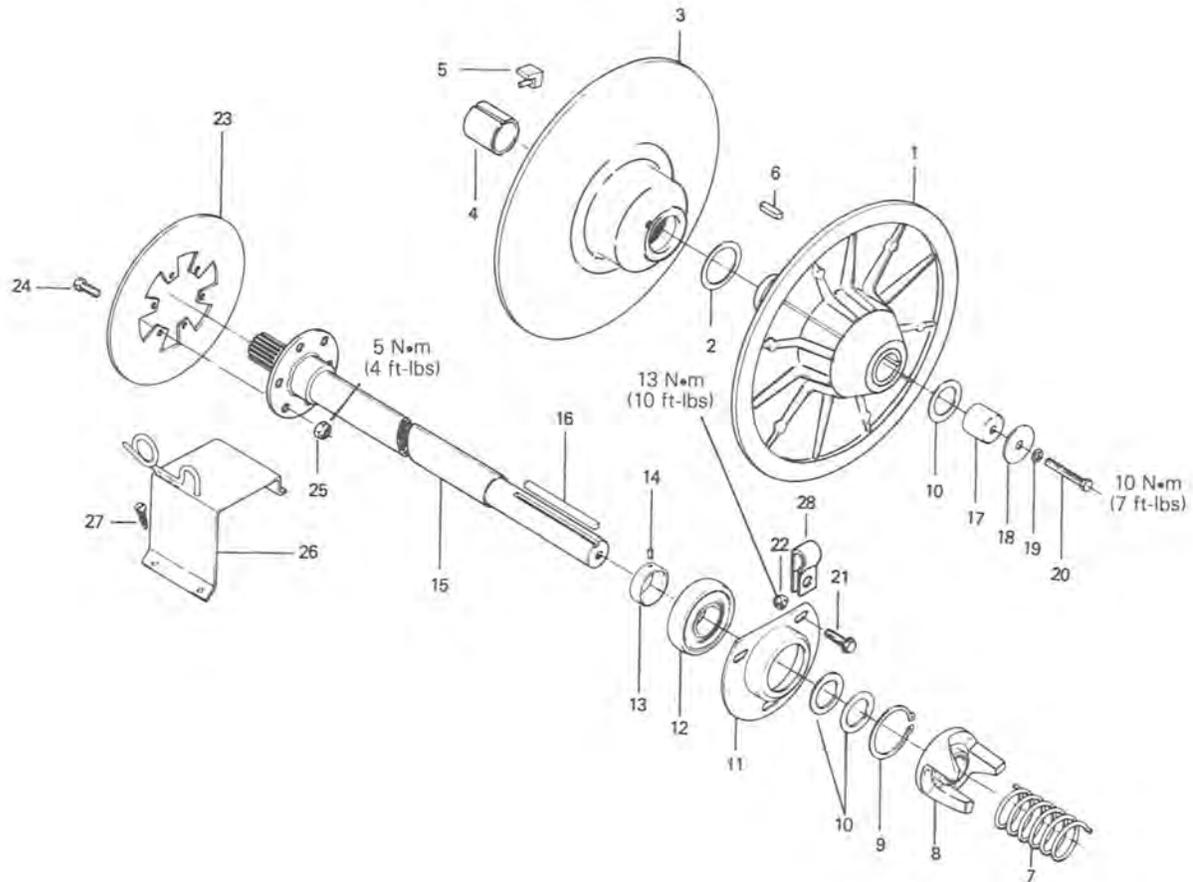
Install the driven pulley support.

Check pulley alignment and install the drive belt.

Install the pulley guard.

SECTION 03 TRANSMISSION
SUB-SECTION 04 (DRIVEN PULLEY)

**EVEREST, FUTURA (except Futura 300), BLIZZARD 5500 MX,
SONIC, BLIZZARD 9500, ULTRA SONIC**



1. Fixed half
2. Shim
3. Sliding half
4. Bushing
5. Slider shoe
6. Key
7. Spring
8. Cam
9. Snap ring
10. Shim
11. Bearing flange
12. Bearing
13. Collar
14. Socket set screw 1/4-20 x 1/4

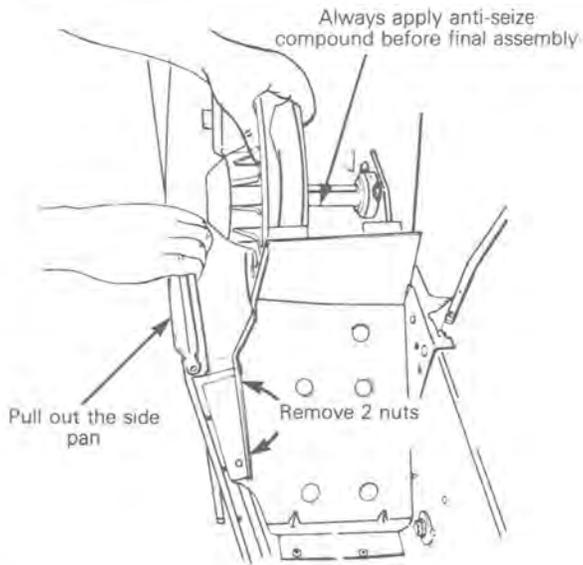
15. Countershaft
16. Key
17. Extension
18. Washer
19. Lockwasher 1/4
20. Screw 1/4-20 x 1 3/4
21. Screw 5/16-18 x 5/8
22. Elastic stop nut 5/16-18
23. Disc
24. Screw 10-32 x 3/4
25. Elastic stop nut 10-32
26. Protector
27. Metal screw 8 x 1/2
28. Clip

SECTION 03 TRANSMISSION SUB-SECTION 04 (DRIVEN PULLEY)

DRIVEN PULLEY REMOVAL

Remove the following items:

- Upper elastic stop nut retaining the front side pan bracket.
- Two rear side pan retaining nuts.
- Belt guard and drive belt.



CAUTION: Always apply anti-seize compound on the countershaft before final pulley installation (Loctite anti-seize lubricant P/N 413 7010 00).

Pull out the side pan and remove pulley assembly.

DISASSEMBLY AND ASSEMBLY

WARNING: The driven pulley cam is spring loaded. Hold in place when removing the circlip.

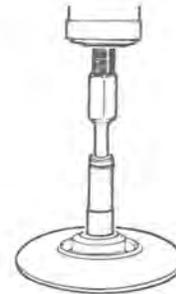


Check sliding half bushing wear, replace bushing if wear is excessive.

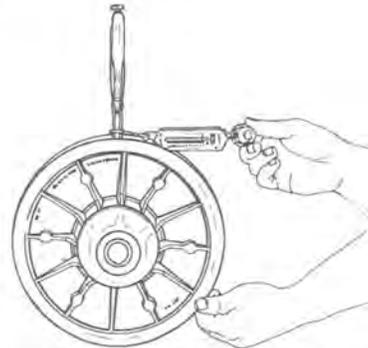
To replace bushing, push out using a press.



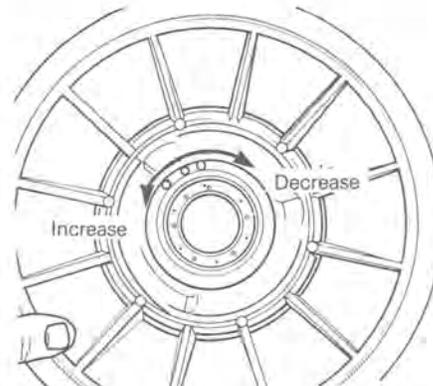
Install new bushing using same procedure.



Check tension using a fish scale positioned at 90° with the pulley axle.



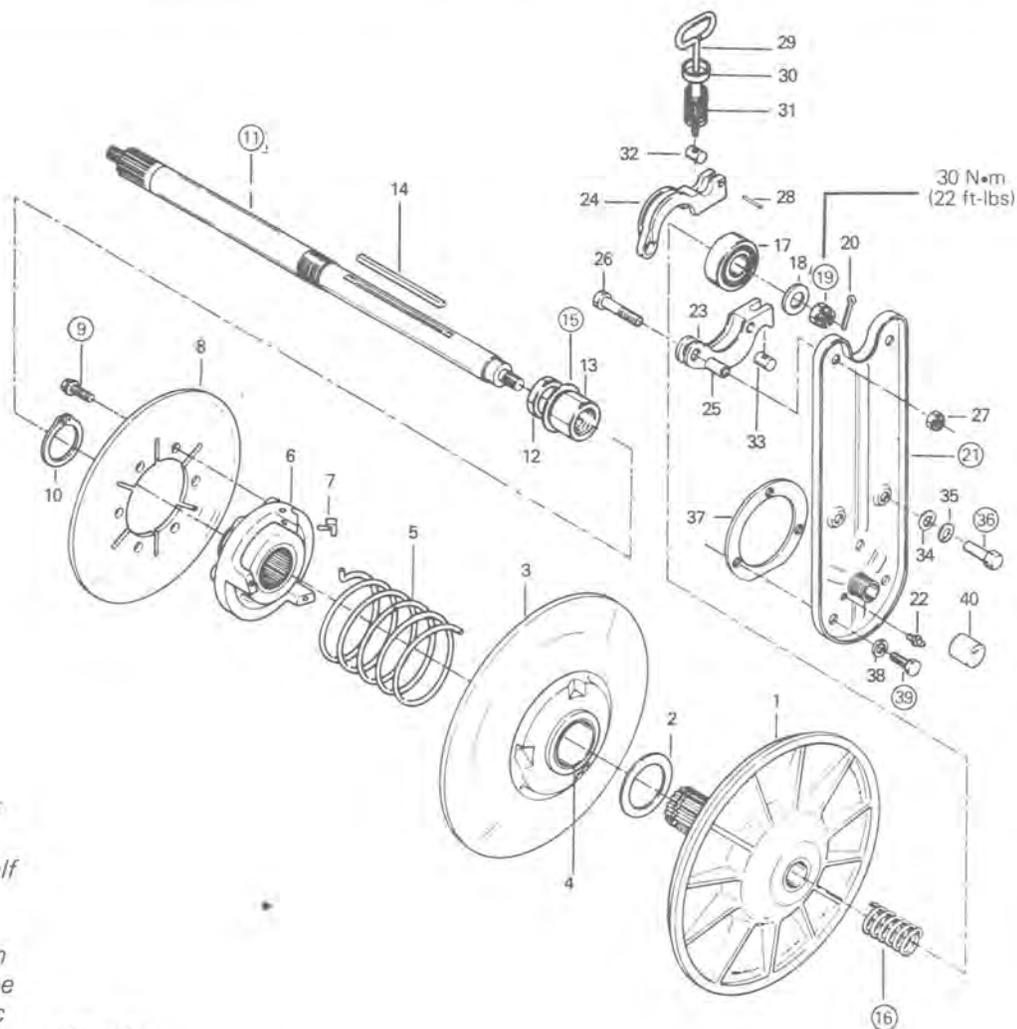
To adjust spring tension, displace spring end accordingly.



Reassemble by reversing removal procedure.

SECTION 03 TRANSMISSION
SUB-SECTION 04 (DRIVEN PULLEY)

CITATION, MIRAGE (all), NORDIK, SKANDIC, FUTURA 300



- 1. Fixed half
- 2. Shim
- 3. Sliding half
- 4. Bushing
- 5. Spring
- 6. Outer cam
- 7. Slider shoe
- 8. Brake disc
- 9. Taptite screw M6 x 16
- 10. Retainer ring
- 11. Countershaft
- 12. Jam nut
- 13. Adjuster nut
- 14. Key
- 15. Tab lock
- 16. Spring
- 17. Bearing
- 18. Flat washer 17/32 x 1 1/16"
- 19. Slotted nut 14 mm
- 20. Cotter pin
- 21. Support
- 22. Grease fitting
- 23. Bearing housing
- 24. Bearing housing
- 25. Bushing

- 26. Cap screw M8 x 35
- 27. Stop nut 8 mm
- 28. Roll pin
- 29. Eye bolt
- 30. Bushing
- 31. Spring
- 32. Barrel
- 33. Barrel
- 34. Flat washer 8.4 x 25 x 1.6 mm
- 35. Lockwasher 8 mm
- 36. Cap screw M8 x 1.25 x 16
- 37. Retainer ring
- 38. Lockwasher 6 mm
- 39. Cap screw M6 x 16
- 40. Plug (if applicable)

SECTION 03 TRANSMISSION SUB-SECTION 04 (DRIVEN PULLEY)

DRIVEN PULLEY REMOVAL

Remove the following items:

- pulley guard and drive belt
- ③⑥ ③⑨ Support screws and drive axle housing screws
- ②① Tilt support forward.
- remove the driven pulley assembly from the countershaft.

DISASSEMBLY AND ASSEMBLY

◆ **WARNING:** The driven pulley cam is spring loaded. Hold in place when removing the circlip.

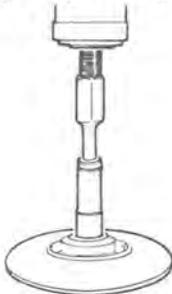


Check sliding half bushing wear, replace bushing if wear is excessive.

To replace bushing, push out using a press.



Install new bushing using same procedure.

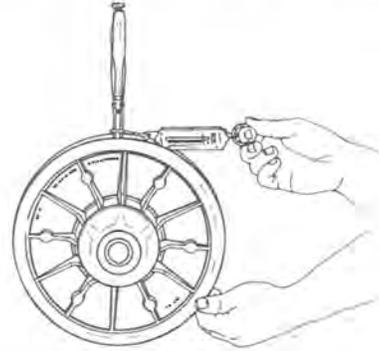


Check tension using a fish scale positioned at 90° with the pulley axle.

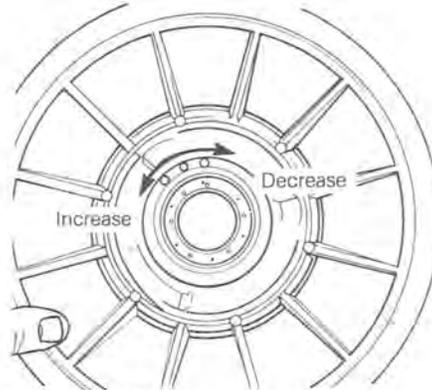
Citation 4500, Nordik, Skandic, Futura 300:

5 1/2 kg ± 1 (12 lbs ± 2)

All other Citation and Mirage: 3.6 kg ± 1 (8 lbs ± 2).

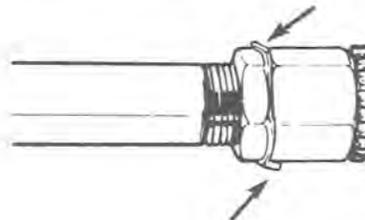


To correct spring tension displace spring end accordingly.



INSTALLATION

- ⑨ Torque to 9 N•m (6 ft-lbs).
- ① Always apply anti-seize compound (Loctite anti-seize lubricant P/N 413 7010 00) on unpainted surface of countershaft.
- ⑰ Torque to 30 N•m (22 ft-lbs).
- ⑱ Make sure the lock tab is properly folded over each nut.

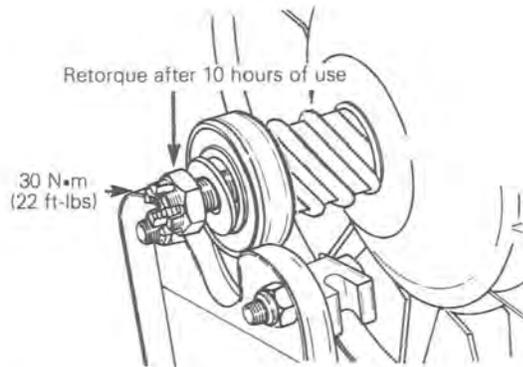


Reassemble driven pulley to countershaft and install by inverting the removal procedure.

Check pulley alignment.

SECTION 03 TRANSMISSION
SUB-SECTION 04 (DRIVEN PULLEY)

- ⑩ Install spring, the bearing, washer and nut.
- ⑨ Torque to 30 N•m (22 ft-lbs).



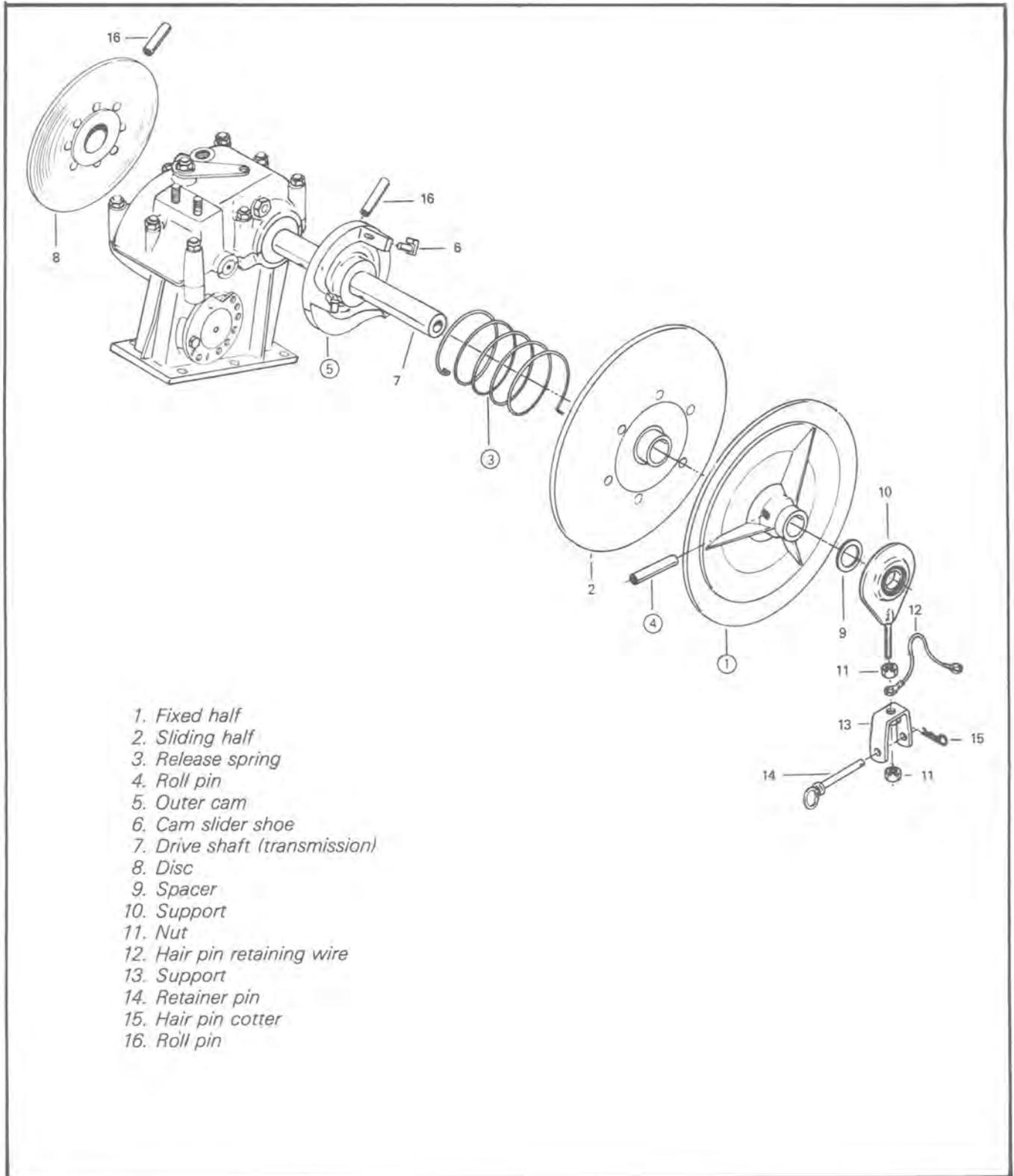
Reinstall a new cotter pin.



10

SECTION 03 TRANSMISSION
SUB-SECTION 04 (DRIVEN PULLEY)

ELITE



- 1. Fixed half
- 2. Sliding half
- 3. Release spring
- 4. Roll pin
- 5. Outer cam
- 6. Cam slider shoe
- 7. Drive shaft (transmission)
- 8. Disc
- 9. Spacer
- 10. Support
- 11. Nut
- 12. Hair pin retaining wire
- 13. Support
- 14. Retainer pin
- 15. Hair pin cotter
- 16. Roll pin

**SECTION 03 TRANSMISSION
SUB-SECTION 05 (PULLEY ALIGNMENT)**

Alpine

Two methods can be used to adjust offset:

- Drive pulley alignment (first method):

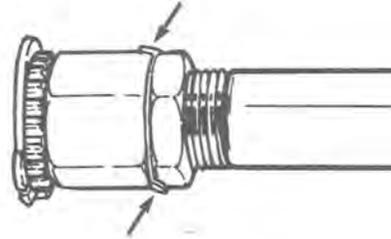
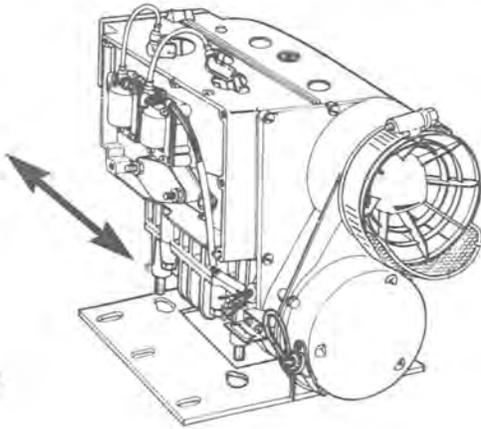
Remove drive pulley and add or remove shim(s) on crankshaft. Shim P/N 504 1057 00 (.032" thickness).

▼ **CAUTION:** Never use more than 5 shims on crankshaft.

◆ **WARNING:** Always torque drive pulley bolt within specifications. (See Technical Data).

- Drive pulley alignment (second method):

Slide engine on its support as illustrated below.



▼ **CAUTION:** The thin nut must be tightened firmly against the adjuster nut before bending the tab lock on each of the two nuts. To tighten the thin nut, use the "Snap-on" extension key no. FC-40. Torque thin nut to 65 N•m (48 ft-lbs).

Snap-on extension key FC-40



**Everest, Futura (except Futura 300 model),
Blizzard, Sonic, Ultra Sonic**

The driven pulley offset is adjusted by adding or removing shim(s). P/N 504 1082 00 (.036" thickness).

○ **NOTE:** To add or remove shim(s), pulley assembly must be removed as per driven pulley removal procedure. Refer to section 03, sub-section 04.

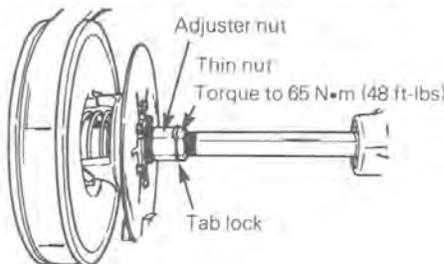
Elite

To adjust offset, slide engine on its support as illustrated above.

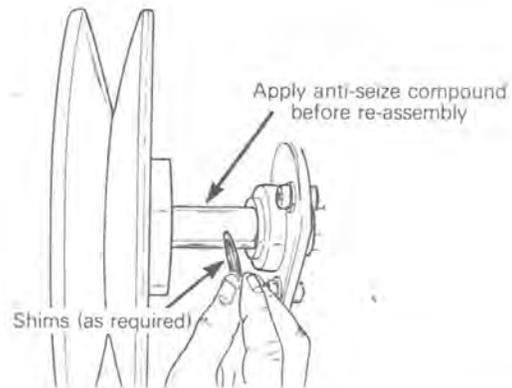
Citation, Mirage, Nordik, Futura 300, Skandic

If the driven pulley is too far in or out, it can be corrected by sliding it toward the appropriate side:

- To adjust the offset:
 - Straighten the tab lock.
 - Loosen the thin nut.
 - Turn the adjuster nut in order to have a dimension of 34 mm (1 11/32") at the offset measurement.



- Holding the adjuster nut, tighten the thin nut and bend the tab lock.



Reinstall the pulley, outer shims, lockwasher and bolt. Torque to 9 N•m (7 ft-lbs).

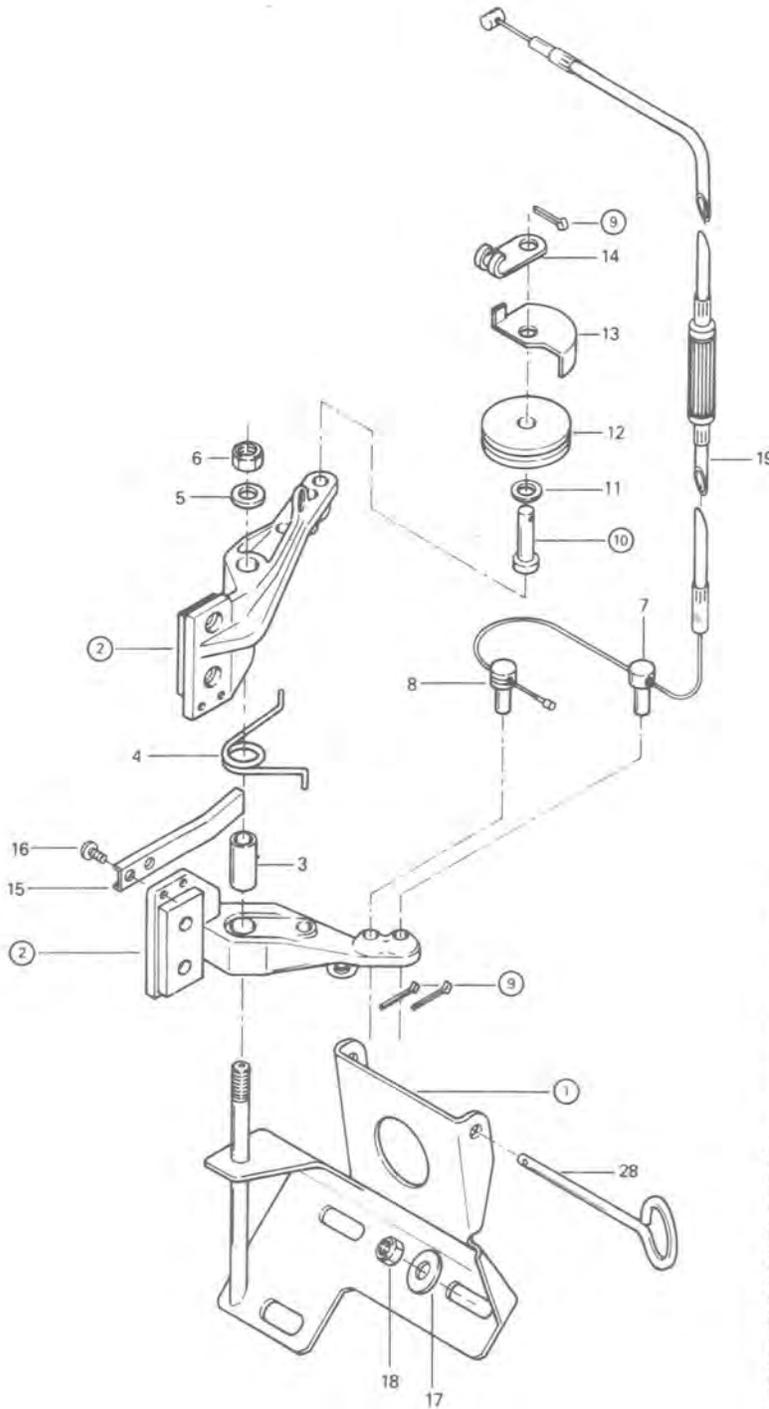
IMPORTANT: Maximum free-play should not exceed 3 mm (1/8").

▼ **CAUTION:** Always apply anti-seize compound (Loctite anti-seize lubricant P/N 413 7010 00) on the countershaft before final assembly.

BRAKE

DISC BRAKE

All Mirage, Citation
 Nordik, Skandic
 Futura 300



1. Bracket
2. Brake lever and lining
3. Bushing
4. Spring
5. Flat washer
6. Nut
7. Barrel
8. Barrel
9. Cotter pin
10. Pin
11. Spring washer
12. Pulley
13. Stop plate
14. Cable bracket (Europe)
15. Brake switch bracket
16. Screw
17. Flat washer
18. Nut
19. Cable

SECTION 03 TRANSMISSION SUB-SECTION 06 (BRAKE)

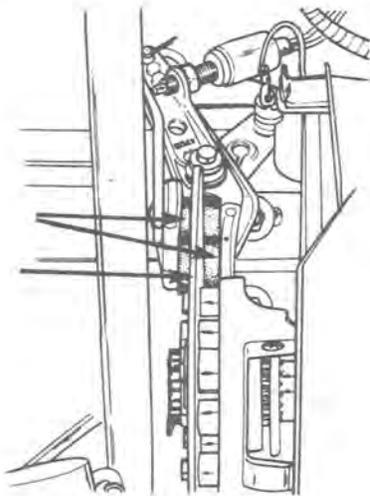
REMOVAL

Remove the following:

air silencer,
brake retainer nut, then pull out brake assembly,
brake light switch,
pulley,
brake cable (disconnect and remove).

Assembly and installation, reverse the procedure.

① When reinstalling caliper brake ass'y, always align caliper ass'y so that the brake disc is well centered between the brake pads.



- ② Replace when pad thickness is less than 3 mm (1/8").
- ⑨ Always reinstall a new cotter pin at assembly.
- ⑩ Install pulley shaft in outer hole of the brake lever.
- ⑬ Make sure the guard lock tab is inserted in the brake lever hole.

◆ **WARNING:** Always readjust the brake light switch after adjusting or removing the brake assembly.

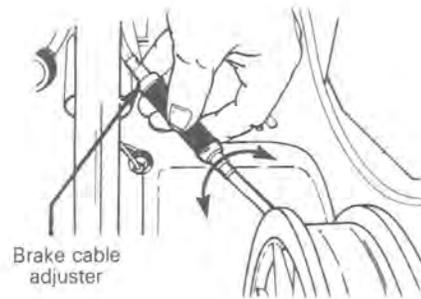
INSPECTION

Measure the thickness of the brake pads. If less than 3 mm (1/8") the pad and lever assembly should be replaced.

ADJUSTMENT

Brake should apply fully while the brake control lever is approximately 13 mm (1/2") from the handlebar grip.

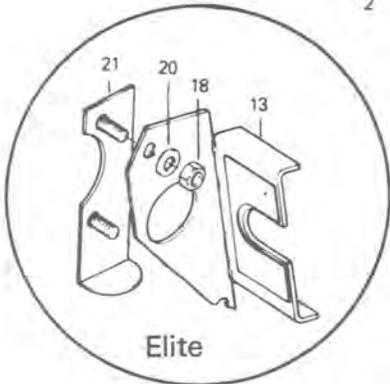
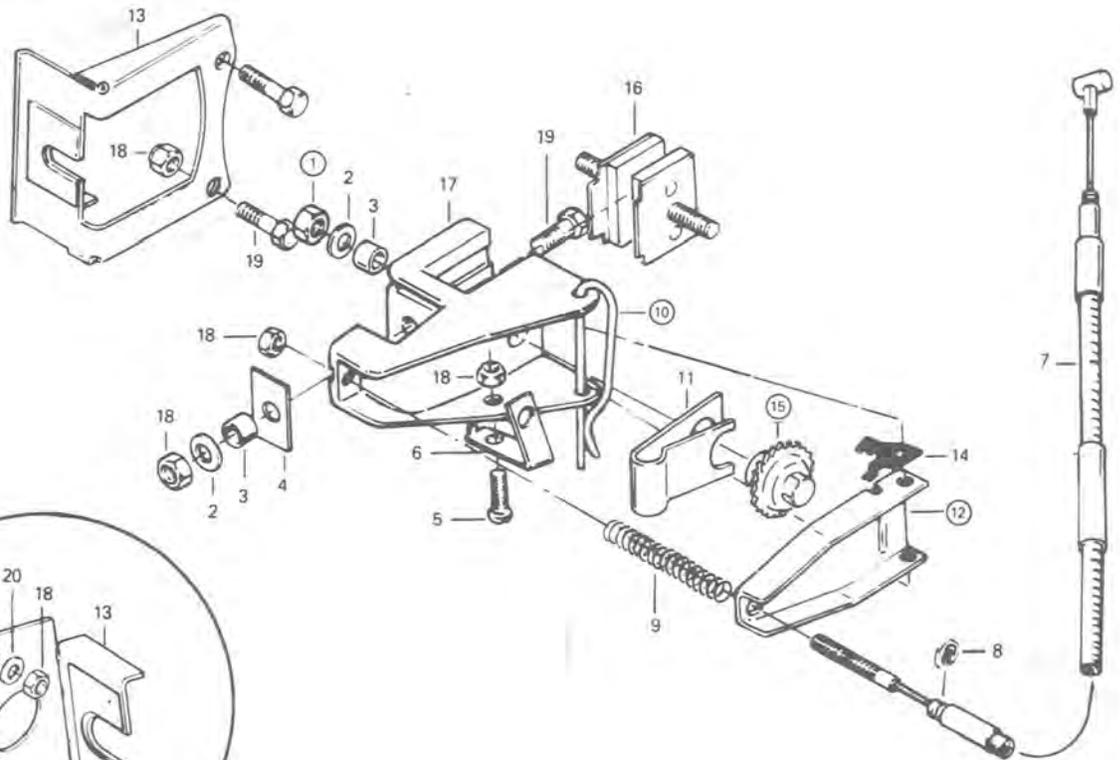
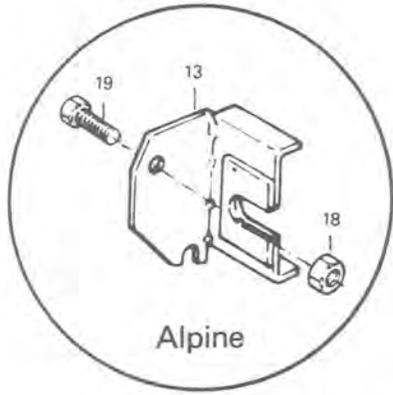
If adjustment is required, turn the brake cable adjuster counterclockwise until the brake disc can no longer turn then back off the adjuster approximately 1 1/2 turns. Re-check brake operation.



◆ **WARNING:** Whenever the brake is readjusted, the brake light switch operation must also be checked and adjusted.

SELF ADJUSTING DISC BRAKE

All Everest
All Futura (except Futura 300)
Blizzard 5500 MX, Blizzard 9500, Sonic
Ultra Sonic, Alpine, Elite



- | | |
|----------------------------|---------------------|
| 1. Nut (nylon) | 12. Lever |
| 2. Washer | 13. Brake support |
| 3. Spacer | 14. Ratchet spring |
| 4. Square washer | 15. Ratchet wheel |
| 5. Bolt | 16. Brake pad |
| 6. Brake switch support | 17. Caliper |
| 7. Brake cable and housing | 18. Nut |
| 8. Circlip | 19. Bolt |
| 9. Spring | 20. Washer |
| 10. Hair pin cotter | 21. Retaining plate |
| 11. Release spring | |

SECTION 03 TRANSMISSION SUB-SECTION 06 (BRAKE)

REMOVAL

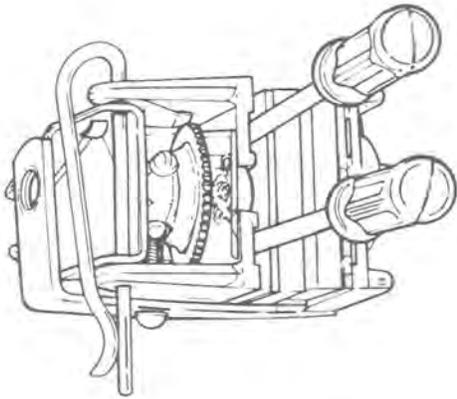
Disconnect brake switch and brake cable.

Remove nuts and/or bolts securing brake support to chaincase.

Slide brake caliper ass'y from brake support.

DISASSEMBLY & ASSEMBLY

⑩ ⑫ To ease hair pin cotter assembly, activate lever and wedge two (2) screwdriver blades between caliper and brake pad to release lever tension.



⑮ Apply low temperature grease on threads and spring seat prior to installation. At assembly, fully tighten then back off 1/2 turn.

① At assembly, torque to 20 N•m (15 ft-lbs).

CLEANING & INSPECTION

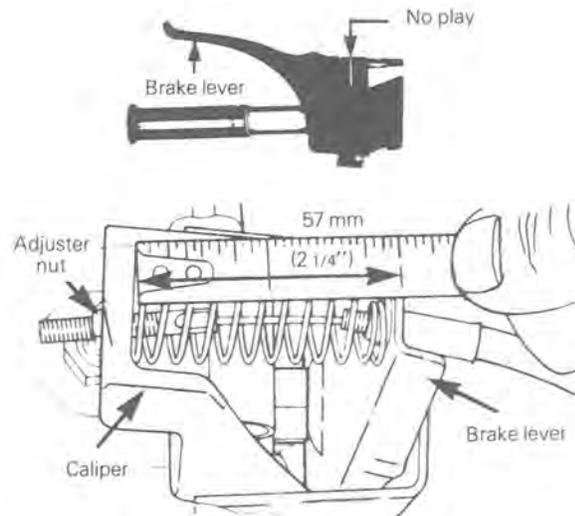
Measure thickness of brake pad. If less than 3 mm (1/8"), the pad should be replaced.

Clean all metal components in a general purpose solvent. Dry using clean cloth.

INSTALLATION & ADJUSTMENT

Slide caliper ass'y onto its support then secure support to vehicle.

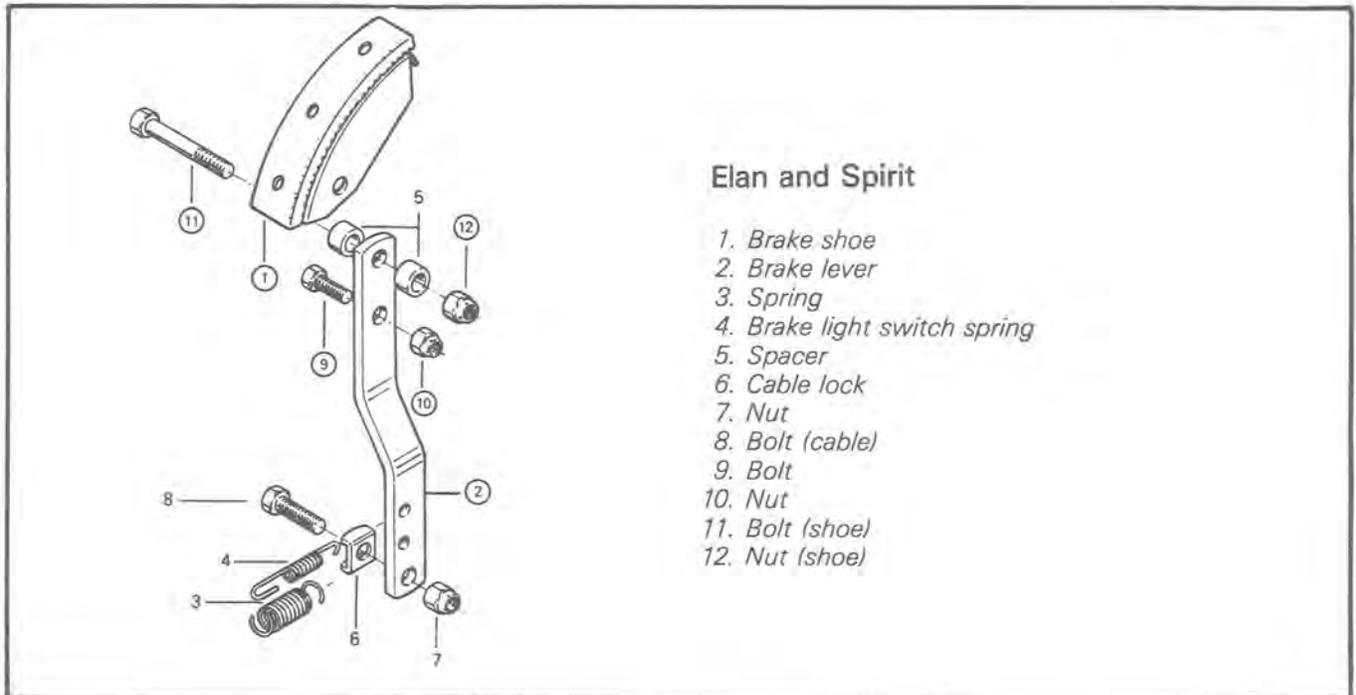
- Activate lever by hand until ratchet click is no longer heard.
- Secure brake cable housing to lever, slide spring over cable then attach cable to housing with adjuster nut.
- Using adjuster nut, adjust until there is no free-play between the brake lever and its housing, and there is a gap of 57 mm \pm 3 (2 1/4" \pm 1/8") between lever and caliper.



○ **NOTE:** It may be necessary to change brake light switch support position to obtain recommended gap between lever and caliper housing.

Connect brake light switch and check operation. Adjust if necessary using two (2) adjuster nuts.

DRUM BRAKE



Elan and Spirit

1. Brake shoe
2. Brake lever
3. Spring
4. Brake light switch spring
5. Spacer
6. Cable lock
7. Nut
8. Bolt (cable)
9. Bolt
10. Nut
11. Bolt (shoe)
12. Nut (shoe)

DISASSEMBLY & ASSEMBLY

- ① ⑪ ⑫ At assembly, torque shoe retaining nut. However shoe must be able to pivot when slight pressure is applied.
- ② ⑨ ⑩ When attaching brake lever assembly to chaincase bracket, tighten nut until lever pivots freely and all side play is eliminated.

○ **NOTE:** Lubricate all moving metal parts of brake with light machine oil.

◆ **WARNING:** Avoid getting oil on brake shoe.

INSPECTION

Check brake lining for wear. If necessary, replace.

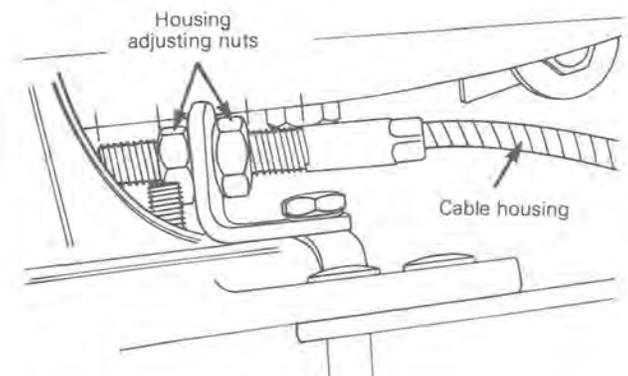
○ **NOTE:** If oil traces are found on lining or drum, check chaincase seal for correct installation position or damage. Replace as needed. Wipe oil from pulley and replace brake shoe.

INSTALLATION & ADJUSTMENT

Connect brake cable to brake lever and 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.

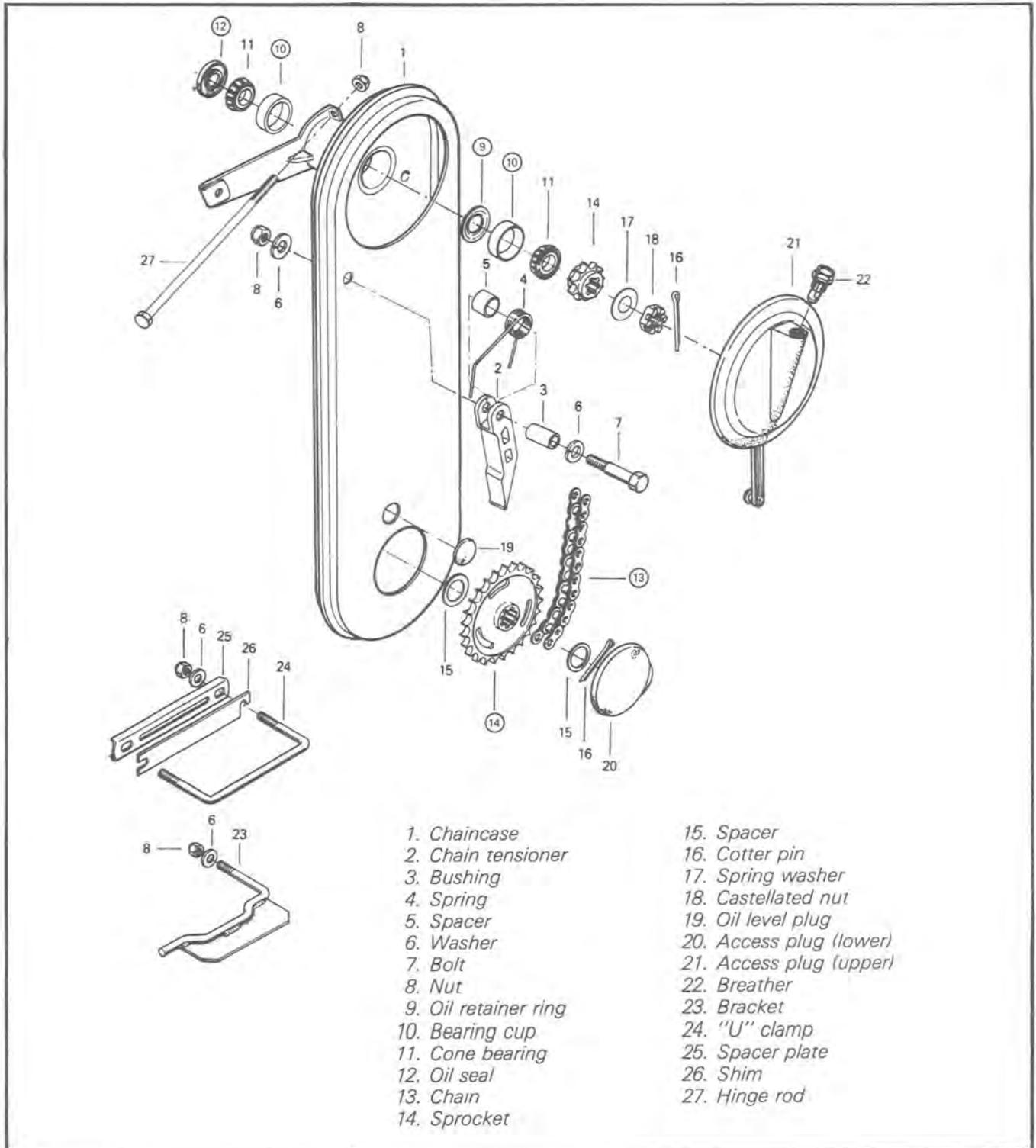


Check brake light operation. If necessary, loosen brake light switch lock nuts and adjust.



CHAINCASE

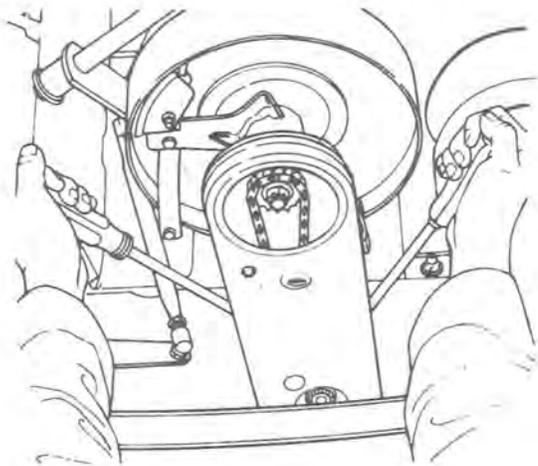
Elan, Spirit



**SECTION 03 TRANSMISSION
SUB-SECTION 07 (CHAINCASE)**

REMOVAL

- Remove the tool box.
- Remove pulley guard, drive belt and inspection cover.
- Release chain tension.
- Release track tension.
- Pry oil seal from chaincase (lower part) and drain oil.
- Disconnect brake cable.
- Pry out lower access plug. Remove cotter pin and spacer.
- Remove nut on hinge rod at chaincase bracket.
- From the inner side of frame, remove the nut securing chaincase lower bracket. Remove bracket.
- Remove nuts, washers and "U" clamp holding the chaincase to the frame.
- Remove chaincase shim(s) if applicable. Move chaincase towards drive pulley to disengage hinge rod.
- Remove drive axle.
- Using two (2) large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.

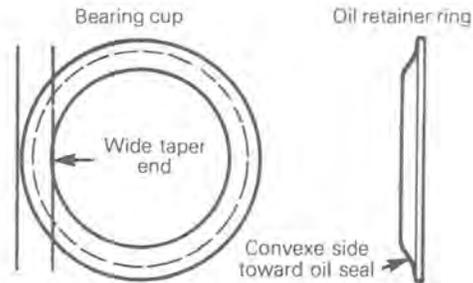


INSPECTION

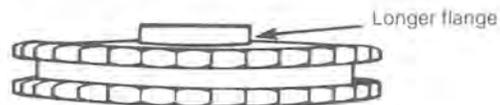
Visually inspect chain for cracked, damaged or missing link rollers. Inspect for defective bearing cones, bearing cups and oil retainer ring. Inspect sprockets for damage, wear.

DISASSEMBLY & ASSEMBLY

⑨ ⑩ Position oil retainer ring then sit bearing cup in chaincase aperture. Cup must be seated so that wide taper end is facing oil retainer ring.



- ⑫ Using an appropriate pusher, press oil seal into chaincase hub. Oil seal must sit flush with case hub edge.
- ⑬ ⑭ Place lower sprocket with longer flange toward track side of chaincase. (For proper sprocket and chain use, see Technical Data.)

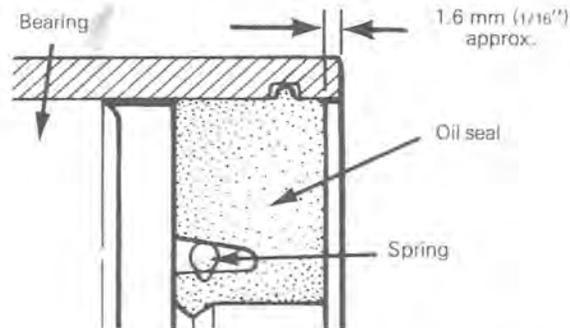


INSTALLATION

Position assembled chaincase and driven pulley in location. Install drive axle. (Ensure that spacer has remained on axle). Install spacer and cotter pin to secure lower sprocket to axle. Install lower access plug. Install hinge rod, lower bracket, "U" clamp and previously removed aligning shim(s).

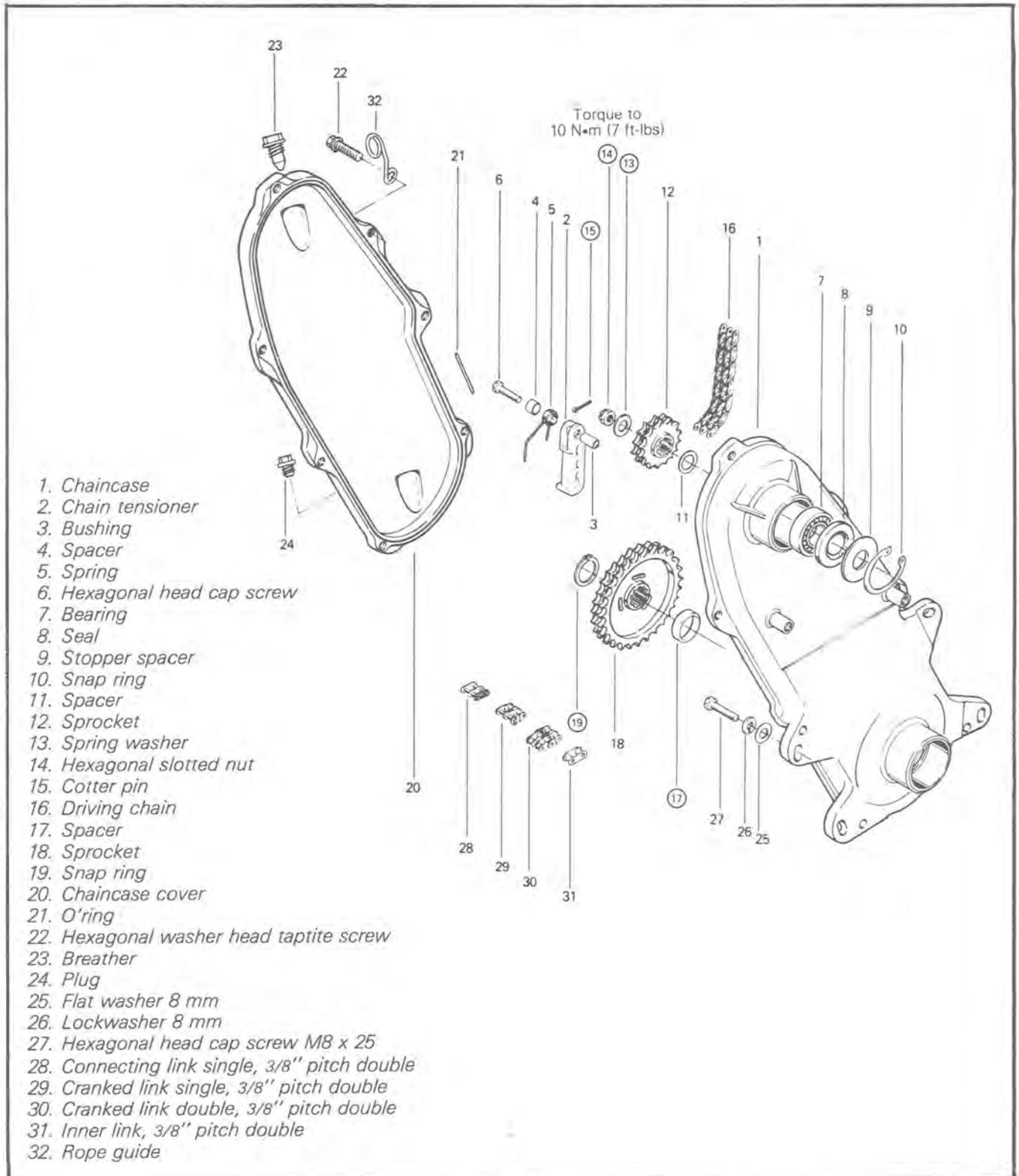
Install oil seal into chaincase flange.

○ **NOTE:** A gap of approximately 1.6 mm (1/16") should exist between the end chaincase flange and oil seal.



- Proceed with pulley alignment. Apply chain tension.
- Pour Bombardier chaincase oil into chaincase until flush with oil level plug.
- Connect and adjust brake. Apply track tension.
- Install drive belt and pulley guard.
- Reinstall the tool box.

**CITATION 3500, MIRAGE I, CITATION 4500/E, MIRAGE III/E,
CITATION SS, MIRAGE SPECIAL, NORDIK, SKANDIC, FUTURA 300**



SECTION 03 TRANSMISSION

SUB-SECTION 07 (CHAINCASE)

REMOVAL

Remove

- suspension
- injection oil reservoir (if applicable)
- battery and battery holder (if applicable)
- chaincase cover and drain the oil

Pry out drive axle oil seal from chaincase. Remove cotter pins, nuts, washers, sprockets and chain. Remove bolts and nuts securing chaincase to frame.

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Inspect for defective bearing, sprockets.

DISASSEMBLY & ASSEMBLY

Remove the oil seal, snap ring and bearing from the chaincase.

INSTALLATION

Install the chaincase to the frame (do not tighten). Position the drive axle into location.

Prior to lower sprocket installation ensure that the spacer ⑰ is on the drive axle.

Reinstall the sprockets, chain, flat washers.

⑬ ⑭ Reinstall spring washer and slotted nut, torque to 10 N•m (7 ft-lbs).

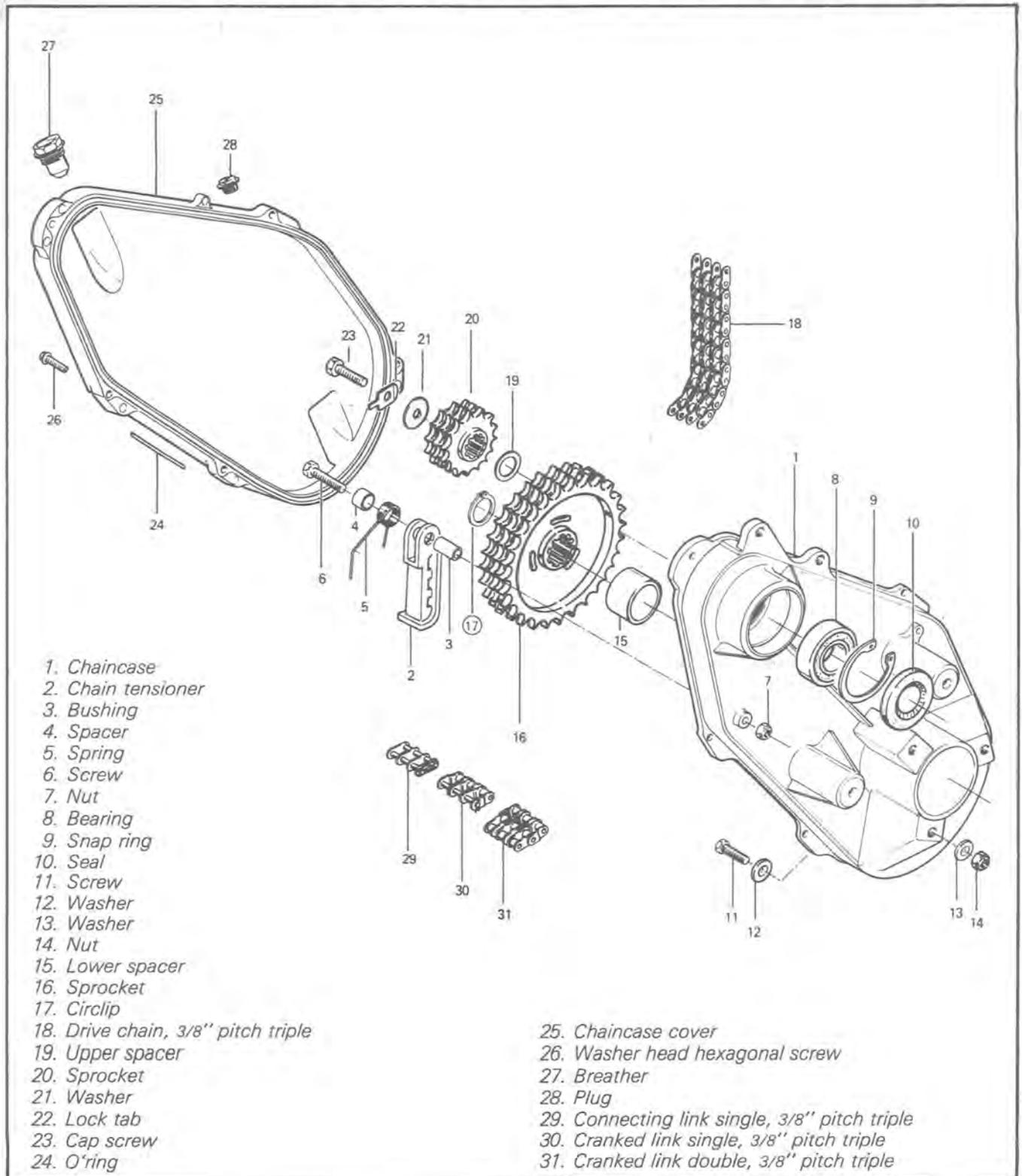
⑮ Install new cotter pin.

⑲ Reinstall snap ring (lower sprocket).

Reinstall the chaincase cover.

Refill with chaincase oil. (200 ml (7 fl. oz)).

**EVEREST 500/E, EVEREST L/C, FUTURA 500/E, FUTURA L/C,
BLIZZARD 5500 MX, SONIC, BLIZZARD 9500, ULTRA SONIC**



SECTION 03 TRANSMISSION SUB-SECTION 07 (CHAINCASE)

REMOVAL

Remove the suspension.

○ **NOTE:** On the Blizzard 9500 and Ultra Sonic disconnect the muffler and push it aside underneath the exhaust pipes.

Remove the chaincase cover and drain the oil.

Slacken the end bearing housing.

Pry out the drive axle oil seal from the chaincase.

Release chain tension then open the tab lock locking the sprocket. Remove the screw, washer, sprocket, circlip and chain.

Remove bolts and/or nuts securing the chaincase to the frame.

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Inspect for defective bearing, sprockets.

DISASSEMBLY & ASSEMBLY

Remove the oil seal, snap ring and bearing from the chaincase.

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the case hub edge.

INSTALLATION

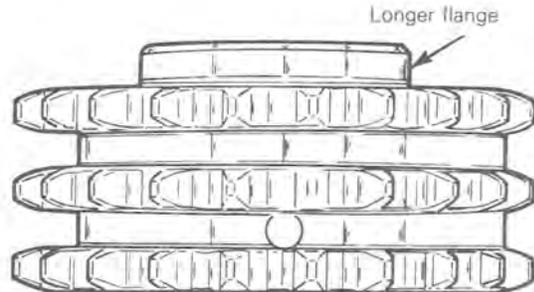
Install the chaincase to the frame (do not tighten). Position the drive axle into location. Tighten the end bearing housing. Prior to lower sprocket installation ensure that the spacer is on the drive axle.

Reinstall the sprockets, chain, flat washers.

Position the sprockets with the longer flanges facing inside the chaincase. (For proper sprocket and chain use, see Technical Data).

⑰ The lower sprocket holding device is a circlip.

▼ **CAUTION:** It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.

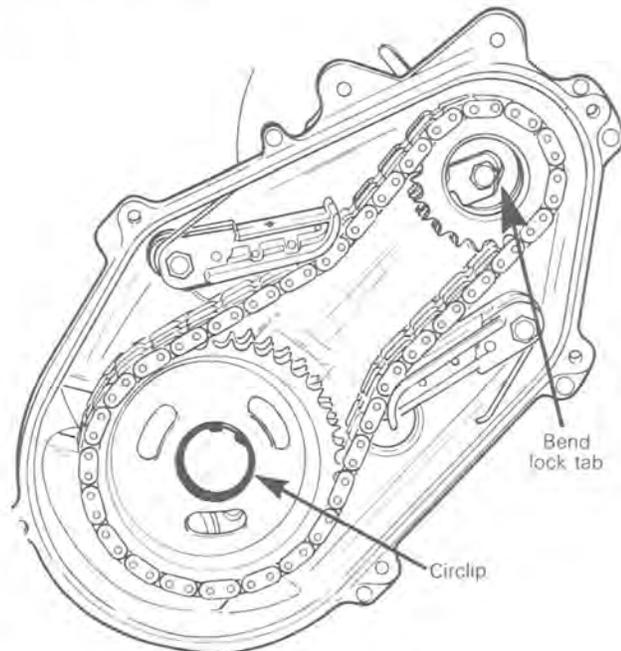


Install the tab lock as illustrated.

Install the screw and torque to 9.5 N•m (7 ft-lbs).

Bend the tab lock.

▼ **CAUTION:** Lock tab should be replaced if bent more than twice. If in doubt, replace.



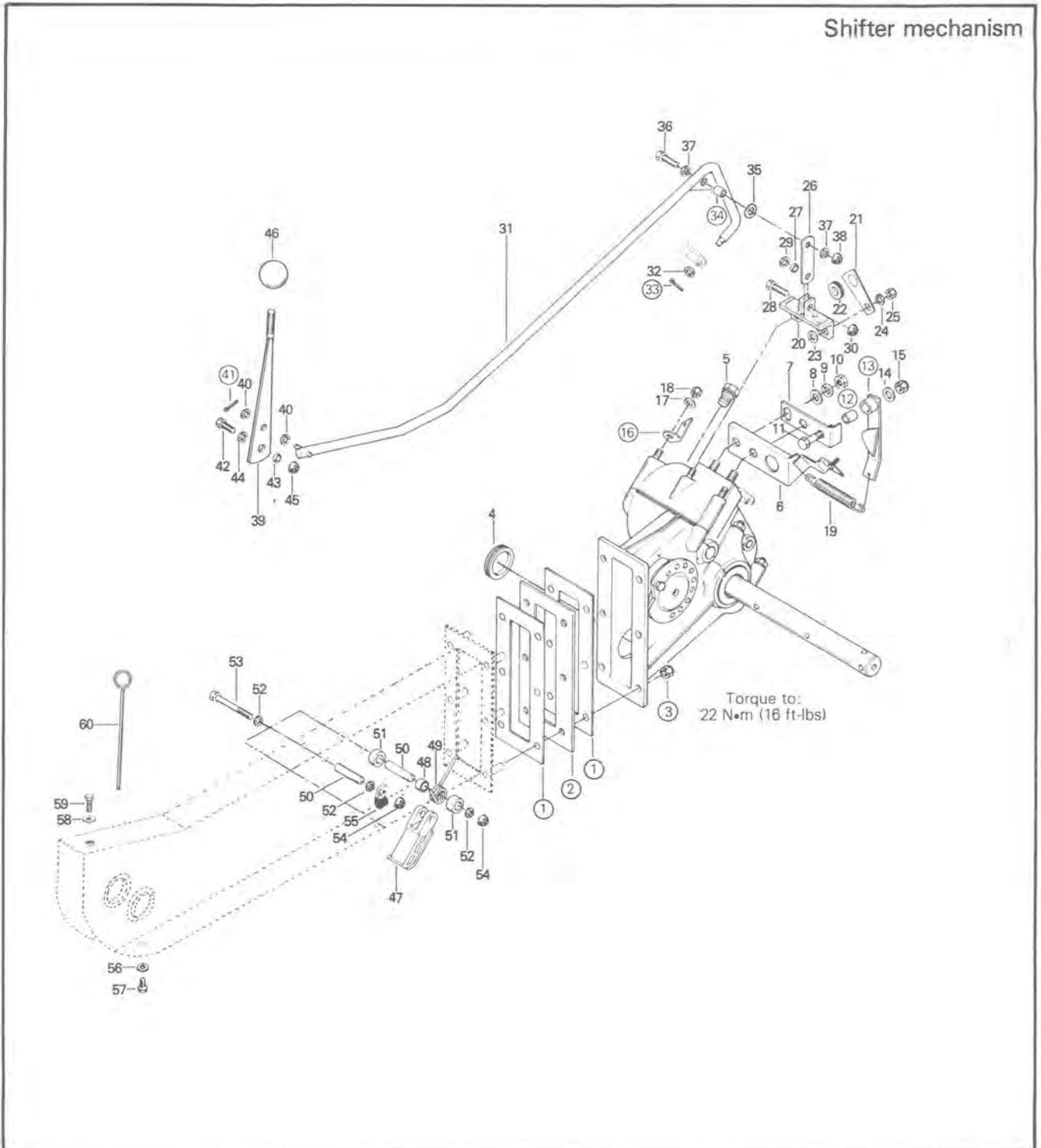
Reinstall the chaincase cover.

Refill with chaincase oil.

GEARBOX

2 SPEEDS GEARBOX (ELITE)

Shifter mechanism



SECTION 03 TRANSMISSION SUB-SECTION 08 (GEARBOX)

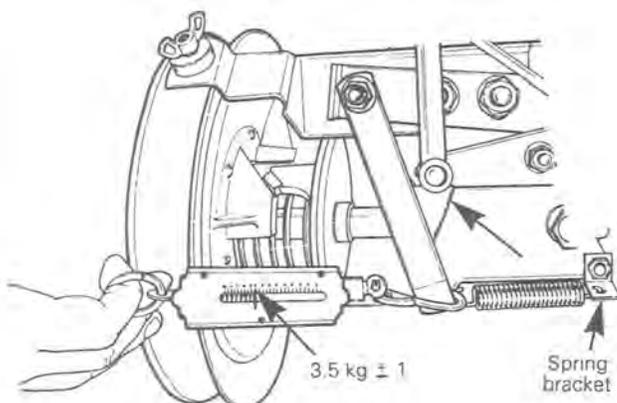
1. Gasket (2)
2. Spacer
3. Hexagonal elastic stop nut 5/16 x 24 (6)
4. Rubber cover
5. Breather plug
6. Bracket
7. Plate
8. Flat washer (2)
9. Lockwasher (2)
10. Hexagonal nut M10 (2)
11. Hexagonal screw 5/16 x 18 x 1 1/2
12. Bushing
13. Bracket
14. Flat washer
15. Hexagonal elastic stop nut 5/16 x 18
16. Spring bracket
17. Lockwasher
18. Hexagonal nut M8
19. Spring
20. Bracket
21. Bracket
22. Grommet
23. Flat washer (2)
24. Lockwasher (2)
25. Hexagonal nut M8 (2)
26. Lever
27. Spacer
28. Hexagonal screw 1/4 x 20 x 1
29. Flat washer
30. Hexagonal elastic stop nut 1/4 x 20
31. Shifter rod
32. Flat washer 13/32 x 11/16 x .060
33. Cotter pin
34. Spacer
35. Flat washer 13/32 x 11/16 x .060
36. Hexagonal screw 1/4 - 20 x 1
37. Flat washer 9/32 x 5/8 x .060 (2)
38. Hexagonal elastic stop nut
39. Shifter
40. Flat washer 13/32 x 11/16 x .060 (2)
41. Cotter pin
42. Hexagonal screw 1/4 x 20 x 1
43. Spacer
44. Flat washer 13/32 x 13/16 x .060
45. Hexagonal elastic stop nut 1/4 x 20
46. Ball (handle)
47. Chain tensioner (2)
48. Spacer (2)
49. Spring (2)
50. Bushing (3)
51. Spacer (4)
52. Fiber washer 1/4 x 1/2 x .060 (4)
53. Hexagonal screw 1/4 x 20 x 2 1/2 (6)
54. Hexagonal elastic stop nut 1/4 x 20 (3)
55. Clip
56. Flat washer 11/32 x 11/16 x .090
57. Drain screw
58. Fiber washer 1/4 x 1/2 x .060
59. Hexagonal screw 1/4 x 20 x 1/2
60. Oil gauge

DISASSEMBLY & ASSEMBLY

① ② ③ At assembly, ensure the gaskets are positioned each side of the spacer. Torque the retaining nuts to 22 N•m (16 ft-lbs).

⑫ ⑬ ⑭ At assembly, apply a layer of grease for smoother operation of the mechanism.

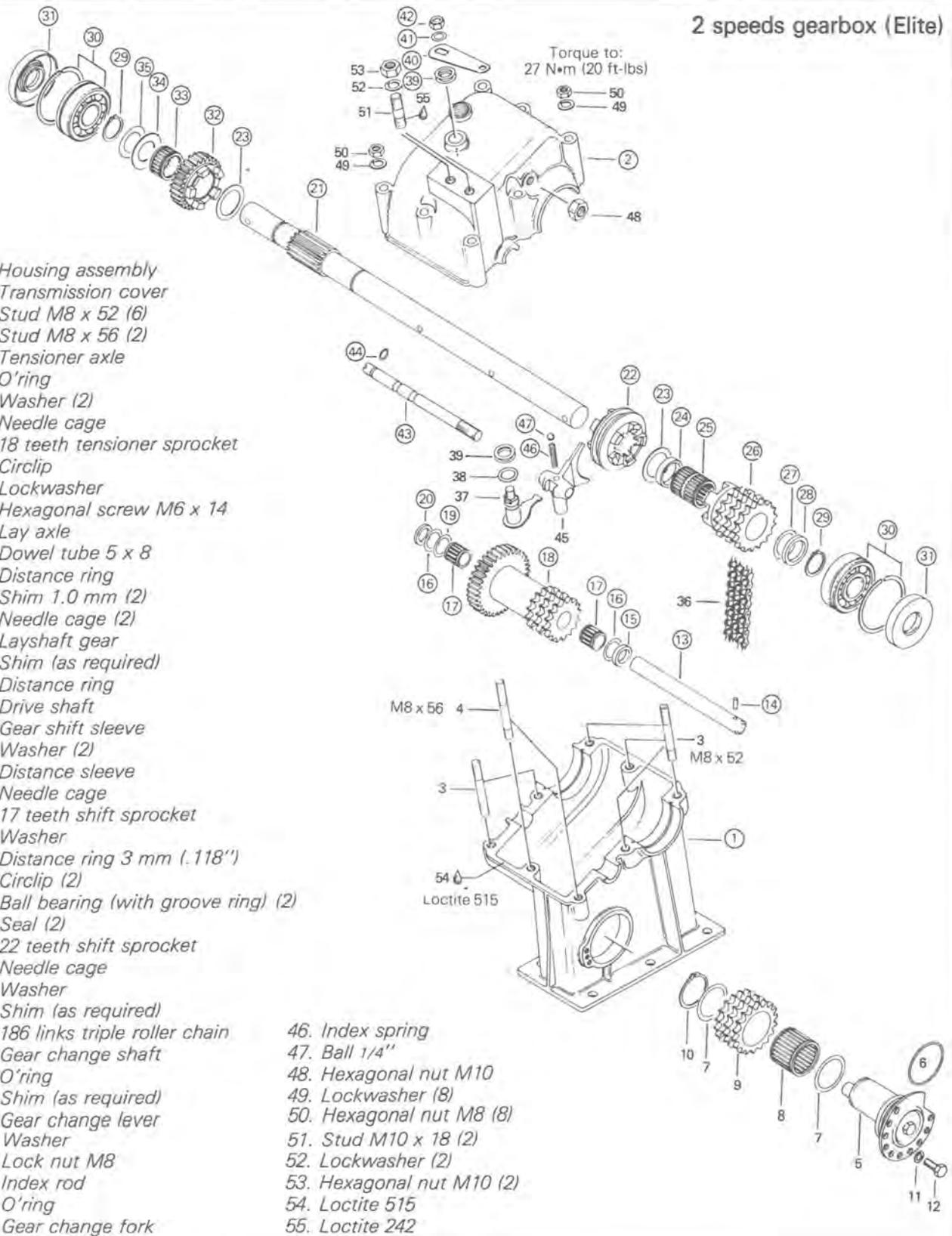
⑯ Using a fish scale, adjust spring bracket to obtain a spring tension of 3.5 kg ± 1 (8 lbs ± 2), when in forward position.



⑳ ㉑ Always install new cotter pins P/N 371 800 200 at assembly.

SECTION 03 TRANSMISSION
SUB-SECTION 08 (GEARBOX)

2 speeds gearbox (Elite)

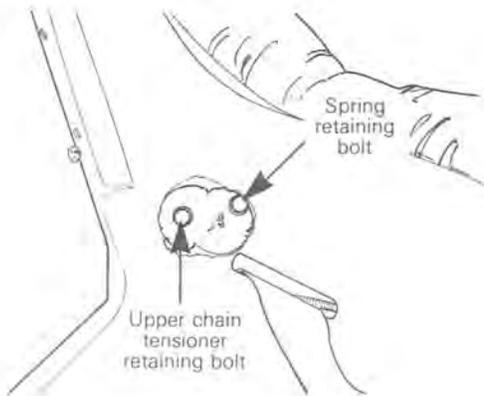


1. Housing assembly
2. Transmission cover
3. Stud M8 x 52 (6)
4. Stud M8 x 56 (2)
5. Tensioner axle
6. O'ring
7. Washer (2)
8. Needle cage
9. 18 teeth tensioner sprocket
10. Circlip
11. Lockwasher
12. Hexagonal screw M6 x 14
13. Lay axle
14. Dowel tube 5 x 8
15. Distance ring
16. Shim 1.0 mm (2)
17. Needle cage (2)
18. Layshaft gear
19. Shim (as required)
20. Distance ring
21. Drive shaft
22. Gear shift sleeve
23. Washer (2)
24. Distance sleeve
25. Needle cage
26. 17 teeth shift sprocket
27. Washer
28. Distance ring 3 mm (.118")
29. Circlip (2)
30. Ball bearing (with groove ring) (2)
31. Seal (2)
32. 22 teeth shift sprocket
33. Needle cage
34. Washer
35. Shim (as required)
36. 186 links triple roller chain
37. Gear change shaft
38. O'ring
39. Shim (as required)
40. Gear change lever
41. Washer
42. Lock nut M8
43. Index rod
44. O'ring
45. Gear change fork
46. Index spring
47. Ball 1/4"
48. Hexagonal nut M10
49. Lockwasher (8)
50. Hexagonal nut M8 (8)
51. Stud M10 x 18 (2)
52. Lockwasher (2)
53. Hexagonal nut M10 (2)
54. Loctite 515
55. Loctite 242

SECTION 03 TRANSMISSION SUB-SECTION 08 (GEARBOX)

REMOVAL

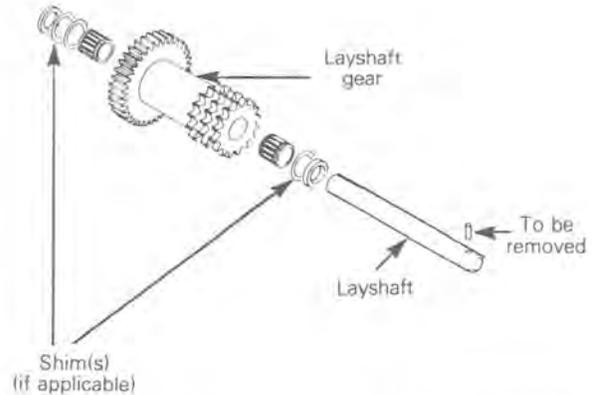
- Remove pulley guard and drive belt.
 - Remove seat backs and seats then remove plates to allow access to engine compartment.
 - Remove engine from vehicle.
 - Remove brake assembly and detach driven pulley support.
 - Remove shifter mechanism.
 - Release track tension. Remove suspension systems.
 - Drain oil from chaincase (incorporated with frame).
 - Remove end bearing housings.
 - Remove drive axle then pull back gearbox assembly until it is possible to enter a hand to remove the two (2) tensioners inside the housing between the track tunnels.
- NOTE:** It is necessary to cut a hole in fiberglass frame in order to be able to reach chain tensioner retaining bolts and nuts.



Remove gearbox, chain and lower sprocket from vehicle.

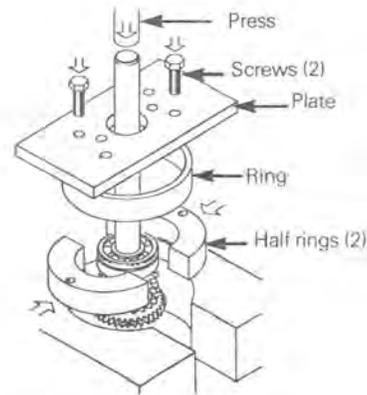
DISASSEMBLY

- ① ② Remove the transmission cover from the transmission housing.
- Remove the transmission components and set them on a table.
- Remove the transmission cover components and set them on a table.
- Clean the transmission housing and cover mating surfaces of Loctite residue.
- ⑬ to ⑳ Remove the dowel tube, the layshaft gear, shim(s) (if applicable), distance rings, needle bearings and visually inspect components for damage or wear.



