

# **ski-doo**®

**1997**  
VOLUME 2

**SHOP MANUAL**



**MX Z 440F/440/583/670  
FORMULA 500/500 DELUXE/583/Z  
SUMMIT 500/583/670  
GRAND TOURING 500/583  
SKANDIC WT/SWT/WT LC**

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### SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair some 1997 Ski-Doo snowmobiles. See model list on next page.

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

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

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

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

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

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

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

The engines and the corresponding components identified in this document should not be utilized on product(s) other than those mentioned in this document.

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


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

 <b>WARNING</b>
--

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

 <b>CAUTION</b>
--

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

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

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

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

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# 1997 BOMBARDIER SNOWMOBILES SHOP MANUAL

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## INTRODUCTION

This *Shop Manual* volume 2 covers the following Bombardier made 1997 snowmobiles:

MODELS	MODEL NUMBER	MODELS	MODEL NUMBER
MX Z 440F (Canada) .....	1171	SUMMIT 500 (Canada).....	1157
MX Z 440F (U.S.).....	1172	SUMMIT 500 (U.S.) .....	1158
MX Z 440F (Europe).....	1173	SUMMIT 583 (Canada).....	1159
MX Z 440 (Canada) .....	1168	SUMMIT 583 (U.S.) .....	1160
MX Z 440 (U.S.).....	1169	SUMMIT 583 (Europe) .....	1161
MX Z 440 (Europe).....	1170	SUMMIT 670 (Canada).....	1162
MX Z 583 (Canada) .....	1174	SUMMIT 670 (U.S.) .....	1163
MX Z 583 (U.S.).....	1175	GRAND TOURING 500 (Canada) ....	1123
MX Z 583 (Europe).....	1176	GRAND TOURING 500 (U.S.).....	1124
MX Z 670 (Canada) .....	1193	GRAND TOURING 500 (Europe).....	1125
MX Z 670 (U.S.).....	1194	GRAND TOURING 583 (Canada) ....	1126
MX Z 670 (Europe).....	1195	GRAND TOURING 583 (U.S.).....	1127
FORMULA* 500 (Canada) .....	1138	GRAND TOURING 583 (Europe).....	1128
FORMULA* 500 (U.S.) .....	1139	SKANDIC* WT (Canada) .....	1134
FORMULA* 500 (Europe) .....	1140	SKANDIC* WT (U.S.).....	1135
FORMULA* 500 DELUXE (Canada)	1191	SKANDIC* SWT (Canada).....	1136
FORMULA* 500 DELUXE (U.S.).....	1192	SKANDIC* SWT (U.S.) .....	1137
FORMULA* 583 (Canada) .....	1141	SKANDIC* WT LC (Canada).....	1132
FORMULA* 583 (U.S.) .....	1142	SKANDIC* WT LC (U.S.) .....	1133
FORMULA* Z (Canada) .....	1145		
FORMULA* Z (U.S.).....	1146		

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## LIST OF MODELS GROUPED BY COMMON CHASSIS

S-Series consists of:

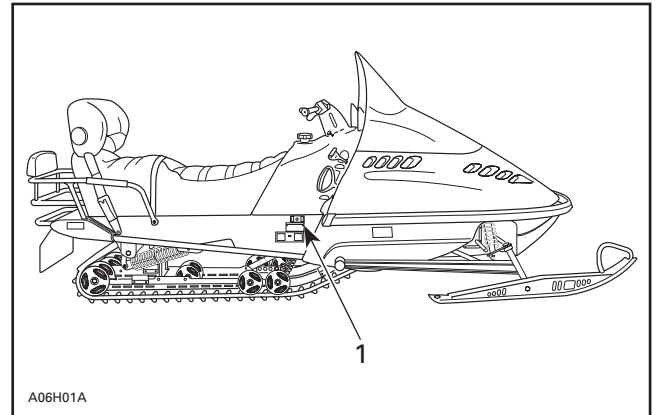
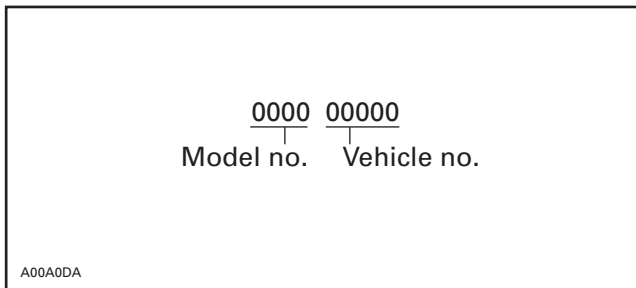
MX Z 440F/440/583/670  
 FORMULA 500/500 DELUXE/583/Z  
 SUMMIT 500/583/670  
 GRAND TOURING 500/583



TYPICAL — S-SERIES

Each vehicle has its particular vehicle  
serial number

Serial Number Meaning:

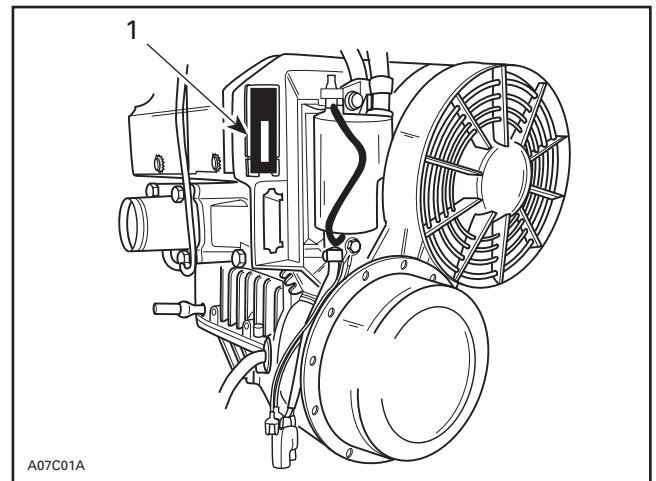


TYPICAL

1. Vehicle serial number

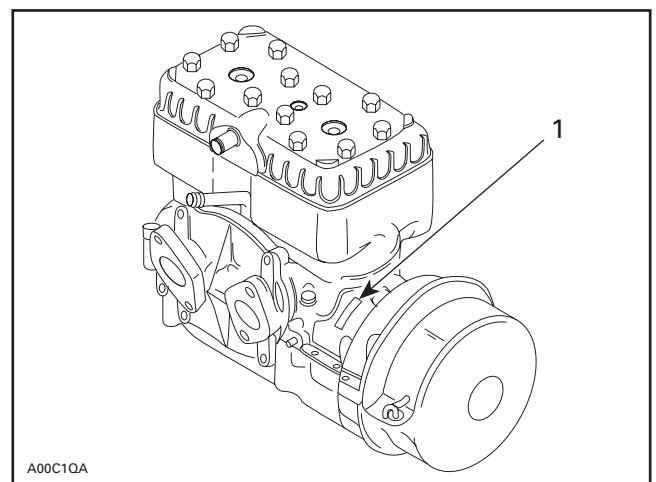
The engine also has a serial number.

### Fan-Cooled Engines



1. Engine serial number

### Liquid-Cooled Engines



1. Engine serial number



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# **1997 BOMBARDIER SNOWMOBILES SHOP MANUAL**

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## **ARRANGEMENT OF THE MANUAL**

The manual is divided into 09 major sections:

**01 LUBRICATION AND MAINTENANCE**

**02 TROUBLESHOOTING**

**03 ENGINE**

**04 TRANSMISSION**

**05 ELECTRICAL**

**06 REAR SUSPENSION**

**07 STEERING/FRONT SUSPENSION**

**08 BODY/FRAME**

**09 TECHNICAL DATA**

**ANNEXES**

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

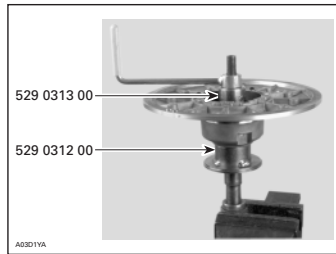


# 1997 BOMBARDIER SNOWMOBILES SHOP MANUAL

## TYPICAL PAGE

### Section 05 TRANSMISSION Sub-Section 03 (DRIVEN PULLEY)

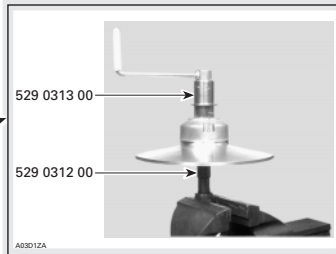
Turn puller handle and sliding half at once to extract the bushing.



**IMPORTANT:** Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 7031 00).

Install bushing as following photo.



#### ASSEMBLY

##### Came Slider Shoe

When replacing slider shoes no. 4, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

##### Cam

Coat cam no. 18 interior with anti-seize lubricant.

#### INSTALLATION

##### Countershaft

#### CAUTION

Always apply anti-seize lubricant (P/N 413 7010 00) on the countershaft before final pulley installation.

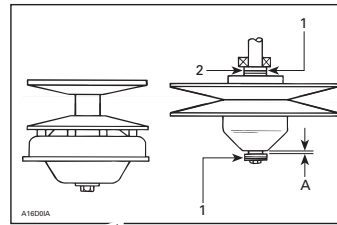
##### *F-Series and S-Series Only*

Should installation procedure be required, refer to BRAKE 05-05 then look for Brake Disc and Countershaft Bearing Adjustment.

Reinstall the pulley on the countershaft by reversing the removal procedure.

##### All Models

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 1082 00) contact it. Measure end play at the mounting screw end between shim(s) and pulley. See illustration.



A18D00A

TYPICAL — TOP VIEW

1 Shim (P/N 504 1082 00) (see required)

2 Contact

A: 0 to 1 mm (0 to 3/64 in)

Torque retaining screw no. 13 to 25 N•m (18 lbf•ft).

#### ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-04 to adjust pulley distance. Adjust drive belt height between pulley halves to obtain specified belt deflection.

Title indicates main procedure to be carried-out.

Italic bold face type setting indicates a particular procedure concerning a model.

Italic bold face setting in this case indicates that particular procedure for F and S-series is finished, so from this point, all models are concerned.

"TYPICAL" caption indicates a general view which does not represent full detail. "TOP VIEW" caption helps you in understanding illustration.

Call-outs for above illustration.

Reference to look up a certain section and sub-section (PULLEY DISTANCE AND ALIGNMENT 05-04). In this case it concerns pulleys adjustment.

Illustration always follows text to which it pertains.

Sub-title indicates a particular procedure for the named part.

Number: Following part name refers to exploded view at beginning of sub-section.

05-03-5

# 1997 BOMBARDIER SNOWMOBILES SHOP MANUAL

## GENERAL INFORMATION

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

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

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

## USEFUL PUBLICATIONS

Refer to *Parts Catalogs* to order the right parts.

PARTS CATALOG	
MODELS	P/N
MX Z 440F MX Z 583 MX Z 670	480 1431 00
MX Z 440	480 1430 00
FORMULA 500 FORMULA 500 DELUXE FORMULA Z FORMULA 583	480 1429 00
SUMMIT 500 SUMMIT 583 SUMMIT 670	480 1427 00
GRAND TOURING 500 GRAND TOURING 583	480 1425 00
SKANDIC WT SKANDIC SWT SKANDIC WT LC	480 1433 00

Use *Tools and Accessories Catalog* to order the tools you need.

1994 TOOLS AND ACCESSORIES (P/N 480 1343 00).

Use *Specification Booklet* to find rapidly the right specs.

1990-1997 SPECIFICATION BOOKLET (P/N 480 1420 00).

## ILLUSTRATIONS AND PROCEDURES

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



### CAUTION

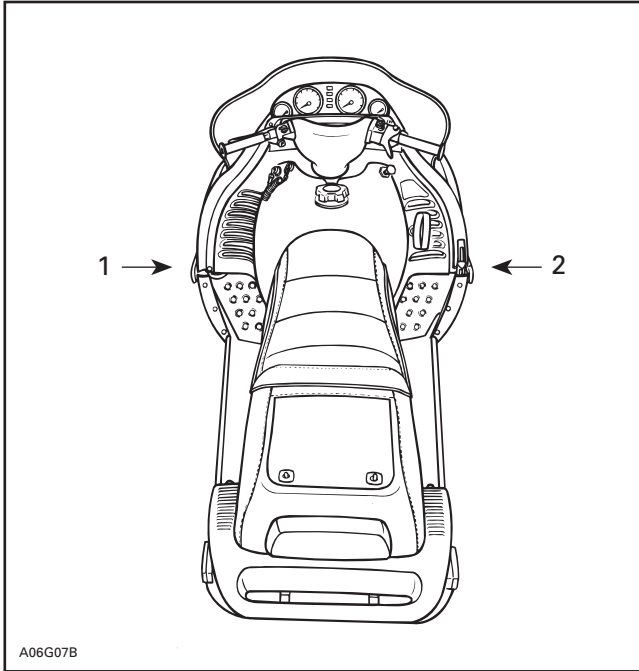
Most components of those vehicles are built with parts dimensioned in the metric system. Most fasteners are metric and must not be replaced by customary fasteners or vice versa. Mismatched or incorrect fasteners could cause damage to the vehicle or possible personal injury.

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

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

# 1997 BOMBARDIER SNOWMOBILES SHOP MANUAL

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



A06G07B

**TYPICAL**

1. Left
2. Right

## TIGHTENING TORQUES

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

N•m	FASTENER SIZE (8.8)	Lbf•in
1		9
2	<b>M4</b>	18
3	M4	27
4	<b>M5</b>	35
5		44
6		53
7		62
8	M6	71
9	M6	80
10	<b>M6</b>	89
11	M6	97
12	M6	106
13		115
14		124
15		133
16		142
17		150
18		159
19		168

# 1997 BOMBARDIER SNOWMOBILES SHOP MANUAL

N•m	FASTENER SIZE (8.8)	Lbf•ft
20		15
21	M8	15
22	M8	16
23	<b>M8</b>	17
24	M8	18
25	M8	18
26		19
27		20
28		21
29		21
30		22
31		23
32		24
33		24
34		25
35		26
36		27
37		27
38		28
39		29
40		30
41		30
42		31
43	M10	32
44	M10	32
45	M10	33
46	M10	34
47	M10	35
48	<b>M10</b>	35
49	M10	36
50	M10	37
51	M10	38
52	M10	38
53	M10	39
54		40
55		41
56		41
57		42
58		43
59		44
60		44
61		45
62		46
63		46
64		47

N•m	FASTENER SIZE (8.8)	Lbf•ft
65		48
66		49
67		49
68		50
69		51
70		52
71		52
72		53
73		54
74		55
75		55
76	M12	56
77	M12	57
78	M12	58
79	M12	58
80	<b>M12</b>	59
81	M12	60
82	M12	60
83	M12	61
84	M12	62
85		63
86		63
87		64
88		65
89		66
90		66
91		67
92		68
93		69
94		69
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96		71
97		72
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101		74
102		75
103		76
104		77
105		77
106		78
107		79
108		80
109		80

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# 1997 BOMBARDIER SNOWMOBILES SHOP MANUAL

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N•m	FASTENER SIZE (8.8)	Lbf•ft
110		81
111		82
112		83
113		83
114		84
115		85
116		86
117		86
118		87
119		88
120		89
121	M14	89
122	M14	90
123	M14	91
124	M14	91
125	M14	92
126	M14	93
127	M14	94
128	M14	94
129	M14	95
130	M14	96
131	M14	97
132	M14	97
133	M14	98
134	M14	99
135	<b>M14</b>	100
136	M14	100
137	M14	101
138	M14	102
139	M14	103
140	M14	103
141	M14	104
142	M14	105
143	M14	105
144	M14	106
145	M14	107
146	M14	108
147	M14	108
148	M14	109
149	M14	110
150	M14	111

*TIGHTENING TORQUES FOR 8.8 GRADE BOLTS AND NUTS*

**Section 01 LUBRICATION AND MAINTENANCE**  
Sub-Section 01 (LUBRICATION AND MAINTENANCE CHART)




# LUBRICATION AND MAINTENANCE CHART

		①	②	③	④	⑤	⑥	REFER TO
	Starting Rope Condition						✓	—
	Engine Head Nuts	✓			✓			Appropriate section: See Top End
	Engine Mount Nuts	✓			✓			Appropriate section: See ENGINE REMOVAL
	Exhaust System	✓		✓				Appropriate section: See ENGINE REMOVAL
	Engine Lubrication						✓	This section no. 1
	Cooling System Condition	✓			✓			Sub-sections 03-07 and 03-08
	Coolant Replacement (Except Fan Cooled)						✓	Sub-section 03-08
	Condition of Seals						✓	Sub-sections 03-02 and 03-03
	Injection Oil Filter Condition			✓				Sub-section 03-06
	Injection Oil Filter Replacement						✓	Sub-section 03-06
	Oil Injection Pump Adjustment	✓			✓			Sub-section 03-06
	Fuel Stabilizer					✓		This section no. 2
	Fuel Filter Replacement						✓	This section no. 3
	Fuel Lines and Connections	✓					✓	Sub-section 03-12
	Carburetor Adjustment	✓			✓			Sub-section 03-11
	Throttle Cable Inspection	✓			✓		✓	Sub-section 03-12
	Air Filter Cleaning			✓				This section no. 4
	Drive Belt Condition	✓	✓					This section no. 5
	Condition of Drive and Driven Pulleys	✓		✓		✓		Sub-sections 04-03 and 04-04
	Cleaning of Drive and Driven Pulleys						✓	Sub-sections 04-03 and 04-04
	Retorquing of Drive Pulley Screw	✓						Sub-section 04-03
	Driven Pulley Preload	✓			✓			Sub-section 04-04
	Brake Condition	✓	✓					Sub-section 04-06
	Brake Adjustment			✓				Sub-section 04-06
	Lubrication of Ratchet Wheel or Fluid Change						✓	Sub-section 04-06
	Drive Chain Tension	✓		✓				Sub-sections 04-07 and 04-08
	Countershaft Lubrication (S and F Series)	✓		✓		✓		Sub-section 04-06
	Chaincase/Gearbox Oil Level	✓		✓		✓		Sub-sections 04-07 and 04-08
	Chaincase/Gearbox Oil Change	✓ <sup>1</sup>				✓		Sub-sections 04-07 and 04-08
	Lubrication of drive axle bearing	✓		✓		✓		Sub-section 06-04
	Handlebar Bolts. Retorque to 26 N•m (19 lbf•ft)	✓						Sub-section 07-02
	Steering and Front Suspension Mechanism	✓		✓		✓		Sub-sections 07-02 and 07-03
	Wear and Condition of Skis and Runners	✓	✓					Sub-section 07-03
	Steering and Ski Leg Camber Adjustment	✓		✓				Sub-section 07-02



## Section 01 LUBRICATION AND MAINTENANCE

### Sub-Section 01 (LUBRICATION AND MAINTENANCE CHART)

		①	②	③	④	⑤	⑥	REFER TO
	Suspension Adjustments	AS REQUIRED						Section 06: See appropriate sub-section and <i>Operator's Guide</i>
	Suspension Lubrication			✓2		✓		Section 06: See appropriate sub-section
	Suspension Condition	✓			✓			Section 06: See appropriate sub-section
	Suspension Stopper Strap Condition				✓			Section 06: See appropriate sub-section
	Track Condition	✓		✓				Sub-section 06-05
	Track Tension and Alignment	✓	AS REQUIRED					
	Spark Plugs*	✓						Sub-section 05-04
	Engine Timing	✓					✓	Sub-section 05-03
	Battery Condition	✓		✓		✓		Sub-section 05-05
	Headlight Beam Aiming				✓			Sub-section 08-02
	Wiring Harnesses, Cables and Lines	✓		✓				Sub-section 08-02
	Operation of Lighting System (HI/LO Beam, Brake Light, etc.) Test Operation of Emergency Cut-Out Switch and Tether Cut-Out Switch	✓	✓				✓	<i>Operator's Guide</i>
	Rags in Air Intake and Exhaust System					✓	✓	This section no. 6
	Engine Compartment	✓		✓				This section no. 7
	General Inspection	✓		✓		✓		This section no. 8

\* Before installing new spark plugs at pre-season preparation, it is suggested to burn excess storage oil by starting the engine with the old spark plugs. Only perform this operation in a well ventilated area.

① 10-HOUR OR 500 km (300 mi) INSPECTION (To be performed by dealer)

② WEEKLY OR EVERY 240 km (150 mi)

③ MONTHLY OR EVERY 800 km (500 mi)

④ ONCE A YEAR OR EVERY 3200 km (2000 mi)

⑤ STORAGE (To be performed by dealer)

⑥ PRE-SEASON PREPARATION (To be performed by dealer)

1. Change oil at 10-hour inspection for Skandic WT/SWT/WT LC

2. Apply anti-seize lubricant (P/N 413 7010 00) on ACM rod every 10 hours or 500 km (300 mi).

## NO. 1 ENGINE LUBRICATION

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

To perform the storage procedures, proceed as follows:

Start the engine and allow it to run at idle speed until the engine reaches its operating temperature.

### ◆ WARNING

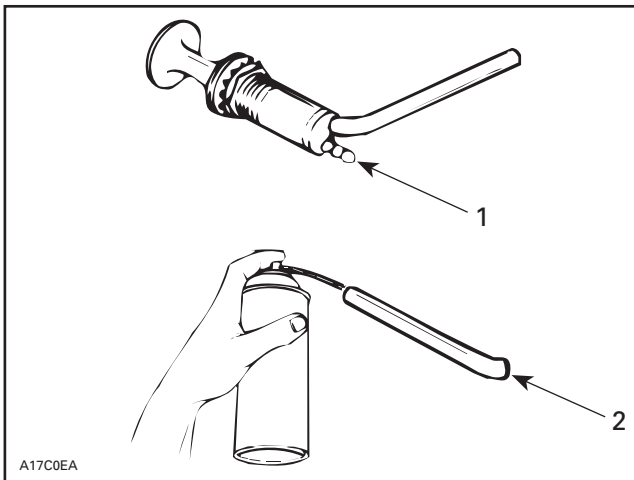
Ensure the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

Stop the engine.

#### **Models with a Primer**

To prevent fuel from draining, primer button should be pushed all the way in.

Disconnect the outlet primer hose from the primer valve (straight coupling).



1. Straight coupling
2. To intake manifold

Insert storage oil (P/N 496 0141 00) nozzle into primer outlet hose.

#### **Models with a Choke**

Remove air silencers to spray storage oil into each carburetor bore.

#### **All Models**

Restart engine and run at idle speed.

Inject storage oil until the engine stalls or until a sufficient quantity of oil has entered the engine (approximately half a can).

With the engine stopped, remove the spark plug and spray storage oil (P/N 496 0141 00) into each cylinder.

Crank slowly 2 or 3 revolutions to lubricate cylinders.

Reinstall the spark plugs and the outlet primer hose or air silencers.

### ◆ WARNING

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

## NO. 2 FUEL STABILIZER

A fuel stabilizer (P/N 413 4086 00) can be added in fuel tank to prevent fuel deterioration and avoid draining fuel system for storage. Follow manufacturer's instructions for proper use.

If above fuel stabilizer is not used, drain fuel system including fuel tank and carburetor(s).

### ▼ CAUTION

Fuel stabilizer should be added prior engine lubrication to ensure carburetor(s) protection against varnish deposit.

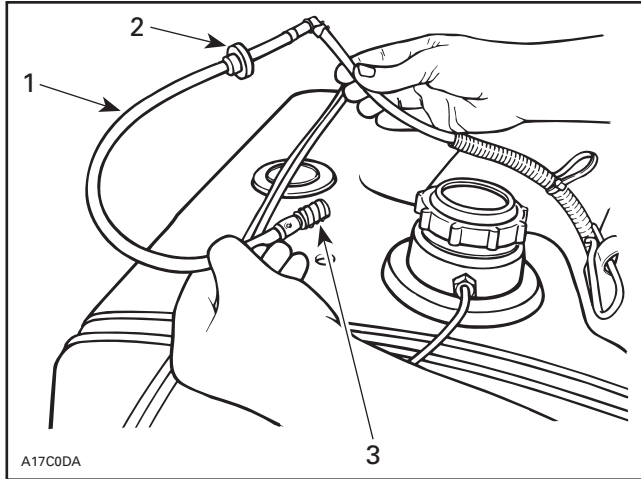
## Section 01 LUBRICATION AND MAINTENANCE

### Sub-Section 01 (LUBRICATION AND MAINTENANCE CHART)

#### NO. 3 FUEL FILTER REPLACEMENT

Drain fuel tank.

Remove fuel line grommet from fuel tank and pull out inlet fuel line from tank.



**TYPICAL**

1. Inlet fuel line
2. Position of grommet when installing
3. Fuel filter

Replace fuel filter. To facilitate the fuel line installation, slide grommet on fuel line about 50 mm (2 in) away from elbow then install grommet on fuel tank and push elbow through grommet.

#### NO. 4 AIR FILTER CLEANING

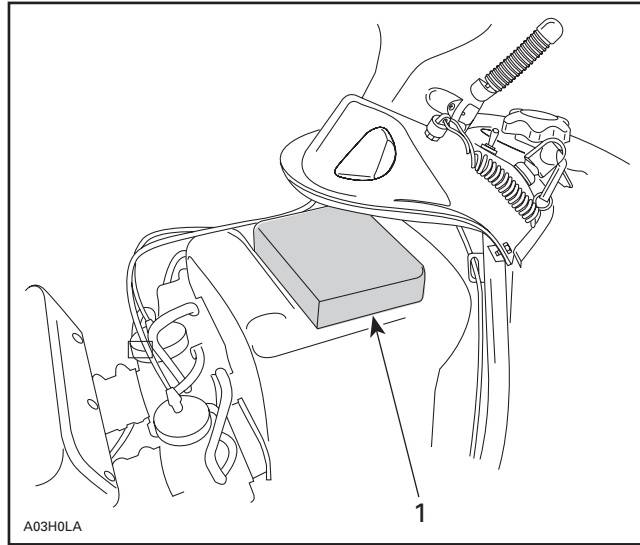
Check that the air box is clean and dry then properly reinstall the filter.