⑳ to ㉓ Remove the shaft seals and the bearing circlips. 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)



Remove the circlip, the distance ring, the shim, the shift sprocket (17 th), the needle bearings, the distance sleeve, the washer and the shift sprocket (22 th) from shaft.

Visually inspect the components for damage or wear.

ASSEMBLY

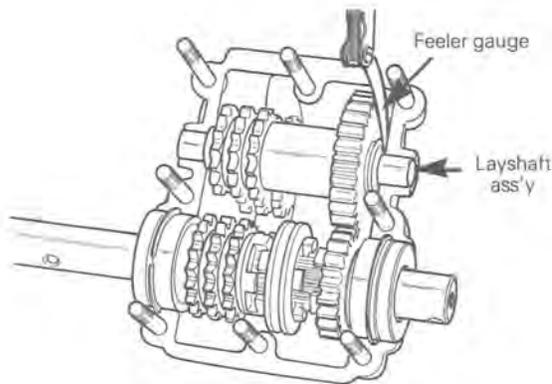
○ **NOTE:** Apply a small amount of motor oil (SAE 30) to the components before assembly.

Reinstall the layshaft components to the layshaft.

▼ **CAUTION:** If the dowel tube is damaged after removal, install a new dowel tube P/N 420 929 380.

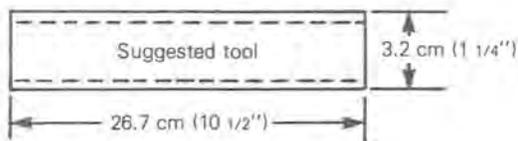
Place the assembled lay gear into the lower housing.

Using a feeler gauge, check end play between assembled layshaft and walls of lower housing. End play must be between 0.15-0.30 mm (.006 and .012"). If end play is not within tolerance, remove or add shims.



To reinstall the drive shaft components to 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.

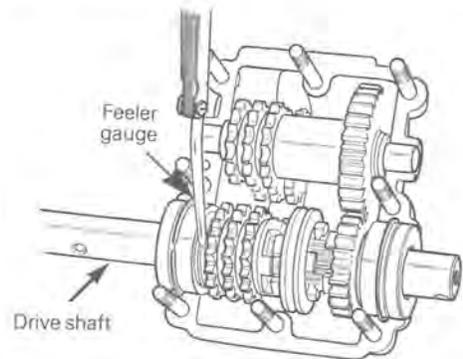
- Install the circlip over the bearing.
- Install the other components.
- Install the other shaft end bearing with shim(s) as required using the above mentioned tool.

- 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)

- Install assembled drive shaft into lower housing then using a feeler gauge, check total free-play between components installed on the drive shaft side of sprocket ⑫.

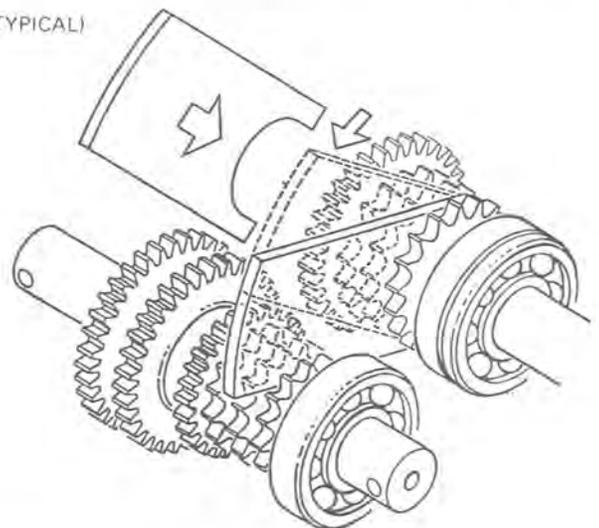
- Free-play must not exceed 0.15-0.30 mm (.006 to .012"). If free-play is not within tolerance, shim ⑬ to correct tolerance.



Verify sprocket alignment using the alignment tool P/N 420 476 010.

- Set alignment tool on shift sprocket 17th and turn it into the corresponding layshaft and tensioner sprockets as illustrated.

(TYPICAL)

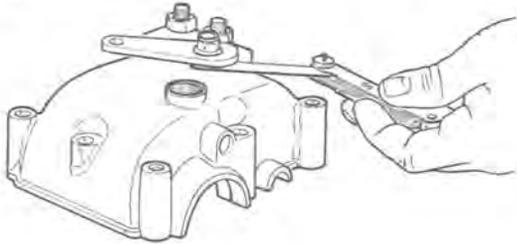


If necessary readjust clearance by transferring shim(s) on drive shaft to the opposite side.

▼ **CAUTION:** Ensure the drive shaft and layshaft gears align with the tensioner gear and that all clearances are respected.

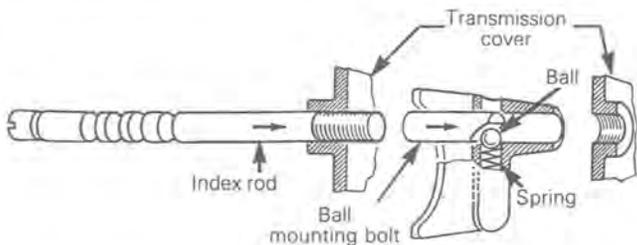
SECTION 03 TRANSMISSION SUB-SECTION 08 (GEARBOX)

③⑨ to ④⑦ At assembly, lubricate gear change shaft and compensate clearance with shims (required end play 0.3 mm (0.011")). 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 (0.011") play.



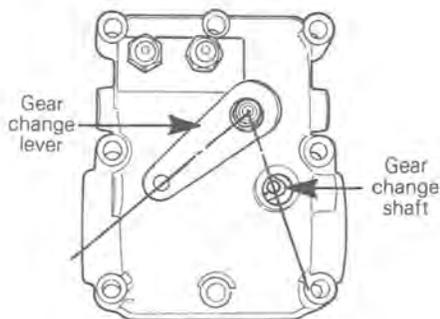
▼ **CAUTION:** The finger of the gear change shaft must not block the gear change fork.

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 fork 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.

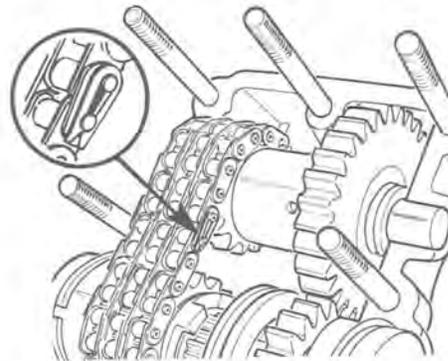


Install the retaining nut and the washer. Torque to 23 N•m (17 ft-lbs).

▼ **CAUTION:** The gear change lever **MUST** be installed as per following illustration.



⑤④ If required, chain locking clip must be installed as per following illustration, with its closed end towards the rotary motion direction when in "Forward" position.

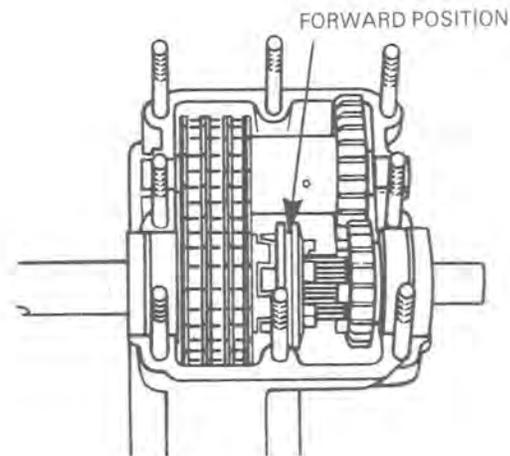


For correct chain selection, see Technical data.

⑤④ ⑤⑤ At the installation of the studs in the gearbox upper housing, apply Loctite 242 on threads and seal upper and lower gearbox housings with Loctite 515 or an equivalent silicone sealant.

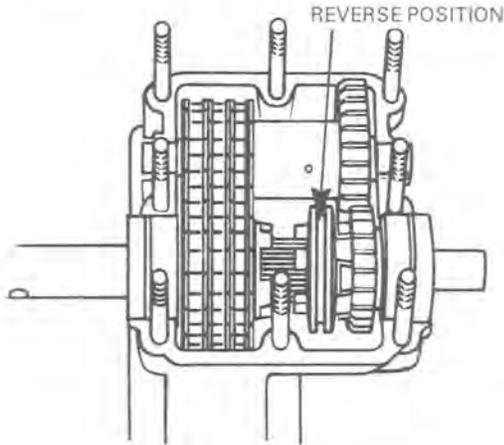
INSTALLATION

Prior to installation, with the gearbox removed, adjust gearbox to obtain correct engagement. At "forward" position, sleeve must be as shown.



SECTION 03 TRANSMISSION
SUB-SECTION 08 (GEARBOX)

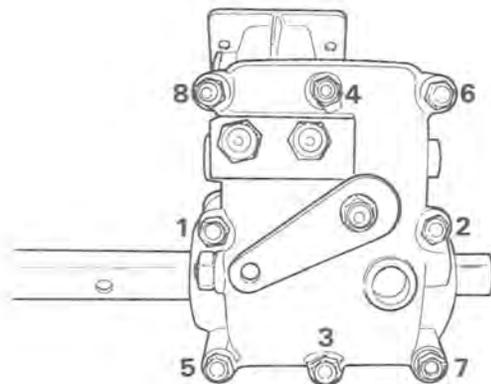
At "reverse" position, sleeve must be as shown.



If any of these positions are unobtainable, use a screwdriver to turn index rod and obtain proper meshing of teeth. Recheck sleeve engagement after adjusting index rod.

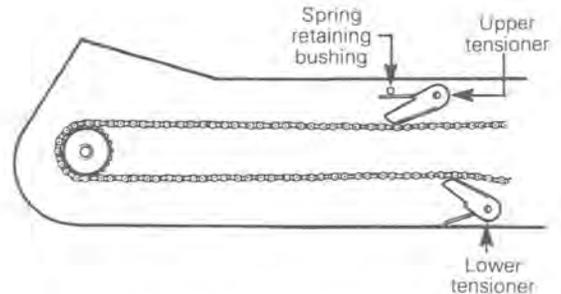
Position gear change fork in gearbox cover so that it aligns with slot of sleeve in gearbox housing.

Install gearbox cover on gearbox using "Loctite 515 crankcase sealant" or an equivalent silicone sealant. Torque nuts in the following sequence to 27 N•m (20 ft-lbs).



Position gaskets and spacer of gearbox on frame studs. Place lower sprocket in drive chain and push it forward inside the housing (between the track tunnels).

Install chain tensioners.

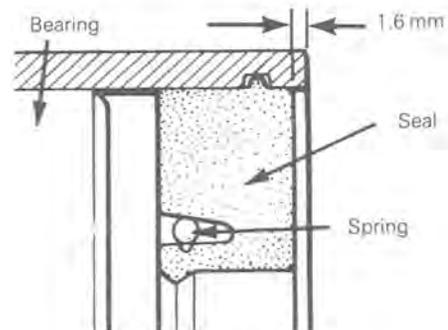


Secure gearbox to frame (torque nuts to 22 N•m (16 ft-lbs) and insert splined end of drive axles in the lower sprocket of the gearbox.

CAUTION: Check condition of drive axle seals; replace if necessary.

Press each end bearing housing into frame and over drive 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.



Install shifter mechanism.

Install brake and driven pulley support.

Apply chain tension by rotating tensioner axle to obtain 6 mm (1/4") maximum chain free-play.

Pour 625 ml (22 Imp. ounces) of Bombardier chaincase oil into gearbox.

Install engine and carry out pulley alignment.

Install suspension systems. Proceed with track tension and alignment.

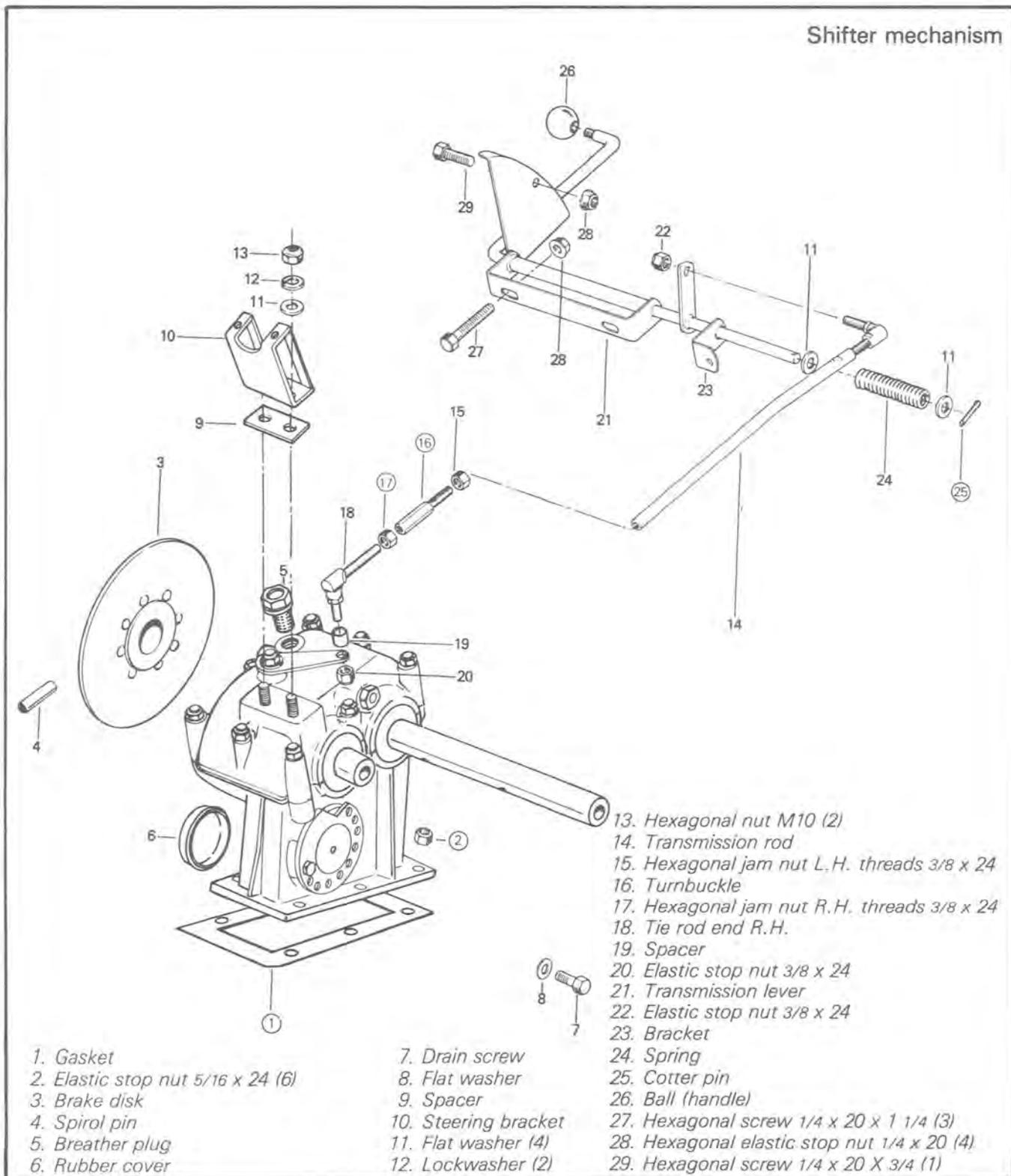
Install drive belt and pulley guard.

Install engine compartment access plates, seats and seat backs.



3 SPEEDS GEARBOX (ALPINE)

Shifter mechanism



- 1. Gasket
- 2. Elastic stop nut 5/16 x 24 (6)
- 3. Brake disk
- 4. Spirol pin
- 5. Breather plug
- 6. Rubber cover

- 7. Drain screw
- 8. Flat washer
- 9. Spacer
- 10. Steering bracket
- 11. Flat washer (4)
- 12. Lockwasher (2)

- 13. Hexagonal nut M10 (2)
- 14. Transmission rod
- 15. Hexagonal jam nut L.H. threads 3/8 x 24
- 16. Turnbuckle
- 17. Hexagonal jam nut R.H. threads 3/8 x 24
- 18. Tie rod end R.H.
- 19. Spacer
- 20. Elastic stop nut 3/8 x 24
- 21. Transmission lever
- 22. Elastic stop nut 3/8 x 24
- 23. Bracket
- 24. Spring
- 25. Cotter pin
- 26. Ball (handle)
- 27. Hexagonal screw 1/4 x 20 x 1 1/4 (3)
- 28. Hexagonal elastic stop nut 1/4 x 20 (4)
- 29. Hexagonal screw 1/4 x 20 X 3/4 (1)

SECTION 03 TRANSMISSION SUB-SECTION 08 (GEARBOX)

DISASSEMBLY & ASSEMBLY

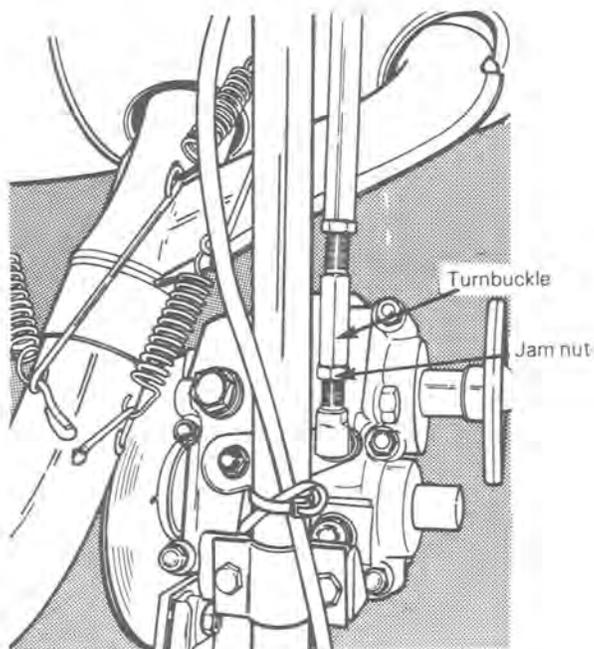
- ① At assembly, ensure the gasket is properly positioned.
- ② At assembly torque to 22 N•m (16 ft-lbs).
- ⑫ At assembly, always reinstall a new cotter pin.

SHIFTER ADJUSTMENT

With gearbox lever properly engaged in gear, adjust so that shifter lever fits correctly in corresponding gear groove.

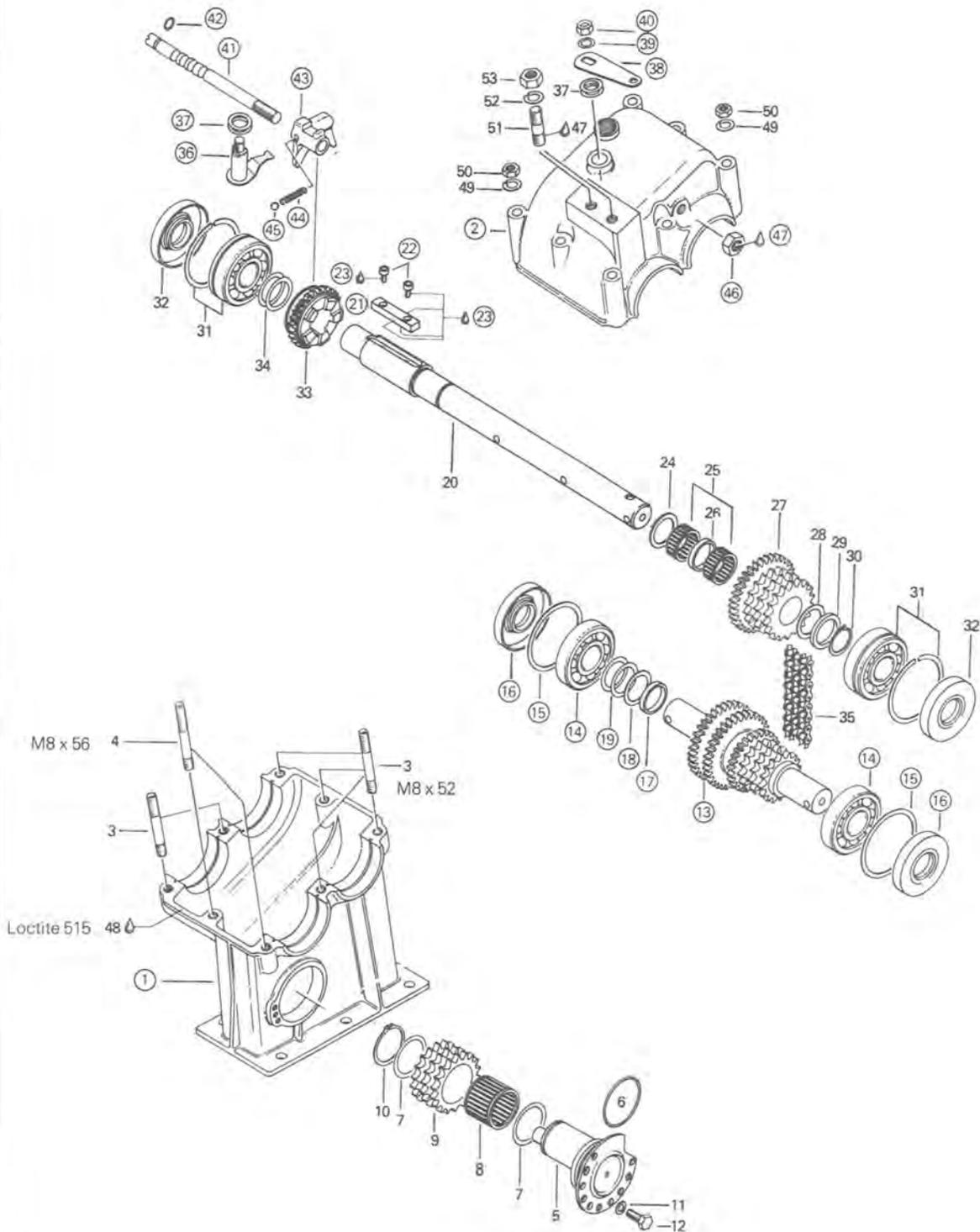
To adjust, loosen ⑰ jam nut and adjust ⑱ turnbuckle as required.

Retighten ⑰ jam nut.



SECTION 03 TRANSMISSION
SUB-SECTION 08 (GEARBOX)

3 speeds gearbox (Alpine)



SECTION 03 TRANSMISSION SUB-SECTION 08 (GEARBOX)

1. Transmission housing
2. Transmission cover
3. Stud M8 x 52 (6)
4. Stud M8 x 56 (2)
5. Tensioner axle
6. O'ring
7. Washer
8. Needle bearing
9. 18 teeth tensioner sprocket
10. Circlip
11. Lockwasher
12. Hexagonal screw M6 x 14
13. Layshaft assembly
14. Ball bearing 6005 (2)
15. Washer (2)
16. Seal (2)
17. Distance sleeve
18. Shim 25.5/34/1
19. Shim (as required)
20. Drive shaft
21. Key
22. Allen screw M4 x 8 (2)
23. Loctite 271 (red)
24. Washer
25. Needle bearing
26. Distance sleeve
27. 19 teeth shift sprocket
28. Shim 25.5/34/1
29. Distance ring
30. Circlip
31. Ball bearing 6205 (2)
32. Seal
33. 23 teeth shift sprocket
34. Shim (as required)
35. 90 links, triple roller chain
36. Gear change shaft
37. Shim (as required)
38. Gear change lever
39. Washer
40. Lock nut M8
41. Index rod
42. O'ring
43. Gear change fork
44. Index spring
45. Ball 1/4"
46. Hexagonal nut M10
47. Loctite 242 (blue)
48. Loctite 515 (violet)
49. Lockwasher (8)
50. Hexagonal nut M8 (8)
51. Stud M10 x 23 (2)
52. Lockwasher (2)
53. Hexagonal nut M10 (2)

REMOVAL

Remove hood, pulley guard, drive belt and exhaust manifold from vehicle.

Remove brake assembly and shifter mechanism.

Remove steering lower bracket from the gearbox.

Slacken upper bracket.

Release chain tension using tensioner.

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.

Remove oil seals from end bearing housings and center frame (to drain the oil).

Remove end bearing housings. (Pry out housings with two (2) screwdrivers inserted between housing and frame).

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.

Remove gearbox and gasket from frame.

DISASSEMBLY

① ② Remove the transmission cover from the transmission housing.

Remove the transmission components and set them on a table.

Remove the transmission cover components and set them on a table.

Clean the transmission housing and cover mating surfaces of Loctite residue.

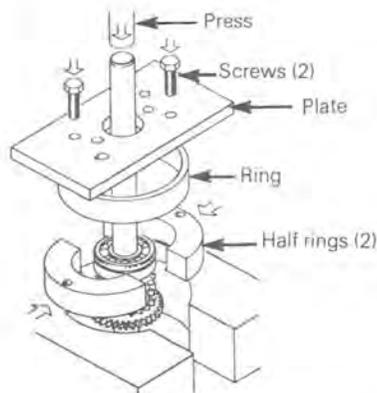
⑬ to ⑰ Remove the layshaft components and inspect for wear and/or damage.

⑳ to ㉓ Remove the shaft seals and the bearing circlips.

SECTION 03 TRANSMISSION SUB-SECTION 08 (GEARBOX)

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)



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.

Visually inspect the components for damage or wear.

ASSEMBLY

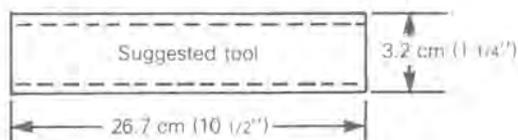
NOTE: Apply a small amount of motor oil (SAE 30) to the components before assembly.

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.

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.

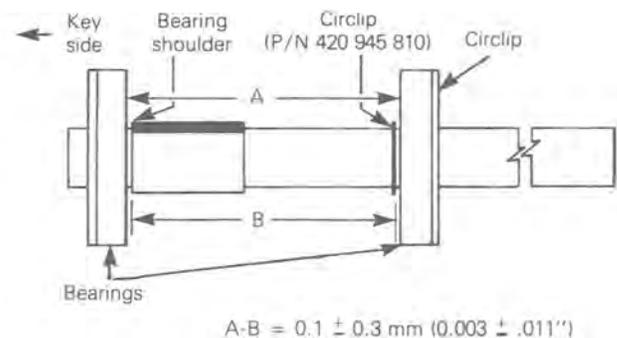
- Install the circlip over the bearing.
- Install the other components.
- Install the other shaft end bearing with shim(s) as required using the above mentioned tool.
 - Available shims:
 - 25.5/34/0.2 (P/N 420 944 470)
 - 25.5/34/0.3 (P/N 420 944 471)
 - 25.5/34/0.5 (P/N 420 944 472)

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.

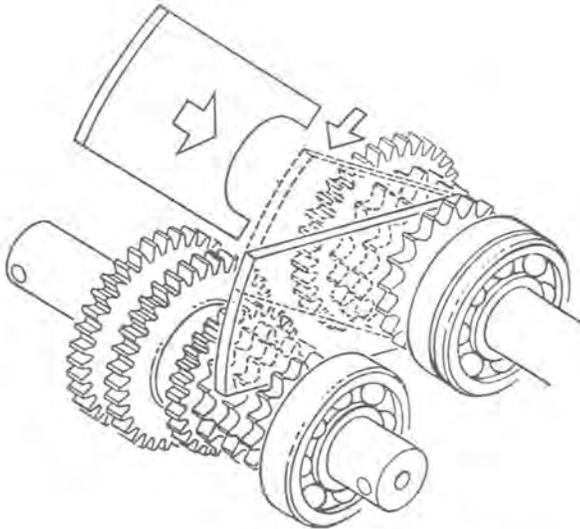


To obtain the proper drive shaft clearance it may be necessary to add or remove shim(s) between the key side bearing and the shaft bearing shoulder.

Verify sprocket alignment using the alignment tool (P/N 420 476 010). Proceed as follows:

SECTION 03 TRANSMISSION SUB-SECTION 08 (GEARBOX)

- Set alignment tool on shift sprocket 19 th and turn it into the corresponding layshaft and tensioner sprockets as illustrated.

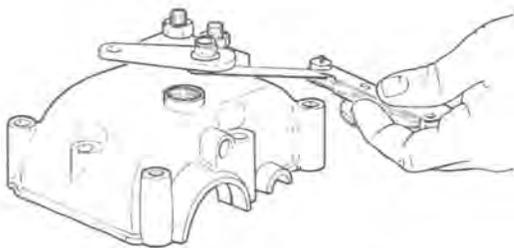


If necessary readjust clearance by transferring shim(s) on drive shaft to the opposite side.

CAUTION: Ensure the drive shaft and layshaft gears align with the tensioner gear and that all clearances are respected.

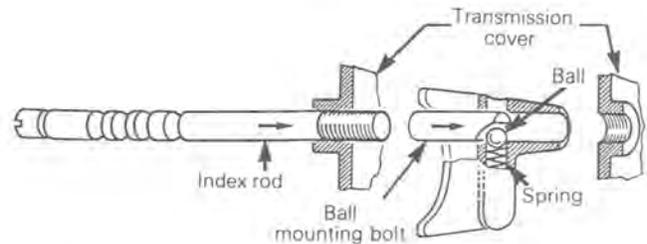
⑶ to ⑷ Reinstall the transmission cover components in the transmission cover.

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.



CAUTION: The finger of the gear change shaft must not block the gear change fork.

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.



Install the retaining nut and the washer. Torque to 23 N•m (17 ft-lbs).

Set the shift sprocket 23 teeth to **reverse** position.

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.

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 ft-lbs).

CAUTION: Before cover installation, ensure that the shifter arm and the 23 teeth shift sprocket are in **REVERSE** position.

INSTALLATION

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.

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.

- Verify pulley alignment and reinstall the drive belt and the belt guard.

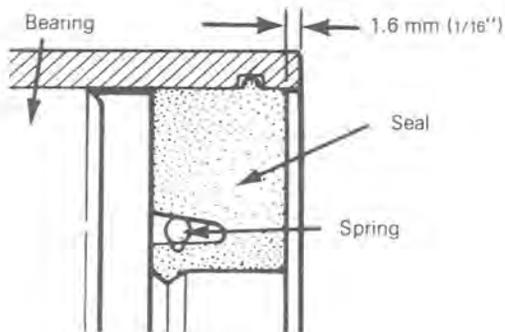
CAUTION: Check condition of drive axle seals; replace if necessary.

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.



Install rear axle and bogie wheel sets to their original position.

Rotate the tensioner axle ⑤ to obtain 6 mm (1/4") maximum drive chain free-play.

Fill gearbox with 450 ml (16 Imp. ounces) of Bombardier chaincase oil.

Install exhaust manifold, drive belt and brake assembly. Proceed with pulley alignment.

Proceed with track tension and alignment.

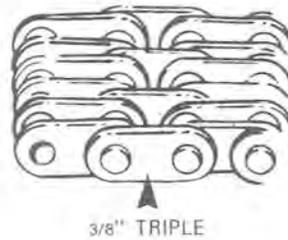
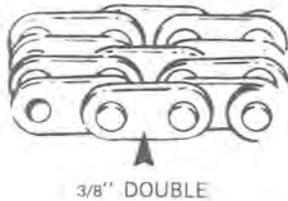
Reinstall the hood.



DRIVE CHAIN

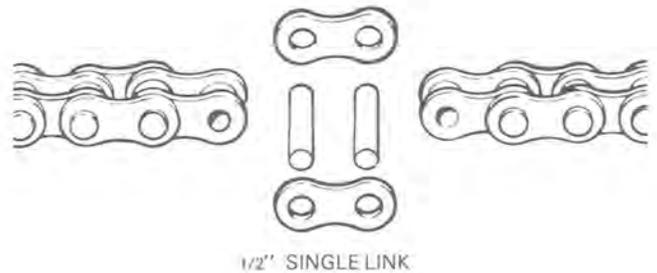
GENERAL

There are three (3) types of the Bombardier drive chains: a single 1/2" pitch, a double 3/8" pitch, and a triple 3/8" pitch. For proper use refer to Technical Data.



CHAIN SEPARATION

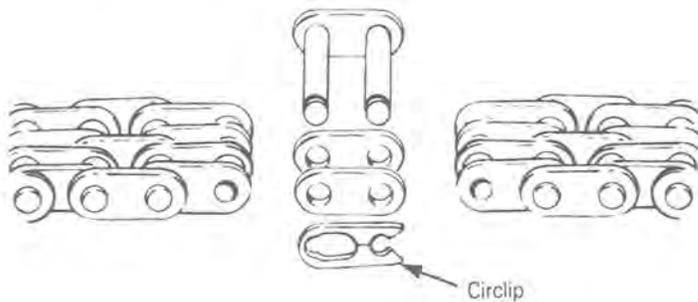
When separating an endless chain, always use a chain bearing pin extractor. Also, make sure to remove one complete link.



There are 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.



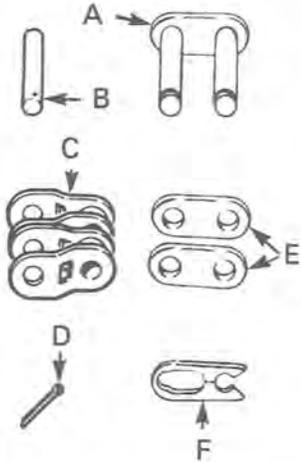
CONNECTING LINK 3/8" DOUBLE



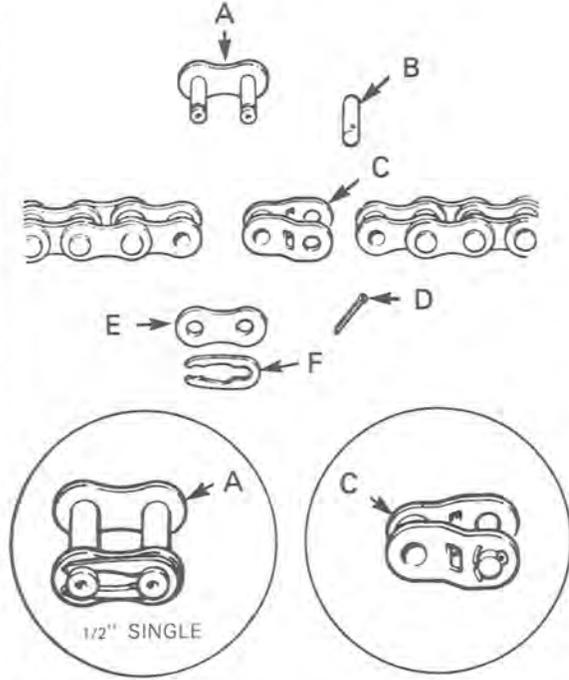
SECTION 03 TRANSMISSION
 SUB-SECTION 09 (DRIVE CHAIN)

LENGTHENING 1/2 LINK

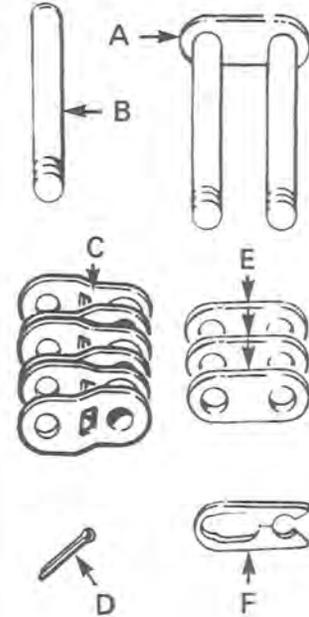
3/8" DOUBLE



1/2" SINGLE



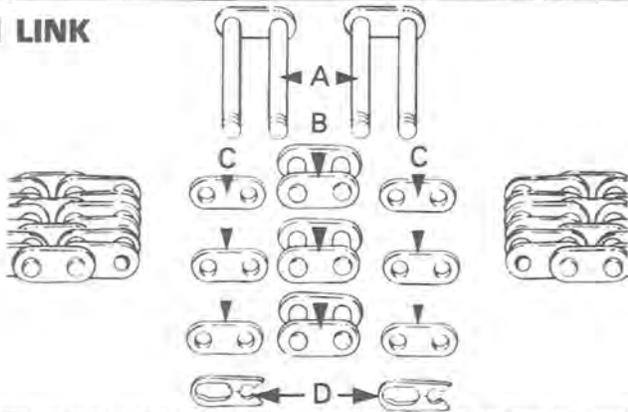
3/8" TRIPLE



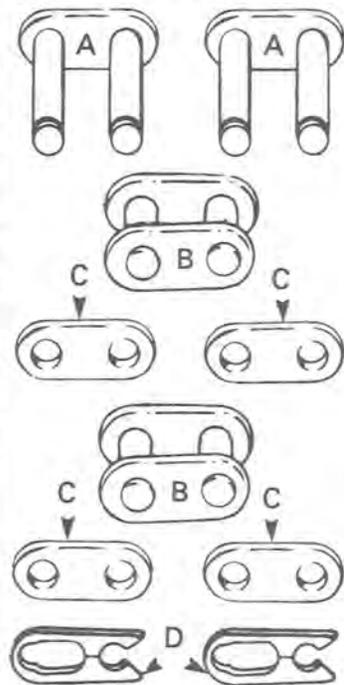
- A. Connecting link
- B. Link pin
- C. Cranked link
- D. Cotter pin
- E. Outer link
- F. Circlip

LENGTHENING 1 LINK

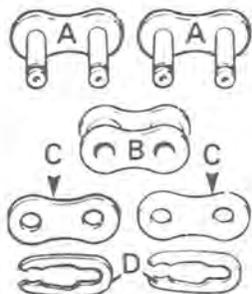
3/8" TRIPLE



3/8" DOUBLE



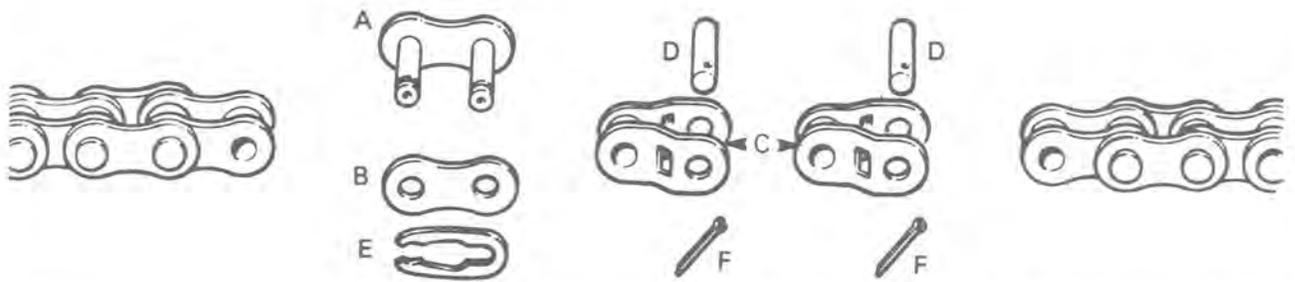
1/2" SINGLE



- A. Connecting link
- B. Inner link
- C. Outer link
- D. Circlip

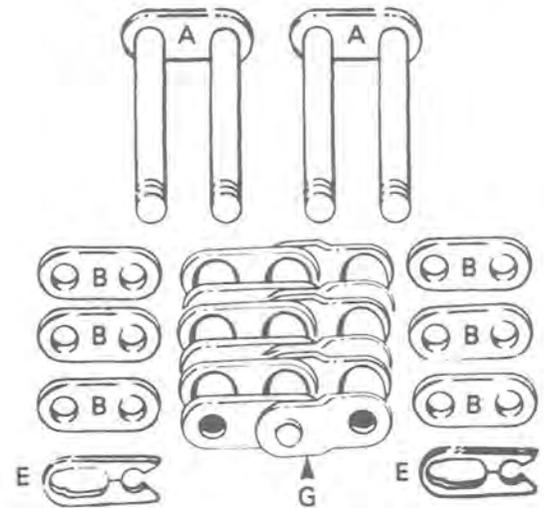
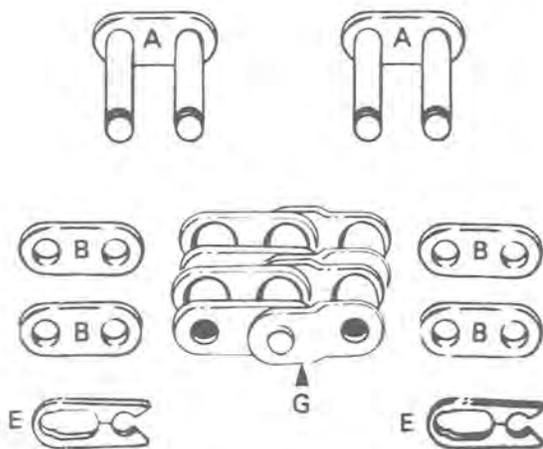
LENGTHENING 1 1/2 LINK

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



ELECTRIC CHARTS

MODEL	CHART PAGE	HEADLAMP (watt)	TAILLIGHT (watt)	ELECTRICAL SYSTEM OUTPUT (watt)
Elan - Spirit	2	60/60	5/21	75/23
Citation 3500 - Mirage I	3	60/60	5/21	160
Citation 4500 - Mirage II	4	60/60	5/21	160
Citation SS - Mirage Special	4	60/60	5/21	160
Nordik	4	60/60	5/21	160
Skandic	4	60/60	5/21	160
Citation 4500/E - Mirage II/E	5	60/60	5/21	160
Everest 500 - Futura 500	6	60/60	5/21	160
Blizzard 5500 MX - Sonic	6	60/60	5/21	160
Everest 500E - Futura 500E	7	60/60	5/21	140
Everest L/C - Futura L/C	8	60/60	5/21	160
Blizzard 9500 - Ultra Sonic	9	60/60	5/21	160
Elite	10	60/60	5/21	420
Alpine 640 E/R	11	60/60	5/21	140

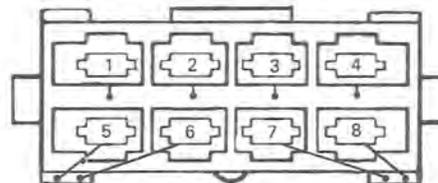
CHARTS CODES

WIRING COLOUR CODE

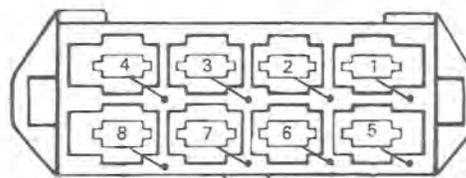
COLOUR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN

Connector position code

Receptacle housing

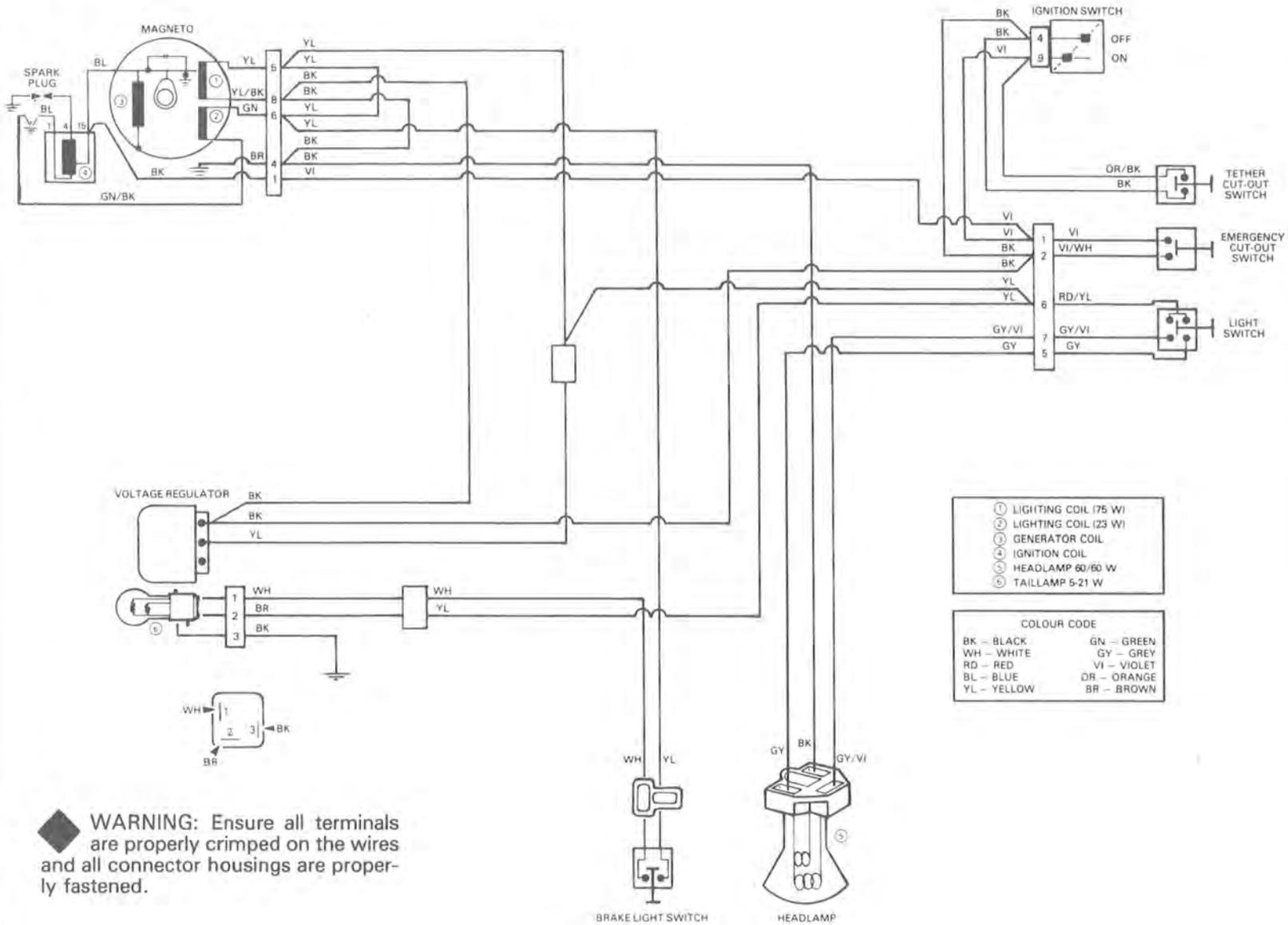


Tab housing

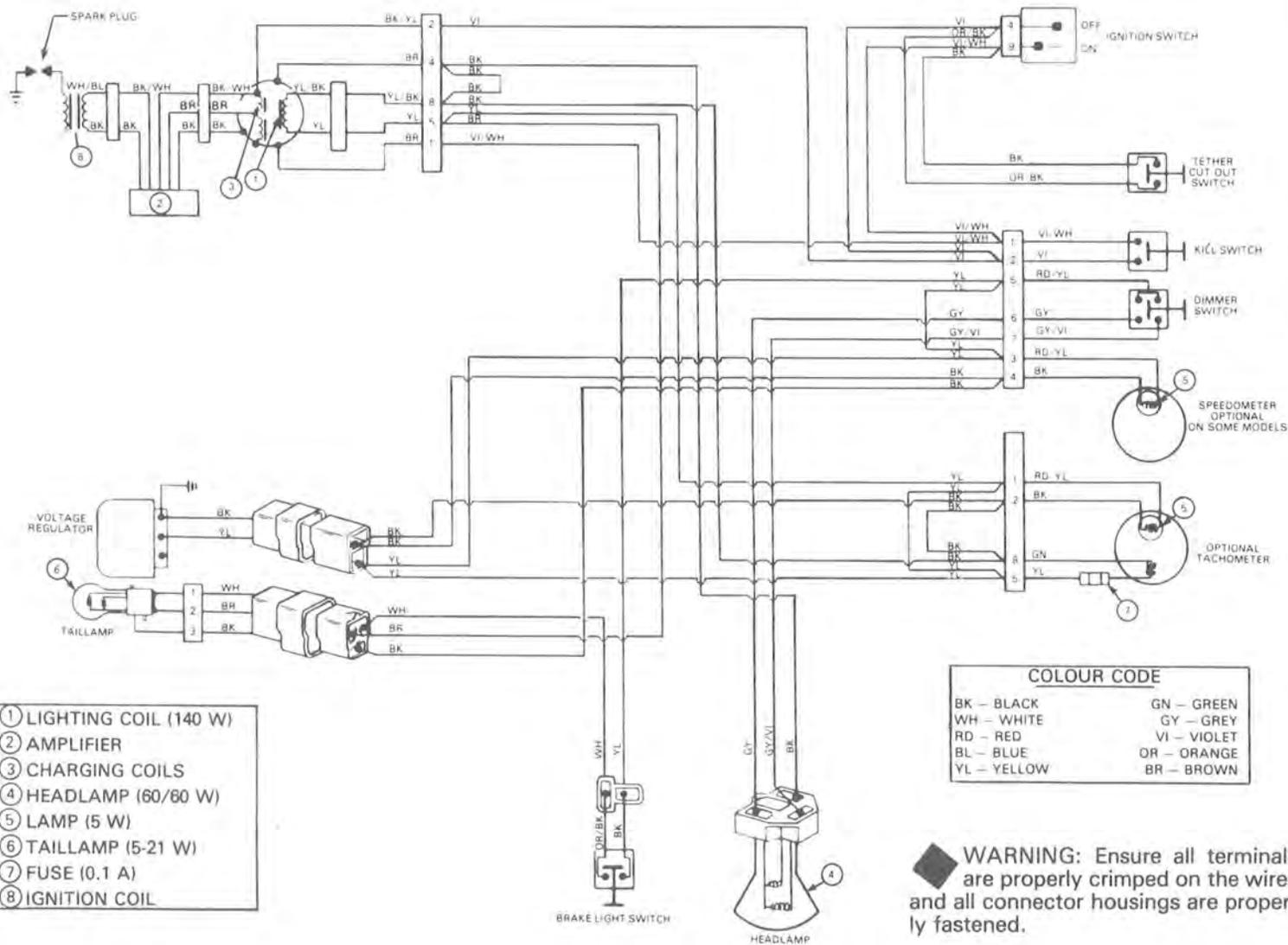


1982 Elan - Spirit

SECTION 04 ELECTRICAL
SUB-SECTION 01 (ELECTRIC CHARTS)



1982 Citation 3500 - Mirage I



- ① LIGHTING COIL (140 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

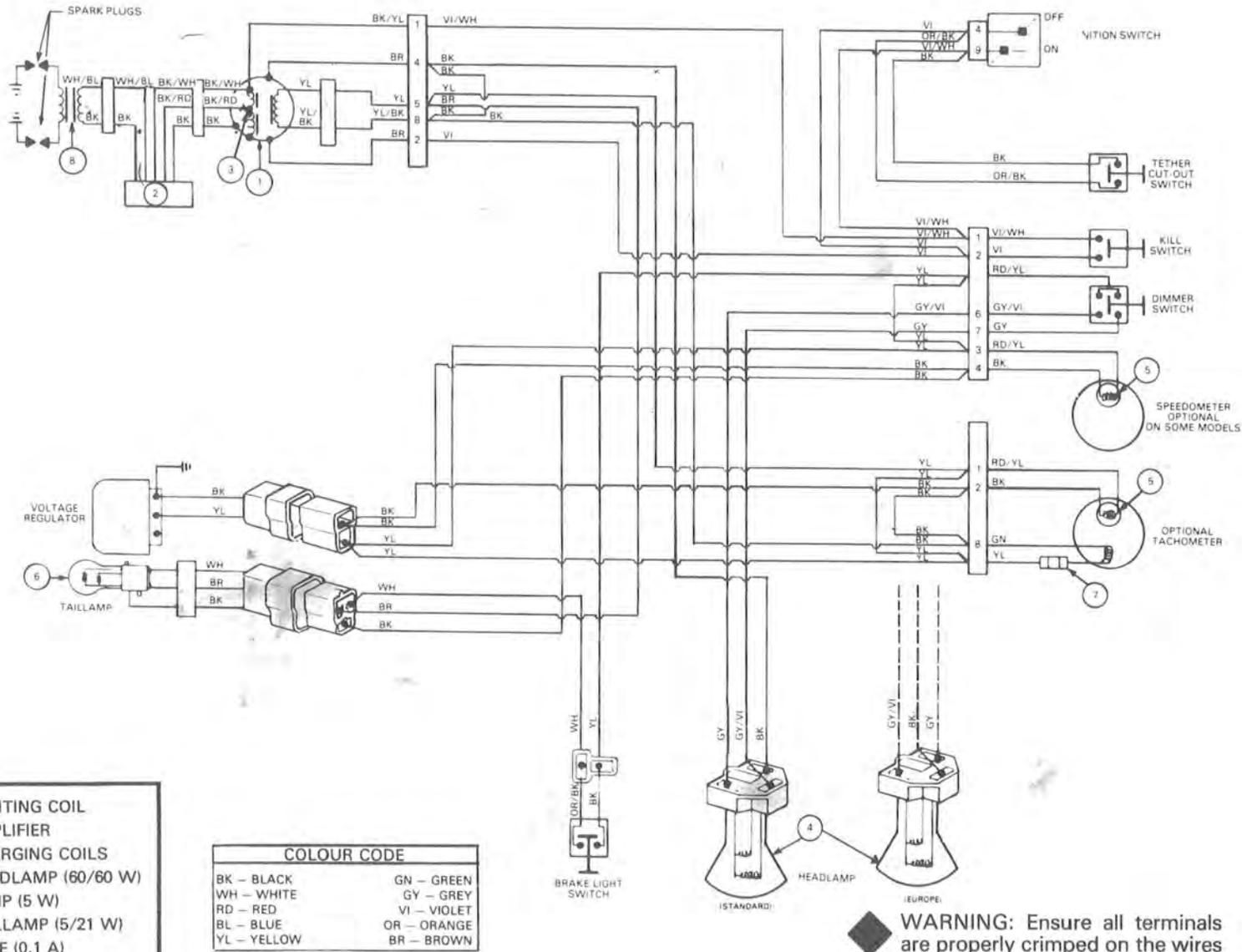
COLOUR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN

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

1982 Skandic
1982 Nordik

1982 Citation 4500 - Mirage II
1982 Citation SS - Mirage Special

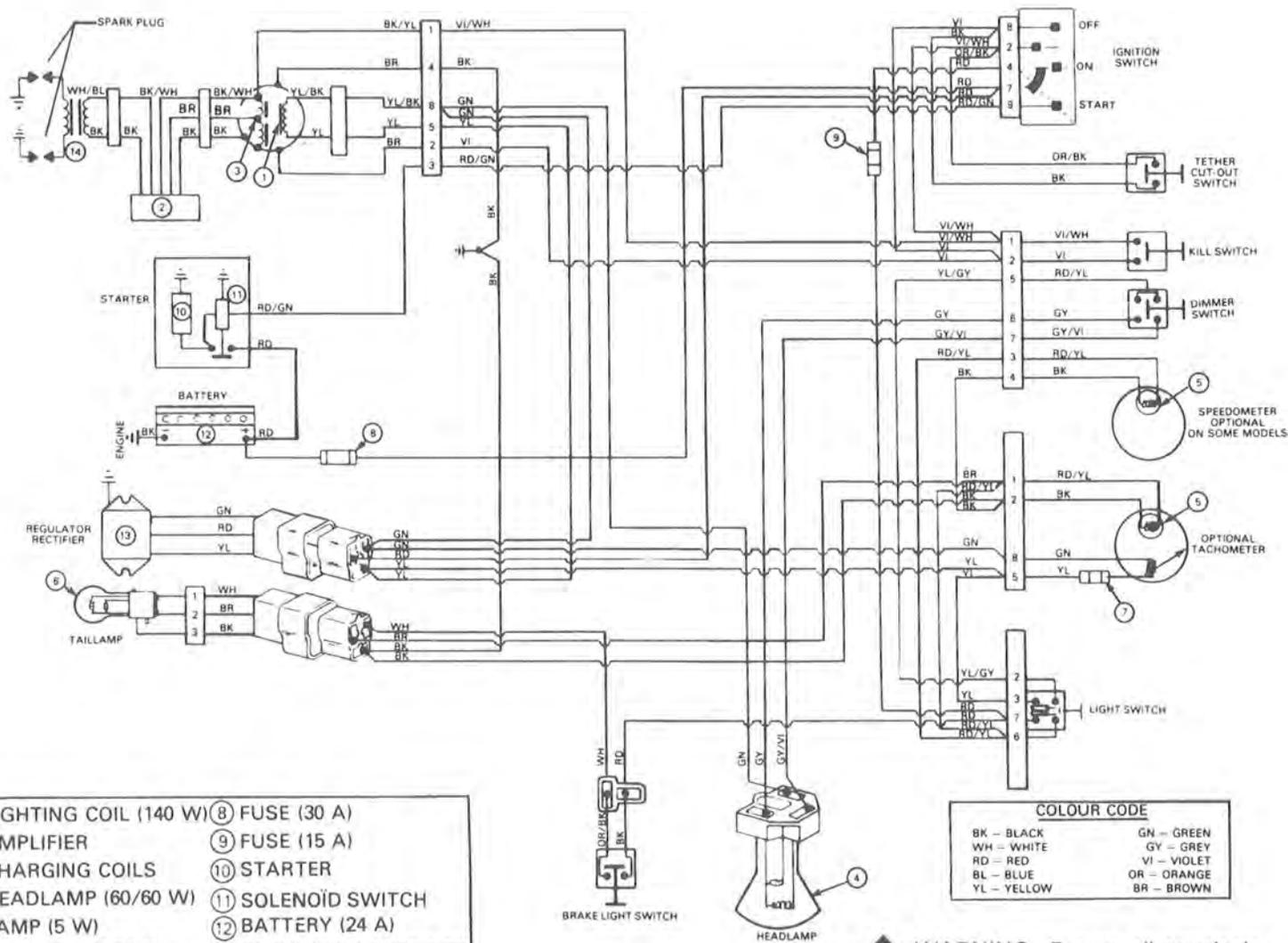
SECTION 04 ELECTRICAL
SUB-SECTION 01 (ELECTRIC CHARTS)



- ① LIGHTING COIL
- 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

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

1982 Citation 4500 E - Mirage II E



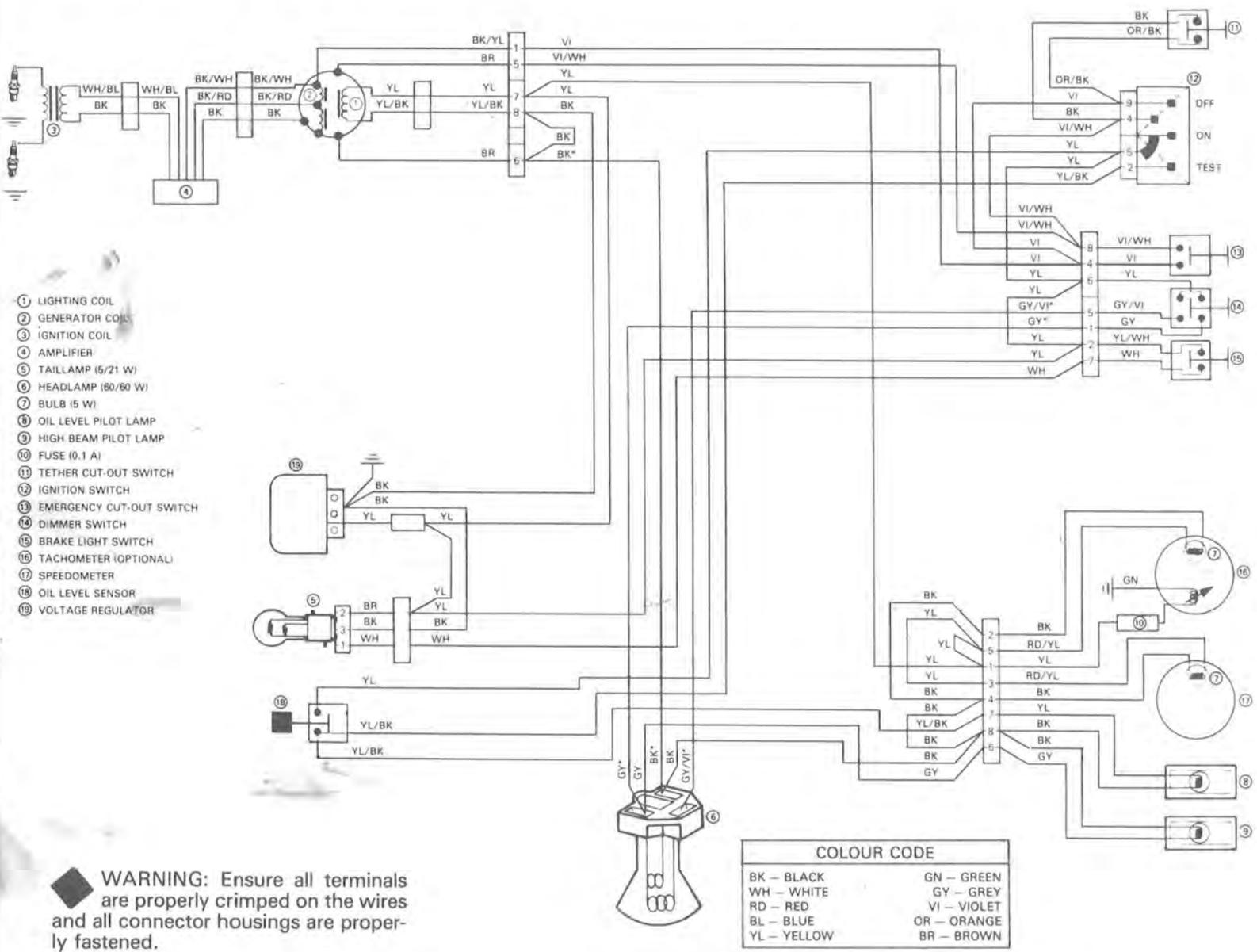
- | | |
|-------------------------|-----------------------|
| ① LIGHTING COIL (140 W) | ⑧ FUSE (30 A) |
| ② AMPLIFIER | ⑨ FUSE (15 A) |
| ③ CHARGING COILS | ⑩ STARTER |
| ④ HEADLAMP (60/60 W) | ⑪ SOLENOID SWITCH |
| ⑤ LAMP (5 W) | ⑫ BATTERY (24 A) |
| ⑥ TAILLAMP (5/21 W) | ⑬ REGULATOR RECTIFIER |
| ⑦ FUSE (0.1 A) | ⑭ IGNITION COIL |

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.

1982 Everest 500 - Futura 500
 1982 Blizzard 5500 MX - Sonic

SECTION 04 ELECTRICAL
 SUB-SECTION 01 (ELECTRIC CHARTS)

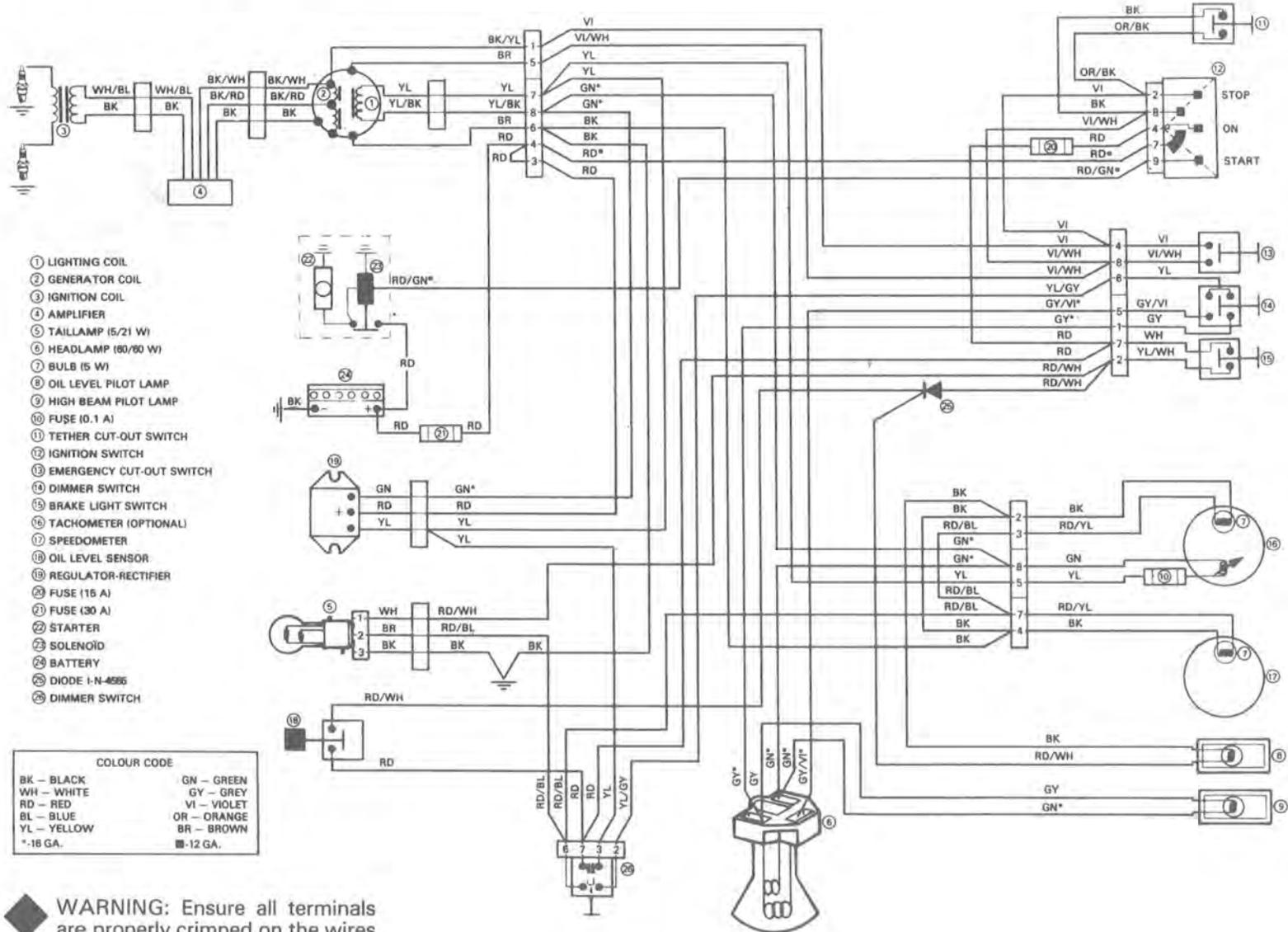


- ① LIGHTING COIL
- ② GENERATOR COIL
- ③ IGNITION COIL
- ④ AMPLIFIER
- ⑤ TAILLAMP (5/21 W)
- ⑥ HEADLAMP (80/60 W)
- ⑦ BULB (5 W)
- ⑧ OIL LEVEL PILOT LAMP
- ⑨ HIGH BEAM PILOT LAMP
- ⑩ FUSE (0.1 A)
- ⑪ TETHER CUT-OUT SWITCH
- ⑫ IGNITION SWITCH
- ⑬ EMERGENCY CUT-OUT SWITCH
- ⑭ DIMMER SWITCH
- ⑮ BRAKE LIGHT SWITCH
- ⑯ TACHOMETER (OPTIONAL)
- ⑰ SPEEDOMETER
- ⑱ OIL LEVEL SENSOR
- ⑲ VOLTAGE REGULATOR

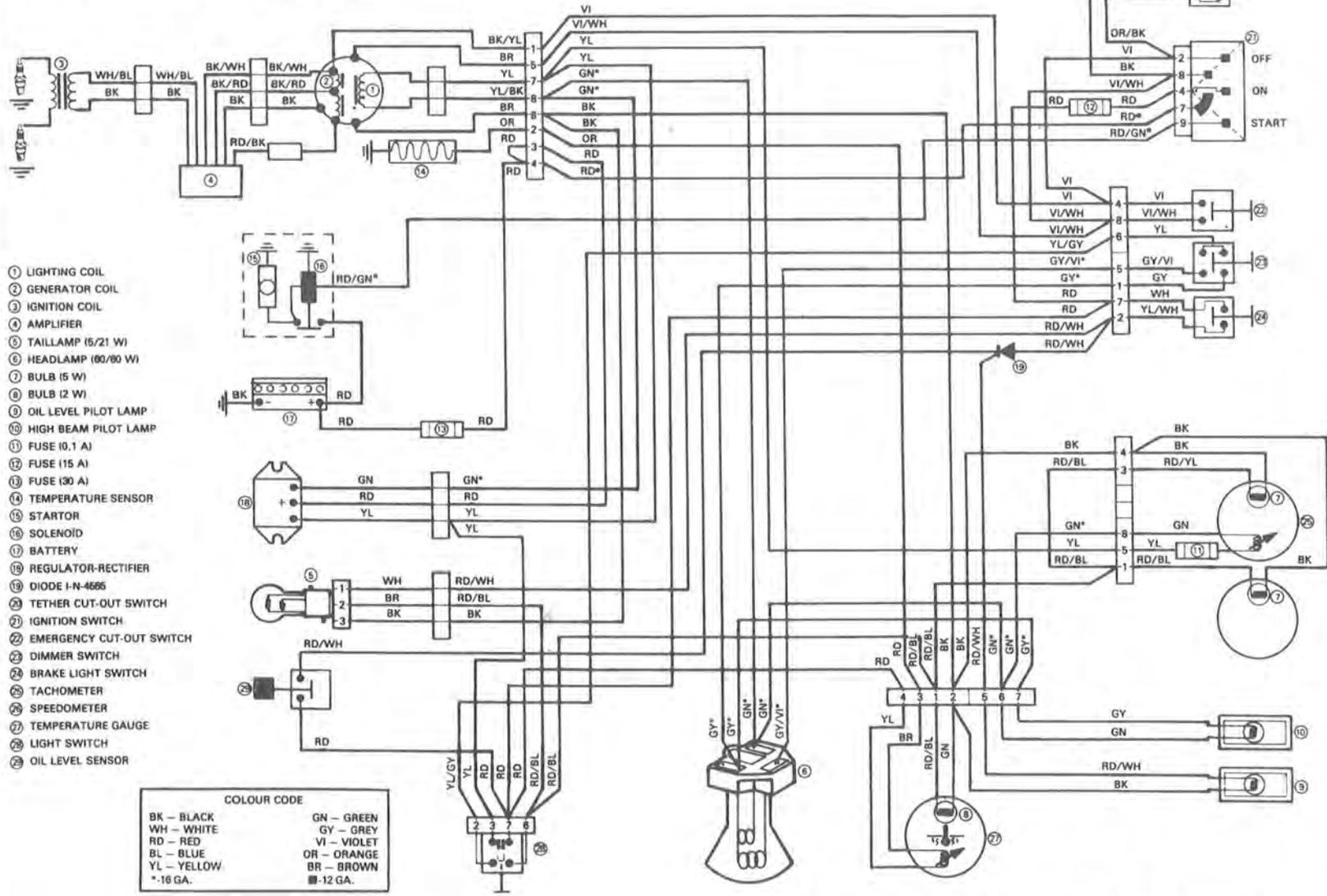
WARNING: Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.

COLOUR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN

1982 Everest 500 E - Futura 500 E



1982 Everest L/C - Futura L/C

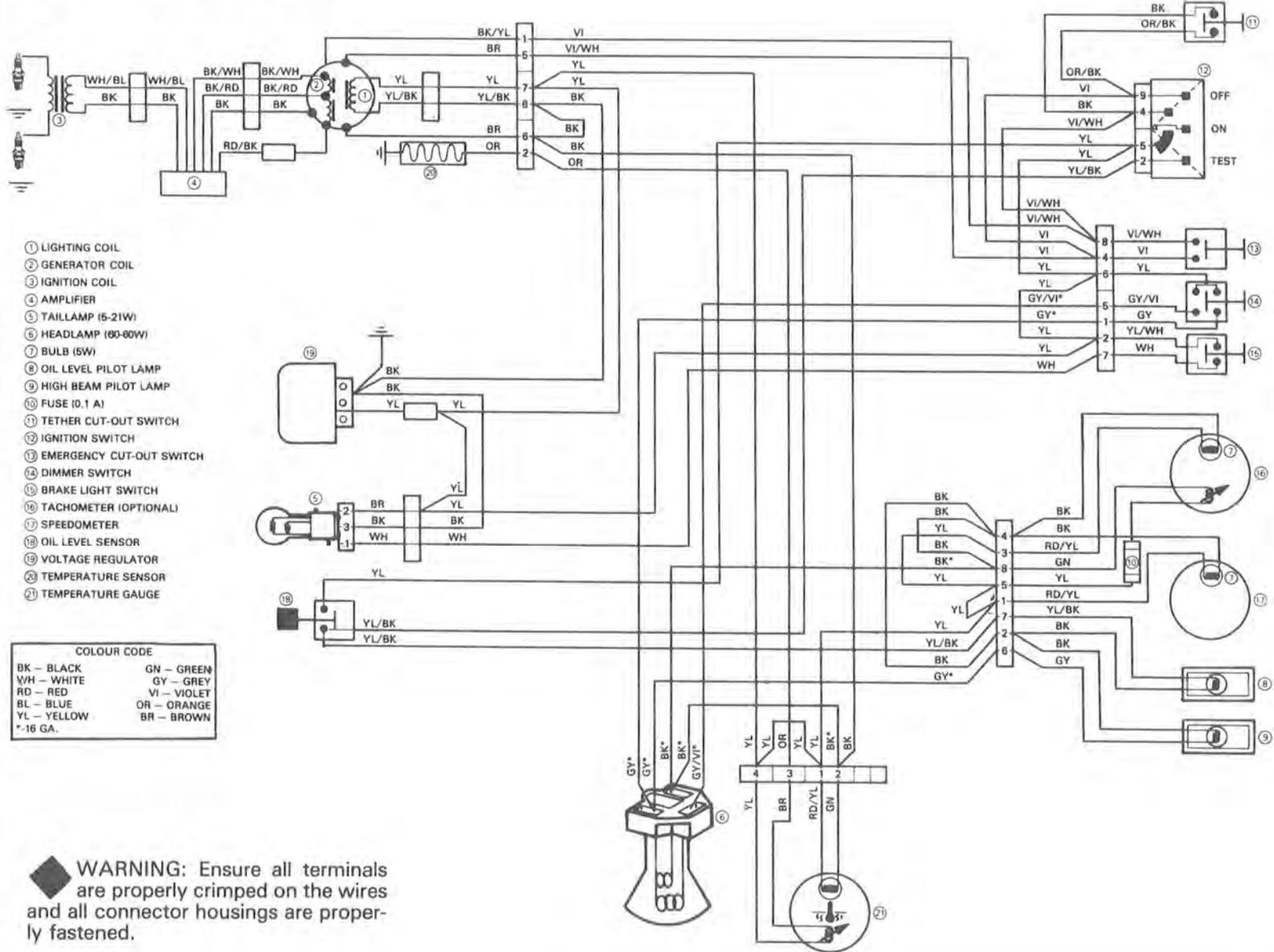


- ① LIGHTING COIL
- ② GENERATOR COIL
- ③ IGNITION COIL
- ④ AMPLIFIER
- ⑤ TAILLAMP (5/21 W)
- ⑥ HEADLAMP (60/80 W)
- ⑦ BULB (5 W)
- ⑧ BULB (2 W)
- ⑨ OIL LEVEL PILOT LAMP
- ⑩ HIGH BEAM PILOT LAMP
- ⑪ FUSE (0.1 A)
- ⑫ FUSE (15 A)
- ⑬ FUSE (30 A)
- ⑭ TEMPERATURE SENSOR
- ⑮ STARTOR
- ⑯ SOLENOID
- ⑰ BATTERY
- ⑱ REGULATOR-RECTIFIER
- ⑲ DIODE I-N-4665
- ⑳ TETHER CUT-OUT SWITCH
- ㉑ IGNITION SWITCH
- ㉒ EMERGENCY CUT-OUT SWITCH
- ㉓ DIMMER SWITCH
- ㉔ BRAKE LIGHT SWITCH
- ㉕ TACHOMETER
- ㉖ SPEEDOMETER
- ㉗ TEMPERATURE GAUGE
- ㉘ LIGHT SWITCH
- ㉙ OIL LEVEL SENSOR

COLOUR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN
* - 16 GA.	
■ - 12 GA.	

◆ **WARNING:** Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.

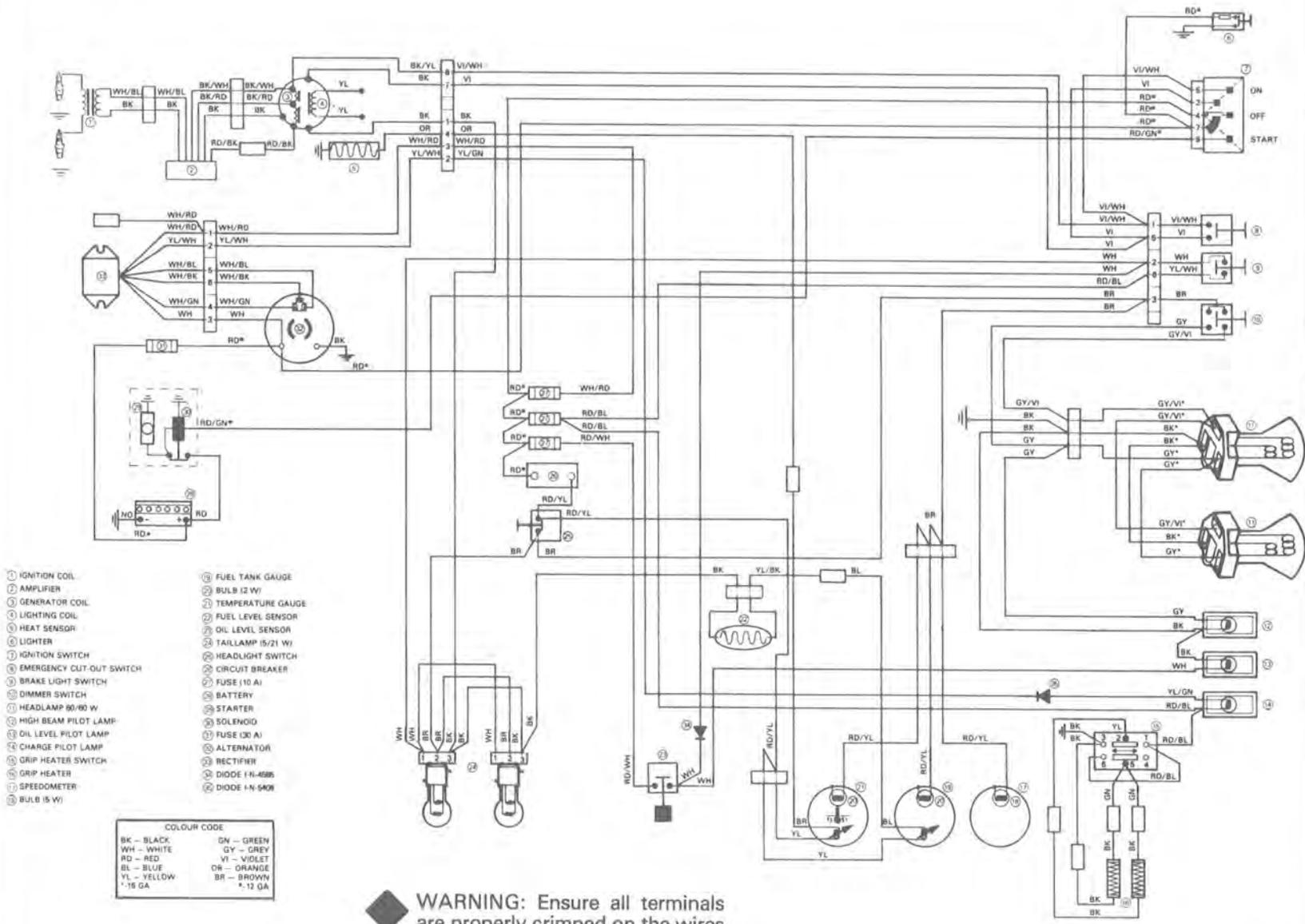
1982 Blizzard 9500 - Ultra Sonic



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

SECTION 04 ELECTRICAL
SUB-SECTION 01 (ELECTRIC CHARTS)

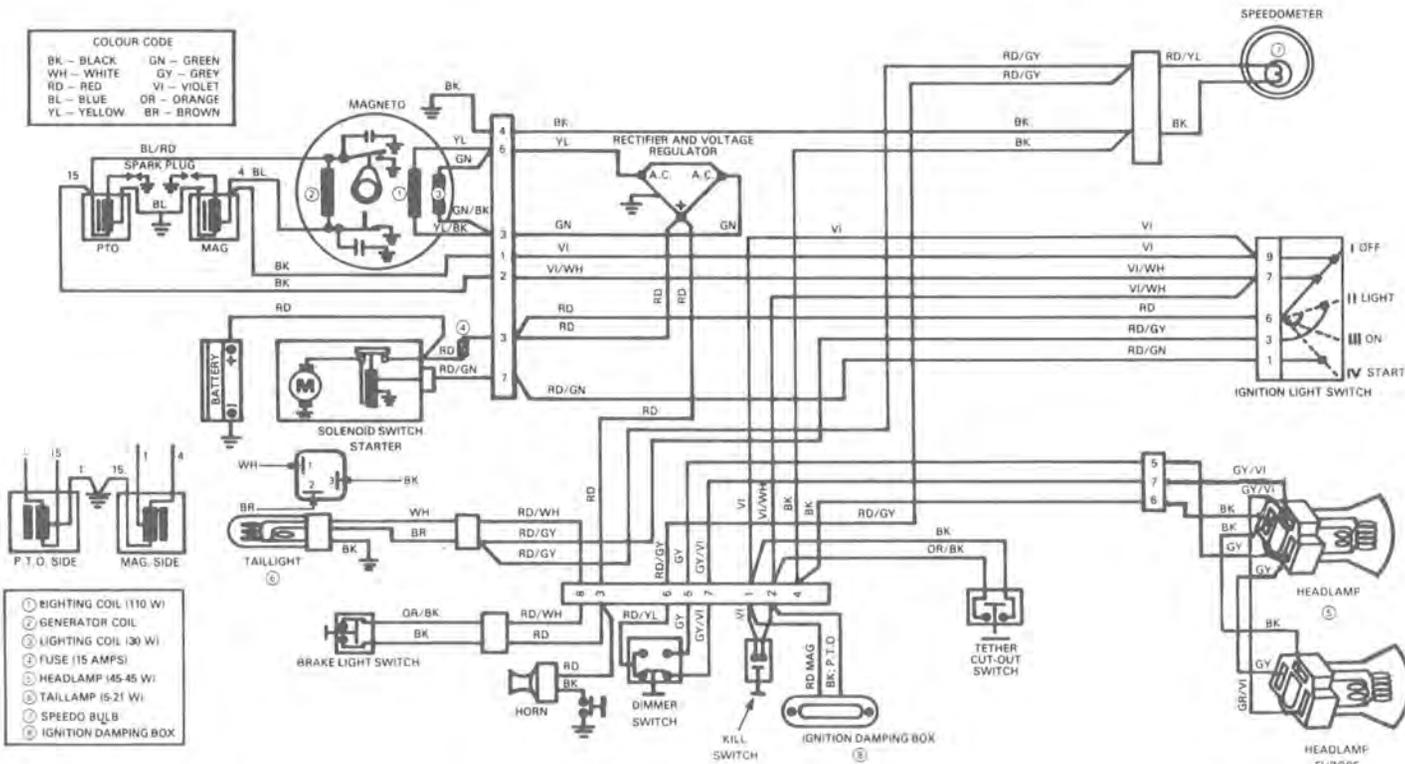
1982 Elite



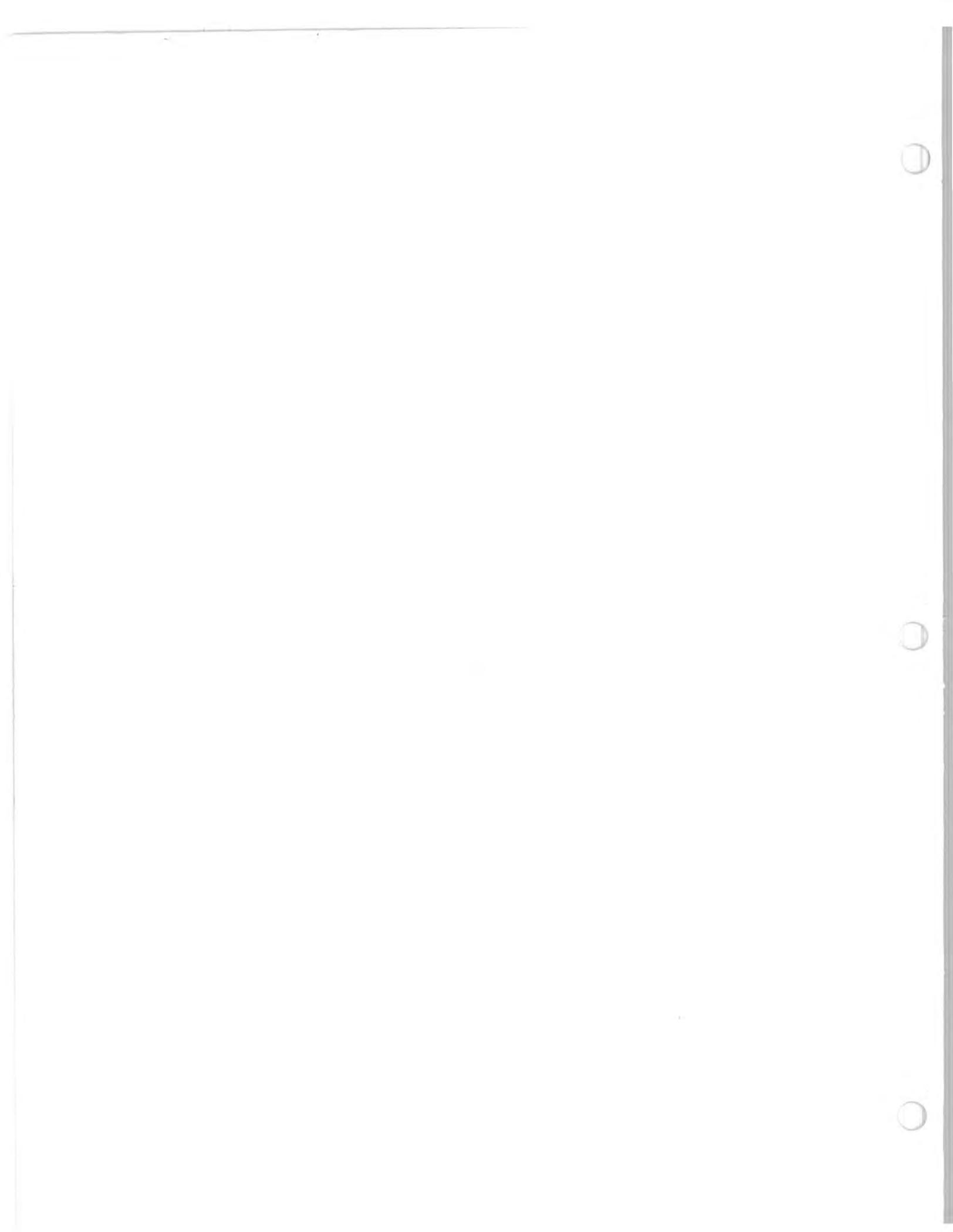
1982 Alpine

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.



IGNITION TIMING

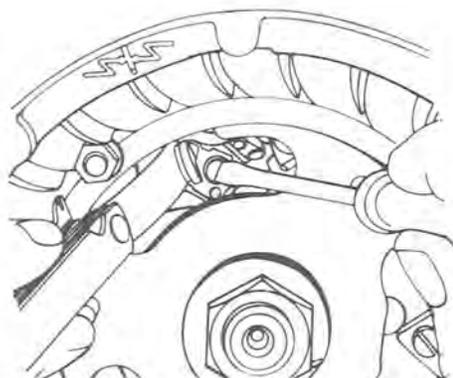
BREAKER POINTS IGNITION SYSTEMS

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.



○ **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) 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

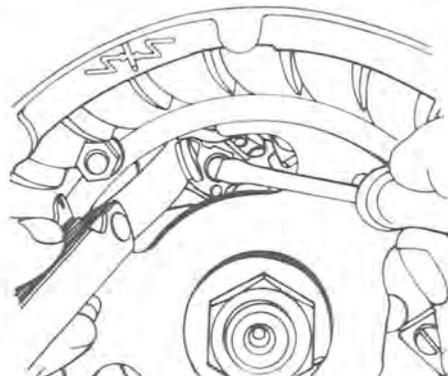
Too late
Turn armature
plate counter-clockwise

○ **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.

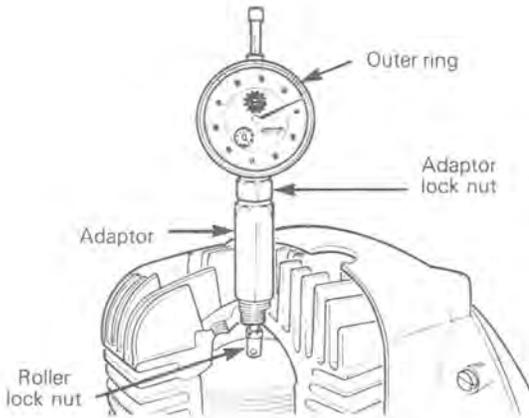


4. Disconnect junction block at engine then connect one lead of a timing instrument (flashlight type) to the blue wire coming from engine. Connect other to ground (metallic portion of the engine).

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.



- 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 "0" on dial aligns with pointer.
- Lock outer ring in position.

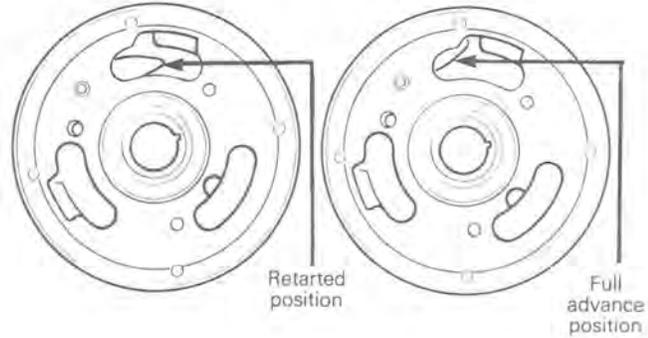
6. Slacken the three (3) armature plate retaining screws and turn timing instrument ON.

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 timing light fluctuates. Retighten retaining screws.

○ **NOTE:** For 247 engine type, hold advance mechanism centrifugal lever in full advance position (toward magneto rim).



○ **NOTE:** Ignition timing can change upon tightening. Always recheck after tightening.

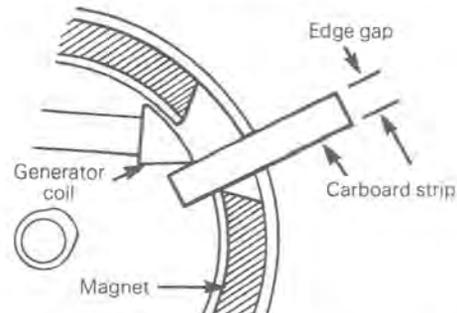
Edge gap verification

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 (0.195 - 0.315")



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.

640 ENGINE TYPE

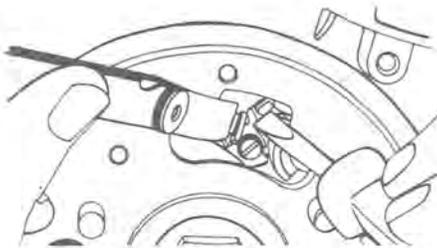
Two methods are detailed in this section; the first using the timing marks stamped on the engine, the second using a Top Dead Center gauge.

Timing marks procedure

1. Disconnect spark plug wires and remove spark plugs.
2. Remove rewind starter assembly from engine then remove the fan protector, starting pulley and "V" belt.

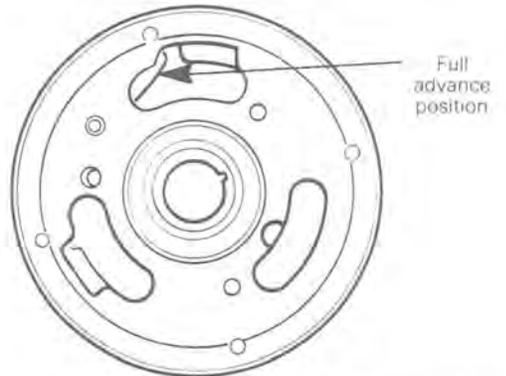
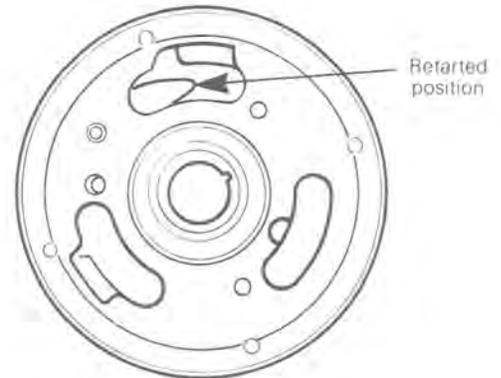
○ **NOTE:** The **upper** breaker point controls the timing of the **magneto side** piston and the **lower** breaker point controls the **P.T.O. side** piston.

3. Rotate crankshaft until breaker points, visible through magneto ring opening, are fully opened. Adjust points setting to 0.30-0.40 mm (0.012-0.016") using a feeler gauge and screwdriver, as illustrated. Repeat procedure for other point. **Adjust both sides equally.**



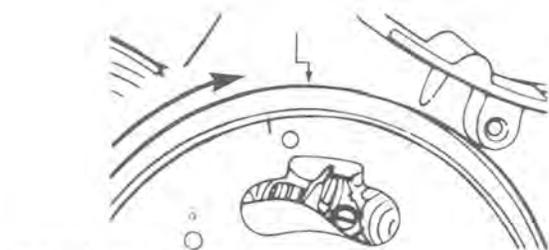
○ **NOTE:** Breaker points gap can change upon tightening. Always recheck after tightening.

4. Disconnect junction block at engine then connect one lead of a timing light (flashlight type) to the blue wire (mag. side) leading from engine. Connect other wire to ground (metallic portion of the engine).
5. Slacken the two (2) armature plate retaining screws and turn timing instrument ON. Rotate crankshaft until mag. side piston approaches top dead center and timing marks align (for 640 engine type, hold centrifugal advance mechanism in full advance position).



Rotate armature plate until timing light fluctuates. Retighten retaining screws.

6. Ignition timing can change upon tightening therefore, rotate the magneto counter-clockwise 1/4 of a turn and slowly turn the magneto back in a clockwise direction. As soon as the timing marks align the timing light should fluctuate. Readjust if necessary.



Too early: Turn armature plate clockwise



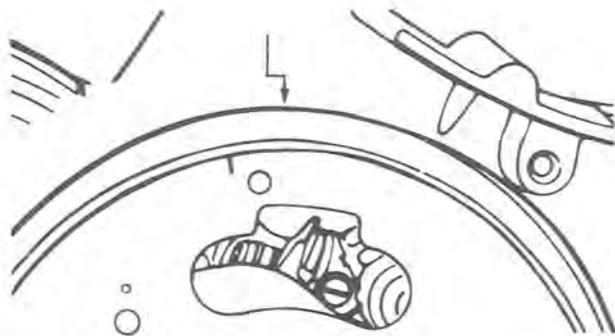
Too late: Turn armature plate counter-clockwise

SECTION 04 ELECTRICAL

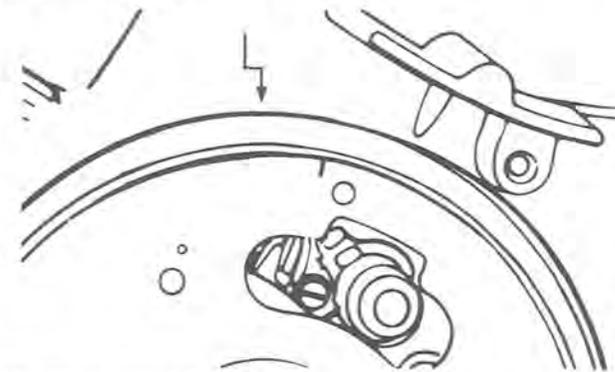
SUB-SECTION 02 (IGNITION TIMING)

7. Disconnect timing instrument wire from blue wire then reconnect it to the blue/red wire (P.T.O. side) leading from engine. Rotate crankshaft until P.T.O. side piston approaches top dead center. As soon as timing marks align, timing light should fluctuate. If necessary to adjust, proceed as follows:

- If timing is too early decrease breaker points gap toward lower limit, i.e. 0.35 mm (0.016") then recheck timing.
- If timing is too late increase breaker points gap toward upper limit, i.e. 0.40 mm (.016"), then recheck timing.



Too early: Decrease points gap



Too late: Increase points gap

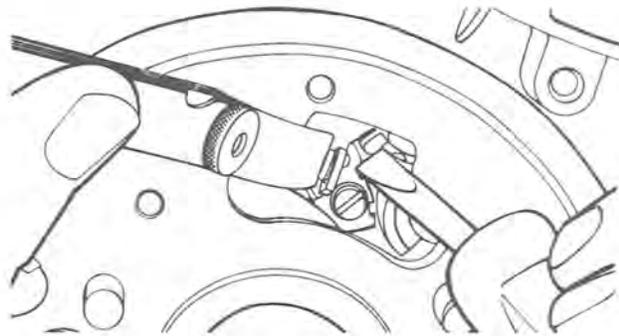
Top dead center gauge procedure

1. Disconnect spark plug wires and remove spark plugs.
2. Remove rewind starter assembly from engine then remove the fan protector, starting pulley and "V" belt.

NOTE: The upper breaker point controls the timing of the magneto side piston and the lower breaker point control the P.T.O. side piston.

3. Rotate crankshaft until breaker points, visible through magneto ring opening, are fully open. Adjust points setting to 0.35 mm \pm 0.05 (.014" \pm .002") using a feeler gauge and screwdriver, as illustrated.

Repeat procedure for other point. **Adjust both side equally.**



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) to the blue wire (mag. side) leading from engine. Connect other wire to ground (metallic portion of the engine).
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.



- Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in mag. side spark plug hole.
 - Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
 - Rotate magneto until mag. side 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 two (2) armature plate retaining screws and turn timing instrument ON.
- Rotate magneto counter-clockwise until specified piston position before top dead center is reached:
INDIRECT TIMING: 3.9 - 4.4 mm BTDC
(0.153" - 0.173")
BTDC: Before top dead center.

Slowly rotate armature plate until timing light fluctuates. (For 640 engine type, hold advance mechanism centrifugal lever in full advance position). Retighten retaining screws.

NOTE: Ignition timing can change upon tightening. Always recheck after tightening.

7. Disconnect timing instrument wire from blue wire then reconnect it to the blue/red wire leading from engine. Remove T.D.C. gauge from mag. side and reinstall it on P.T.O. side, as previously detailed.
8. Rotate crankshaft until P.T.O. piston approaches T.D.C. As soon as same specified piston position before top dead center as on mag. side is reached the timing light should fluctuate (for 640 engine type, hold advance mechanism in full advance position).

If necessary to adjust, proceed as follows.

With piston at specified position, slacken lower breaker point retaining screw then readjust breaker points gap until fluctuates.

- If timing is too early decrease breaker points gap toward lower limit, i.e. 0.35 mm (0.016"), then recheck timing.

- If timing is too late increase breaker points gap toward upper limit, i.e. 0.40 mm (.016"), then recheck timing.

NOTE: Breaker points gap can change upon tightening. Always recheck after tightening.

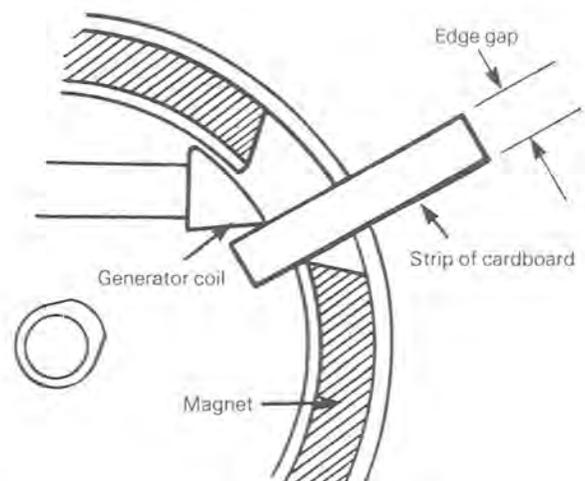
Edge gap verification

By following either of the two procedures herein 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, then slowly turn magneto back counterclockwise until timing light fluctuates (flash light) (for 640 engine type, hold advance mechanism in full advance position).

At this point check the distance between generator coil end and magnet (edge gap), with a strip cardboard of appropriate width. (Refer to the following table).

ENGINE TYPE	EDGE GAP
640	7 - 10 mm (0.275 - 0.394")



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.

SECTION 04 ELECTRICAL SUB-SECTION 02 (IGNITION TIMING)

ELECTRONIC IGNITION SYSTEMS — NIPPONDENSO

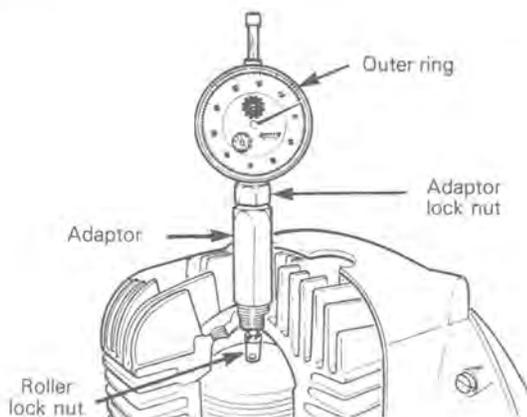
277 ENGINE TYPE

Two methods are detailed in this section, the first using a **Top dead center gauge**, the second using a **stroboscopic timing light**.

Top dead center gauge verification

1. Disconnect spark plug wire and remove spark plug.
2. Remove the cylinder cowl and hold the hood in an open position.
3. 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.

(TYPICAL)

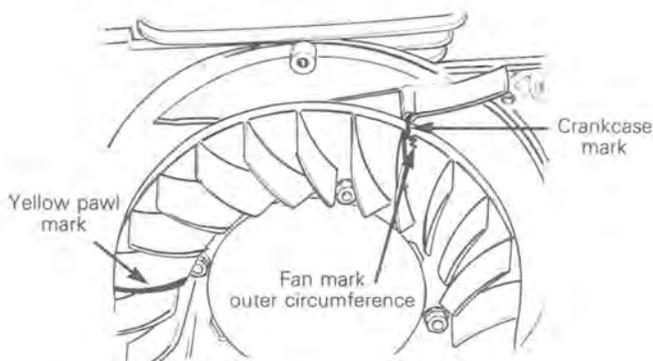


- Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in spark plug hole.
- Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.
- Rotate magneto until piston is at Top Dead Center.
- Unlock outer ring of dial and turn it until "O" on dial aligns with pointer.
- Lock outer ring in position.

4. Rotate the crankshaft by the fan counter-clockwise until the piston is at:

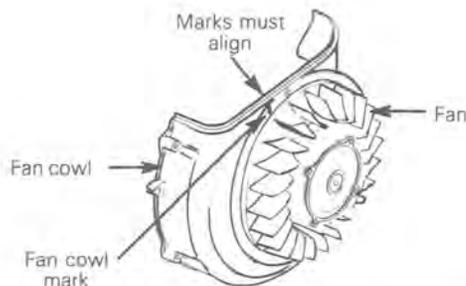
INDIRECT TIMING: 2.85 mm (0.112") B.T.D.C.
BTDC: Before top dead center.

At this point, the crankcase mark and the fan outer circumference mark **MUST** align.



If the marks do not align, reinstall the cylinder cowl and verify if the fan yellow pawl mark aligns with the fan cowl mark.

- A) If the yellow pawl mark aligns with the fan cowl mark, remove the cowl and make a new fan outer circumference mark in line with the crankcase mark.
- B) If the yellow pawl mark does not align with the fan cowl mark, make a new fan cowl mark in line with the yellow pawl mark.



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 align.

Reinstall the cylinder cowl and the spark plug

Stroboscopic timing light

○ **NOTE:** To perform this procedure we strongly recommend a stroboscopic timing light which is able to go over 6000 R.P.M. such as:

SNAP-ON MT 212

ELECTRO-SPECIALTY, model 978.

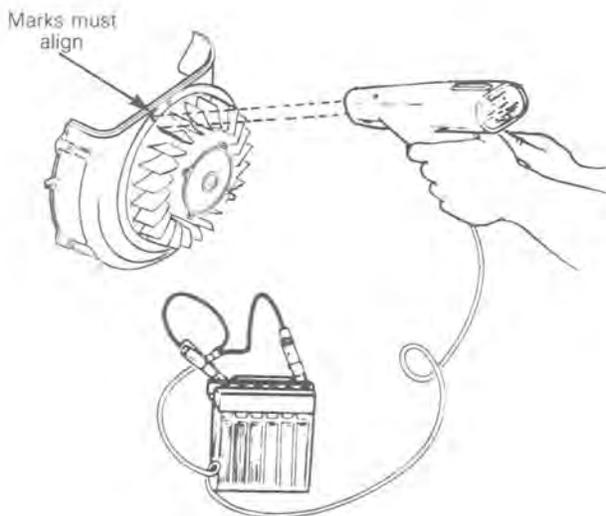
The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold, after MAXIMUM 20 seconds idling.

Connect timing light pick-up to the spark plug lead.

○ **NOTE:** Use a separate battery to supply timing light.

◆ **WARNING:** Place ski tips against a wall, raise rear of vehicle on a stand so that track does not contact the ground. Make sure no one passes behind the vehicle while engine is running. Keep clear of track and other moving parts.

Start the engine and point timing light straight in line with the fan cowl timing mark.



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.

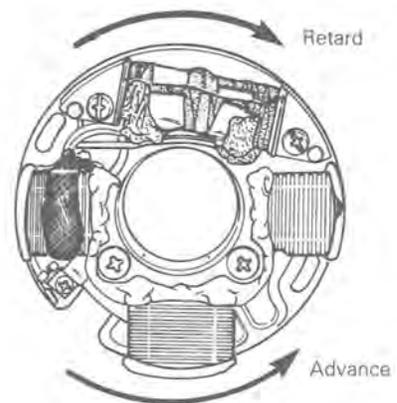
Stop engine.

If 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 rewinding starter assembly and starter pulley.

Loosen the armature plate retaining screws, move the plate in appropriate direction. Refer to the following illustration.



Tighten the armature plate screws.

▼ **CAUTION:** Make sure the armature plate screws are well secured.

Reassemble starter pulley and assembly.

Reverify engine timing (make sure engine is cold).

SECTION 04 ELECTRICAL

SUB-SECTION 02 (IGNITION TIMING)

377, 503, ENGINE TYPES

Two methods are detailed in this section, the first using a **Top dead center gauge**, the second using a stroboscopic timing light.

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.

○ **NOTE:** The only way to remove the fan cover without damage on a Blizzard 5500 MX and a Sonic is to slide it against the muffler in a forward direction. Reverse procedure at installation.

Install a dial indicator in magneto side spark plug hole. Bring magneto side piston to top dead center position.

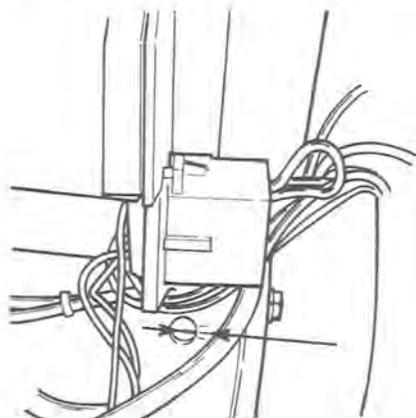
Back-off (rotate counter-clockwise) piston to:

377 engine type: 2.31 mm (0.091") BTDC

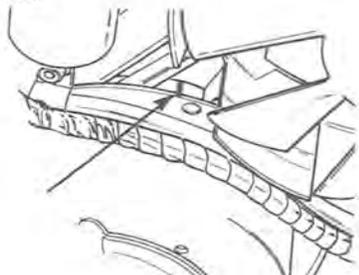
503 engine type: 2.29 mm (0.090") BTDC

BTDC: Before top dead center.

377 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.



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.



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).

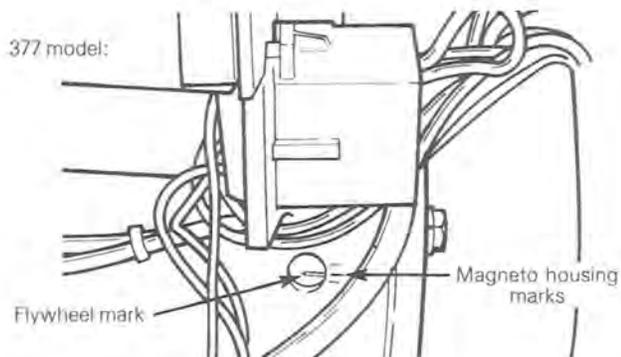
◆ **WARNING:** Place ski tips against a wall, raise rear of the vehicle on a stand so that the track does not contact the ground. Make sure no one passes behind the vehicle while engine is running. Keep clear of track and other moving parts.

○ **NOTE:** Turn headlamp "ON" when checking the timing.

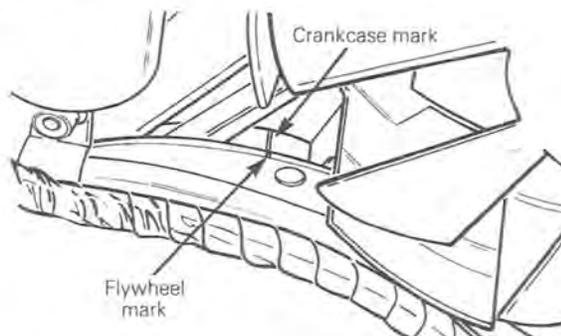
Start engine and point timing light straight in line with the timing marks:

377: Look through inspection hole.

503: Look through the fan.



503 model:



Check timing mark alignment. If timing marks align, timing is correct.

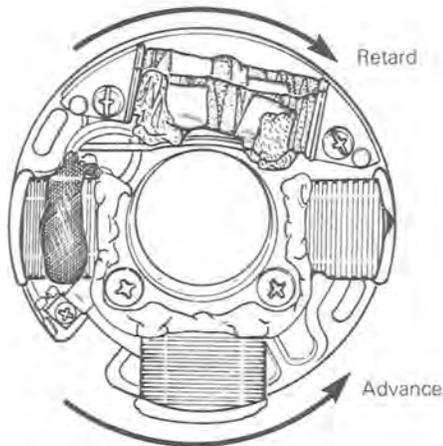
For both models (377 & 503 engine) if the timing marks do not align, armature plate must be adjusted.

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.



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).

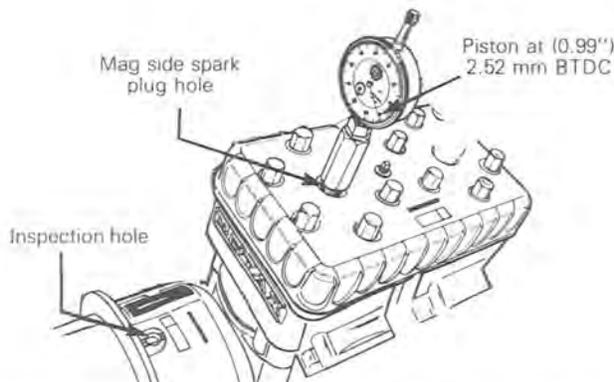
454, 464 ENGINE TYPE

Two methods are detailed in this section, the first using a **Top dead center gauge**, the second using a **Stroboscopic timing light**.

Top dead center gauge verification

Remove spark plugs.

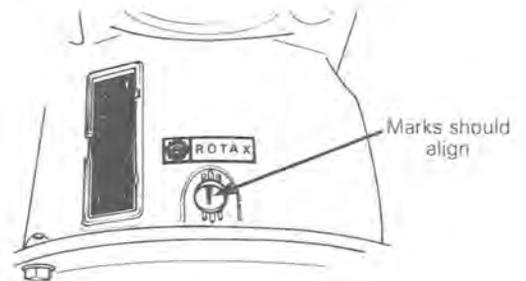
Remove inspection plug on magneto housing.



Install dial indicator in magneto side spark plug hole.
Bring magneto side piston to top dead center.

Back-off (rotate counter-clockwise) piston to 2.52 mm (0.99") before top dead center. Look through inspection hole and check if flywheel and magneto housing timing marks align. Marks should align when piston is within specified tolerances 2.52 mm \pm 0.25 (0.99" \pm 0.010") BTDC.

If the marks do not correspond to the specifications, scribe a new mark on the magneto housing.



Stroboscopic timing light

NOTE: Timing can be checked using a stroboscopic timing light (Electro Specialty 978, Snap-On MT 215 or equivalent). The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold.

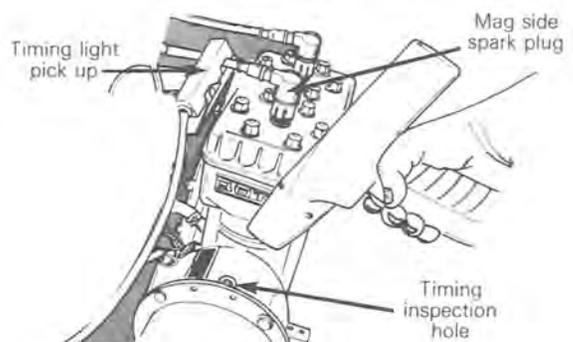
Remove the timing inspection plug on magneto housing.

Connect timing light pick-up to magneto side spark plug lead (on manual start models use a separate battery to supply timing light).

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.

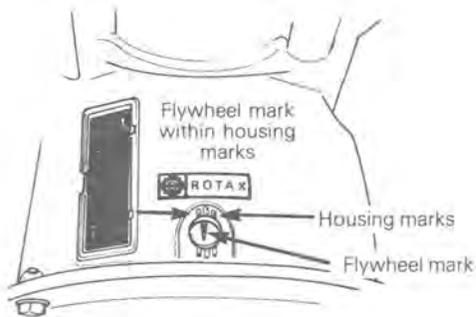
NOTE: Turn headlamp "on" when checking timing.

Start engine and point timing light straight into inspection hole.

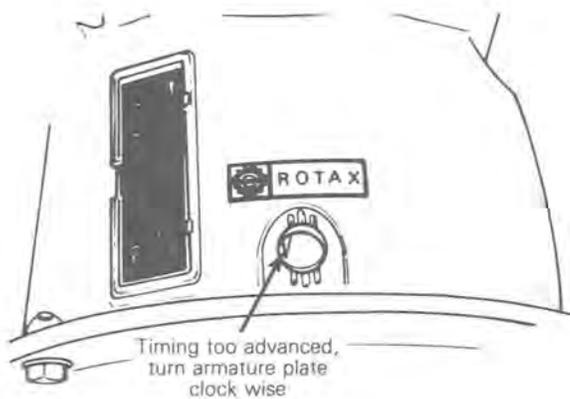


SECTION 04 ELECTRICAL SUB-SECTION 02 (IGNITION TIMING)

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.

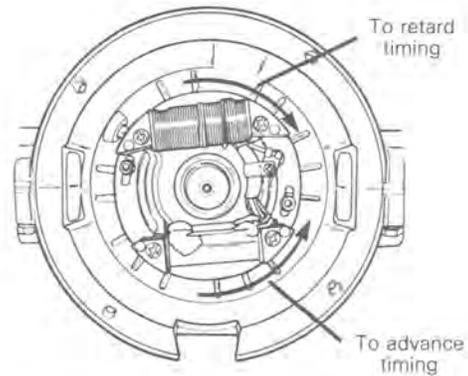


If flywheel mark did not align within magneto housing marks, armature plate must be adjusted.
Armature plate will have to be moved to advance or retard timing.



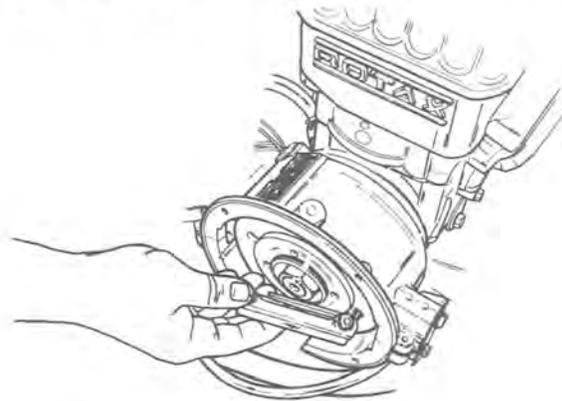
To adjust remove rewinding starter assembly and starter pulley.

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 1982 Bombardier snowmobiles are using two (2) spark plug types. One type is the Bosch spark plug and the other type is NGK spark plug.

BOSCH SPARK PLUG TYPE

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.

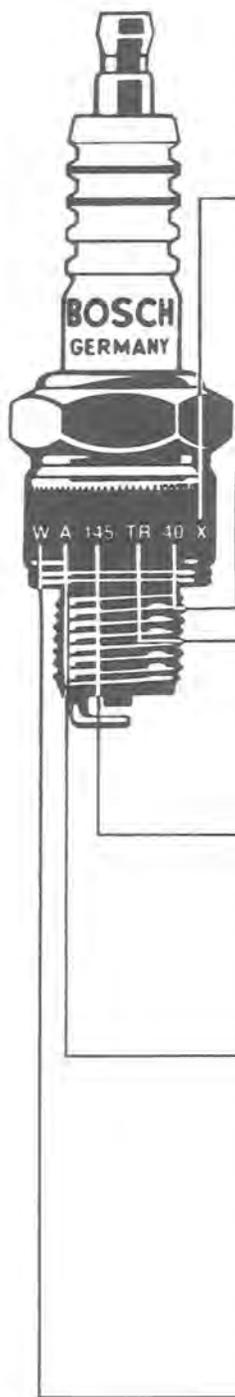
High number	hot plug
Low number	cold plug

1982 CROSS REFERENCE CHART

List of Bosch spark plugs used on 1982 Bombardier snowmobiles.

New number	Old number
M 7 A	M 175 T 1
M 4 A2	M 240 T 1
W 2 C	W 300 T 2

SECTION 04 ELECTRICAL
SUB-SECTION 03 (SPARK PLUGS)



EXPLANATION OLD SYSTEM

Example:

- M** For Marine Engines, resistant to seawater
- P** Electrodes 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 × 1.5
- U** M 10 × 1
- W** M 14 × 1.25
- X** M 12 × 1.25
- Z** 7/8" -18 SAE



EXPLANATION NEW SYSTEM

Example:

- X** wide gap .044" (1.1 mm)
- Y** wide gap .060" (1.5 mm)
- 0**
- 1**
- 2** special shell or electrode designs
- 3**
- 4**
- 5**

Thread Reach:

- A** Thread reach -.460" standard electrode
- B** Thread reach .460" extended tip electrode
- C** Thread reach 3/8" regular electrode
- D** Thread reach 3/8" extended tip electrode
- E** Thread reach 3/8" regular electrode
- F** Thread reach 3/8" extended tip electrode
- 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
- H** 14 mm thread diameter tapered seat
- M** 18 mm thread diameter
- U** 10 mm thread diameter
- W** 14 mm thread diameter
- X** 12 mm thread diameter

NGK SPARK PLUG TYPE

SPARK PLUG NUMBERING SYSTEM

Bombardier has introduced on some of the 1982 snowmobile models the NGK spark plug type.

The heat range identification system is:

High number	cold plug
Low number	hot plug

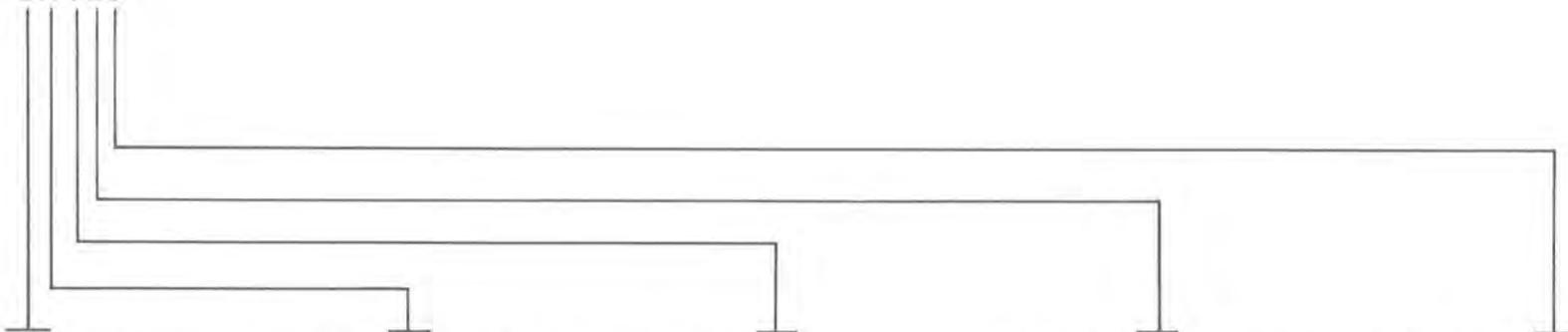
1982 CROSS REFERENCE CHART

List of NGK spark plugs used on 1982 Bombardier snowmobiles.

BR-7ES
BR-8ES

EXPLANATION OF NGK SYSTEM

BR-7ES



First letter prefix for thread and hexagon size

Second & third letter prefix for construction feature, except single prefix

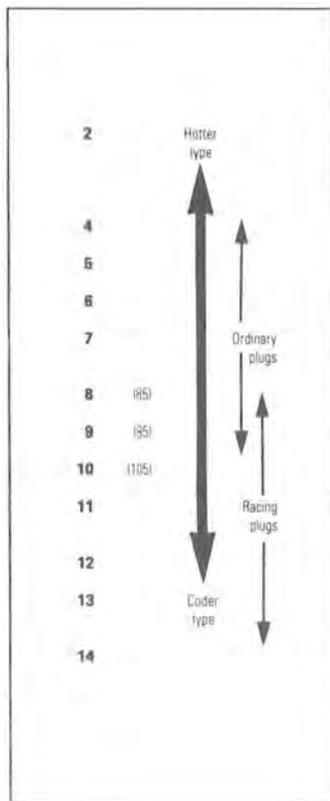
Heat rating number

First letter suffix for thread reach

Second suffix letter for construction feature, etc.

Letter	Thread size Hexagon size	Example
A	18 mm 25.4 mm (1")	A 6
B	14 mm 20.6 mm (13/16")	B 6ES
C	10 mm 16.0 mm (5/8")	C 7HS
D	12 mm 18.0 mm (7/8")	D 7ES
F	7/8" 19 23.8 mm (15/16")	F 23
G	PF 1/2" 14 23.8 mm (15/16")	G 27

Letter	Construction feature	Example
B	Hexagon size is 20.6 mm	A B 6
C	Hexagon size is 16.0 mm	B C 6E
G	Hexagon size is 23.8 mm	A G 6
M	Short type plug (Bantam)	B M 6A
P	Projected insulator nose type	B P 6ES
R	Resistor type	BP R 6FS
S	Shielded type	B S 6E
U	Surface discharge type	B U HX



Letter	Thread reach	Example
E	19.0 mm (3/4") (Racing type 18.0 mm)	BE E S
H	12.7 mm (1/2") (Racing type 12.5 mm)	DE H S
L	11.2 mm (7/16")	B 6 L
None	12.0 mm (0.472") (thread dia. 18 mm)	A 6
None	9.5 mm (3/8") (thread dia. 14 mm)	B 6 S
None	22.5 mm (0.886") (thread dia. PF 1/2" 14)	G 27
None	16.0 mm (5/8") (thread dia. 7/8" 18)	F 23
None	Conical seat type	
A	F 10.9 mm (0.429")	AP6 F S
B	F 11.2 mm (0.441")	BP6 F S
BM	F 7.8 mm (0.307")	(BM - F)
B	EF 17.5 mm (0.689")	BP6E F S

Letter	Construction feature, etc.	Example
A	Special method	BP5E A
B	For CVCC	B6E B
C	Competition type	BBH C S
F	Conical seat type	AP6 F S
K	Multiple ground electrodes (2 electrodes)	BP6E K A
L	Middle heat range	BP5EA L
M	For Rotary, multiple ground electrodes (2 electrodes)	B7E M
N	Racing plugs, Nickel ground electrode	B 6E N
P	Racing plugs, platinum, ground electrode	B 6E P
Q	Multiple ground electrodes (4 electrodes)	BP5E Q 13
S	Copper core center electrode	BP6E S
T	For Rotary, multiple ground electrodes (3 electrodes)	B7E T
V	Center electrode of precious metals	B6E V
W	Tungsten electrode	BUH W
X	Series gap plugs	BUH X

HEAT RANGE

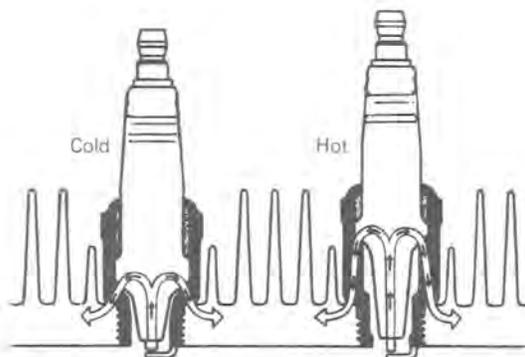
The proper operating temperature or heat range of the spark plug is determined by the spark plug's ability to dissipate the heat generated by combustion.

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.



▼ **CAUTION;** Severe engine damage can occur if a wrong heat range plug is used:

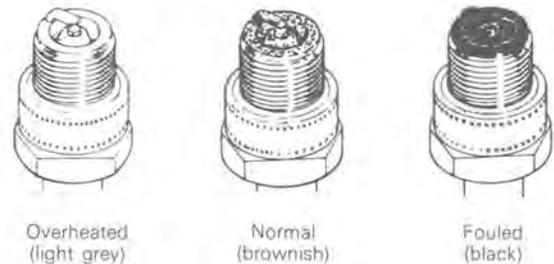
A too "hot" plug will result in overheating and pre-ignition, etc.

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, decreasing 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



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.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench.

M (18 mm) 40 N•m (30 ft-lbs)

W (14 mm) 27 N•m (20 ft-lbs)

SECTION 04 ELECTRICAL
 SUB-SECTION 03 (SPARK PLUGS)

SPARK PLUG CHART

Models	Engine type	Spark plugs
Elan & Spirit	247	Bosch M 175 T 1 (M 7 A)
Citation 3500 & Mirage I	277	NGK BR-8ES
Citation 4500/E & Mirage II/E	377	NGK BR-8ES
Citation SS & Mirage Special	377	NGK BR-8ES
Nordik, Skandic & Futura 300	377	NGK BR-8ES
Blizzard 5500 MX & Sonic	503	NGK BR-7ES
Blizzard 9500 & Ultra Sonic	454	Bosch W 300 T 2 (W 2 C)
Everest 500/E & Futura 500/E	503	NGK BR-7ES
Everest L/C & Futura L/C	464	NGK BR-8ES
Alpine 640 E/R	640	BOSCH M 240 T 1 (M 4 A2)
Elite	464	NGK BR-8ES

BATTERY

REMOVAL

◆ **WARNING:** When disconnecting battery cables, always remove the black negative cable first then the positive cable (red). Care should be taken while disconnecting above mentioned cables otherwise battery post breakage could occur.

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.

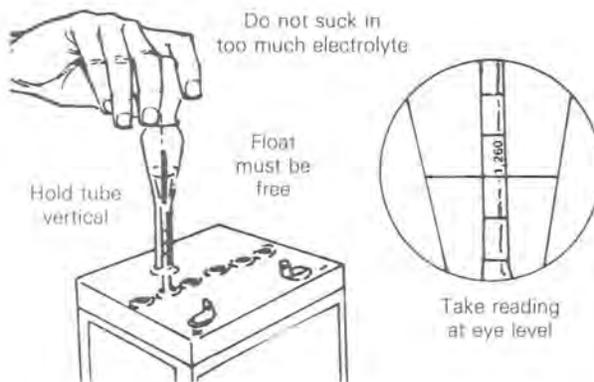
INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casting is damaged, replace battery.

Inspect battery posts for security of mounting. Inspect for cracked or damaged battery caps. Ensure that vent holes are unobstructed. Replace defective caps. If vent hole is blocked, clean using a firm strand of wire.

◆ **WARNING:** Some battery caps do not have holes. Make sure that overflow tube is unobstructed.

HYDROMETER TEST



A hydrometer measures a battery's state of charge 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 4°C (10°F) above 27°C (80°F) and by subtracting .004 points for every 4°C (10°F) below 27°C (80°F).

Refer to the following illustration.

THE ILLUSTRATION WILL AID YOU IN FINDING 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 battery's state of charge.

SECTION 04 ELECTRICAL
SUB-SECTION 04 (BATTERY)

Temperature-Corrected Specific Gravity	Battery State of Charge	Freezing Point of Battery
1.260	Fully Charged	-59°C (-74°F)
1.230	$\frac{3}{4}$ charged	-40°C (-40°F)
1.200	$\frac{1}{2}$ charged	-27°C (-16°F)
1.170	$\frac{1}{4}$ 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 (if unavailable use drinkable water).

CAUTION: Do not overfill bottom of vent wells.

The battery should 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 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 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 soak through battery cells.
4. Readjust the electrolyte level to the UPPER LEVEL.
5. Charge battery at a charging rate of 2.0 amperes for 10 to 20 hours.

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 vibrating lightly the battery hand.
7. Readjust electrolyte level to UPPER LEVEL.
8. Reinstall the caps and wipe off any spillage 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 once a month the battery state. If necessary readjust the battery at fully charged condition.

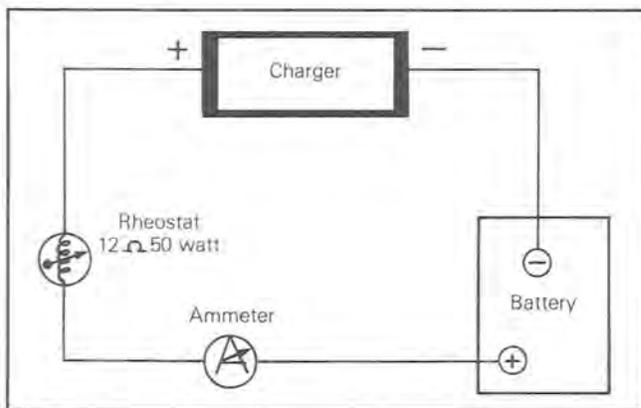
BATTERY CHARGING EQUIPMENT

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.



For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent 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 battery overflow tube to outlet tube located on bottom plate.

 **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.

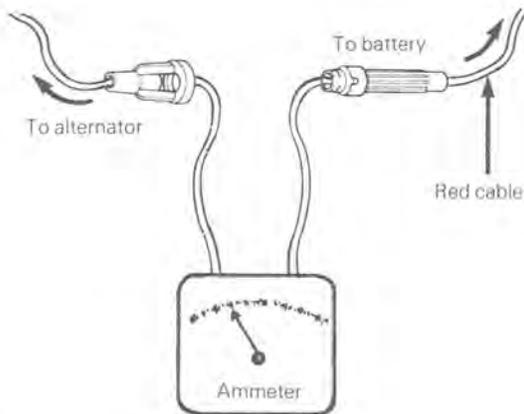
ALTERNATOR

○ NOTE: This sub-section is applicable to ELITE model only.

BATTERY CHARGING RATE TEST

○ NOTE: Before alternator verification, ensure the battery is fully charged and all electrical connections are not corroded and properly crimped.

Connect ammeter to fuse holder of the red cable (between alternator and battery).



◆ WARNING: Before checking output, support rear of vehicle with a mechanical stand. Ensure that the track is free of all particles which could be thrown out while tract is rotating. Keep hands, feet, tools and clothing clear of track.

Run engine at moderate speed and check output.

Battery condition	Output	Diagnosis
A – Charged	Low (less than 5A)	Normal
B – Charged	High (above 5A)	Refer to condition B
C – Discharged	High (above 5A)	Normal
D – Discharged	Low (less than 5A)	Refer to condition D

Condition B (charged battery, high, output):

Disconnect field connectors ass. (plastic tab housing) on alternator.



Output drops off: alternator is OK. Check voltage regulator, repair or replace.

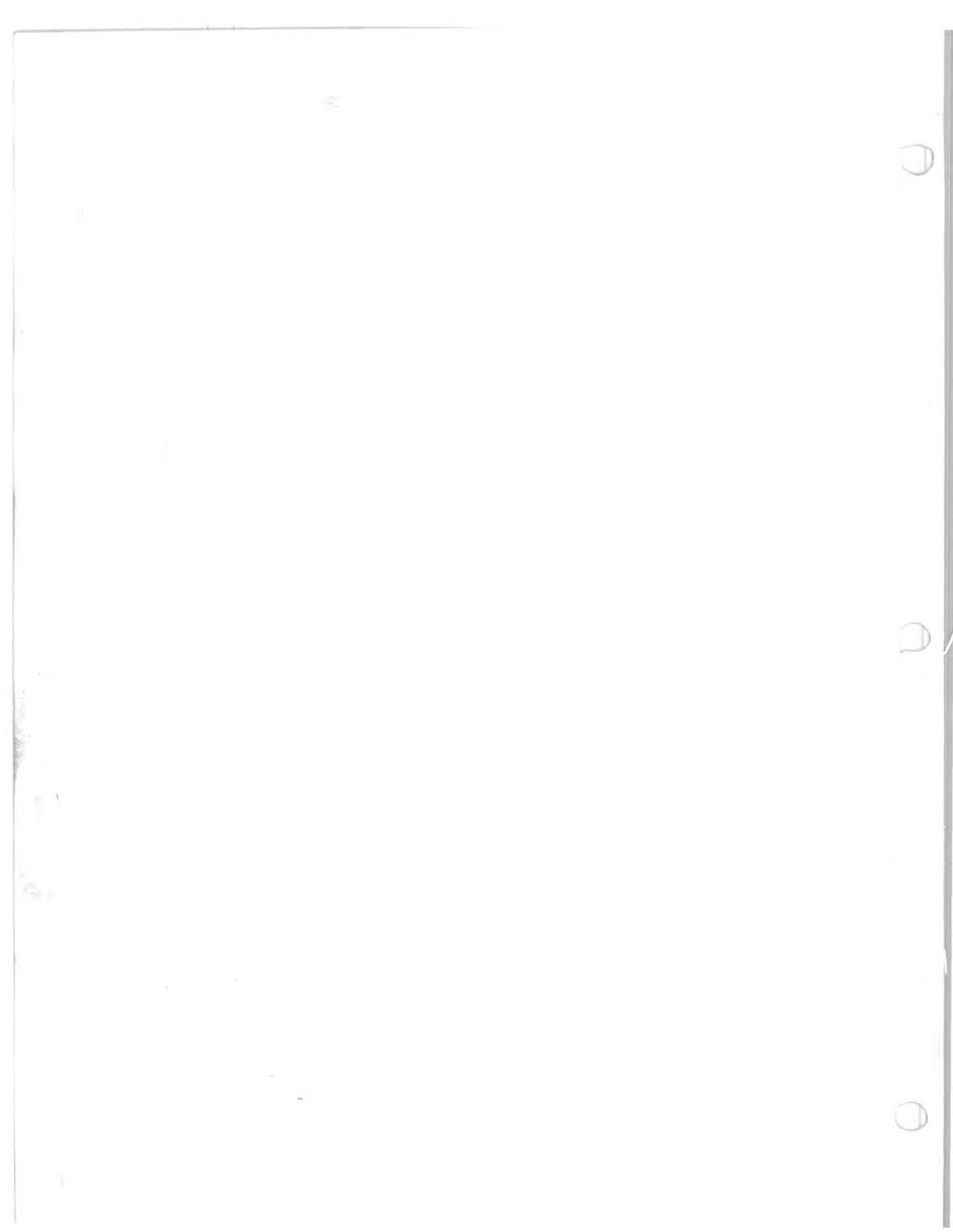
Output continues: alternator is faulty, repair or replace.

Condition D (discharged battery, low output)

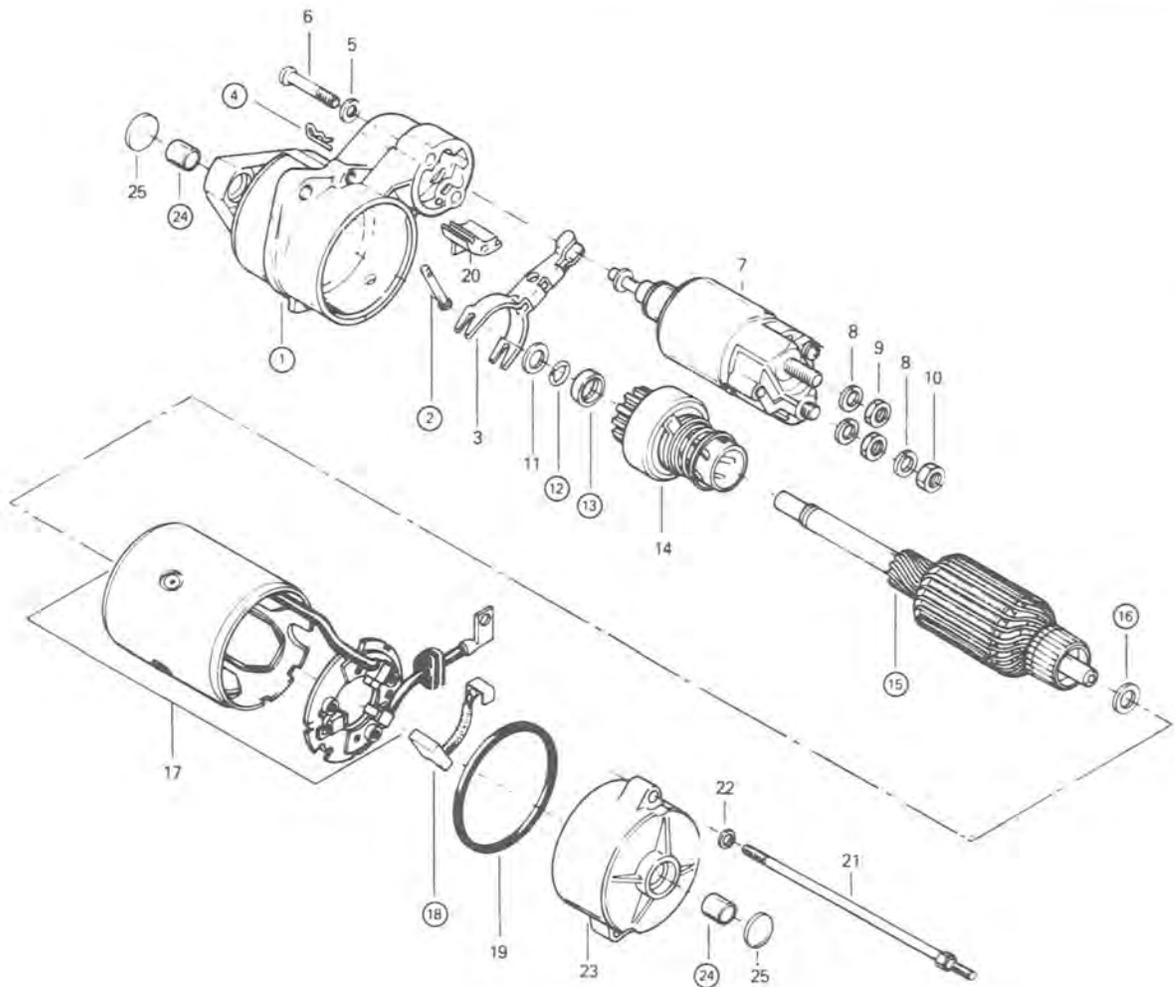
Check all connectors, drive belt tension, wiring and connections. If problem persists, replace unit.

Check output.

▼ CAUTION: If for any reason, the alternator needs to be removed, ensure at re-assembly that the alternator pulley perfectly aligns with the engine pulley. Moving the alternator support bracket in the appropriate direction will ease pulleys alignment.



ELECTRIC STARTER



- 1. Drive housing Assembly
- 2. Drive Lever Set Pin
- 3. Pinion Drive Lever
- 4. Snap Pin
- 5. Lockwasher
- 6. Magnetic Switch Screw
- 7. Magnetic Switch
- 8. Lockwasher 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. Lockwasher
- 23. End Frame
- 24. Bushing
- 25. Bushing cover

SECTION 04 ELECTRICAL

SUB-SECTION 06 (ELECTRIC STARTER)

REMOVAL

Disconnect black cable ground connection from battery. Disconnect red battery cable and red and green wire from solenoid switch. Remove starter.

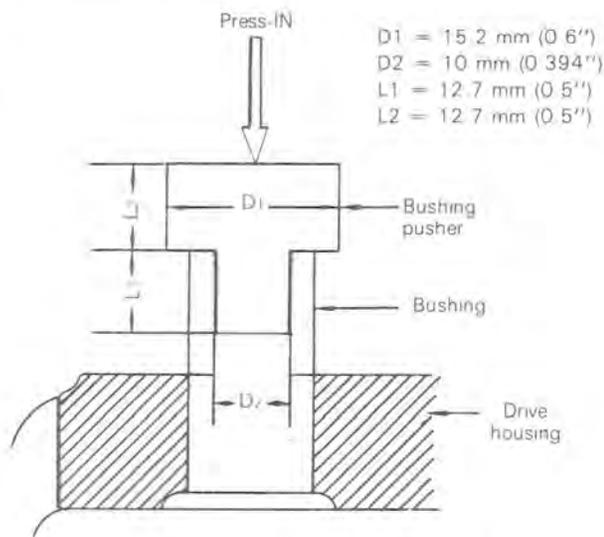
DISASSEMBLY & ASSEMBLY

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 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 bushing to obtain proper fit.

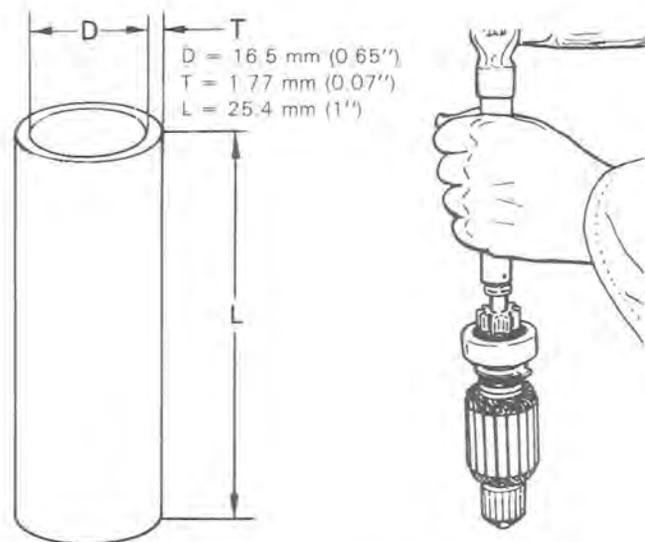


②④ To pull out the armature with overrunning clutch assembly and the drive lever from the drive housing, remove the hair pin and pull out the drive lever set pin.

⑮⑯ 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.

⑫⑬ To remove the pinion stop collar from the armature, make a tool similar to the illustration below.

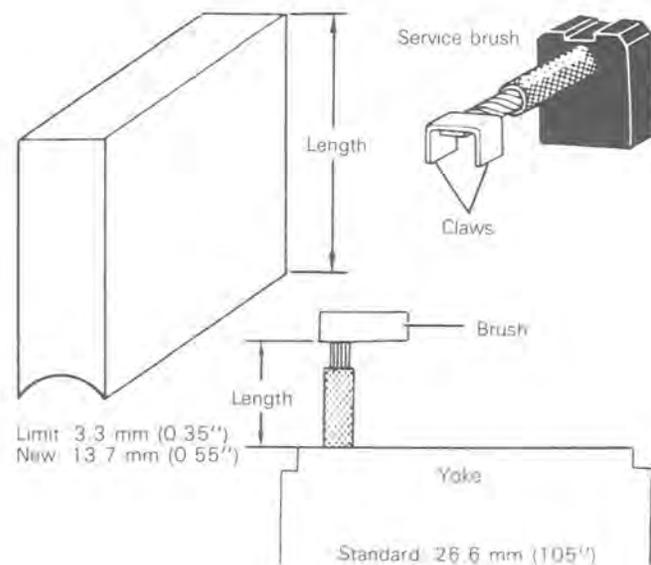
Drive out the pinion stop collar toward the overrunning clutch using the tool as shown below then remove snap ring.



⑱ Check the brush length if less than 9 mm (0.350"), replace the brush. (A new brush is 14 mm (0.550") 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.

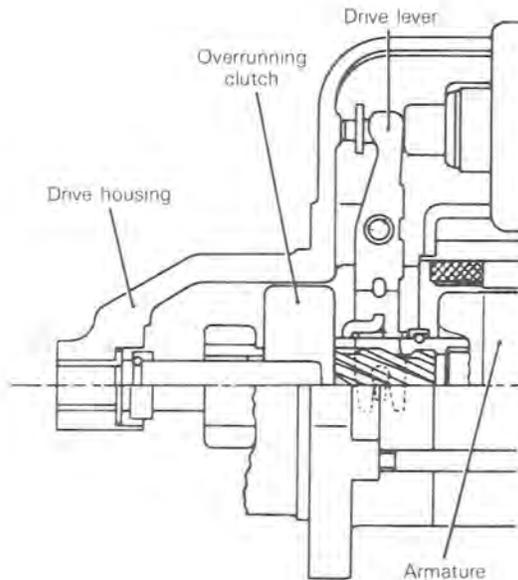
Standard brush lead length is 26.6 mm (1.050").



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 coldness resistant).

Reinstall the drive lever as illustrated below



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 use of an ohmmeter can be applicable for all tests except for the one concerning the shorted windings in the armature.

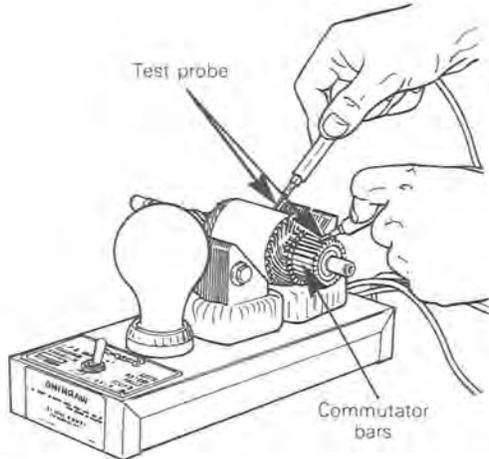
Check the commutator for roughness, burnt or scored surface. If necessary, turn the commutator in a lathe, enough to remove grime only.

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.

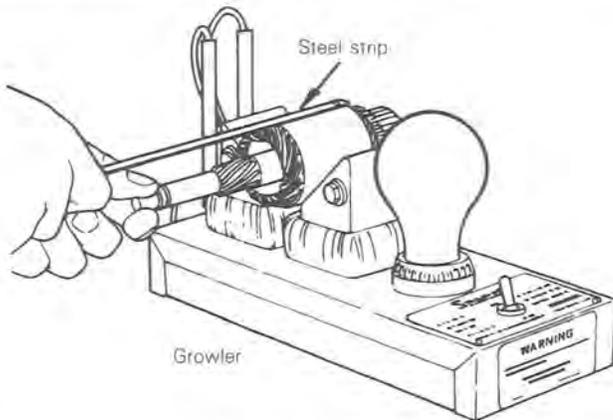
Check the commutator for mica depth. If the depth is less than 0.20 mm (0.008"), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.

SECTION 04 ELECTRICAL SUB-SECTION 06 (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.



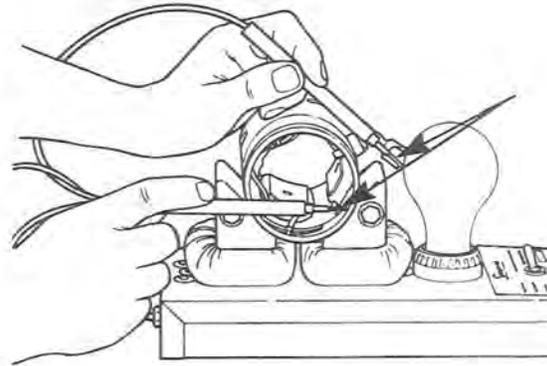
Test armature for shorted windings using a growler. When the armature is rotated in the growler with a steel strip held above it, the strip will vibrate over that area of the armature which has short circuited.



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 user where coils are soldered. (Burnt commutator bars are usually an indication of an open-circuited armature coil.)

Field windings and brushes

Test the field winding for open circuit 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 counter-clockwise direction, and should not slip in a clockwise direction with the armature fixed. If it is defective, replace.

Check the pinion teeth for wear and damage. If defective, replace.

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.

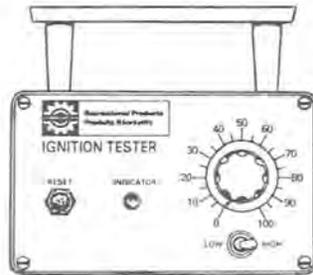
◆ **WARNING:** Short circuiting the electric starter is always a danger, therefore disconnect the ground cable at the battery before carrying out any kind of maintenance on the starting system. Do not place tools on battery.

SECTION 04 ELECTRICAL
SUB-SECTION 06 (ELECTRIC STARTER)

SYMPTOM	CAUSE	REMEDY
Starter does not turn.	Poor contact of starter switch contact points.	Repair or replace switch.
Starter turns; but does not crank the engine.	Burnt or poor contact of solenoid switch contact disc. Open circuit of solenoid switch pull-in winding. Open circuit of solenoid switch hold-in winding. Poor contact of brush. Burnt out commutator. Commutator mica too high. Shorted field coil. Shorted armature. Weak brush spring tension. Worn bushings. Weak battery. Shorted battery cell(s). Poor contact of battery terminal(s). Open circuit between starter switch and solenoid switch. Poor battery ground cable connection.	Replace solenoid switch. Replace solenoid switch. Replace solenoid switch. Straighten commutator and brush. Turn commutator in lathe. Undercut mica. Repair or replace yoke. Repair or replace armature. Replace spring. Replace bushings. Recharge battery. Replace battery. Clean and tighten terminal(s). Repair. Clean and tighten.
Starter turns, but overrunning clutch pinion does not mesh with flywheel.	Worn clutch pinion gear. Defective clutch. Poor movement of clutch on splines. Worn clutch bushing. Worn starter bushing(s). Worn ring gear.	Replace clutch. Replace clutch. Clean and correct. Replace clutch. Replace bushing(s). Replace ring gear.
Starter motor keeps running.	Shorted solenoid switch winding(s). Melted solenoid switch contacts. Starter switch returns poorly.	Replace solenoid switch. Replace solenoid switch. Replace ignition switch.

TESTING PROCEDURE

BOMBARDIER IGNITION TESTER



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 flywheel 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 parts. 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 07 (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.

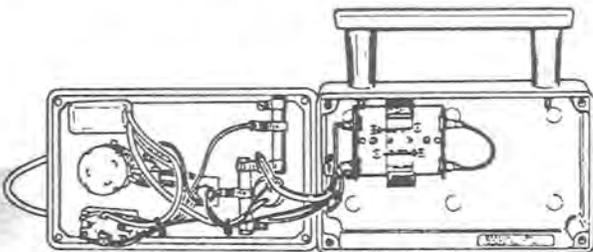
Low scale test

- 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.



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

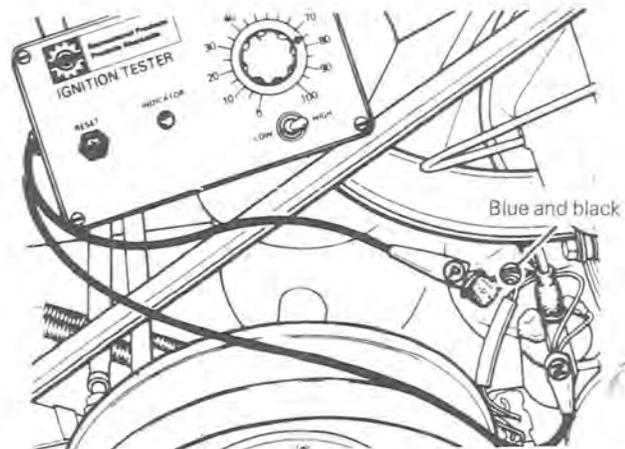
Check indicator knob alignment by turning knob fully clockwise. The white mark on the knob must align with no. 100 on the scale. If the marks does not line up with the no. 100, loosen the knob set screw, line the mark on the knob with no. 100, and tighten the set screw. Re-check alignment.

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.



- 3) Set tester dial and switch as follows:

Engine type	Switch position	Dial
247	HIGH	75

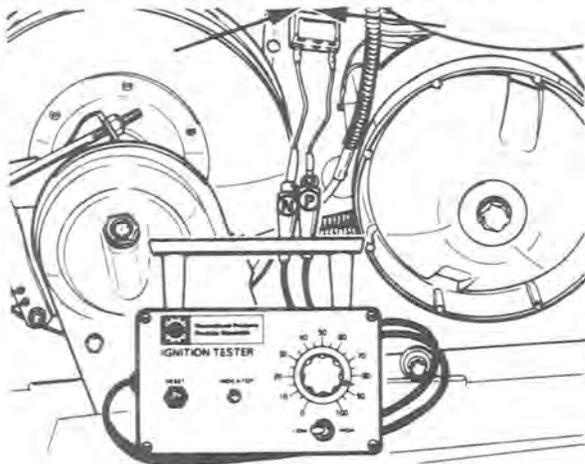
- 4) Turn ignition key to ON position, disable emergency cut-out button circuit and tether cut-out switch then crank engine.
 - a) **Indicator lamp lights:** Coil output is up to specifications. Repeat test at least three (3) times to verify reading and check for consistency.
 - b) **Indicator lamp does 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:

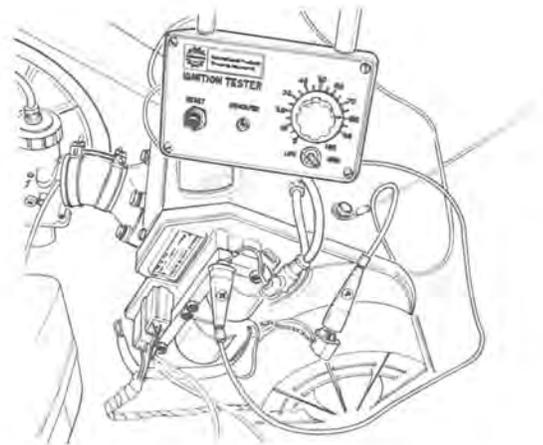
Engine type	Switch position	Dial
247	LOW	85

- 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.

TWO CYLINDER BREAKER POINTS ENGINE (640 ENGINE TYPE)

1. Generator coil output

- 1) Disconnect blue/red and black wires from P.T.O. side ignition coil.
- 2) Connect tester P lead to blue/red and black wires previously disconnected. Connect N lead to a good engine ground.



- 3) Set tester switch and dial as follows:

Engine type	Switch position	Dial
640	HIGH	80

- 4) Turn ignition key to ON position, disable cut-out button circuit and tether cut-out switch then crank engine.
 - a) **Indicator lamp lights:** Generator coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.
 - b) **Indicator lamp does not light:** Generator coil output is below specifications. This could be caused either by faulty coil or breaker points.
- 5) Repeat test with other side (magneto, blue and black wires). If test indicates good on magneto side wire, but not on the other, suspect faulty breaker points. If test indicates no output on either side, suspect either faulty generator coil or breaker points.