#### ▼ CAUTION

These snowmobiles have been calibrated with the filter installed. Operating the snowmobile without it may cause engine damage.

#### **S-Series**

Lift hood and remove air filter from air intake silencer.



**TYPICAL**

1. Filter

To clean the filter, shake the snow out of it then, dry it out.

#### NO. 5 DRIVE BELT CONDITION

Inspect belt for cracks, fraying or abnormal wear (uneven wear, wear on one side, missing cogs, cracked fabric). If abnormal wear is noted, probable cause could be pulley misalignment, excessive RPM with frozen track, fast starts without warm-up period, burred or rusty sheave, oil on belt or distorted spare belt.

Check the drive belt width. Replace the drive belt if width is less than the minimum width recommended in DRIVE BELT 04-02.

#### NO. 6 RAGS IN AIR INTAKE AND EXHAUST SYSTEM

At storage preparation, block air intake hole and exhaust system hole using clean rags.

Remove those rags at pre-season preparation.

#### NO. 7 ENGINE COMPARTMENT

Keep clean of grass, twigs, cloth, etc. These are combustible under certain conditions.

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**Section 01 LUBRICATION AND MAINTENANCE**  
Sub-Section 01 (LUBRICATION AND MAINTENANCE CHART)

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## NO. 8 GENERAL INSPECTION

Remove any dirt or rust.

To clean the entire vehicle, use only flannel clothes or Kimtowels® wipers no. 58-380 from Kimberly-Clark.

▼ **CAUTION**

It is necessary to use flannel cloths or “Kimtowels” wipers on windshield and hood to avoid damaging further surfaces to clean.

To clean the entire vehicle, including metallic parts with a **thick** coat of grease, use “Endust” imported by Bristol Myers, available at hardware stores or supermarkets.

To clean the entire vehicle, including metallic parts with a **thin** coat of grease, use “Simple Green” from Sunshine Makers Inc., available at hardware stores or at automotive parts retailer.

To remove scratches on windshield or hood: Start with “Slip Streamer Motorcycle Windshield Heavy Duty Scratch, Remover”. Finish with “Slip Streamer Motorcycle Cleaner and Polish”.

○ **NOTE:** The latest product may be use alone if only light scratches are noticeable.

▼ **CAUTION**

Never clean plastic parts or hood with strong detergent, degreasing agent, paint thinner, acetone, products containing chlorine, etc.

Inspect the hood and repair any damage. Touch up all metal spots where paint has been scratched off. Spray all metal parts including shock chromed rods with Bombardier Lube (P/N 293 6000 06). Wax the hood and the painted portion of the frame for better protection.

○ **NOTE:** Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

▼ **CAUTION**

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

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# ENGINE

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

<b>SYMPTOM</b>	<b>ENGINE BACKFIRES</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check spark plug(s).</b> a. Carbon accumulation caused by defective spark plug(s). <i>Clean carbon accumulation and replace spark plug(s).</i>
	<b>2. Check cooling system.</b> a. Loose fan belt. <i>Adjust or replace fan belt (refer to TECHNICAL DATA 09).</i> b. Low antifreeze level. <i>Adjust antifreeze level. Then check clamps or hoses.</i> c. Defective tank cap. <i>Replace cap.</i> d. Air in system. <i>Bleed system.</i>
	<b>3. Check ignition timing.</b> a. Timing is too advanced. <i>Set timing according to specifications (refer to TECHNICAL DATA 09).</i>

## Section 02 TROUBLESHOOTING

### Sub-Section 02 (ENGINE)

SYMPTOM	ENGINE SUDDENLY TURNS OFF
CONDITION	NORMAL USE
Test/Inspection	<b>1. Perform engine leak test. Refer to engine leak verification flow chart. Check possible piston seizure.</b> a. Damaged gasket and/or seal. <i>Replace defective parts.</i>
	<b>2. "Four-corner" seizure of piston(s).</b> a. Accelerating too fast when engine is cold. Piston expands faster than cylinder. <i>Replace piston(s). Ask driver to refer to warm-up procedure in Operator's Guide.</i>
	<b>3. Piston(s) seizure on exhaust side (color on piston dome is correct).</b> a. Kinked fuel tank vent tube. <i>Relocate fuel tank vent tube.</i> b. Leaks at fuel line connections or damaged fuel lines. <i>Replace defective lines.</i> c. Fuel does not flow through carburetor(s) (plastic particles in needle area and/or varnish formation in carburetor(s)). <i>Clean carburetor(s).</i> d. Spark plug heat range is too warm. <i>Install spark plug(s) with appropriate heat range (refer to TECHNICAL DATA 09).</i> e. Improper ignition timing. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i> f. Restriction in exhaust system. <i>Replace.</i> g. Compression ratio is too high. <i>Install genuine parts.</i> h. Carburetor calibration is too lean. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i> i. Improper rotary valve timing or improper valve. <i>Adjust according to specifications (refer to TECHNICAL DATA 09) and/or install Bombardier's recommended rotary valve.</i> j. Poor quality oil. <i>Use Bombardier Rotax oil.</i> k. Leaks at air intake silencer. <i>Replace air intake silencer grommets.</i>

	<p><b>4. Melted and/or perforated piston dome; melted section at ring end gap.</b></p> <p>a. When piston reaches TDC, mixture is ignited by heated areas in combustion chamber. This situation is due to an incomplete combustion of a poor quality oil. <i>Clean residue accumulation in combustion chamber and replace piston(s). Use Bombardier Rotax oil.</i></p> <p>b. Spark plug heat range is too high. <i>Install recommended spark plug(s) (refer to TECHNICAL DATA 09).</i></p> <p>c. Ignition timing is too advanced. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p> <p>d. Inadequate fuel quality. <i>Use appropriate fuel.</i></p> <p>e. Carburetion is too lean. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p> <p><b>5. Seized piston all around the circumference (dry surface).</b></p> <p>a. Lack of oil, damaged oil line or defective injection pump. <i>Replace defective part(s).</i></p> <p><b>6. Grooves on intake side of piston only.</b></p> <p>a. Oil film eliminated by water (snow infiltration in engine). <i>Replace piston(s) and check if intake system leaks.</i></p> <p><b>7. Piston color is dark due to seizure on intake and exhaust sides.</b></p> <p>a. Broken or loose fan belt. <i>Replace fan belt or adjust its tension (refer to TECHNICAL DATA 09).</i></p> <p>b. Cooling system leaks and lowers coolant level. <i>Tighten clamps or replace defective parts. Add antifreeze in cooling system until appropriate level is reached.</i></p> <p>c. Accumulation of foreign particles in needle and/or main jet area. <i>Clean carburetor(s).</i></p> <p><b>8. Cracked or broken piston(s).</b></p> <p>a. Cracked or broken piston(s) due to excessive piston/cylinder clearance or engine overrevving. <i>Replace piston(s). Check piston/cylinder clearance (refer to TECHNICAL DATA 09). Adjust drive pulley according to specifications (refer to TECHNICAL DATA 09) and/or clean pulley sheaves if they are contaminated with greasy particles.</i></p>
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## Section 02 TROUBLESHOOTING

### Sub-Section 02 (ENGINE)

SYMPTOM	PISTON RING AND CYLINDER SURFACES ARE GROOVED
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check oil quality.</b> a. Poor oil quality. <i>Use Bombardier Rotax oil.</i>
	<b>2. Check injection pump and its hoses.</b> a. Inadequate injection pump adjustment and/or defective hoses. <i>Adjust pump according to specifications (refer to ENGINE 03) and/or replace hoses.</i>

SYMPTOM	ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check spark plug condition.</b> a. Fouled spark plug(s). <i>Replace.</i>
	<b>2. Check if there is water in fuel.</b> a. There is water in fuel. <i>Drain fuel system, then fill it with appropriate fuel.</i>
	<b>3. Check items listed in "Engine runs out of fuel" (refer to fuel and oil system sub-section 02).</b>
	<b>4. Check carburetor adjustments and cleanliness.</b> a. Inadequate carburetor adjustments or dirt accumulation. <i>Adjust according to specifications (refer to TECHNICAL DATA 09) or clean.</i>
	<b>5. Check drive belt.</b> a. Worn belt. <i>Replace belt if width is 3 mm (1/8") less than nominal dimension (refer to TECHNICAL DATA 09).</i>
	<b>6. Check track adjustment.</b> a. Too much tension and/or improper alignment. <i>Align track and adjust its tension to specifications (refer to TECHNICAL DATA 09).</i>
	<b>7. Check drive pulley.</b> a. Improper calibration screw adjustments (TRA pulley) and/or worn bushing(s). <i>Adjust according to specifications (refer to TECHNICAL DATA 09) and/or replace bushing(s).</i>

**Section 02 TROUBLESHOOTING**  
Sub-Section 02 (ENGINE)

	<p><b>8. Check driven pulley.</b> a. Worn bushing and/or spring tension. <i>Replace spring and/or adjust its tension according to specifications (refer to TECHNICAL DATA 09).</i></p>
	<p><b>9. Check exhaust system.</b> a. Restriction. <i>Replace.</i></p>
	<p><b>10. Check ignition timing.</b> a. Decrease in power due to retarded ignition. <i>Adjust according to specification (refer to TECHNICAL DATA 09).</i></p>
	<p><b>11. Check engine compression.</b> a. Worn piston(s) and ring(s). <i>Replace (refer to TECHNICAL DATA 09 for specification).</i></p>
	<p><b>12. Check engine cooling system.</b> a. Engine overheats. Improper fan belt tension. <i>Adjust fan belt (refer to TECHNICAL DATA 09).</i> b. Antifreeze level is low, cap fails to pressurize system or air circulates through lines. <i>Adjust level, replace cap or bleed cooling system.</i></p>

<b>SYMPTOM</b>	<b>ENGINE DETONATION AT MAXIMUM RPM</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check which type of fuel is used.</b> a. Octane number is too low and/or alcohol level is too high. <i>Use recommended fuel type.</i></p>
	<p><b>2. Check spark plug type.</b> a. Improper spark plug heat range. <i>Install recommended spark plug(s) (refer to TECHNICAL DATA 09).</i></p>
	<p><b>3. Check exhaust system.</b> a. Too much restriction. <i>Replace.</i></p>
	<p><b>4. Check ignition timing.</b> a. Timing is too advanced. <i>Adjust according to specification (refer to TECHNICAL DATA 09).</i></p>
	<p><b>5. Check carburetion.</b> a. Fouled and/or improper carburetor components. <i>Clean or replace according to specification (refer to TECHNICAL DATA 09).</i></p>
	<p><b>6. Check compression ratio and squish area.</b> a. Compression ratio is too high. <i>Install genuine parts.</i></p>

## Section 02 TROUBLESHOOTING

### Sub-Section 02 (ENGINE)

SYMPTOM	ENGINE TURNS OVER BUT FAILS TO START
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check switches.</b> a. Ignition switch, emergency cut-out switch or tether switch is in the OFF position. <i>Place all switches in the RUN or ON position.</i>
	<b>2. Check fuel level.</b> a. Mixture not rich enough to start cold engine. <i>Check fuel tank level and use primer.</i>
	<b>3. Check spark plug.</b> a. Defective spark plug (no spark). <i>Replace spark plug(s).</i>
	<b>4. Check amount of fuel on spark plug.</b> a. Flooded engine (spark plug wet when removed). <i>Do not overprime. Remove wet spark plug(s), turn ignition switch to OFF and crank engine several times. Install clean dry spark plug. Start engine following usual starting procedure.</i>
	<b>5. Check fuel lines.</b> a. No fuel to the engine (spark plug dry when removed). <i>Check fuel tank level; turn fuel valve on if applicable; check fuel filter, replace if clogged; check condition of fuel and impulse lines and their connections.</i>
	<b>6. Check engine compression.</b> a. Insufficient engine compression. <i>Replace defective part(s) (ex.: piston(s), ring(s), etc.).</i>

SYMPTOM	IRREGULAR ENGINE IDLE
CONDITION	NORMAL USE AFTER ENGINE WARM UP
Test/Inspection	<b>1. Check primer.</b> a. Fuel leaks at primer nipple which is mounted to carburetor. <i>Replace.</i>
	<b>2. Check choke.</b> a. Choke plunger may be partially opened. <i>Readjust.</i>
	<b>3. Check carburetor adapter.</b> a. Air enters through a crack. <i>Replace.</i>
	<b>4. Check air screw position.</b> a. Inadequate fuel/air mixture. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i>

**Section 02 TROUBLESHOOTING**  
Sub-Section 02 (ENGINE)

	<p><b>5. Check ignition system trigger coil air gap.</b> a. Air gap is too large. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p>
	<p><b>6. Check dimension of pilot jet.</b> a. Inadequate fuel/air mixture. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p>
	<p><b>7. Perform engine leak test. (Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT 03-04).</b> a. Leaking gaskets allow air to enter in engine. <i>Replace defective parts.</i></p>

SYMPTOM	HIGH ENGINE OPERATING TEMPERATURE
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check temperature gauge sensor.</b> a. False reading. <i>Replace.</i></p>
	<p><b>2. Check fan belt.</b> a. Belt slides because it is too loose. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p>
	<p><b>3. Verify antifreeze level and check if there is air infiltration in the system or if there are leaks in gasket areas.</b> a. Low antifreeze level or air in system. <i>Add antifreeze until recommended level is reached, bleed system and/or tighten clamps at fitting.</i></p>
	<p><b>4. Check if antifreeze flows through system properly.</b> a. Foreign particles and/or broken coolant pump impeller. <i>Clean cooling system and/or replace coolant pump impeller.</i></p>
	<p><b>5. Check thermostat.</b> a. Thermostat reacts slowly or not at all. <i>Replace.</i></p>
	<p><b>6. Check antifreeze concentration.</b> a. Antifreeze concentration is too high. <i>Adjust concentration according to Bombardier's recommendations.</i></p>
	<p><b>7. Check tank cap.</b> a. Cap does not hold pressure. <i>Replace.</i></p>

## Section 02 TROUBLESHOOTING

### Sub-Section 02 (ENGINE)

	<p><b>8. Check carburetion.</b></p> <p>a. Improperly adjusted or inadequate carburetor components. <i>Adjust according to specifications (refer to TECHNICAL DATA 09) or replace inadequate component(s).</i></p>
	<p><b>9. Check cylinder head gaskets.</b></p> <p>a. Worn gaskets. <i>Replace.</i></p>
	<p><b>10. Check ignition timing.</b></p> <p>a. Ignition timing is too advanced. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p>
	<p><b>11. Check if there are leaks at air intake silencer and/or engine crankcase.</b></p> <p>a. Leak(s). <i>Repair or replace.</i></p>
	<p><b>12. Check condition and heat range of spark plug(s).</b></p> <p>a. Melted spark plug tip or inadequate heat range. <i>Replace.</i></p>

<b>SYMPTOM</b>	<b>ENGINE EQUIPPED WITH "RAVE" VALVE DOES NOT REACH ITS FULL OPERATING RPM (500 TO 1000 RPM SLOWER)</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check "RAVE" valve pistons.</b></p> <p>a. Valve piston(s) is (are) too far out. <i>Screw valve piston(s) to bottom.</i></p>
	<p><b>2. Check "RAVE" valve stems.</b></p> <p>a. Bent "RAVE" valve stem(s). <i>Replace.</i></p>
	<p><b>3. Check "RAVE" valves.</b></p> <p>a. Jammed valve(s). <i>Clean.</i></p>
	<p><b>4. Check tension of "RAVE" springs.</b></p> <p>a. Inadequate spring tension. <i>Replace.</i></p>
	<p><b>5. Check "RAVE" pressure holes.</b></p> <p>a. Clogged holes. <i>Clean.</i></p>
	<p><b>6. Check clamps or sleeves.</b></p> <p>a. Damaged clamp(s) or sleeve(s). <i>Replace.</i></p>

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**Section 02 TROUBLESHOOTING****Sub-Section 02 (ENGINE)**

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<b>SYMPTOM</b>	<b>ENGINE EQUIPPED WITH "RAVE". ENGINE HESITATES AT MID-SPEED AND REACHES MAXIMUM PERFORMANCE ONLY AFTER A WHILE</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check "RAVE" valve spring(s).</b> a.Spring tension is too weak or spring(s) is (are) broken. <i>Replace.</i>
	<b>2. Check "RAVE" valve cover red adjustment screws.</b> a.Adjustment screw(s) is (are) too loose. <i>Fully tighten.</i>
	<b>3. Check "RAVE" valve movement ("RAVE" movement indicator P/N 861 7258 00).</b> a.Valve(s) is (are) stuck in open position. <i>Clean.</i>

<b>SYMPTOM</b>	<b>REWIND STARTER ROPE DOES NOT REWIND</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check rewind spring.</b> a.Broken spring. <i>Replace spring.</i>

<b>SYMPTOM</b>	<b>REWIND STARTER PAWL DOES NOT ENGAGE</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check stopper spring.</b> a.Broken stopper spring. <i>Replace.</i>
	<b>2. Check pawl and pawl lock.</b> a.Pawl and pawl lock have stuck together because of heat. <i>Replace.</i>
	<b>3. Check pawl and rope sheave.</b> a.Pawl and rope sheave have stuck together because of heat. <i>Replace.</i>

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## Section 02 TROUBLESHOOTING

### Sub-Section 02 (ENGINE)

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SYMPTOM	ENGINE PINGING
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check fuel lines.</b> a. Bent fuel lines (preventing fuel from flowing through). <i>Relocate or replace fuel lines.</i>
	<b>2. Check if carburetor(s) is (are) clean.</b> a. Dirt prevents fuel from flowing through. <i>Clean.</i>
	<b>3. Check ignition timing.</b> a. Timing is too advanced. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i>
	<b>4. Check compression ratio.</b> a. Compression ratio is too high. <i>Replace inadequate part(s) to obtain manufacturer's recommended compression ratio or use a higher grade fuel.</i>

SYMPTOM	ENGINE GENERATES A LOT OF VIBRATIONS
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check engine supports.</b> a. Loose broken supports or interference between support(s) and chassis. <i>Retighten to specification (refer to TECHNICAL DATA 09) or replace.</i>
	<b>2. Check drive pulley (refer to: vibrations coming from drive pulley).</b>
	<b>3. Check carburetor synchronization.</b> a. Throttle slide heights are adjusted differently and/or throttle slide openings are unsynchronized. <i>Adjust throttle slide heights and throttle cable.</i>

# FUEL AND OIL SYSTEMS

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	HIGH FUEL CONSUMPTION (OR RICH MIXTURE)
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check fuel tank.</b> a.Perforated fuel tank. <i>Replace fuel tank.</i>
	<b>2. Check fuel pump reservoir and carburetor fittings.</b> a.Leaking fittings. <i>Replace defective part.</i>
	<b>3. Check primer.</b> a.Fuel flows through primer while engine runs. <i>Replace primer.</i>
	<b>4. Check float height in carburetor(s).</b> a.Fuel level is too high in float bowl(s). <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i>
	<b>5. Check needle valve.</b> a.Foreign particles prevent needle valve(s) from closing and/or worn seating area. <i>Clean or replace needle valve(s), then clean seating area.</i>
	<b>6. Check H.A.C. system.</b> a.Connection to atmosphere is plugged. <i>Clean.</i> b.Leakage in H.A.C. to carburetor tube. <i>Replace.</i> c.Leak in H.A.C. sealed chamber. <i>Replace.</i> d.H.A.C. frozen. <i>Replace.</i>
SYMPTOM	FUEL LEAKS IN ENGINE BASE WHEN ENGINE IS STOPPED
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check items 3, 4 and 5 of "High fuel consumption".</b>
	<b>2. Check fuel pump diaphragm.</b> a.Cracked diaphragm. <i>Replace.</i>



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## Section 02 TROUBLESHOOTING

### Sub-Section 03 (FUEL AND OIL SYSTEMS)

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SYMPTOM	ENGINE LACKS POWER OR STALLS AT HIGH RPM
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check fuel tank vent hose.</b> a.Kinked or clogged hose. <i>Relocate or replace.</i>
	<b>2. Check fuel filter.</b> a.Clogged filter. <i>Replace.</i>
	<b>3. Check fuel lines.</b> a.Kinked or clogged lines. <i>Relocate or replace.</i>
	<b>4. Check fuel pump flow.</b> a.Dried diaphragm. <i>Replace.</i>
	<b>5. Check if carburetor(s) is (are) clean.</b> a.Varnish. <i>Clean.</i>

SYMPTOM	HIGH INJECTION OIL CONSUMPTION
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check oil injection pump adjustment.</b> a.Oil injection pump adjusted too rich. <i>Adjust.</i>
	<b>2. Check injection oil lines and their fitting.</b> a.Leaking lines and/or cover. <i>Replace defective part(s).</i>
	<b>3. Check injection pump cover gasket.</b> a.Worn gasket. <i>Replace.</i>
	<b>4. Pressurize crankcase rotary valve gear reservoir.</b> a.Leaking gasket(s). <i>Replace gasket(s).</i>

**Section 02 TROUBLESHOOTING**  
Sub-Section 03 (FUEL AND OIL SYSTEMS)

SYMPTOM	ENGINE RUNS OUT OF FUEL (OR LEAN MIXTURE)
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check fuel filter ball located in fuel tank. Ball must move freely.</b></p> <p>a. Corrosion due to oxidation at installation. <i>Replace fuel filter.</i></p>
	<p><b>2. Check if lines are perforated or kinked and make sure they do not leak at fittings.</b></p> <p>a. Lines are too big for their fittings or are improperly routed. <i>Replace or properly relocate lines.</i></p>
	<p><b>3. Check fuel pump outlet flow.</b></p> <p>a. Dirt clogging fuel pump lines or torn membrane. <i>Clean or replace fuel pump.</i></p>
	<p><b>4. Check carburetor needle valve(s).</b></p> <p>a. Dirt (varnish, foreign particle) clogging fuel line inlets. <i>Clean.</i></p>
	<p><b>5. Check main jet.</b></p> <p>a. Dirt (varnish, foreign particle) accumulation at main jet. <i>Clean.</i></p>
	<p><b>6. Check float height in carburetor bowl(s).</b></p> <p>a. Running out of fuel at high speed because float height is too low. <i>Adjust float lever height according to specification.</i></p>
	<p><b>7. Check H.A.C. system.</b></p> <p>a. Plugged hole in air jet inlet. <i>Clean.</i></p> <p>b. H.A.C. frozen. <i>Replace.</i></p>

# TRANSMISSION AND BRAKE SYSTEMS

The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

## TRANSMISSION

SYMPTOM	THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check drive belt condition.</b></p> <p>a. Belt is too narrow (drive belt engagement is higher in drive pulley). <i>Replace belt if width is 3 mm (1/8") less than a new one (refer to TECHNICAL DATA 09).</i></p>
	<p><b>2. Check distance between pulleys and/or drive belt deflection.</b></p> <p>a. Distance is too small between pulleys or deflection is too high (drive belt engagement is higher in drive pulley). <i>Adjust distance between pulleys and/or drive belt deflection according to specifications (refer to TECHNICAL DATA 09).</i></p>
	<p><b>3. Check driven pulley sliding half play.</b></p> <p>a. Jammed sliding half. <i>Replace.</i></p>
	<p><b>4. Check spring tension of driven pulley sliding half.</b></p> <p>a. Sliding half rotation is accelerated when spring tension is too weak. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p>
	<p><b>5. Refer to "Vibrations originating from driven pulley" and check items listed.</b></p>
	<p><b>6. Check drive pulley spring tension.</b></p> <p>a. Spring tension is too weak. <i>Replace.</i></p>

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## Section 02 TROUBLESHOOTING

### Sub-Section 04 (TRANSMISSION AND BRAKE SYSTEMS)

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<b>SYMPTOM</b>	<b>ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check items 1, 2 and 3 of "The snowmobile accelerates slowly, especially when it is stopped".</b>
	<b>2. Check driven pulley spring tension.</b> a.Spring tension is to stiff. <i>Adjust according to specification (refer to TECHNICAL DATA 09).</i>
	<b>3. Check position of the calibration screws. (TRA drive pulley).</b> a.Selected numbers are too high. <i>Adjust according to specification (refer to TECHNICAL DATA 09).</i>
	<b>4. Refer to "Vibrations originating from driven pulley" and check items listed.</b>

<b>SYMPTOM</b>	<b>LOOSENESS IS FELT IN DRIVE SYSTEM WHEN ACCELERATING/DECELERATING</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check drive chain tension.</b> a.Drive chain is too loose. <i>Adjust.</i>
	<b>2. Check play of driven pulley Woodruff key (aluminum frame models).</b> a.Worn Woodruff key or keyway. <i>Replace.</i>

**Section 02 TROUBLESHOOTING**  
Sub-Section 04 (TRANSMISSION AND BRAKE SYSTEMS)

SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVEN PULLEY
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check drive belt.</b> a. Belt width is uneven at many places. <i>Replace (refer to TECHNICAL DATA 09 for the part number).</i>
	<b>2. Check tightening torque of drive pulley screw.</b> a. Moving governor cup. <i>Retighten bolt.</i>
	<b>3. Spring cover bolts.</b> a. Spring cover moves and restrains sliding half movement. <i>Retighten bolts.</i>
	<b>4. Check spring cover (TRA TYPE) and/or outer half bushings.</b> a. Excessive gap between bushings and inner half shaft, thus restraining sliding half movements. <i>Replace bushing(s).</i>
	<b>5. Check sliding half slider shoes.</b> a. Worn slider shoes. <i>Replace.</i>


SYMPTOM	VIBRATIONS ORIGINATING FROM DRIVEN PULLEY
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check sliding half play.</b> a. Sliding half runout. <i>Replace sliding half bushing.</i>
	<b>2. Check sliding half and fixed half straightness.</b> a. Sliding half/fixed half runout. <i>Replace.</i>
	<b>3. Check cam slider shoes.</b> a. One or two slider shoes out of three are broken. <i>Replace.</i>

## Section 02 TROUBLESHOOTING

### Sub-Section 04 (TRANSMISSION AND BRAKE SYSTEMS)

<b>SYMPTOM</b>	<b>PULLEYS DO NOT DOWN SHIFT PROPERLY</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check driven pulley spring tension.</b> a.Spring tension is too weak. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i>
	<b>2. Refer to "Vibrations coming from driven pulley" and check items listed.</b>
	<b>3. Check drive pulley bushings (cleanliness, wear, etc.).</b> a.Bushings stick to fixed half pulley shaft. <i>Clean or replace.</i>
	<b>4. Check driven pulley spring tension.</b> a.Spring tension is too weak. <i>Replace.</i>

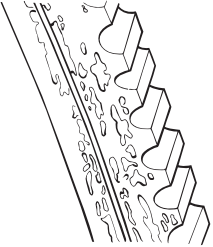
<b>SYMPTOM</b>	<b>IT IS DIFFICULT TO ENGAGE TRANSMISSION IN FORWARD OR REVERSE GEAR</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check position of gear shift lever adjustment screw.</b> a.Improper adjustment. <i>Adjust according to specifications (refer to TRANSMISSION 04).</i>

<b>SYMPTOM</b>	<b>UNEVEN BELT WEAR ON ONE SIDE ONLY</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>  	<b>1. Check tightening torque of engine mount bolts.</b> a.Loose engine mount. <i>Tighten engine mount nuts/bolts equally.</i>
	<b>2. Check pulley alignment.</b> a.Pulley misalignment. Align pulleys.
	<b>3. Check drive belt contact area on pulleys.</b> a.Rough or scratched pulley surfaces. Repair or replace pulley half.
	<b>4. Check driven pulley sliding half play.</b> a.Driven pulley bushing worn. Replace bushing.

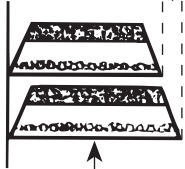
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## Section 02 TROUBLESHOOTING

### Sub-Section 04 (TRANSMISSION AND BRAKE SYSTEMS)

SYMPTOM	BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE
CONDITION	NORMAL USE
<b>Test/Inspection</b>  	<b>1. Check if drive pulley bushings are worn.</b> a. Insufficient pressure on belt sides. <i>Replace bushing.</i>
	<b>2. Check condition of drive pulley fixed half shaft.</b> a. Rusted drive or driven pulley shafts. <i>Clean shaft with fine steel wool and lubricate with low temperature grease (if applicable only).</i>
	<b>3. Check if pulley halves are clean.</b> a. Oil on pulley surfaces. <i>Clean pulley halves.</i>
	<b>4. Check pulley calibration.</b> a. Improper pulley calibration. <i>Calibrate according to specification.</i>

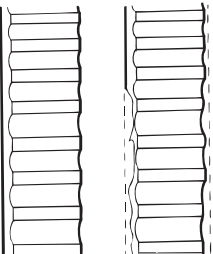
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SYMPTOM	BELT WORN EXCESSIVELY IN TOP WIDTH
CONDITION	NORMAL USE
<b>Test/Inspection</b>  Considerable use 	<b>1. Check drive pulley.</b> a. Excessive slippage due to irregular outward actuation movement of drive pulley. <i>Carry out drive pulley inspection.</i>
	<b>2. Check drive belt identification number.</b> a. Improper belt angle. (wrong type of belt). <i>Replace belt with an appropriate drive belt.</i>
	<b>3. Check drive belt width.</b> a. Considerable use. <i>Replace belt if 3 mm (1/8") less than recommended width (see TECHNICAL DATA 09).</i>


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## Section 02 TROUBLESHOOTING

### Sub-Section 04 (TRANSMISSION AND BRAKE SYSTEMS)

SYMPTOM	BELT WORN NARROW IN ONE SECTION
CONDITION	NORMAL USE
<b>Test/Inspection</b>  	<b>1. Check if parking brake is released.</b> a. Parking brake is engaged. <i>Release parking brake.</i>
	<b>2. Check track tension/alignment.</b> a. Frozen or too tight track. <i>Liberate track from ice or check track tension and alignment.</i>
	<b>3. Check drive pulley.</b> a. Drive pulley not functioning properly. <i>Repair or replace drive pulley.</i>
	<b>4. Check idle speed.</b> a. Engine idle speed too high. <i>Adjust according to specification.</i>
	<b>5. Check drive belt length.</b> a. Incorrect belt length. <i>Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 09).</i>
	<b>6. Check distance between pulleys.</b> a. Incorrect pulley distance. <i>Readjust according to specification.</i>
	<b>7. Check belt deflection.</b> a. Deflection is too small. <i>Adjust according to specification.</i>

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SYMPTOM	BELT SIDES WORN CONCAVE
CONDITION	NORMAL USE
<b>Test/Inspection</b>  	<b>1. Check pulley half surfaces.</b> a. Rough or scratched pulley half surfaces. <i>Repair or replace.</i>
	<b>2. Check drive belt identification number.</b> a. Unspecified type of belt. <i>Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 09).</i>


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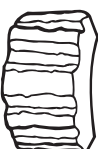


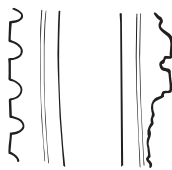
## Section 02 TROUBLESHOOTING

### Sub-Section 04 (TRANSMISSION AND BRAKE SYSTEMS)

<b>SYMPTOM</b>	<b>BELT DISINTEGRATION</b>
CONDITION	NORMAL USE
<p><b>Test/Inspection</b></p>  <p>A00DOEY</p>	<p><b>1. Check drive belt identification number.</b></p> <p>a. Excessive belt speed. <i>Using unspecified type of belt. Replace belt with proper type of belt (refer to TECHNICAL DATA 09).</i></p> <hr/> <p><b>2. Check if pulley halves are clean.</b></p> <p>a. Oil on pulley surfaces. <i>Clean pulley surfaces with fine emery cloth and wipe clean using Loctite Safety Solvent (P/N 413 7082 00) and a cloth.</i></p>

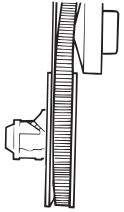
<b>SYMPTOM</b>	<b>BELT EDGE CORD BREAKAGE</b>
CONDITION	NORMAL USE
<p><b>Test/Inspection</b></p>  <p>A00DOFY</p>	<p><b>1. Check pulley alignment.</b></p> <p>a. Pulley misalignment. <i>Align pulley according to specifications (refer to TECHNICAL DATA 09).</i></p>

<b>SYMPTOM</b>	<b>FLEX CRACKS BETWEEN COGS</b>
CONDITION	NORMAL USE
<p><b>Test/Inspection</b></p>  <p>A00D0GY</p>	<p><b>1. Check drive belt condition.</b></p> <p>a. Considerable use, belt wearing out. <i>Replace.</i></p>

<b>SYMPTOM</b>	<b>SHEARED COGS, COMPRESSION SECTION FRACTURED OR TORN</b>
CONDITION	NORMAL USE
<p><b>Test/Inspection</b></p>  <p>A00D0HY</p>	<p><b>1. Check drive belt rotational direction.</b></p> <p>a. Improper belt installation. <i>Replace.</i></p> <hr/> <p><b>2. Check if drive belt rubs against components.</b></p> <p>a. Belt rubbing on stationary object. <i>Relocate components.</i></p> <hr/> <p><b>3. Check drive pulley.</b></p> <p>a. Violent engagement of drive pulley. <i>Check drive pulley engagement speed, drive pulley bushings and components.</i></p>

## Section 02 TROUBLESHOOTING

### Sub-Section 04 (TRANSMISSION AND BRAKE SYSTEMS)

SYMPTOM	BELT "FLIP-OVER" AT HIGH SPEED
CONDITION	NORMAL USE
Test/Inspection 	<b>1. Check pulley alignment.</b> a. Pulley misalignment. <i>Align pulley according to specifications (refer to TECHNICAL DATA 09).</i>
	<b>2. Check drive belt identification number.</b> a. Using unspecified type of belt. <i>Replace belt with an appropriate drive belt.</i>

## BRAKE SYSTEM

### MECHANICAL BRAKE

SYMPTOM	BRAKE DOES NOT ADJUST AUTOMATICALLY
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check ratchet wheel spring.</b> a. Broken ratchet wheel tag. <i>Replace.</i>
	<b>2. Check mobile pad stud.</b> a. Stud rotates in pad. <i>Replace.</i>

SYMPTOM	BRAKE HANDLE DOES NOT RETURN COMPLETELY
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check brake return spring.</b> a. Broken return spring. <i>Replace.</i>
	<b>2. Check if brake cable moves freely in its housing.</b> a. Brake cable movement is limited due to oxidation or dirt accumulation. <i>Replace.</i>
	<b>3. Check distance between brake lever and caliper.</b> a. Distance is too wide. <i>Adjust according to specifications (refer to TRANSMISSION 04).</i>

**HYDRAULIC BRAKE**

<b>SYMPTOM</b>	<b>SPONGY BRAKE CONDITION</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<i>Replace brake fluid and bleed system. If problem still occurs, replace master cylinder.</i>

<b>SYMPTOM</b>	<b>BRAKE FLUID LEAKING</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check for loosen hose connectors.</b> <i>Retighten.</i>
	<b>2. Check for damaged hose, master cylinder and caliper.</b> <i>Replace part(s) and check for proper mounting.</i>

**MECHANICAL AND HYDRAULIC BRAKES**

<b>SYMPTOM</b>	<b>BRAKE SYSTEM IS NOISY</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check brake pad thickness.</b> a.Pads are worn up to wear warner. <i>Replace.</i>

# ELECTRICAL SYSTEM

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

SYMPTOM	STARTER DOES NOT TURN
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check fuse.</b> a. Burnt fuse. <i>Check wiring condition and replace fuse.</i>
	<b>2. Check continuity of starter switch contact points.</b> a. Poor contact of starter switch contact points. <i>Repair or replace switch.</i>
	<b>3. Check continuity between starter switch and solenoid.</b> a. Open circuit between starter switch and solenoid switch. <i>Repair.</i>

SYMPTOM	STARTER TURNS; BUT DOES NOT CRANK THE ENGINE
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check battery capacity.</b> a. Shorted battery cell(s). <i>Replace.</i>
	<b>2. Check battery charge.</b> a. Weak battery. <i>Recharge.</i>
	<b>3. Check wire connection.</b> a. Inadequate connection (too much resistance). <i>Clean and reconnect.</i>
	<b>4. Check solenoid switch contact disc.</b> a. Burnt or poor contact of solenoid switch contact disc. <i>Replace solenoid switch.</i>
	<b>5. Check continuity of solenoid switch pull-in winding.</b> a. Open circuit of solenoid switch pull-in winding. <i>Replace solenoid switch.</i>
	<b>6. Check continuity of solenoid switch hold-in winding.</b> a. Open circuit of solenoid switch hold-in winding. <i>Replace solenoid switch.</i>

## Section 02 TROUBLESHOOTING

### Sub-Section 05 (ELECTRICAL SYSTEM)

	<p><b>7. Check brushes.</b> a.Poor contact of brushes. <i>Replace brushes.</i></p>
	<p><b>8. Check commutator.</b> a.Burnt commutator. <i>Turn commutator on lathe.</i></p>
	<p><b>9. Check height of commutator mica.</b> a.Commutator mica too high. <i>Undercut mica.</i></p>
	<p><b>10. Check field coil resistance.</b> a.Shorted field coil. <i>Repair or replace yoke.</i></p>
	<p><b>11. Check armature resistance.</b> a.Shorted armature. <i>Repair or replace armature.</i></p>
	<p><b>12. Check tension of brush springs.</b> a.Weak brush spring tension. <i>Replace springs.</i></p>
	<p><b>13. Check yoke assembly magnets.</b> a.Weak magnets. <i>Replace yoke assembly.</i></p>
	<p><b>14. Check if bushings are worn.</b> a.Worn bushings. <i>Replace bushings.</i></p>

<b>SYMPTOM</b>	<b>STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check clutch pinion gear.</b> a.Worn clutch pinion gear. <i>Replace clutch.</i></p>
	<p><b>2. Check clutch.</b> a.Defective clutch. <i>Replace clutch.</i></p>
	<p><b>3. Check movement of clutch on splines.</b> a.Poor movement of clutch on splines. <i>Clean and correct.</i></p>

**Section 02 TROUBLESHOOTING**  
Sub-Section 05 (ELECTRICAL SYSTEM)


	<p><b>4. Check clutch bushing.</b> a.Worn clutch bushing. <i>Replace clutch.</i></p>
	<p><b>5. Check starter bushing.</b> a.Worn starter bushing(s). <i>Replace bushing(s).</i></p>
	<p><b>6. Check ring gear.</b> a.Worn ring gear. <i>Replace ring gear.</i></p>

<b>SYMPTOM</b>	<b>ELECTRIC STARTER KEEPS TURNING WHEN ENGINE IS STARTED</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check clutch.</b> a.Jammed clutch pinion gear. <i>Replace or clean.</i></p>
	<p><b>2. Check movement of clutch on splines.</b> a.Clutch is stuck on splines. <i>Clean.</i></p>
	<p><b>3. Check ignition switch.</b> a.Ignition switch does not return to its ON position or is short-circuited. <i>Adjust retaining screw or replace switch.</i></p>
	<p><b>4. Check solenoid.</b> a.Shorted solenoid switch winding(s). <i>Replace solenoid switch.</i></p>
	<p><b>5. Check solenoid switch contacts.</b> a.Melted solenoid switch contacts. <i>Replace solenoid switch.</i></p>
	<p><b>6. Check starter switch.</b> a.Starter switch returns poorly. <i>Replace ignition switch.</i></p>

<b>SYMPTOM</b>	<b>NOISE OCCURENCE WHEN STARTING ENGINE</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check if ring gear is well mounted to drive pulley inner half.</b> a.Loose and/or broken bolts. <i>Retighten bolts using threadlocker or replace ring gear and drive pulley inner half.</i></p>

## Section 02 TROUBLESHOOTING

### Sub-Section 05 (ELECTRICAL SYSTEM)

SYMPTOM	ELECTRIC STARTER SOMETIMES DOES NOT WORK WHEN TURNING IGNITION SWITCH
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check battery cables and starter wires.</b> a. Corroded and/or loose connection(s). <i>Clean and/or retighten.</i>
	<b>2. Check fuse.</b> a. Oxidized fuse. <i>Clean.</i>
	<b>3. Check wiring harness connections.</b> a. Oxidized connections. <i>Clean or replace defective terminals.</i>
	<b>4. Check ignition switch.</b> a. Defective contacts in ignition switch. <i>Replace.</i>
	<b>5. Check solenoid of electric starter.</b> a. Shorted solenoid wiring harness or eroded contact washer. <i>Replace.</i>
SYMPTOM	HEADLAMP NOT LIGHTING
CONDITION	WHITE BULB
Test/Inspection	<b>1. Check bulb.</b> a. Gas leak. <i>Replace bulb.</i>
CONDITION	BROKEN ELEMENT
Test/Inspection	<b>1. Check for loose headlamp housing and bulb socket.</b> a. Vibration problem. <i>Tighten headlamp mounting screws. Lock bulb in socket. Replace bulb.</i>
CONDITION	MELTED FILAMENT (ENDS OF ELEMENT HOLDER) AND BLACK BULB
Test/Inspection	<b>1. Check voltage at headlamp at different speeds. It must not be above 15 VAC.</b>  <b>NOTE:</b> If quartz halogen bulb is involved, ensure that proper voltage regulator is installed. a. Excessive voltage in lighting circuit. <i>Replace voltage regulator and ensure proper grounding. Retest.</i>

**Section 02 TROUBLESHOOTING**  
Sub-Section 05 (ELECTRICAL SYSTEM)

SYMPTOM	HEADLAMP DIMING
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check voltage at headlamp at different speeds. It must not be below 11 VAC.</b></p> <p>a. Insufficient voltage in lighting circuit. <i>Replace voltage regulator and retest.</i></p>
	<p><b>2. Visually inspect wiring harness for damaged and/or melted wires and/or bad wire terminal crimping and/or connections.</b></p> <p>a. Heating, rotating or sharp part in contact with harness. Improper harness routing. <i>Repair/replace damaged wires and/or terminals. Reroute harness where necessary.</i></p>
	<p><b>3. On manual start models: Verify regulator ground.</b></p> <p>a. Rusted or loose retaining screws. <i>Clean, apply lithium grease (LMZ1) and firmly tighten screws.</i></p>
	<p><b>4. Verify if there is an interconnection between AC and DC current.</b></p> <p>a. Faulty installation of optional equipment. <i>Find optional equipment connected directly to DC ground (BK wire or chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).</i></p>
	<p><b>5. Verify if optional electric accessories are overloading the magneto/generator.</b></p> <p>a. Excessive electrical load to magneto/generator. <i>Reduce the electrical load by removing excess accessories. Reconnect as recommended by manufacturer.</i></p>
	<p><b>6. Hot Grips brand: Verify if they were connected in parallel by mistake.</b></p> <p>a. Excessive electrical load to magneto/generator. <i>Reconnect as recommended by manufacturer.</i></p>
	<p><b>7. Bombardier heating grips: Verify if the return wires of the elements were grounded to the chassis by mistake.</b></p> <p>a. Faulty installation of optional equipment. <i>Reconnect as recommended by manufacturer.</i></p>
	<p><b>8. Verify if heating grips installation overloads the magneto/generator capacity.</b></p> <p>a. Excessive electrical load to magneto/generator. <i>Reduce the electrical load by removing accessories.</i></p>



## Section 02 TROUBLESHOOTING

### Sub-Section 05 (ELECTRICAL SYSTEM)

SYMPTOM	FALSE FUEL AND/OR TEMPERATURE GAUGE READINGS
CONDITION	NORMAL USE
Test/Inspection	<b>1. Verify if gauge was connected on DC current by mistake (in case of optional installation).</b> a. Faulty installation of optional equipment. <i>Find optional wires connected directly to DC ground (BK wire to chassis) or to any DC hot wire (RD, RD/BL). Disconnect and reconnect to AC current (YL and YL/BK wires).</i>
	<b>2. Verify sender unit for free movement and/or correct arm position.</b> a. Defective or damaged part. <i>Correct or replace sender unit.</i>
	<b>3. Verify sender unit/gauge wiring harness condition.</b> a. Heating, rotating or sharp part in contact with harness. Improper harness routing. <i>Replace or repair damaged wires. Reroute where necessary.</i>

SYMPTOM	ENGINES DOES NOT START — NO SPARK AT SPARK PLUG
CONDITION	AT ENGINE CRANKING
Test/Inspection	<b>1. Verify spark plug condition.</b> a. Defective, improperly set, worn-out, fouled. <i>Identify source of problem and correct. Replace spark plug.</i>
	<b>2. Verify spark plug cap resistance with an ohmmeter.</b> a. Defective part. <i>Replace cap.</i>
	<b>3. Verify if problem originated from electrical system wiring harness and/or accessories and/or ignition cut-out switches by unplugging the 4-wire connectors between the magneto/generator and the vehicle wiring harness. Check condition of connectors.</b> a. Heating, rotating or sharp part in contact with harness. Improper harness routing. Defective switch(es). Corroded connector terminals. <i>Replace or repair damaged wires. Reroute where necessary. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.</i>
	<b>4. Verify trigger coil resistance with an ohmmeter and connector condition.</b> a. Defective coil. Corroded connector terminals. <i>Replace defective coil. Clean terminals and apply silicone dielectric grease.</i>
	<b>5. Verify condition of ignition coil.</b> a. Mechanically damaged part. Vibration problem. Electrically damaged part. <i>Tighten mounting screws. Replace ignition coil.</i>

**Section 02 TROUBLESHOOTING**  
Sub-Section 05 (ELECTRICAL SYSTEM)

	<p><b>6. Verify condition of ignition generator coils.</b> a. Mechanically damaged part. Vibration problem. Electrically damaged part. <i>Tighten mounting screws. Replace coils.</i></p>
	<p><b>7. Verify CDI (Capacitor discharge ignition) module.</b> a. Mechanically damaged part. Vibration problem. Electrically damaged part. <i>Tighten mounting screws. Replace CDI module, retest and verify ignition timing.</i></p>

<b>SYMPTOM</b>	<b>ENGINE STALLS</b>
CONDITION	AT LOW SPEED
Test/Inspection	<b>1. Verify items 4, 5 and 6 above.</b>

<b>SYMPTOM</b>	<b>IRREGULAR ENGINE SPEED</b>
CONDITION	AT HIGH SPEED
Test/Inspection	<b>1. Verify items 4, 5 and 6 above.</b>
CONDITION	AT LOW SPEED
Test/Inspection	<p><b>1. Verify items 4 and 5 above and trigger coil/flywheel protrusion air-gap.</b> a. Air-gap too large. <i>Readjust air-gap.</i></p>

<b>SYMPTOM</b>	<b>ENGINE IS MISFIRING — ERRATIC SPARK AT SPARK PLUG</b>
CONDITION	RIDING ON WET SNOW
Test/Inspection	<p><b>1. Verify if spark plug wires and/or spark plug cap seals are sealing-out moisture.</b> a. Defective wires and/or seals. <i>Replace defective part.</i></p> <p><b>2. Verify if ignition system wiring harness connectors are in good condition and/or are sealing-out moisture.</b> a. Loose connectors, corroded terminals or defective parts. <i>Clean terminals and apply silicone dielectric grease. Replace defective parts.</i></p>
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Verify misfiring by observing flash of stroboscopic timing light; unplug connectors between magneto/generator and vehicle wiring harness to isolate problem. Check condition of connectors.</b> a. Defective spark plug and/or cables/caps. Defective electrical system wiring harness and/or accessories and/ignition cut-out switches. Condition of connector terminals. <i>Replace defective parts and/or repair damaged wires. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.</i></p>

## Section 02 TROUBLESHOOTING

### Sub-Section 05 (ELECTRICAL SYSTEM)

CONDITION	RIDING IN DEEP AND THICK SNOW
Test/Inspection	<b>1. Perform all verifications outlined under “Engine does not start–no spark at spark plug”.</b>
	<b>2. Verify spark plug(s). Proceed with spark plug analysis in order to identify source of problem.</b> a. Defective and/or worn spark plug(s) and/or cable(s) and/or cap(s). <i>Replace defective part(s). Proceed with ignition system testing procedures. Perform engine analysis.</i>

SYMPTOM	FOULED (BLACK) SPARK PLUG TIP
CONDITION	NORMAL USE
Test/Inspection	<b>1. Check carburetor(s).</b> a. Carburetion is too rich. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i>
	<b>2. Check injection oil consumption.</b> a. Injection pump flow is too high. <i>Adjust according to specification or replace.</i>
	<b>3. Check oil quality.</b> a. Poor oil quality that creates deposits. <i>Use Bombardier oil.</i>
	<b>4. Check engine compression.</b> a. Leaking piston ring(s). <i>Replace.</i>

SYMPTOM	SPARK PLUG TIP(S) IS (ARE) LIGHT GREY
CONDITION	NORMAL USE
Test/Inspection	<b>1. Refer to “Engine slows down or stops at high RPM” and check items listed.</b>
	<b>2. Check spark plug heat range.</b> a. Spark plug heat range is too high. <i>Replace by Bombardier’s recommended spark plug (refer to TECHNICAL DATA 09).</i>
	<b>3. Check if air intake silencer leaks.</b> a. Air surplus coming from opening(s) located between halves. <i>Seal.</i>
	<b>4. Check carburetor adapter collars.</b> a. Loose collar(s). <i>Tighten.</i>
	<b>5. Check carburetor adapter(s).</b> a. Cracked or deformed adapter(s). <i>Replace.</i>

**Section 02 TROUBLESHOOTING**  
**Sub-Section 05 (ELECTRICAL SYSTEM)**

<b>SYMPTOM</b>	<b>BRAKE LIGHT REMAINS ON</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check if bulb is properly installed.</b> a. Bulb is not installed correctly (contact elements are reversed). <i>Install bulb correctly.</i>
	<b>2. Check brake switch.</b> a. Switch contact remains closed. <i>Adjust brake cable or brake switch.</i>

<b>SYMPTOM</b>	<b>REAR LIGHT BULB FLASHES</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check bulb tightness in housing.</b> a. Looseness at bulb contact elements. <i>Install bulb correctly.</i>
	<b>2. Check if rear light is properly connected.</b> a. Connector housing is partially connected. <i>Install connector housing properly.</i>
	<b>3. Check continuity of wires.</b> a. Corroded terminals and/or broken wires. <i>Replace terminal(s) or crimp defective wires.</i>

<b>SYMPTOM</b>	<b>TACHOMETER DOES NOT WORK</b>
<b>CONDITION</b>	NORMAL USE
<b>Test/Inspection</b>	<b>1. Check continuity of wires.</b> a. Corroded terminals and/or broken wires. <i>Replace terminal(s) or crimp defective wires.</i>