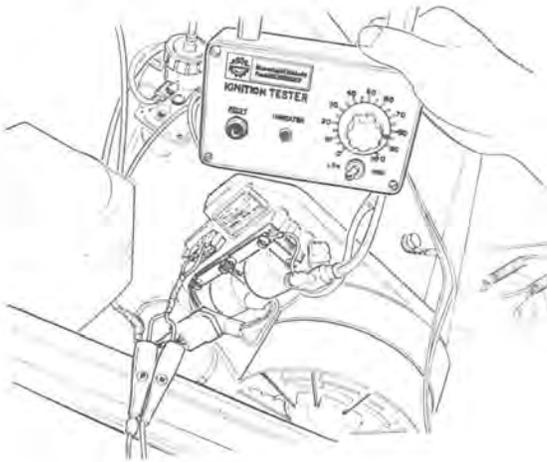
SECTION 04 ELECTRICAL
SUB-SECTION 07 (TESTING PROCEDURE)

2. Lighting coils output

NOTE: On the engine types covered by this test an additional lighting coil is connected in parallel with the main lighting coil; in this case the parallel connection must be broken off as each coil is to be tested individually.

- 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 wires



- 3) Set tester dial and switch as follows:

Engine type	Switch position	Dial
640	LOW	85

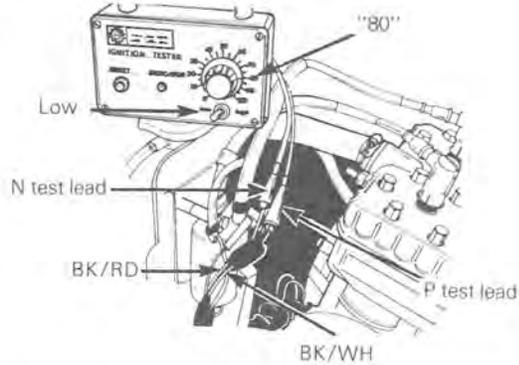
- 4) Crank engine.
 - a) **Indicator lamp lights:** Coil output is up to specifications. Repeat test at least three (3) times to verify reading and consistency.
 - b) **Indicator lamp does not light:** Coil is faulty.

277, 377, 454, 464, 503 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
277,377,454, 464,503	LOW	80

- 4) Turn ignition key to ON position, set cut-out switch and tether cut-out switch to OFF position 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...).

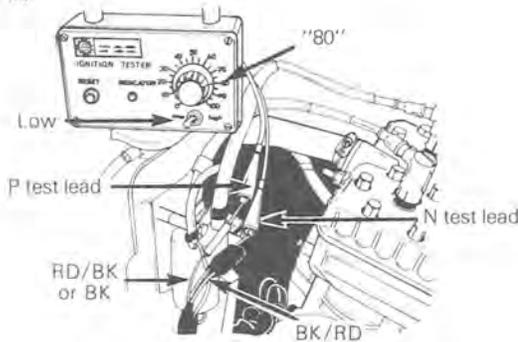
- a) **Indicator lamp lights:** Coil output is up to specifications. Repeat at least three (3) times to verify reading and consistency.
- b) **Indicator lamp does not light:** The problem is a faulty high speed charging coil.

WARNING: Do not touch tester P lead clip while cranking the engine. Also make sure that tester leads do not touch any metallic object.

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:
454, 464: RD/BK wire
277, 377, 503: BK 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
277,377,454, 464,503	LOW	80

- 4) Turn ignition switch to ON position, set cut-out switch and tether cut-out switch to OFF position then crank engine.

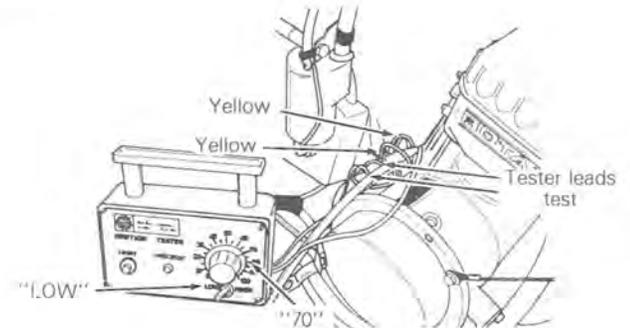
WARNING: To prevent powerful electric shocks when engine is running, do not touch any electronic ignition components (ignition coil, high tension wire, wire harness, etc...).

- 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:
454, 464: YL wire
277, 377, 503: YL/BK wire
and connect tester N test lead to YL wire.

(TYPICAL)



- 3) Set tester and dial as follows:

Engine type	Switch position	Dial
277,377,454, 464,503	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 07 (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 Ⓐ & Ⓑ	1.4 – 2.6Ω [Ⓐ] 2.8-4.2Ω [Ⓑ]	Low 80 Ⓐ & Ⓑ	If the reading is: 0Ω - short circuit ∞Ω - open circuit
	Low speed charging coil	RD/BK with BK/RD [Ⓐ] BK with BK/RD [Ⓑ]	125 – 235Ω [Ⓐ] 120-180Ω [Ⓑ]	Low 80 Ⓐ & Ⓑ	
	Lighting coil	YL with YL [Ⓐ] YL/BK with YL [Ⓑ]	0.09 – 0.2Ω [Ⓐ] 0.21-0.31Ω [Ⓑ]	Low 70 Ⓐ & Ⓑ	
IGNITION COIL	Primary	BK with WH/BL Ⓐ & Ⓑ	0.23 – 0.43Ω Ⓐ & Ⓑ	N.A.	
	Secondary winding	High tension wire with high tension wire Ⓒ Ⓔ	2.45 – 4.55KΩ [Ⓒ] 3.0-5.6 KΩ [Ⓓ]	N.A.	
	Insulation	WH/BL with core [Ⓐ] BK with core [Ⓑ]		N.A.	
		WH/BL with high tension wire [Ⓐ] BK with high tension wire [Ⓑ]	∞Ω	N.A.	

Ⓐ : 454 & 464 engine type

Ⓑ : 277, 377, 503 engine type

Ⓒ : all except 277 engine type

Ⓓ : 277 engine type only

Ⓔ : 377 and 503 engine type

Ⓕ : for 277 engine type, the secondary winding resistance reading is between the high tension wire and the coil ground.

N.A.: not applicable

BOMBARDIER CDI CHECKER



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.

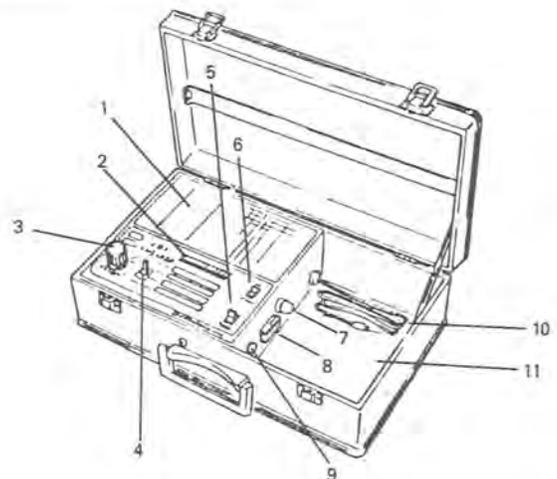
NOTE: The Bombardier CDI checker is not applicable to other Nippondenso CDI systems than those used on the Bombardier snowmobiles since 1981 models (354, 454, 464 1981 Nippondenso CDI engine types).

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



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

SECTION 04 ELECTRICAL
SUB-SECTION 07 (TESTING PROCEDURE)

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.

Test items

CODE NUMBER	IGNITION TYPE	ENGINE TYPE	TEST ITEM
1	4-4P (Harness A)	354,454,464	Generator coil (HI & LO) Control unit Spark test
2	4-5P (Harness B)	277,377,503	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	Output of high speed	1,2	4-4P 4-5P
	LO	Output of high and low speed generator coil	1,2	4-4P 4-5P
Control unit test		Output of control unit	1,2	4-4P 4-5P
Control unit diode test		Check of control diode in control unit	2	4-5P
Spark test		Check of ignition spark	1,2	4-4P 4-5P

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 indicates 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, 277, 377, 503 engine type)

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 following items.

- Lighting coil output
- Control unit diode of 4-4P ignition type (354, 454, 464 engine type)

○ **NOTE:** 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).

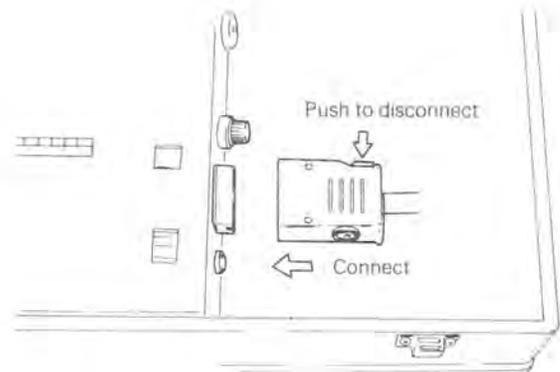
▼ **CAUTION:** To prevent any damage to the checker, do not try other power source than the above mentioned one and ensure that the checker is installed on a plane surface, away from vehicle vibrations.

CONNECTION OF TEST WIRE HARNESS

a) Choose the right test wire harness according to the following.

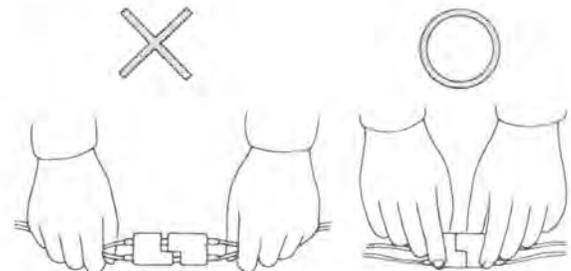
CODE NO.	IGNITION TYPE	ENGINE TYPE	TEST WIRE HARNESS
1	4-4P	354,454,464	A
2	4-5P	277,377,503	B

b) Connect the test wire harness to the checker aligning the arrow marks.



c) Disconnect the connectors of magneto and control unit.

▼ **CAUTION:** Never pull the wire harness to disconnect.



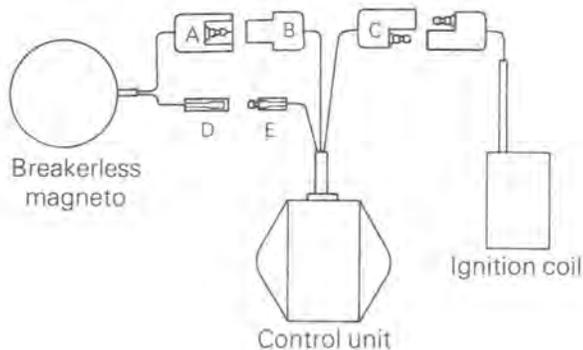
d) Securely connect the connectors of test wire harness.

▼ **CAUTION:** When connecting, be sure that the test wire harness does not interfere with moving part of engine.

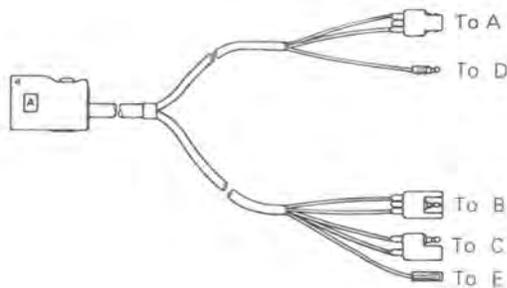
SECTION 04 ELECTRICAL
SUB-SECTION 07 (TESTING PROCEDURE)

4-4P ignition type engine (354, 454, 464)

(Vehicle wiring)

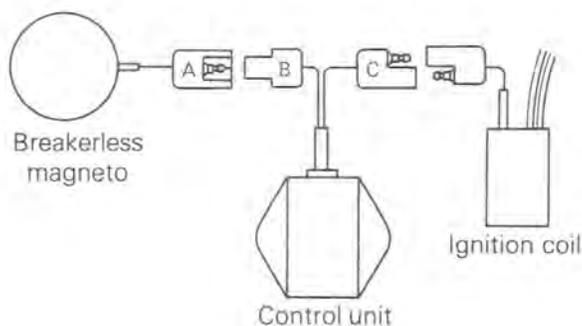


(Test wire harness) A

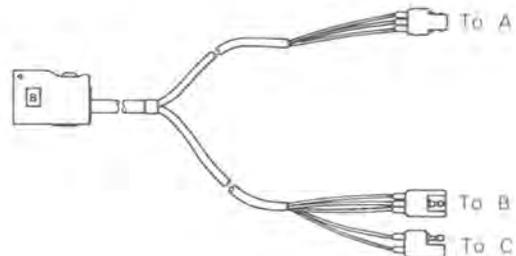


4-5P ignition type engine (277, 377, 503)

(Vehicle wiring)



(Test wire harness) B



NOTE: The harness (C) supplied in the kit is only applicable to the Can-Am 504 engine type. For complete 504 engine type testing procedure, refer to the appropriate Can-Am Shop Manual.

TEST

a) Turn the power switch on. Then one LED or two LEDs will light to indicate the checker is operating. Reset the indication circuit by depressing the reset switch, but then one LED remains to indicate the checker is operating.

NOTE: After every test where in 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.

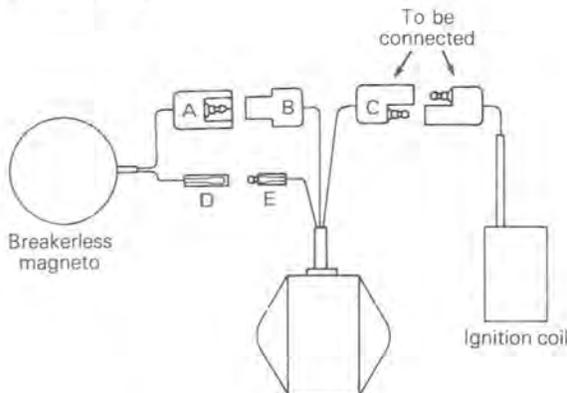
d) If the test results are over or lower than the limit, see "Analysis of test".

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.).

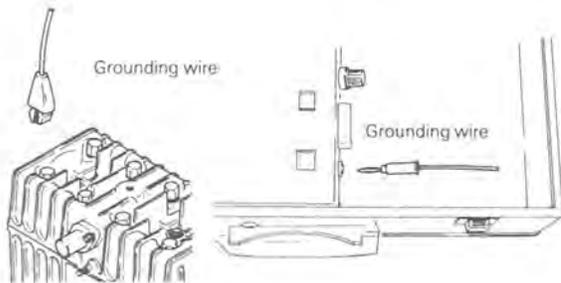
SPARK TEST

- Before performing this test, ensure that the control unit and the control unit diode (if applicable) have been checked.
- Disconnect the checker from the connector of the control unit output side (originally connected to the ignition coil).

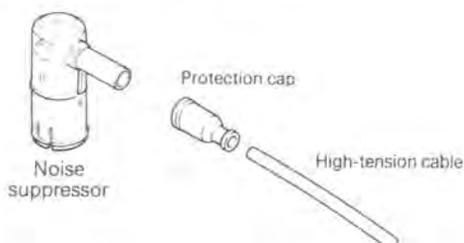
(Vehicle wiring)



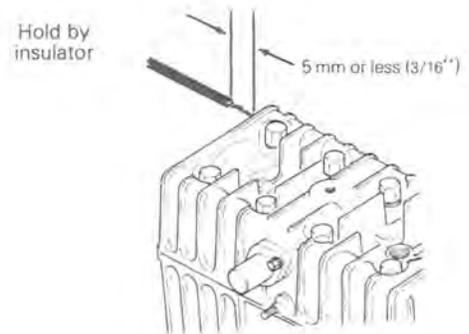
- Connect the ignition coil connectors to the control unit connectors.
- Connect the grounding wire to the checker and to a bore surface of the engine.



- Set the selector to CONTROL UNIT position.
- Remove the noise suppressor and the protection cap from the end of high-tension wire.



- 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.



WARNING: Do not touch the high tension wire while doing this procedure. Hold high tension wire with an insulator.

Generator coil test

- This test should be performed at both HI & LO switch positions. Switch LO position and set the selector to GENERATOR COIL position.
- Crank the engine and read the LED level indicator. Reading should be:
for 4-4P: from 2 to 8
for 4-5P: from 2 to 8
- 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

- To perform this test, switch can be at LO or HI position.
- Set the selector to CONTROL UNIT position.
- Depress START switch for 5 seconds minimum and read LED level indicator. Reading should be:
for 4-4P: from 4 to 5
for 4-5P: from 4 to 5

SECTION 04 ELECTRICAL
SUB-SECTION 07 (TESTING PROCEDURE)

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 LEDs will light. If four or five LEDs 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

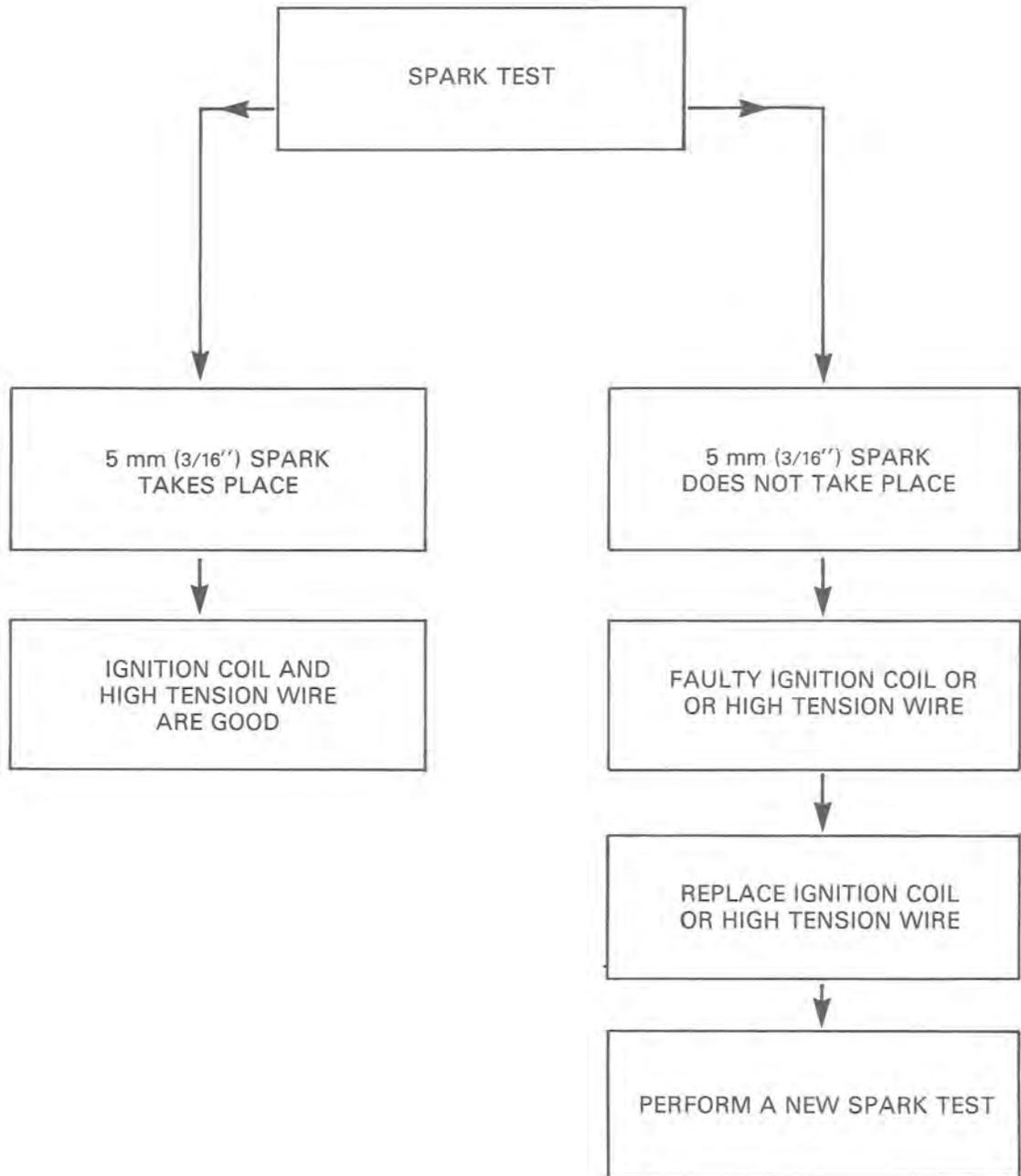
ANALYSIS OF TEST RESULT

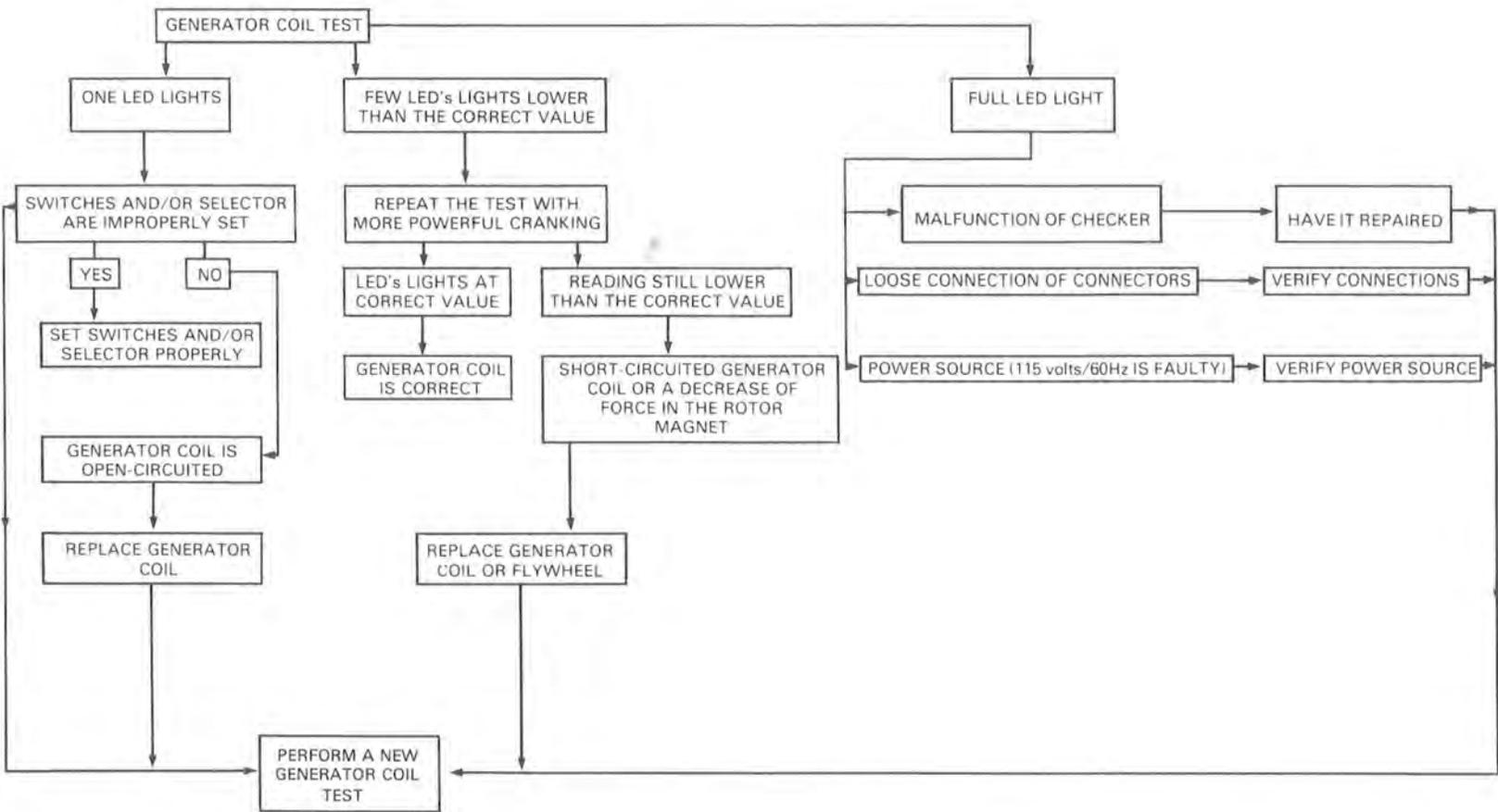
After every test, perform the diagnosis comparing with the diagnostic chart as shown in below.

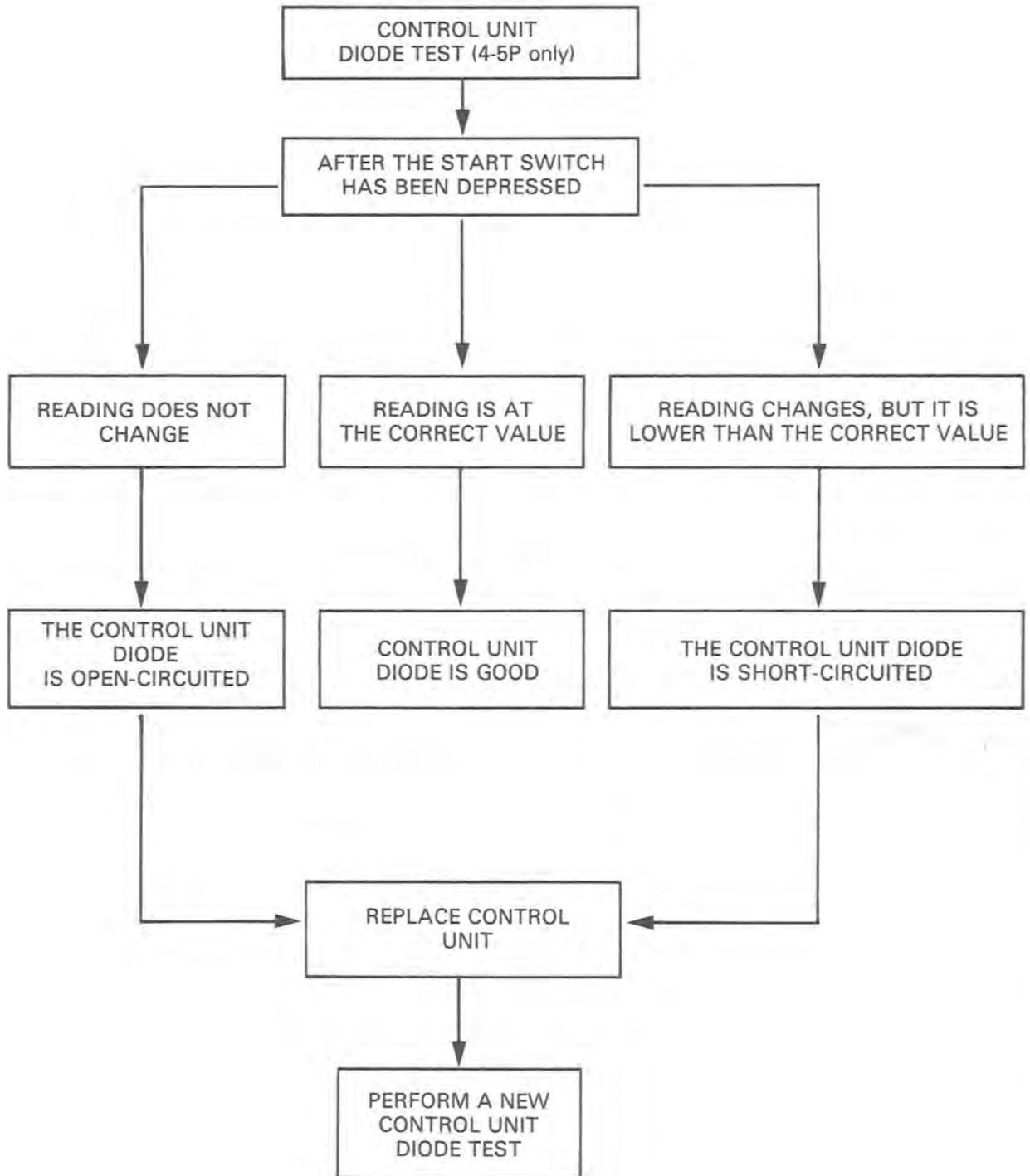
CODE NO.	IGNITION TYPE	CHECK PART	LEVEL INDICATOR										NG	OK	HARNESS	ENGINE TYPE		
			0	1	2	3	4	5	6	7	8	9						
1	4-4P	Generator coil	HI														A	354,454,464
			LO															
		Control unit																
2	4-5P	Generator coil	HI														B	277,377,503
			LO															
		Control 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.

TROUBLE SHOOTING CHART — NIPPONDENSO CDI SYSTEMS





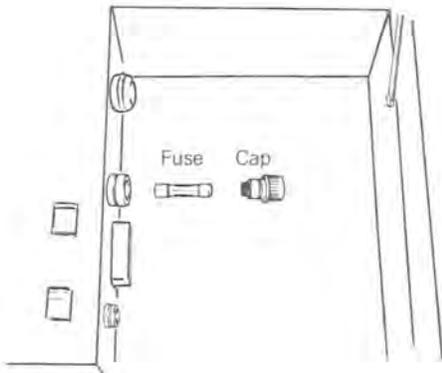


SECTION 04 ELECTRICAL
SUB-SECTION 07 (TESTING PROCEDURE)

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.

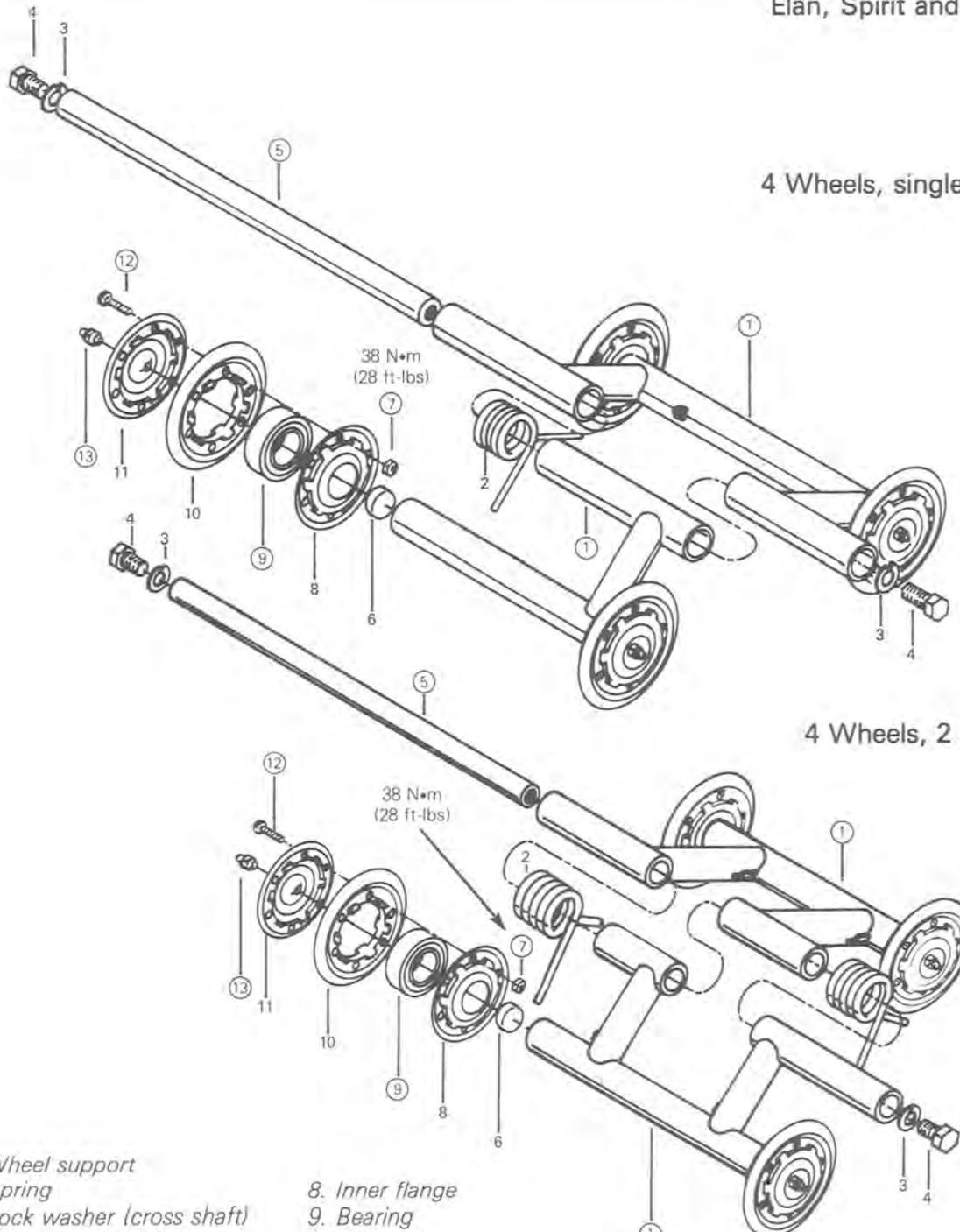
Nippondenso Canada Ltd.
4500 Sheppard Avenue East, Unit 29
Agincourt, Ontario
Canada (M1S 3R6)

BOGIE WHEELS

Elan, Spirit and Alpine

4 Wheels, single spring

4 Wheels, 2 springs

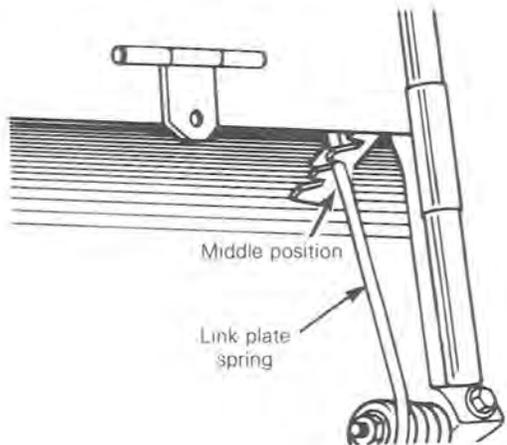


- | | |
|------------------------------|--------------------|
| 1. Wheel support | 8. Inner flange |
| 2. Spring | 9. Bearing |
| 3. Lock washer (cross shaft) | 10. Wheel tire |
| 4. Bolt (cross shaft) | 11. Outer flange |
| 5. Cross shaft | 12. Bolt (flange) |
| 6. Grease cap | 13. Grease fitting |
| 7. Nut (flange) | |

**SECTION 05 SUSPENSION
SUB-SECTION 01 (BOGIE WHEELS)**

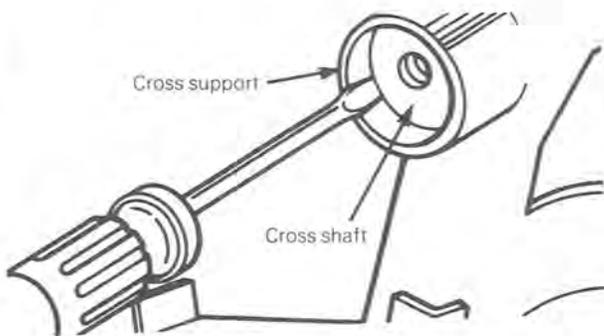
REMOVAL

Raise and block rear of vehicle off the ground.
Release track tension by unlocking the link plate springs using an appropriate tool.



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.



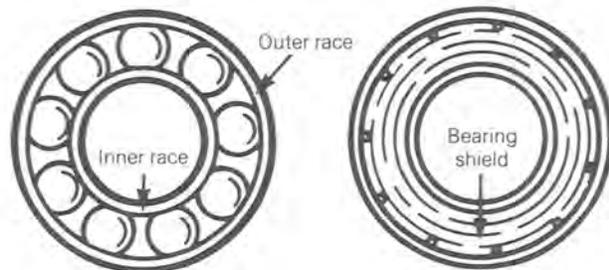
Remove bogie wheel set.

○ **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.

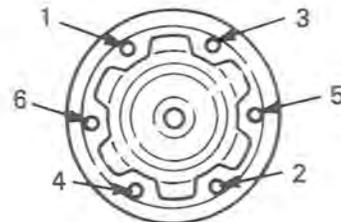
Repeat operation for remaining bogie wheel sets.

DISASSEMBLY & ASSEMBLY

- ① Heat wheel support anchor before attempting to open or close anchor.
- ⑤ Clean, then lubricate cross shaft with low temperature grease before installation.
- ⑨ 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.



⑦⑫ 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 bolts and nuts tighten in the following sequence to 38 N•m (28 ft-lbs).

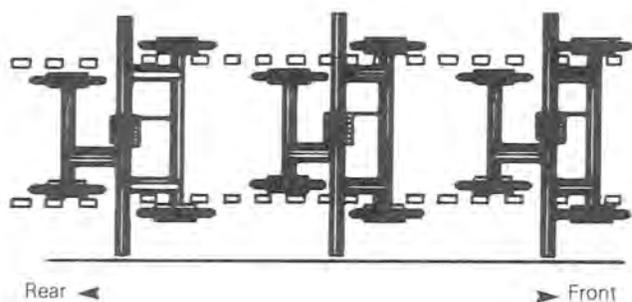


Torque sequence

INSTALLATION

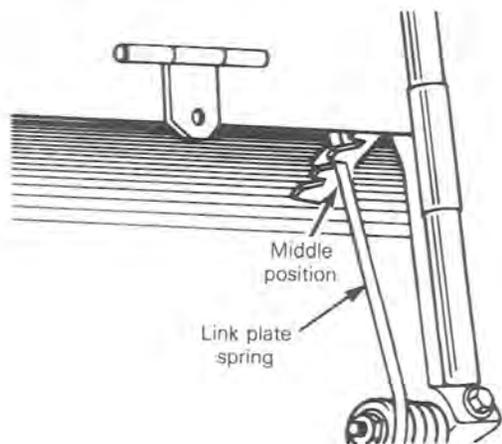
With rear of vehicle supported off the ground, position front bogie wheel set in location and secure to frame using lock washers and bolts. Secure rear set then remaining set(s) to frame.

○ **NOTE:** On Elan and Spirit models, put the wider portion of bogie wheel to the front direction of vehicle. (On Alpine inverse the position.)



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.



⑬ Lubricate each bogie wheel until new grease appears at joint. Wipe off excess grease (grease P/N 498 028 100).

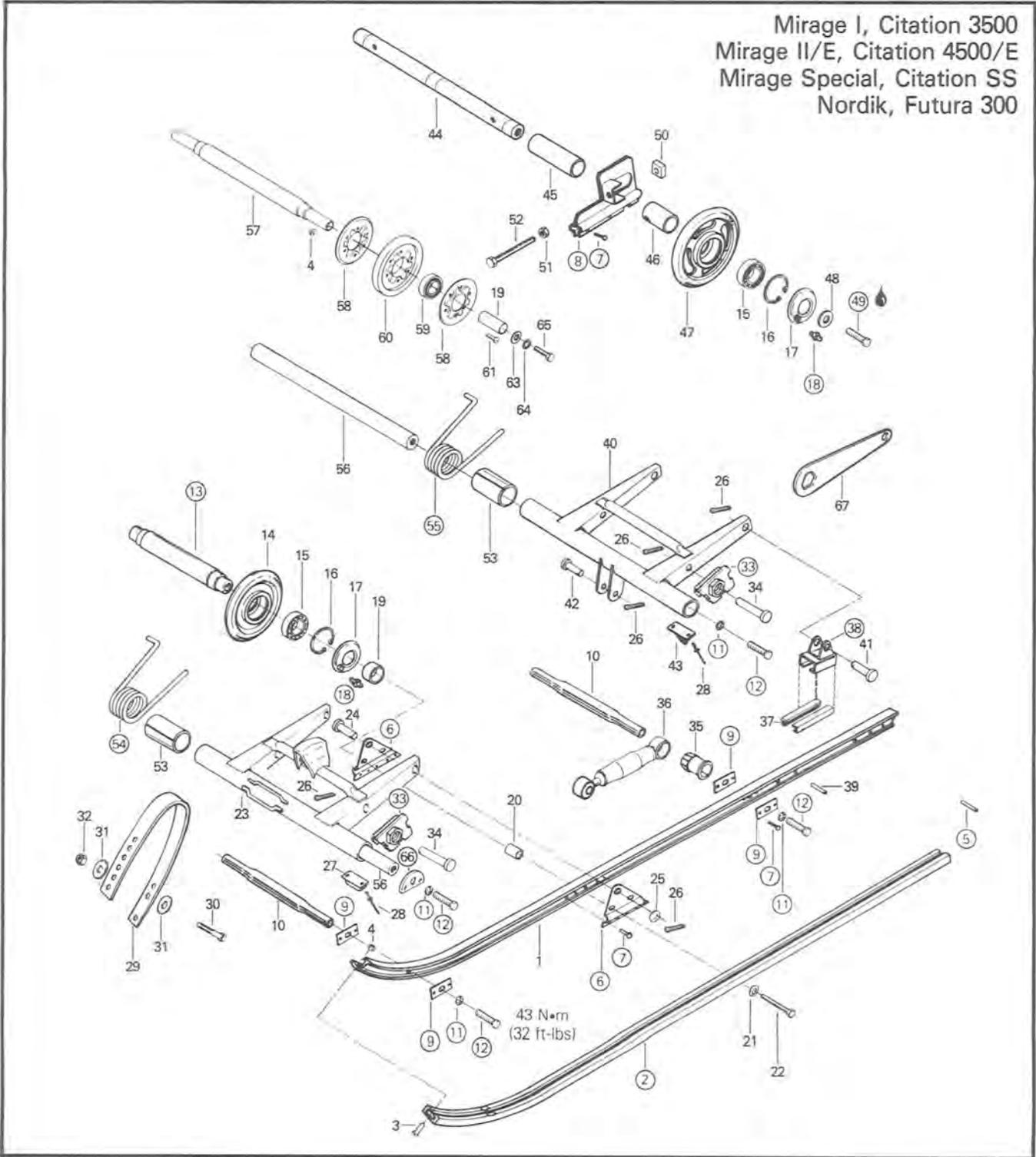
○ **NOTE:** To adjust the track tension and alignment refer to section 05-05.



SLIDE & MX SUSPENSION

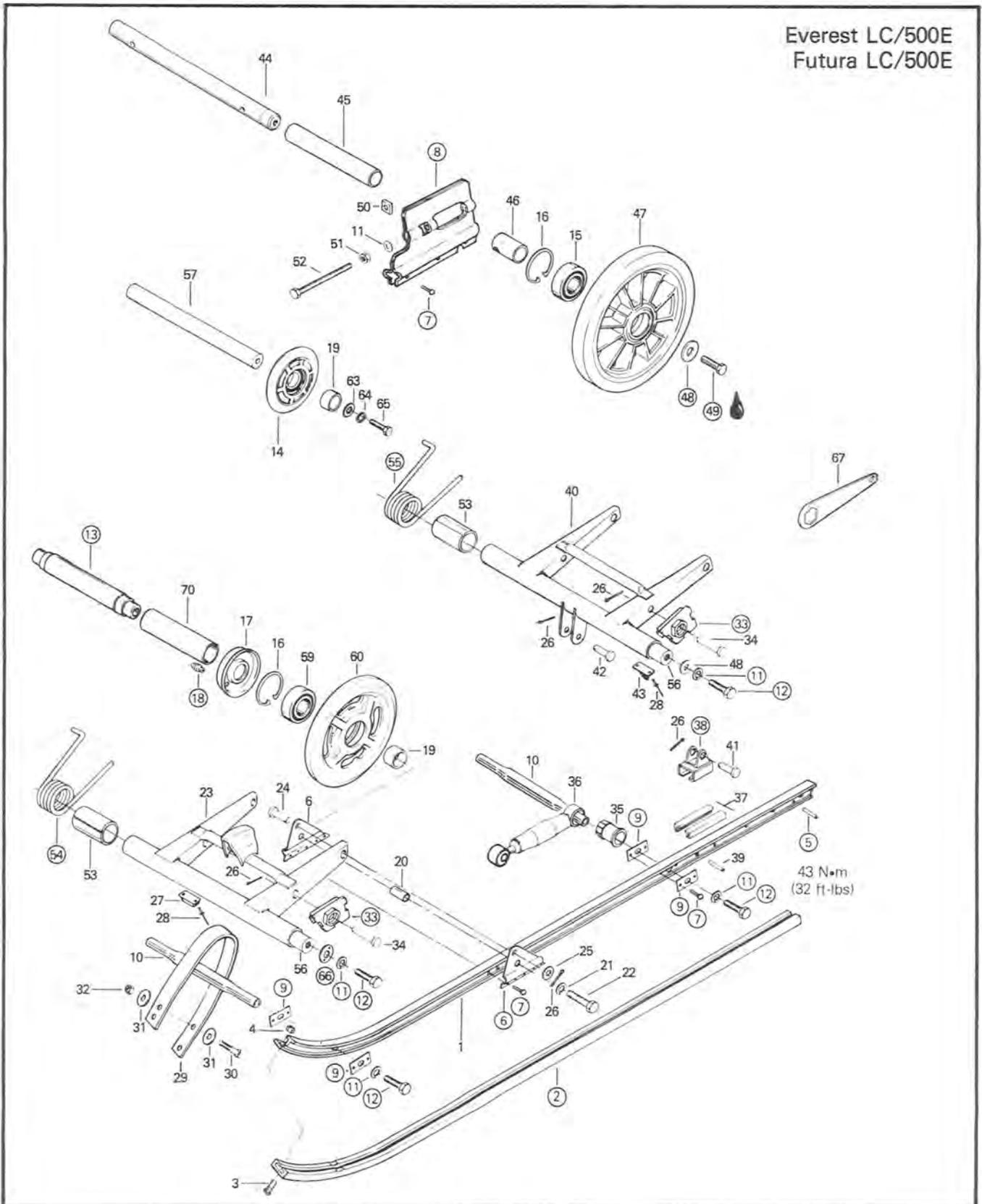
"TORQUE REACTION" TYPE SUSPENSION

Mirage I, Citation 3500
Mirage II/E, Citation 4500/E
Mirage Special, Citation SS
Nordik, Futura 300



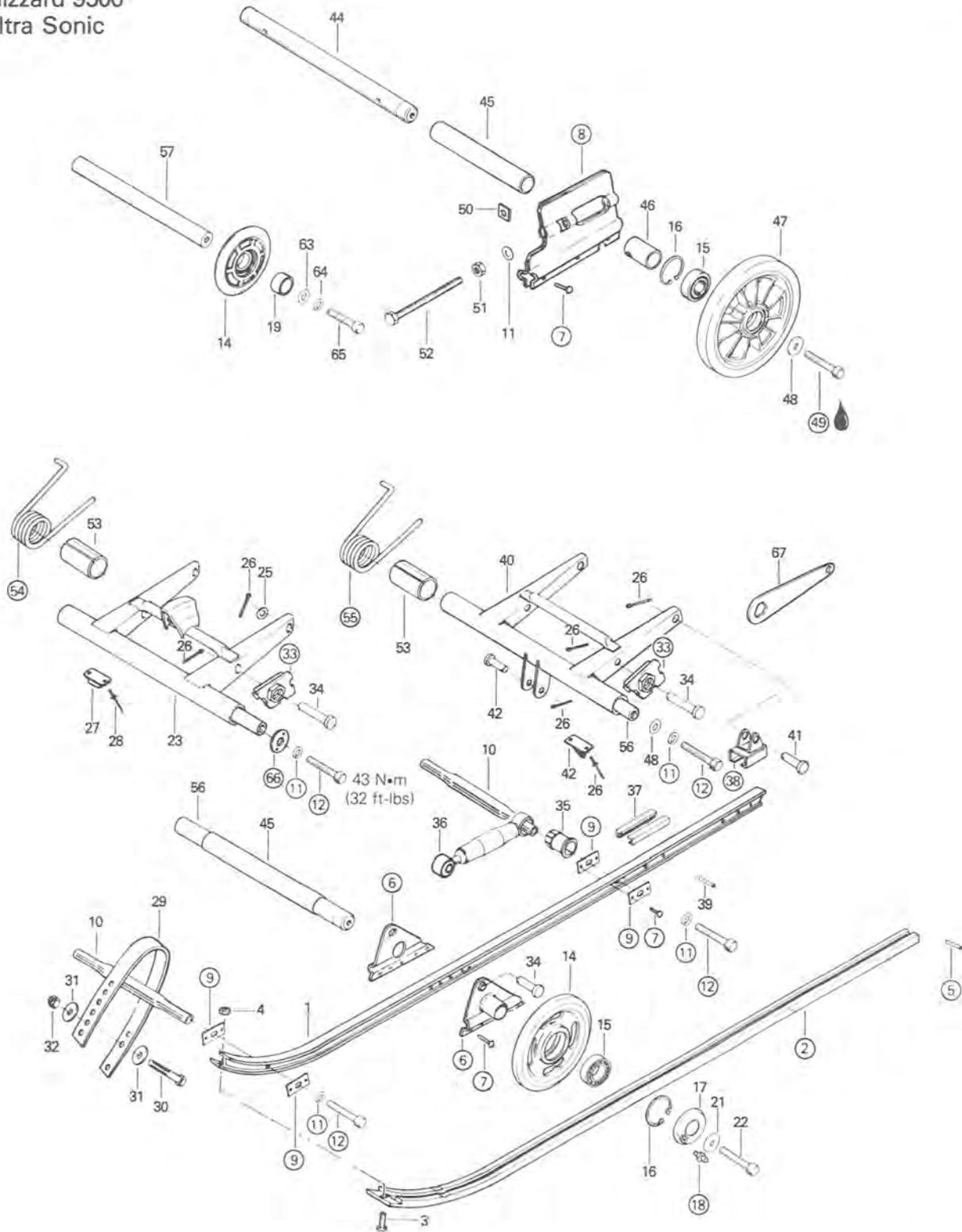
SECTION 05 SUSPENSION
SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)

Everest LC/500E
Futura LC/500E



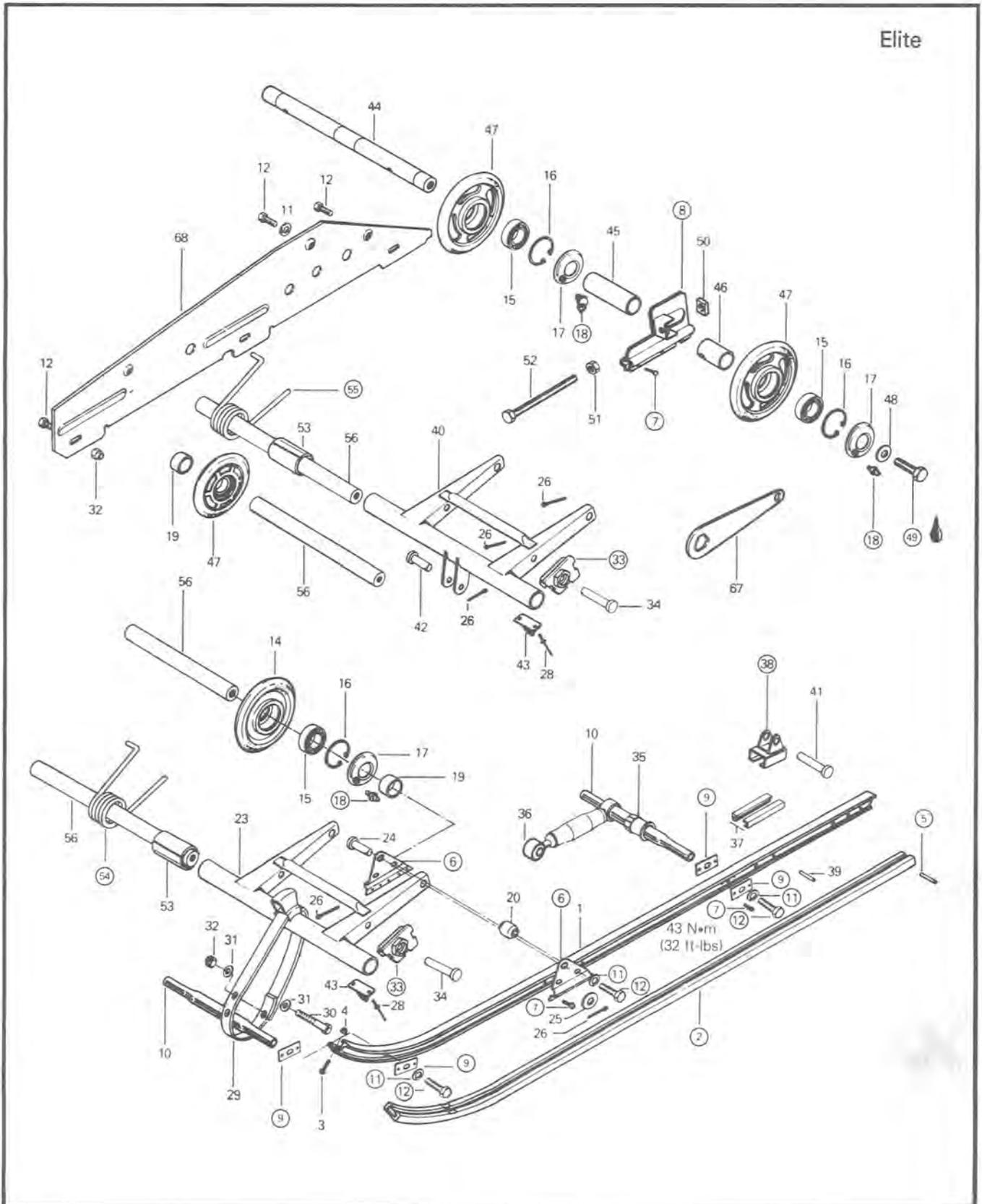
SECTION 05 SUSPENSION
SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)

Blizzard 9500
Ultra Sonic



SECTION 05 SUSPENSION
SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)

Elite



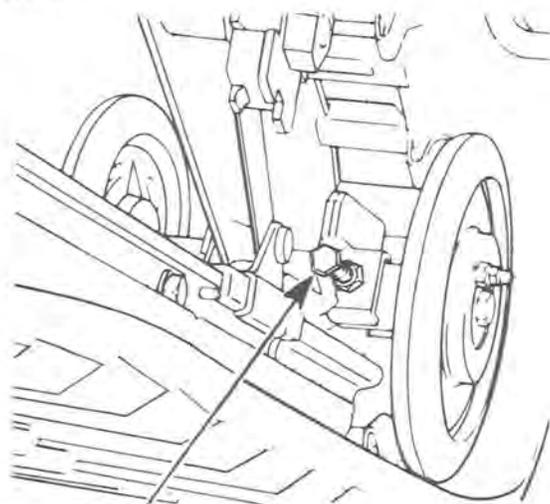
SECTION 05 SUSPENSION SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)

- | | | |
|--------------------------|--------------------|-------------------------|
| 1. Runner | 25. Flat washer | 49. Screw "Loctite 242" |
| 2. Slider shoe | 26. Cotter pin | 50. Nut |
| 3. Screw | 27. Rubber stopper | 51. Nut |
| 4. Stop nut | 28. Rivet | 52. Adjustment screw |
| 5. Spiral pin | 29. Stopper strap | 53. Bushing |
| 6. Front arm bracket | 30. Screw | 54. Front spring |
| 7. Rivet | 31. Washer | 55. Rear spring |
| 8. Adjustment plate | 32. Stop nut | 56. Cross shaft |
| 9. Reinforcement bracket | 33. Adjustment cam | 57. Rear idler shaft |
| 10. Tube | 34. Clevis pin | 58. Flange |
| 11. Lockwasher | 35. Bushing | 59. Bearing |
| 12. Screw | 36. Shock absorber | 60. Wheel tire |
| 13. Front idler shaft | 37. Slider pad | 61. Screw |
| 14. Idler | 38. Slider support | 62. Retainer ring |
| 15. Bearing | 39. Spiral pin | 63. Flat washer |
| 16. Retainer ring | 40. Rear arm | 64. Lockwasher |
| 17. Cap | 41. Clevis pin | 65. Screw |
| 18. Grease fitting | 42. Clevis pin | 66. Washer |
| 19. Spacer | 43. Rubber stopper | 67. Wrench |
| 20. Spacer | 44. Rear axle | 68. Side member |
| 21. Lockwasher | 45. Tube | 69. Wheel axle |
| 22. Screw | 46. Tube | 70. Spacer tube |
| 23. Front arm | 47. Idler | 71. Wheel support |
| 24. Clevis pin | 48. Washer | |

REMOVAL

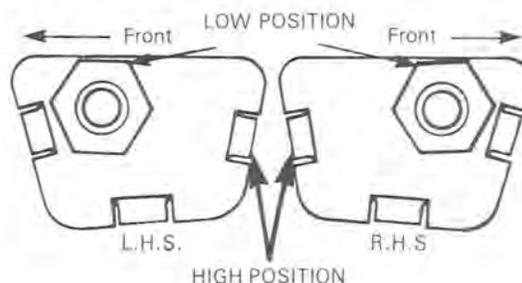
Release track tension by loosening adjuster bolts located on inner side of rear idler wheels.

(TYPICAL)



Adjuster bolt

Position the adjustment cams at the lowest elevation.



Remove the four (4) bolts securing suspension to frame. On Elite model, remove bolts securing side members to chassis.

Lift rear of vehicle then withdraw suspension assy from track area.

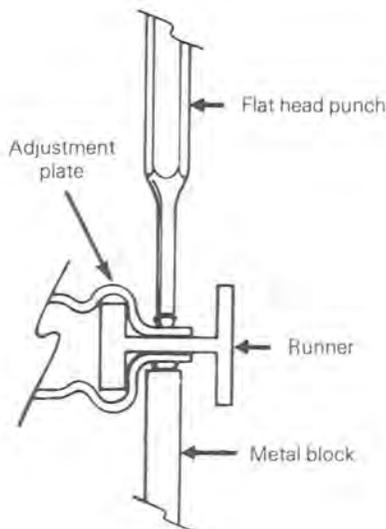
NOTE: To prevent cross shaft from turning within the suspension arm, wedge the blade of a small screwdriver between the shaft and suspension arm.

DISASSEMBLY & ASSEMBLY

② ⑤ To replace a worn slider shoe, remove the rear spiral pin. Slide the shoe rearwards out of the runner.

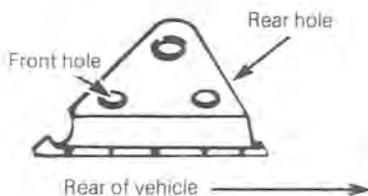
⑦ ⑧ To remove the rivets securing the adjustment plate on the front arm supports, cut off the rivet heads using a cold chisel.

At assembly, position the rivet head on a suitable metal block and hold the assembly firmly in place. With a flat head punch and hammer secure the rivet in place.

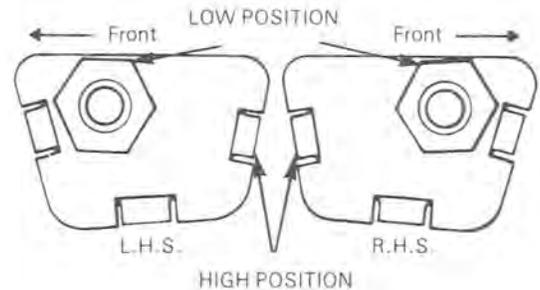


⑦ ⑨ To remove rivet use a 3/16" dia. drill. At assembly secure reinforcement bracket to runner with two (2) 10-32 x 1/2" bolts and nuts.

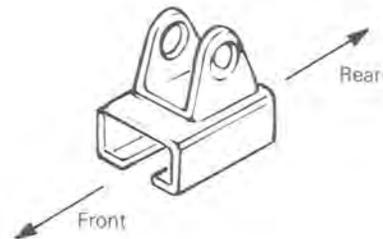
⑥ ⑬ The front idler shaft must be positioned in the front hole of the front arm bracket. On Elite model, install in rear hole.



③③ At assembly, adjustment cam must be installed to that hexagonal projection on cam is located toward front of vehicle.



③⑥ Sliding support must be installed with offset toward front.



④⑨ Clean all traces of plastic from threads. Prior to assembly, apply a light coat of "Loctite 242" or equivalent on threads.

⑤④ ⑤⑤ Prior to assembly, identify front and rear springs. Front spring coil diameter is smaller than rear.

SECTION 05 SUSPENSION SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)

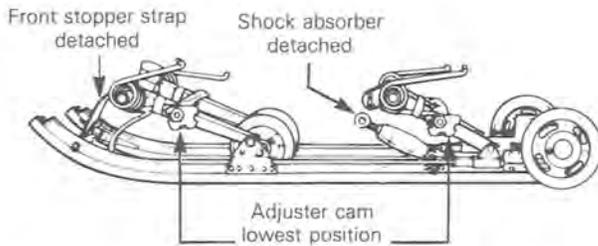
INSTALLATION

On all slide suspension models, except Blizzard 5500 MX, Sonic MX and Elite, install the suspension ass'y as shown.

Preparation

- Detach the front stopper strap.
- Remove the cotter pin locking the shock absorber clevis pin and detach the shock absorber by removing the clevis pin.
- Set the adjuster cam to the lowest position and fix the springs with a tape.
- Push the rear idler wheel forward.

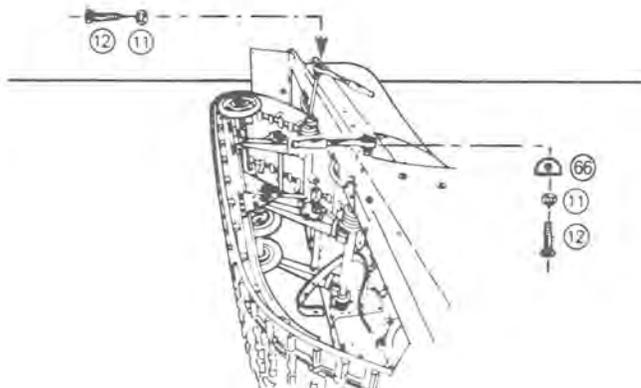
(TYPICAL)



Installation

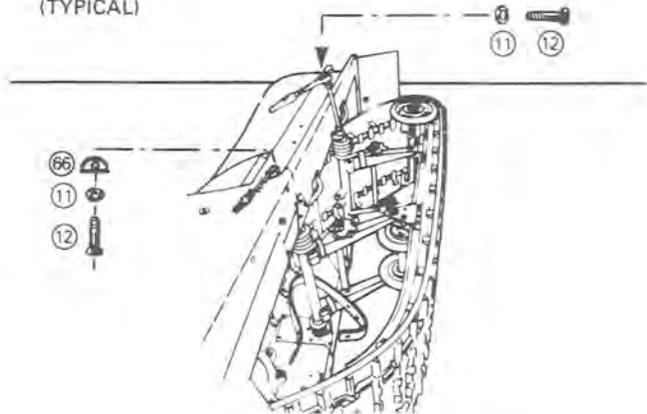
- Place a cardboard on the floor.
- Plug the chaincase vent hole with a small wire to prevent leaks.
- Tilt vehicle on one side.
- Attach front suspension and the rear suspension arm to the frame. Do not torque.

(TYPICAL)



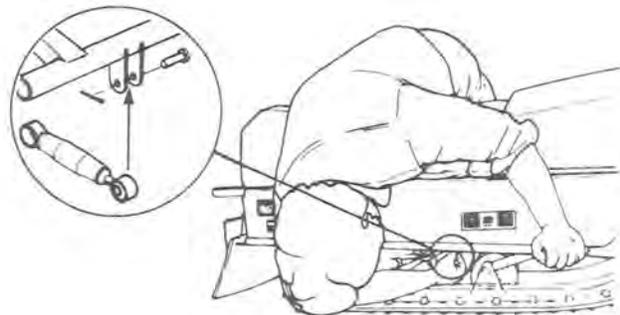
- Tilt the vehicle on the other side.
- Attach the front then the rear suspension arm to frame.

(TYPICAL)

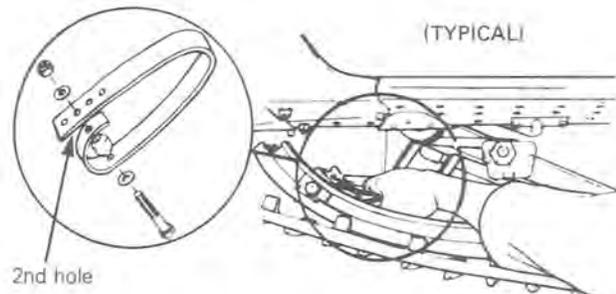


- Reposition vehicle on the ground. Position adjuster cams at the lowest elevation.
- Torque the four suspension retaining bolts to 43 N•m (32 ft-lbs).
- Apply downward pressure on the seat.
- Secure the extended shock with clevis pin and a new cotter pin.

(TYPICAL)



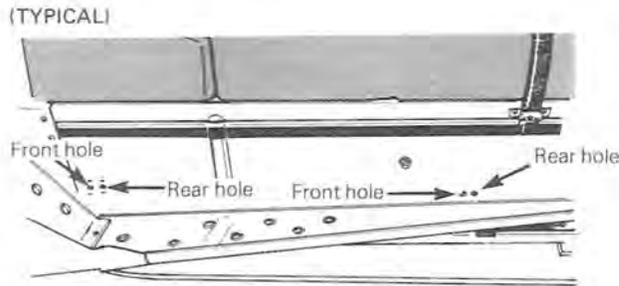
- Attach front stopper strap at 2nd hole.



- Remove chaincase vent hole plug.

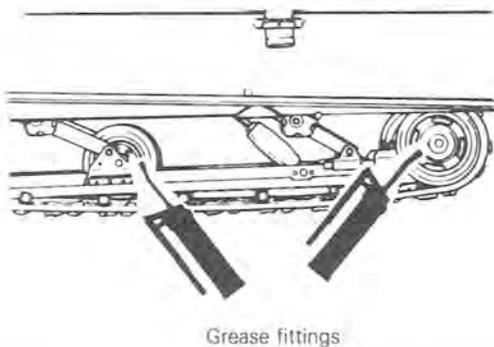
○ NOTE: On all models except Elite, the holes in the frame provide the possibility of locating the suspension arms for easier track tension adjustment 13 mm (1/2") clearance. It means that if the slide suspension adjustment screws are at the maximum adjustment and the suspension arms are at the front 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.



⑱ If necessary, lubricate the idler wheels at grease fittings until grease appears at joints. Use low temperature grease only (P/N 498 028 100).

(TYPICAL)



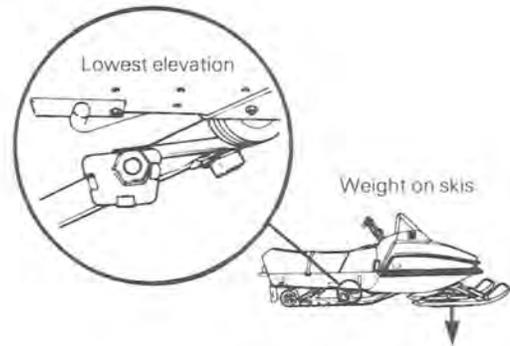
○ NOTE: To adjust the track tension and alignment, refer to section 05-05.

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 lowest elevation for deep snow conditions. A higher elevation is preferred when negotiating icy snow.

The rear adjuster blocks should be adjusted to rider preference.

(TYPICAL)

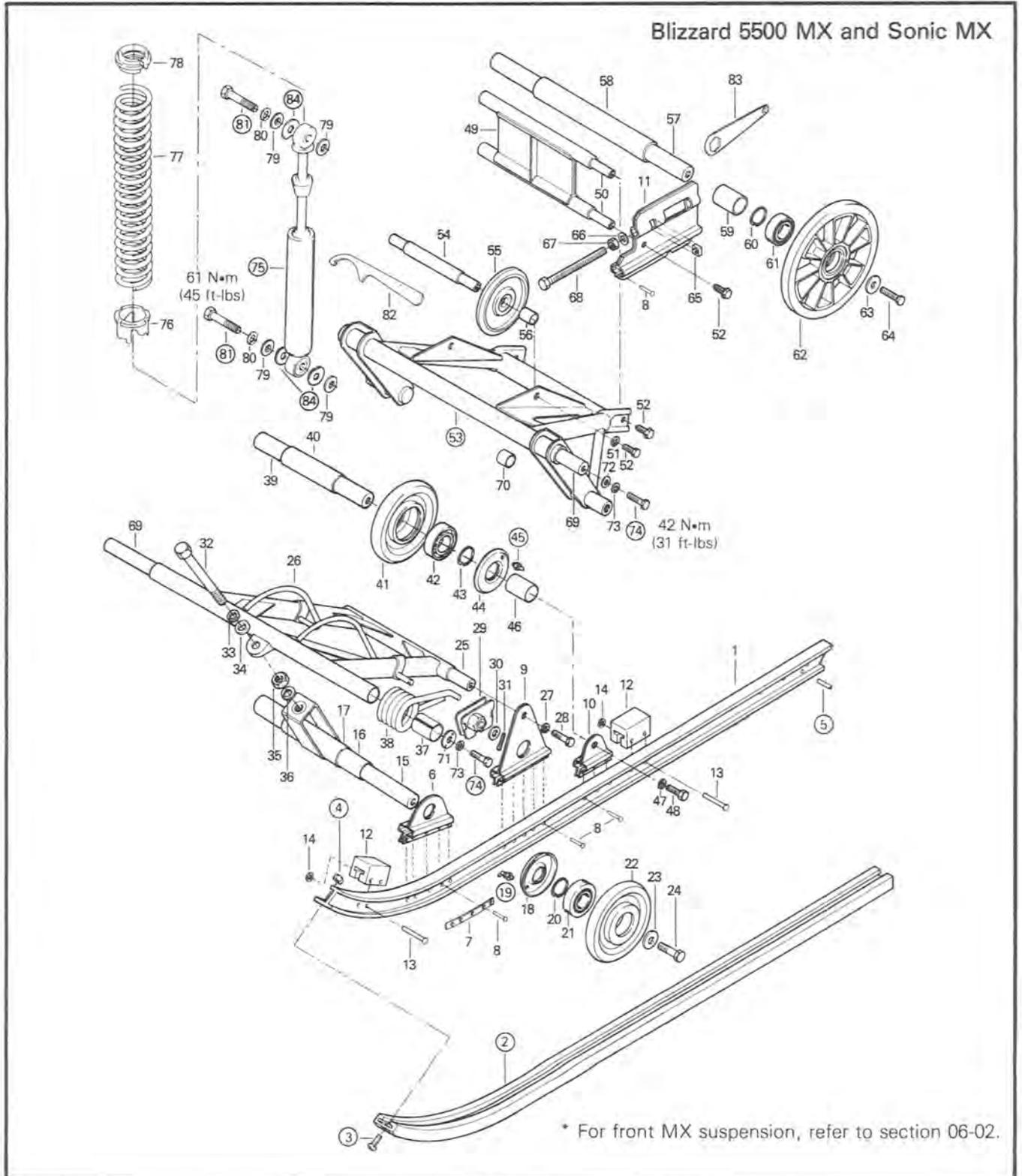


▼ CAUTION: Always turn left side adjustment cams in a clockwise direction, the right side cams in a counter-clockwise direction. Left and right adjustment cams of each adjustment (front and rear), must always be set at the same elevation.



REAR MX SUSPENSION

Blizzard 5500 MX and Sonic MX

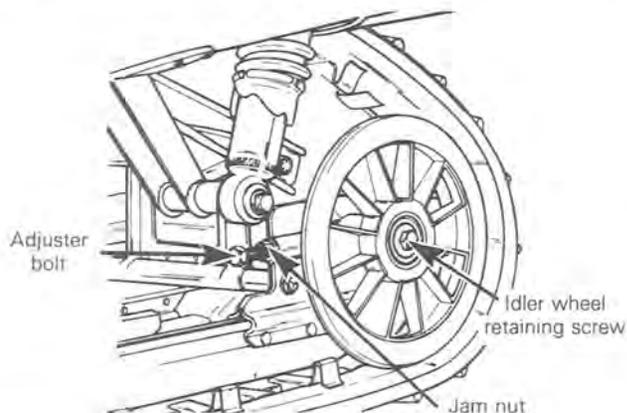


SECTION 05 SUSPENSION
SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)

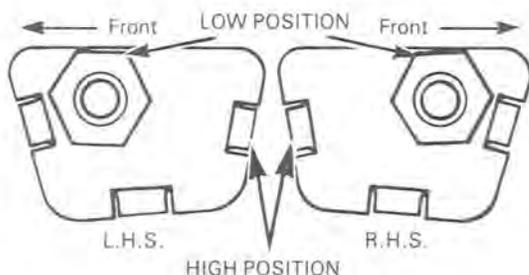
1. Runner
2. Slider shoe
3. Round slotted head machine screw
4. Hexagonal elastic stop nut 10-24
5. Spiral pin
6. Front wheel bracket
7. Reinforcement strip
8. Rivet
9. Front arm support
10. Wheel support
11. R.H. adjustment plate
L.H. adjustment plate
12. Rubber stopper
13. Pin
14. Push nut
15. Cross shaft
16. Spacer tube
17. Stopper bracket
18. Cap
19. Grease fitting
20. Circlip
21. Ball bearing
22. Idler
23. Washer
24. Hexagonal head cap screw
25. Cross shaft
26. Front arm
27. Lockwasher 3/8"
28. Hexagonal head cap screw
29. R.H. adjustment cam
L.H. adjustment cam
30. Flat washer
31. Cotter pin
32. Stopper bolt
33. Flat washer
34. Damper
35. Hexagonal jam nut
36. Lockwasher
37. Bushing
38. R.H. spring
L.H. spring
39. Wheel axle
40. Spacer tube
41. Idler
42. Ball bearing
43. Circlip
44. Cap
45. Grease fitting
46. Spacer tube
47. Lockwasher
48. Hexagonal head cap screw
49. Pivot arm
50. Pivot shaft
51. Lockwasher
52. Hexagonal head cap screw
53. Rear arm
54. Idler shaft
55. Idler
56. Spacer
57. Rear axle
58. Spacer tube
59. Spacer tube
60. Circlip
61. Ball bearing
62. Idler
63. Washer
64. Hexagonal head cap screw
65. Square nut
66. Flat washer
67. Hexagonal nut
68. Hexagonal adjustment screw
69. Cross shaft
70. Bushing
71. Washer
72. Flat washer
73. Lockwasher
74. Hexagonal head cap screw
75. Shock absorber
76. Adjuster ring
77. Spring
78. Spring collar
79. Flat washer
80. Lockwasher
81. Hexagonal head cap screw
82. Hexagonal wrench
(adjustment cam P/N 529 003 800)
83. Adjustment wrench
(shock spring P/N 529 002 400)
84. Special washer

REMOVAL

Release track tension by loosening adjuster bolts located on inner side of rear idler wheels.



Position the adjustment cams at the lowest elevation.



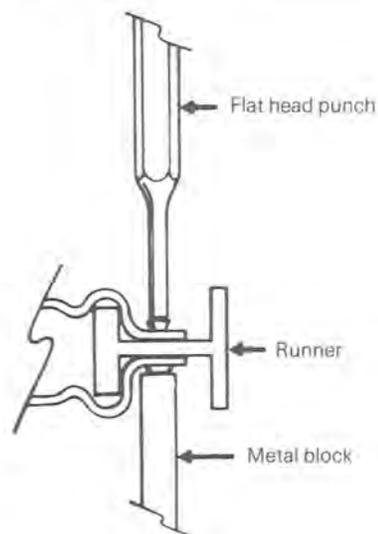
Remove the two lower shock absorber screws.
 Remove the four bolts securing suspension to frame.
 Remove suspension.

DISASSEMBLY & ASSEMBLY

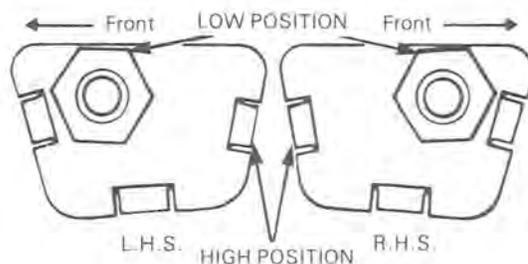
②③④⑤ To replace a worn slider shoe, remove the screw and spiral pin. Slide the shoe rearwards out of the runner.

⑧ 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 on a suitable metal block and hold the assembly firmly in place. With a flat head punch and hammer secure the rivet in place.



②⑨ At assembly, adjustment cam must be installed to that hexagonal projection on cam which is located toward front of vehicle.



SECTION 05 SUSPENSION SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)

INSTALLATION

Lift the rear of vehicle off the ground.

Place suspension within the track and align front arm of suspension with front holes of frame and secure using bolts and washers (74). Torque to 42 N•m (31 ft-lbs).

Raise the rear section of the suspension and track into the tunnel and align rear arm with rear holes in frame. Secure to frame using bolts and washers (74). Torque to 42 N•m (31 ft-lbs).

(8) (75) (53) Secure shock absorbers to rear arm, torque bolt to 61 N•m (45 ft-lbs).

(19) (45) If necessary, lubricate the idler wheels at grease fittings until grease appears at joints. Use low temperature grease only (P/N 498 028 100).

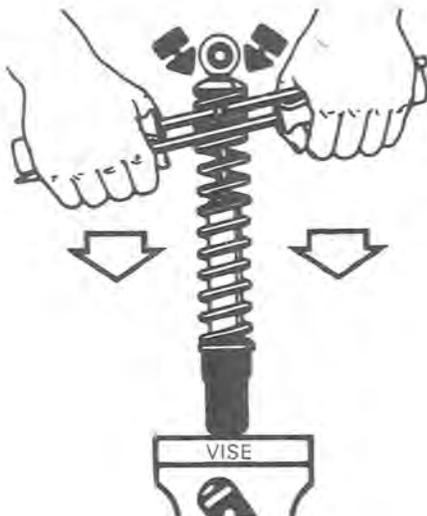
○ **NOTE:** To adjust the track tension and alignment, refer to section 05-05.

◆ **WARNING:** Ensure to install the special washer (84) as illustrated or the shock absorber rubber bushing may slip out of their shock eye.

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 screwdrivers as illustrated, remove the spring collar and the spring.



Install the new spring

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.



▼ **CAUTION:** Do not clamp directly on shock body.

Compress and extend each shock by hand at various speeds and compare the resistance of one shock to the other.

○ **NOTE:** Obtain a known good shock for comparison purposes and keep in mind that the rebound resistance (extending the shock) is normally stronger than the compression resistance.

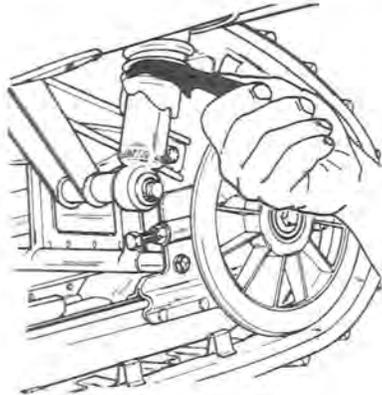
Pay attention to the following conditions that will denote a defective shock:

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

REAR SUSPENSION ADJUSTMENT

Shock spring adjustment

The rear suspension may be adjusted by turning the shock absorber cam collars with the adjustment key.



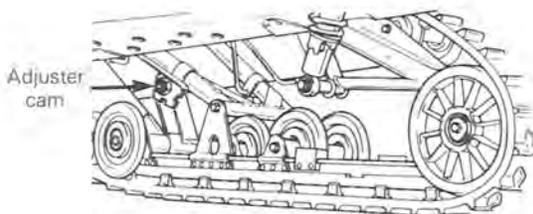
- 1st Position: For rider weight of 0 to 68 kg (0 to 150 lbs).
- 2nd Position: For rider weight of 68 to 82 kg (150 to 180 lbs).
- 3rd Position: For rider weight of 82 kg (180 lbs) and higher.

CAUTION: Always turn the left side adjuster block in a clockwise direction, the right side adjuster block in a counter-clockwise direction. Left and right adjuster blocks must always be set at the same elevation.

Front spring adjustment

The suspension can be tuned to the rider's specific requirement using the front adjuster cams.

CAUTION: Always turn the left side adjuster cam clockwise, the right side adjuster cam counter-clockwise. Left and right adjuster cams must always be set at the same position.

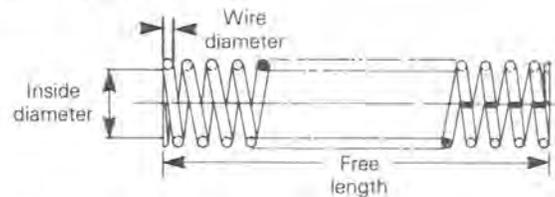


NOTE: It is possible to use "Optional" shock springs (P/N 503 069 400) on rear shock absorbers. (See shock spring diagram.)

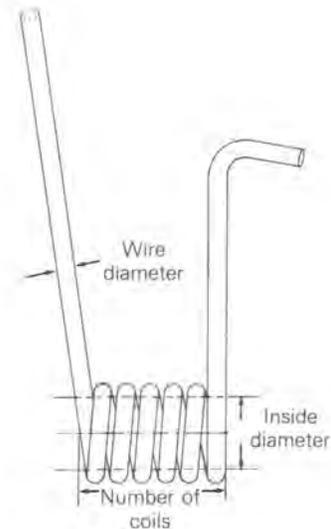
CAUTION: Optional parts are calibrated to operate together. Failure to follow this recommendation may affect handling of the vehicle.

SUSPENSION SPRING IDENTIFICATION

Shock springs



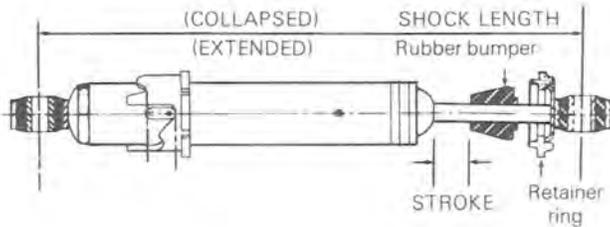
Slide suspension springs



Shock specifications

	REAR SHOCK (without spring)
Part number	414 476 400
Stroke	13.20 cm (5.200")
Length ① collapsed*	23.78 cm (9.360")
Length extended*	36.98 ± 0.3 cm (14.560 ± 0.125")
Colour code	Blue dot

SECTION 05 SUSPENSION SUB-SECTION 02 (SLIDE & MX SUSPENSIONS)



CAUTION: The front and rear shocks have different valving calibration and therefore must not be interchanged. Ensure that the shocks are properly positioned. Refer to the color code: white dot front, yellow dot rear.

① 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 always measured center to center of shock eyes.

Springs specifications

	SHOCK SPRINGS ①				FRONT SPRINGS ②			
	FRONT (STANDARD)	REAR (STANDARD)	FRONT (OPTIONAL)	REAR (OPTIONAL)	RIGHT SIDE (STANDARD)	LEFT SIDE (STANDARD)	RIGHT SIDE (OPTIONAL)	LEFT SIDE (OPTIONAL)
PIN	503 069 500	503 069 600	N.A.	503 069 400	414 477 500	414 477 600	N.A.	N.A.
NUMBER OF COILS	16.0	13.0	N.A.	15.0	5.5	5.5	N.A.	N.A.
FREE LENGTH	28.93 ± 30 cm (11.39 ± 0.12")	28.93 ± 30 cm (11.39 ± 0.12")	N.A.	29.0 ± 30 cm (11.42 ± 0.12")	②	②	②	②
SPRING RATE	14.35 ± 0.7 kN/m (82 ± 4 lbs/in)	16.62 ± 0.7 kN/m (95 ± 4 lbs/in)	N.A.	19.25/28.0 ± 0.7 kN/m (110/160 ± 4 lbs/in)	N.A.	N.A.	N.A.	N.A.
INSIDE DIAMETER	+ 0.76 38.35 - 0.00 mm (+ .030" 1.51 - .000")	+ 0.76 38.35 - 0.00 mm (+ .030" 1.51 - .000")	N.A.	+ 0.76 38.35 - 0.00 mm (+ .030" 1.51 - .000")	34.8 mm	34.8 mm	N.A.	N.A.
WIRE DIAMETER	8.65 ± .05 mm (0.262 ± .002")	6.65 ± .05 mm (0.262 ± .002")	N.A.	7.14 ± .05 mm (0.281 ± .002")	10.31 mm (0.406")	10.31 mm (0.406")	N.A.	N.A.
COMPRESSED LENGTH	10.79 cm (4.25")	8.38 cm (3.30")	N.A.	10.89 cm (4.29")	N.A.	N.A.	N.A.	N.A.
COLOUR CODE	Green/Red	Green/Blue	N.A.	Green/Yellow	Yellow	Yellow	N.A.	N.A.

① "Shock Springs" illustration

② "Slide Suspension Springs" illustration

N.A.: Not applicable

OPTIONAL PARTS INSTALLATION

Lift the rear of the vehicle until the track is "off" the ground.

Remove the shock covers.

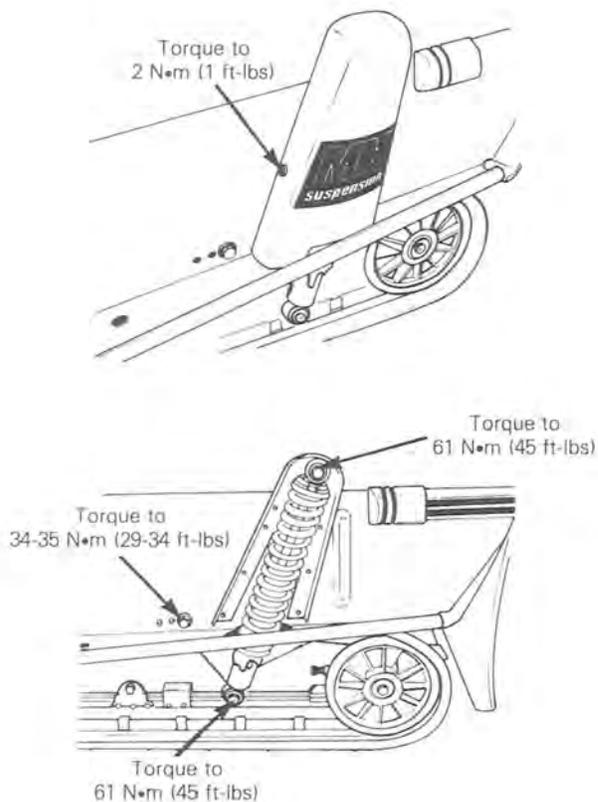
Remove the shock assemblies.

Remove the springs from the shocks.

Install optional springs (503 069 400) on the shocks.

Install the two (2) shock assemblies on vehicle, torque the retainer bolts to 61 N•m (45 ft-lbs). Refer to the illustration.

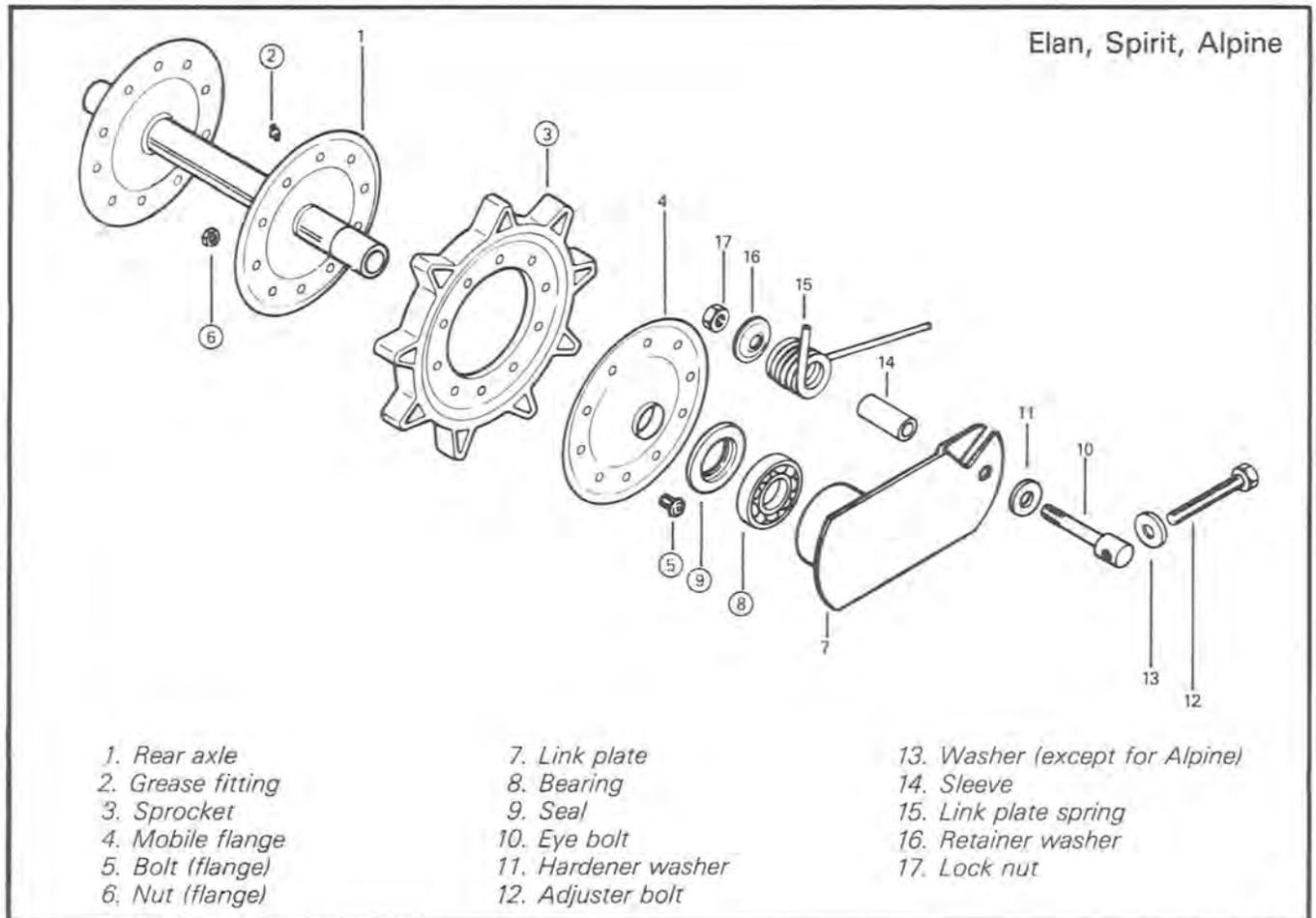
Install the shock covers and torque the retainer screws to 2 N•m (1 ft-lbs) - refer to illustration.



○ **NOTE:** To adjust the track tension and alignment, refer to section 05-05.



REAR AXLE



REMOVAL

Lift and block rear of vehicle off the ground.

Remove the link plate spring lock nuts and retainer washers.

Using an appropriate tool unlock link plate springs.

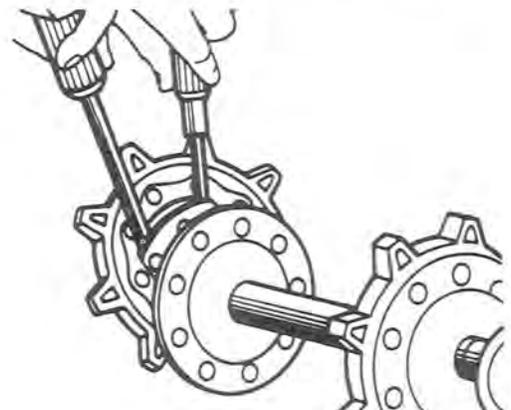
Remove track adjuster bolts, eye bolts, hardener washers and adjuster sleeves.

Withdraw rear axle from vehicle.

DISASSEMBLY & ASSEMBLY

③ Idler wheels and 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.

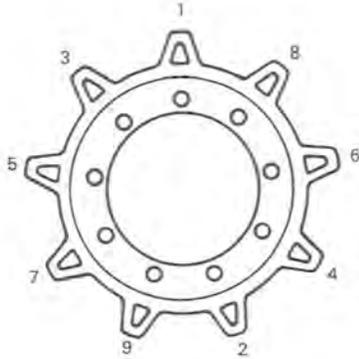


SECTION 05 SUSPENSION

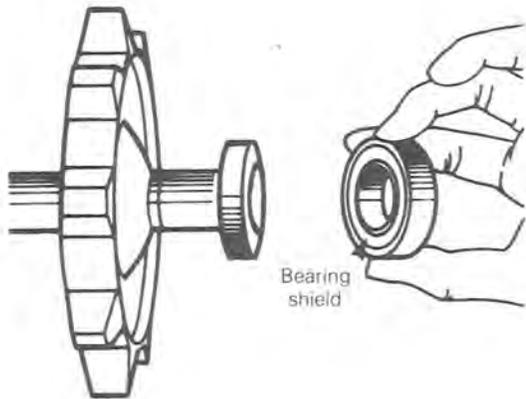
SUB-SECTION 03 (REAR AXLE)

Secure idler wheels and flanges using bolts and nuts tightened in the following sequence to 3.5 N•m (3 ft-lbs).

⑤⑥ Tightening torques for sprockets are 3.5 N•m (3 ft-lbs).



⑧ Always pull or push the bearing by inner race. Install bearing with shield facing the sprocket.



⑨ 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

With rear of vehicle off the ground, position the rear axle within the track.

Install sleeves, hardener washers and eye bolts.

Partially screw-in the track adjuster bolts.

Hook the link plate springs. If applicable, hook springs into middle position of 3 position anchors.

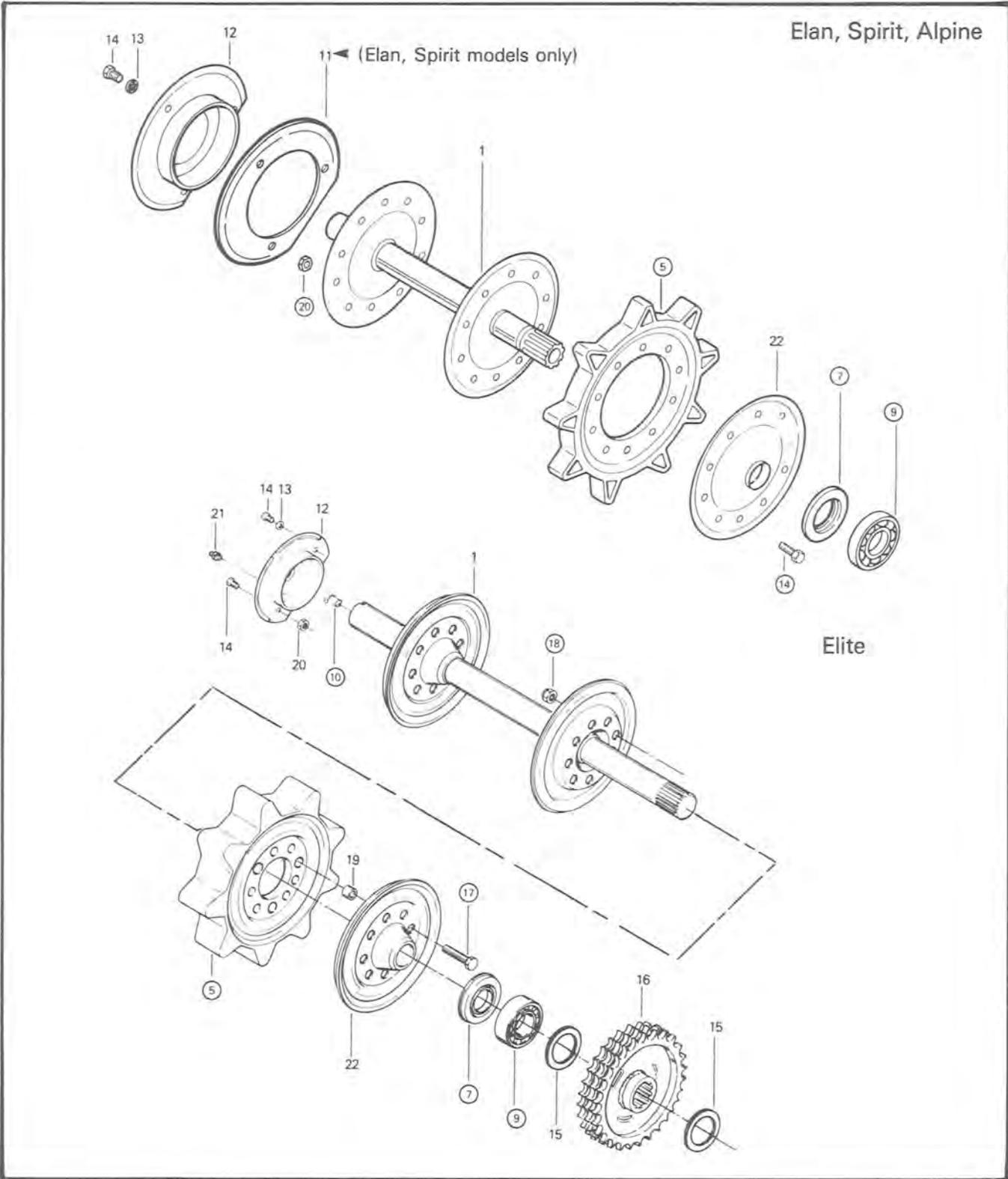
Install retainer washers and partially tighten the link plate spring lock nuts.

Carry out track tension and alignment.

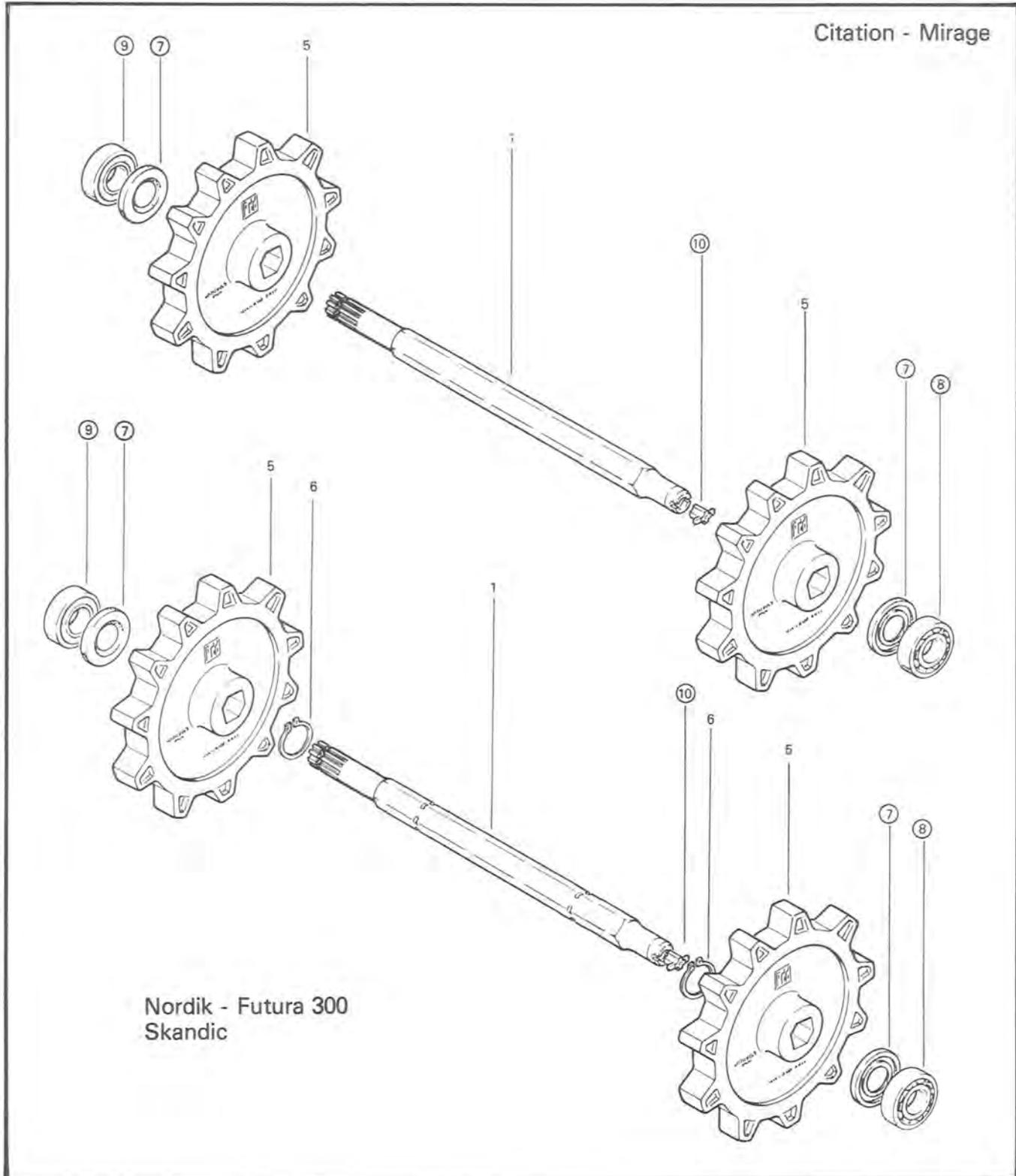
② If necessary, lubricate idler wheels at grease fittings until grease appears at joints. Use low temperature grease only (P/N 498 028 100).

○ **NOTE:** To adjust the track tension and alignment, refer to Section 05-05.

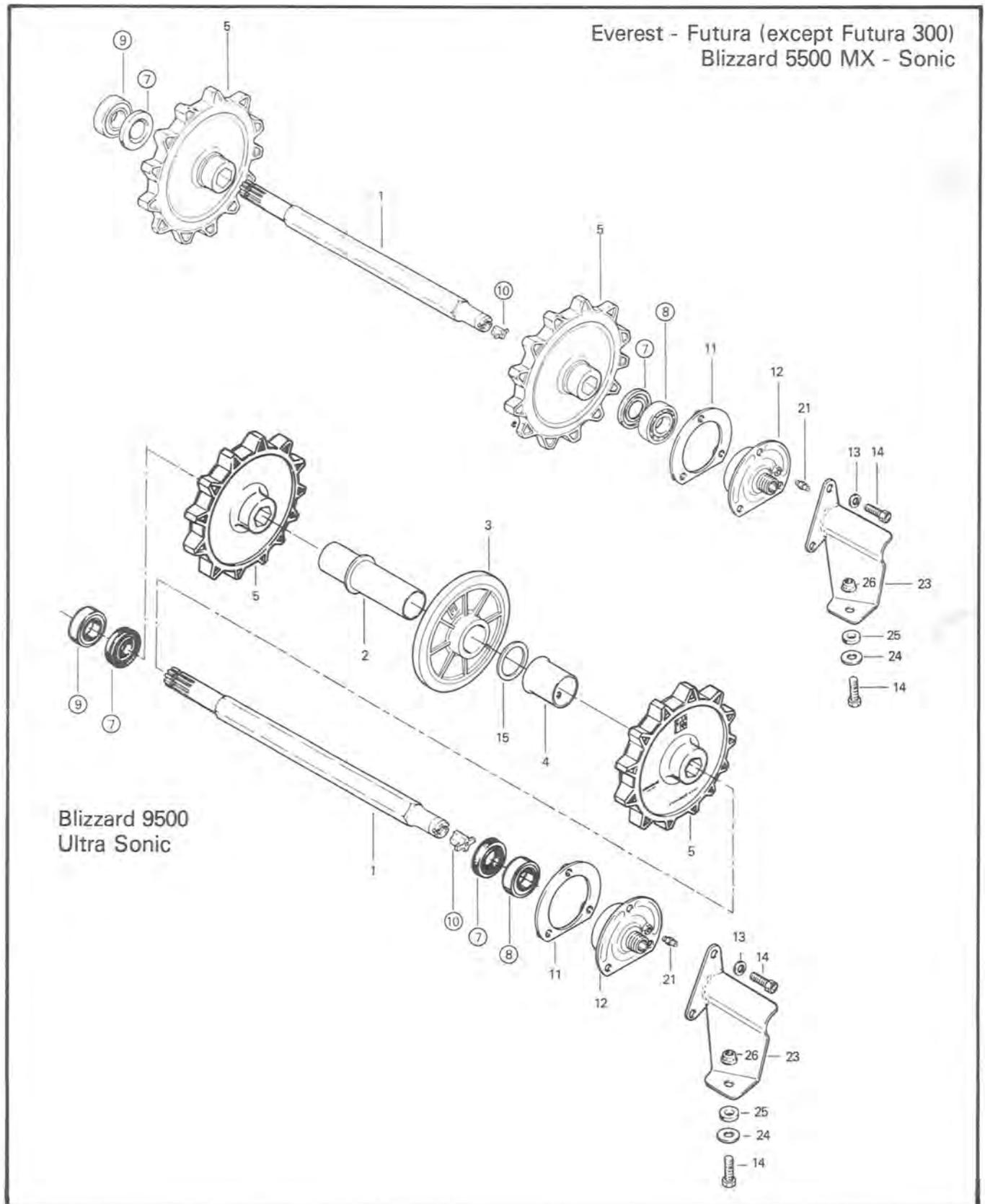
DRIVE AXLE



SECTION 05 SUSPENSION
SUB-SECTION 04 (DRIVE AXLE)



SECTION 05 SUSPENSION
SUB-SECTION 04 (DRIVE AXLE)



SECTION 05 SUSPENSION

SUB-SECTION 04 (DRIVE AXLE)

1. Drive axle
2. Spacer tube
3. Idler
4. Spacer tube
5. Sprocket
6. Circlip
7. Seal
8. Bearing
9. Bearing
10. Speedo drive insert
11. Retainer ring
12. End bearing housing
13. Lockwasher 5/16

14. Hexagonal head cap screw 1/4-20 x 3/4
15. Shim
16. Sprocket 34 teeth
17. Hexagonal head cap screw 1/4-20 x 1
18. Hexagonal elastic stop nut 1/4-20
19. Bushing
20. Hexagonal flanged elastic stop nut 1/4-20
21. Grease fitting
22. Mobile flange
23. Cable protector
24. Flat washer 17/64 x 7/8 x .060
25. Rubber spacer
26. Hexagonal flanged elastic stop nut 1/4-20

REMOVAL

Drain oil from chaincase or gear box. Release drive chain tension (if applicable).

Raise and block rear of vehicle off ground.

Remove suspension.

Pry oil seals from chaincase and end bearing housing.

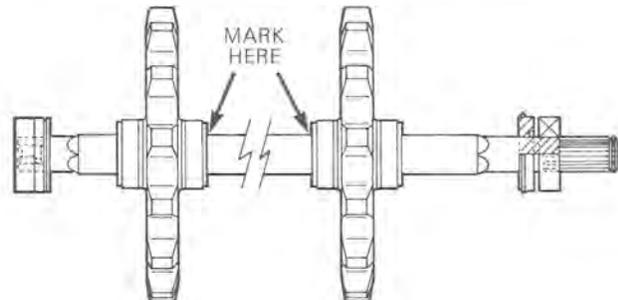
Remove end bearing housing and unlock drive axle sprocket (single track models).

NOTE: If applicable, remove battery and its seat. If vehicle is equipped with a speedometer, remove angle drive unit and coupling cable.

Release drive sprocket 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.

⑤ When replacing sprockets, make a reference mark on the axle to facilitate reassembly of the new sprockets.

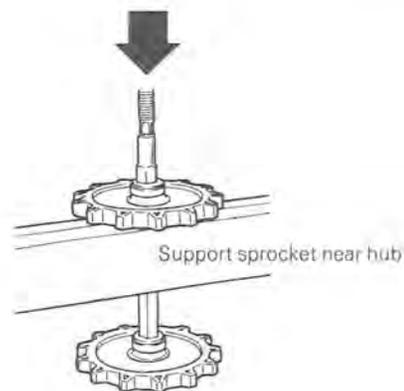
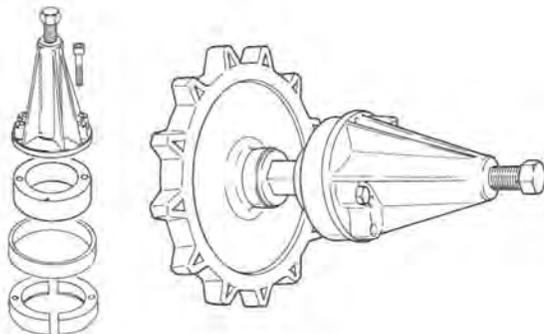


To remove, press fit sprockets (drive axle without flange), use a press and a suitable support as illustrated.

DISASSEMBLY

⑩ Remove speedo drive insert (if applicable).

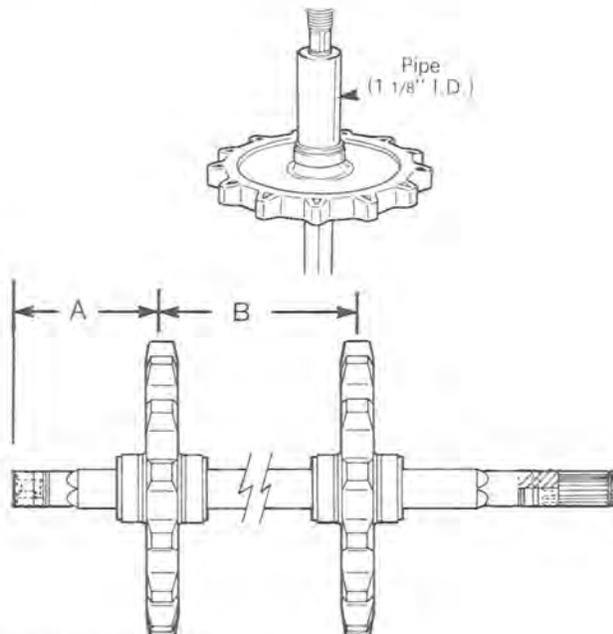
⑦ ⑧ To remove bearings, use puller assembly, ring and half rings as illustrated. (Refer to tools section).



ASSEMBLY

NOTE: 1982 models have two different axle-sprocket press fits. Ensure to replace ring reinforced sprockets with the same type.

⑤ To assemble press fit sprockets, use a press and a pipe (1 1/8 I.D.) as illustrated. Sprockets must be assembled with the following dimensions.



On Citation and Mirage models:

Dimension A = 100 mm (3 15/16")

Dimension B = 225.5 mm (8 7/8")

On Everest, Futura (Futura 300 excepted), Blizzard 5500 MX, Sonic, Blizzard 9500 and Ultra Sonic models:

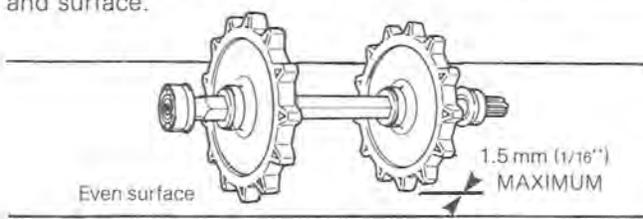
Dimension A = 104.5 mm (4 7/64")

Dimension B = 242 mm (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.

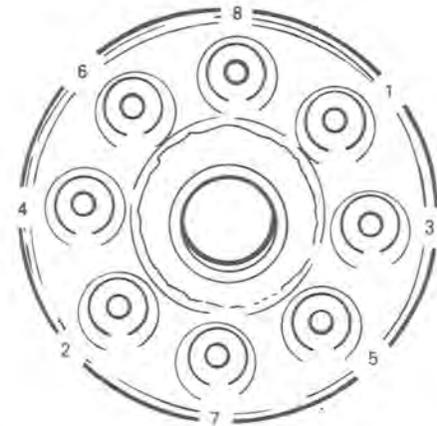


CAUTION: The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

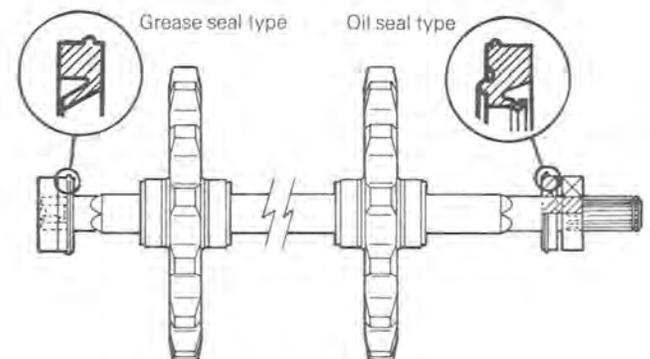
NOTE: Idler wheel ③ must turn freely.

⑭ ⑰ ⑱ ⑳ Tightening torque for axle flanges is 3-4 N•m (2-3 ft-lbs).

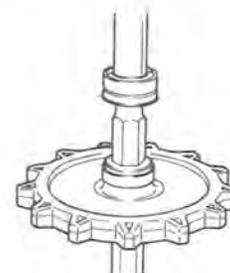
When reassembling, install a new nut or apply "Loctite" (or equivalent) on old threads. Tighten in the following sequence.



⑦ When assembling drive axle, always position a new seal on each end of drive axle. The seal lip must face sprocket as illustrated.

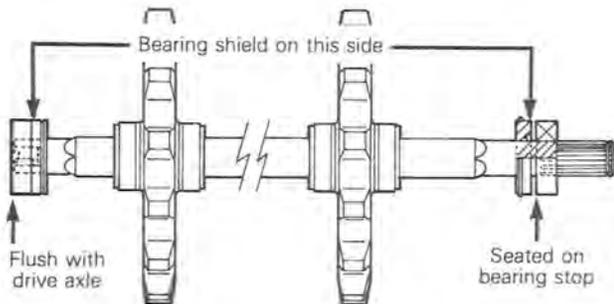


⑧ ⑨ Always push bearing by inner race.



SECTION 05 SUSPENSION SUB-SECTION 04 (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.



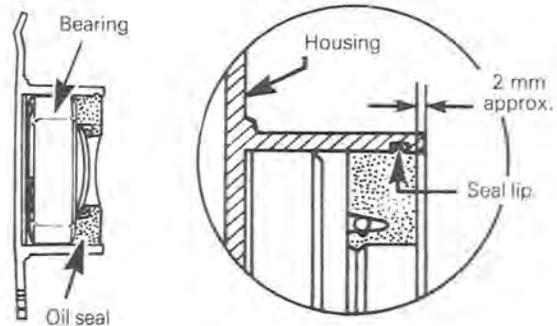
⑩ If the drive axle to be installed is a new component, and the vehicle is equipped with a speedometer, a correct size speedometer drive insert must be installed into the axle end. Ensure that insert is flush with end of axle.

INSTALLATION

If the drive axle to be installed is a new component and the vehicle is equipped with a speedometer, a 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.



Lock drive axle sprocket with a new cotter pin (Elan/Spirit models) or circlip (other single track models).

Reinstall the chaincase cover.

Refill with chaincase oil.

Install the suspension. Apply track tension and carry out track alignment procedure.

TRACK

TRACK TYPE APPLICATION

Refer to the "Technical Data" section (09-05).

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: Never run a vehicle with a damaged track.**

REMOVAL

Elan, Spirit

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

Citation, Mirage, Nordik, Futura 300, Skandic

Remove the following items:

- Pulley guard and drive belt
- Air silencer
- Injection oil reservoir (if so equipped)
- Battery and battery support (if so equipped)
- Speedometer, angle drive (if so equipped)
- Chaincase cover, sprockets and chain
- Suspension
- Countershaft bearing housing (clamp)
- Drive axle shaft bearing housing (left side)
- Drive axle (outwards from left side)
- Upper center idler(s) assembly
- Track

Everest, Futura, Blizzard, Blizzard MX, SONIC MX, ULTRA SONIC

Remove the following items:

- Speedometer cable and angle drive (if so equipped)
- Chaincase cover, sprockets and chain
- Suspension
- Two drive axle seals
- Chaincase
- Drive axle (outwards from chaincase side)
- Upper center idler wheel (if applicable)
- Track

Alpine

Remove the following items:

- Release the chain tensioner of the transmission chain
- Bogie wheels
- Rear axle assembly
- Drain the transmission oil
- Drive axle seal(s)
- End bearing(s) housing
- Drive axle(s) (outwards from end bearing(s) housing)
- Track

Elite

Remove the following items:

- Release the chain tensioner of the transmission chain
- Suspension
- Drain the chaincase oil
- Drive axle seal(s)
- Drive axle end bearing housing access plug(s)
- Drive axle(s) (outwards from end bearing(s) housing)
- Track

(On Alpine and Elite models, use the same removal procedure for each track).

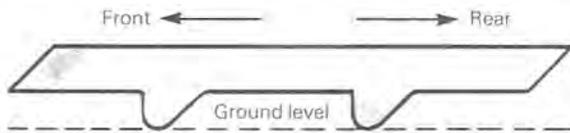
SECTION 05 SUSPENSION SUB-SECTION 05 (TRACK)

INSTALLATION:

All models:

Reverse the removal procedure.

○ **NOTE:** When installing the track, ensure the right angle of bearing surface of the track rib is facing the front of vehicle.



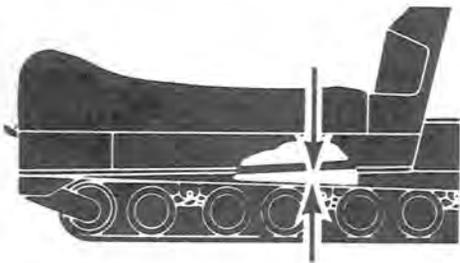
Track tension & alignment

Track tension and alignment are inter-related. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

▼ **CAUTION:** Each item must be installed following the procedure detailed in this manual.

Tension (bogie wheel), Elan, Spirit

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 and bottom of foot board.



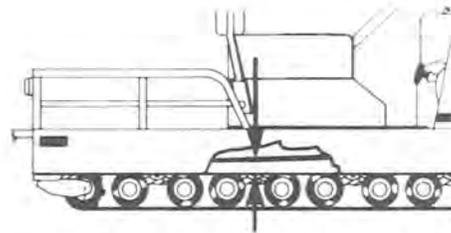
If applicable, ensure that the link plate springs are in the middle position of the 3 position slotted anchors.

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 counter-clockwise to slacken.

Tighten link plate spring lock nuts.

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.



To correct track tension, loosen link plate spring lock nuts on inner side of link plate springs. Turn adjuster bolts clockwise to tighten track or counter-clockwise to slacken.

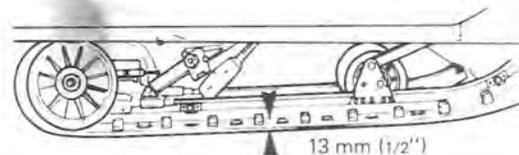
Tighten link plate spring lock nuts.

▼ **CAUTION:** Too much 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.

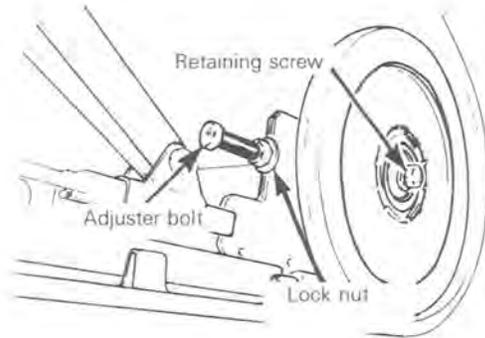
Tension (for all slide suspension models except Blizzard 5500 MX and Sonic MX)

Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap 13 mm (1/2") between the slider shoe and the bottom inside of the track.



▼ **CAUTION:** Too much or too little tension will result in power loss and excessive stresses on suspension components.

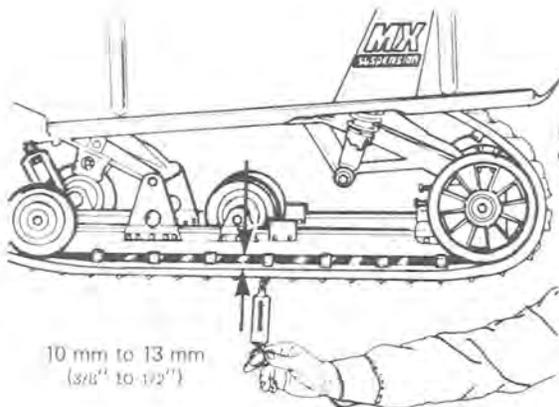
To adjust, Loosen the rear idler wheel retaining screw and the adjuster bolt lock nut; then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



○ **NOTE:** If the track tension is too loose, the track will have a tendency to thump.

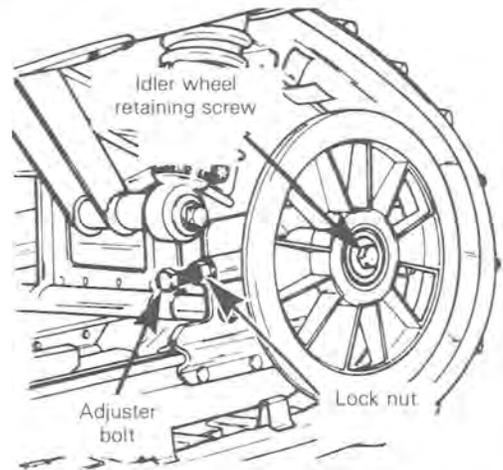
Tension (for Blizzard 5500 MX and Sonic MX)

Lift rear of vehicle and support it with a stand. Allow the track to extend normally. Adjust the gap between track and slider shoe between 10 mm & 13 mm (3/8" & 1/2") when pulling down on the track with a force of 3 kg (6.5 lbs).



▼ **CAUTION:** Too much or too little tension will result in power loss and excessive stresses on suspension components.

To adjust, loosen the rear idler wheel retaining screw and the adjuster bolt lock nut, then loosen or tighten the adjuster bolts.



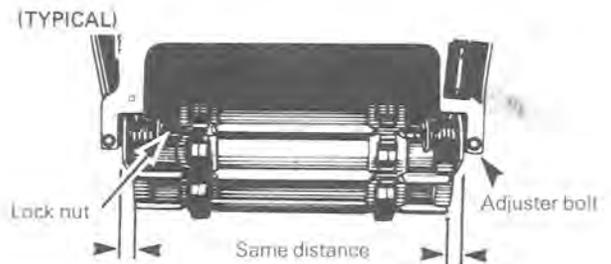
○ **NOTE:** If the track tension is too loose, the track will have a tendency to thump.

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.



Rotate track slowly and recheck alignment and tension.

SECTION 05 SUSPENSION SUB-SECTION 05 (TRACK)

To correct alignment, loosen link plate spring lock nut on side where track is closest to the link plate.

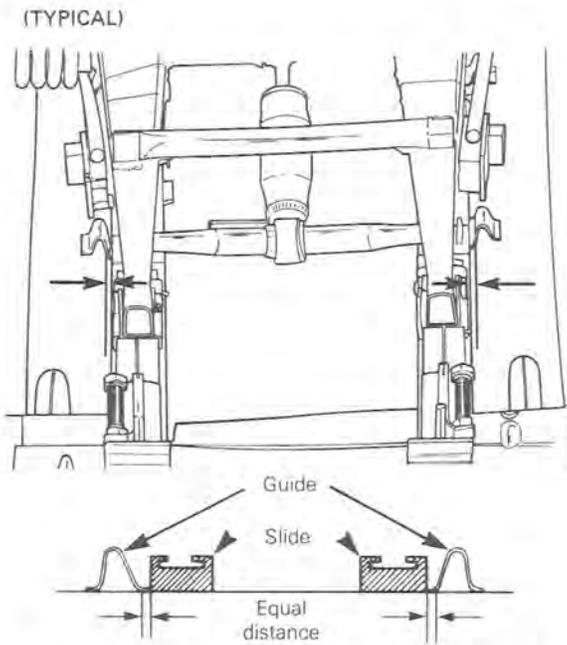
Turn track adjuster bolt on same side, clockwise until track re-aligns.

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 closest to slide. Tighten lock nuts and recheck alignment.



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 N^o. 529 004 500 tool (with two standard jigs)

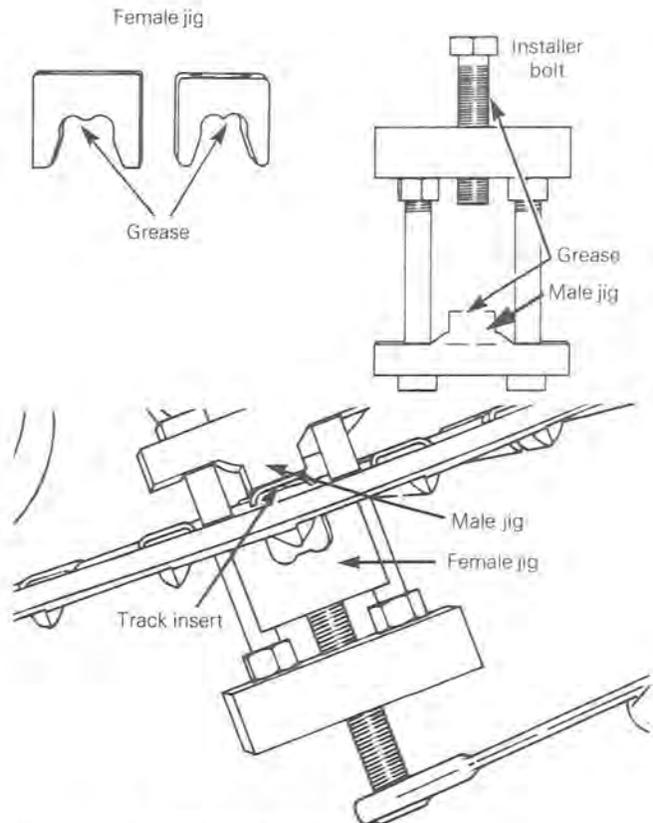
("Moto-Ski" jig P/N 529 004 300)

Tilt vehicle on its side to expose the track notches then place insert into position.

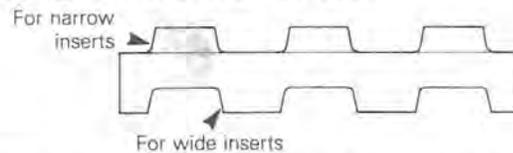
Place the track insert installer into track notches and position male jig on top of track insert.

Tighten installer bolt until track insert is locked in place.

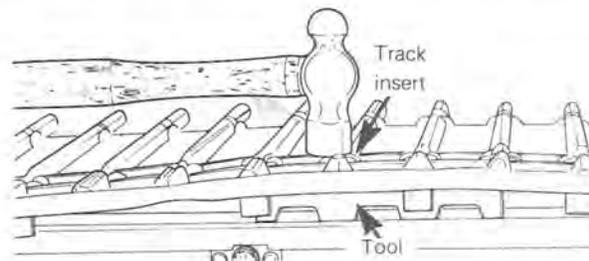
CAUTION: To prevent damages and for an easier operation of the tool, apply grease on male jig, female jig and to the installer bolt threads.



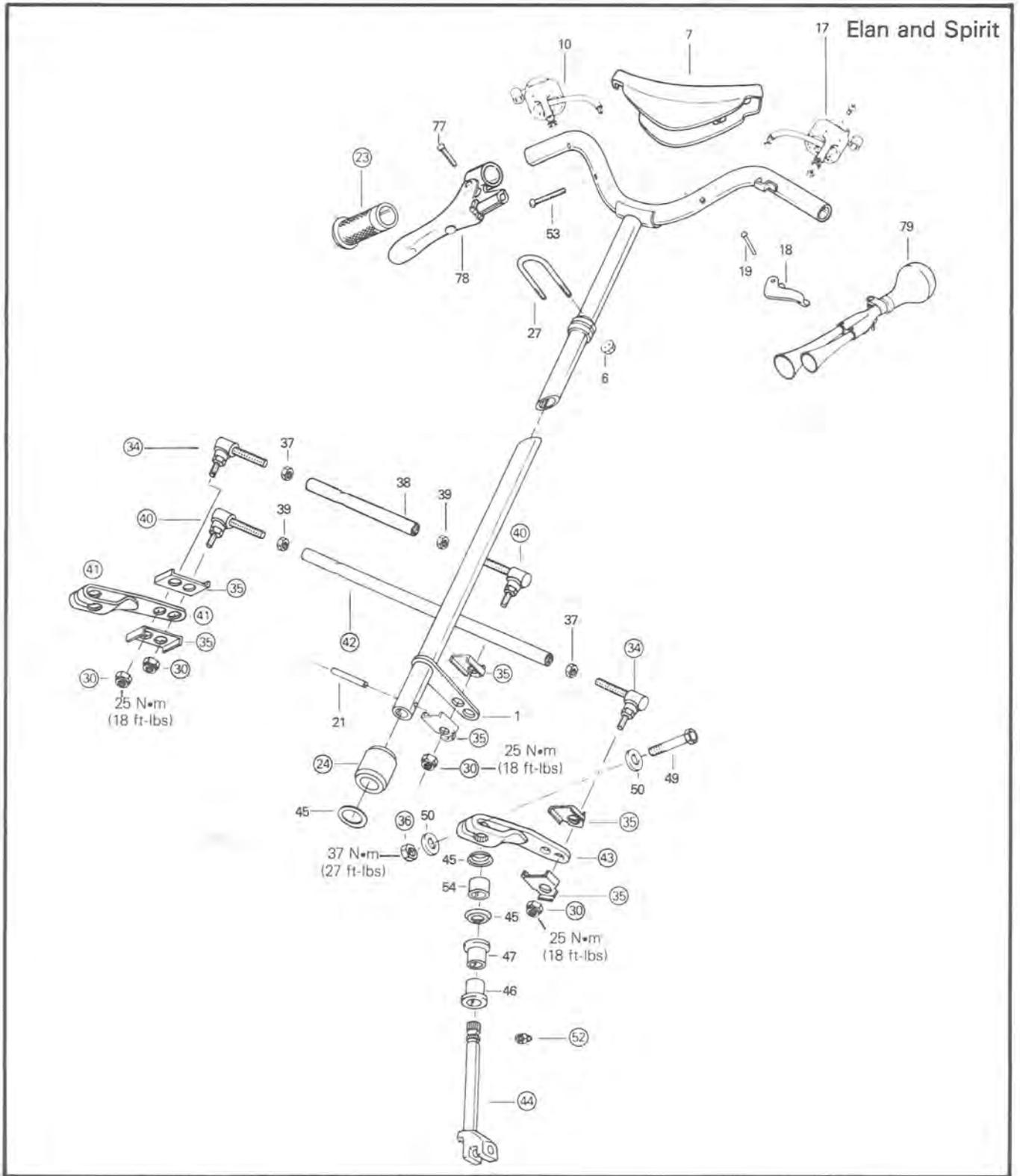
Using N^o. 529 002 600 tool



Place inserts into position and, with tool being under the inserts, tap them over the track using a hammer.

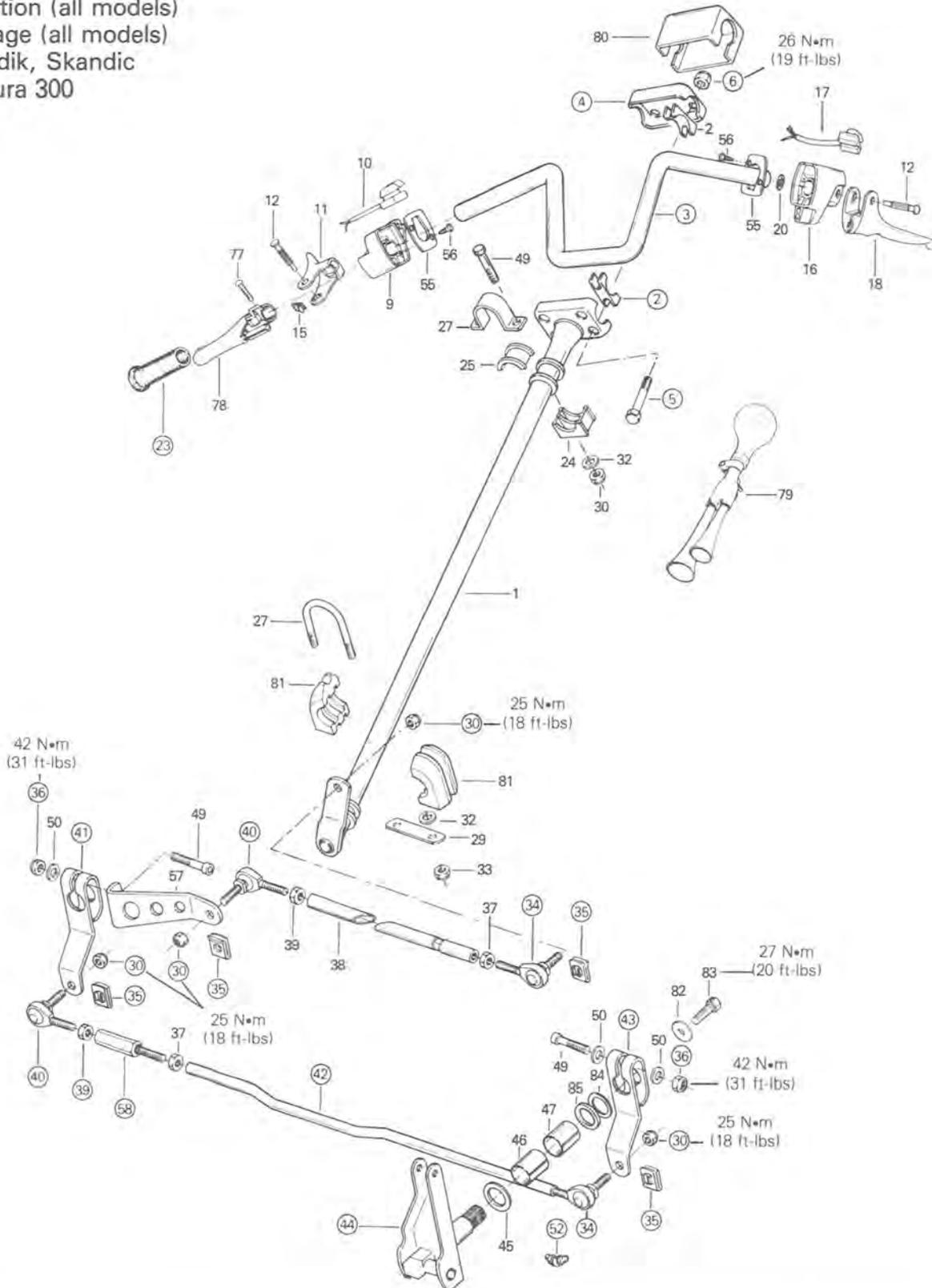


STEERING SYSTEM



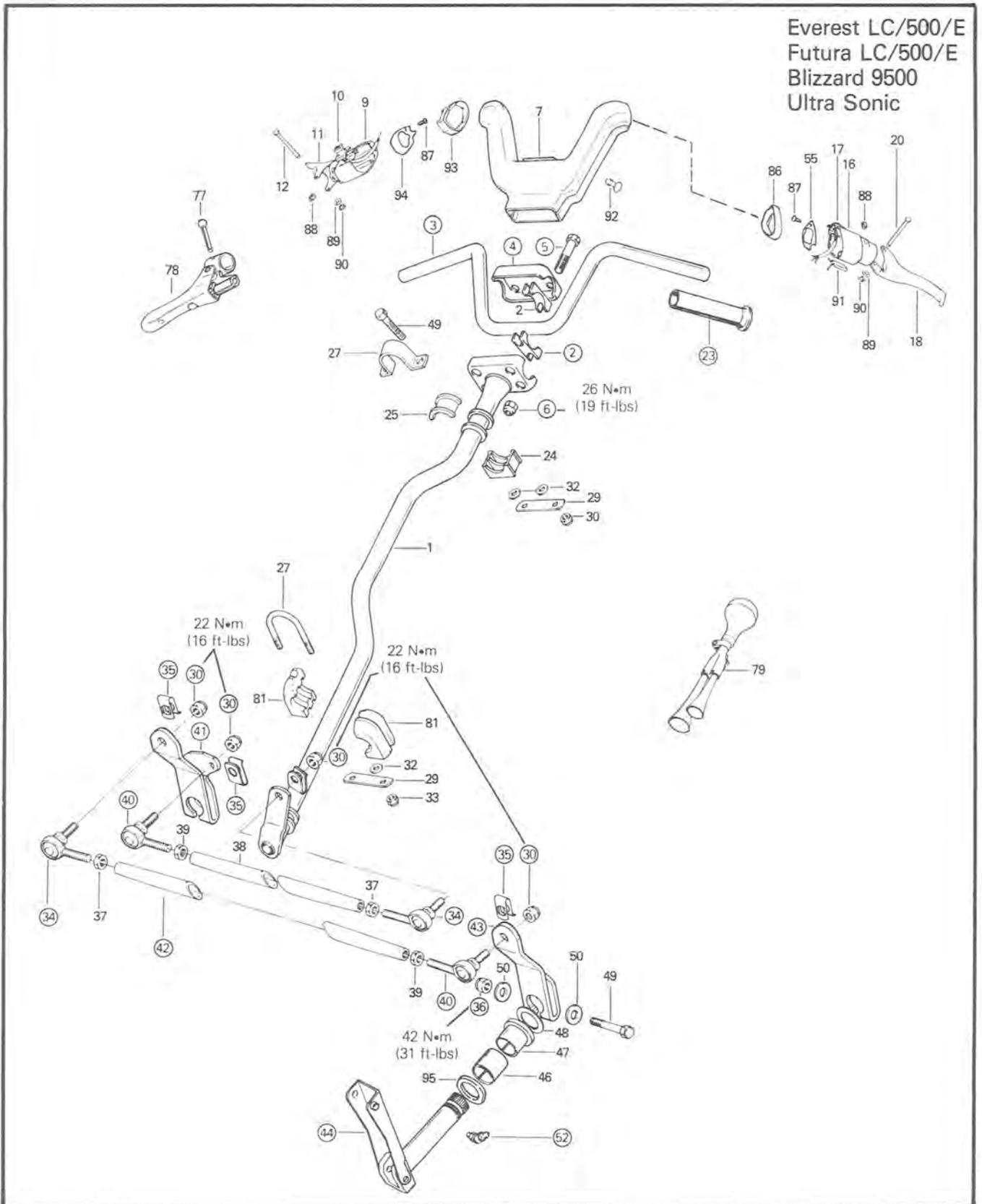
SECTION 06 STEERING/SKIS
 SUB-SECTION 01 (STEERING SYSTEM)

Citation (all models)
 Mirage (all models)
 Nordik, Skandic
 Futura 300



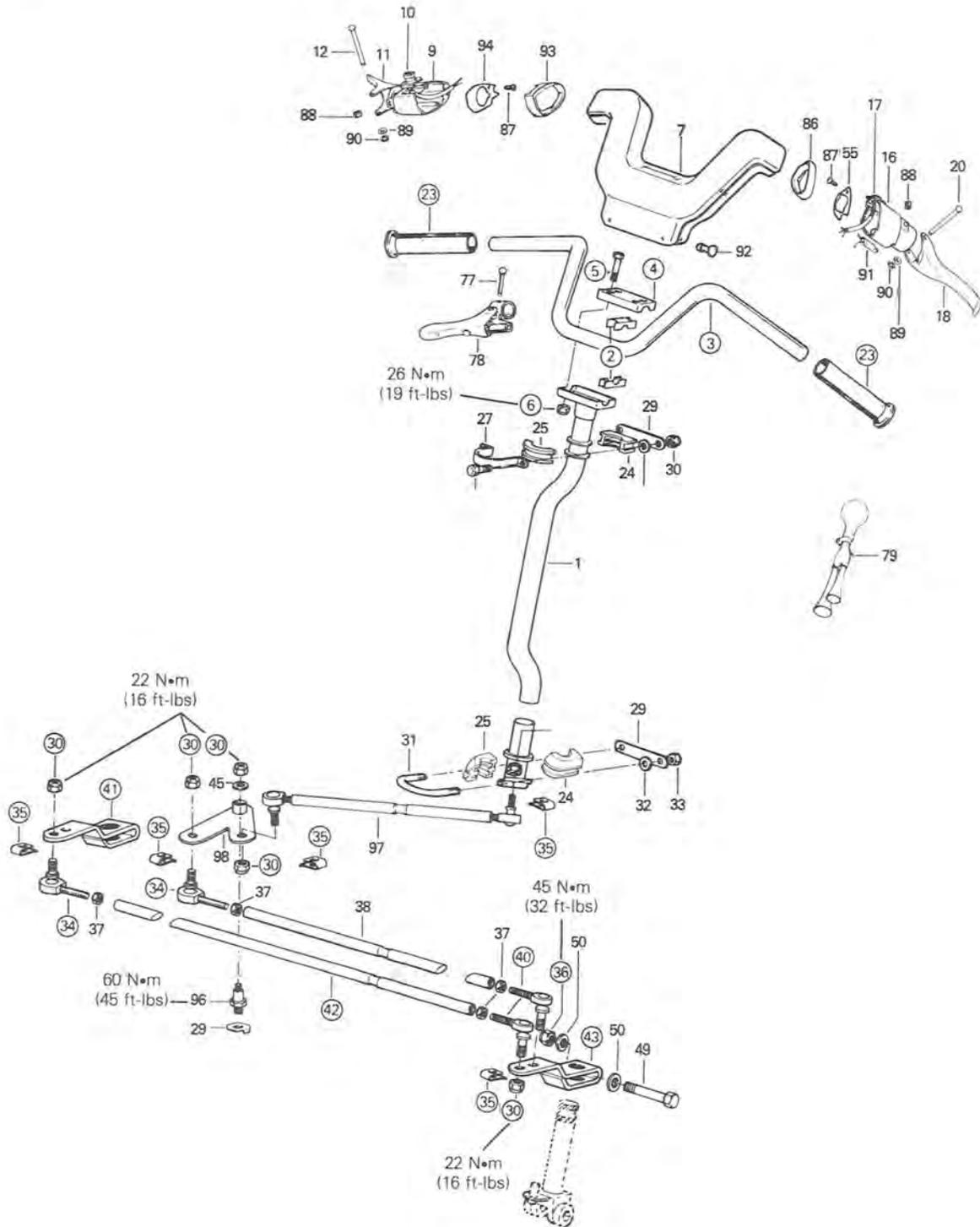
SECTION 06 STEERING/SKIS
 SUB-SECTION 01 (STEERING SYSTEM)

Everest LC/500/E
 Futura LC/500/E
 Blizzard 9500
 Ultra Sonic



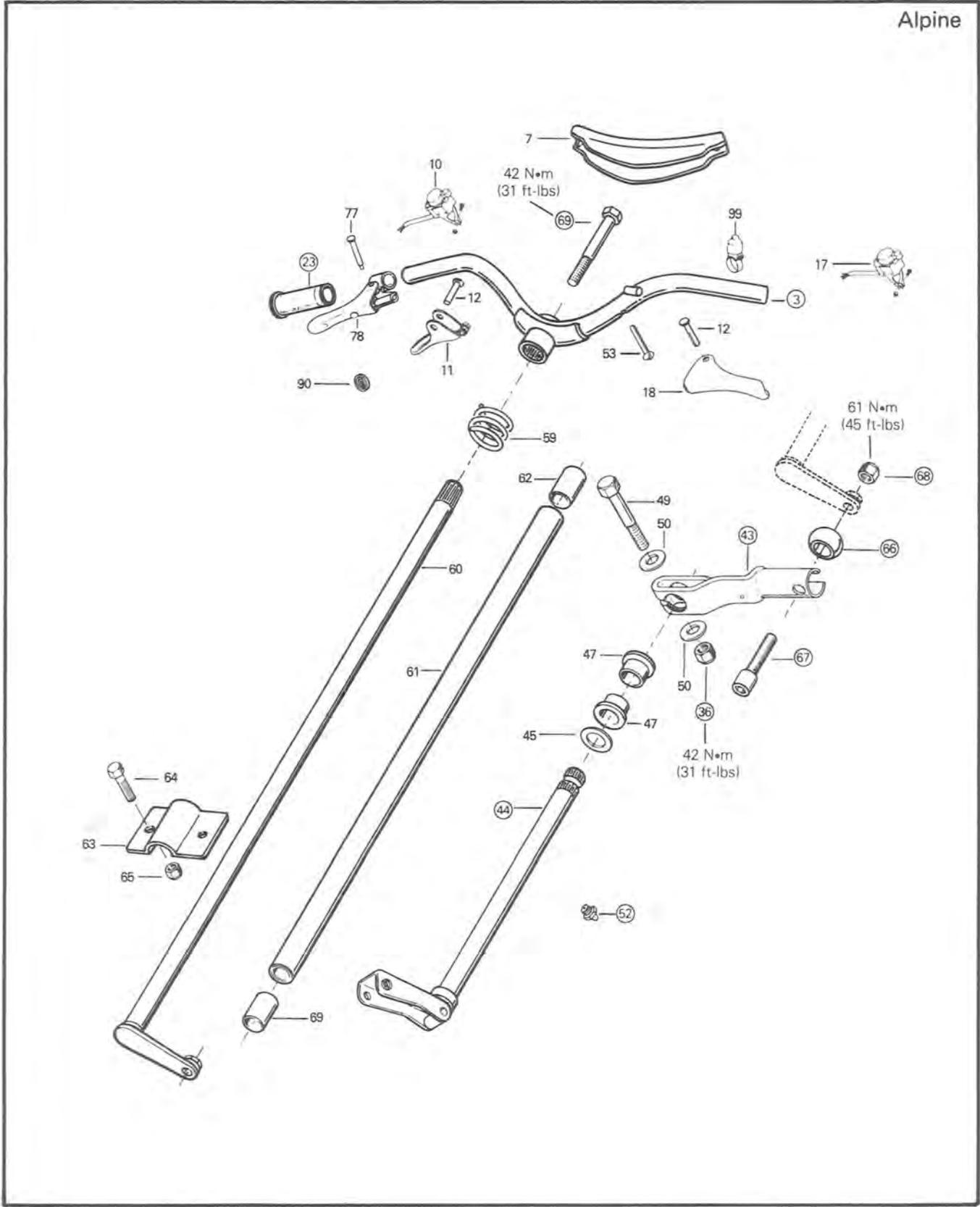
SECTION 06 STEERING/SKIS
SUB-SECTION 01 (STEERING SYSTEM)

Blizzard 5500 MX
Sonic MX



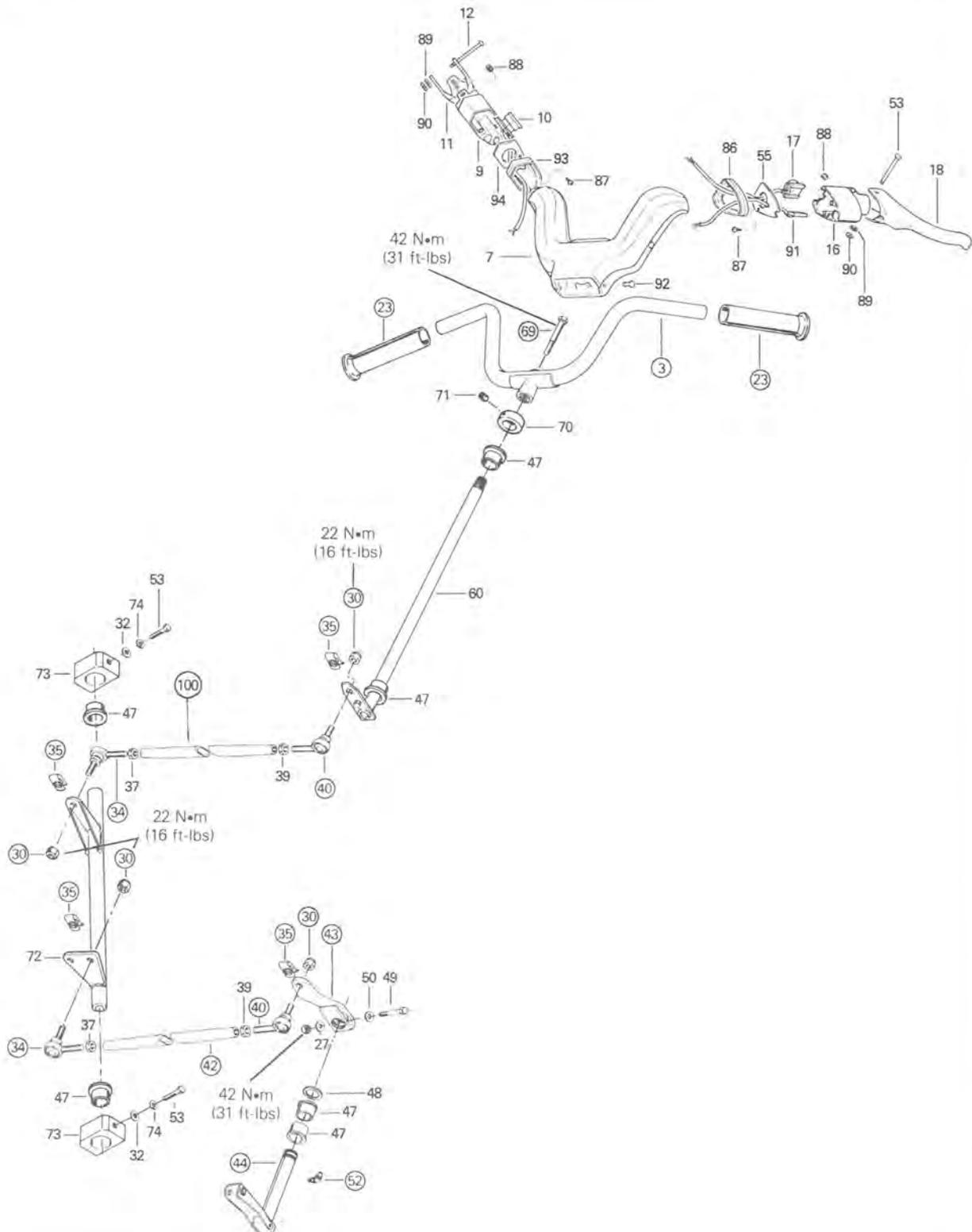
SECTION 06 STEERING/SKIS
SUB-SECTION 01 (STEERING SYSTEM)

Alpine



SECTION 06 STEERING/SKIS
SUB-SECTION 01 (STEERING SYSTEM)

Elite



SECTION 06 STEERING/SKIS
SUB-SECTION 01 (STEERING SYSTEM)

1. *Steering column*
2. *Handlebar support*
3. *Handlebar*
4. *Steering clamp*
5. *Cap screw*
6. *Elastic stop nut*
7. *Steering pad*
8. *Rivet*
9. *Throttle handle housing*
10. *Kill switch*
11. *Throttle handle*
12. *Pin*
13. *Nut*
14. *Screw*
15. *Retainer*
16. *Brake handle housing*
17. *Dimmer switch*
18. *Brake handle*
19. *Pin*
20. *Push nut*
21. *Spiral pin*
22. *Elastic stop nut*
23. *Grip*
24. *Lower bushing*
25. *Upper bushing*
26. *Retainer bracket*
27. *"U" clamp*
28. *Noise shield*
29. *Lock tab*
30. *Elastic Stop Nut*
31. *Retainer bracket*
32. *Flat washer*
33. *Elastic stop nut*
34. *Ball joint L.H.*
35. *Lock tab*
36. *Elastic stop nut*
37. *Jam nut L.H.*
38. *Tie rod*
39. *Jam nut R.H.*
40. *Ball joint R.H.*
41. *Steering arm*
42. *Tie rod*
43. *Steering arm*
44. *Ski leg*
45. *Washer*
46. *Bushing*
47. *Bushing*
48. *Shim*
49. *Cap screw*
50. *Flat washer*
51. *Elastic stop nut*
52. *Grease fitting*
53. *Screw*
54. *Rubber spacer*
55. *Housing cap*
56. *Screw*
57. *Steering arm extension*
58. *Turnbuckle*
59. *Spring*
60. *Steering shaft (main)*
61. *Steering column*
62. *Bushing*
63. *Retainer bracket*
64. *Bolt*
65. *Nut*
66. *Ball bushing*
67. *Allen bolt*
68. *Nut*
69. *Cap screw*
70. *Collar*
71. *Allen screw*
72. *Secondary steering shaft*
73. *Block*
74. *Lockwasher*
75. *Retainer ring*
76. *End cap*
77. *Rivet (Europe only)*
78. *Parking handle (Europe only)*
79. *Horn (Europe only)*
80. *Steering cover*
81. *Bushing*
82. *Flat washer 8.4 x 25*
83. *Cap screw*
84. *Spring washer*
85. *Washer 7/8"*
86. *Brake adaptor*
87. *Self tapping screw*
88. *Set screw*
89. *Washer*
90. *Circlip*
91. *Brake light switch*
92. *Dart*
93. *Throttle adaptor*
94. *Throttle cover*
95. *Brass washer*
96. *Pivot (stud)*
97. *Tie rod*
98. *Pivot arm*
99. *Horn button*
100. *Tie rod*

SECTION 06 STEERING/SKIS

SUB-SECTION 01 (STEERING SYSTEM)

INSPECTION

Check skis and runner shoes for excessive wear, replace as necessary. (See section 06-02.)

Make sure steering arm and ski leg splines interlock.

Check general condition of steering system.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY & ASSEMBLY

②③ 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.

③④ ④① 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 Technical Data.

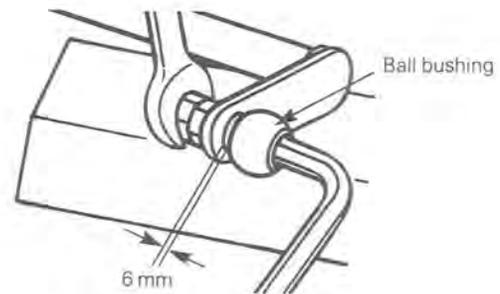
④① ④③ The steering arm angles should be equal on both sides when skis are parallel with vehicle.

③① Tighten ball joint nuts to specified torque and bend lock tabs over nuts. (See illustration.)

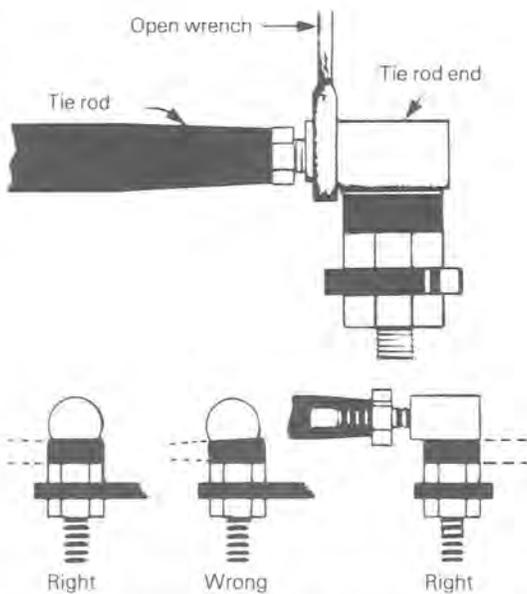
③⑥ Tighten steering arm nuts to specified torque and bend lock tabs over nuts. (See illustration.)

Alpine

⑥⑥ ⑥⑦ ⑥⑧ 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 ft-lbs)

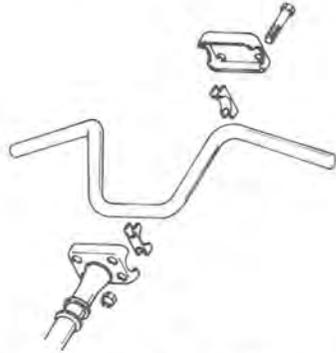


③⑤ When assembling components, always position new lock tabs.

ADJUSTABLE STEERING HANDLE

If applicable, remove and discard the U clamp and nuts holding the steering handle to the steering column.

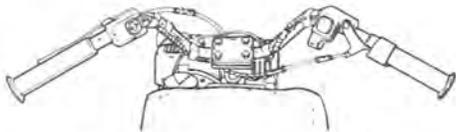
Install the four (4) clamps (2), the cover (4), the four (4) screws (5) and nuts (6) to the column, as illustrated.



On all vehicles, adjust the steering handle to the desired position.

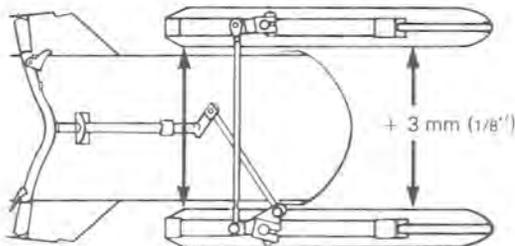
Lock the handle in place by tightening the four (4) screws to 26 N•m (19 ft-lbs).

CAUTION: Tighten the screws equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps.



WARNING: Do not adjust the handlebar too high to avoid contact between the brake lever and windshield, when turning.

STEERING ADJUSTMENT (SKIS)



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:

Loosen the jam nuts locking the tie rod(s) (37) (39) 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 and Elite)

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

When assembling steering arm (43) and ski leg (44) the handlebar must be horizontal with the ski perpendicular to the vehicle.