# SUSPENSION SYSTEM AND TRACK

The following chart is provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

<b>SYMPTOM</b>	<b>REAR SUSPENSION BOTTOMS OUT</b>
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Check rear spring preload or rear arm spring preload.</b></p> <p>a.Spring tension is too low. <i>Increase rear arm spring preload.</i></p>

<b>SYMPTOM</b>	<b>SLIDER SHOES WEAR OUT PREMATURELY</b>
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Check track tension.</b></p> <p>a.Pressure is too great on slider shoes. <i>Adjust according to specifications (refer to TECHNICAL DATA 09). Replace defective parts.</i></p>

<b>SYMPTOM</b>	<b>TRACK CLEATS BECOME BLUE</b>
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Check track tension.</b></p> <p>a.Pressure is too great on cleats. <i>Adjust according to specifications (refer to TECHNICAL DATA 09).</i></p> <p><b>2. Check slider shoes and/or suspension retaining screws.</b></p> <p>a.Worn slider shoes or lost retaining screws. <i>Replace defective parts and/or tighten loose screws.</i></p>

<b>SYMPTOM</b>	<b>NOISE OR VIBRATIONS ORIGINATING FROM THE TRACK</b>
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Check slide suspension retaining bolts.</b></p> <p>a.Missing bolt(s) allowing movement of certain components which in turn interfere with track rotation. <i>Replace missing bolt(s).</i></p> <p><b>2. Check condition of idler wheel(s).</b></p> <p>a.Idle wheel rubber is damaged. <i>Replace.</i></p> <p><b>3. Check guide cleats.</b></p> <p>a.Top portion of guide cleat(s) is bent. <i>Replace.</i></p> <p><b>4. Check sprockets.</b></p> <p>a.One or various teeth of drive shaft sprockets are broken. <i>Replace sprocket(s).</i></p>

## Section 02 TROUBLESHOOTING

### Sub-Section 06 (SUSPENSION SYSTEM AND TRACK)

	<p><b>5. Check track rods and/or internal traction teeth.</b></p> <p>a. One or various track rods and/or teeth are broken. <i>Replace track.</i></p>
--	--

SYMPTOM	DERAILING TRACK
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Check track tension.</b></p> <p>a. Track is too loose. <i>Adjust.</i></p>
	<p><b>2. Check if track and slider shoes are properly aligned.</b></p> <p>a. Improper alignment. <i>Adjust.</i></p>

SYMPTOM	REAR SUSPENSION IS LOW OR TOO STIFF
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Check track tension.</b></p> <p>a. Track is too tight. <i>Adjust.</i></p>
	<p><b>2. Check if axles are properly lubricated.</b></p> <p>a. Improper lubrication and/or contaminated grease (sticky oil sludge). <i>Clean and/or lubricate.</i></p>
	<p><b>3. Check rear spring preload.</b></p> <p>a. Insufficient preload. <i>Increase preload using shock adjustment cams.</i></p>

SYMPTOM	WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS
CONDITION	NORMAL USE
Test/Inspection	<p><b>1. Check ski runner condition.</b></p> <p>a. Worn ski runners. <i>Replace.</i></p>
	<p><b>2. Check tension of front spring adjustment cams.</b></p> <p>a. Insufficient ski pressure on the ground. <i>Increase spring preload.</i></p>
	<p><b>3. Check if front arm stopper strap is too long.</b></p> <p>a. Insufficient ski pressure on the ground. <i>Shorten stopper strap.</i></p>
	<p><b>4. Check front arm spring tension.</b></p> <p>a. Insufficient ski pressure on the ground. <i>Slacken spring tension.</i></p>

## Section 02 TROUBLESHOOTING

### Sub-Section 06 (SUSPENSION SYSTEM AND TRACK)

<b>SYMPTOM</b>	<b>HANDLE BAR IS DIFFICULT TO TURN</b>
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check position of front spring adjustment cams.</b></p> <p>a. More pressure on the ground when cam increases spring preload. <i>Reduce front spring preload.</i></p>
	<p><b>2. Check position of stopper strap.</b></p> <p>a. More weight when stopper strap is short. <i>Lengthen front arm stopper strap.</i></p>
	<p><b>3. Check position of front arm shock adjustment cam(s).</b></p> <p>a. When spring tension is weak, more weight is transferred to the skis. <i>Increase spring preload.</i></p>
	<p><b>4. Check condition of ball joints.</b></p> <p>a. Corrosion restrains movement. <i>Lubricate or replace.</i></p>
	<p><b>5. Check swing arm camber (liquid cooled models).</b></p> <p>a. Too much ski leg inclination. <i>Adjust camber to <math>0^\circ \pm .5^\circ</math>.</i></p>

<b>SYMPTOM</b>	<b>THE SNOWMOBILE IS UNSTABLE (IT MOVES FROM LEFT TO RIGHT AND VICE VERSA)</b>
CONDITION	NORMAL USE
<b>Test/Inspection</b>	<p><b>1. Check ski runner condition.</b></p> <p>a. Worn or bent ski runners. <i>Replace ski runners.</i></p>
	<p><b>2. Check ski alignment.</b></p> <p>a. Improper ski alignment. <i>Align skis in order to obtain proper toe-out (opening) (to adjust, refer to STEERING SYSTEM 07).</i></p>
	<p><b>3. Check if bushings are too loose in steering system.</b></p> <p>a. Bushings are too loose. <i>Replace.</i></p>

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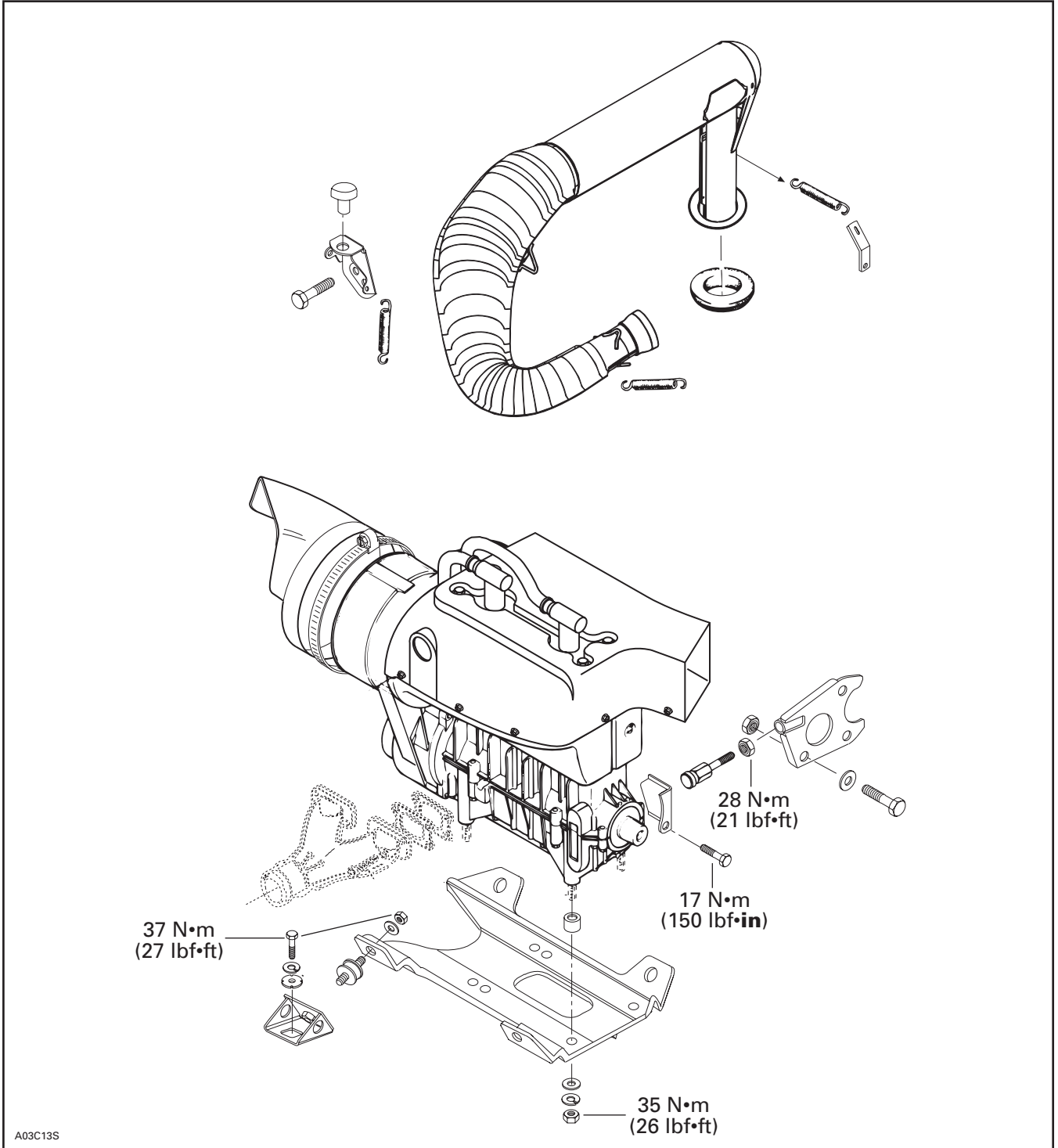
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# 443 AND 503 ENGINE TYPES

## ENGINE REMOVAL AND INSTALLATION

### 443 Engine Type



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## Section 03 ENGINE

### Sub-Section 02 (443 AND 503 ENGINE TYPES)

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## ENGINE REMOVAL AND INSTALLATION

Disconnect or remove the following:

### ◆ WARNING

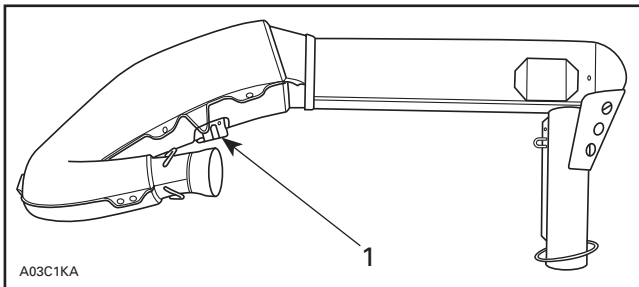
Before disconnecting any electrical wire in starter system always first disconnect the **BLACK** negative battery cable (on electric starting models).

- negative cable from battery (on electric starting models)
- belt guard
- drive belt
- drive pulley using appropriate puller, refer to 04-03 DRIVE PULLEY
- air silencer and carburetors
- impulse line from engine crankcase
- 4-connector housing
- exhaust pipe and exhaust cooling hose on so equipped models
- oil pump inlet tube and plug it
- oil pump cable
- rewind cable: tie a knot near rewind housing and remove starting grip

## TUNED PIPE IDENTIFICATION

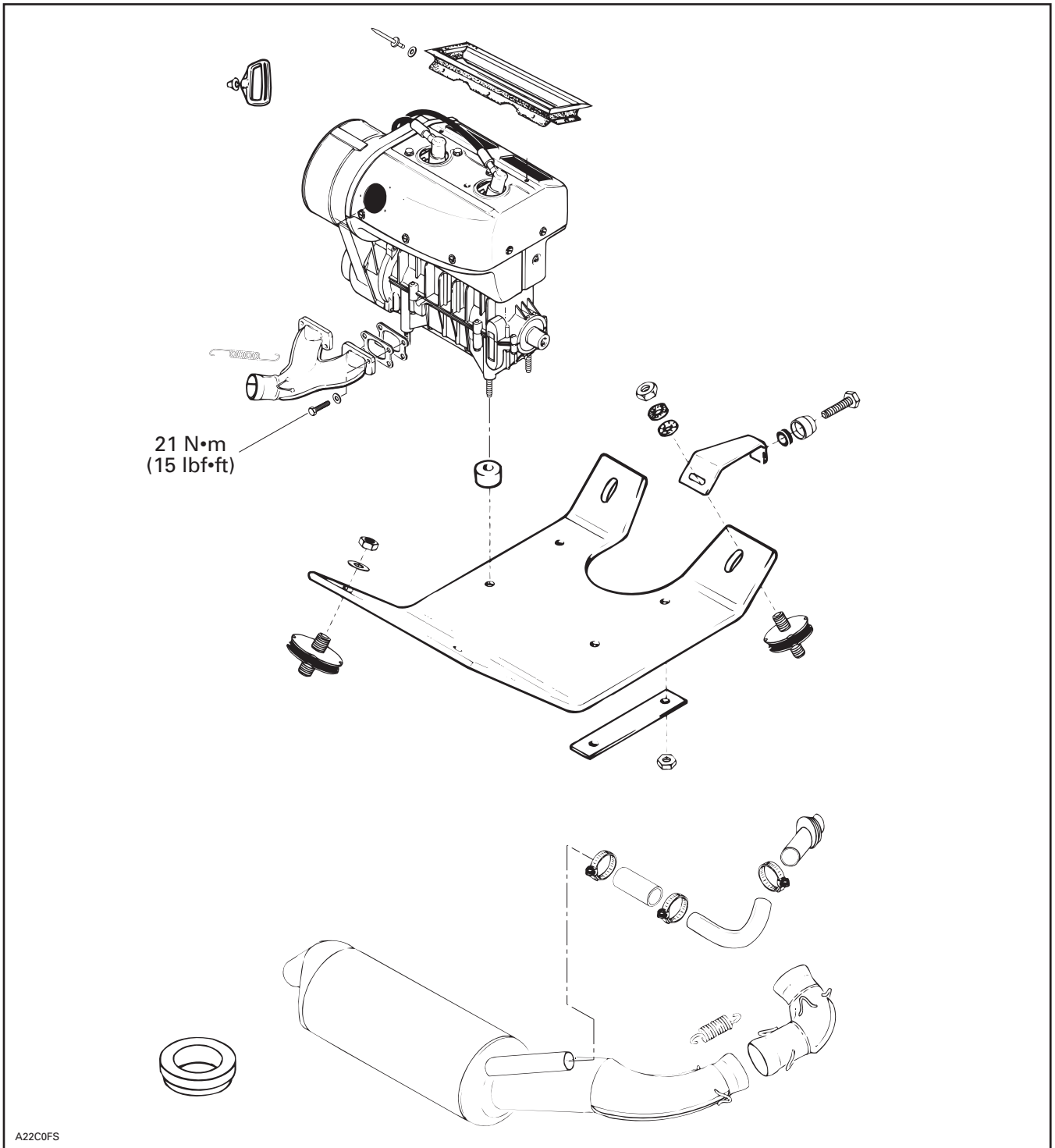
This part is identified on welded support.

Second number sequence of P/N is stamped on part.



1. Identification: 0464 for 514 0464 00

**Skandic WT/SWT 503 Engine Type**



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## Section 03 ENGINE

### Sub-Section 02 (443 AND 503 ENGINE TYPES)

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## ENGINE REMOVAL AND INSTALLATION

Disconnect or remove the following:

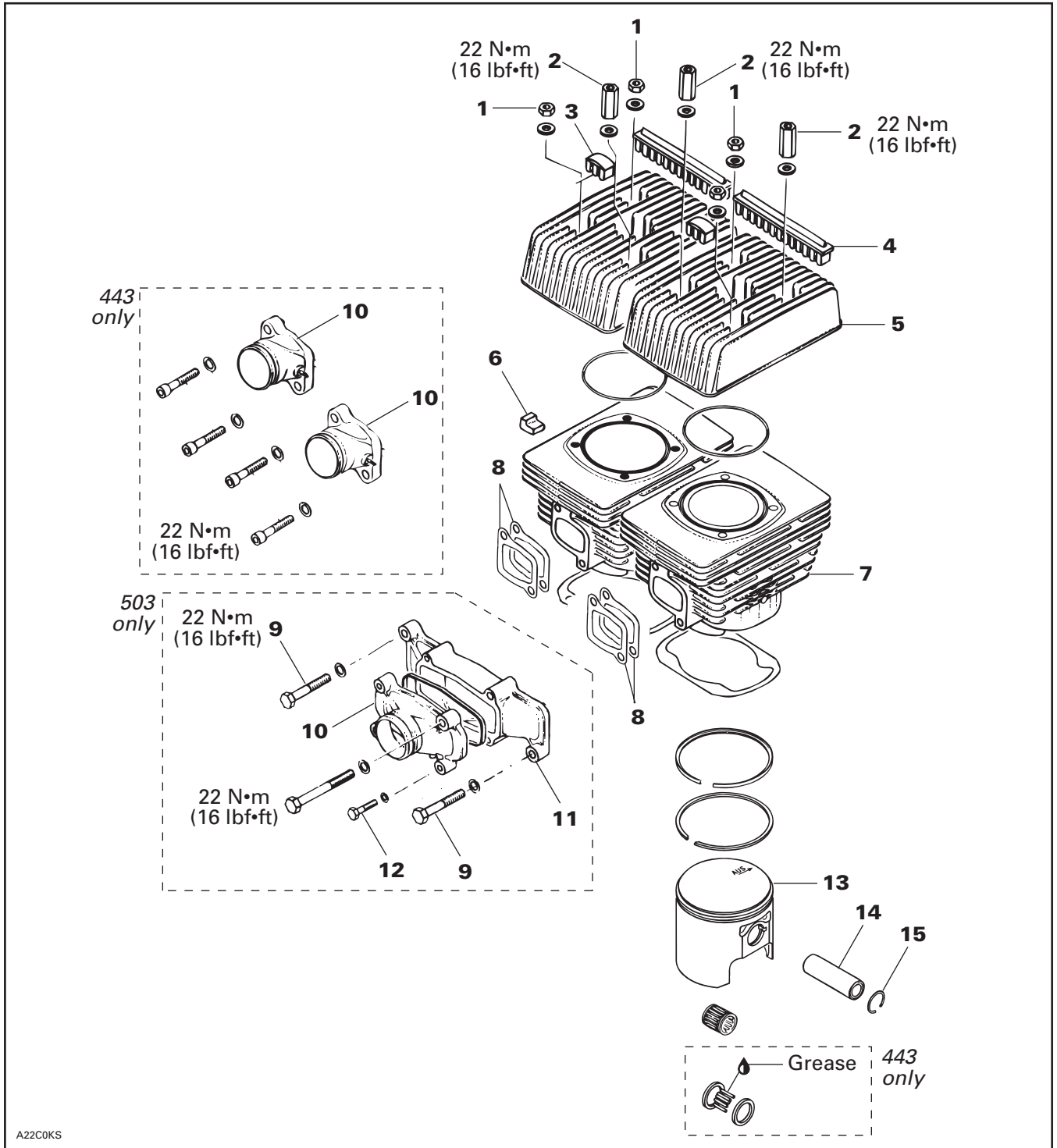


### **WARNING**

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

- negative cable from battery
- Positive cable and wire from starter then from engine
- belt guard
- drive belt
- drive pulley using appropriate puller, refer to 04-03 DRIVE PULLEY
- air silencer and carburetor
- impulse line from engine crankcase
- 4-connector housing
- exhaust pipe and exhaust cooling hose
- oil pump inlet tube and plug it
- oil pump cable
- rewind cable: tie a knot near rewind housing and remove starting grip

**TOP END**



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## Section 03 ENGINE

### Sub-Section 02 (443 AND 503 ENGINE TYPES)

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

## CLEANING

Discard all gaskets. Use Gasket Remover (P/N 413 7085 00) to clean mating surfaces.

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" and arrow on the piston dome must be visible after cleaning.

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

## DISASSEMBLY

Remove top fan cowl, intake sockets and lower fan cowl.

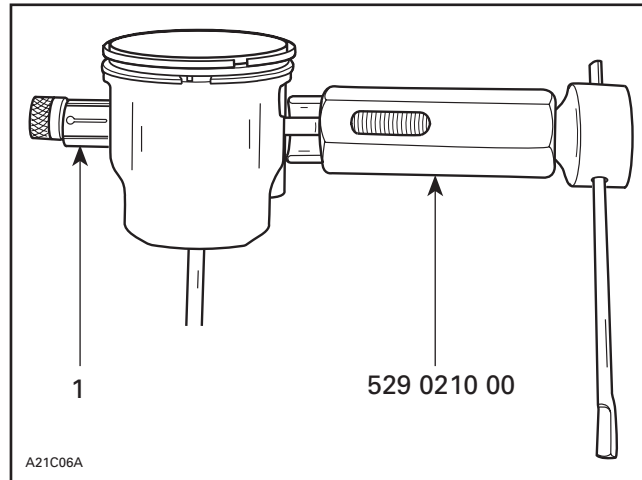
Remove cylinder heads.

### 443 Engine

On this 443 engine, piston pin needle bearing is mounted without a cage.

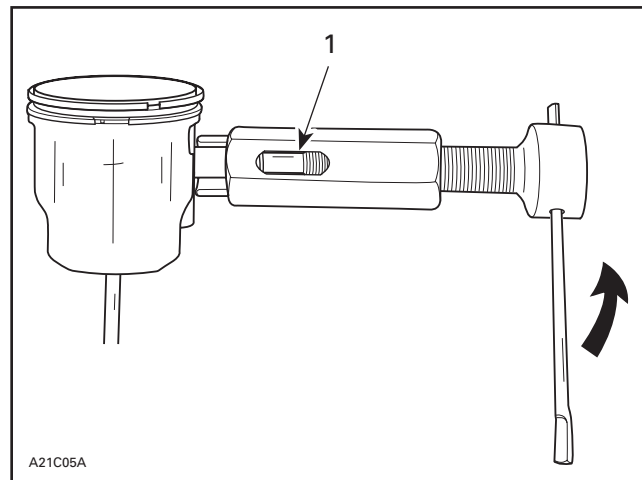
Use piston pin puller (P/N 529 0210 00) along with expansion sleeve and locating sleeve.

- Place a clean cloth or rubber pad (P/N 529 0234 00) over crankcase to prevent circlips **no. 15** from falling into crankcase. Then with a pointed tool inserted in piston **no. 13** notch, remove piston circlip on side where piston pin **no. 14** puller will be inserted.
- Insert piston pin puller (P/N 529 0210 00) then install expansion sleeve over puller rod.



1. Expansion sleeve

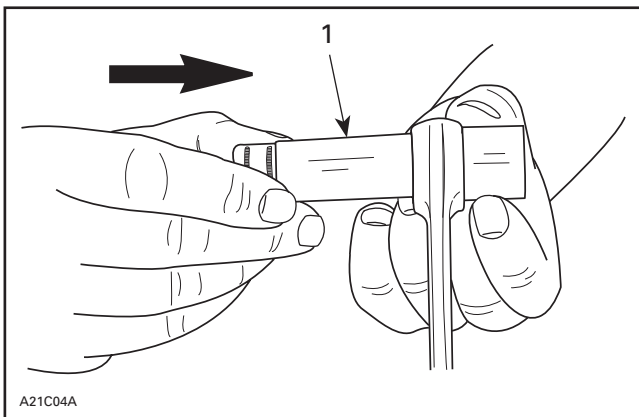
- Pull out piston pin by unscrewing puller until first thread of puller rod aligns with 503 mark.



1. 503 mark on puller

- Screw in puller in order to remove it from piston.
- Remove piston from connecting rod.
- Install locating sleeve. Then push needle bearings along with thrust washers using a 21 mm (.826 in) diameter pusher.





1. Pusher 21 mm (.826 in)

Use a locking tie to fasten all needles and thrust washers along with sleeves.

○ **NOTE:** The PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

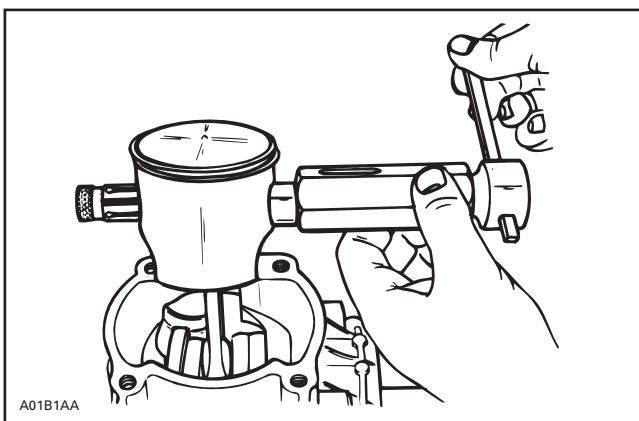
○ **NOTE:** 0.25 and 0.5 mm oversized piston and rings are available if necessary.

**503 Engine**

Place a clean cloth over crankcase to prevent cir-clips **no. 15** from falling into crankcase. Then with a pointed tool inserted in piston notch, remove cir-clip from piston **no. 13**.

To remove piston pin **no. 14**, use piston pin puller (P/N 529 0210 00) as follows:

- Fully screw puller handle.
- Insert puller end into piston pin.
- Screw (LH threads) extracting nut.
- Hold puller firmly and rotate puller handle counterclockwise to pull piston pin.



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○ **NOTE:** The PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

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

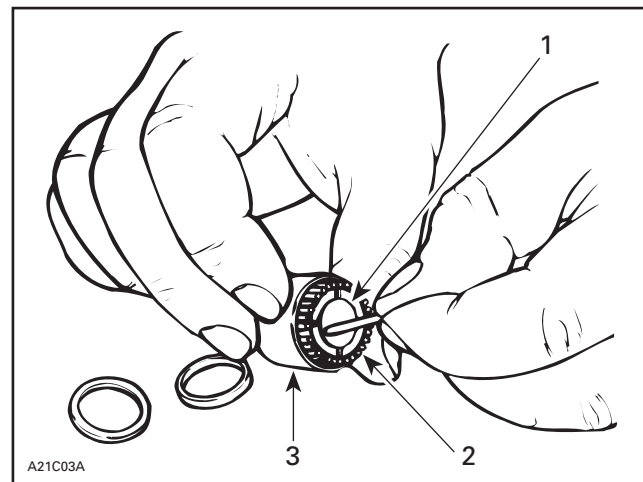
**INSPECTION**

Refer to ENGINE DIMENSIONS MEASUREMENT 03-04.

**ASSEMBLY**

**443 Engine**

When reinstalling original needle bearings, make sure that 31 needles are inserted between expansion sleeve and locating sleeve.

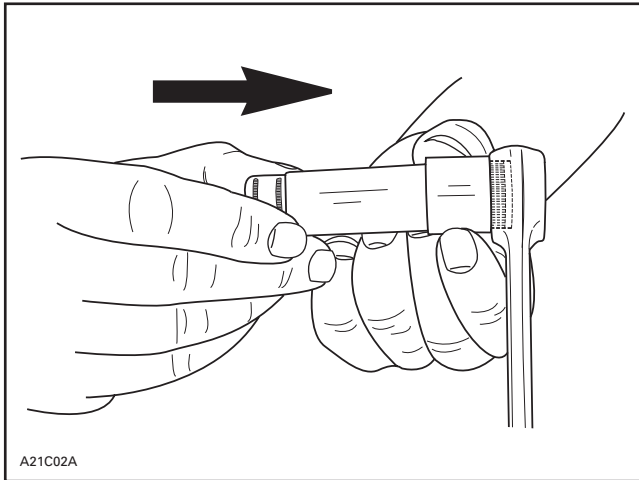


1. Expansion sleeve  
2. 31 needles  
3. Locating sleeve

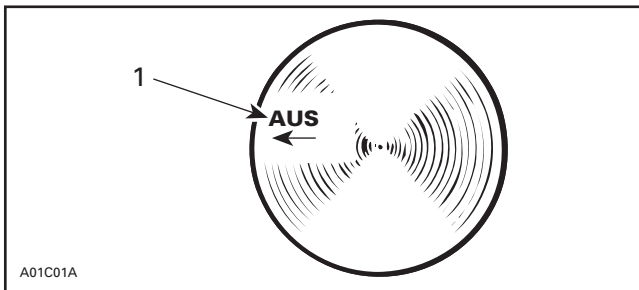
- Grease thrust washers and install them on each end of needles.
- Using a 21 mm (.826 in) diameter pusher, insert needles into connecting rod.

## Section 03 ENGINE

### Sub-Section 02 (443 AND 503 ENGINE TYPES)

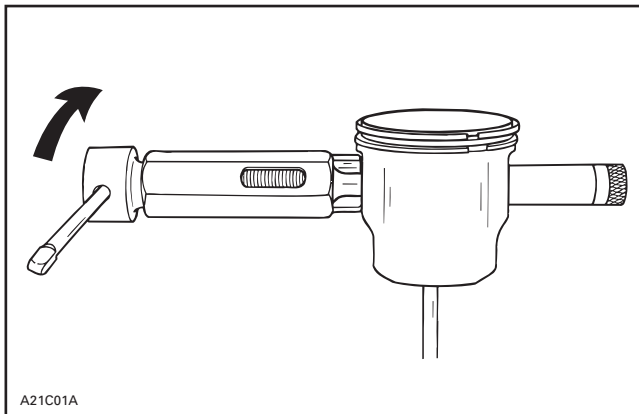


- Mount piston over connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in the direction of exhaust port.



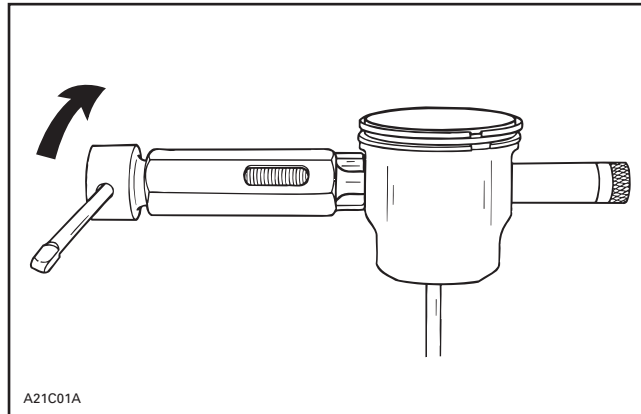
1. Exhaust

- Install piston pin puller (P/N 529 0210 00) and turn handle until piston pin is correctly positioned in piston.



- Remove piston pin puller and expansion sleeve.
- Install circlips as described below.

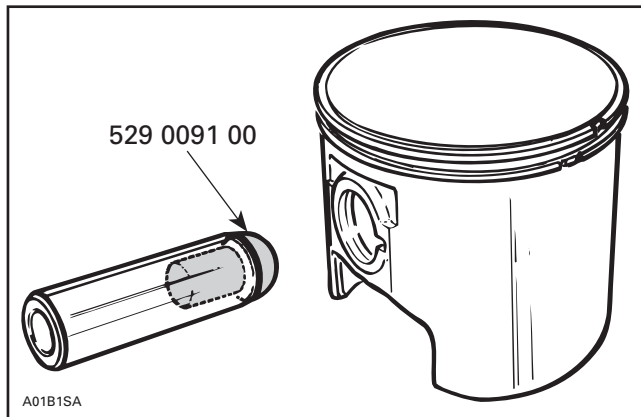
- When installing new needle bearing, insert needles with thrust washers. Instead of expansion sleeve, needles are held in place by 2 inner plastic cage halves.
- Use piston pin puller (P/N 529 0210 00) to insert piston pin. Plastic halves should come off piston. If not, pull them out using long nose pliers.



- Install circlips as described below.

#### 503 Engine

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



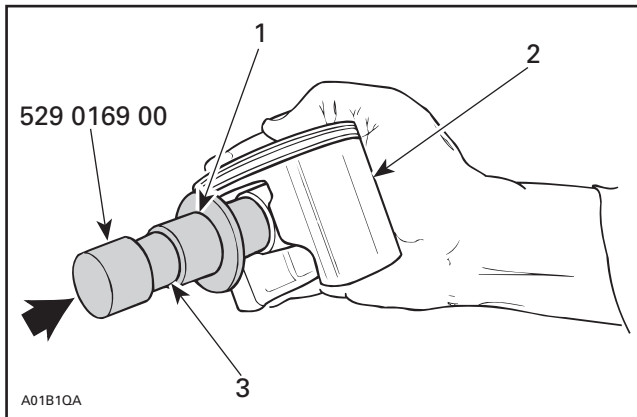
**NOTE:** The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

#### All Engines

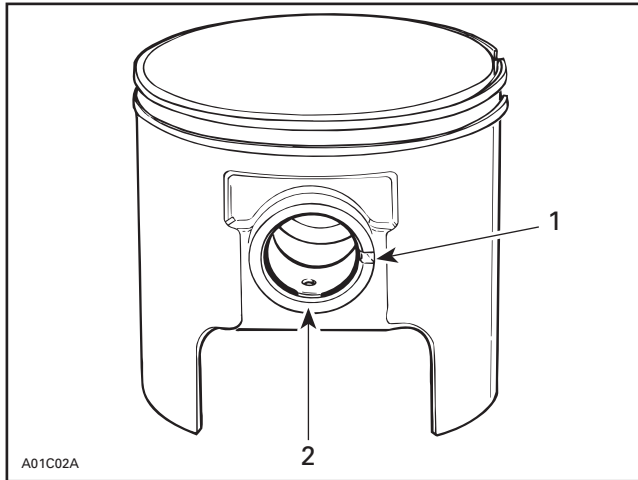
To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0086 00).

## Section 03 ENGINE

### Sub-Section 02 (443 AND 503 ENGINE TYPES)



1. Place circlip in
2. Restrain
3. Oil



1. Piston notch
2. Circlip break at 6 o'clock

### ▼ CAUTION

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

○ **NOTE:** Be sure to restore the chamfer around all cylinder sleeve port openings. Before inserting piston in cylinder **no. 7**, lubricate the cylinder with new injection oil or equivalent. Install proper ring compressor on piston assembly.

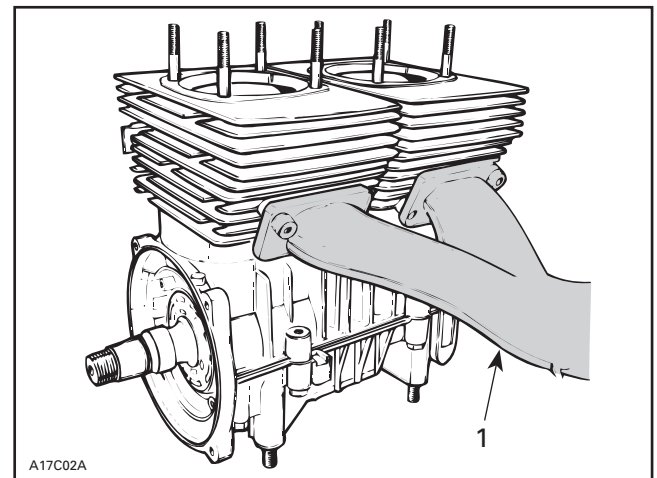
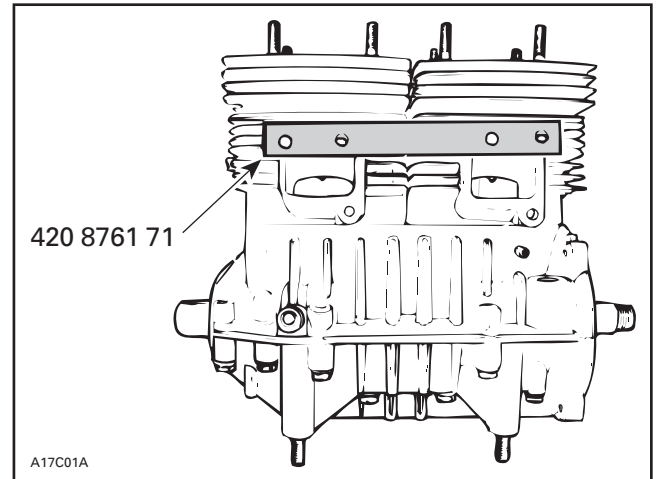
ENGINE TYPE	RING COMPRESSOR P/N
443	420 8760 90
503	420 8769 70

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

Check flatness of intake sockets **no. 10**. Refer to ENGINE DIMENSION MEASUREMENT 03-04 and look for **checking surface flatness**.

At cylinder **no. 7** and/or cylinder head **no. 5** installation, use aligning tool or exhaust manifold itself to ensure sealing of intake manifold and exhaust before tightening cylinder head nuts.

ENGINE TYPE	ALIGNING TOOL P/N
443 and 503	420 8761 71

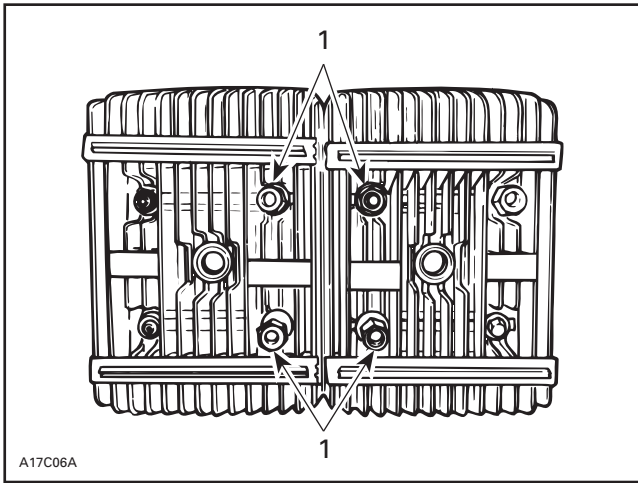


1. Or use exhaust manifold to align cylinders

## Section 03 ENGINE

### Sub-Section 02 (443 AND 503 ENGINE TYPES)

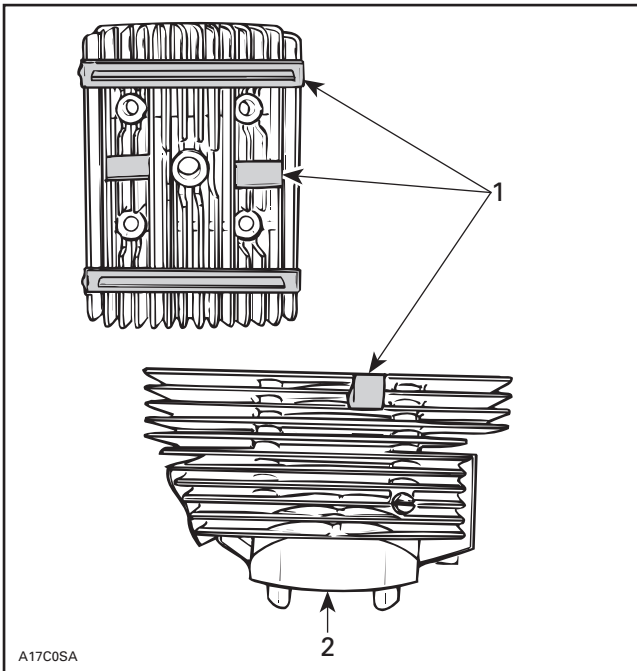
Position distance nuts no. 2 as illustrated.



1. Distance nuts

Cross torque cylinder head nuts nos. 1 and 2 to 22 N•m (16 lbf•ft); torque each cylinder head individually.

For proper position of noise dampers nos. 3, 4 and 6, refer to the following illustrations.



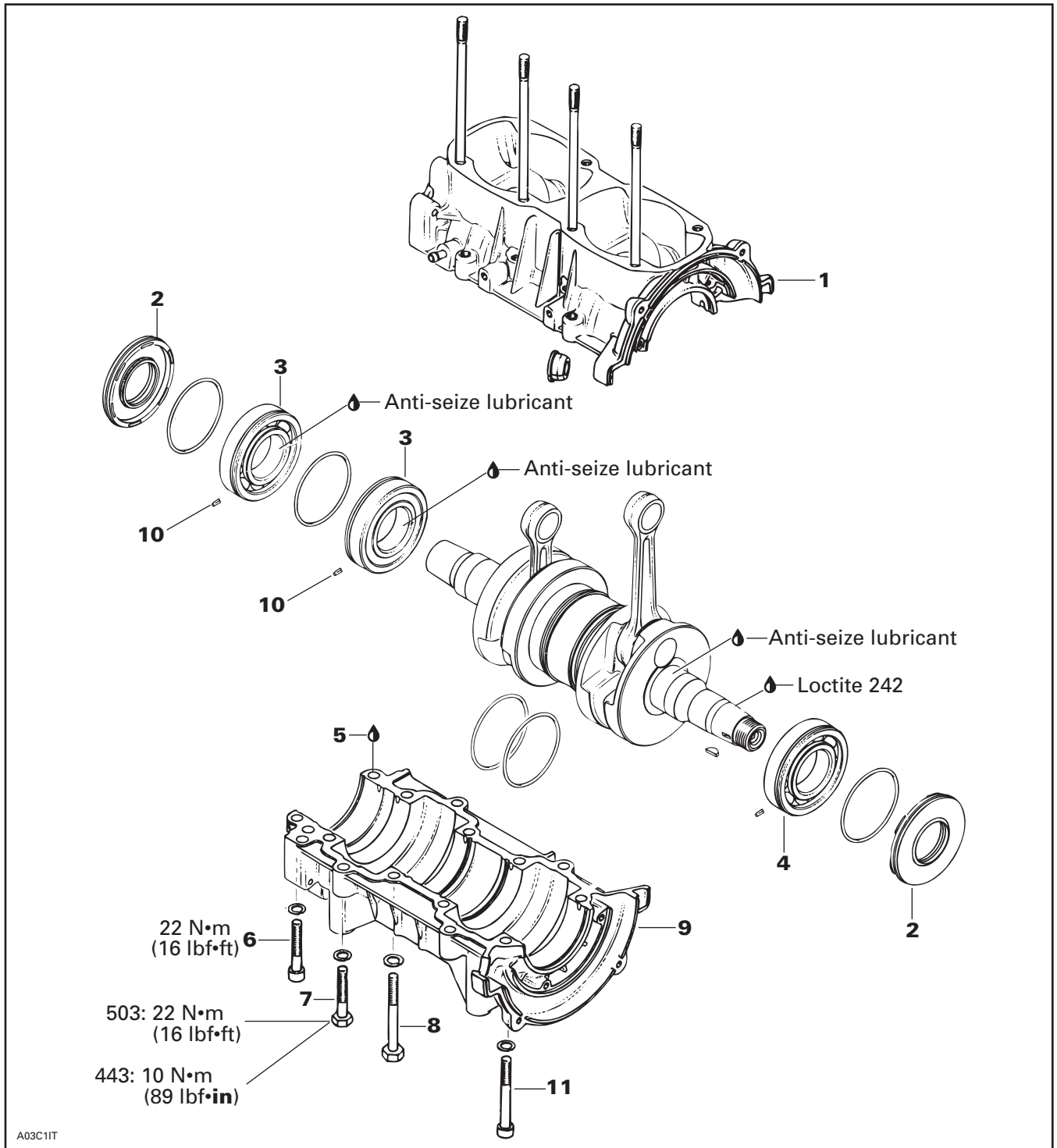
1. Noise dampers  
2. PTO side cylinder

Install armature plate, fan housing and then air deflector.

Install a gasket on each side of the air deflector.

Torque intake socket bolts to 22 N•m (16 lbf•ft).

**BOTTOM END**



A03C11T

## Section 03 ENGINE

### Sub-Section 02 (443 AND 503 ENGINE TYPES)

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

Remove engine from chassis.

Remove fan guard, rewind starter, starting pulley, trigger coil wire from 4-connector housing, magneto flywheel then fan housing.

Remove stator plate.

## CLEANING

Discard all seals, gaskets and O-rings.

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 7085 00) accordingly.

Remove all trace of Loctite 242 from crankshaft taper.

Remove old sealant from crankcase mating surfaces with Bombardier gasket remover (P/N 413 7085 00).

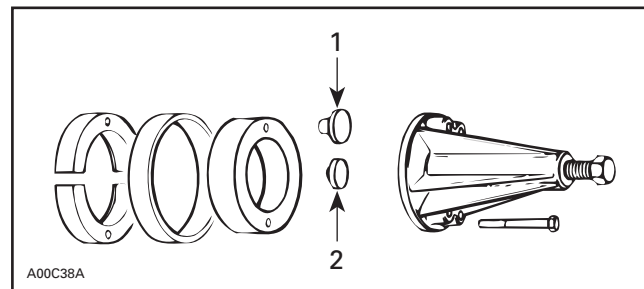


## CAUTION

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

## DISASSEMBLY

To remove bearings nos. 3 and 4 from crankshaft, use a protective cap and a special puller, as illustrated.



1. PTO side
2. MAG side

## INSPECTION

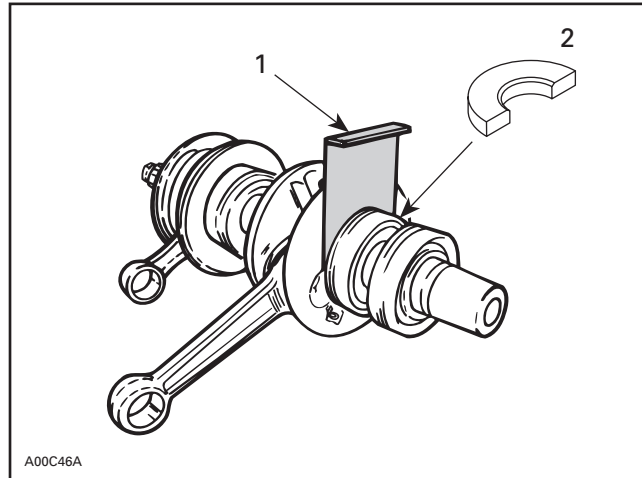
Refer to ENGINE DIMENSIONS MEASUREMENT 03-04.

## ASSEMBLY

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

To check proper clearance between bearing no. 3 and counterweight, use feeler gauge (P/N 420 8766 20).

Mount second bearing with distance gauge (P/N 420 8768 22) for 443 engine and (P/N 420 8768 24) for 503 engine for proper positioning.



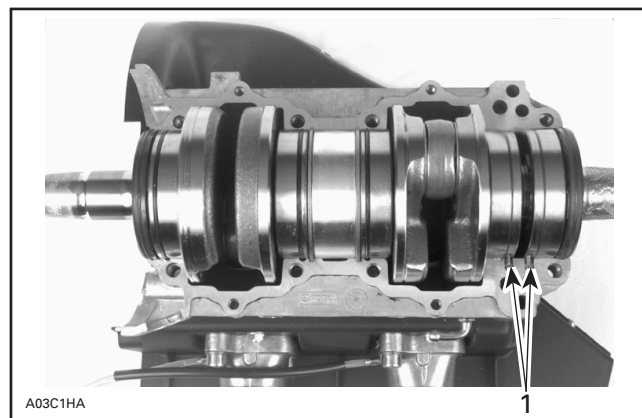
1. Feeler gauge
2. Distance gauge

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

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

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

When installing crankshaft, position drive pins no. 10 as illustrated.

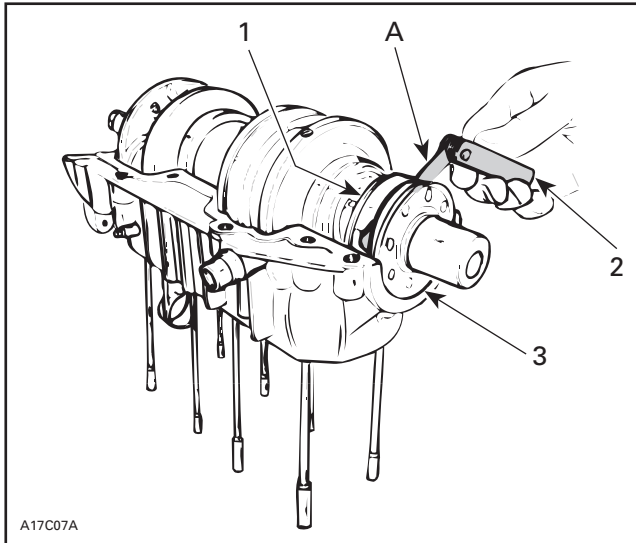


1. Drive pins

At seal no. 2 assembly, apply a light coat of lithium grease on seal lip.

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

When installing plain oil seals (seal without locating ring or without spacing legs), ensure to maintain 1.0 mm (.040 in) gap.



- 1. Bearing
- 2. Feeler gauge
- 3. Plain oil seal
- A. 1 mm (.040 in)

Crankcase halves nos. 1 and 9 are factory matched and therefore, are not interchangeable as single halves.

Prior to joining of crankcase halves, spray some new injection oil (or equivalent) on all moving parts of the crankshaft. Spray Primer N (P/N 413 7081 00) on one of mating surfaces. Let it dry for 10 to 20 minutes.

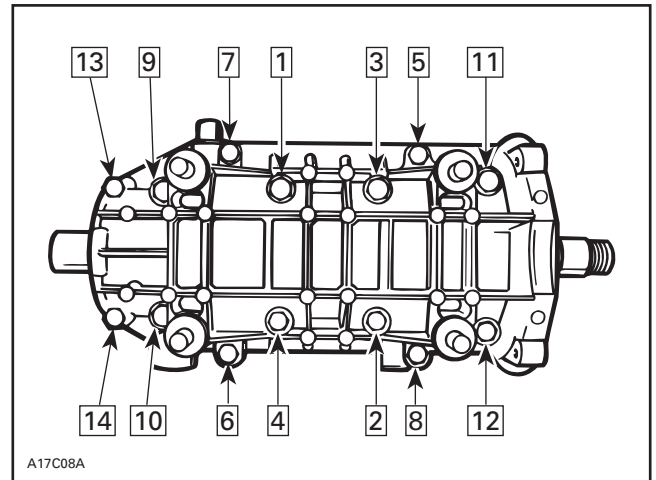
Apply paste gasket (P/N 413 7027 00) no. 5 on the other mating surface.

**NOTE:** Primer N allows Loctite 515 to fully cure on aluminum surfaces. It increases filling capacity and reduces curing time.

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

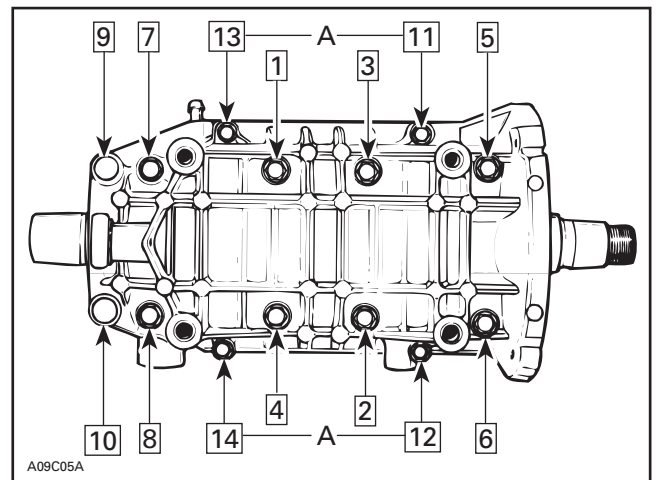
**503 Engine**

Torque screws nos. 6, 7, 8 and 11 to 22 N•m (16 lbf•ft) following illustrated sequence.



**443 Engine**

Torque screws to proper torque in the following sequence.