Elite

(3) (100) Check that handle bar is horizontal while skis are parallel with the vehicle. To correct, loosen tie rod jam nuts, turn manually until handle bar is horizontal.

Tighten jam nuts firmly.

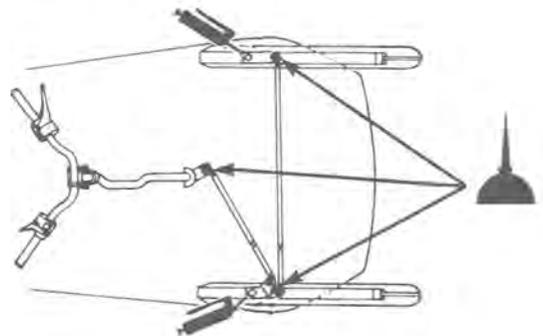
LUBRICATION

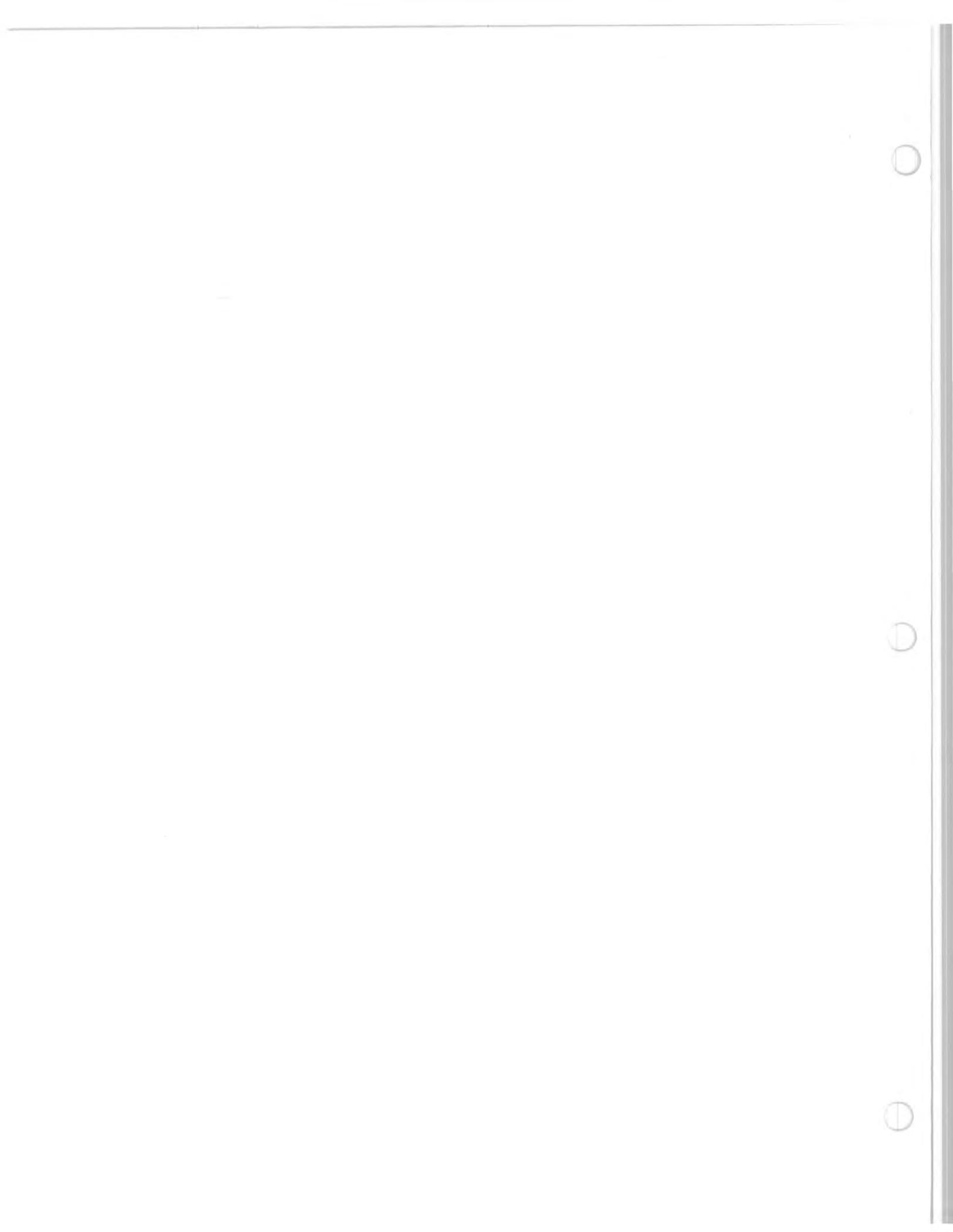
WARNING: Do not lubricate throttle and/or brake cable and housings, and spring coupler bolts.

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)

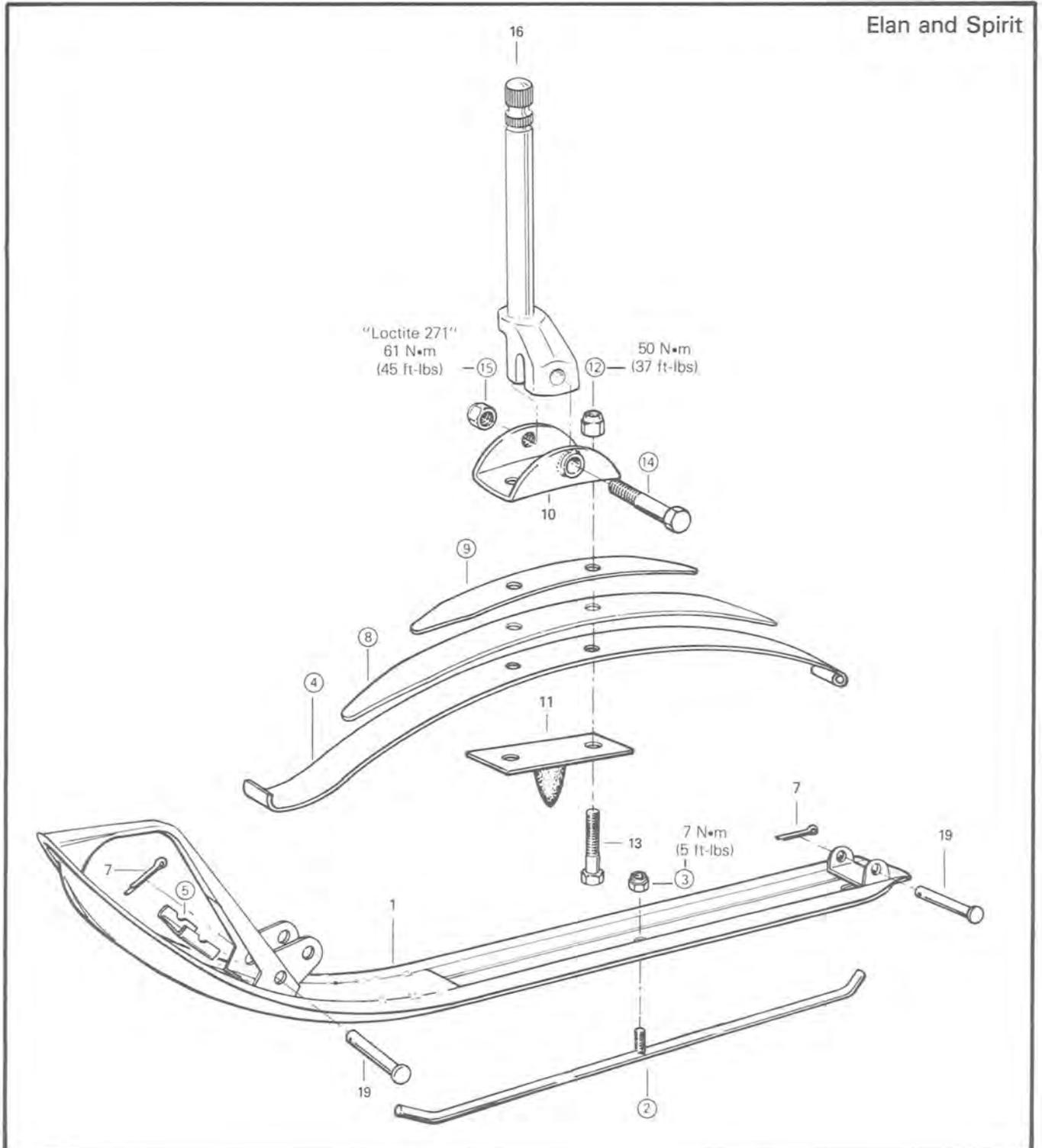




SKI SYSTEM

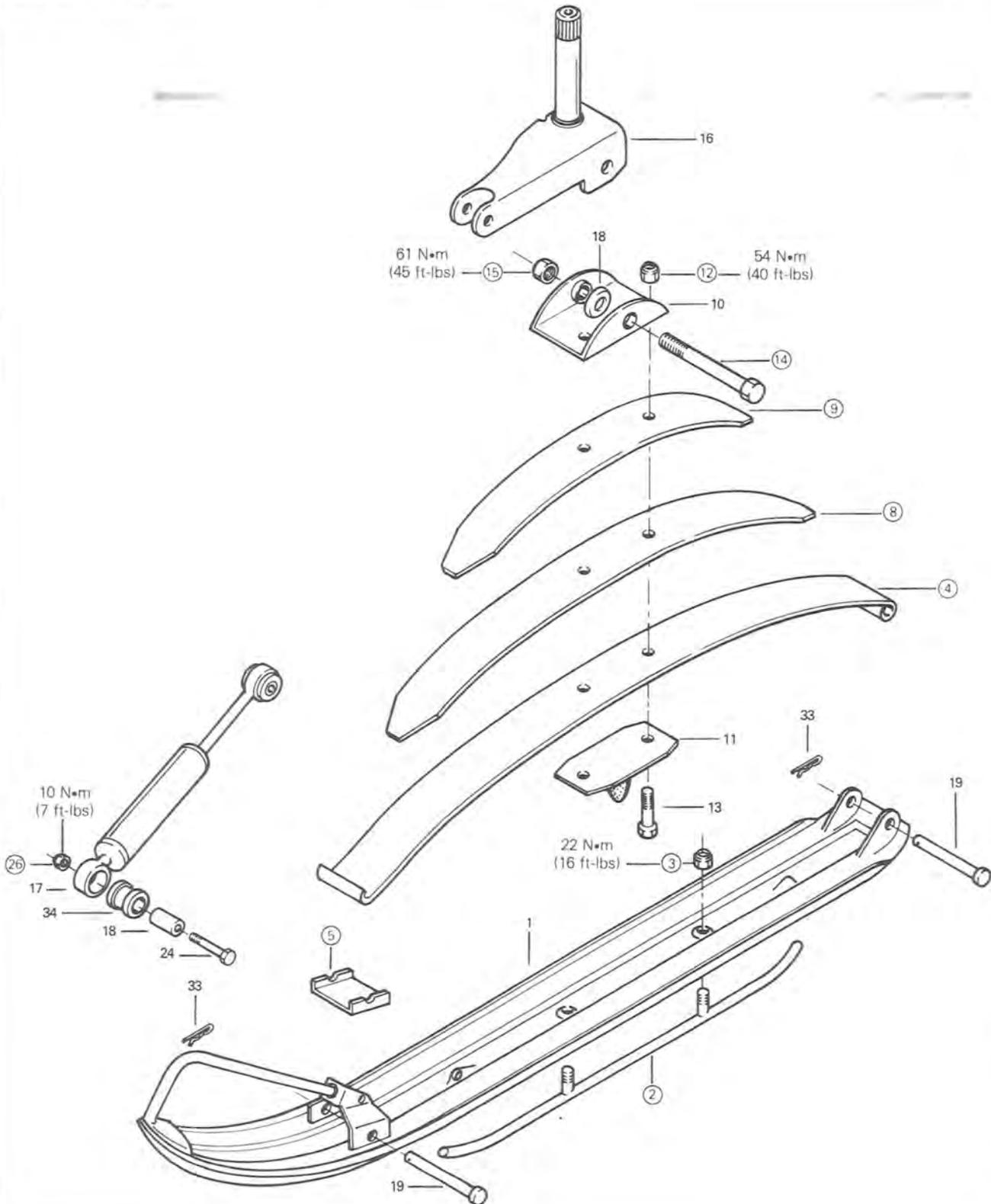
LEAF SPRING SUSPENSION

Elan and Spirit



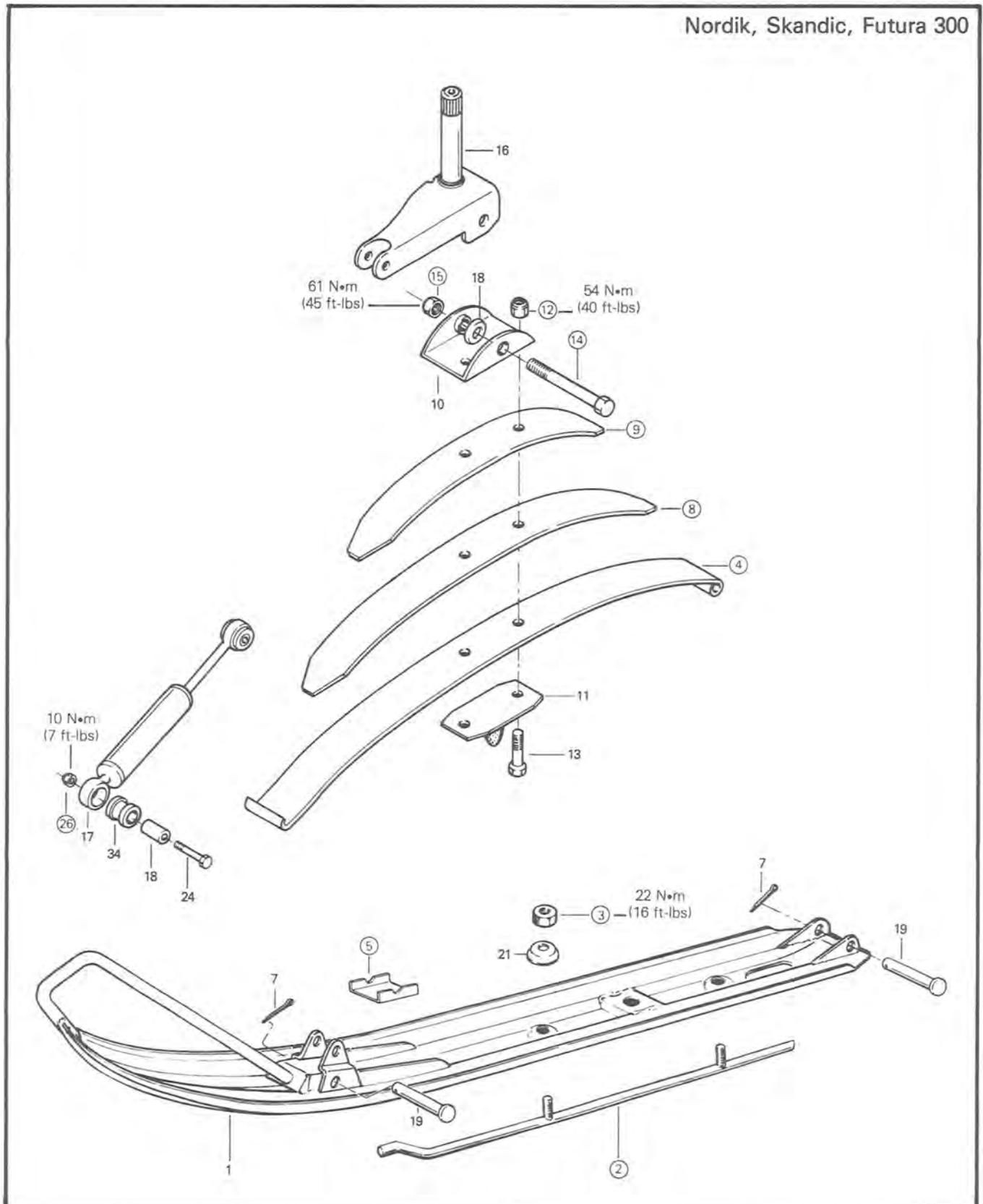
SECTION 06 STEERING/SKIS
SUB-SECTION 02 (SKI SYSTEM)

Citation/Mirage



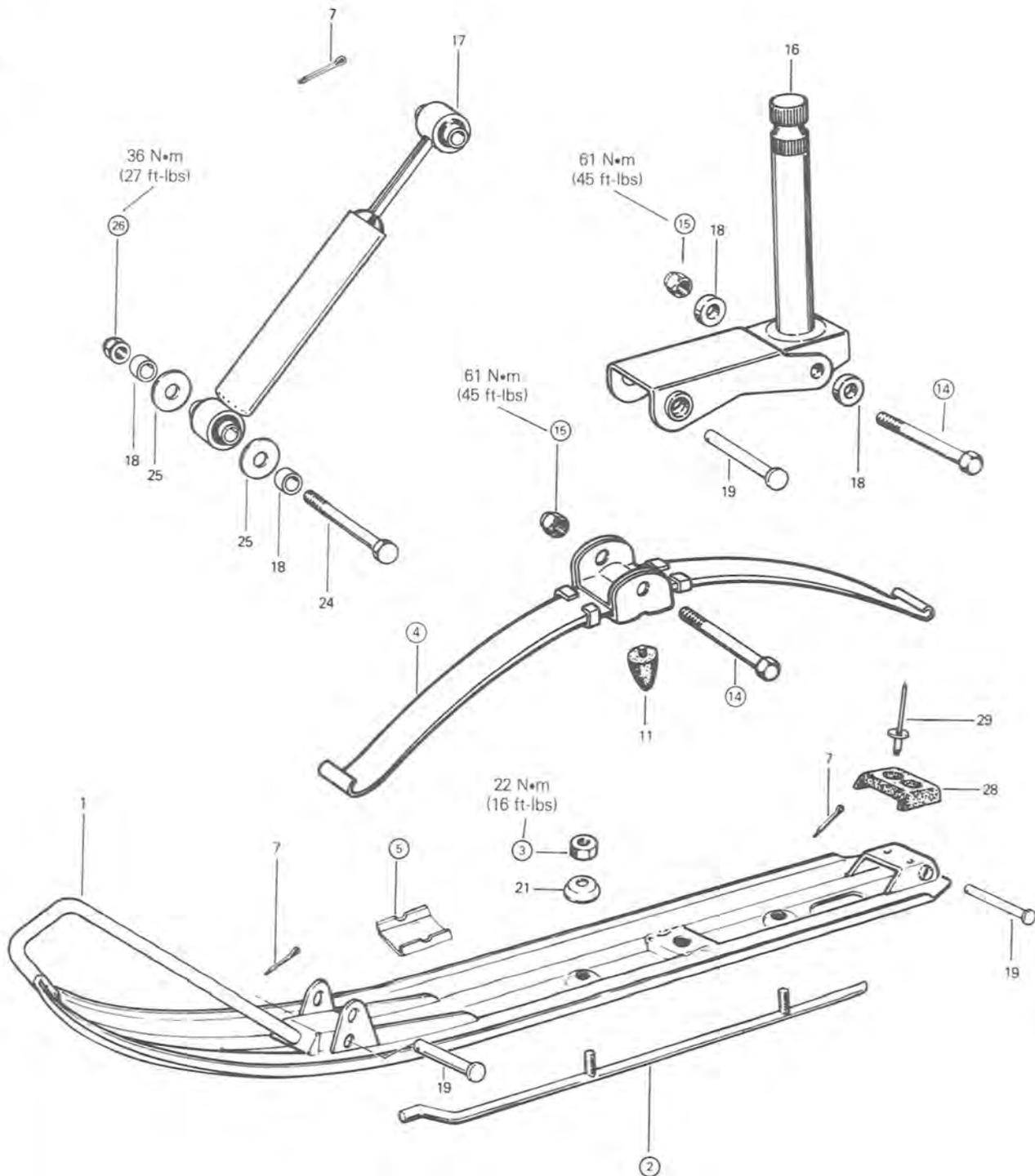
SECTION 06 STEERING/SKIS
SUB-SECTION 02 (SKI SYSTEM)

Nordik, Skandic, Futura 300



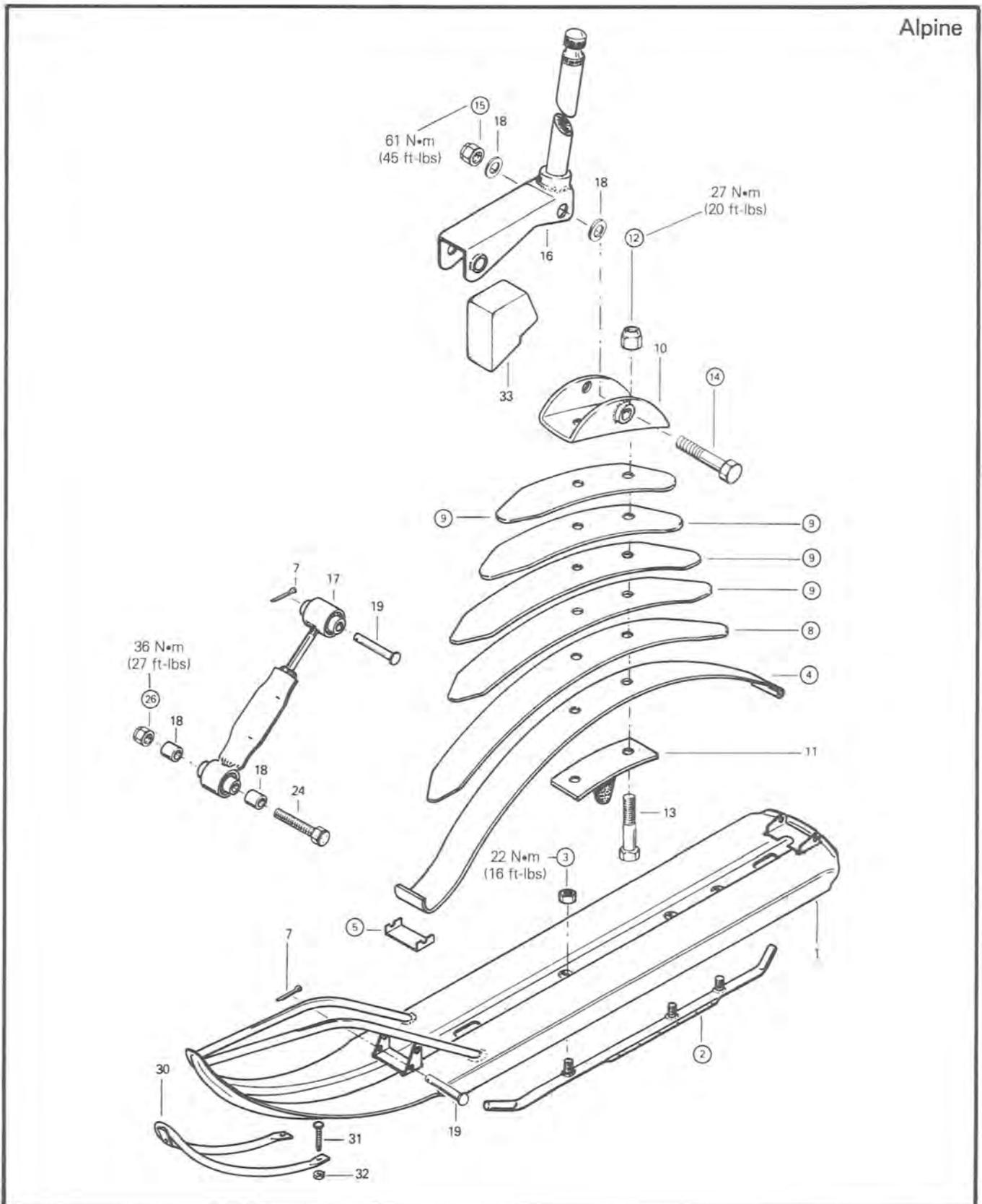
SECTION 06 STEERING/SKIS
SUB-SECTION 02 (SKI SYSTEM)

Everest LC/500/E, Futura LC/500/E
Blizzard 9500, Ultra Sonic



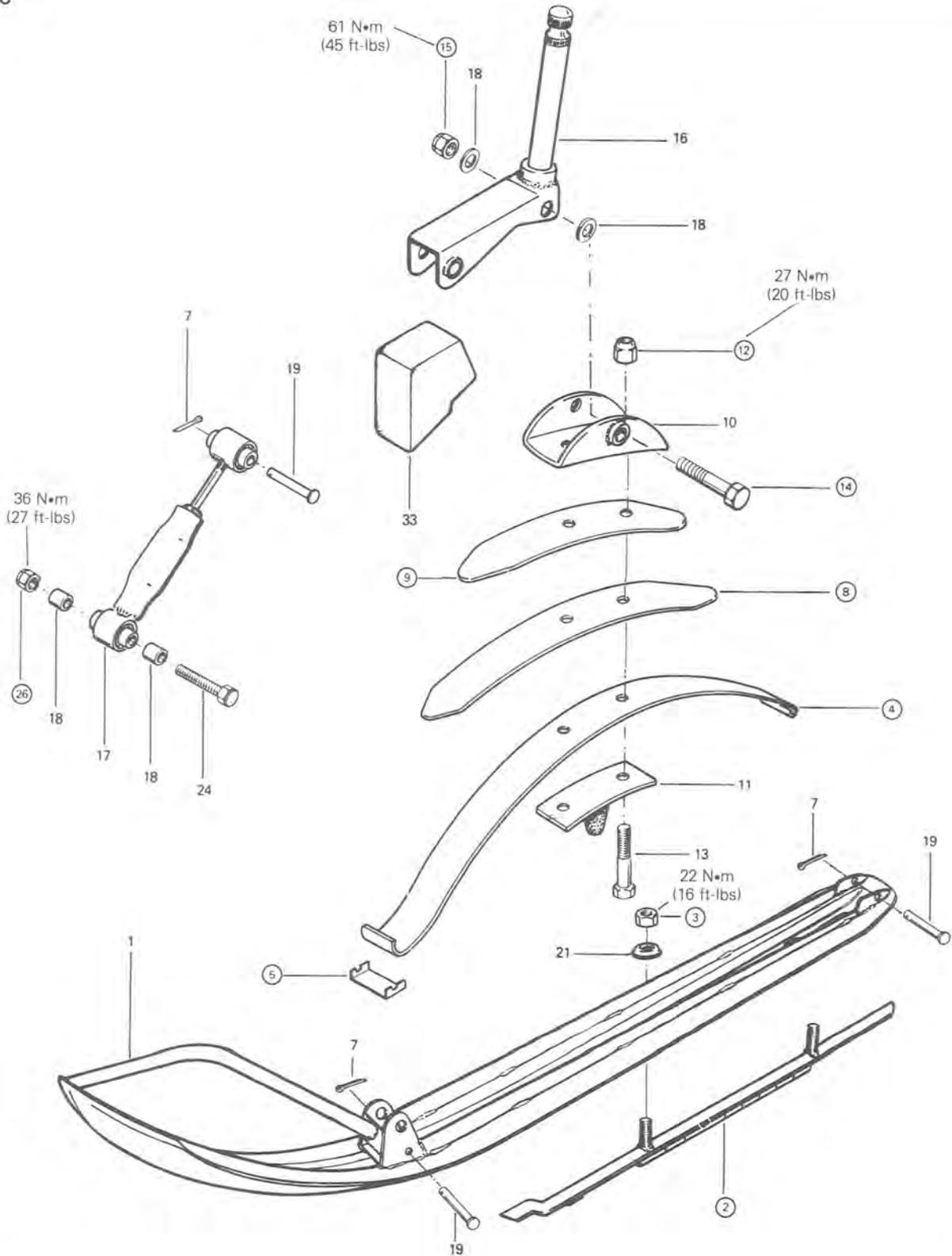
SECTION 06 STEERING/SKIS
SUB-SECTION 02 (SKI SYSTEM)

Alpine



SECTION 06 STEERING/SKIS
SUB-SECTION 02 (SKI SYSTEM)

Elite



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. Hair pin
21. Cup
22. Bushing
23. Rubber spacer
24. Bolt
25. Washer
26. Nut
27. Rubber bumper
28. Rivet
29. Protector tube (Europe)
30. Screw
31. Nut
32. Ski bumper
33. Hair pin
34. Rubber bushing

INSPECTION

Check skis and runner shoes for excessive wear, replace if necessary.

Make sure steering arm and ski leg splines interlock.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY & ASSEMBLY

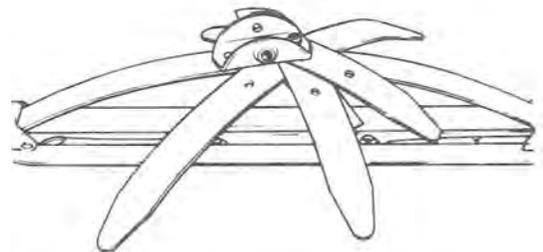
⚠️ ② **WARNING:** Observe caution while prying or removing steel runner shoes from ski slots as the shoes are under tension. Check that ski runner shoes are not worn more than half of their original thickness.

② Replace when half worn.

③ On Elan and Spirit vehicles, torque to 7 N•m (5 ft-lbs). On all others vehicles, torque to 22 N•m (16 ft-lbs).

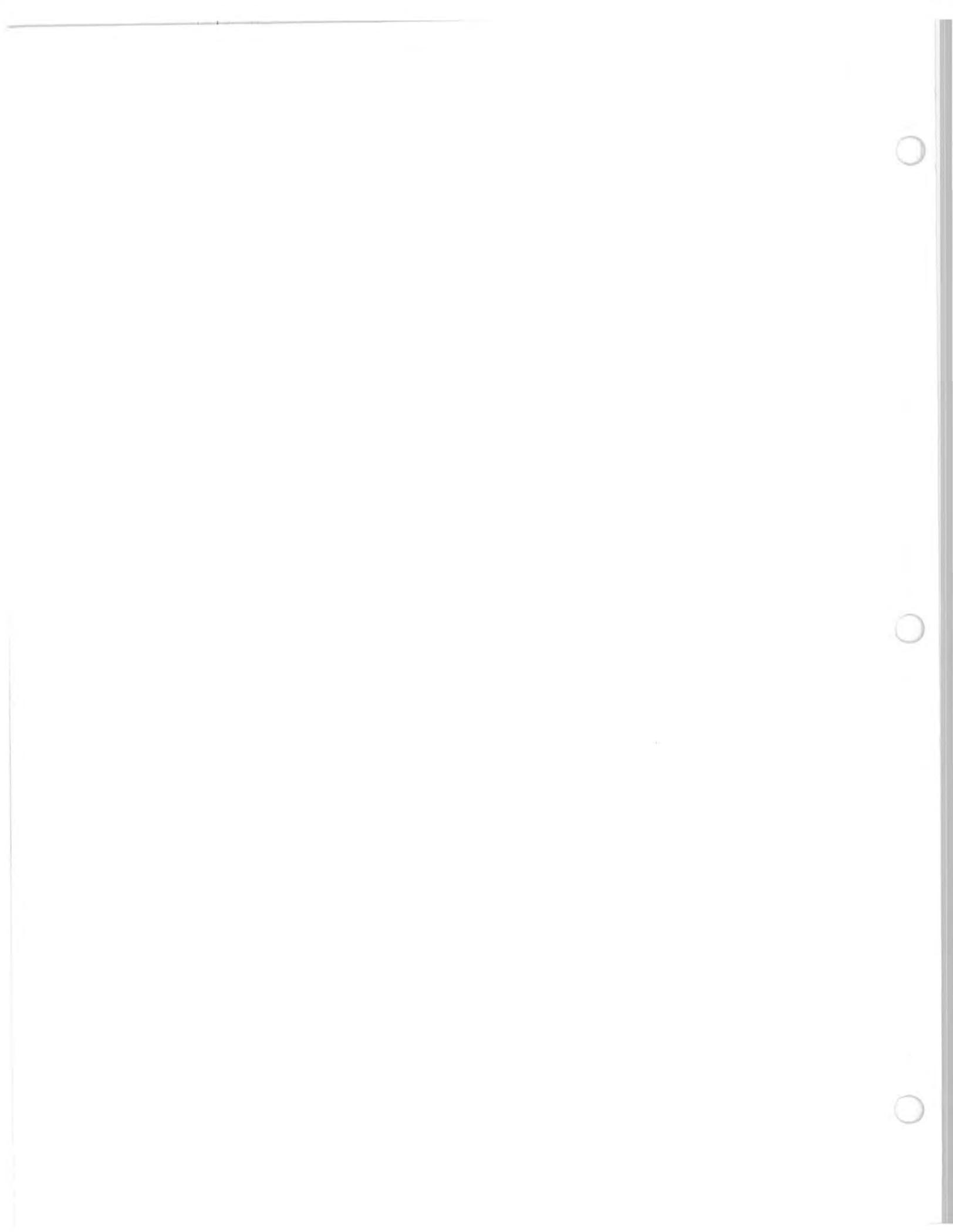
⚠️ ④ ⑧ ⑨ **CAUTION:** When disassembling leaf coupler from spring leaves be careful of leaf tension.

When assembling spring leaves, cross each and temporarily insert one (1) nut ⑫ and bolt then position them parallel to each other and install remaining bolt and nut. Tighten fully.



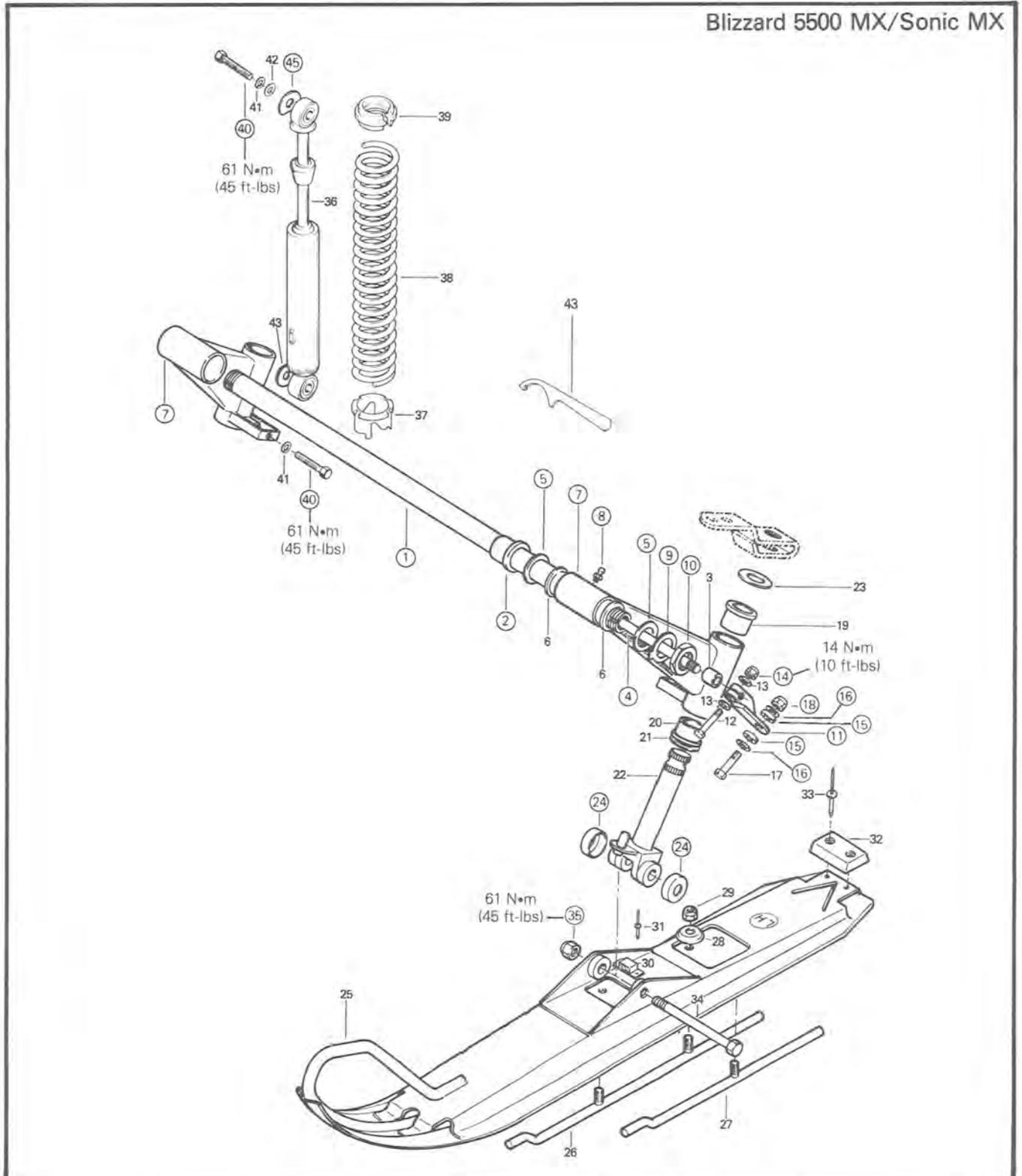
⑤ Apply Lithium grease at least once a year.

⑭ ⑮ Torque bolt and move ski by hand to check that it pivots on ski leg. Torque locking nut to 61 N•m (45 ft-lbs). For all models.



MX SUSPENSION

Blizzard 5500 MX/Sonic MX



SECTION 06 STEERING/SKIS

SUB-SECTION 02 (SKI SYSTEM)

1. Tube
2. Bushing
3. Bushing
4. Stabilizer bar
5. Shim
6. Bushing
7. R.H. swing arm
L.H. swing arm
8. Grease fitting
9. Lock tab
10. Nut
11. R.H. stabilizer arm
L.H. stabilizer arm
12. Hexagonal head cap screw
13. Flat washer
14. Hexagonal elastic stop nut
15. Rubber washer
16. Flat washer
17. Hexagonal head cap screw
18. Hexagonal elastic stop nut
19. Bushing
20. Bushing
21. Brass washer
22. Ski leg
23. Shim
24. Friction cup
25. R.H. ski
L.H. ski
26. Inner runner shoe
27. Outer runner shoe
28. Cup
29. Hexagonal eslock nut
30. Stop bonding
31. Rivet
32. Protector
33. Rivet
34. Hexagonal head cap screw
35. Hexagonal elastic stop nut
36. Damper
37. Adjuster ring
38. Spring
39. Spring collar
40. Hexagonal head cap screw
41. Lockwasher 3/8
42. Flat washer 13/32 x 7/8
43. Adjuster wrench
44. Flat washer
45. Special washer

* R.H. right hand side
L.H. left hand side

DISASSEMBLY

Lift front end of vehicle off the ground and rest on a stand.

Remove skis.

Remove rivets of the side pan plastic caps.

Remove shock absorbers.

① Remove one stabilizer arm.

④ Disconnect the other stabilizer arm from the swing arm and pull out stabilizer bar.

⑤ ⑨ ⑩ Open lock tab and remove nut, lock tab, shim.

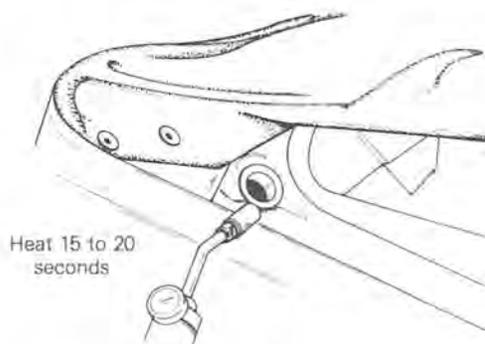
① ⑦ Slip both swing arms from stabilizer tube.

① Pull out stabilizer tube.

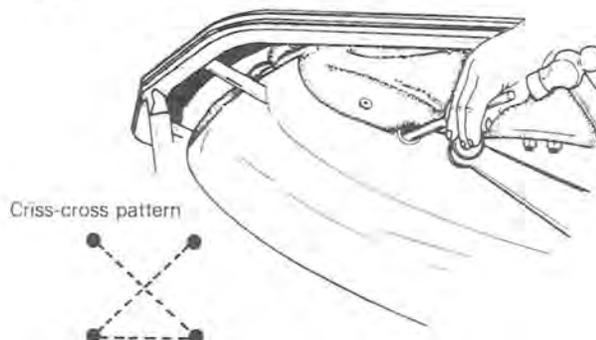
Bushing replacement

② If it is necessary to change the bushing(s) proceed as shown:

Heat bushing with propane torch (approximately 15-20 seconds) to break Loctite bond.



Using a steel bar, remove bushing.



CAUTION: Always push out bushing in a criss-cross pattern.

CLEANING

Clean all metal components in a non ferrous metal cleaner.

② Clean bushing seat with Loctite Safety Solvent or Acetone.

◆ **WARNING:** This procedure must be performed in a well ventilated area.

SHOCK SERVICING

See section 05-02.

▼ **CAUTION:** The front and rear shocks have different valving calibration and therefore must not be interchanged. Ensure that the shocks are properly positioned. Refer to the part number stamped on the shock body. (Front shock: P/N 414 4664 00 and rear shock: P/N 414 4764 00.)

ASSEMBLY

② Apply Loctite RC 680 or equivalent on bushing and seat and push bushing in using appropriate pusher or a piece of wood.

Repeat for the other bushing.

① ⑤ ⑦ Reinstall stabilizer tube, shims, swing arms, shims.

① ⑩ Hand tighten nuts so that stabilizer tube threads exceed equally on both sides.

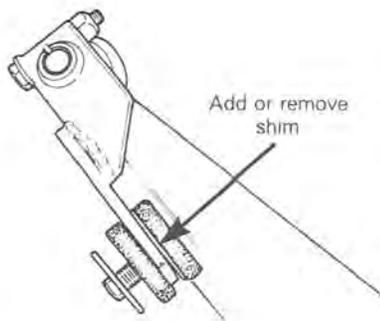
⑩ Torque nut to 35 N•m (26 ft-lbs), unscrew and re-torque to 1 N•m (10 in-lbs).

◆ **WARNING:** Do not exceed 1 N•m (10 in-lbs) on final torquing of nut.

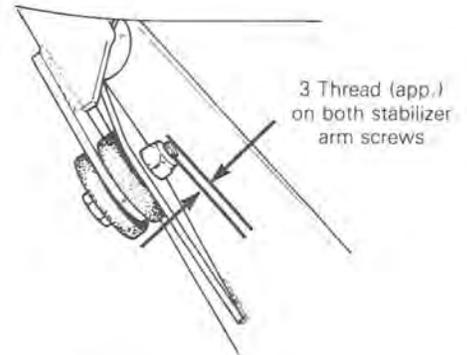
⑨ Bend lock tab.

④ Reinstall stabilizer bar.

⑦ ⑪ ⑮ ⑯ Reinstall stabilizer arm so that it is parallel to the other arm. In order to avoid tension on stabilizer bar add or remove shim between rubber washer and swing arm.



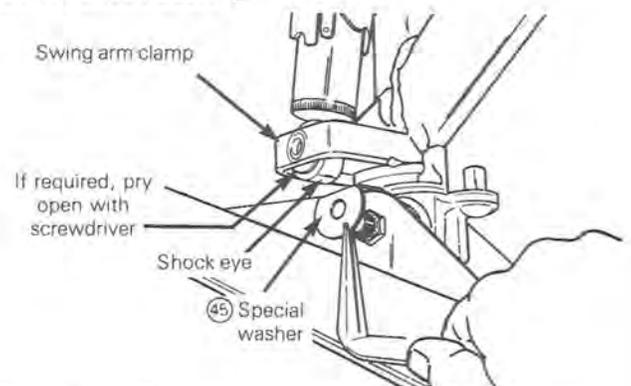
⑪ ⑱ Tighten stabilizer arm nuts equally on both arms.



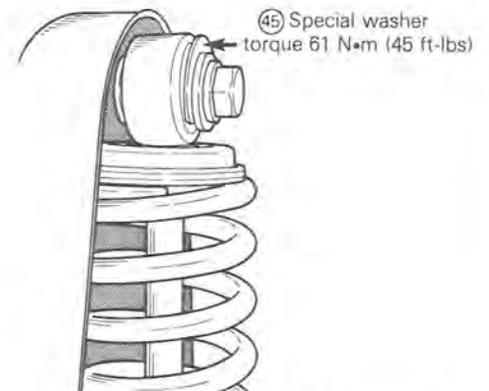
Shock installation

④⑩ Reinstall shocks absorber as shown. Torque the screws to 61 N•m (45 ft-lbs).

Lower shock bushing



Upper shock bushing



◆ **WARNING:** Ensure to install the special washer ④⑤ as illustrated, or the shock absorber rubber bushings may slip out of their shock eye.

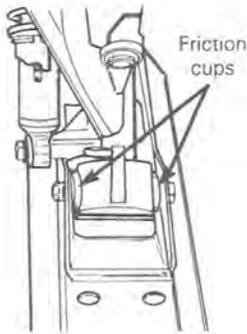
Secure side pan plastic caps with new rivets.

SECTION 06 STEERING/SKIS

SUB-SECTION 02 (SKI SYSTEM)

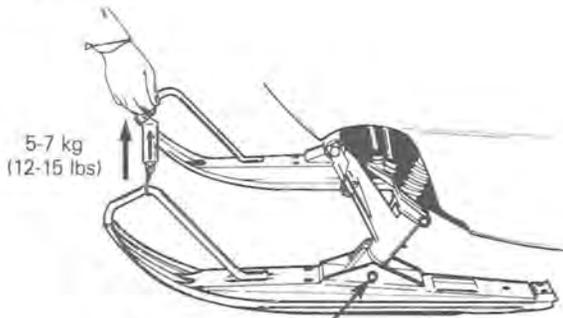
Ski installation

②④ Position the skis with a friction cup on each side of the ski leg.



Install the ski leg/coupler bolt and torque to obtain 5-7 kg (12-15 lbs) on the lift tube at the front of the ski.

○ **NOTE:** You must pull on the ski at an angle of 90° with the ski surface. (Front of vehicle "Off" the ground.)



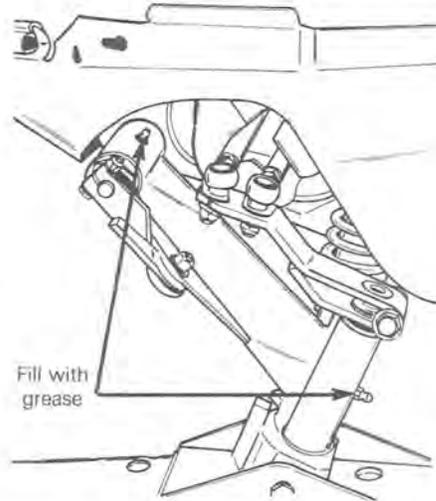
Torque to have 5-7 kg (12-15 pounds) at the front of the ski with a scale

③⑤ Torque the elastic stop nut on the ski leg coupler to 56-57 N•m (42-50 ft-lbs).

For the skis alignment, see section 06-01.

Lubrication

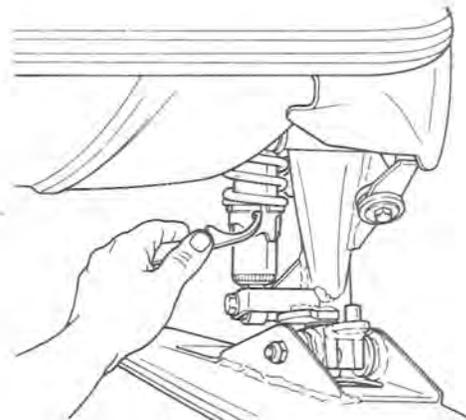
⑧ Using low temperature grease only, lubricate swing arms and ski leg until grease appears at joints. After the operation wipe all excess grease from the swing arm and ski leg housing.



○ **NOTE:** The "ski system" must be greased at an interval of 1200 to 1600 kilometers (800 to 1000 miles).

FRONT SUSPENSION ADJUSTMENT

The front suspension may be pre-loaded by turning clockwise or counter-clockwise the shock absorber cam collar with the adjustment key.



Cam adjustment

1st Position: Smooth ride – bumps 5 to 8 cm (2 to 3") – 0 to 64 km/h (0 - 40 M.P.H.).

2nd Position; Medium ride – bumps 5 to 10 cm (2 to 4") – 64 to 96 km/h (40 - 60 M.P.H.).

3rd Position: Sport ride – bumps 10 cm (4") and more – 96 km/h (60 M.P.H.) and more.

Optional parts

The front suspension may be tuned to the rider's specific requirement using the optional following parts:

- Shock springs P/N 503 0694 00 (see rear shock springs diagram, section 05-02).
- Skis (single runner shoe type)
 - (R) P/N 580 4573 00
 - (L) P/N 580 4574 00

For more aggressive steering.

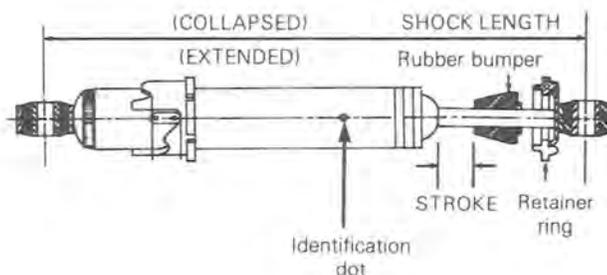
- Carbide runners P/N 414 1964 00 can replace the standard short runner or can be installed on the optional skis.

CAUTION: Optional parts are calibrated to be operated together. Failure to follow this recommendation may affect handling of the vehicle.

- * (R) Right hand side
- (L) Left hand side

Front shocks specifications

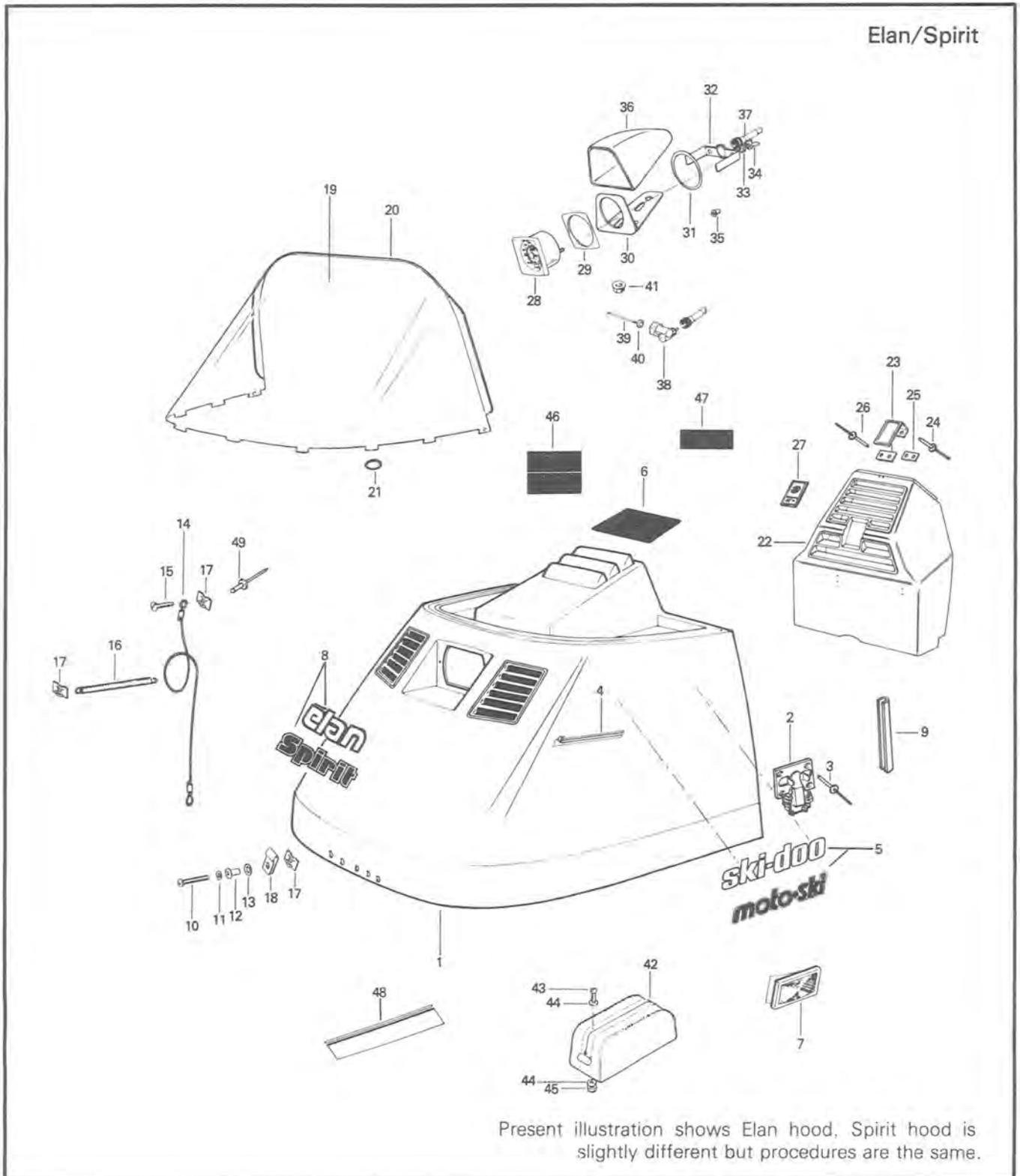
	FRONT SHOCK (without spring)
Part number	414 4664 00
Stroke	13.20 cm (5.200")
Length collapsed	23.78 cm (9.360")
Length extended	36.98 ± 0.3 cm (14.560 ± 0.125")
Colour code	Red dot





HOOD

Elan/Spirit



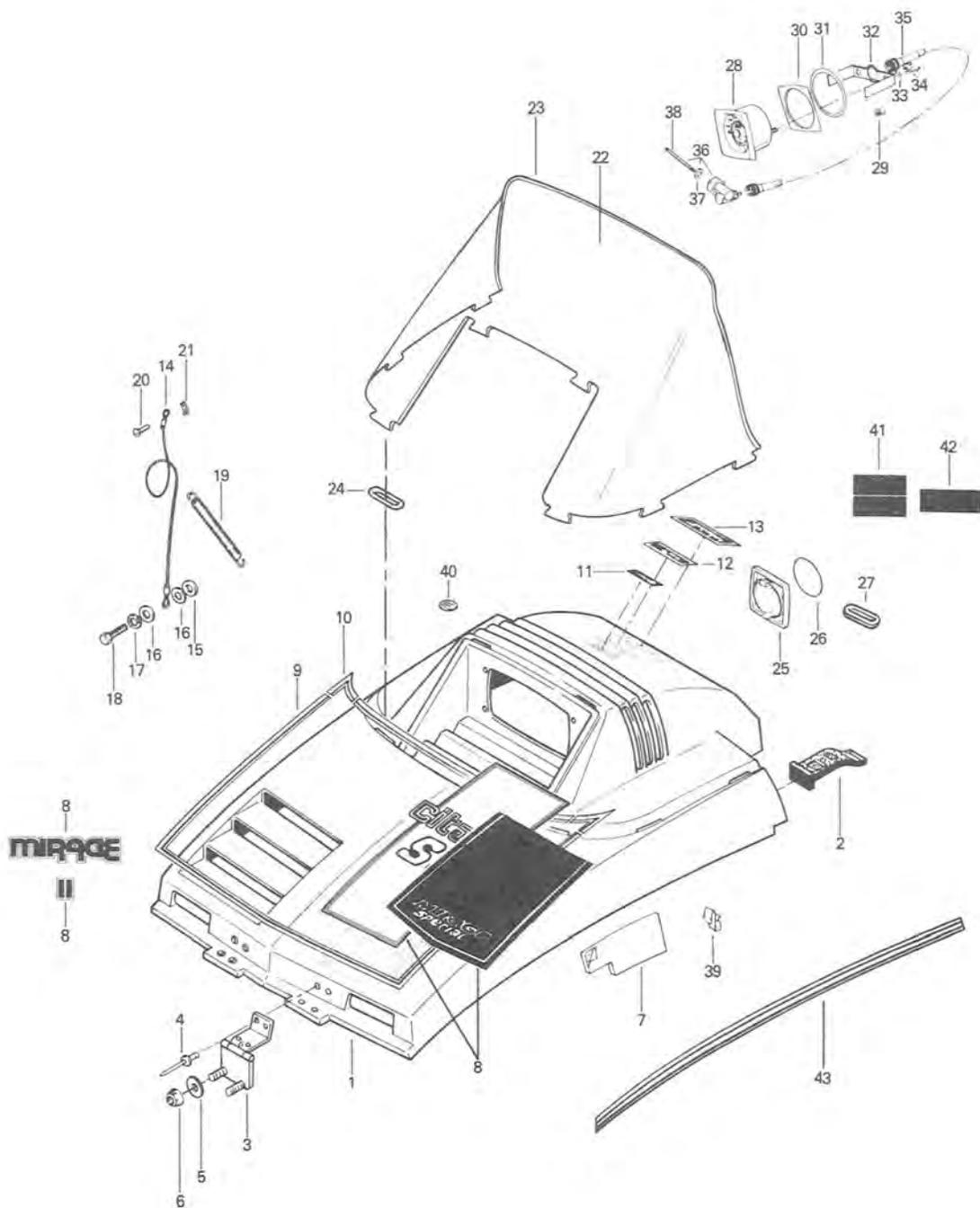
SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

1. Hood
2. Hood latch
3. Rivet
4. Stripe
5. Ski-Doo or Moto-Ski label
6. Decal, black *
7. Reflector
8. Identification label
9. Hood trim 17.5" (445 mm)
10. Machine screw
11. Flat washer
12. Well nut
13. Flat washer
14. Retainer cable
15. Screw (Elan only)
16. Spring
17. Speed nut
18. Clip
19. Windshield
20. Windshield trim
(Elan 46.5" - 1181 mm)
(Spirit 41.5" - 1054 mm)
21. O-Ring
22. Console
23. Latch
24. Rivet
25. Plate
26. Rivet
27. Bombardier label
28. Speedometer *
29. Packing *
30. Meter support *
31. Ring *
32. Case holder *
33. Lockwasher *
34. Wing nut *
35. Bulb *
36. Meter case *
37. Cable *
38. Angle drive *
39. Cable branch key *
40. Washer *
41. Elastic stop nut *
42. Tool bag *
43. Machine screw *
44. Flat washer *
45. Elastic stop nut *
46. Instruction label
47. Warning label
48. Stripe (Spirit)
49. Rivet (Spirit)

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

Citation/Mirage



Present illustration shows Citation hood. Mirage hood is slightly different but procedures are the same.

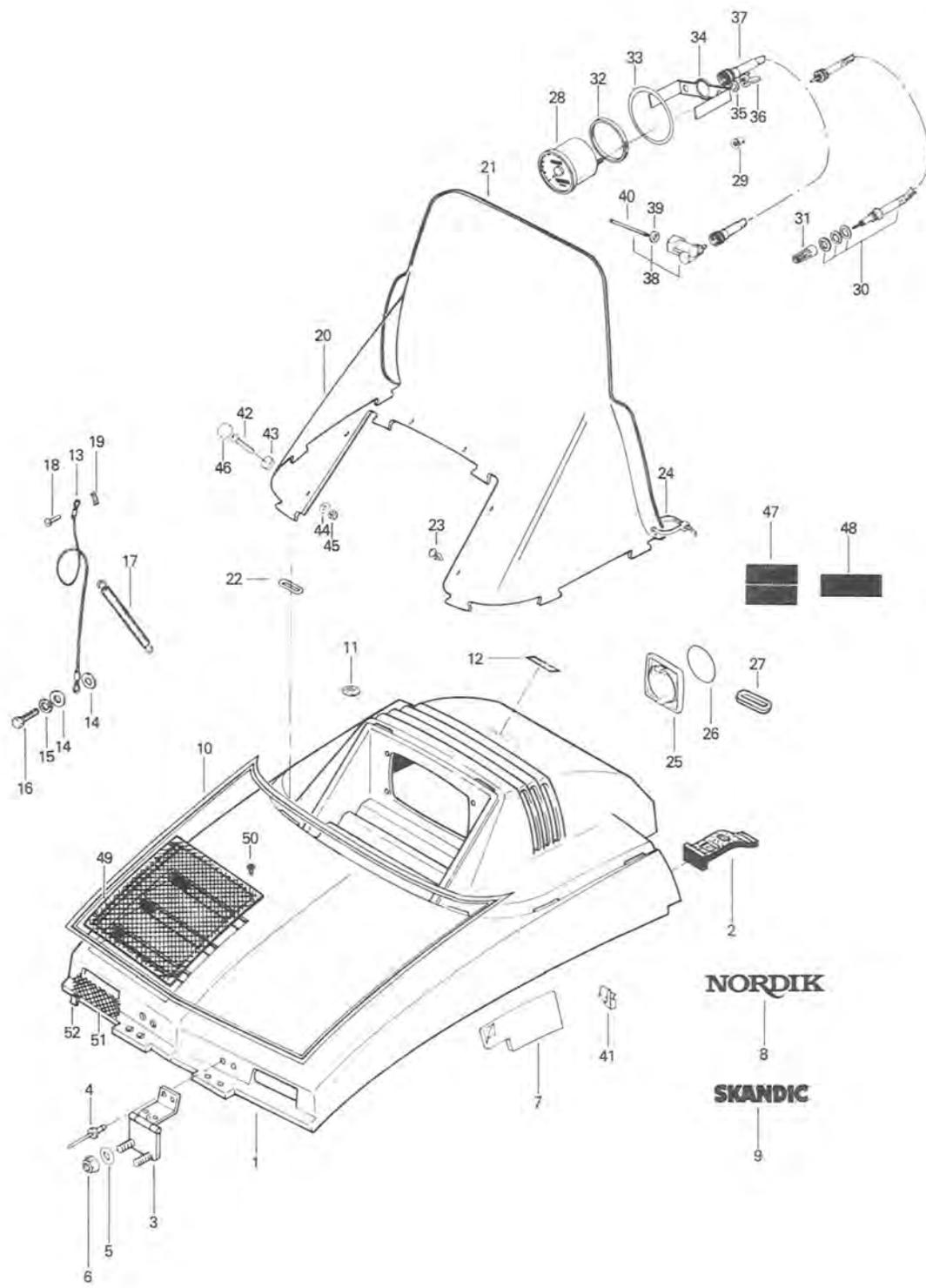
SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

1. Hood
2. Hood latch
3. Hinge
4. Rivet
5. Flat washer
6. Elastic stop nut
7. Foam
8. Identification label
9. Stripe *
10. Corner stripe set *
11. Bombardier label
12. Decal (injection)
13. Label (electric) *
14. Retainer cable
15. Spacer
16. Flat washer
17. Lockwasher
18. Hexagonal screw
19. Spring
20. Machine screw
21. Speed nut
22. Windshield
23. Windshield trim 1181 mm (46.5")
24. O-Ring
25. Meter plug *
26. Decal *
27. Protector
28. Speedometer *
29. Bulb *
30. Packing *
31. Ring *
32. Case holder *
33. Lockwasher *
34. Wing nut *
35. Cable *
36. Angle drive *
37. Washer *
38. Branch key *
39. Clip
40. Decal patch
41. Instruction label
42. Warning label *
43. Stripe set (Mirage only)

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

Nordik/Skandic



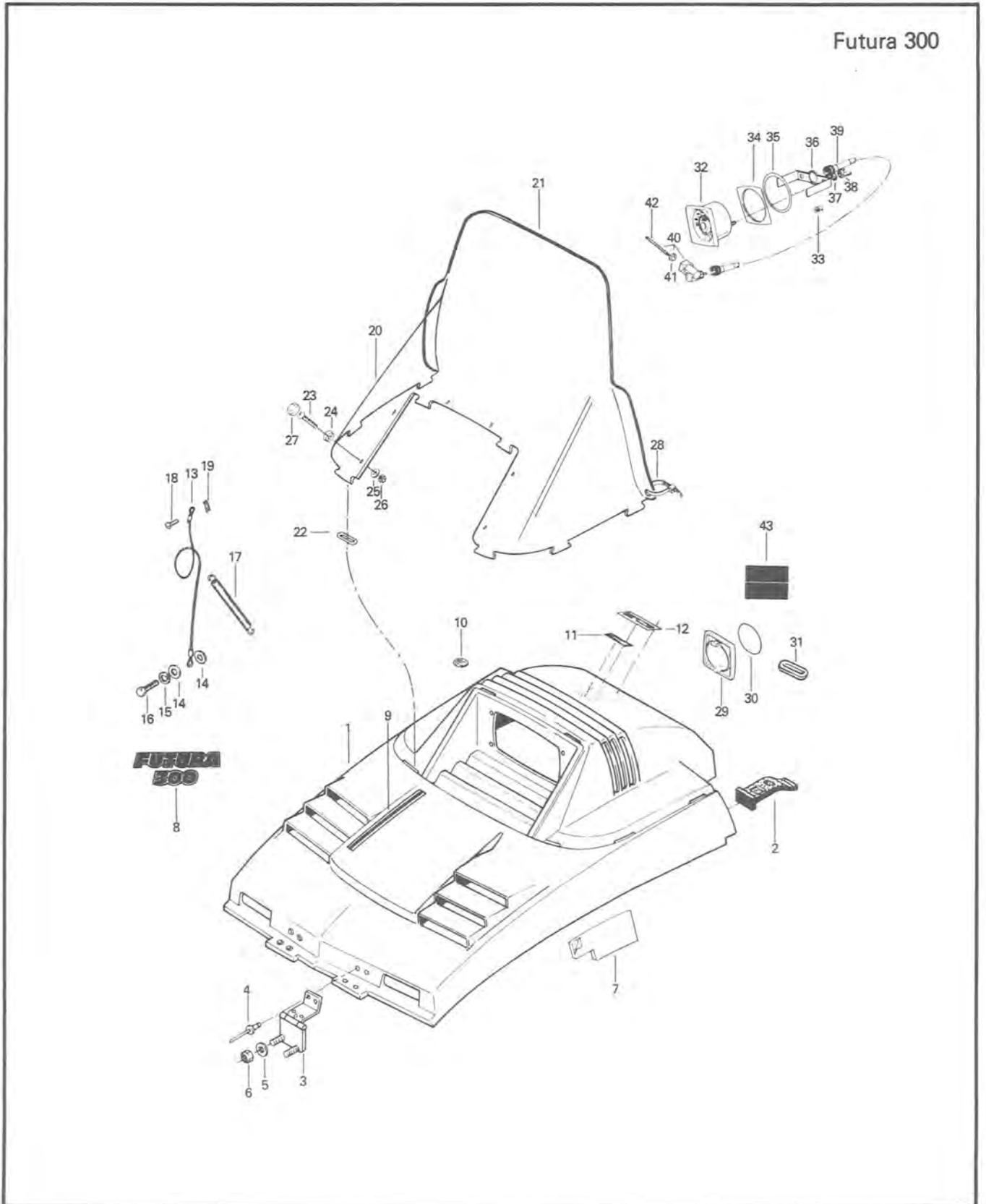
SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

1. Hood
2. Hood latch
3. Hinge
4. Rivet
5. Flat washer
6. Elastic stop nut
7. Foam
8. Identification label *
9. Identification label *
10. Stripe set *
11. Decal patch *
12. Bombardier label
13. Retainer cable
14. Flat washer
15. Lockwasher
16. Hexagonal screw
17. Spring
18. Machine screw
19. Speed nut
20. Windshield
21. Windshield trim
(Nordik 72" - 1829 mm)
(Skandic 53" - 1346 mm)
22. O-Ring
23. Dart (Europe) *
24. Tie wrap *
25. Meter plug
26. Decal
27. Protector
28. Speedometer (with trip meter)
29. Bulb
30. Trip meter cable
31. Knob
32. Packing
33. Ring
34. Case holder
35. Lockwasher
36. Wing nut
37. Cable
38. Angle drive
39. Washer
40. Branch key
41. Clip
42. Screw *
43. Cap retainer *
44. Flat washer *
45. Elastic stop nut *
46. Snap cap *
47. Instruction label
48. Warning label *
49. Upper snow deflector *
50. Screw *
51. Lower snow deflector *
52. Clip *

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

Futura 300



SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

1. Hood
2. Hood latch
3. Hinge
4. Rivet
5. Flat washer
6. Elastic stop nut
7. Foam
8. Identification label
9. Stripe
10. Decal patch
11. Bombardier label
12. Decal (injection)
13. Retainer cable
14. Flat washer
15. Lockwasher
16. Screw
17. Spring
18. Screw
19. Speed nut
20. Windshield
21. Windshield trim 1346 mm 53"
22. O-Ring
23. Screw
24. Cap retainer
25. Flat washer
26. Elastic stop nut
27. Snap cap
28. Tie wrap
29. Meter plug
30. Decal
31. Protector
32. Speedometer
33. Bulb
34. Packing
35. Ring
36. Case holder
37. Lockwasher
38. Wing nut
39. Cable
40. Angle drive
41. Washer
42. Branch key
43. Instruction label

SECTION 07 HOOD/FRAME
 SUB-SECTION 01 (HOOD)



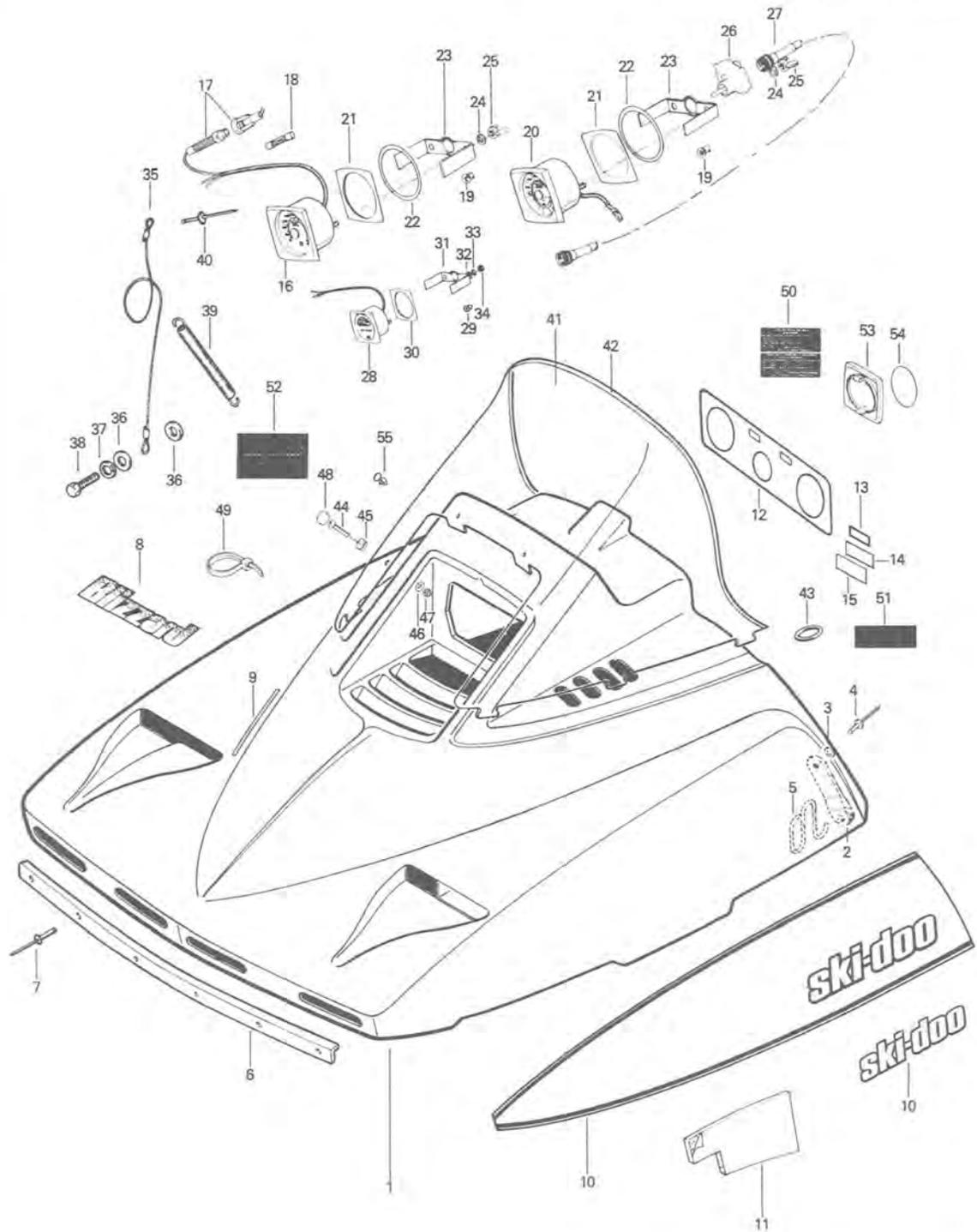
SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

1. Hood
2. Rubber band
3. Flat washer
4. Rivet
5. Hook
6. Reinforcement plate
7. Rivet
8. Dash decal
9. Meter plug *
10. Decal *
11. Bombardier label
12. Speedometer
13. Tachometer *
14. Bulb
15. Fuse holder *
16. Fuse 0.1 ampere *
17. Packing
18. Ring
19. Case holder
20. Lockwasher
21. Wing nut
22. Corrector (speedometer)
23. Cable
24. Temperature gauge *
25. Bulb *
26. Packing *
27. Case holder *
28. Flat washer *
29. Hexagonal nut *
30. Retainer cable
31. Flat washer *
32. Lockwasher
33. Screw
34. Rivet
35. Spring
36. Ring
37. Foam
38. Mirror *
39. Decal (injection)
40. Decal set (Everest or Futura)
41. Decal set (Everest or Futura)
42. Front decal (Everest or Futura)
43. Front stripe (Everest or Futura)
44. Ski-Doo or Moto-Ski label
45. Identification label (LC/500/E)
46. Windshield
47. Windshield trim 47" (1194 mm)
48. O-Ring
49. Machine screw
50. Cap retainer
51. Flat washer
52. Elastic stop nut
53. Snap cap
54. Dart
55. Tie wrap
56. Warning label
57. Flat washer (Europe only) *

*If applicable

SECTION 07 HOOD/FRAME
 SUB-SECTION 01 (HOOD)

Blizzard 9500/Ultra Sonic
 Blizzard 5500 MX/Sonic MX



Present illustration shows Ski-Doo striping only. Moto-Ski striping is different but procedures are the same.

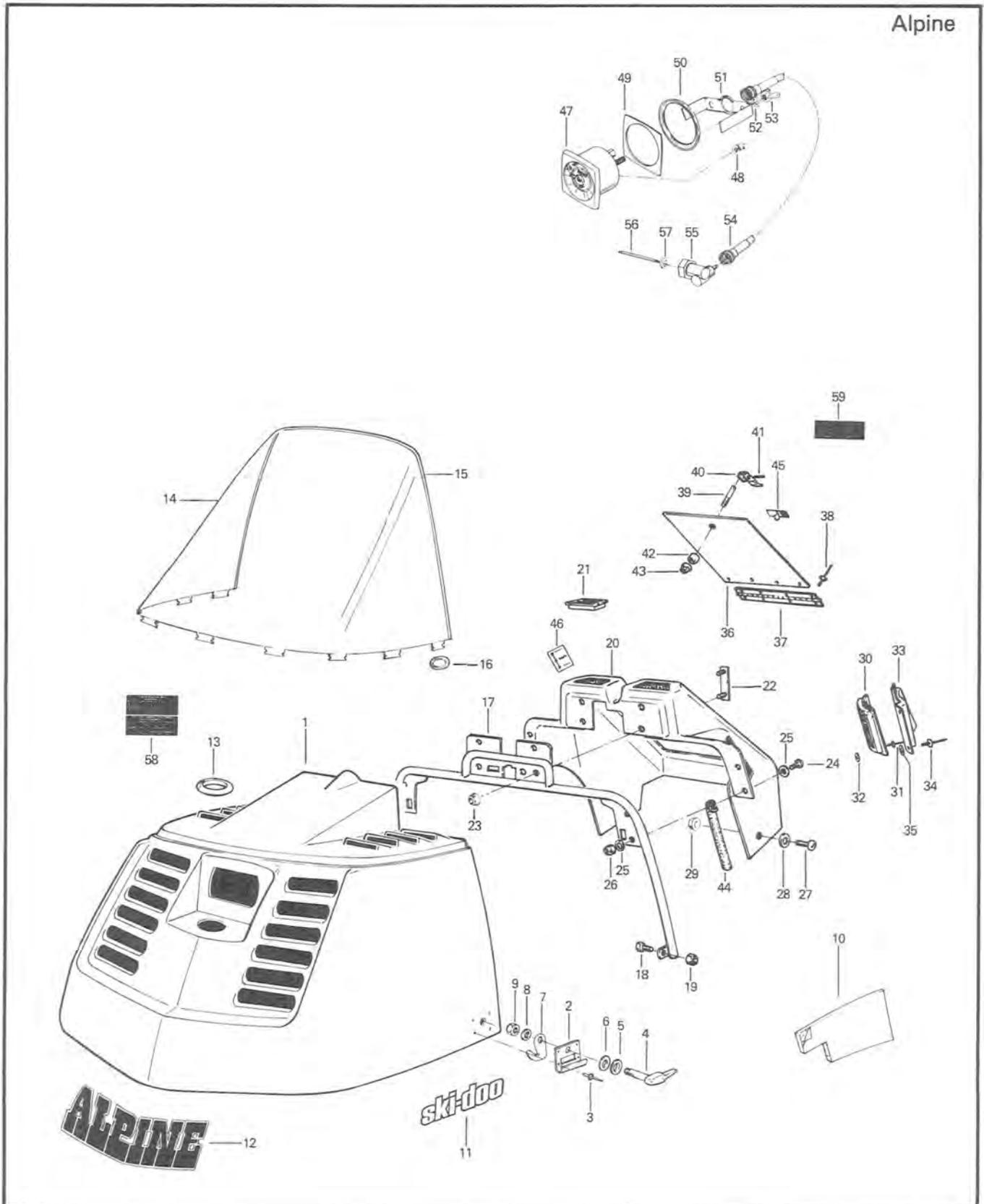
SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

1. Hood
2. Rubber band
3. Flat washer
4. Rivet
5. Hook
6. Hood reinforcement
7. Rivet
8. Identification label (Ski-Doo or Moto-Ski)
9. Stripe
10. Side decal set (Ski-Doo or Moto-Ski)
11. Foam
12. Dash decal
13. Bombardier label
14. Blizzard label *
15. Lub injection label
16. Tachometer (Blizzard 9500 and Ultra Sonic only)
17. Fuse holder *
18. Fuse 0.1 ampere *
19. Bulb
20. Speedometer
21. Packing
22. Ring
23. Case holder
24. Lockwasher
25. Wing nut
26. Corrector
27. Cable
28. Temperature gauge
(Blizzard 9500 and Ultra Sonic only)
29. Bulb *
30. Packing *
31. Case holder *
32. Flat washer *
33. Lockwasher *
34. Hexagonal nut *
35. Retainer cable
36. Flat washer
37. Lockwasher
38. Screw
39. Spring
40. Rivet
41. Windshield
42. Windshield trim (Blizzard 9500 and Ultra Sonic
45" - 1143 mm
Blizzard 5500 MX 51" - 1296 mm
Sonic MX 56.5" - 1436 mm)
43. O-Ring
44. Screw
45. Cap retainer
46. Flat washer
47. Elastic stop nut
48. Snap cap
49. Tie wrap *
50. Instruction label
51. Warning label
52. Warning label (performance) *
53. Meter plug *
54. Decal *
55. Dart (Europe only)

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

Alpine



SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

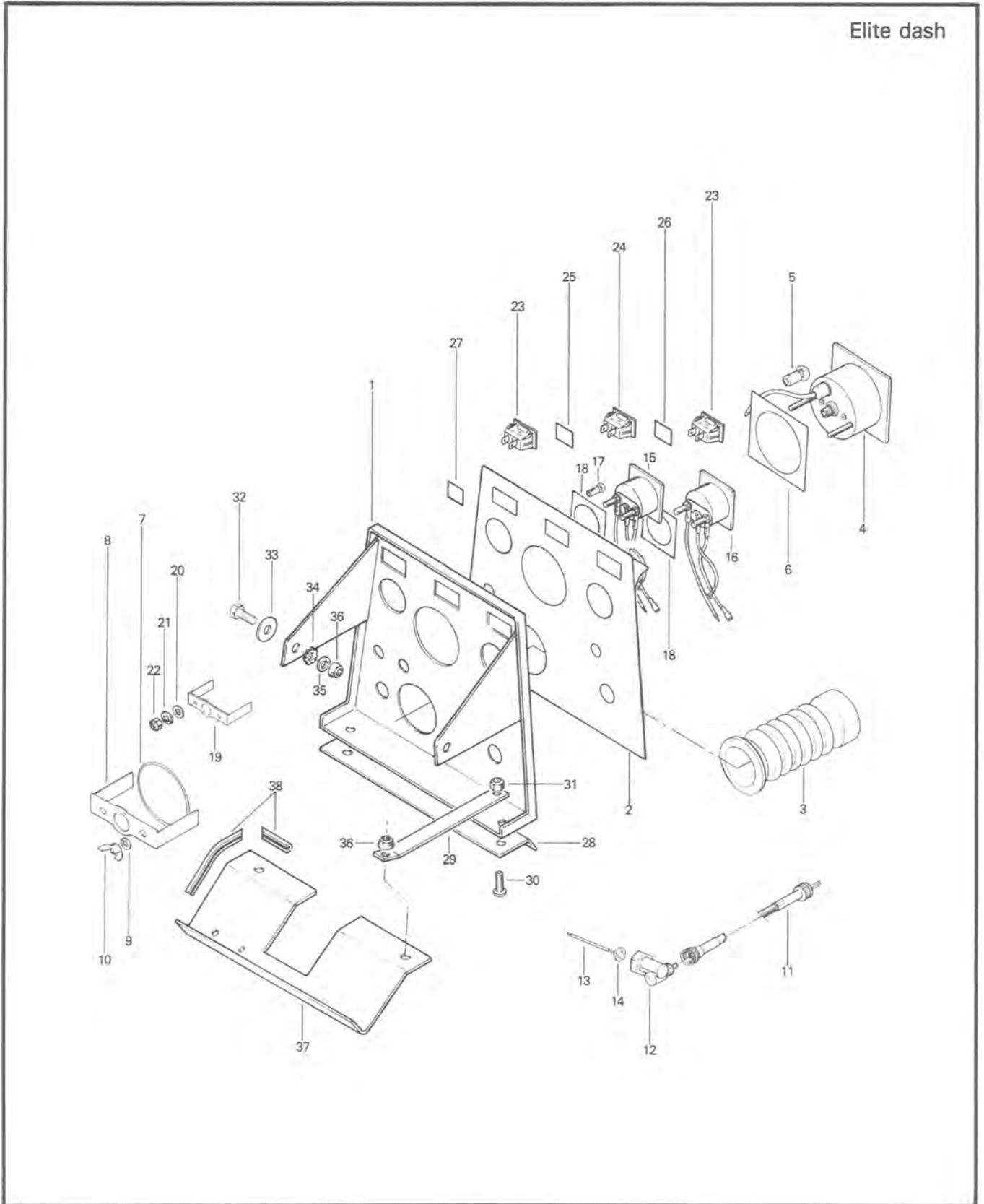
1. Hood
2. Hood latch bracket
3. Rivet
4. Hand lever
5. Flat washer
6. Spring washer
7. Hook
8. Flat washer
9. Elastic stop nut
10. Aphonic foam
11. Ski-Doo label
12. Identification label
13. Filler pipe grommet
14. Windshield
15. Windshield trim 54" (1372 mm)
16. O-Ring
17. Upper column
18. Screw
19. Elastic stop nut
20. Console
21. Louvre
22. Retainer plate
23. Elastic stop nut
24. Screw
25. Flat washer
26. Elastic stop nut
27. Screw
28. Flat washer
29. Elastic stop nut
30. Louvre
31. Rivet
32. Flat washer
33. Air deflector
34. Rivet
35. Flat washer
36. Door
37. Hinge
38. Rivet
39. Threaded screw
40. Latch
41. Pin
42. Rubber spacer
43. Plastic nut
44. Hood trim (14.5" - 368 mm + 2.5" - 63.5 mm)
45. Bombardier label
46. Shifting label
47. Speedometer
48. Bulb
49. Packing
50. Ring
51. Case holder
52. Lockwasher
53. Wing nut
54. Cable
55. Angle drive
56. Cable branch key
57. Washer
58. Instruction label
59. Warning label

SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

1. Upper body
2. Trunk door
3. Hood
4. Hinge
5. Screw
6. Flat washer
7. Elastic stop nut
8. Square washer
9. Rivet
10. Front latch bracket
11. Rivet
12. Rear latch bracket
13. Rivet
14. Cap screw
15. Nut
16. Flat washer
17. Elastic stop nut
18. Plate
19. Rivet
20. Square washer
21. Flat washer
22. Knob
23. Spring washer
24. Hook
25. Flat washer
26. Elastic stop nut
27. Stand rod
28. Push nut
29. Stand rod retainer
30. Metal screw
31. Grommet
32. Seat belt
33. Rivet
34. Square washer
35. Seat bracket
36. Rivet
37. Square washer
38. Console cover
39. Rivet
40. Plate
41. Rivet
42. Access plate
43. Machine screw
44. Seat
45. Seat cover
46. Backrest
47. Backrest cover
48. Speed nut
49. Flat washer
50. Wing nut
51. Louvre
52. Push nut
53. Trim 70" (1778 mm)
54. Foam
55. Grommet
56. Roll bar
57. Cap screw
58. Elastic stop nut
59. Mirror
60. Front handle
61. Grip
62. Cap screw
63. Flat washer
64. Washer
65. Flat washer
66. Front reflector
67. Rear reflector
68. Windshield
69. Trim 74" (1880 mm)
70. Machine screw
71. Flat washer
72. Elastic stop nut
73. Plate
74. Machine screw
75. Hitch plate
76. Cap screw
77. Elastic stop nut
78. Tool box
79. Elastic stop nut
80. Cover
81. Floor
82. Rivet
83. Machine screw
84. Footrest
85. Cap screw
86. Elastic stop nut
87. Trunk shield
88. Flat washer
89. Machine screw
90. Rivet
91. Body retainer
92. Side bumper
93. Rear bumper
94. Rivet
95. Vinyl trim
96. Rivet
97. Snow guard
98. Rivet
99. Cover (drive axle access)
100. Bombardier label
101. Dash decal
102. Shifting label
103. Elite label
104. Decal set
105. Ski-Doo label
106. Side corner stripe set
107. Front corner stripe set
108. Hood corner stripe set (36" per stripe)
109. Bump
110. Instruction label

SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

Elite dash

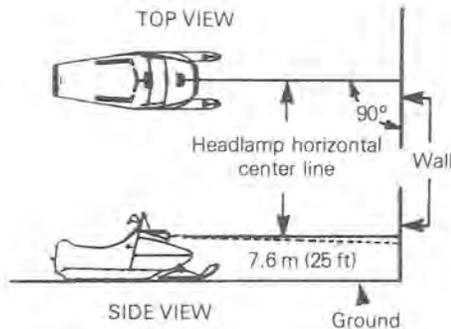


SECTION 07 HOOD/FRAME
SUB-SECTION 01 (HOOD)

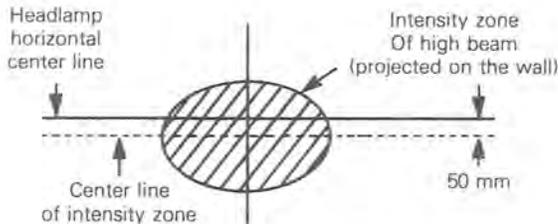
1. *Dash*
2. *Instrument panel decal*
3. *Steering boot*
4. *Speedometer*
5. *Bulb*
6. *Packing*
7. *Ring*
8. *Case holder*
9. *Lockwasher*
10. *Wing nut*
11. *Cable*
12. *Angle drive*
13. *Cable branch key*
14. *Washer*
15. *Temperature gauge*
16. *Fuel tank gauge*
17. *Bulb*
18. *Packing*
19. *Holder*
20. *Flat washer*
21. *Lockwasher*
22. *Nut*
23. *Pilot lamp (alternator and oil level)*
24. *High beam pilot lamp*
25. *Decal (alternator)*
26. *Decal (oil level)*
27. *Decal (heating grip switch)*
28. *Plate*
29. *Dash bracket*
30. *Machine screw*
31. *Elastic stop nut*
32. *Cap screw*
33. *Flat washer*
34. *Lockwasher*
35. *Flat washer*
36. *Elastic stop nut*
37. *Foot guard*
38. *Trim 2.5" (64 mm)*

HEADLAMP BEAM AIMING

Place the vehicle on a flat surface 7.6 m (25') from a wall or screen.



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.



To adjust, on vehicles so equipped remove the headlamp chrome ring, 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, unscrews the two (2) Phillips head screws. Verify all lights after replacement.

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.

Inspect hood and repair damage. Repair kits are available at your authorized dealer.

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.

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.

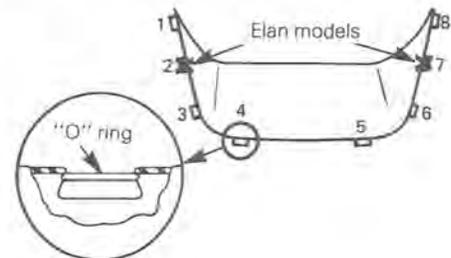
WINDSHIELD INSTALLATION

Elan, Spirit, Citation, Mirage, Skandic

Pell off the protective film from the 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 "O" rings.

Elan models: do not install "O" rings on second and seventh tabs.



If applicable, install the windshield trim.

SECTION 07 HOOD/FRAME

SUB-SECTION 01 (HOOD)

Nordik, Futura, Everest, Blizzard 5500 MX, Blizzard 9500, Sonic MX, Ultra Sonic

Peel off protective film from windshield.

Position windshield on the hood then push down until tabs are fully inserted into hood slots.

Lock windshield tabs in position using the "O" rings.

Properly seat the windshield in place.

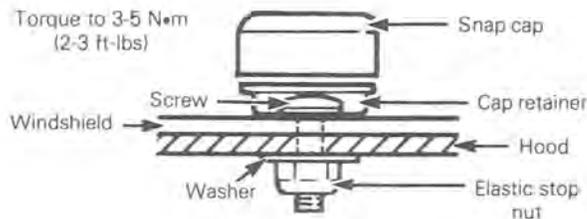
Using windshield holes as a guide, drill 5 mm dia. (3/16") holes through the hood.

CAUTION: Ensure the electrical wires are protected inside the hood.

Clean the hood.

If applicable, install the darts.

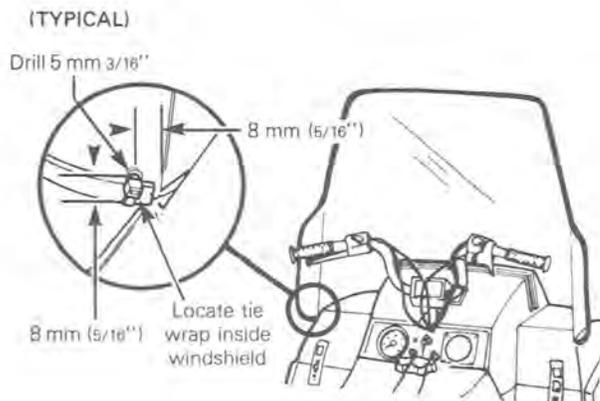
Install the windshield fixtures.



If applicable, install the windshield trim.

If applicable, drill a 5 mm (3/16") hole in the windshield to install the two windshield trim retaining tie wraps.

Locate tie wrap head inside the windshield.



Alpine

Peel off protective film from the new windshield.

Position windshield on hood then push until tabs are fully inserted into slots. Lock windshield tabs in position using the eleven (11) "O" rings (install two (2) "O" rings on outer tabs).

If applicable, install the windshield trim.

Elite

Align the windshield in position (in order to have the windshield deflector pleat on each side in line with the body side).

Mark the body, and drill 17/64" holes. Secure the windshield in place using the windshield fixtures.

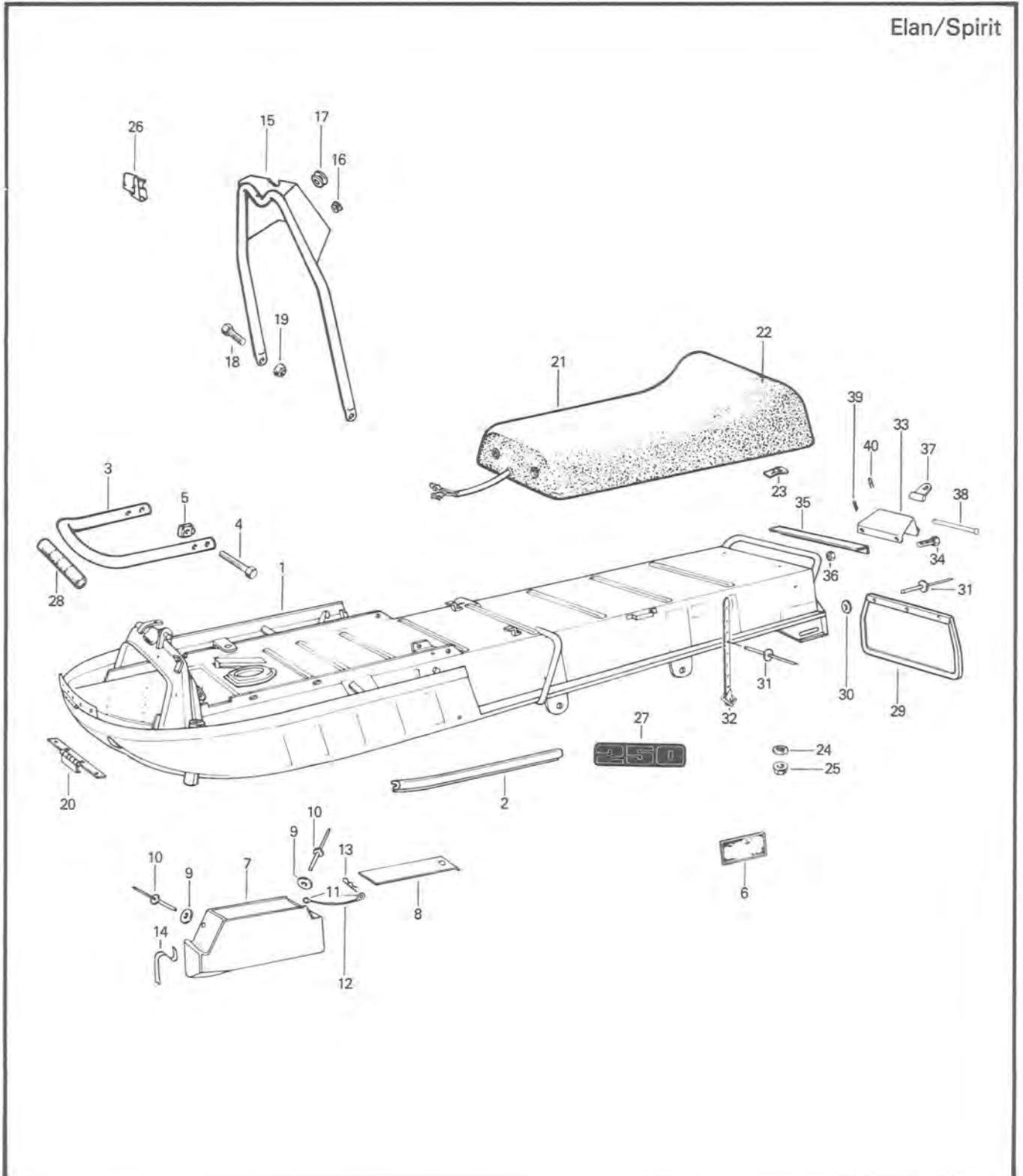
CAUTION: Ensure the electrical wires are protected inside the hood.

If applicable, install windshield trim on outer edge, and secure both ends by installing the two (2) tie wraps.

Install the trunk door stopper in place by drilling a 1/8" hole in the center of the windshield at exactly 23 cm (9") from bottom edge of windshield and push the trunk door stopper in place.

FRAME

Elan/Spirit

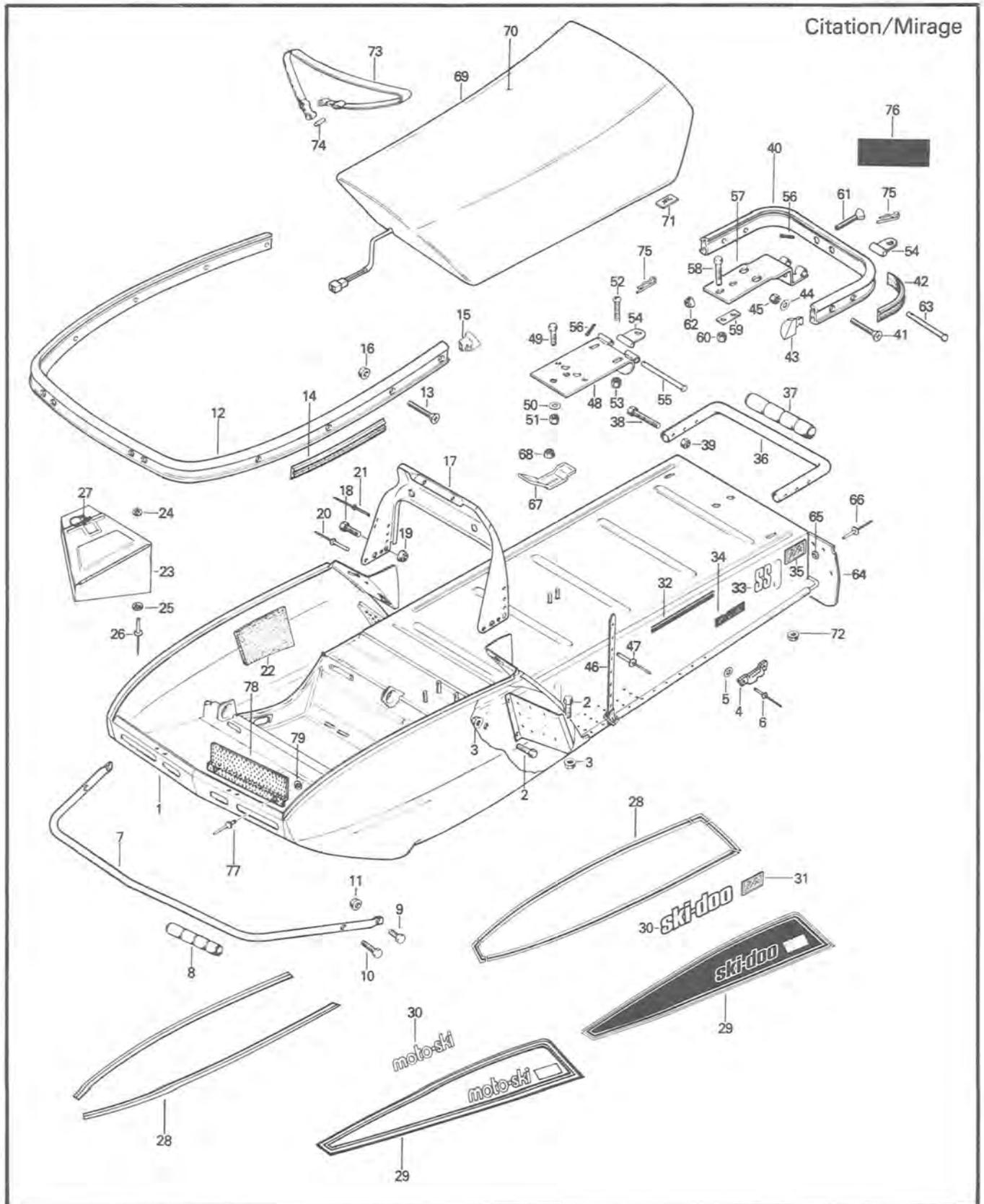


SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame (bogie)*
2. *Body moulding*
3. *Front handle*
4. *Cap screw*
5. *Clip nut*
6. *Reflector **
7. *Tool box assembly*
8. *Cover*
9. *Flat washer*
10. *Rivet*
11. *Ring terminal*
12. *Wire*
13. *Hair pin*
14. *Spring clip*
15. *Upper column*
16. *Grommet*
17. *Grommet*
18. *Cap screw*
19. *Elastic stop nut*
20. *Hinge assembly*
21. *Seat*
22. *Seat cover (leatherette)*
23. *Speed nut*
24. *Lockwasher*
25. *Elastic stop nut*
26. *Clip (to hold harness on frame)*
27. *Decal (250)*
28. *Grip **
29. *Snow guard*
30. *Flat washer*
31. *Rivet*
32. *Ski tie down **
33. *Hitch bracket **
34. *Cap screw **
35. *Reinforcement **
36. *Elastic stop nut **
37. *Hitch plate **
38. *Pin **
39. *Cotter pin **
40. *Hair pin*

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)



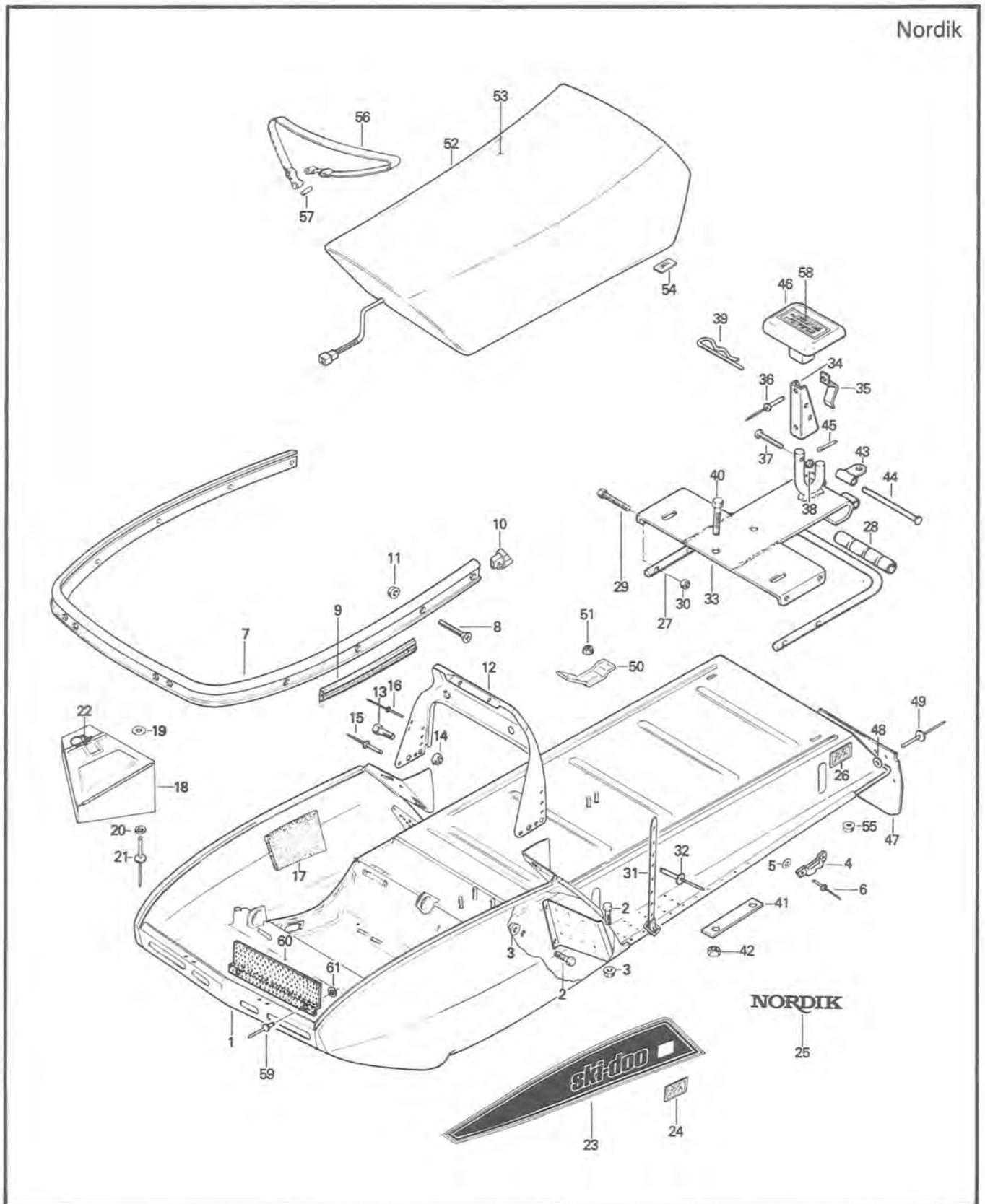
SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame*
2. *Cap screw*
3. *Elastic stop nut*
4. *Seat belt bracket **
5. *Flat washer **
6. *Rivet **
7. *Front bumper **
8. *Grip **
9. *Cap screw **
10. *Cap screw **
11. *Elastic stop nut **
12. *Front bumper **
13. *Machine screw **
14. *Vinyl bumper 2782 mm*
15. *Bumper cap **
16. *Elastic stop nut **
17. *Upper column*
18. *Cap screw*
19. *Elastic stop nut*
20. *Rivet*
21. *Rivet*
22. *Foam*
23. *Tool box*
24. *Flat washer*
25. *Rubber spacer*
26. *Rivet*
27. *Hair pin*
28. *Stripe **
29. *Decal set **
30. *Ski-Doo or Moto-Ski label **
31. *Reflector*
32. *Frame stripe **
33. *Frame decal*
34. *Electro label **
35. *Reflector **
36. *Rear bumper **
37. *Grip **
38. *Cap screw **
39. *Elastic stop nut **
40. *Rear bumper **
41. *Machine screw **
42. *Vinyl bumper 800 mm **
43. *Bumper cap **
44. *Flat washer*
45. *Elastic stop nut **
46. *Ski tie down **
47. *Rivet **
48. *Hitch bracket **
49. *Cap screw **
50. *Flat washer **
51. *Elastic stop nut **
52. *Machine screw **
53. *Elastic stop nut **
54. *Hitch plate*
55. *Pin **
56. *Cotter pin*
57. *Hitch bracket **
58. *Cap screw **
59. *Retainer plate **
60. *Elastic stop nut **
61. *Machine screw **
62. *Elastic stop nut **
63. *Pin **
64. *Snow guard*
65. *Flat washer*
66. *Rivet*
67. *Retainer*
68. *Elastic stop nut*
69. *Seat*
70. *Seat cover*
71. *Speed nut*
72. *Elastic stop nut*
73. *Seat belt **
74. *Pin **
75. *Hair pin **
76. *Warning label (towing) **
77. *Rivet*
78. *Front grill **
79. *Flat washer*

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

Nordik



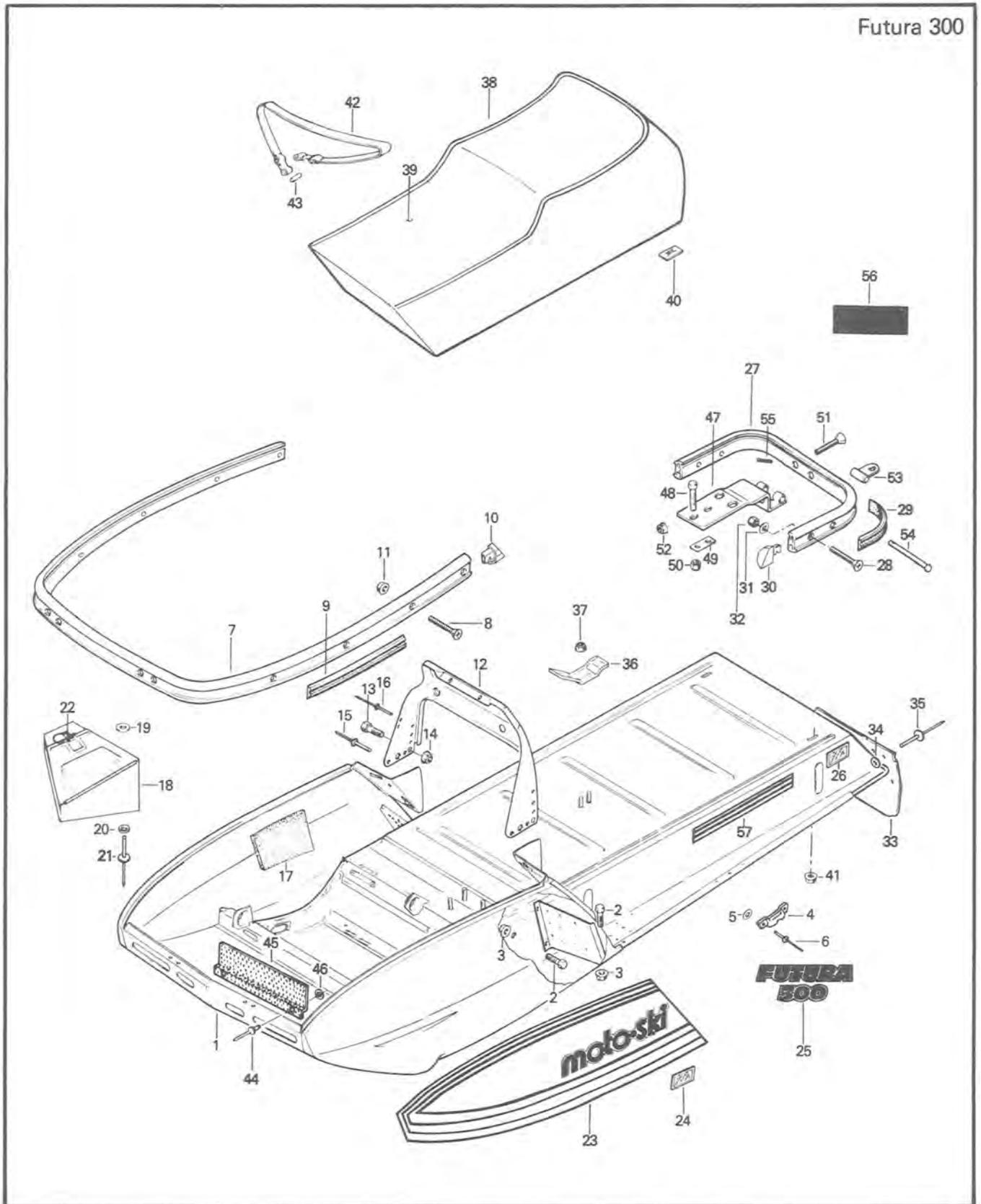
SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame*
2. *Cap screw*
3. *Elastic stop nut*
4. *Seat belt bracket*
5. *Flat washer*
6. *Rivet*
7. *Front bumper*
8. *Machine screw*
9. *Vinyl bumper 2782 mm*
10. *Bumper cap*
11. *Elastic stop nut*
12. *Upper column*
13. *Cap screw*
14. *Elastic stop nut*
15. *Rivet*
16. *Rivet*
17. *Foam*
18. *Tool box*
19. *Flat washer*
20. *Rubber spacer*
21. *Rivet*
22. *Hair pin*
23. *Decal set*
24. *Reflector*
25. *Frame decal*
26. *Reflector **
27. *Rear bumper*
28. *Grip*
29. *Cap screw*
30. *Elastic stop nut*
31. *Ski tie down **
32. *Rivet **
33. *Hitch bracket*
34. *Catch*
35. *Spring*
36. *Rivet*
37. *Machine screw*
38. *Elastic stop nut*
39. *Hair pin*
40. *Cap screw*
41. *Retainer plate*
42. *Elastic stop nut*
43. *Hitch plate*
44. *Pin*
45. *Cotter pin*
46. *Protector*
47. *Snow guard*
48. *Flat washer*
49. *Rivet*
50. *Retainer*
51. *Elastic stop nut*
52. *Seat*
53. *Seat cover*
54. *Speed nut*
55. *Elastic stop nut*
56. *Seat belt*
57. *Pin*
58. *Warning label (towing)*
59. *Rivet*
60. *Front grill*
61. *Flat washer*

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

Futura 300

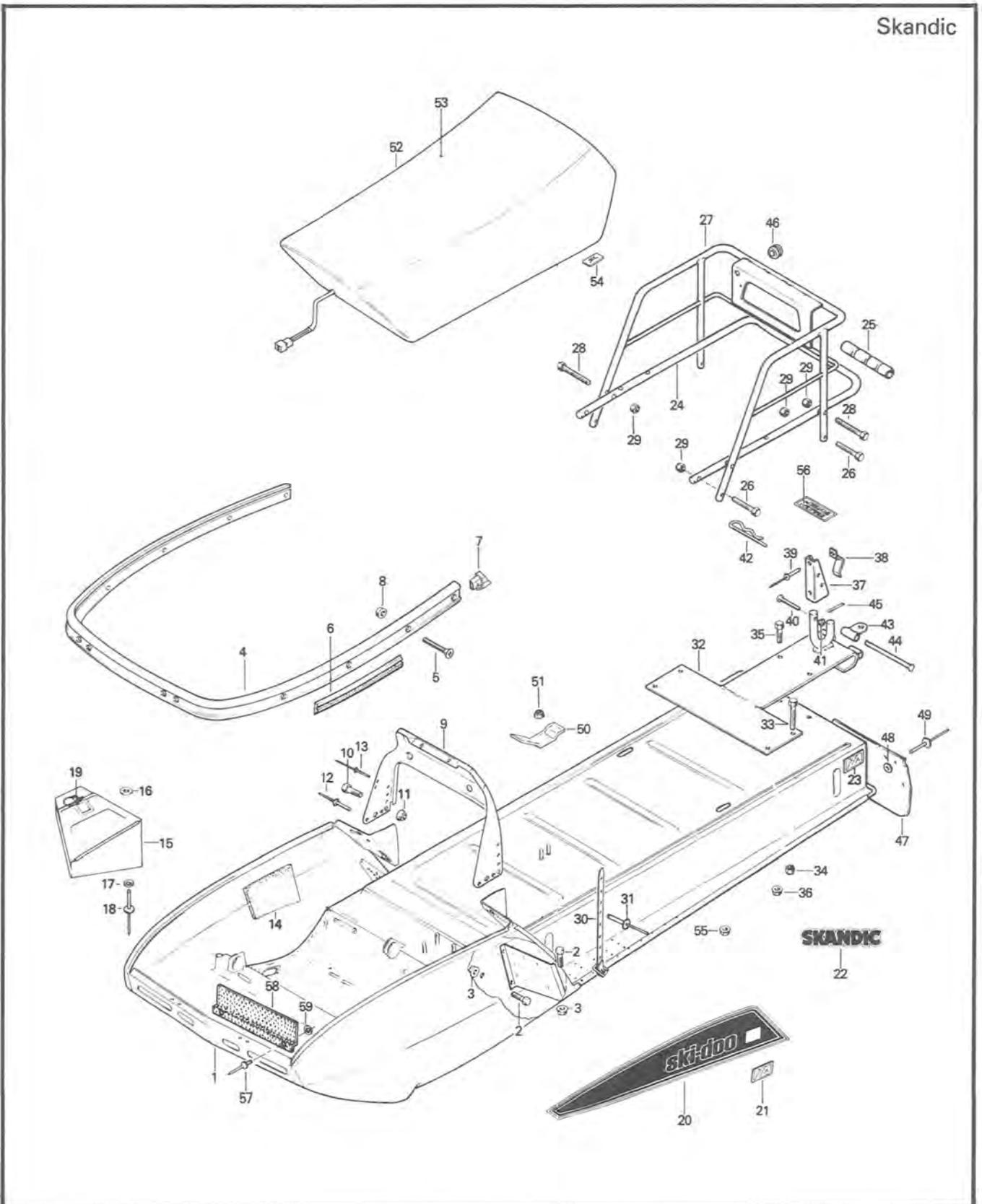


SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame*
2. *Cap screw*
3. *Elastic stop nut*
4. *Seat belt bracket*
5. *Flat washer*
6. *Rivet*
7. *Front bumper*
8. *Machine screw*
9. *Vinyl bumper 2782 mm*
10. *Bumper cap*
11. *Elastic stop nut*
12. *Upper column*
13. *Cap screw*
14. *Elastic stop nut*
15. *Rivet*
16. *Rivet*
17. *Foam*
18. *Tool box*
19. *Flat washer*
20. *Rubber spacer*
21. *Rivet*
22. *Hair pin*
23. *Decal set*
24. *Reflector*
25. *Frame decal*
26. *Reflector*
27. *Rear bumper*
28. *Machine screw*
29. *Vinyl bumper 800 mm*
30. *Bumper cap*
31. *Flat washer*
32. *Elastic stop nut*
33. *Snow guard*
34. *Flat washer*
35. *Rivet*
36. *Retainer*
37. *Elastic stop nut*
38. *Seat*
39. *Seat cover*
40. *Speed nut*
41. *Elastic stop nut*
42. *Seat belt*
43. *Pin*
44. *Rivet*
45. *Front grill*
46. *Flat washer*
47. *Hitch bracket*
48. *Cap screw*
49. *Retainer plate*
50. *Elastic stop nut*
51. *Machine screw*
52. *Elastic stop nut*
53. *Hitch plate*
54. *Pin*
55. *Cotter pin*
56. *Warning label (towing)*

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

Skandic

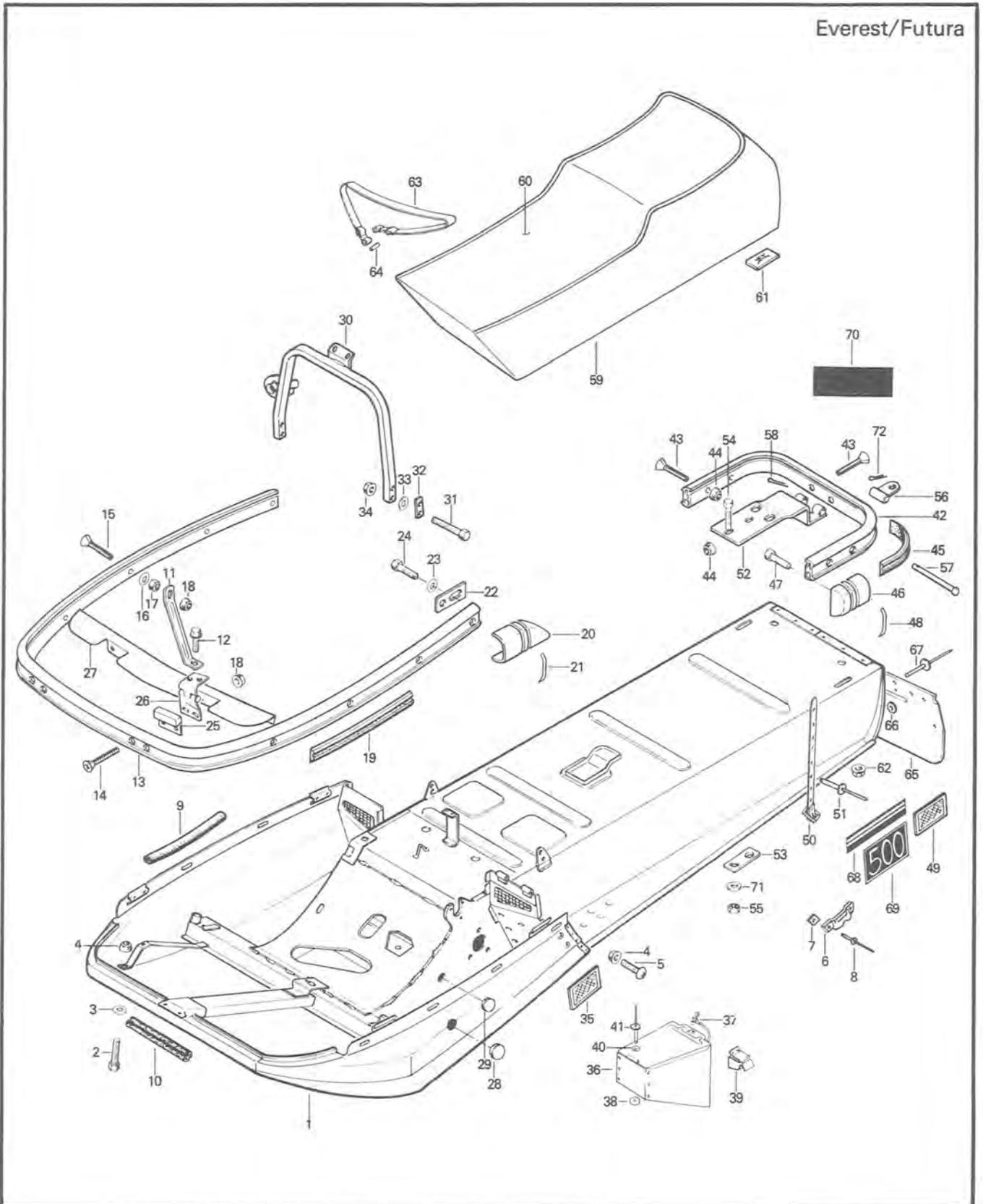


SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame*
2. *Cap screw*
3. *Elastic stop nut*
4. *Front bumper*
5. *Machine screw*
6. *Vinyl bumper (2782 mm)*
7. *Bumper cap*
8. *Elastic stop nut*
9. *Upper column*
10. *Cap screw*
11. *Elastic stop nut*
12. *Rivet*
13. *Rivet*
14. *Foam*
15. *Tool box*
16. *Flat washer*
17. *Rubber spacer*
18. *Rivet*
19. *Hair pin*
20. *Decal set*
21. *Reflector*
22. *Frame decal*
23. *Reflector*
24. *Rear bumper*
25. *Grip*
26. *Cap screw*
27. *Rack*
28. *Cap screw*
29. *Elastic stop nut*
30. *Ski tie down*
31. *Rivet*
32. *Hitch bracket*
33. *Cap screw*
34. *Elastic stop nut*
35. *Cap screw*
36. *Elastic stop nut*
37. *Catch*
38. *Spring*
39. *Rivet*
40. *Machine screw*
41. *Elastic stop nut*
42. *Hair pin*
43. *Hitch plate*
44. *Pin*
45. *Cotter pin*
46. *Grommet*
47. *Snow guard*
48. *Flat washer*
49. *Rivet*
50. *Retainer*
51. *Elastic stop nut*
52. *Seat*
53. *Seat cover*
54. *Speed nut*
55. *Elastic stop nut*
56. *Warning label (towing)*
57. *Rivet*
58. *Front grill*
59. *Flat washer*

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

Everest/Futura



SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame (without heat exchangers)*
2. *Cap screw*
3. *Flat washer*
4. *Elastic stop nut*
5. *Machine screw*
6. *Seat belt bracket*
7. *Square washer*
8. *Rivet*
9. *Cab seat 32" (813 mm) x 2*
10. *Cab seal*
11. *Side pan retainer*
12. *Self locking screw*
13. *Front bumper*
14. *Machine screw*
15. *Machine screw*
16. *Flat washer*
17. *Screw*
18. *Elastic stop nut*
19. *Vinyl trim 112.75 (2864 mm)*
20. *Cap*
21. *Stripe 11.25" (286 mm) x 2*
22. *Stiffening plate*
23. *Flat washer*
24. *Self locking screw*
25. *Hinge trim*
26. *Hinge*
27. *Bumper filler*
28. *Cap*
29. *Plug*
30. *Upper column*
31. *Cap screw*
32. *Tank cover retainer*
33. *Spacer*
34. *Elastic stop nut*
35. *Reflector*
36. *Tool box*
37. *Hair pin*
38. *Rubber spacer*
39. *Clip*
40. *Flat washer*
41. *Rivet*
42. *Rear bumper*
43. *Machine screw*
44. *Elastic stop nut*
45. *Vinyl trim 36.62" (931 mm)*
46. *Cap*
47. *Screw*
48. *Stripe 11.25" (286 mm) x 2*
49. *Reflector **
50. *Ski tie down **
51. *Rivet **
52. *Hitch bracket**
53. *Retainer plate*
54. *Cap screw*
55. *Elastic stop nut*
56. *Hitch plate **
57. *Pin*
58. *Cotter pin*
59. *Seat*
60. *Seat cover*
61. *Speed nut*
62. *Elastic stop nut*
63. *Seat belt*
64. *Pin*
65. *Snow guard*
66. *Flat washer*
67. *Rivet*
68. *Stripe*
69. *Frame decal (500)*
70. *Warning label (towing)*
71. *Flat washer **
72. *Hair pin **

* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame*
2. *Machine screw*
3. *Elastic stop nut*
4. *Rubber guard*
5. *Flat washer*
6. *Rivet*
7. *Rubber shield (tie rod)*
8. *Cap*
9. *Rivet*
10. *Cross bar*
11. *Lockwasher*
12. *Cap screw*
13. *Cab seat 32" (813 mm) x 2*
14. *Cab seal*
15. *Bumper support*
16. *Cap screw*
17. *Elastic stop nut*
18. *Front bumper*
19. *Machine screw*
20. *Machine screw*
21. *Elastic stop nut*
22. *Vinyl trim 115.50" (2934 mm)*
23. *Stiffening plate*
24. *Front bumper cap*
25. *Stripe 11.25" (286 mm) x 2*
26. *Flat washer*
27. *Screw*
28. *Front bumper filler*
29. *Hinge trim*
30. *Hinge*
31. *Elastic stop nut*
32. *Cap*
33. *Plug*
34. *Upper column*
35. *Cap screw*
36. *Retainer plate*
37. *Spacer*
38. *Elastic stop nut*
39. *Tool box*
40. *Hair pin*
41. *Spark plug bracket*
42. *Rivet*
43. *Rubber spacer*
44. *Flat washer*
45. *Machine screw*
46. *Elastic stop nut*
47. *Reflector*
48. *Reflector **
49. *Rear bumper*
50. *Machine screw*
51. *Vinyl trim 36.62" (931 mm)*
52. *Rear bumper cap*
53. *Stripe 11.25" (286 mm) x 2*
54. *Elastic stop nut*
55. *Screw*
56. *Hitch bracket **
57. *Retainer plate*
58. *Cap screw*
59. *Elastic stop nut*
60. *Hitch plate **
61. *Pin*
62. *Cotter pin*
63. *Ski tie down **
64. *Rivet **
65. *Snow guard*
66. *Flat washer*
67. *Rivet*
68. *Seat*
69. *Seat cover*
70. *Speed nut*
71. *Elastic stop nut*
72. *Shock cover*
73. *Speed nut*
74. *Cap retainer*
75. *Machine screw*
76. *Snap cap*
77. *Towing instruction label*
78. *Flat washer **
79. *Hair pin **

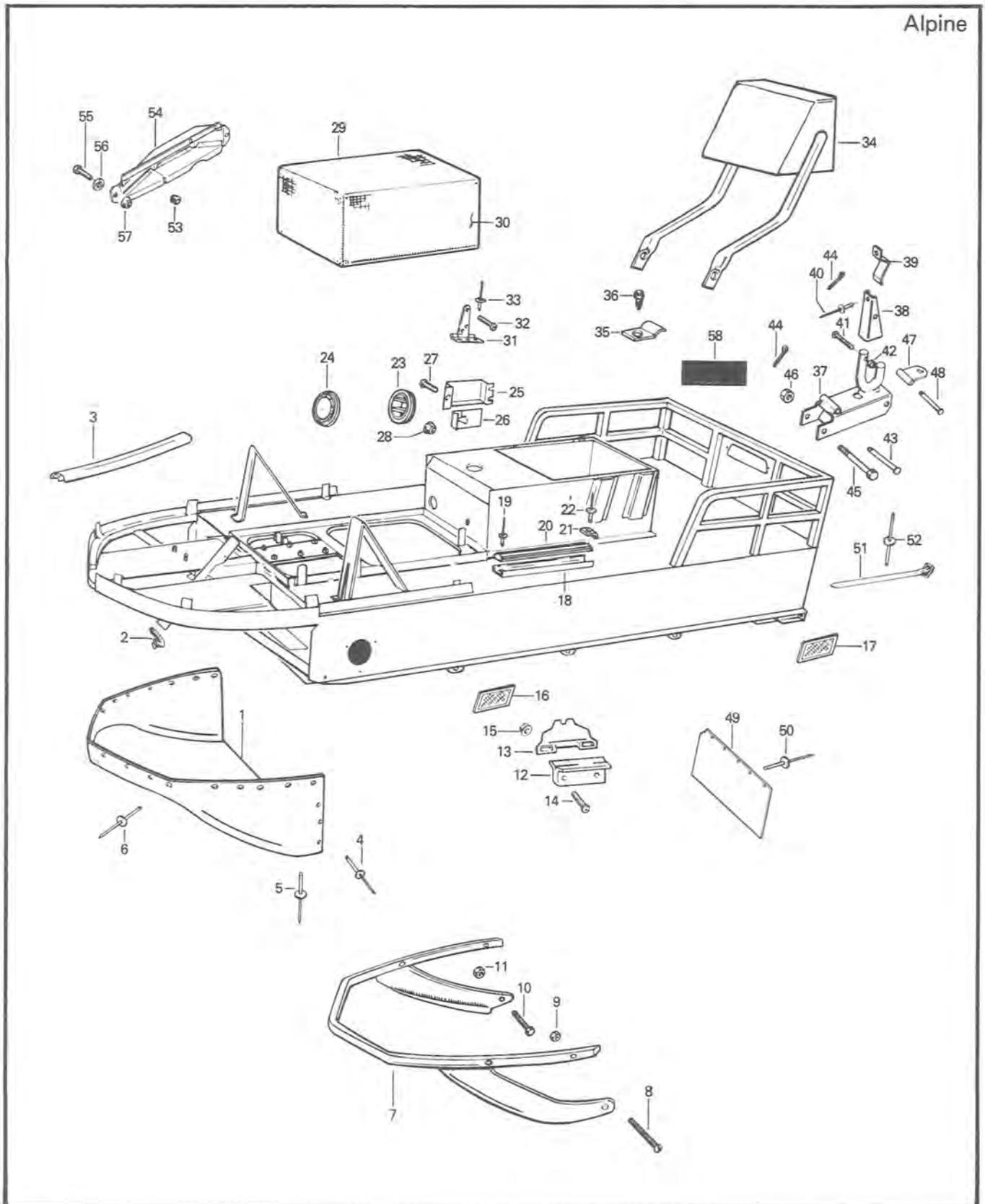
* If applicable

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Frame*
2. *Machine screw*
3. *Elastic stop nut*
4. *Cap seat 32" (813 mm) x 2*
5. *Cab seal*
6. *Side pan retainer*
7. *Screw*
8. *Bumper support*
9. *Cap screw*
10. *Elastic stop nut*
11. *Front bumper*
12. *Machine screw*
13. *Machine screw*
14. *Flat washer*
15. *Hexagonal nut*
16. *Elastic stop nut*
17. *Vinyl trim 112.75" (2864 mm)*
18. *Stiffening plate*
19. *Front bumper cap*
20. *Stripe 11.25" (286 mm) x 2*
21. *Flat washer*
22. *Screw*
23. *Front bumper filler*
24. *Hinge trim*
25. *Hinge*
26. *Elastic stop nut*
27. *Cap*
28. *Plug*
29. *Upper column*
30. *Cap screw*
31. *Tank cover retainer*
32. *Spacer*
33. *Elastic stop nut*
34. *Tool box*
35. *Hair pin*
36. *Rubber spacer*
37. *Clip*
38. *Flat washer*
39. *Rivet*
40. *Reflector*
41. *Frame stripe*
42. *Reflector*
43. *Rear bumper*
44. *Machine screw*
45. *Vinyl trim 36.62" (931 mm)*
46. *Rear bumper cap*
47. *Stripe 11.25" (286 mm) x 2*
48. *Elastic stop nut*
49. *Screw*
50. *Snow guard*
51. *Flat washer*
52. *Rivet*
53. *Seat*
54. *Seat cover*
55. *Speed nut*
56. *Elastic stop nut*

SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

Alpine



SECTION 07 HOOD/FRAME
SUB-SECTION 02 (FRAME)

1. *Bottom plate*
2. *Plastic sealer 7" (178 mm)*
3. *Body moulding*
4. *Rivet*
5. *Rivet*
6. *Rivet*
7. *Front bumper*
8. *Machine screw*
9. *Elastic stop nut*
10. *Cap screw*
11. *Elastic stop nut*
12. *Cushion*
13. *Latch bracket*
14. *Machine screw*
15. *Elastic stop nut*
16. *Reflector*
17. *Reflector*
18. *Side guard (20 1/2" - 521 mm)*
19. *Rivet*
20. *Rubber rib 160" (4064 mm)*
21. *Foot rib stop*
22. *Rivet*
23. *Grill*
24. *Plug*
25. *Deflector*
26. *Foam*
27. *Machine screw*
28. *Elastic stop nut*
29. *Seat*
30. *Seat cover*
31. *Hinge*
32. *Machine screw*
33. *Rivet*
34. *Backrest*
35. *Clip*
36. *Metal screw*
37. *Attach bracket*
38. *Catch*
39. *Spring*
40. *Rivet*
41. *Machine screw*
42. *Elastic stop nut*
43. *Pin*
44. *Cotter pin*
45. *Cap screw*
46. *Elastic stop nut*
47. *Hitch plate*
48. *Pin*
49. *Snow guard*
50. *Rivet*
51. *Ski tie down*
52. *Rivet*
53. *Grommet*
54. *Protector (angle drive)*
55. *Cap screw*
56. *Flat washer*
57. *Elastic stop nut*
58. *Warning label*

FOR ELITE MODEL:

Refer to the equivalent model in section 07-01.

FRAME WELDING

Steel frame:

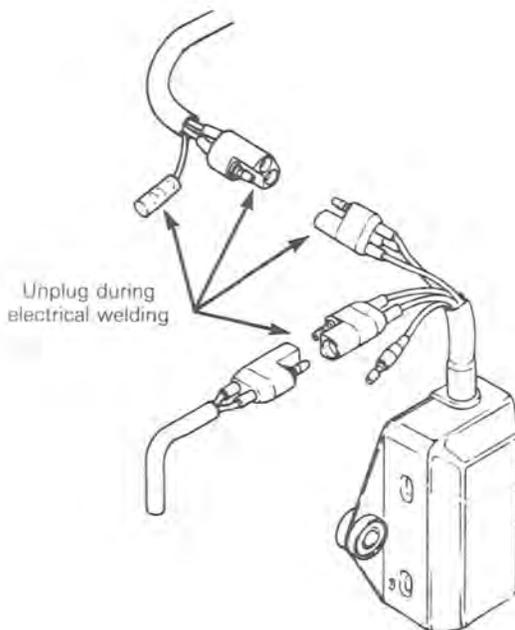
- Electric Welding
- Amperage: 70-110 Amp.
- Voltage: 20-24 volts
- Rod: E-7014 (3/32")

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.



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.

SEATS

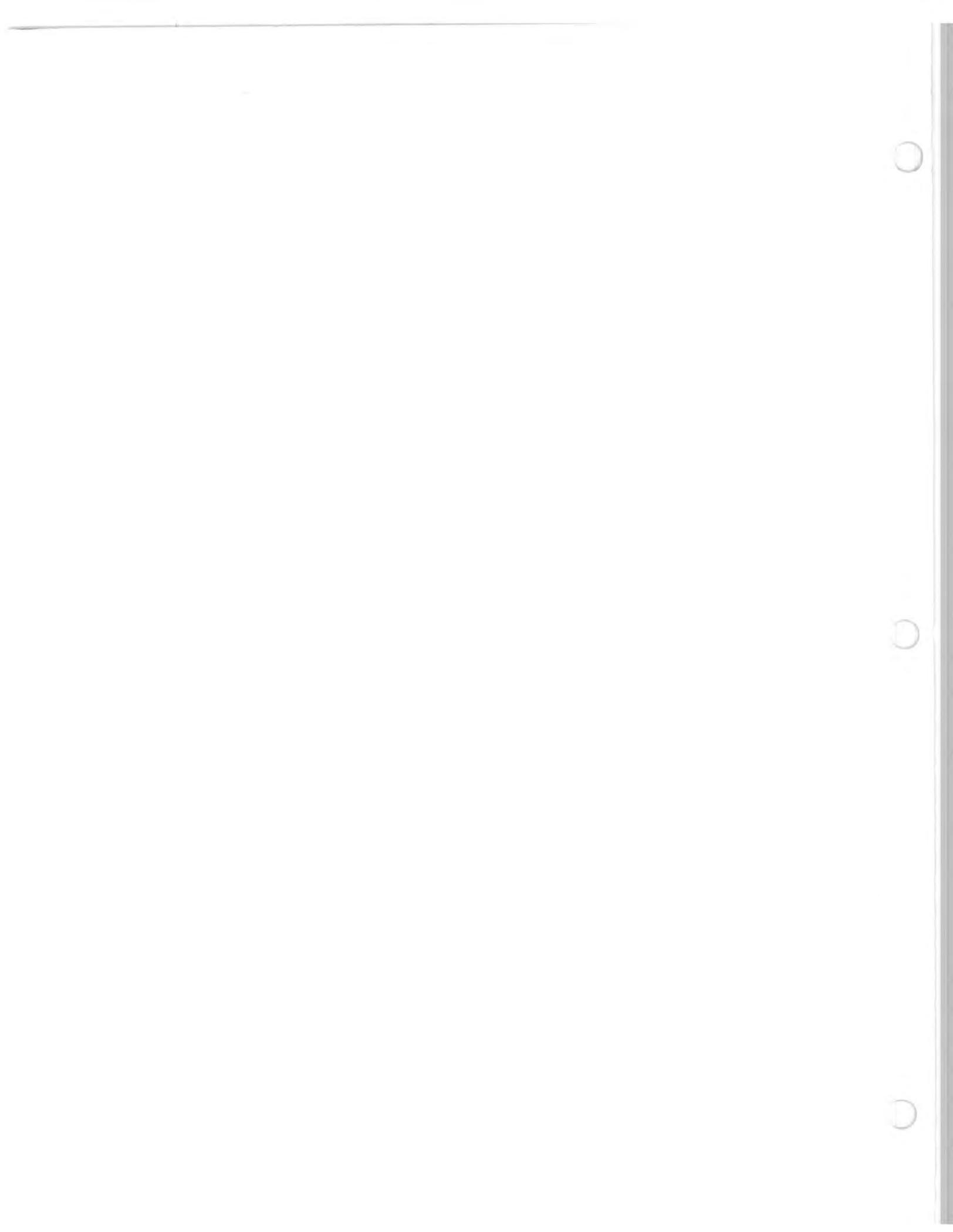
Elite model

To remove the backrest, unscrew the two (2) wing nuts located in the engine compartment.

Seat cleaning

For all 1981 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.



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 of any rotating parts, moving parts, heating parts and vibrating parts.

FUEL LINE (ALL MODELS)

This section has been made as a guide to help you in the proper location of the fuel lines on the above mentioned models.

Each fuel line is coded from number 1 to 13 and refers to a "fuel line length chart" at the end of this section.

◆ **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 of any rotating parts, moving parts, heating parts and vibrating parts.

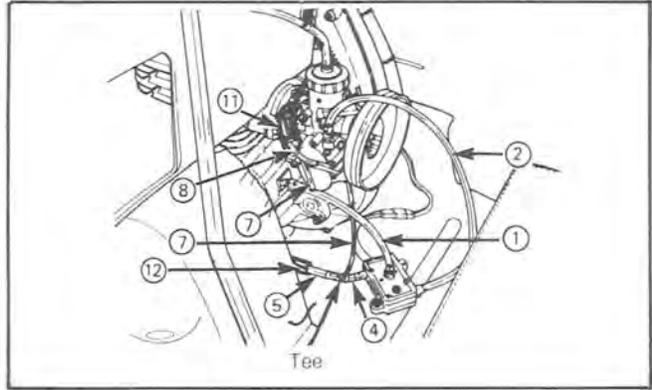
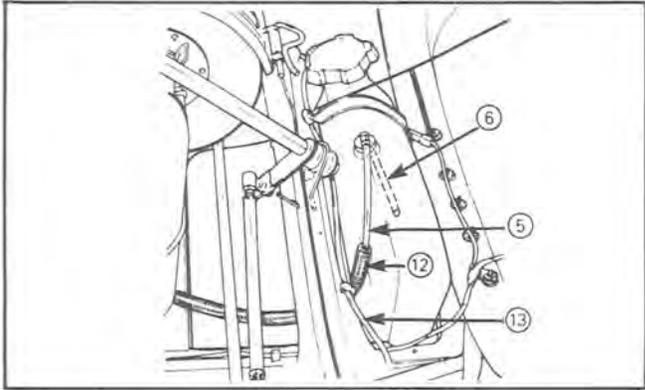
Refer to the following illustrations.

○ **NOTE:** For the fixation of the fuel lines, use as required the following **spring clips**:

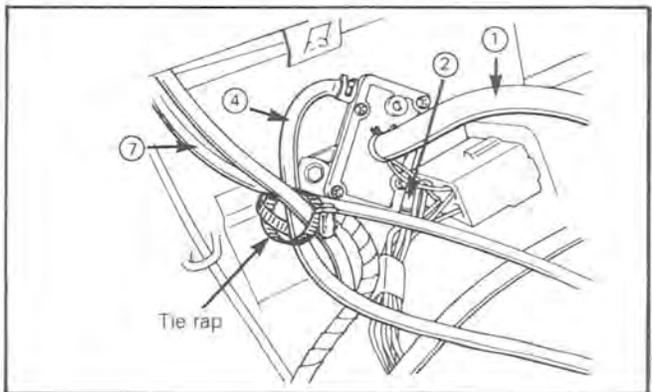
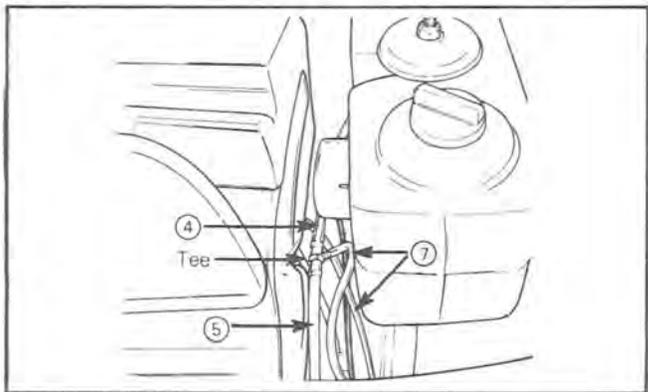
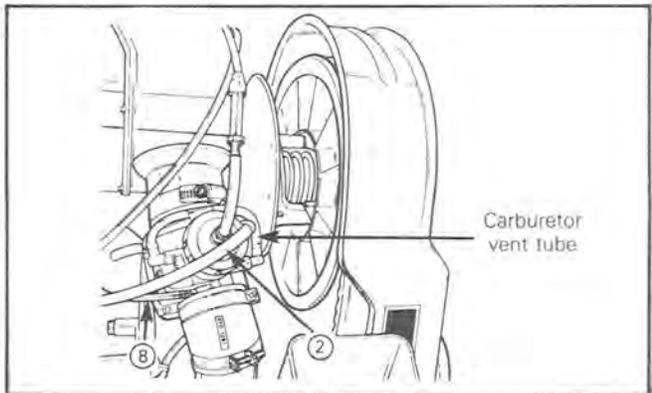
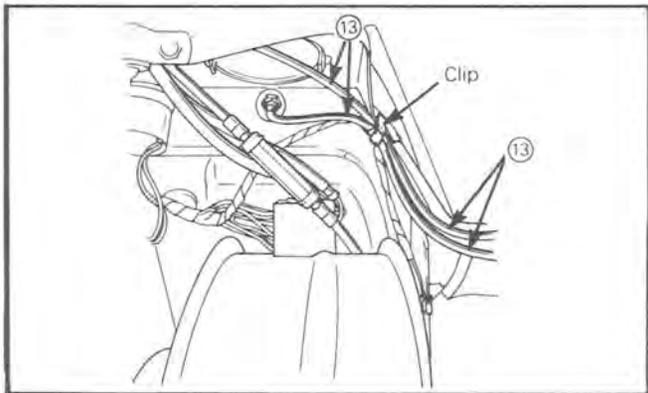
- Impulse hose to fuel pump and engine: 414 4152 00
- Fuel line to carburetor and fuel pump: 414 2786 00

SECTION 08 FUEL LINE, WIRING HARNESS &
CABLE ROUTING

Elan - Spirit

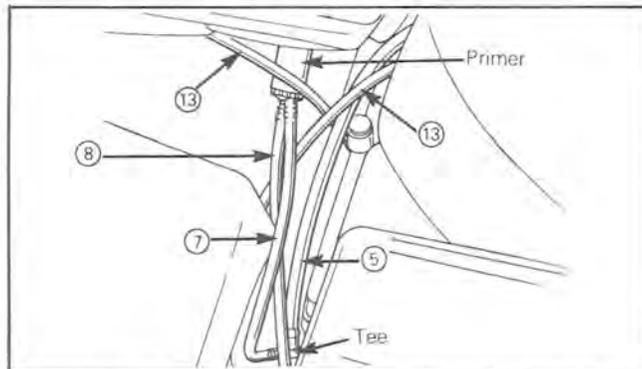
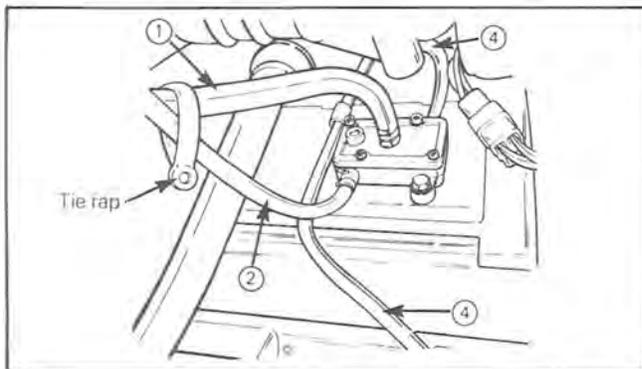
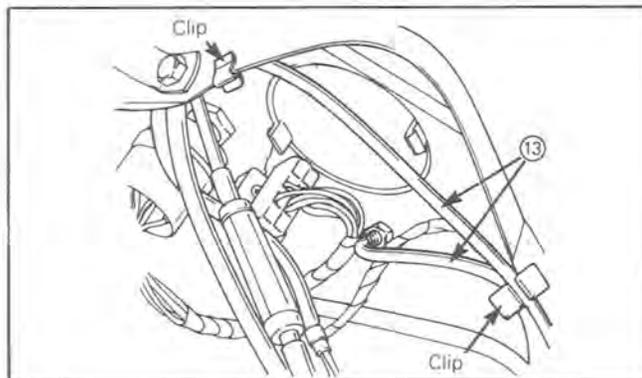
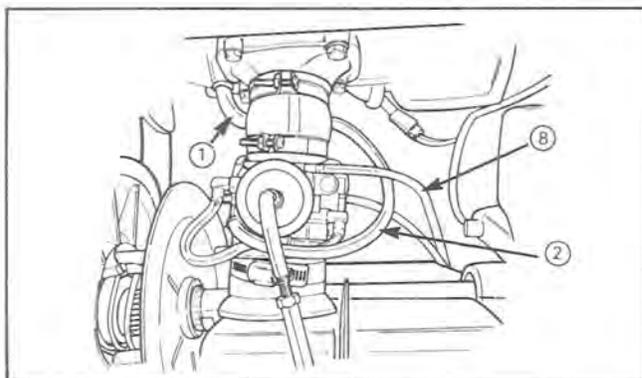


Citation 3500 - Mirage I

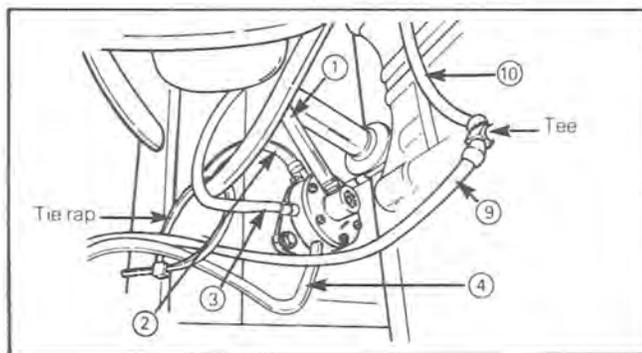
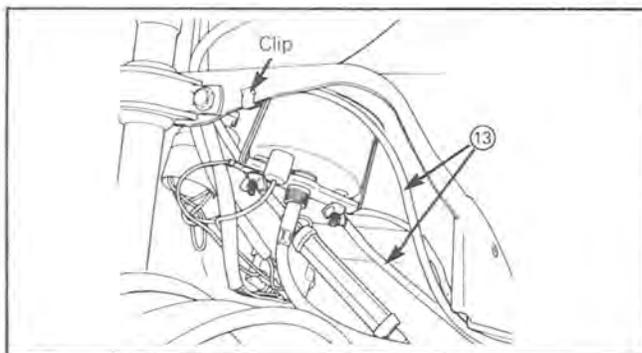
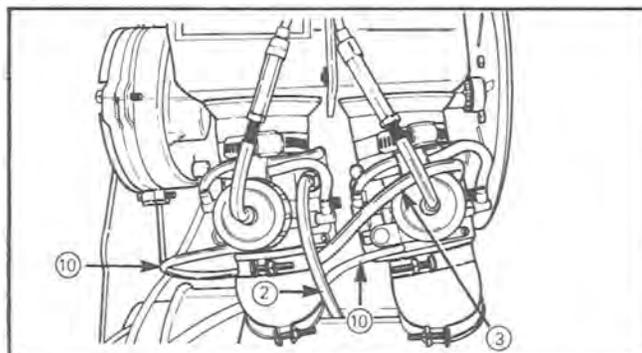
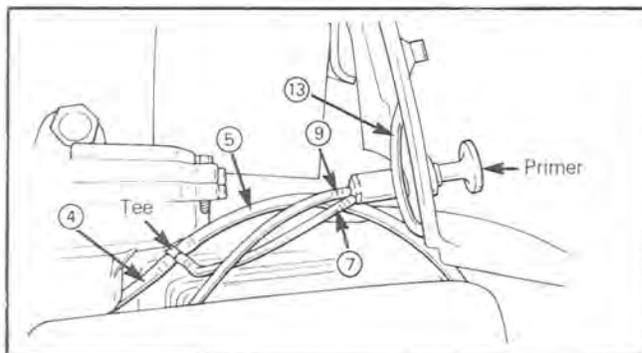


SECTION 08 FUEL LINE, WIRING HARNESS & CABLE ROUTING

Citation 4500/E, Mirage II/E
Nordik, Skandic, Futura 300

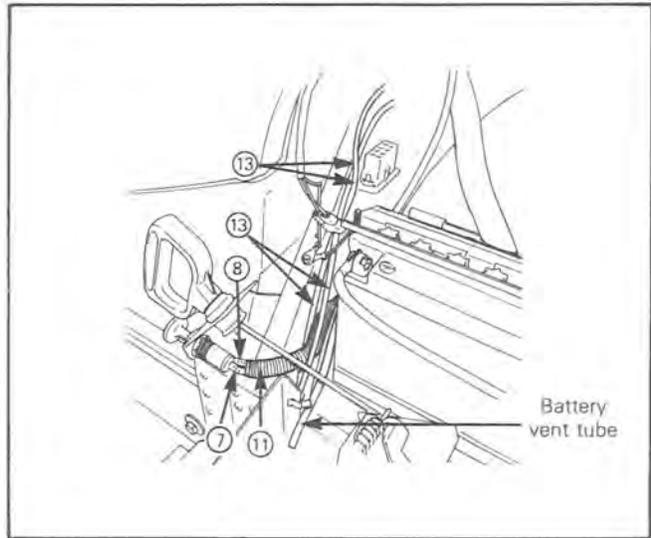
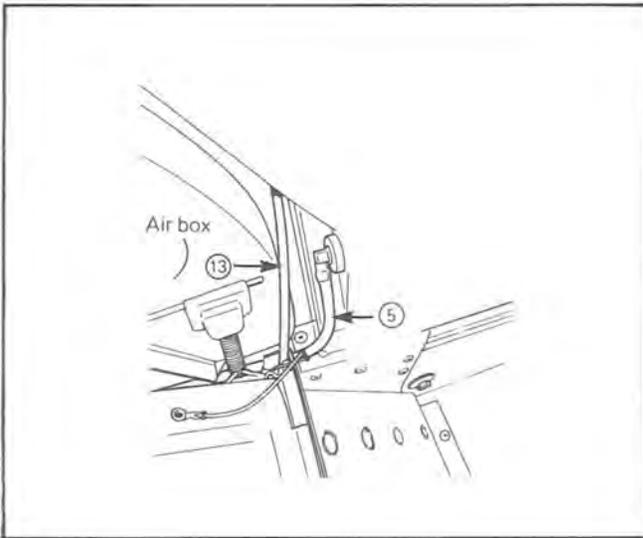
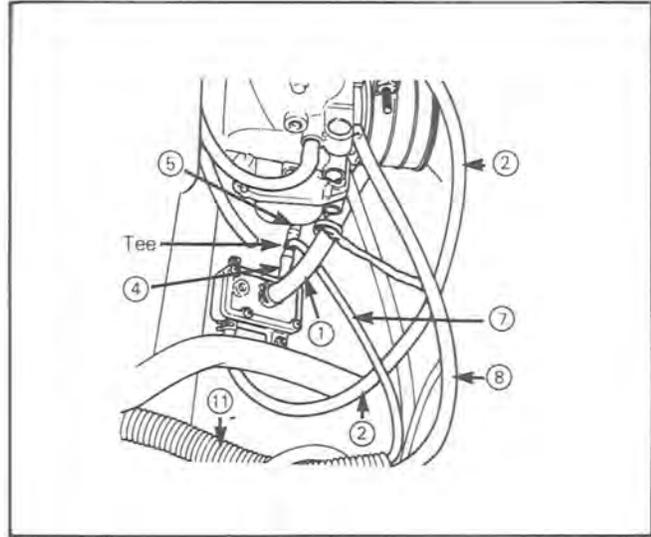
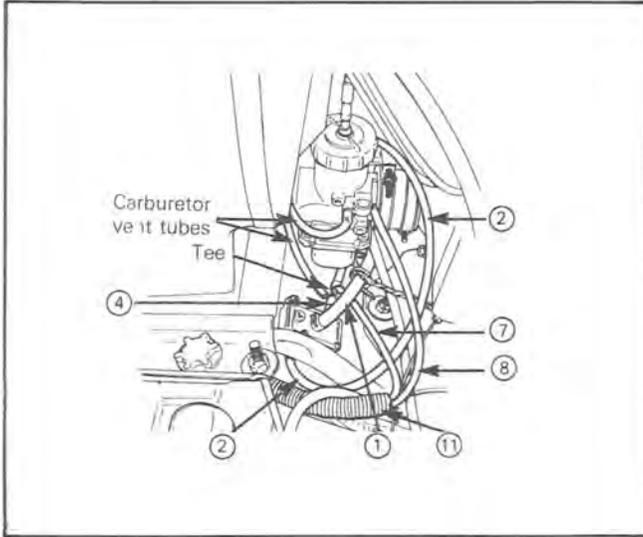