- A. 10 N•m (89 lbf•in)
- All the other screws are torqued to 21 N•m (15 lbf•ft)

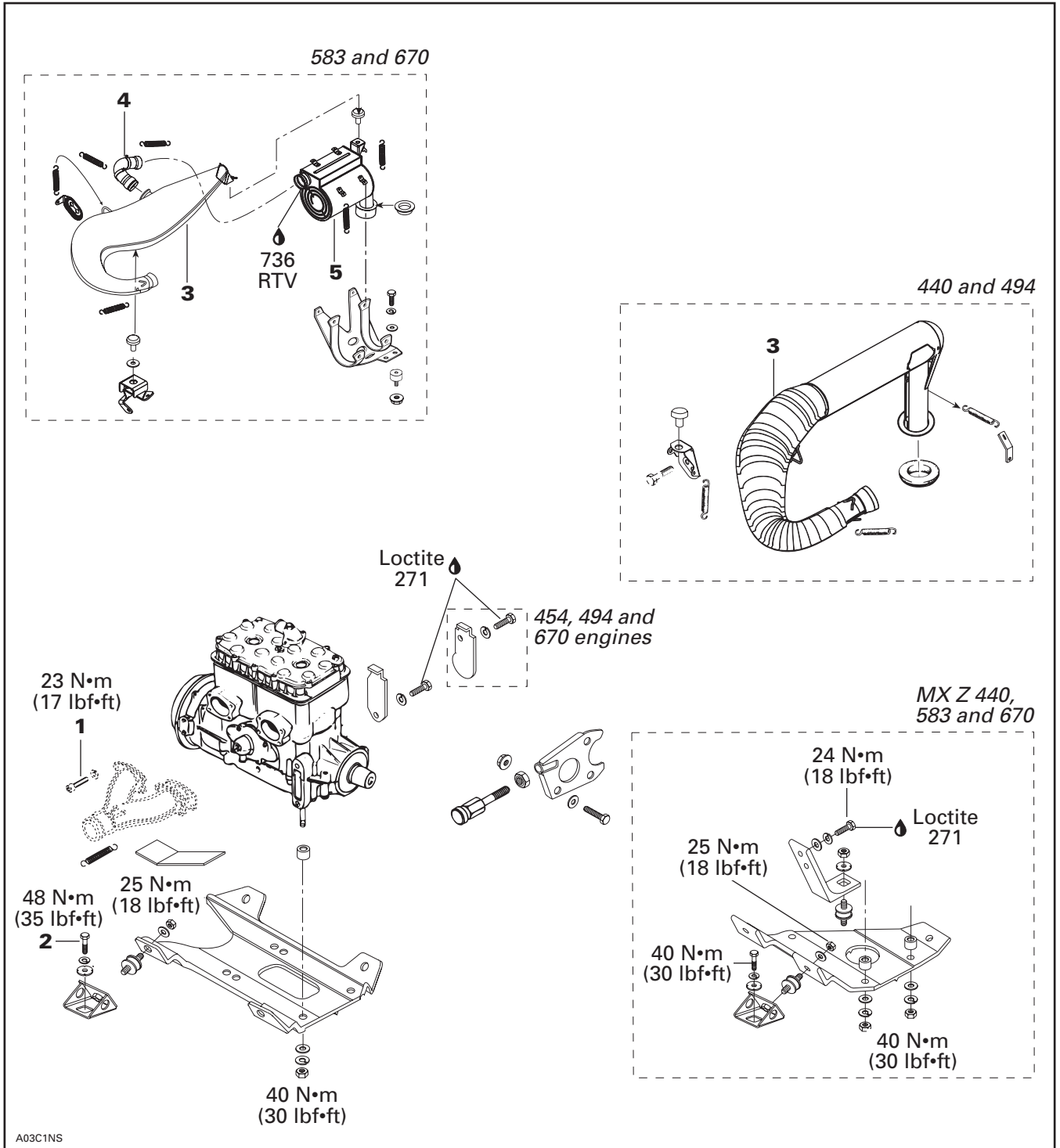
**All Engines**

To install magneto, refer to CDI MAGNETO 03-05.

# 454, 494, 583 AND 670 ENGINE TYPES

## ENGINE SUPPORT AND MUFFLER

All Models





## Section 03 ENGINE

### Sub-Section 03 (454, 494, 583 AND 670 ENGINE TYPES)

## REMOVAL FROM VEHICLE

Disconnect or remove the following from vehicle.

- air intake silencer
- belt guard and drive belt
- drive pulley
- carburetors and throttle cable at oil injection pump
- impulse line, oil supply line and rotary valve shaft lubrication hoses then plug all these hoses
- ignition coils and ignition module
- temperature sensor connector, 4 circuit connector, 3 circuit connector and black/yellow wire
- drain the cooling system and disconnect hoses from the engine. Refer to COOLING SYSTEM 03-08
- 4 screws retaining support to frame

## ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

### 1,2, Manifold Screw and Engine Support Screw

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

Torque the manifold screws to 23 N•m (17 lbf•ft).

## INSTALLATION ON VEHICLE

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

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



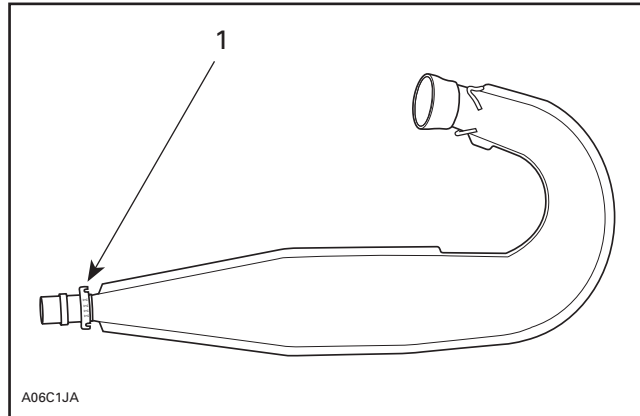
### CAUTION

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

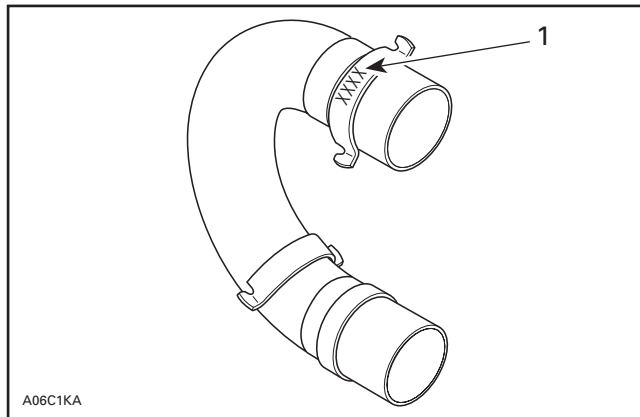
### 3,4,5, Tuned Pipe, Tail Pipe and Muffler

These parts are identified on welded hook.

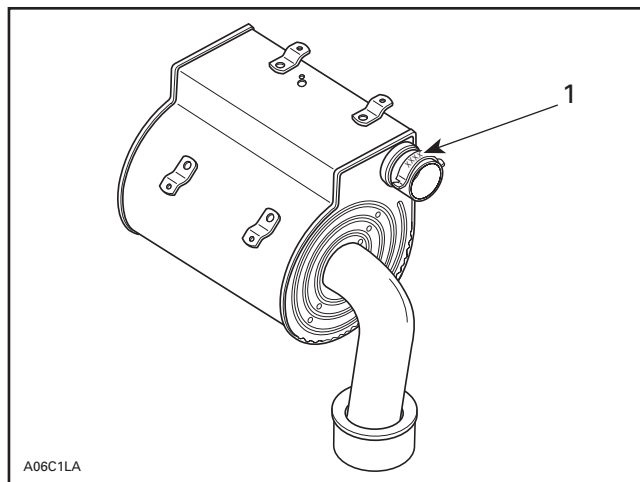
Second number sequence of P/N is stamped on part.



1. Example: 0392 for 514 0392 00



1. Number sequence

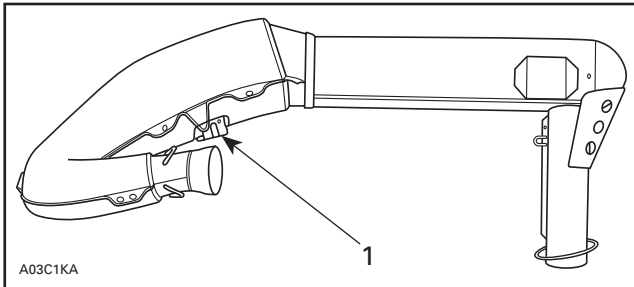


1. Number sequence

### 3, Tuned Muffler

This part is identified on welded support.

Second number sequence of P/N is stamped on part.



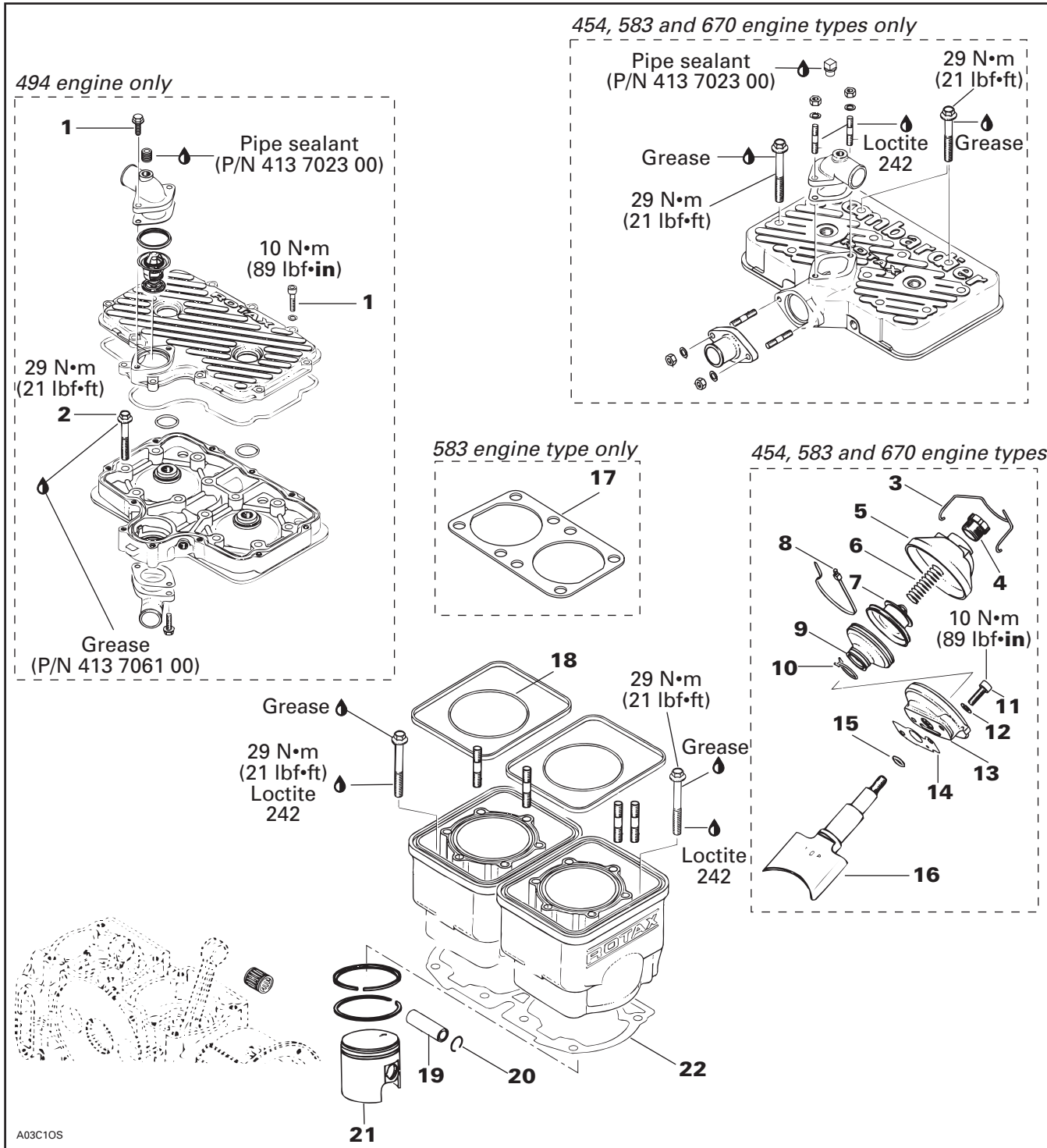
1. *Identification*

- Should a light exhaust leak be experienced at any ball joints, Dow Corning sealer no. 736 RTV (P/N 413 7092 00) can be used.

# Section 03 ENGINE

## Sub-Section 03 (454, 494, 583 AND 670 ENGINE TYPES)

### TOP END



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

## CLEANING

Discard all gaskets and O-rings.

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

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

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

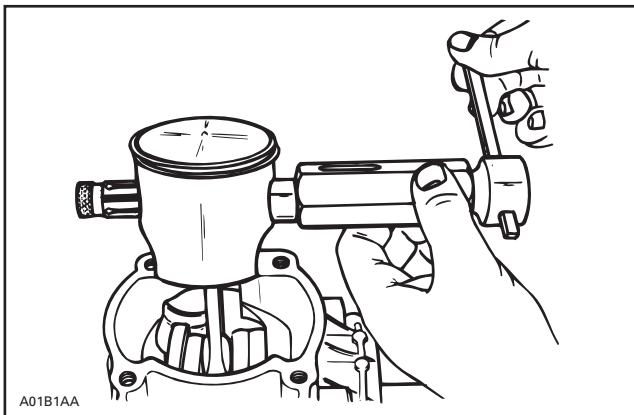
Clean the piston ring groove with a groove cleaner tool, or with a piece of broken ring.

## DISASSEMBLY

Place a clean cloth over crankcase then with a pointed tool inserted in piston notch, remove circlip no. 20 from piston no. 21.

To remove piston pin no. 19, use piston pin puller (P/N 529 0290 00) as follows:

- Fully screw puller handle.
- Insert puller end into piston pin.
- Install adaptor (P/N 529 0236 00) then screw extracting nut (LH threads).
- Hold puller firmly and rotate puller handle counterclockwise to pull piston pin.



○ **NOTE:** 0.25 mm oversize piston and rings are available if necessary except for 454 engine.

## RAVE System

○ **NOTE:** RAVE stands for Rotax Adjustable Variable Exhaust.

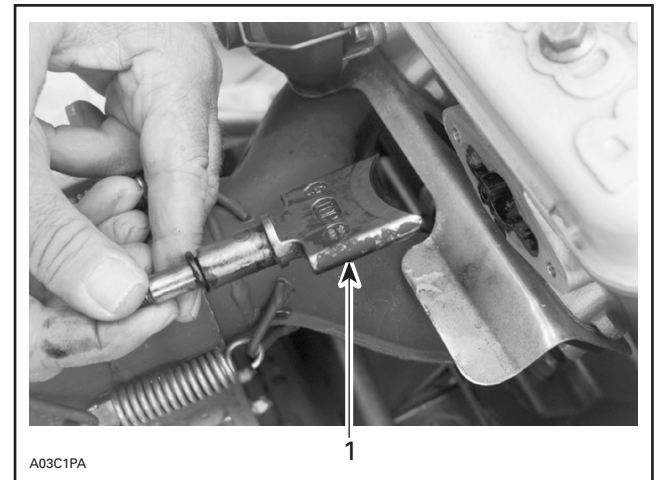
Remove spring clip no. 3, cover no. 5 and spring no. 6.

Cut clamp no. 8 (remove spring on 454) and unscrew valve piston no. 7.

Spread clamp no. 10 (except 454) and remove bellows no. 9.

Remove cylindrical screws no. 11 and their washers no. 12 then valve rod housing no. 13.

Pull out exhaust valve no. 16.



1. Exhaust valve

## INSPECTION

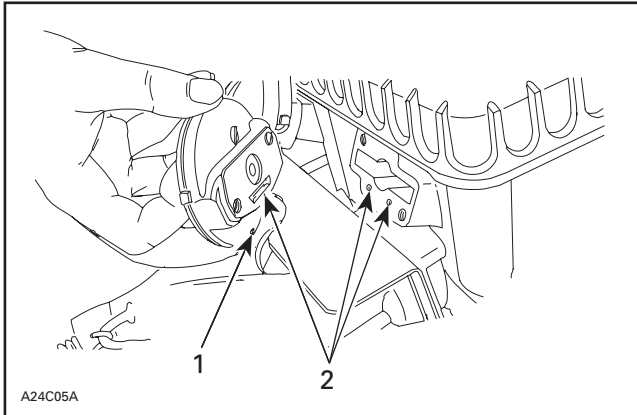
Refer to ENGINE DIMENSIONS MEASUREMENT 03-04.

## RAVE System

Check valve rod housing and cylinder for clogged passages.

## Section 03 ENGINE

### Sub-Section 03 (454, 494, 583 AND 670 ENGINE TYPES)



#### TYPICAL

1. Draining hole
2. Passages

**NOTE:** Oil dripping from draining hole indicates a loosen clamp or damaged bellows.

Check for cracked, dried or perforated bellows no. 9.

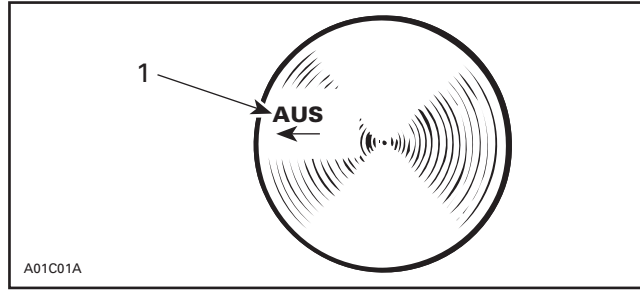
## 6, Spring

ENGINE TYPE	SPRING P/N	WIRE DIA.	FREE LENGTH	PRELOAD IN N (LBF) AT COMPRESSED LENGTH
		mm (in)	mm (in)	OF 14.7 mm (.579 in)
454	420 2399 45	1.0 (.039)	48.5 (1-29/32)	0.0203 (.00455)
583 and 670	420 2399 48	1.0 (.039)	38.0 (1-1/2)	0.0163 (.00365)

Make sure both springs installed on the engine have same characteristics.

## ASSEMBLY

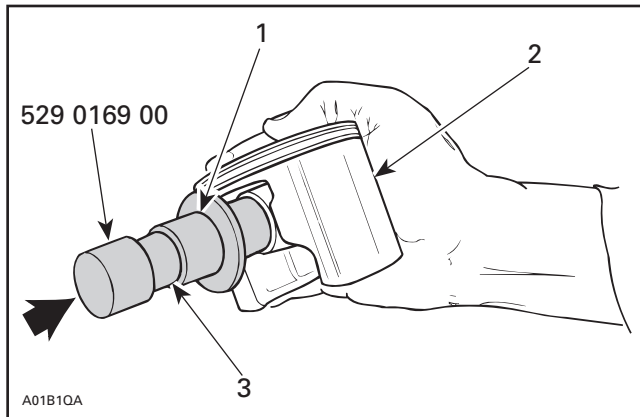
At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing in direction of the exhaust port.



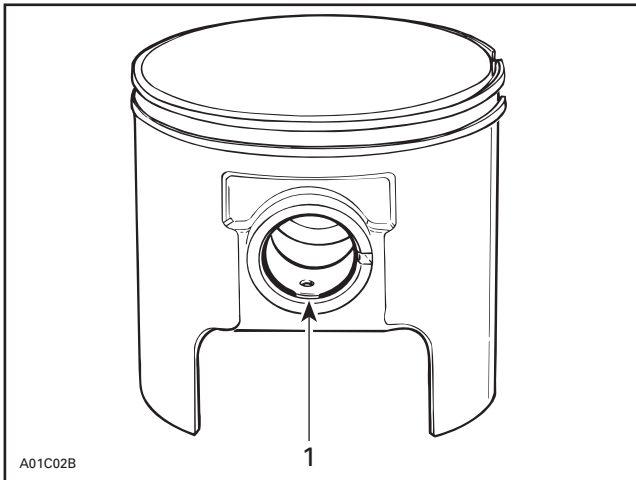
1. Exhaust

Use piston pin puller (P/N 529 0210 00) to ease piston pin installation.

To minimize the effect of acceleration forces on circlip, install each circlip so the circlip break is at 6 o'clock as illustrated. Use piston circlip installer (P/N 529 0169 00) for all engines except 670 and (P/N 290 8770 16) for 670 engine.



1. Place circlip in
2. Restrain
3. Oil



**TYPICAL**  
1. Circlip break

**▼ CAUTION**

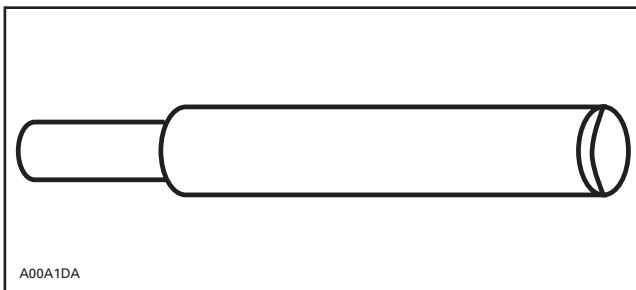
Circlips must not move freely after installation if so, replace them.

## 22, Cylinder

### 494 Only

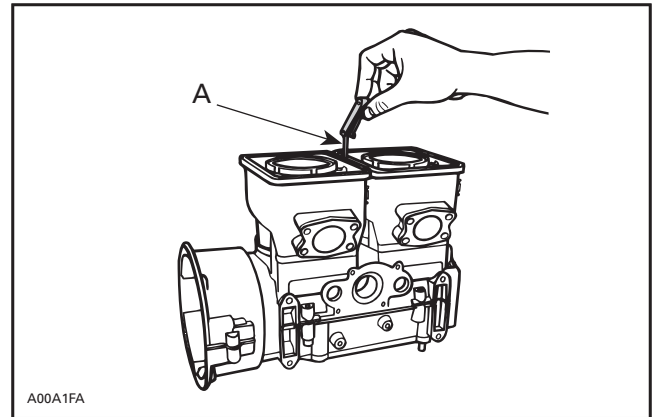
To avoid pinching or cutting of O-ring no. 18 between cylinder and cylinder head, it is necessary to use a special tool and to proceed as follows:

Use aligning pin (P/N 529 0189 00).



**NOTE:** Neither exhaust manifold nor cylinder aligning tools (flat bars) must be installed on exhaust flanges to perform this procedure.

1. Place a 0.43 mm (.017 in) feeler gauge between cylinders and slide it back and forth to have the good spacing along cylinders.

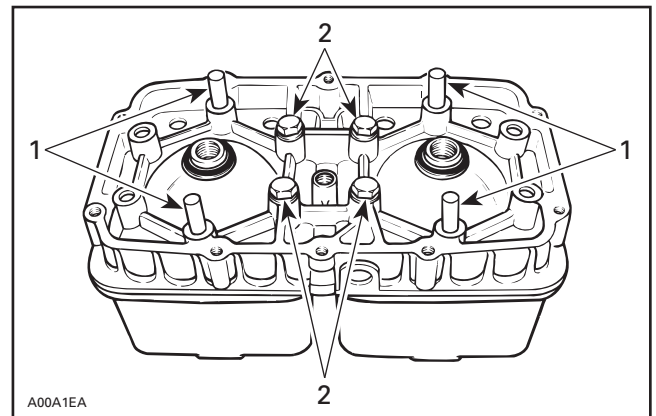


A. 0.43 mm (.017 in) feeler gauge

2. Apply Loctite 242 to screw threads. Properly torque cylinders screws.
3. Lay down cylinder head and insert aligning pins in holes as shown.

**NOTE:** If pins can not be inserted in cylinder head holes, enlarge them with a 8.75 mm (11/32 in) drill bit.

4. Install 4 screws in center holes. Torque to 10 N•m (89 lbf•in).



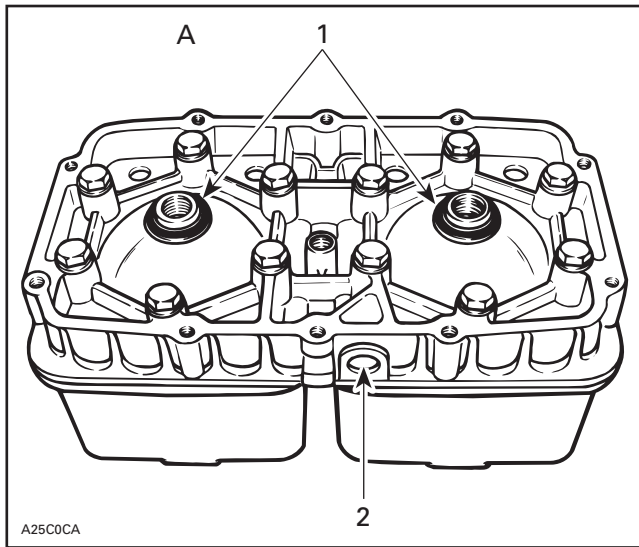
1. Pins  
2. Screws

5. Remove pins and install remaining screws.
6. Tighten all screws in recommended above sequence and torque as specified.

Position O-rings over cylinders then install cylinder head with its temperature sensor hole on rotary valve side. Install and torque screws to 29 N•m (21 lbf•ft) as per following illustrated spark plug sequence. Make sure to install O-rings around spark plug holes.