Citation SS - Mirage Special



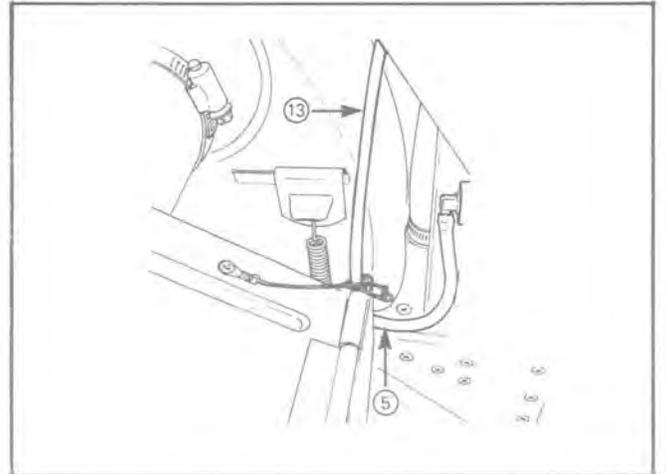
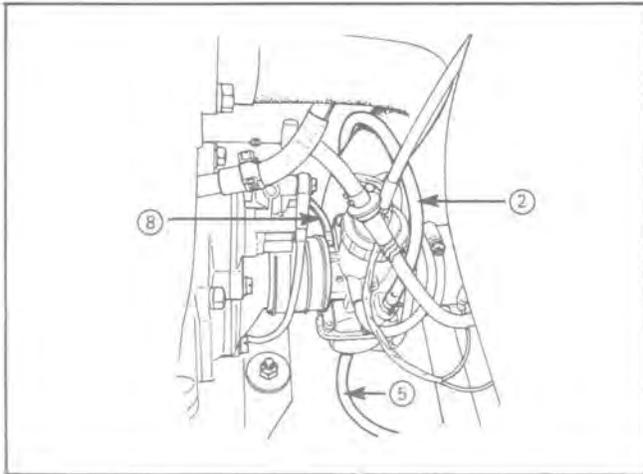
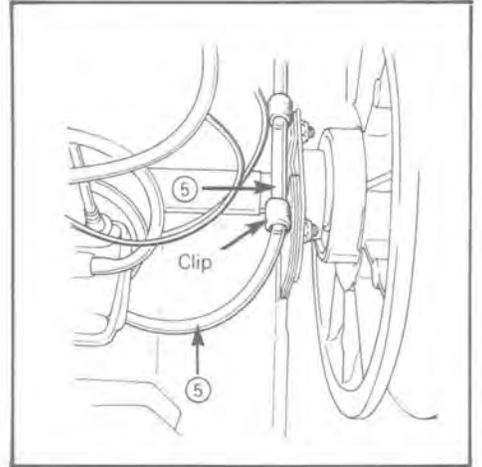
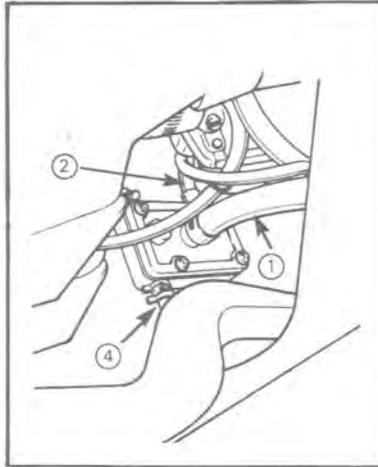
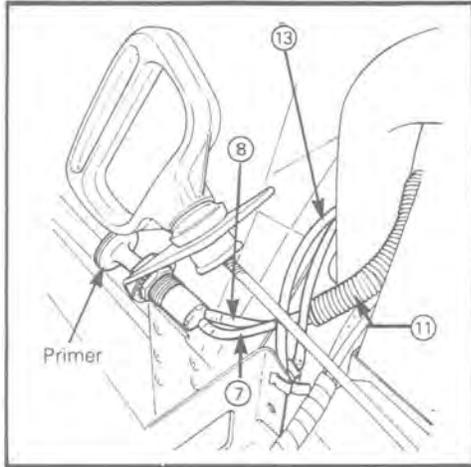
SECTION 08 FUEL LINE, WIRING HARNESS & CABLE ROUTING

Everest 500/E - Futura 500/E



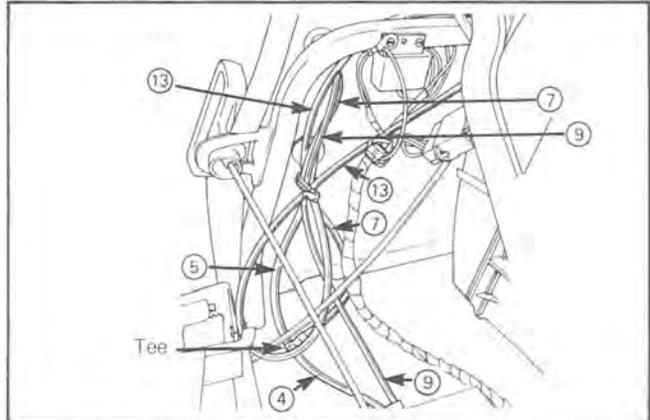
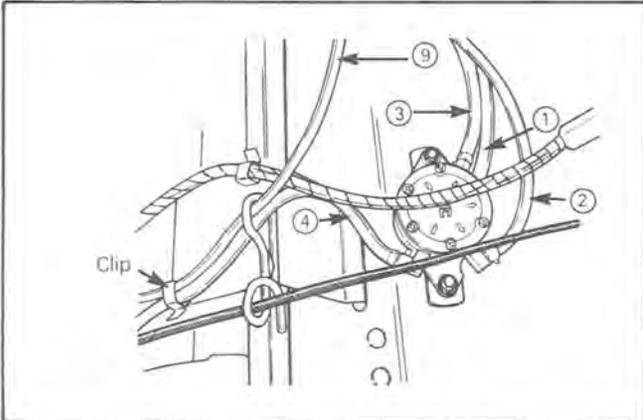
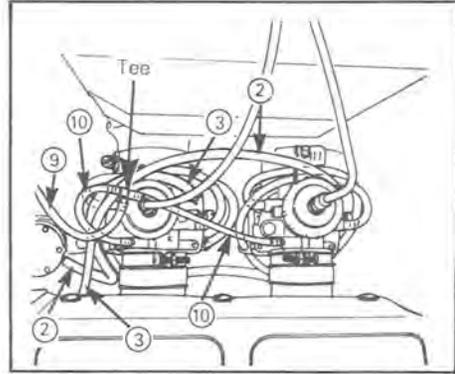
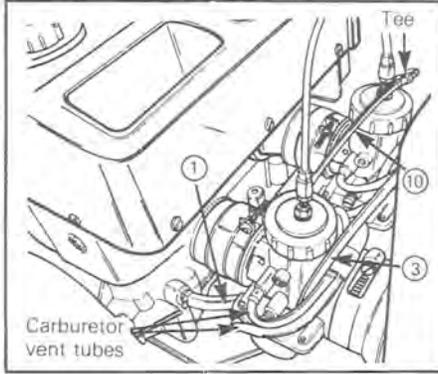
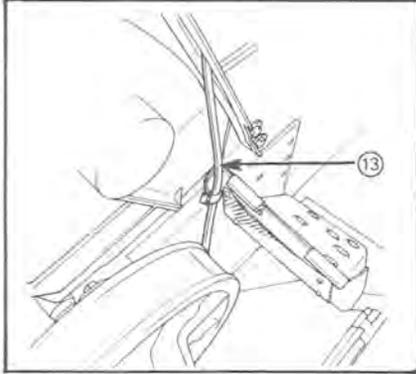
SECTION 08 FUEL LINE, WIRING HARNESS & CABLE ROUTING

Everest L/C - Futura L/C

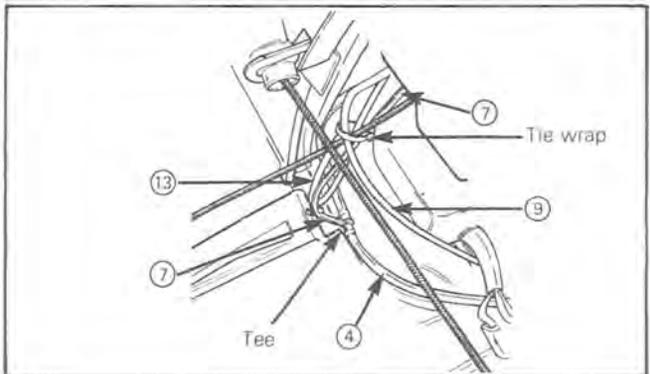
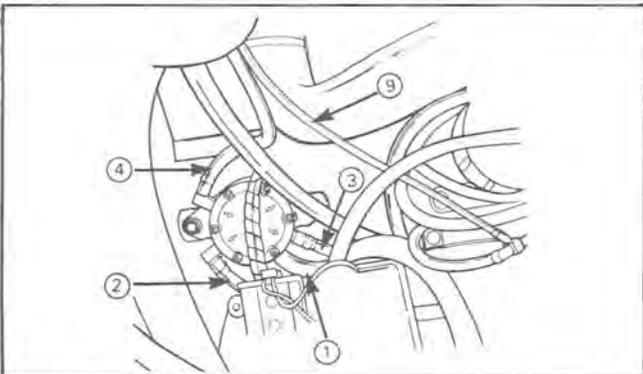
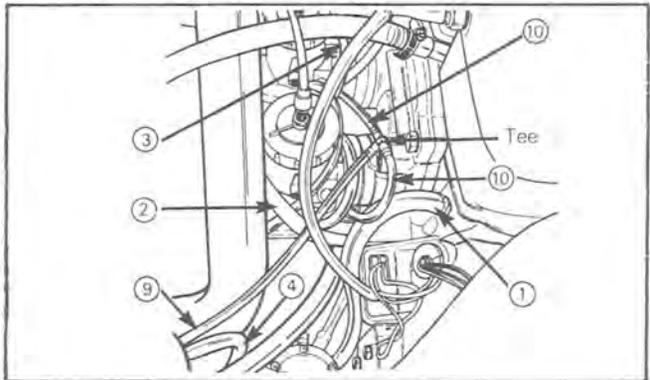
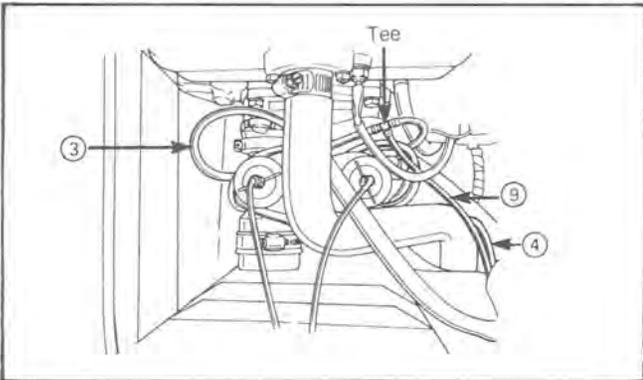


SECTION 08 FUEL LINE, WIRING HARNESS &
CABLE ROUTING

Blizzard 5500 MX - Sonic MX

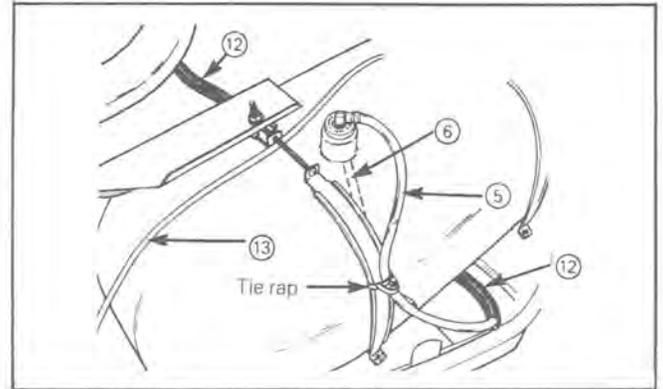
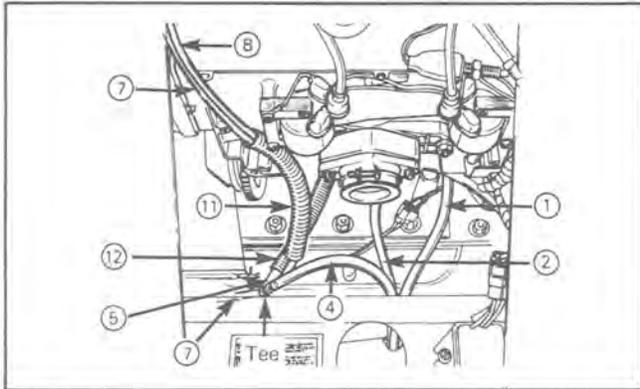


Blizzard 9500 - Ultra Sonic

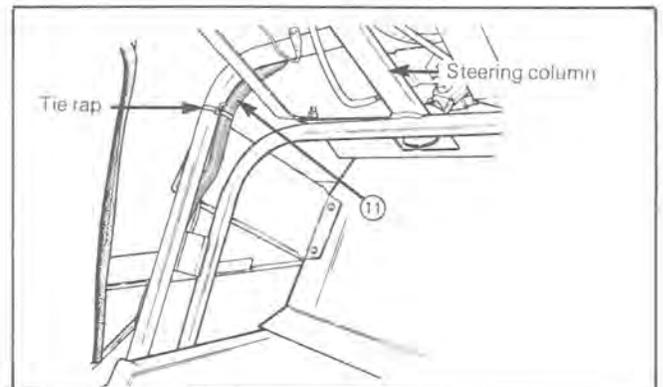
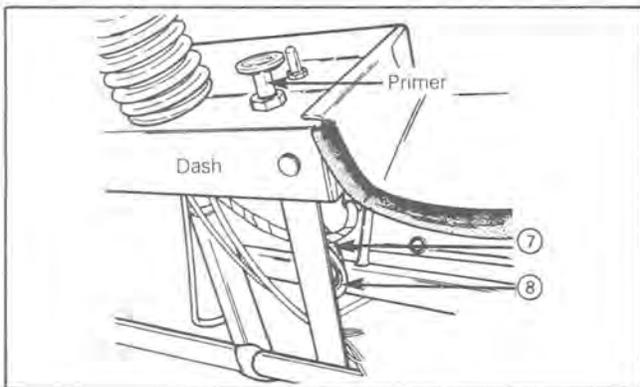
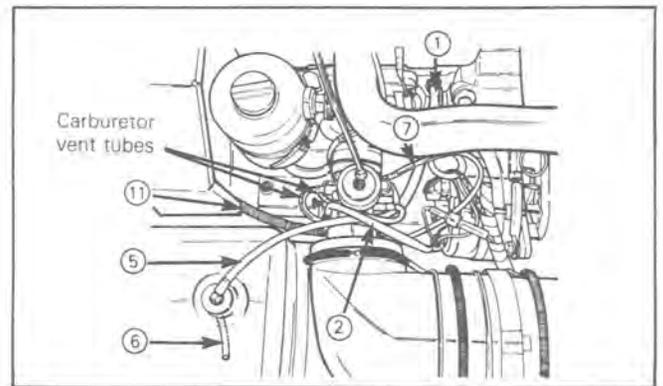
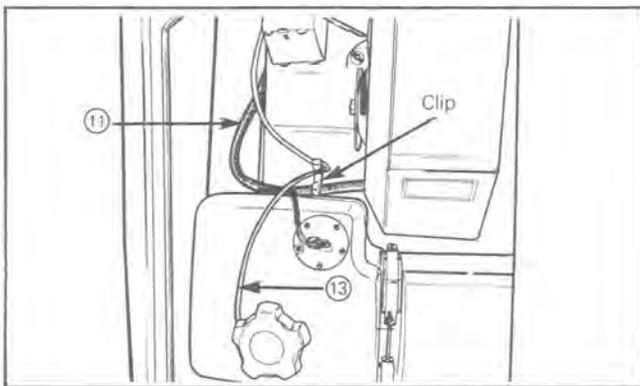


SECTION 08 FUEL LINE, WIRING HARNESS & CABLE ROUTING

Alpine



Elite



SECTION 08 FUEL LINE, WIRING HARNESS & CABLE ROUTING

FUEL LINES LENGTH CHART

- ① Impulse hose from engine to fuel pump
- ② Fuel line from fuel pump to carburetor inlet (single carburetor or M.A.G. side carburetor)
- ③ Fuel line from fuel pump to carburetor inlet (twin carburetor, P.T.O. side)
- ④ Fuel line from tee to fuel pump
- ⑤ Fuel line from fuel tank to tee
- ⑥ Fuel line inside the fuel tank
- ⑦ Primer line from primer to tee of the main fuel line
- ⑧ Primer line from primer to carburetor (single carburetor)
- ⑨ Primer line from primer to tee (twin carburetor)
- ⑩ Primer line from tee to carburetor (twin carburetor)- *The value is for one primer line only.
- ⑪ Isolating line over the primer line
- ⑫ Isolating line over the fuel line
- ⑬ Fuel tank vent tube

N.A.: not applicable

ITEMS		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩ *	⑪	⑫	⑬
MODELS														
Everest L/C & Futura L/C	mm (in)	254 (10)	457 (18)	N.A.	32 (1.25)	508 (20)	508 (20)	712 (28)	712 (28)	N.A.	N.A.	508 (20)	N.A.	1235 (49)
Blizzard 5500 MX Sonic MX	mm (in)	280 (11)	356 (15)	381 (15)	407 (16)	153 (6)	508 (20)	610 (24)	N.A.	788 (31)	115 (4.5)	N.A.	N.A.	1473 (58)
Blizzard 9500 Ultra Sonic	mm (in)	280 (11)	343 (13.5)	343 (13.5)	407 (16)	153 (6)	508 (20)	610 (24)	N.A.	788 (31)	115 (4.5)	N.A.	N.A.	1473 (58)
Citation 3500 - Nordik Mirage I - Futura 300	mm (in)	280 (11)	570 (22)	N.A.	508 (20)	380 (15)	356 (14)	178 (7)	508 (20)	N.A.	N.A.	N.A.	N.A.	1575 (62)
Citation 4500/E Mirage II/E - Skandic	mm (in)	280 (11)	570 (22)	N.A.	508 (20)	380 (15)	356 (14)	178 (7)	508 (20)	N.A.	N.A.	N.A.	N.A.	1575 (62)
Citation SS & Mirage Special	mm (in)	280 (11)	570 (22)	204 (8)	508 (20)	380 (15)	356 (14)	178 (7)	N.A.	432 (17)	204 (8)	N.A.	N.A.	1575 (62)
Everest 500/E & Futura 500/E	mm (in)	254 (10)	457 (18)	N.A.	32 (1.25)	508 (20)	508 (20)	712 (28)	712 (28)	N.A.	N.A.	508 (20)	N.A.	1235 (49)
Elan & Spirit	mm (in)	184 (7.25)	332 (13)	N.A.	38 (1.5)	927 (36.5)	356 (14)	470 (18.5)	178 (7)	N.A.	N.A.	102 (4)	750 (29.5)	586 (23)
Alpine	mm (in)	381 (15)	661 (26)	N.A.	381 (15)	1257 (49.5)	432 (17)	559 (22)	356 (14)	N.A.	N.A.	254 (10)	864 (34)	1461 (57.5)
Elite	mm (in)	457 (18)	661 (26)	N.A.	457 (18)	204 (8)	394 (15.5)	3150 (124)	3150 (124)	N.A.	N.A.	2870 (113)	N.A.	915 (36)

Impulse hose
Fuel line
Primer line
Vent tube
Isolating line

P/N 414 2867 00
P/N 414 0511 00
P/N 414 2969 00
P/N 414 2969 00
P/N 414 0178 00

○ NOTE: Ask for the required line length, using the appropriate part number.

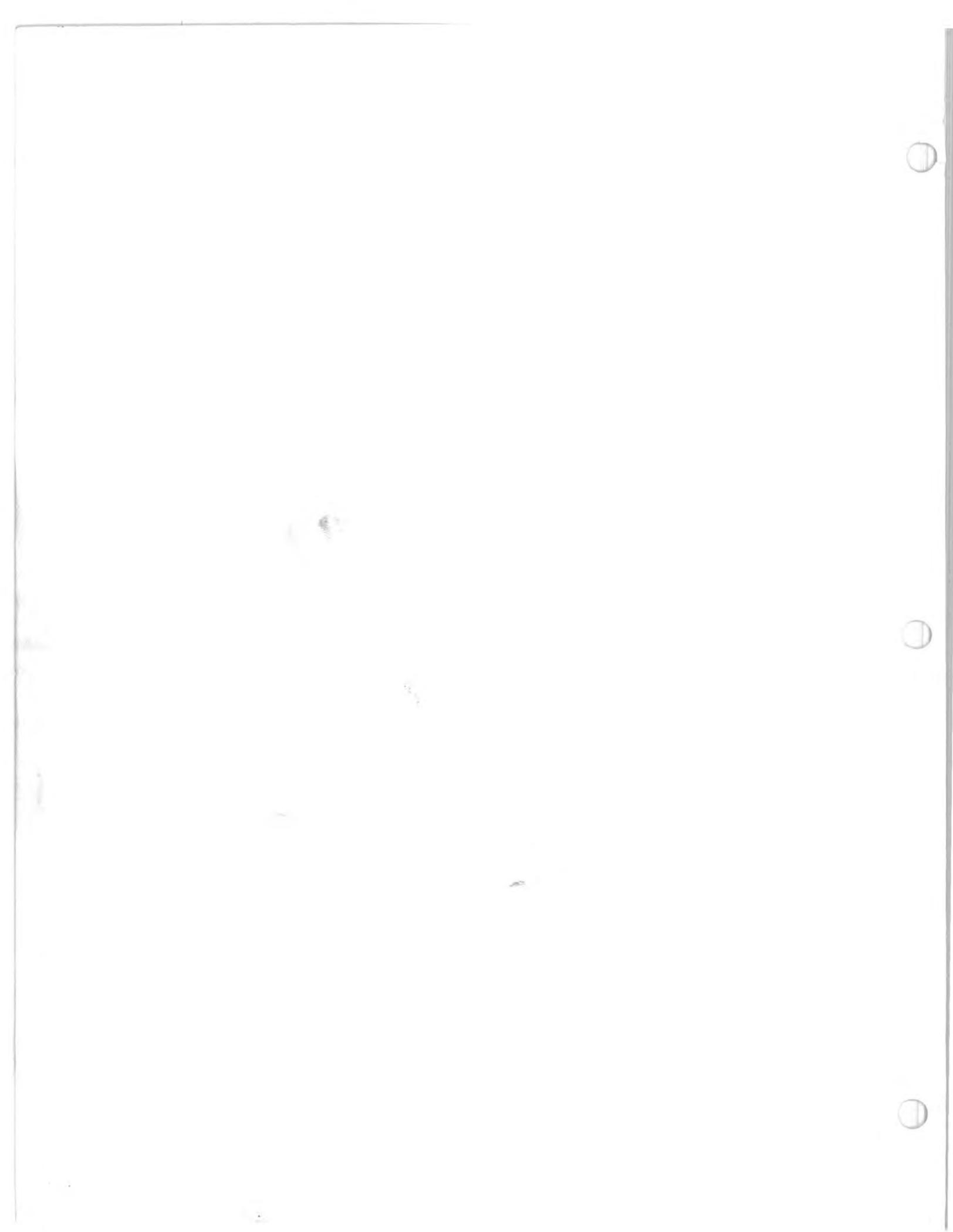
◆ WARNING: Always ensure that the lines are away from moving parts, rotating parts and heat source or sparks.

ENGINE

1982 ENGINES — TOLERANCES AND WEAR LIMITS

ENGINE TYPE		CYLINDER BORE (NOMINAL)		PISTON TO WALL CLEARANCE		MAXIMUM RING END GAP	CRANKSHAFT END PLAY	
		STD	OVERSIZE	MIN.	MAX.		MIN.	MAX.
247	mm (in)	69.5 (2.736)	N.A.	0.066 (0.0026)	0.203 (0.008)	0.991 (0.039)	0.203 (0.008)	0.406 (0.016)
277	mm (in)	72 (2.835)	72.25 (2.845)	0.07 (0.003)	0.09 (0.004)	1.0 (0.040)	0.203 (0.008)	0.406 (0.016)
377	mm (in)	62 (2.441)	62.25 (2.451)	0.08 (0.003)	0.10 (0.004)	1.0 (0.040)	N.A.	N.A.
454	mm (in)	67.5 (2.657)	67.75 (2.667)	0.10 (0.004)	0.12 (0.005)	1.0 (0.040)	N.A.	N.A.
464	mm (in)	69.5 (2.736)	69.75 (2.746)	0.08 (0.003)	0.10 (0.004)	1.0 (0.040)	N.A.	N.A.
503	mm (in)	72 (2.835)	72.25 (2.845)	0.07 (0.003)	0.09 (0.004)	1.0 (0.040)	N.A.	N.A.
640	mm (in)	76 (2.992)	76.5 (3.012)	0.08 (0.003)	0.10 (0.004)	1.2 (0.047)	0.203 (0.008)	0.406 (0.016)

N.A.: not applicable



CARBURATION

CARBURETOR ADJUSTMENT

MODEL	ENGINE TYPE	CARBURETOR TYPE	AIR SCREW ADJUSTMENT ± 1/8	IDLE SPEED ADJUSTMENT RPM
Elan, Spirit	247	Mikuni VM28-242	1 1/2 turn	1300 - 1500
Citation 3500 Mirage I	277	Mikuni VM34-255	1 1/2 turn	1100 - 1300
Citation 4500/E Mirage II/E	377	Mikuni VM34-276	1 1/2 turn	1800 - 2000
Citation SS Mirage Special	377	2 x Mikuni VM34-277	1 1/2 turn	1800 - 2000
Nordik Skandic Futura 300	377	Mikuni VM34-276	1 1/2 turn	1800 - 2000
Blizzard 5500 MX Sonic	503	2 x Mikuni VM34-203	1 1/2 turn	1800 - 2000
Blizzard 9500 Ultra Sonic	454	PTO: Mikuni VM36-119 MAG: Mikuni VM36-118	1 1/2 turn	1800 - 2000
Everest 500/E Futura 500/E	503	Mikuni VM36-114	1 1/2 turn	1800 - 2000
Everest L/C Futura L/C	464	Mikuni VM 34-227	1 1/2 turn	1800 - 2000
Alpine	640	Mikuni VM34-215	1 1/2 turn	1500 - 1800
Elite	464	Mikuni VM34-258	1 1/2 turn	1800 - 2000

SECTION 09 TECHNICAL DATA
SUB-SECTION 02 (CARBURATION)

1982 MIKUNI CARBURETOR SPECIFICATIONS

CARBURETOR	MAIN JET	NEEDLE	NEEDLE JET	CUT AWAY	PILOT JET
VM28-242	160	6 DP1-3	182 O-8	2.0	30
VM34-203	220	6 DH2-3	159 P-4	3.0	35
VM34-215	280	6 F9-3	159 P-2	2.0	30
VM34-227	380	6 EJ1-3	159 P-4	3.0	40
VM34-255	220	6 DH4-3	159 P-2	3.0	30
VM34-258	340	6 EV1-3	159 P-0	2.5	40
VM34-276	260	6 DH4-3	159 P-2	3.0	35
VM34-277	160	6 DH2-3	159 P-0	3.0	40
VM36-114	300	6 F9-3	159 P-6	3.0	35
VM36-118	330	6 DH4-3	159 P-4	3.0	45
VM36-119	310	6 DH4-3	159 P-4	3.0	45

ELECTRICAL

1982 IGNITION TIMING

ENGINE TYPE	IGNITION TYPE	DIRECT MEASUREMENT B.T.D.C. 	INDIRECT MEASUREMENT B.T.D.C. 	EDGE GAP 
247	Breaker point	3.98 mm \pm 0.25 (.157" \pm .010)	N.A.	5-8 mm (0.197-0.315")
277	CD ①	N.A.	2.85 \pm 0.25 mm (0.112 \pm 0.010")	N.A.
377	CD ①	2.31 \pm 0.25 mm (0.091 \pm 0.010")	N.A.	N.A.
454	CD ①	2.52 \pm 0.25 mm (0.099 \pm 0.010")	N.A.	N.A.
464	CD ①	2.52 \pm 0.25 mm (0.099 \pm 0.010")	N.A.	N.A.
503	CD ①	2.29 \pm 0.25 mm (0.090 \pm 0.010")	N.A.	N.A.
640	Breaker point	N.A.	4.15 \pm 0.25 mm (0.163 \pm 0.010")	5-8 mm (0.197-0.315")

N.A.: Not applicable

① Stroboscopic timing at 6000 R.P.M. (engine cold).

SECTION 09 TECHNICAL DATA
 SUB-SECTION 03 (ELECTRICAL)

IGNITION SYSTEM RESISTANCE CHART

	ENGINE TYPE	GENERATOR COIL	LIGHTING COIL (large)	LIGHTING COIL (small)	HIGH TENSION COIL (PRIMARY)	HIGH TENSION COIL (SECONDARY)
A	247	3.0-3.7 Ω	0.38-0.58 Ω	1.85-2.35 Ω	1.65-2.05 Ω	4850-5850 Ω
	640	3.2-3.7 Ω		2.13-2.63 Ω	1.71-2.26 Ω	
B	277	L.S.: 120-180 Ω	0.21-0.31 Ω	N.A.	0.23-0.43 Ω	3.0-5.6 K Ω
	377	H.S.: 2.8-4.2 Ω				2.45-4.55 K Ω
	503					
	454	L.S.: 125-235 Ω	0.09-0.20 Ω			
	464	H.S.: 1.4-2.6 Ω				

A : Breaker points ignition systems

B : Nippondenso electronic ignition systems

Ω : ohm

KΩ : kilo ohm

L.S.: low speed charging coil

H.S.: high speed charging coil

N.A.: not applicable

○ **NOTE:** Components temperature **MUST** be around 20°C (68°F) when this test is performed.

**BOMBARDIER IGNITION TESTER DIAL POSITION FOR 1982
 COMPONENTS**

	ENGINE TYPE	GENERATOR COIL (charging)	LIGHTING COIL (large)	LIGHTING COIL (small)
Ⓐ	247	HIGH 75	LOW 85 ①	LOW 85 ①
	640	HIGH 80	LOW 85 ①	
Ⓑ	277	H.S.: LOW 80 L.S.: LOW 80	LOW 70	
	377			
	454			
	464			
	503			

Ⓐ : Breaker points ignition systems

Ⓑ : Nippondenso electronic ignition systems

L.S.: Low speed generating coil

H.S.: High speed generating coil

① : The two lighting coils (large one and small one) are connected in parallel and this parallel connection must be broken off for testing as each coil is to be checked individually.

SECTION 09 TECHNICAL DATA
SUB-SECTION 03 (ELECTRICAL)

1982 SPARK PLUG CHART

MODELS	SPARK PLUG TYPE	ELECTRODE GAP
Elan, Spirit	Bosch M 175 T 1 (M 7 A)	0.5 mm (0.020")
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Nordik, Skandic, Futura 300	NGK BR 8 ES	0.4 mm (0.016")
Blizzard 5500 MX, Sonic	NGK BR 7 ES	0.4 mm (0.016")
Blizzard 9500, Ultra Sonic	Bosch W 300 T 2 (W 2 C)	0.4 mm (0.016")
Everest 500/E, Futura 500/E	NGK BR 7 ES	0.4 mm (0.016")
Everest L/C, Futura L/C	NGK BR 8 ES	0.4 mm (0.016")
Elite	NGK BR 8 ES	0.4 mm (0.016")
Alpine	Bosch M 240 T 1 (M 4 A 2)	0.5 mm (0.020")

TRANSMISSION

1982 VEHICLE MODEL/DRIVE BELT NUMBER

MODELS	1982 BELT NUMBER	WIDTH	
		MIN.	MAX.
Elan and Spirit	570 0411 00	26.99 mm (1 1/16")	30.16 mm (1 3/16")
Citation 3500 Mirage I Citation 4500/E Mirage II/E Citation SS Mirage Special	414 3945 00	30.16 mm (1 3/16")	33.33 mm (1 5/16")
Nordik, Skandic Futura 300	414 3758 00	30.16 mm (1 3/16")	33.33 mm (1 5/16")
Blizzard 5500 MX Sonic Blizzard 9500 Ultra Sonic Everest 500/E Futura 500/E Everest L/C Futura L/C	414 3758 00	30.16 mm (1 3/16")	33.33 mm (1 5/16")
Alpine	414 3758 00	30.16 mm (1 3/16")	33.33 mm (1 5/16")
Elite	414 3758 00	30.16 mm (1 3/16")	33.33 mm (1 5/16")

○ **NOTE:** For longer belt life, always reinstall the drive belt in the same direction of rotation.

SECTION 09 TECHNICAL DATA
SUB-SECTION 04 (TRANSMISSION)

1982 DRIVE PULLEY SPECIFICATIONS

MODELS	TYPE	COUNTERWEIGHT IDENTIFICATION	ROLLER IDENTIFICATION mm (in)	SPRING P/N/COLOR LENGTH \pm 1.5 mm (0.060")	CLUTCH ENGAGEMENT RPM	RETAINING BOLT TORQUE N•m (ft-lbs)
Elan, Spirit	R.R.S.	E-4	Nylon 31.75 (1.25)	414 2580/Bronze 81.28 (3.20)	2000-2200	61 (45)
Citation 3500 Mirage I	R.R.S.	B-2-K-S	Fiber 31.75 (1.25)	414 4422/Black 104.7 (4.12)	3300-3600	85 (63)
Citation 4500 Mirage II	R.S.S.	B-E-K-S-H	Fiber 29.2 (1.15)	414 1995/Yellow 100 (3.94)	3900-4200	85 (63)
Citation 4500/E Mirage II/E	R.R.S.	C-7-L-X	Fiber 31.75 (1.25)	414 4423/Yellow 88.9 (3.50)	3200-3500	85 (63)
Nordik Skandic Futura 300	R.S.S.	B-3-K-S-H	Fiber 29.2 (1.15)	414 1995/Yellow 100 (3.94)	3700-3900	85 (63)
Blizzard 5500 MX Sonic	R.S.S.	C-7-L-H	Fiber 29.2 (1.15)	414 4065/Orange 96.5 (3.80)	3600-3800	85 (63)
Blizzard 9500 Ultra Sonic	R.S.S.R.	A-6-S	Aluminum 15.75 (0.62)	414 3412/Brown 76.96 (3.03)	4400-4700	85 (63)
Everest 500/E Futura 500/E	R.S.S.	C-6-L-H	Fiber 29.2 (1.15)	414 2328/Gold 74.42 (2.93)	2900-3200	85 (63)
Everest L/C Futura L/C	R.S.S.	C-7-L-H	Fiber 29.2 (1.15)	414 1967/Light blue 119.13 (4.69)	3400-3700	85 (63)
Elite	R.S.S.	C-7-C-H	Fiber 29.2 (1.15)	414 1967/Light blue 119.13 (4.69)	3400-3700	85 (63)
Alpine	R.S.S.B.	C-8 Double	Fiber 34.04 (1.34)	414 1966/Pink	2250-2400	118 (88)

R.S.S.: roller square shaft

R.R.S.: roller round shaft

R.S.S.B.: roller square shaft with bearing

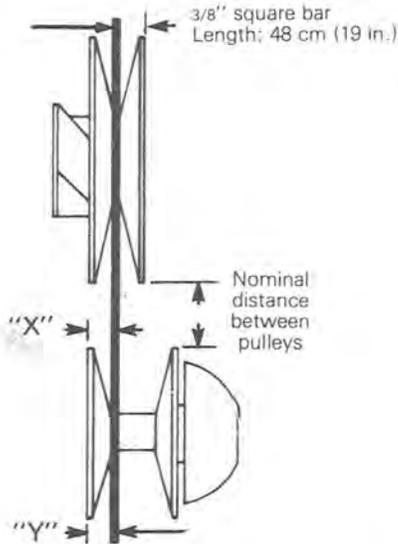
R.S.S.R.: roller square shaft 3 ramps

1982 DRIVEN PULLEY SPRING TENSION

MODELS	TENSION Kg (lbs)
Elan and Spirit	3.2 - 4 (7 -9)
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special	2.7 - 4.5 (6 - 10)
Citation 4500, Mirage II Nordik, Skandic, Futura 300	4.8 - 6.3 (11 - 13)
Blizzard 5500 MX, Sonic Blizzard 9500, Ultra Sonic Everest 500/E, Futura 500/E Everest L/C, Futura L/C	4.8 - 6.8 (11 - 15)
Elite	5.4 - 6.3 (12 - 14)
Alpine	5.4 - 6.3 (12 - 14)

SECTION 09 TECHNICAL DATA
 SUB-SECTION 04 (TRANSMISSION)

1982 PULLEY ALIGNMENT

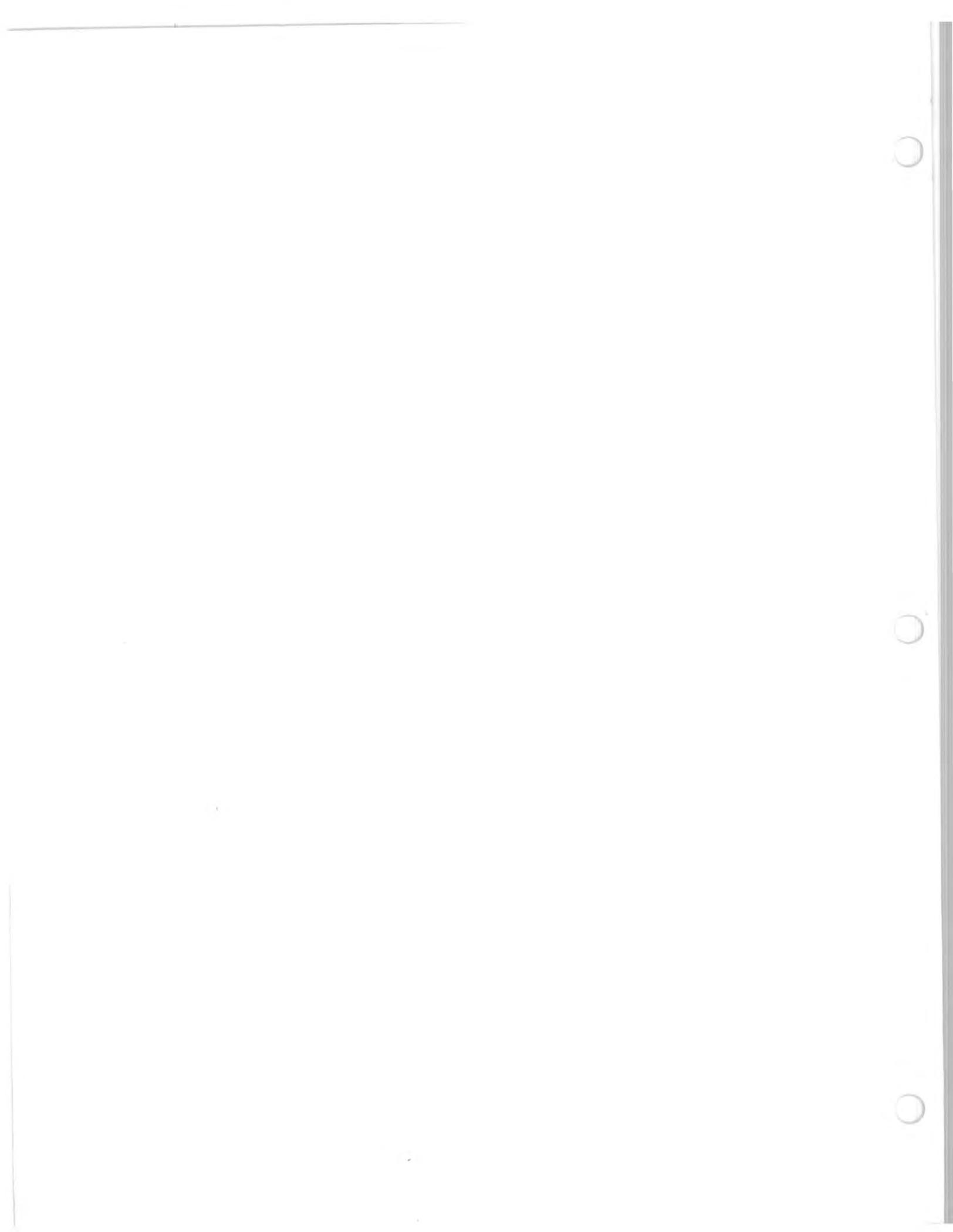


- Dimension "X" must never exceed dimension "Y".
- Dimension "Y" can exceed dimension "X" by 1.6 mm (1/16").

MODELS	DIMENSIONS X and Y (offset)	NOMINAL DISTANCE (between pulleys)
Elan and Spirit	34 mm (1 11/32")	44.45 mm (1 3/4")
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Nordik, Skandic, Futura 300	34 mm (1 11/32")	41.27 mm (1 5/8")
Blizzard 5500 MX, Sonic Blizzard 9500, Ultra Sonic Everest 500/E, Futura 500/E Everest L/C, Futura L/C	32.5 mm (1 9/32")	35 mm (1 3/8")
Elite	34 mm (1 11/32")	44.45 mm (1 3/4")
Alpine	34 mm (1 11/32")	44.45 mm (1 3/4")

1982 CHAIN & SPROCKET SPECIFICATIONS

MODELS	CHAIN PITCH AND NUMBER OF LINKS	SPROCKET UPPER/LOWER
Elan and Spirit	1/2" single, 62	10/25
Citation 3500, Mirage I	3/8" double, 86	15/34
Citation 4500E/Mirage II/E	3/8" double, 86	16/33
Citation SS, Mirage Special	3/8" double, 86	17/35
Nordik, Skandic, Futura 300	3/8" double, 86	14/35
Blizzard 5500 MX, Sonic	3/8" triple, 68	19/40
Blizzard 9500, Ultra Sonic	3/8" triple, 68	20/39
Everest 500/E, Futura 500/E	3/8" triple, 68	19/40
Everest L/C, Futura L/C	3/8" triple, 64	17/34
Elite	3/8" triple, 186	17/34
Alpine	3/8" triple, 90	17/38



SUSPENSION

1982 TRACK TENSION

SLIDE AND "MX" SUSPENSIONS

MODELS	TENSION
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Nordik, Skandic, Futura 300	13 mm (1/2")
Blizzard 5500 MX, Sonic ① Blizzard 9500, Ultra Sonic	
Everest 500/E, Futura 500/E Everest L/C, Futura L/C	
Elite	

BOGIE WHEEL SUSPENSION

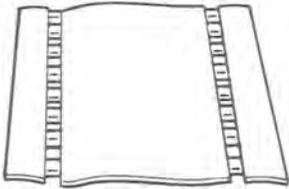
MODELS	TENSION
Elan, Spirit	13 mm (1/2")
Alpine	

①: For Blizzard 5500 MX and Sonic models, 13 mm (1/2") gap should exist between the slider shoes and the bottom inside of the track when pulling down on the track with a force of 3 kg (6.5 lbs).

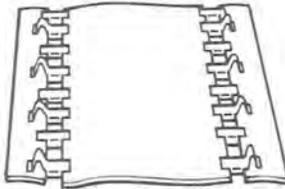
SECTION 09 TECHNICAL DATA
SUB-SECTION 05 (SUSPENSION)

1982 TRACK SPECIFICATIONS

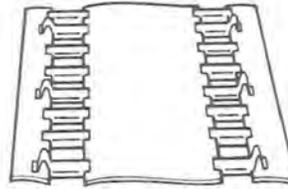
CLEAT AND GUIDE ARRANGEMENT



TYPE 1: Narrow insert.



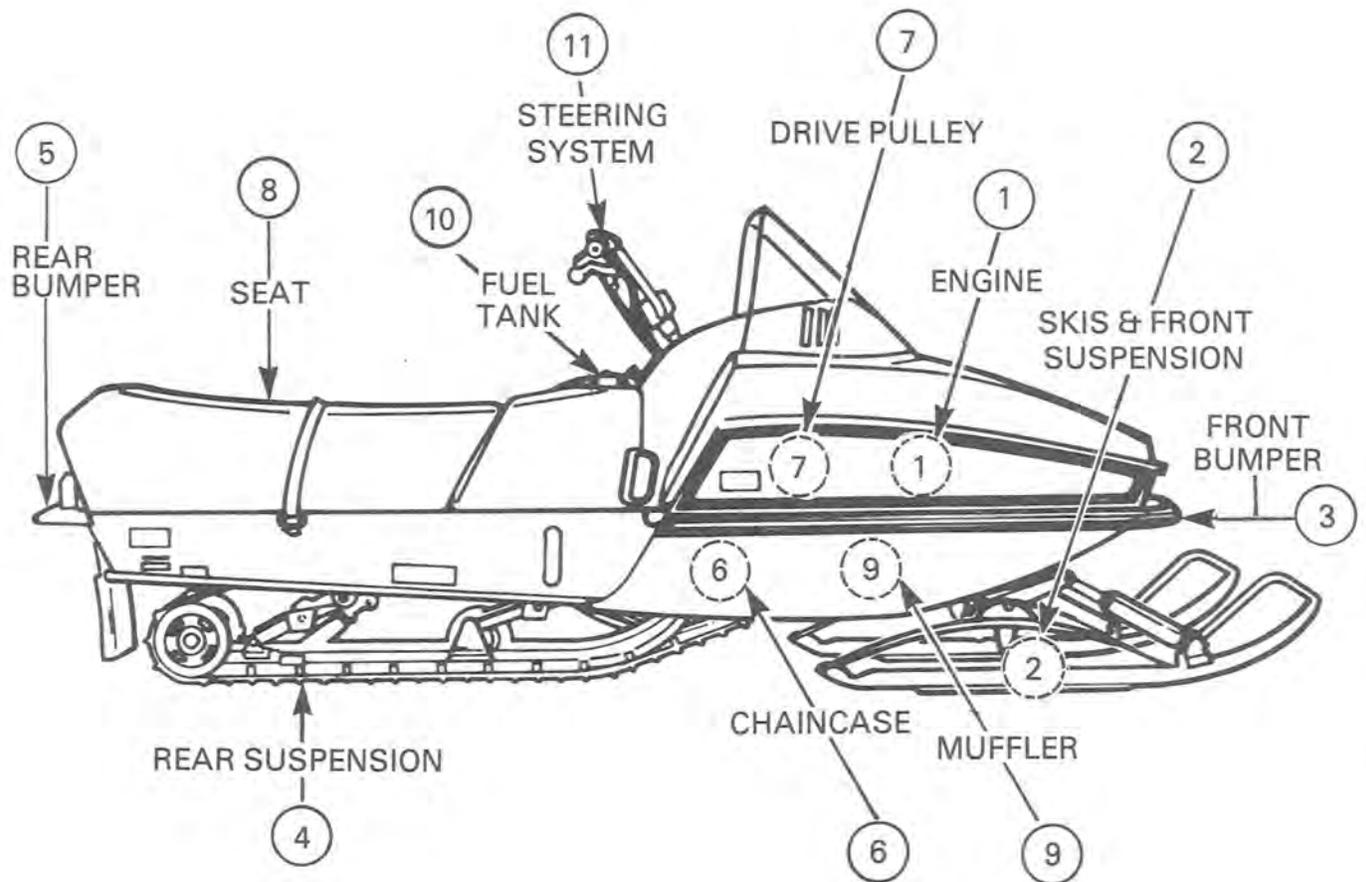
TYPE 2: Narrow insert with shoulder



TYPE 3: Wide guide
(large track hole)

MODELS	TYPE	TRACK PART NUMBER	WIDTH	LENGTH (interior)
Elan	1	570 0006 00	381 mm (15'')	289.6 cm (114'')
Spirit	1	570 0085 00	381 mm (15'')	289.6 cm (114'')
Citation 3500	2	570 0091 00	381 mm (15'')	269.2 cm (106'')
Mirage I	2	570 0092 00	381 mm (15'')	269.2 cm (106'')
Citation 4500/E	2	570 0097 00	381 mm (15'')	289.6 cm (114'')
Mirage II/E	2	570 0098 00	381 mm (15'')	289.6 cm (114'')
Citation SS	2	570 0097 00	381 mm (15'')	289.6 cm (114'')
Mirage Special	2	570 0098 00	381 mm (15'')	289.6 cm (114'')
Nordik	2	570 2004 00	381 mm (15'')	315 cm (124'')
Futura 300	2	570 2004 00	381 mm (15'')	315 cm (124'')
Blizzard 5500 MX	3	570 2002 00	419 mm (16 1/2'')	289.6 cm (114'')
Sonic	3	570 2003 00	419 mm (16 1/2'')	289.6 cm (114'')
Blizzard 9500	3	570 2002 00	419 mm (16 1/2'')	289.6 cm (114'')
Ultra Sonic	3	570 2003 00	419 mm (16 1/2'')	289.6 cm (114'')
Everest 500/E	3	570 2000 00	419 mm (16 1/2'')	315 cm (124'')
Futura 500/E	3	570 2001 00	419 mm (16 1/2'')	315 cm (124'')
Everest L/C	3	570 2000 00	419 mm (16 1/2'')	315 cm (124'')
Futura L/C	3	570 2001 00	419 mm (16 1/2'')	315 cm (124'')
Elite	3	570 0056 00	381 mm (15'')	304.8 cm (120'')
Alpine	1	570 0014 00	381 mm (15'')	353 cm (139'')
Skandic	2	570 2005 00	381 mm (15'')	353 cm (139'')

MAIN SNOWMOBILE TORQUES



NOTE: This sub-section should be used **ONLY** as a guideline. Always refer to the appropriate section to complete your information.

SECTION 09 TECHNICAL DATA
 SUB-SECTION 06 (MAIN SNOWMOBILE TORQUES)

TORQUES:

① ENGINE:

ENGINE TYPE	CYLINDER HEAD	FLYWHEEL NUT	CRANKCASE HALVES	ENGINE MOUNTS	ARMATURE PLATE SCREWS	ROTARY VALVE COVER SCREWS	FAN RETAINING NUT
247	20 N•m (15 ft-lbs)	85 N•m (63 ft-lbs)	21 N•m (16 ft-lbs)	38 N•m (28 ft-lbs)	4-5 N•m (3-4 ft-lbs)	N.A.	N.A.
277	21 N•m (16 ft-lbs)	85 N•m (63 ft-lbs)	21 N•m (16 ft-lbs)	21 N•m (16 ft-lbs)	4-5 N•m (3-4 ft-lbs)	N.A.	N.A.
377	21 N•m (16 ft-lbs)	85 N•m (63 ft-lbs)	M6: 9 N•m (7 ft-lbs) M8: 21 N•m (16 ft-lbs)	38 N•m (28 ft-lbs)	4-5 N•m (3-4 ft-lbs)	N.A.	65 N•m (48 ft-lbs)
454	21 N•m (16 ft-lbs)	95 N•m (70 ft-lbs)	M6: 9 N•m (7 ft-lbs) M8: 21 N•m (16 ft-lbs)	38 N•m (28 ft-lbs)	4-5 N•m (3-4 ft-lbs)	20 N•m (15 ft-lbs)	N.A.
464	21 N•m (16 ft-lbs)	95 N•m (70 ft-lbs)	M6: 9 N•m (7 ft-lbs) M8: 21 N•m (16 ft-lbs)	38 N•m (28 ft-lbs)	4-5 N•m (3-4 ft-lbs)	20 N•m (15 ft-lbs)	N.A.
503	21 N•m (16 ft-lbs)	85 N•m (63 ft-lbs)	21 N•m (16 ft-lbs)	38 N•m (28 ft-lbs)	4-5 N•m (3-4 ft-lbs)	N.A.	65 N•m (48 ft-lbs)

N.A.: not applicable

SECTION 09 TECHNICAL DATA
SUB-SECTION 06 (MAIN SNOWMOBILE TORQUES)

② SKIS & FRONT SUSPENSION

MODELS	SKI LEAF/ LEAF COUPLER RETAINING BOLT N•m (ft-lbs)	RUNNER SHOE NUT N•m (ft-lbs)	LEAF COUPLER TO SKI LEG N•m (ft-lbs)
Elan, Spirit	50 (37)	7 (5)	61 (45)
Citation 3500 Mirage I Citation 4500/E Mirage II/E Citation SS Mirage Special Nordik, Skandic, Futura 300	54 (40)	22 (16)	61 (45)
Blizzard 5500 MX Sonic	N.A.	22 (16)	*
Blizzard 9500 Ultra Sonic	N.A.	22 (16)	61 (45)
Everest 500/E, LC Futura 500/E, LC	N.A.	22 (16)	61 (45)
Elite	27 (20)	22 (16)	N.A.
Alpine	27 (20)	22 (16)	61 (45)

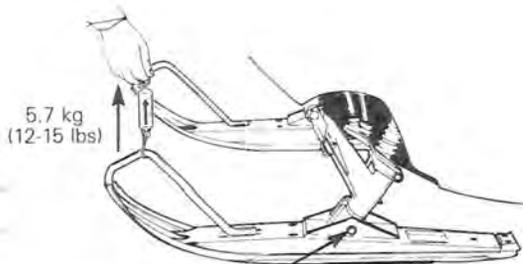
*** Blizzard 5500 MX & Sonic**

Install the ski leg/coupler bolt and torque to obtain 5-7 kg (12-15 lbs) on the lift tube at the front of the ski.

○ **NOTE:** You must pull on the ski at an angle of 90° with the ski surface. (Front of vehicle "Off" the ground).

Torque the elastic stop nut on the ski leg coupler to 56-57 N•m (42-50 ft-lbs).

*Torque bolt, move ski by hand to check that it pivots easily on ski leg. Then tighten locking nut to specified torque.



Torque to have 5-7 kg (12-15 pounds) at the front of the ski with a scale

SECTION 09 TECHNICAL DATA
 SUB-SECTION 06 (MAIN SNOWMOBILE TORQUES)

③ FRONT BUMPER

MODELS	TORQUE
Elan, Spirit	8-11 N•m (6-8 ft-lbs)
Citation 3500, 4500/E, SS Mirage I, II/E, Special Nordik, Skandic, Futura 300	8-11 N•m (6-8 ft-lbs)
Blizzard 5500 MX Sonic Blizzard 9500 Ultra Sonic Everest 500/E, LC Futura 500/E, LC	8-11 N•m (6-8 ft-lbs)
Alpine	8-11 N•m (6-8 ft-lbs)

④ REAR SUSPENSION

Slide & MX suspension

FRONT ARM RETAINING SCREWS	43 N•m (32 ft-lbs)
REAR ARM RETAINING SCREWS	43 N•m (32 ft-lbs)
FRONT TUBE RETAINING SCREWS	20 N•m (32 ft-lbs)
REAR AXLE RETAINING SCREWS	43 N•m (32 ft-lbs)
SHOCK ABSORBER RETAINING SCREWS	61 N•m (45 ft-lbs)

SECTION 09 TECHNICAL DATA
SUB-SECTION 06 (MAIN SNOWMOBILE TORQUES)

⑤ REAR BUMPER

MODELS	TORQUE
Elan, Spirit	8-11 N•m (6-8 ft-lbs)
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Nordik, Skandic, Futura 300	8-11 N•m (6-8 ft-lbs)
Blizzard 5500 MX, Sonic Blizzard 9500, Ultra Sonic Everest 500/E, Futura 500/E Everest L/C, Futura L/C	8-11 N•m (6-8 ft-lbs)

⑥ CHAINCASE

MODELS	CHAINCASE RETAINING SCREWS	CHAINCASE COVER RETAINING SCREWS
Elan, Spirit	20 N•m (15 ft-lbs) ("U" clamp nuts)	N.A.
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Nordik, Skandic, Futura 300	20 N•m (15 ft-lbs)	20 N•m (15 ft-lbs)
Blizzard 5500 MX, Sonic Blizzard 9500, Ultra Sonic Everest 500/E, Futura 500/E Everest L/C, Futura L/C	20 N•m (15 ft-lbs)	20 N•m (15 ft-lbs)

N.A.: not applicable

SECTION 09 TECHNICAL DATA
 SUB-SECTION 06 (MAIN SNOWMOBILE TORQUES)

7 DRIVE PULLEY

MODELS	DRIVE PULLEY RETAINING BOLT	SHOULDERED PIN RETAINING NUTS
Elan, Spirit	61 N•m (45 ft-lbs)	12 N•m (9 ft-lbs)
Nordik, Skandic, Futura 300 Citation 4500, Mirage II Citation SS, Mirage Special	80 N•m (59 ft-lbs)	25 N•m (18 ft-lbs)
Citation 3500, Mirage I Citation 4500/E, Mirage II/E	80 N•m (59 ft-lbs)	13 N•m (10 ft-lbs)
Blizzard 5500 MX, Sonic Everest 500/E, Futura 500/E	85 N•m (63 ft-lbs)	23 N•m (17 ft-lbs)
Blizzard 9500 Ultra Sonic Elite	85 N•m (63 ft-lbs)	16 N•m (12 ft-lbs)
Alpine	119 N•m (88 ft-lbs)	16 N•m (12 ft-lbs)

8 SEAT

ALL MODELS EXCEPT – ALPINE & ELITE

Torque the retaining nuts to: 6 N•m (4 ft-lbs)

9 MUFFLER

EXHAUST MANIFOLD (all except 247 engine type)	21 N•m (15 ft-lbs)
MUFFLER TO ENGINE (247 engine type only)	22 N•m (16 ft-lbs)

SECTION 09 TECHNICAL DATA
SUB-SECTION 06 (MAIN SNOWMOBILE TORQUES)

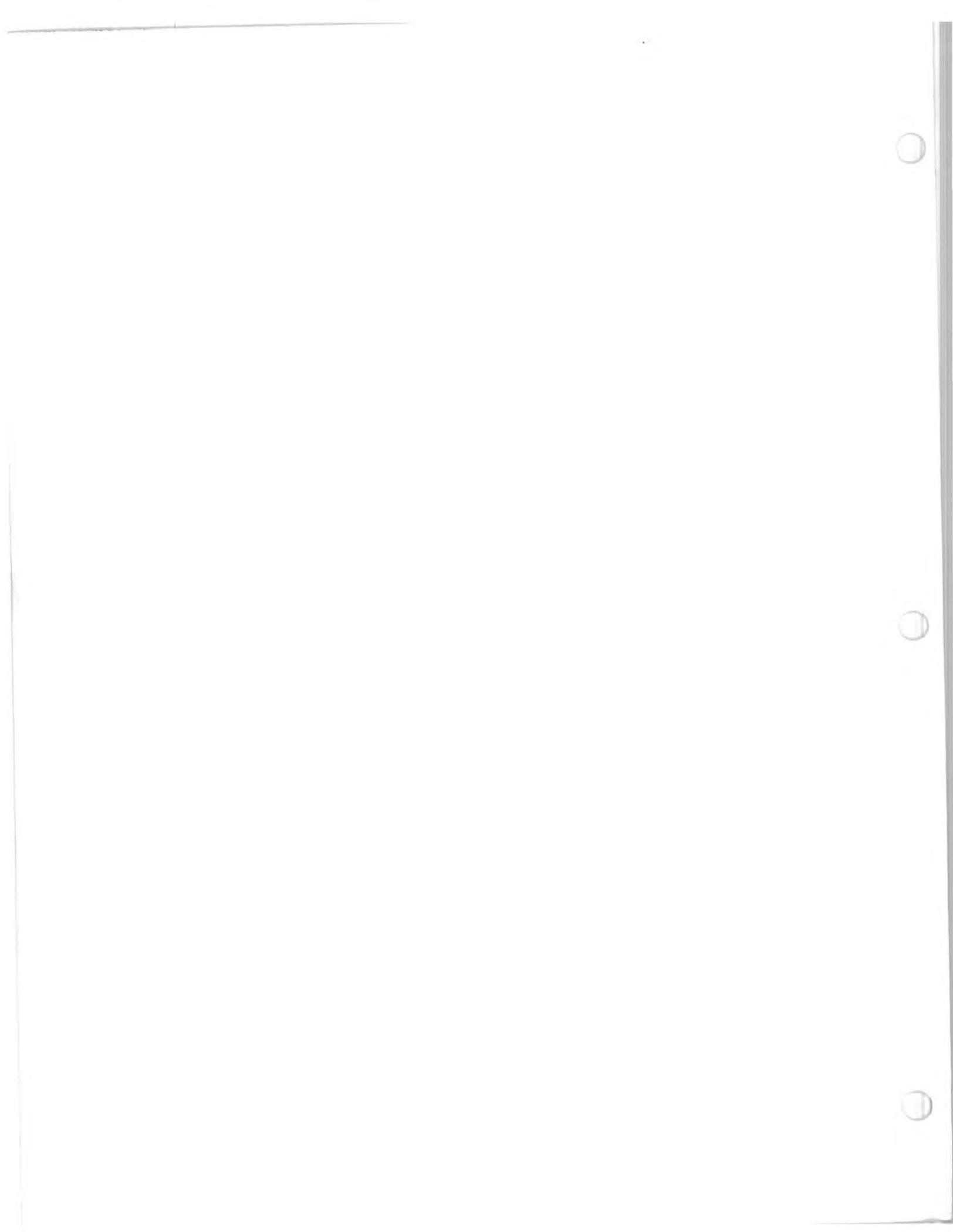
⑩ FUEL TANK

FUEL TANK RETAINING BRACKET NUT(S) (all models)	10 N•m (7 ft-lbs)
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⑪ STEERING SYSTEM

MODELS	HANDLEBAR RETAINING BOLT(S) N•m (ft-lbs)	STEERING ARM TO SKI LEG N•m (ft-lbs)	TIE ROD END TO STEERING ARM N•m (ft-lbs)
Elan, Spirit	N.A.	37 (27)	25 (18)
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Nordik, Skandic, Futura 300	25 (18)	43 (31)	25 (18)
Blizzard 5500 MX, Sonic Blizzard 9500, Ultra Sonic	26 (19)	43 (31)	25 (18)
Everest 500/E, Futura 500/E Everest L/C, Futura L/C	26 (19)	43 (31)	25 (18)
Elite	44 (32)	44 (31)	25 (18)
Alpine	44 (32)	44 (32)	Ⓐ 61 (45)

Ⓐ : ball bushing nut torque value.



GENERAL INFORMATION

CHASSIS

INFORMATION MODELS	OVERALL LENGTH cm (in)	OVERALL WIDTH cm (in)	OVERALL HEIGHT cm (in)	SKI STANCE cm (in)	SKI ^(A) ALIGNMENT mm (in)	MASS (WEIGHT) kg (lbs)	GROUND PRESSURE kPa (PSI)
Elan, Spirit	224.8 (88.5)	77.5 (30.5)	106.7 (42)	64.7 (25.5)	3 (1/8")	129.3 (285)	1.813 (.263)
Citation 3500 Mirage I	249 (98)	92.7 (36.5)	100.3 (39.5)	81.9 (32.2)	3 (1/8")	156.5 (345)	2.626 (.381)
Citation 4500 Mirage II	262.9 (103.5)	92.7 (36.5)	100.3 (39.5)	81.9 (32.2)	3 (1/8")	169.1 (373)	2.661 (.386)
Citation 4500 E Mirage II E	269.2 (103.5)	92.7 (36.5)	100.3 (39.5)	81.9 (32.2)	3 (1/8")	179.1 (395)	2.820 (.409)
Citation SS Mirage Spécial	262.9 (103.5)	92.7 (36.5)	100.3 (39.5)	81.9 (32.2)	3 (1/8")	172.3 (380)	2.709 (.393)
Blizzard 5500 MX Sonic	264.1 (104)	100.3 (39.5)	108.9 (42.9)	86.1 (33.9)	3 (1/8")	223.1 (492)	2.413 (.350)
Blizzard 9500 Ultra Sonic	264.1 (104)	100.3 (39.5)	101.6 (40)	85.1 (33.5)	3 (1/8")	223.1 (492)	2.413 (.350)
Everest 500 Futura 500	276.8 (109)	99 (39)	106.7 (42)	85.1 (33.5)	3 (1/8")	204.5 (451)	2.302 (.334)
Everest 500 E Futura 500 E	276.8 (109)	99 (39)	106.7 (42)	85.1 (33.5)	3 (1/8")	219.5 (484)	2.468 (.358)
Everest L/C Futura L/C	276.8 (109)	99 (39)	106.7 (42)	85.1 (33.5)	3 (1/8")	229.1 (505)	2.578 (.374)
Elite	271.7 (107)	113.03 (44.5)	139.7 (55)	87.6 (34.5)	3 (1/8")	365.1 (805)	2.571 (.373)
Alpine	288.3 (113.5)	90.17 (35.5)	123.2 (48.5)	N.A.	N.A.	292.6 (645)	2.054 (.298)
Nordik	274 (107.8)	90.5 (35.6)	130.8 (51.5)	76.2 (30)	3 (1/8")	172.3 (380)	2.461 (.357)
Skandic	289.5 (114)	96.5 (38)	108 (42.5)	81.9 (32.2)	3 (1/8")	193.2 (426)	2.502 (.363)
Futura 300	269.9 (103.5)	96.5 (38)	108 (42.5)	81.9 (32.2)	3 (1/8")	178.7 (394)	2.550 (.370)

N.A.: Not applicable

(A) : ski alignment: toe out

SECTION 09 TECHNICAL DATA
SUB-SECTION 07 (GENERAL INFORMATION)

BRAKE

MODELS	BRAKE TYPE	BRAKE ADJUSTMENT
Elan, Spirit	①	Ⓐ
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Nordik, Skandic, Futura 300	②	Ⓑ
Blizzard 5500 MX, Sonic Blizzard 9500, Ultra Sonic Everest 500/E, Futura 500/E Everest L/C, Futura L/C Elite Alpine	②	Ⓒ

① : Drum brake

② : Disk brake

Ⓐ : Manual

Ⓑ : 13 mm (1/2") minimum distance from handlebar grip when fully applied.

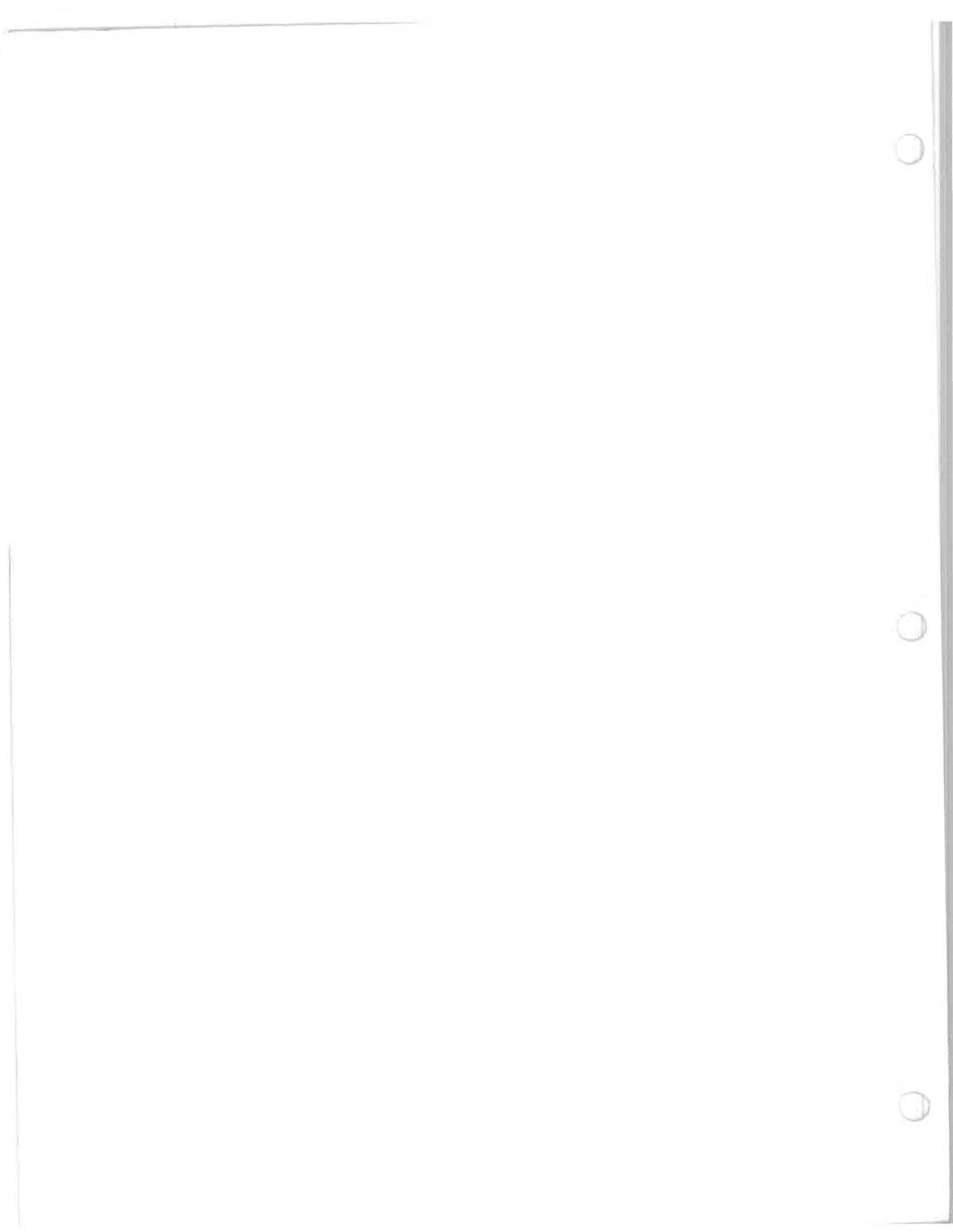
Ⓒ : Self adjusting

SECTION 09 TECHNICAL DATA
SUB-SECTION 07 (GENERAL INFORMATION)

LIQUID CAPACITIES

RESERVOIRS MODELS	ROTARY VALVE OIL RESERVOIR	INJECTION OIL RESERVOIR	CHAINCASE OR GEARBOX	COOLING SYSTEM	FUEL TANK
Elan, Spirit	N.A.	N.A.	200 ml 6.99 U.S. fl. oz. 6.76 Imp. fl. oz.	N.A.	13.6 L 3.6 U.S. gal 3.0 Imp. gal
Citation 3500, Mirage I Citation 4500/E, Mirage II/E Citation SS, Mirage Special Futura 300	N.A.	2.55 L 89.76 U.S. fl. oz. 86.24 Imp. fl. oz.	200 ml 6.99 U.S. fl. oz. 6.76 Imp. fl. oz.	N.A.	28.4 L 7.5 U.S. gal 6.3 Imp. gal
Nordik, Skandic	N.A.	N.A.	200 ml 6.99 U.S. fl. oz. 6.76 Imp. fl. oz.	N.A.	28.4 L 7.5 U.S. gal 6.3 Imp. gal
Blizzard 5500 MX, Sonic Everest 500/E, Futura 500/E	N.A.	2.27 L 79.91 U.S. fl. oz. 76.77 Imp. fl. oz.	200 ml 6.99 U.S. fl. oz. 6.76 Imp. fl. oz.	N.A.	27.3 L 7.2 U.S. gal 6 Imp. gal
Blizzard 9500, Ultra Sonic	454 ml 15.88 U.S. fl. oz. 15.35 Imp. fl. oz.	2.27 L 79.91 U.S. fl. oz. 76.77 Imp. fl. oz.	200 mL 6.99 U.S. fl. oz. 6.76 Imp. fl. oz.	4.20 L 148 U.S. fl. oz. 142 Imp. fl. oz.	27.3 L 7.2 U.S. gal 6 Imp. gal
Everest L/C, Futura L/C	568 ml 19.86 U.S. fl. oz. 19.21 Imp. fl. oz.	2.27 L 79.91 U.S. fl. oz. 76.77 Imp. fl. oz.	200 ml 6.99 U.S. fl. oz. 6.76 Imp. fl. oz.	4.54 L 160 U.S. fl. oz. 153 Imp. fl. oz.	27.3 L 7.2 U.S. gal 6 Imp. gal
Elite	568 ml 19.86 U.S. fl. oz. 19.21 Imp. fl. oz.	2.27 L 79.91 U.S. fl. oz. 76.77 Imp. fl. oz.	625 ml 21.85 U.S. fl. oz. 21.14 Imp. fl. oz.	6.225 219 U.S. fl. oz. 210 Imp. fl. oz.	30.7 L 8.1 U.S. gal 6.8 Imp. gal
Alpine	N.A.	N.A.	454 ml 15.88 U.S. fl. oz. 15.35 Imp. fl. oz.	N.A.	22.7 L 6.0 U.S. gal 5.0 Imp. gal

N.A.: not applicable

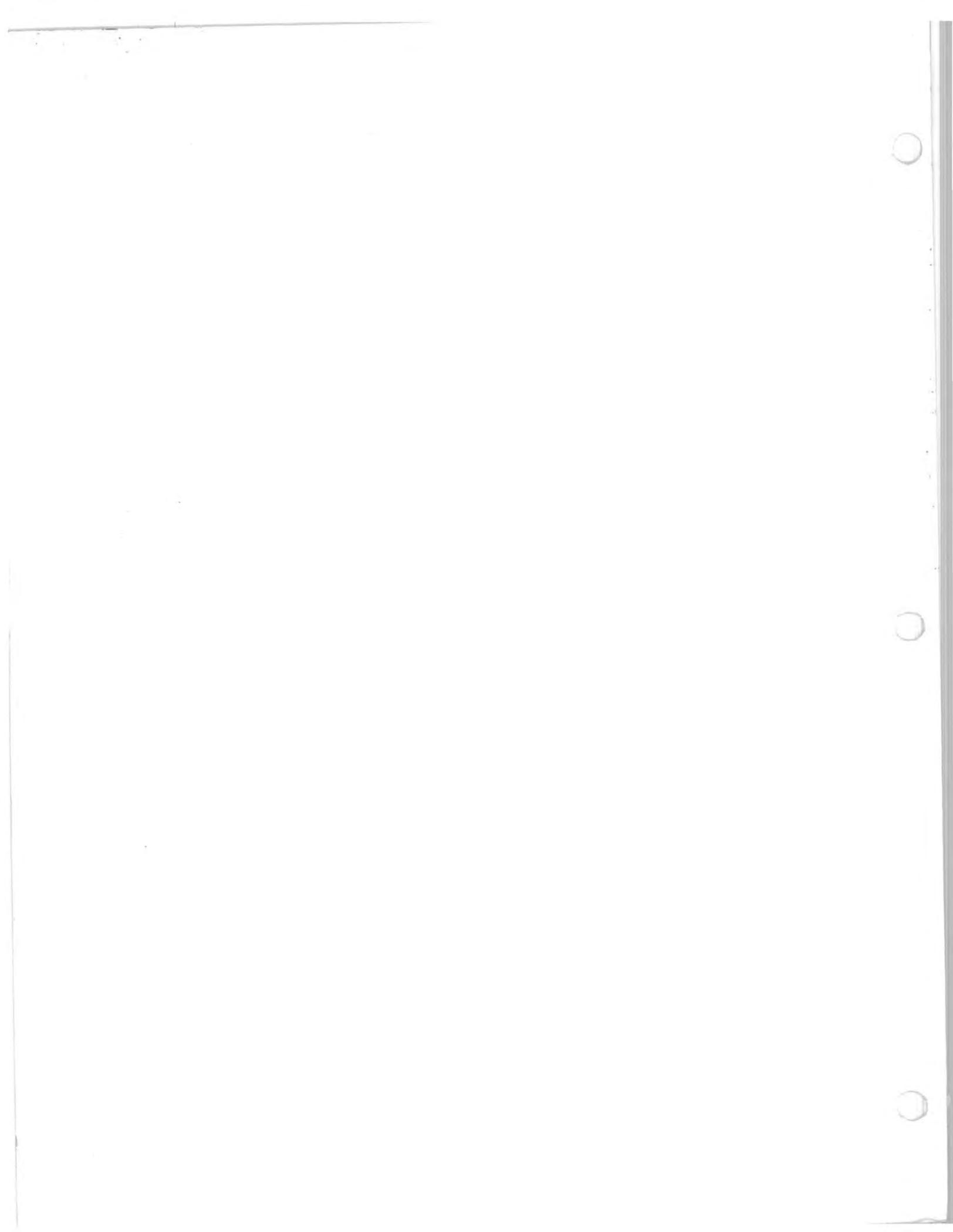


SI* METRIC INFORMATION CHART

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

*THE INTERNATIONAL SYSTEM OF UNITS (SYSTEME INTERNATIONAL) ABBREVIATES "SI" IN ALL LANGUAGES.



WARRANTY

LIMITED WARRANTY 1982 SKI-DOO® SNOWMOBILES

1 - PERIOD

BOMBARDIER® INC. as manufacturer, warrants FROM THE DATE OF FIRST CONSUMER SALES, every 1982 SKI-DOO® snowmobile, sold as NEW AND UNUSED, by an authorized SKI-DOO dealer, for periods of:

- 12 consecutive months for ELAN®, CITATION®, EVEREST®, ELITE®, ALPINE® models.
- 90 consecutive days for NORDIK®, SKANDIC®, BLIZZARD® 5500 MX and 9500 models subject to the following:
 1. If delivery is made after the 31st day of March of a given year and before the 1st day of December of the same year, the above 90 day warranty will start on December 1st.
 2. If delivery is made on/or after the 2nd day of January of a given year but before the 31st day of March of the same year, all the unused portion of the 90 day period will be carried over to the next winter and start again on the 1st day of December of the same year.

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 SKI-DOO dealer during said warranty period.

3 - CONDITION TO HAVE WARRANTY WORK PERFORMED

Present to the servicing dealer, the hard copy of the BOMBARDIER Customer 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
 - breaker points
 - 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.
- A sulphated battery.
- Vehicles used for racing purposes.
- All optional accessories installed on the vehicle.
(The normal warranty policy for parts and accessories, if any, applies).

SECTION 10 WARRANTY

- Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.
- 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.

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.

6 - 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.

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.

7 - 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
Valcourt, Quebec, Canada, JOE 2LO

January 1981
Bombardier Inc.
Valcourt, Quebec, Canada, JOE 2LO

[®] *Trademarks of Bombardier Inc.

LIMITED WARRANTY 1982 MOTO-SKI® SNOWMOBILES

1 - PERIOD

BOMBARDIER® INC. as manufacturer, warrants FROM THE DATE OF FIRST CONSUMER SALES, every 1982 MOTO-SKI® snowmobile, sold as NEW AND UNUSED, by an authorized SKI-DOO dealer, for periods of:

- 12 consecutive months for SPIRIT*, MIRAGE*, FUTURA® models.
- 90 consecutive days for SONIC*, ULTRA SONIC* models subject to the following:
 1. If delivery is made after the 31st day of March of a given year and before the 1st day of December of the same year, the above 90 day warranty will start on December 1st.
 2. If delivery is made on/or after the 2nd day of January of a given year but before the 31st day of March of the same year, all the unused portion of the 90 day period will be carried over to the next winter and start again on the 1st day of December of the same year.

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 MOTO-SKI dealer during said warranty period.

3 - CONDITION TO HAVE WARRANTY WORK PERFORMED

Present to the servicing dealer, the hard copy of the BOMBARDIER Customer 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:
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 - spark plugs
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 - 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.
- A sulphated battery.
- Vehicles used for racing purposes.
- All optional accessories installed on the vehicle.
(The normal warranty policy for parts and accessories, if any, applies).

SECTION 10 WARRANTY

- Damage resulting from accident, fire or other casualty, misuse, abuse or neglect.
- 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.

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.

6 - 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.

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