## Section 03 ENGINE

### Sub-Section 03 (454, 494, 583 AND 670 ENGINE TYPES)

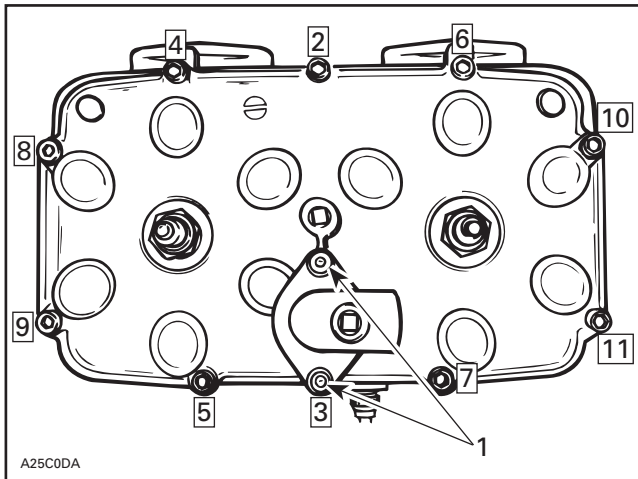


#### TYPICAL

1. O-rings
2. Temperature sensor hole
- A. Torque to 29 N•m (21 lbf•ft)

### 1, Screw

Torque cylinder head cover screws to 10 N•m (90 lbf•in) as per following illustrated sequence.

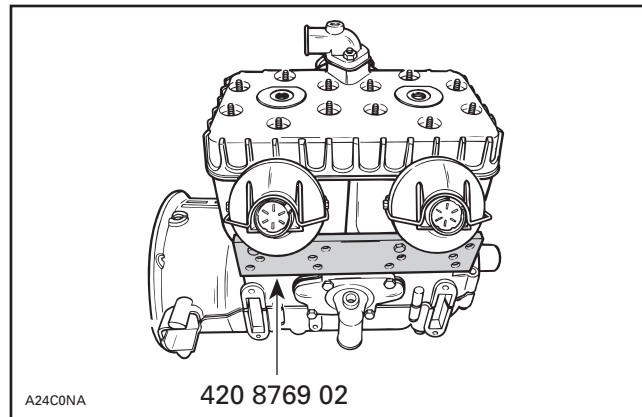


#### TYPICAL

1. Longer screws

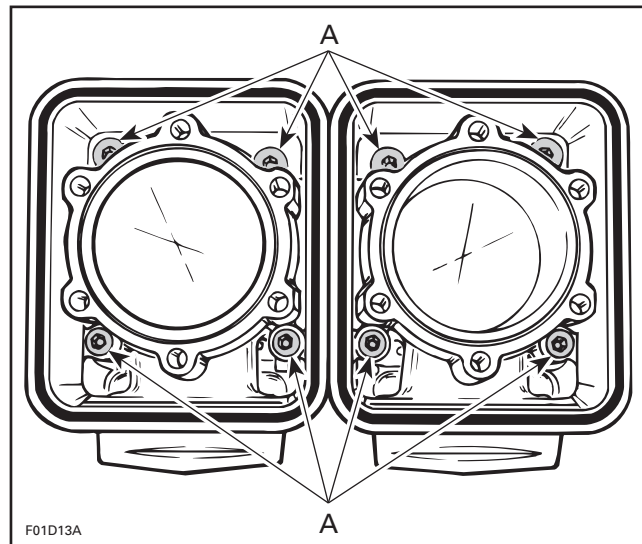
### 454, 583 and 670 Only

When reassembling the cylinders to the crankcase, it is important to have them properly aligned so that the cylinder head holes will match up with the studs. Cylinder head itself can be used to align the cylinders. Prior to torquing crankcase/cylinder nuts, install exhaust manifold to properly align exhaust flanges or use exhaust flange aligning tool (P/N 420 8769 02).



Apply Loctite 242 (P/N 413 7030 00) on cylinder screw threads.

Install and torque screws in a criss-cross sequence for each cylinder to 29 N•m (21 lbf•ft). For 454 and 670 engines longer screws go on exhaust side.



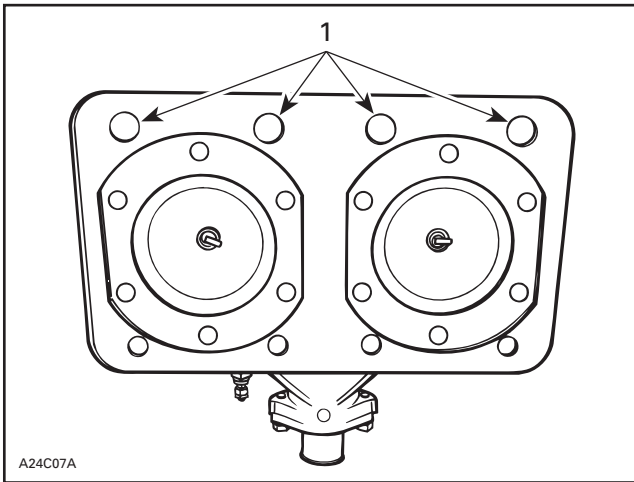
#### TYPICAL

- A. Torque screws to 29 N•m (21 lbf•ft)

### 17, Gasket

#### 583 Only

Install gasket with its larger holes on exhaust side.



**EXHAUST SIDE**

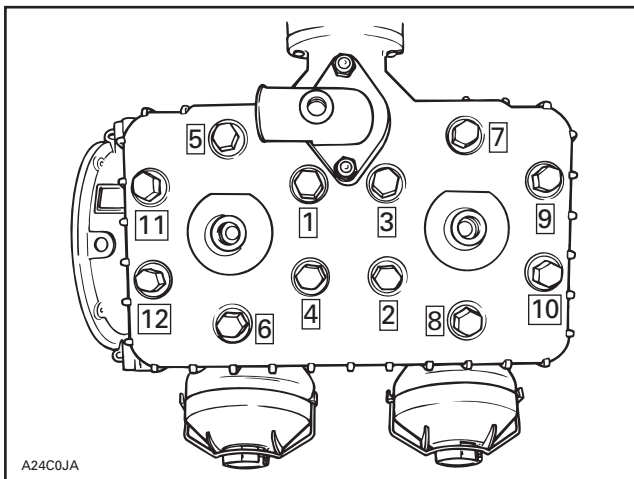
1. Larger holes

**All Models**

**2, Cylinder Head Screw**

ENGINE TYPE	CYLINDER HEAD SCREWS TIGHTENING TORQUE
454, 494, 583 and 670	29 N•m (21 lbf•ft) Apply grease under screw head

Torque cylinder head screws following illustrated sequence. On 583 and 670 engines longer screws go on intake side.

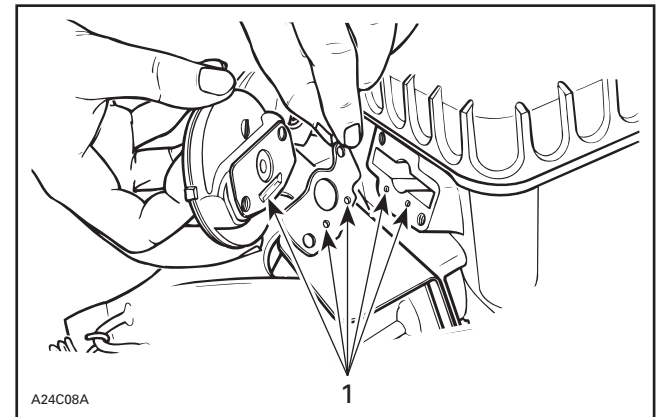


Torque screws no. 1 to 10 N•m (90 lbf•in).

**RAVE SYSTEM**

Install exhaust valve in cylinder with its mention TOP upward (see illustration at removal).

Install gasket and valve rod housing with their passages toward bottom.



1. Passages

Torque cylindrical screws to 10 N•m (90 lbf•in). Check free sliding action of valve.

Install bellows over valve rod housing groove and secure with a clamp. 454 engine has no clamp.

Screw by hand valve piston on valve rod until it bottoms.

Secure bellows to valve piston with a clamp (spring on 454 engine.)

Install spring, cover and spring clip. Turn adjustment screw by hand until it bottoms.





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

## CLEANING

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

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 7085 00) accordingly.

Remove all trace of Loctite from crankshaft taper.

Remove old paste gasket from crankcase mating surfaces with Bombardier gasket remover (P/N 413 7085 00).

### CAUTION

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

## DISASSEMBLY

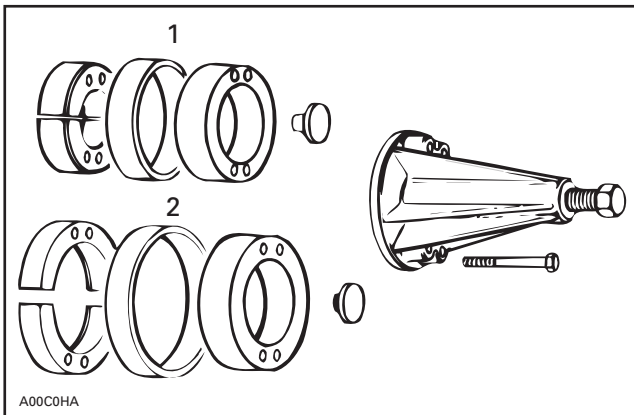
### General

To remove drive pulley, refer to DRIVE PULLEY 04-03.

To remove magneto, refer to CDI MAGNETO 03-05.

### 2,4,6,9, Crankshaft Bearing

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



- 1. PTO side
- 2. MAG side

## INSPECTION

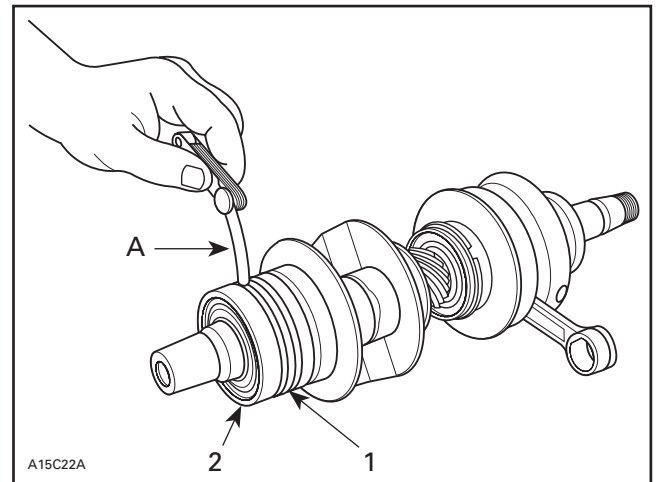
Refer to ENGINE DIMENSIONS MEASUREMENT 03-04.

## ASSEMBLY

### 2,4,5,6,9, Crankshaft Bearing and Labyrinth Sleeve

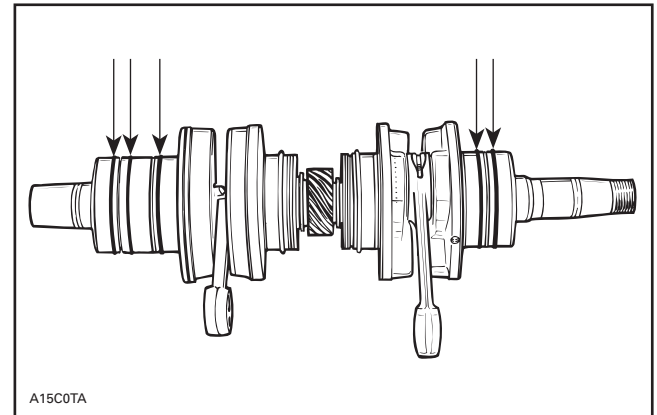
Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

Prior to installation, place bearings into an oil container filled with oil previously heated to 75°C (167°F). This will expand bearing and ease installation. Install bearings and labyrinth sleeve with groove as per the following illustration. Keep a 0.3 mm (.012 in) gap between outer bearing and labyrinth sleeve.



- 1. Labyrinth sleeve
- 2. Outer bearing
- A. 0.3 mm (.012 in)

Install O-rings as illustrated.

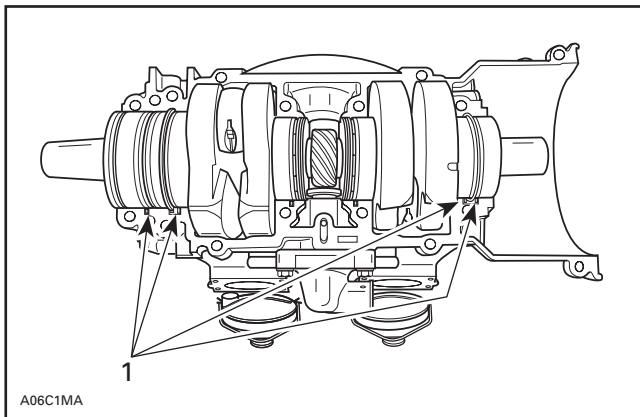


ALL ENGINES EXCEPT 454 AND 670

Install bearing drive pins no. 2 as illustrated.

## Section 03 ENGINE

### Sub-Section 03 (454, 494, 583 AND 670 ENGINE TYPES)



A06C1MA

454 AND 670 ENGINES — EXHAUST SIDE

1. Drive pins

### ▼ CAUTION

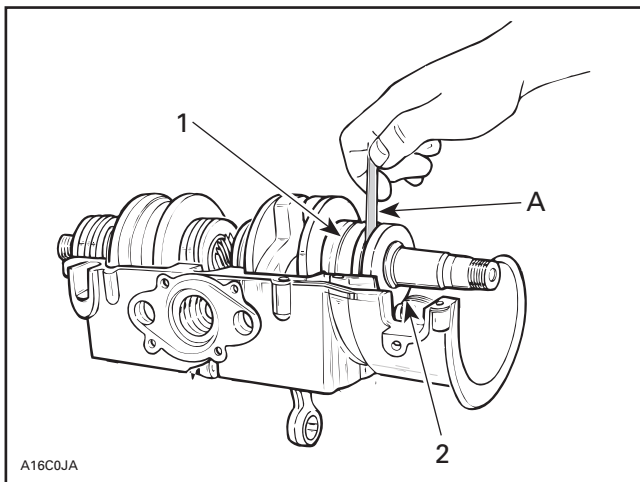
Make sure drive pins of bearings are on exhaust side of crankcase for proper seating in recesses.

### 3,7, Seal

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

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

When installing plain oil seals (seal without locating ring or without spacing legs), ensure to maintain a 1.0 mm (.040 in) gap. For seals with spacing legs, install them against the bearing.



A16C0JA

1. Bearing  
2. Oil seal  
A. 1 mm (.040 in)

### 1,8, Upper Crankcase and Lower Crankcase

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

Prior to joining of crankcase halves, spray some new injection oil (or equivalent) on all moving parts of the crankshaft. Spray Primer N (P/N 413 7081 00) on one of mating surfaces. Let it dry for 10 to 20 minutes.

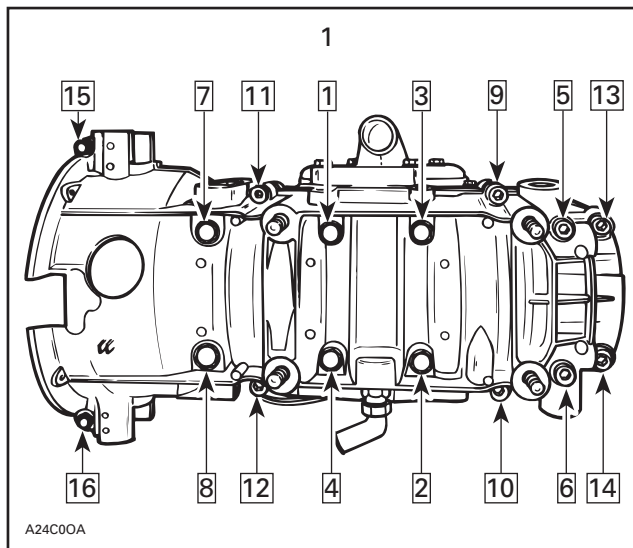
Apply paste gasket (P/N 413 7027 00) no. 5 on the other mating surface.

○ **NOTE:** Primer N allows Loctite 515 to fully cure on aluminum surfaces. It increases filling capacity and reduces curing time.

### ▼ CAUTION

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

Position the crankcase halves together and tighten screws by hand then install and tighten armature plate on magneto side to correctly align crankcase halves. Apply Loctite 242 on screw threads and under head. Torque screws as specified following illustrated sequence.



A24C00A

1. Follow sequence shown 1 to 14: Torque to 29 N•m (21 lbf•ft)  
15 and 16: Torque to 10 N•m (90 lbf•in)

○ **NOTE:** Torque the 2 smaller screws (15 and 16) on magneto side to 10 N•m (90 lbf•in).

Apply pipe sealant (P/N 413 7023 00) on threads prior to assembly angular tube **no. 11**.

At assembly on crankcase, apply medium strength threadlocker (P/N 413 7030 00) on stud threads **no. 12**.

Torque the crankcase/engine bracket nut **no. 13** to 38 N•m (28 lbf•ft).

To install magneto, refer to CDI MAGNETO 03-05.

# LEAK TEST AND ENGINE DIMENSION MEASUREMENT

## LEAK TEST

The following gives verification procedures for liquid cooled engines though it also applies to fan cooled engines. For FC engines, do not consider information pertaining to coolant system and crankcase rotary valve gear reservoir/components.

On twin-cylinder engines, each cylinder can not be verified individually due to leakage from one cylinder to the other through rotary valve (except on engines with separate intake manifolds). Besides, on FC engines, leak will occur through labyrinth sleeve in center of crankshaft.

## PREPARATION

1. Remove tuned pipe/muffler and exhaust manifold.
2. Install plug(s) over exhaust flange(s). Tighten with previously removed screws.
3. On engines with RAVE system, remove RAVE valves and install plugs over flanges. Tighten with previously removed screws.
4. Remove carburetor(s).
5. Insert plug(s) in intake rubber boot(s). Tighten with clamps already there.
6. Using a hose pincher(s) (P/N 529 0099 00), block impulse hose(s).

○ **NOTE:** Do not block large hoses of rotary valve gear lubrication system.

7. Install air pump on any valve of exhaust plug.

○ **NOTE:** If necessary, lubricate air pump piston with mild soap.

### ▼ CAUTION

Using hydrocarbon lubricant (such as engine oil) will damage rubber seal of pump piston.

8. Rotate crankshaft so that piston goes to B.D.C. (Bottom Dead Center) on side where the pump is installed. This will open exhaust port.
9. Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.

10. Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, check tester kit by spraying a soapy solution on pump piston, all plugs and fittings.

–If tester kit is leaking, bubbles will indicate where leak comes from.

–If tester kit is not leaking, check engine as per following procedure.

## PROCEDURE

○ **NOTE:** A flow chart has been prepared as a visual reference. See pages of this chapter.

Using flow chart and following text, pressurize area to be tested and spray soapy solution at the indicated location.

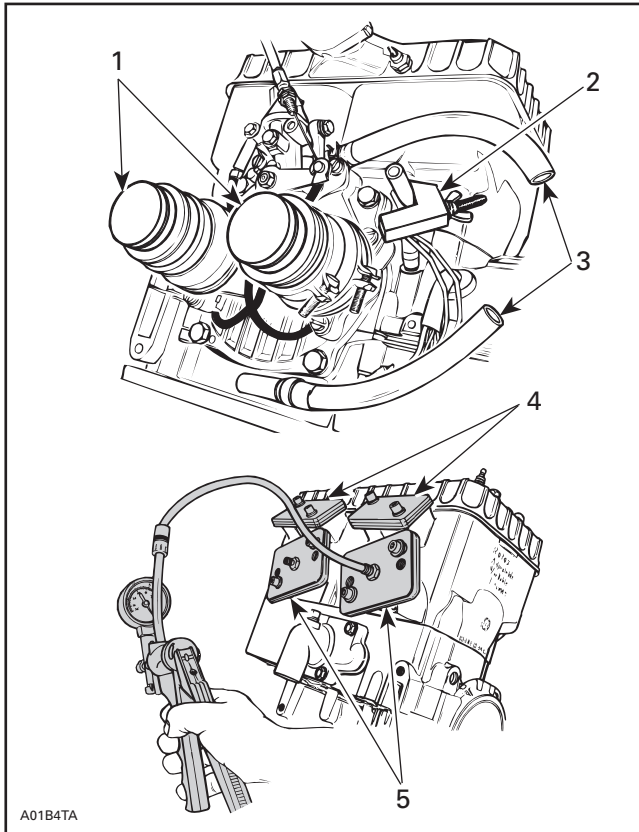
**TEST PRESSURE: 34kPa (5 PSI)  
for 3 minutes**

- If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.
- If there is no leak at the tested location, continue pumping to maintain pressure and continue with next items until leak is found.

## Section 03 ENGINE

### Sub-Section 04 (LEAK TEST AND ENGINE DIMENSION MEASUREMENT)

#### Engine



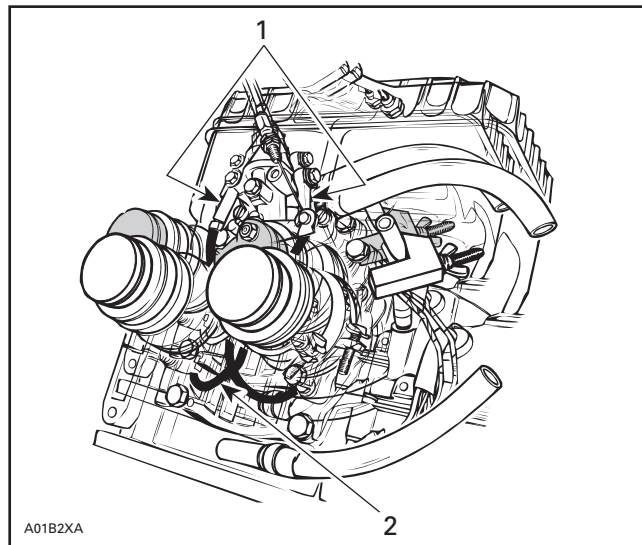
#### TYPICAL

1. Blocked intake flanges
2. Blocked impulse fitting
3. Open ends (if applicable)
4. Blocked RAVE valve flanges (if applicable)
5. Blocked exhaust flanges

When exhaust manifold is installed, use rubber plug. (In this case it is not necessary to move piston to B.D.C.).

Check the following:

1. All jointed surfaces and screw/stud threads of engine:
  - spark plug base, insulator
  - cylinder head
  - cylinder base
  - crankcase halves (joint)
  - rotary valve cover
  - oil injection pump mounting flange (O-ring, seal)
  - coolant pump housing
  - bleed screws/plugs
2. Small injection oil lines coming from pump.



1. Banjo fittings
2. Small injection oil lines

Check for air bubbles or oil column going toward pump. It indicates defective check valve in banjo fitting (or lines).

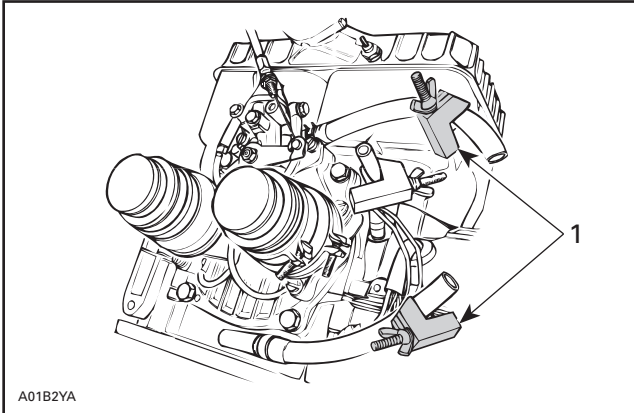
3. Remove cooling system cap.

Check for air bubbles in antifreeze. It indicates defective cylinder head O-ring or cylinder base gasket.



1. Rubber Plug

- Block both hoses of rotary valve gear lubrication system with hose pinchers.



1. Block both hoses

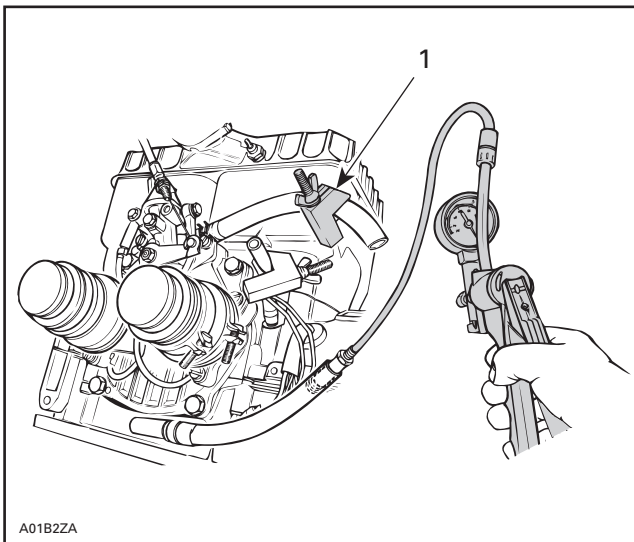
If leakage stops, ignore remaining items and check crankcase rotary valve gear reservoir as per **Crankcase Rotary Valve Gear Reservoir** of this section.

- Remove clutch then check crankshaft outer seal.
- Remove rewind starter and magneto system then check crankshaft outer seal.
- Check crankcase rotary valve gear reservoir.

**Crankcase Rotary Valve Gear Reservoir**

Block one hose of rotary valve gear lubrication system with a hose pincher and install an adapter in remaining hose.

Install air pump on adapter and pressurize as before.



1. Blocked hose

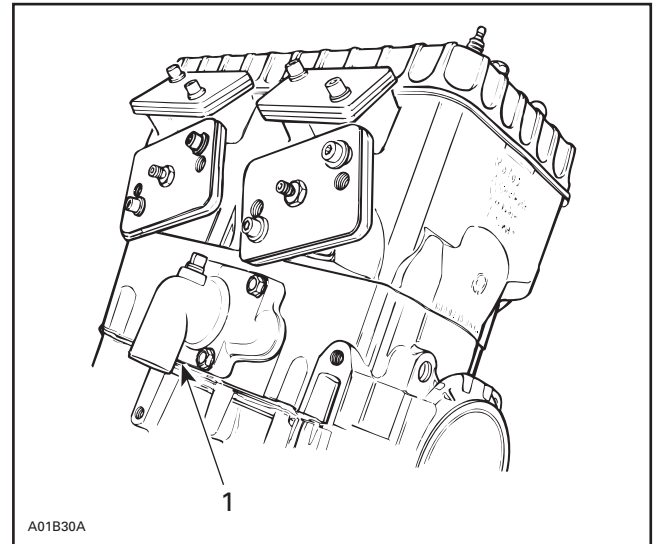
- Remove a spark plug or any plug of leak tester kit on PTO side.

If pressure drops, it indicates defective crankshaft inner seal on PTO side.

- Remove a spark plug or any plug of leak tester kit on MAG side.

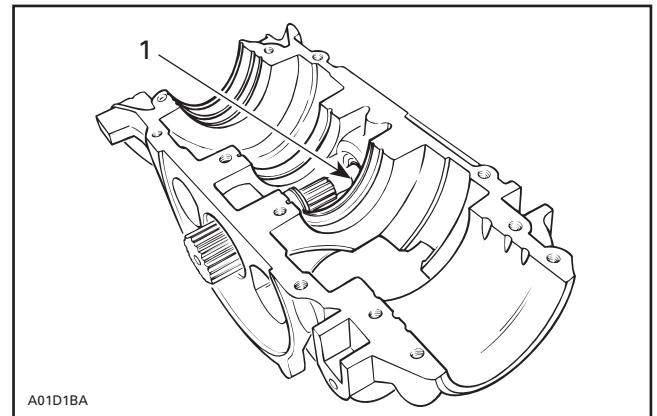
If pressure drops, it indicates defective crankshaft inner seal on MAG side.

- Check drain hole below coolant pump housing with soapy water.



1. Drain hole

If there is a leak, it indicates defective seal of rotary valve shaft (oil seal beside coolant seal).

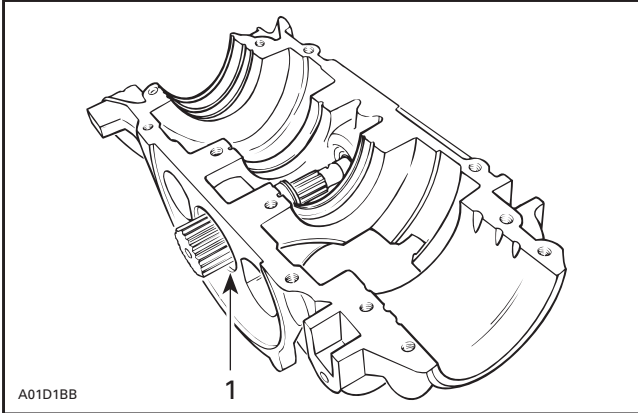


1. Oil seal

## Section 03 ENGINE

### Sub-Section 04 (LEAK TEST AND ENGINE DIMENSION MEASUREMENT)

4. Remove rotary valve cover and check for leak of rotary valve seal with soapy water.



1. Seal

5. If leak still persists, it indicates a defective casting somewhere in engine.

Disassemble engine and carefully check for defects in castings. Pay attention to tapped holes which may go through engine sealed area and thus leading to leakage.

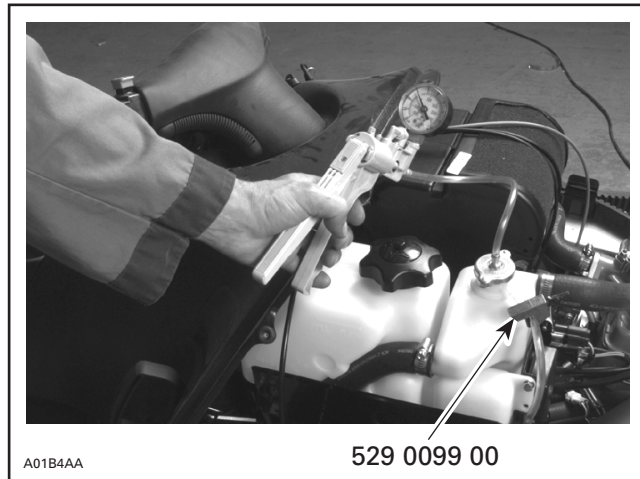
## FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

## COOLING SYSTEM LEAK TEST

Install special plug (radiator cap) (P/N 529 0214 00) and hose pincher (P/N 529 0099 00) on overflow hose. Pressurize all system through coolant reservoir to 15 PSI.

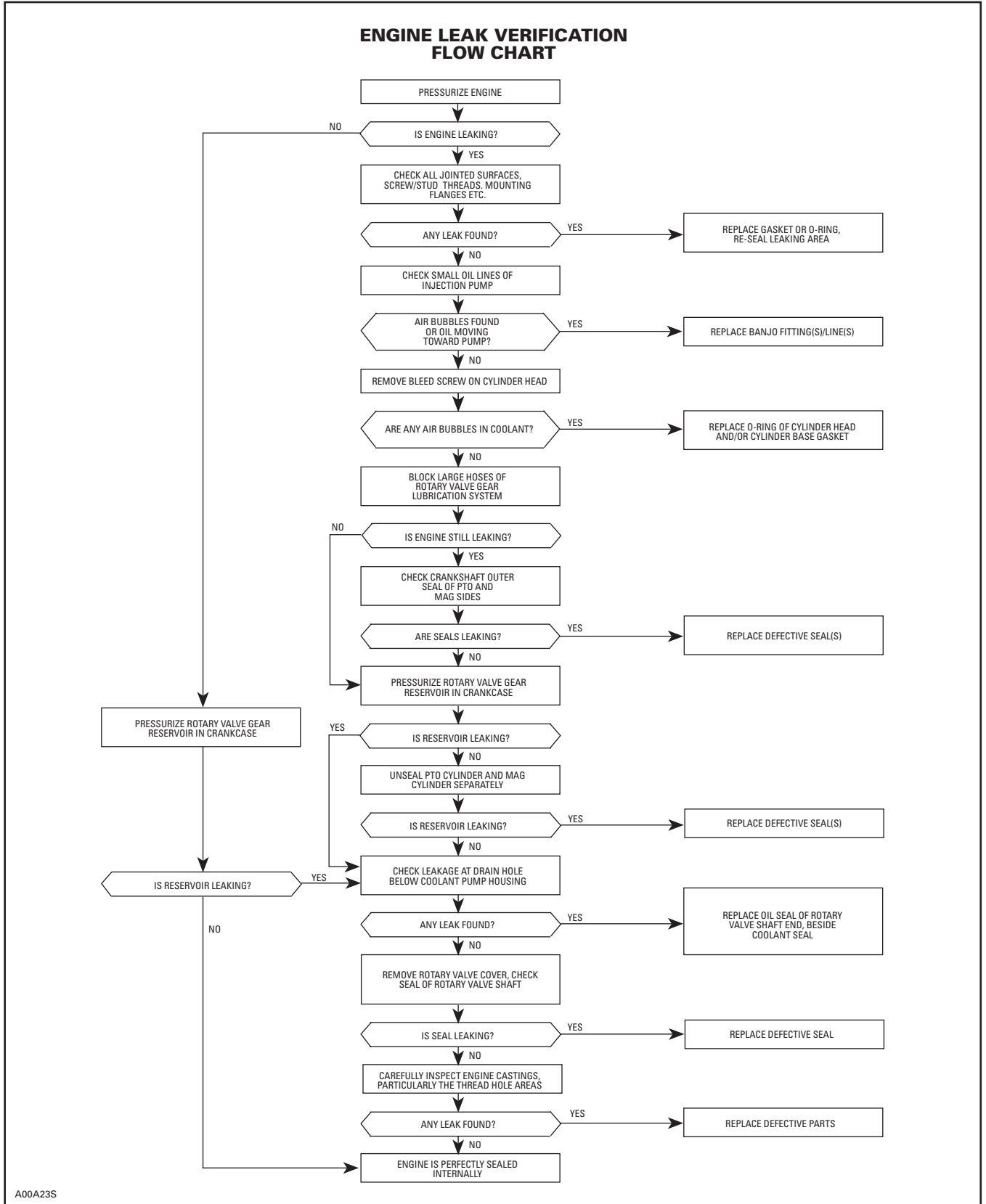
Check all hoses and cylinder/base for coolant leaks. Spray a soap/water solution and look for presence of air bubbles.



TYPICAL



**ENGINE LEAK VERIFICATION FLOW CHART**



## Section 03 ENGINE

### Sub-Section 04 (LEAK TEST AND ENGINE DIMENSION MEASUREMENT)

## ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

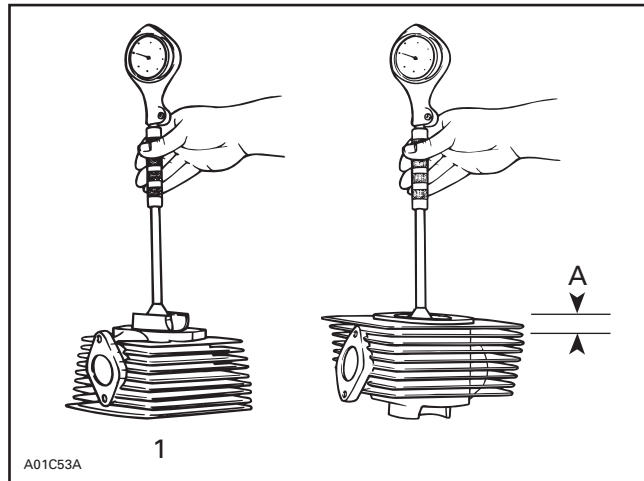
### CYLINDER TAPER

ENGINE TYPE	MAXIMUM
All	0.08 mm (.003 in)

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

On rotary valve engines, measure just below auxiliary transfer port, facing exhaust port. If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced.

**NOTE:** Be sure to restore the chamfer around all cylinder sleeve port openings.



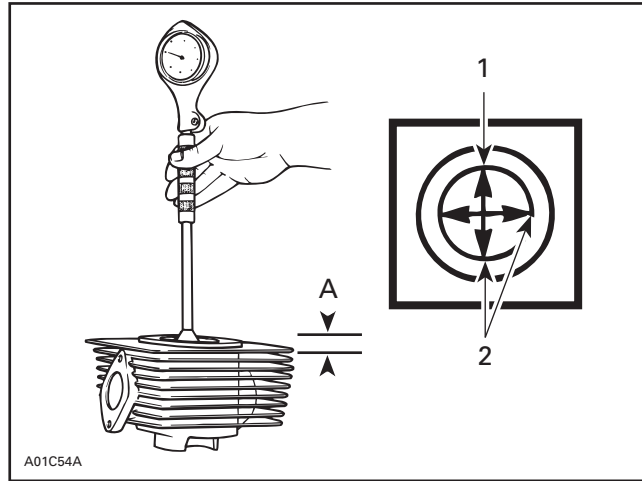
1. Below the intake port  
A. 16 mm (5/8 in) from top

### CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in)

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

**NOTE:** Be sure to restore the chamfer around all cylinder sleeve port openings.



1. Piston pin position  
2. Measures to be compared  
A. 16 mm (5/8 in)

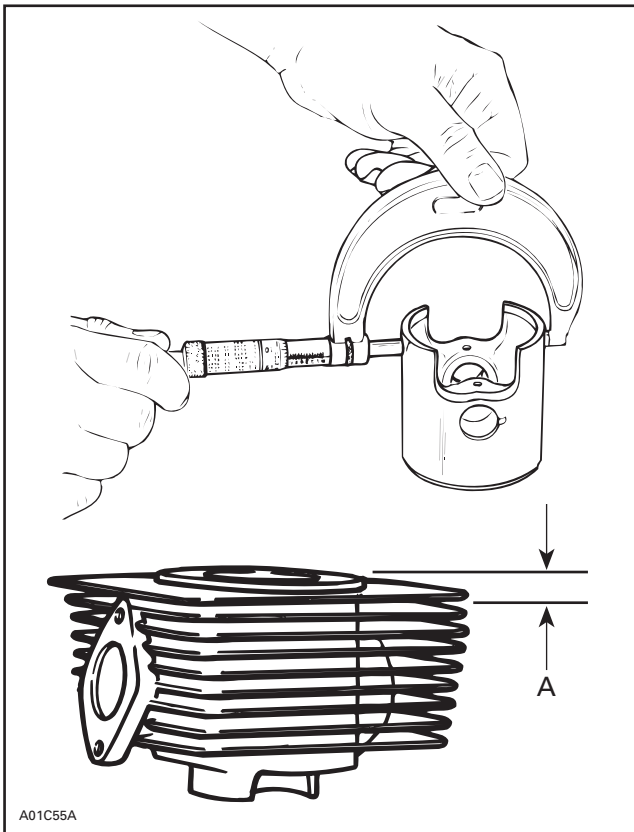
### CYLINDER/PISTON CLEARANCE

#### Measurement (used parts)

Check cylinder taper and out-of-round as described above before proceeding with piston/cylinder clearance.

To accurately determine piston to cylinder clearance, the piston should be measured under the axis hole and 90° to piston pin axis. Find the biggest diameter.

The cylinder should be measured 16 mm (5/8 in) below its top edge. Find the smallest diameter.



A. 16 mm (5/8 in)

The difference between these 2 measurements should be within specified tolerance. Refer to TECHNICAL DATA 09-02.

**Measurement (fitting new parts)**

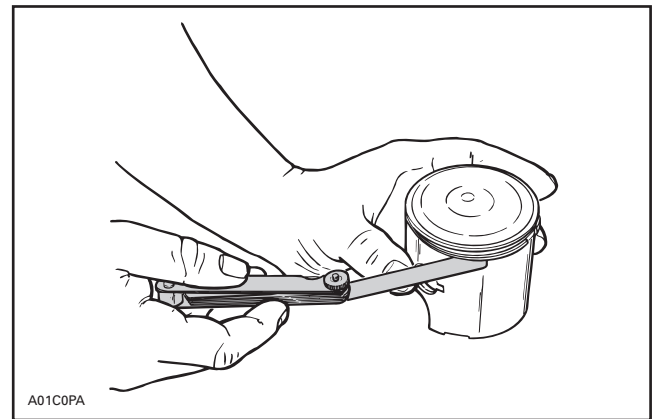
With an inside micrometer, measure cylinder diameter above the exhaust port.

With a micrometer, measure the piston diameter perpendicularly (90°) to piston axis and 3 mm (1/8 in) above bottom edge.

The difference of both measurements is the clearance.

**RING/PISTON GROOVE CLEARANCE**

Using a feeler gauge check clearance between rectangular ring and groove. Replace piston. If clearance exceeds specified tolerance. Refer to TECHNICAL DATA 09-02.

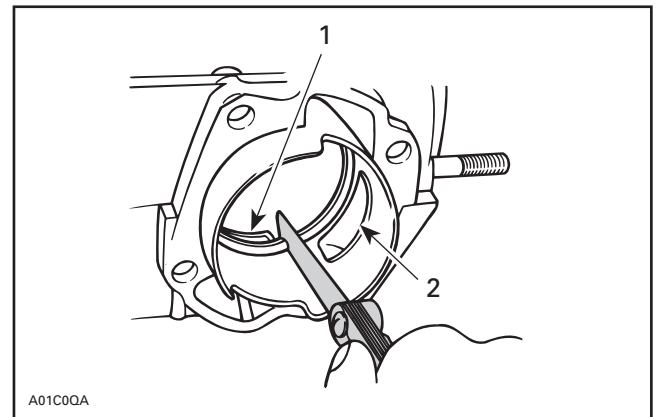


**RING END GAP**

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. Replace ring. If gap exceeds specified tolerance, refer to TECHNICAL DATA 09-02.



1. Transfer port  
2. Intake port

**CRANKSHAFT DEFLECTION**

Crankshaft deflection is measured with a dial indicator.

**Measuring (in engine)**

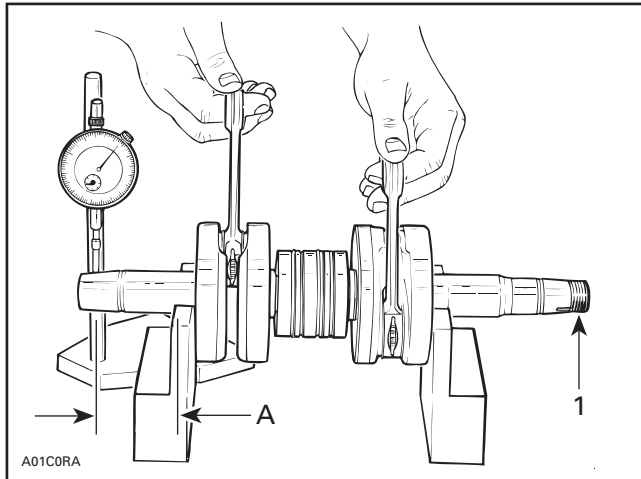
First, check deflection with crankshaft in engine. If deflection exceeds the specified tolerance, re-check deflection using V-shaped blocks to determine the defective part(s). See below.

## Section 03 ENGINE

### Sub-Section 04 (LEAK TEST AND ENGINE DIMENSION MEASUREMENT)

#### Measuring (on bench)

Once engine is disassembled, check crankshaft deflection on V-shaped blocks. If deflection exceeds the specified tolerance, it can be worn bearings or a bent crankshaft. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s). See measurement A in following illustration.



TYPICAL

1. Measure at mid point between the key and the first thread
- A. See table below

#### Crankshaft Deflection on PTO Side

ENGINE TYPE	DISTANCE A mm (in)	MAXIMUM ON PTO SIDE mm (in)
443	75.5 (2.972)	0.05 (.002)
454, 494 and 583	86 (3.386)	0.06 (.002)
503	82.5 (3.248)	
670	100 (3.937)	

#### Crankshaft Deflection on MAG Side

ENGINE TYPE	MAXIMUM ON MAG SIDE mm (in)
All	0.03 (.001)

#### Crankshaft Deflection in Center of Crankshaft

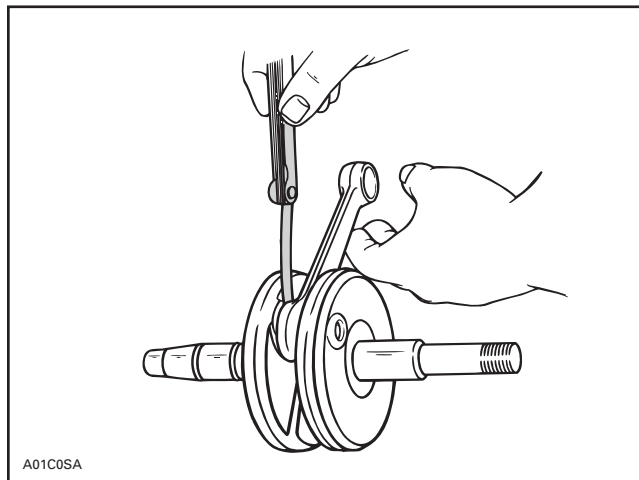
ENGINE TYPE	MAXIMUM IN CENTER OF CRANKSHAFT
All	0.08 mm (.0031 in)

**NOTE:** Crankshaft deflection can not be correctly measured between centers of a lathe. If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

#### CONNECTING ROD BIG END AXIAL PLAY

ENGINE TYPE	NEW PARTS MIN. – MAX.	WEAR LIMIT
443 and 503	0.20 – 0.53 mm (.008 – .021 in)	1.00 mm (.039 in)
454, 494, 583 and 670	0.40 – 0.75 mm (.016 – .029 in)	1.20 mm (.047 in)

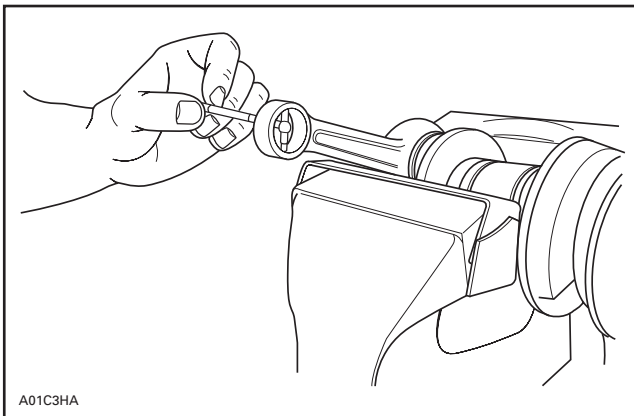
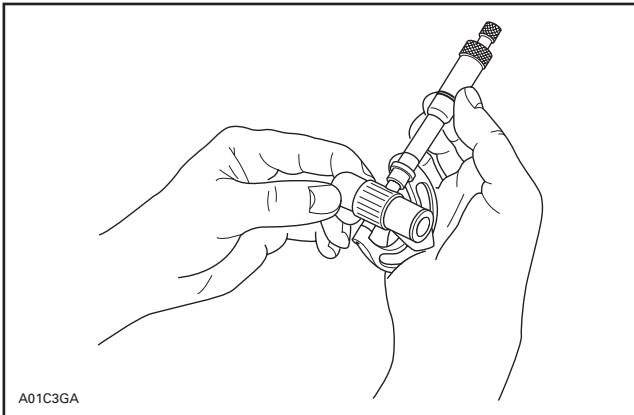
Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.



TYPICAL

#### CONNECTING ROD/PISTON PIN CLEARANCE

Measure piston pin with its needle bearing. Compare to inside diameter of connecting rod.



ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
All	0.03-0.012 mm (.0001-.0005 in)	0.015 mm (.0006 in)

**CONNECTING ROD/CRANKPIN CLEARANCE**

ENGINE TYPE	NEW PARTS MIN. - MAX.	WEAR LIMIT
443 and 503	0.020 – 0.033 mm (.0008 – .0013 in)	0.05 mm (.0020 in)
454, 494, 583 and 670	0.038 – 0.050 mm (.0015 – .0020 in)	0.06 mm (.0024 in)

**CRANKSHAFT END-PLAY**

**443, 454, 494, 503 and 670 Engine Types**

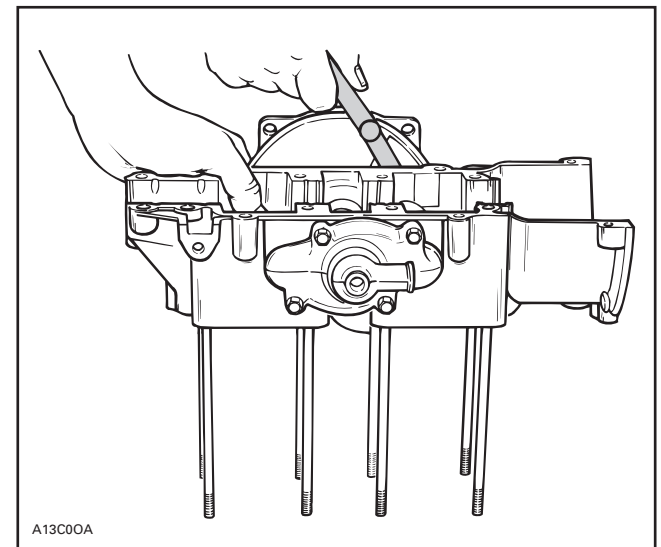
End-play is not adjustable but it should be between 0.10 – 0.30 mm (.004 – .012 in).

**CRANKCASE/ROTARY VALVE GAP**

ENGINE TYPE	MINIMUM	MAXIMUM
Liquid cooled engines	0.27 mm (0.011 in)	0.40 mm (0.016 in)

**First Method**

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



*TYPICAL*

The gap can be measured with the engine installed on vehicle. Use 45° bent blade feeler gauge (Snap-On FB300A) inserted through intake socket of valve cover.

If gap is under tolerances, rotary valve cover can be refaced to increase clearance.

If gap is over tolerances, cover replacement may be necessary. Check if surfaces on crankcase halves are damaged, replacement wear plate is available.

**Second Method**

Remove rotary valve cover and its O-ring.

Use the following type of solder:

- rosin core
- diameter: 0.5 mm (0.020 in)
- electronic application (available at electronic stores)

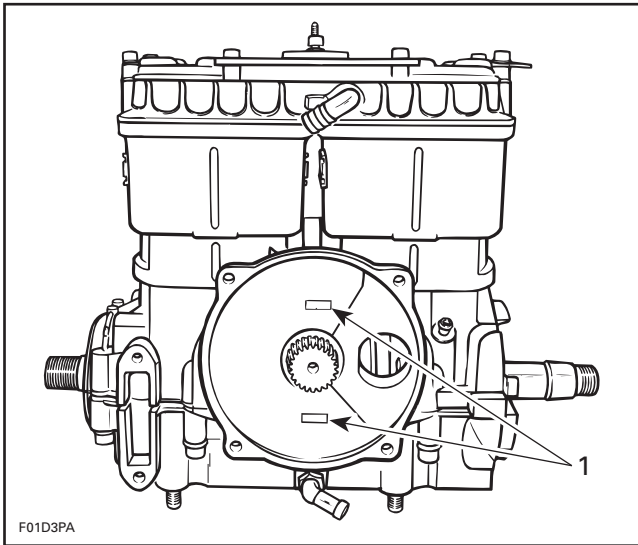
## Section 03 ENGINE

### Sub-Section 04 (LEAK TEST AND ENGINE DIMENSION MEASUREMENT)

Install 2 short pieces (13 mm (1/2 in) long) of solder directly on rotary valve, one above and one below rotary valve gear. Apply grease to hold solder in position.

Reinstall cover in place WITHOUT its O-ring and torque screws to 20 N•m (15 lbf•ft).

Remove cover then clean and measure compressed solder thickness, it must be within the specified tolerance.



TYPICAL

1. Solder

## CHECKING SURFACE FLATNESS

Intake manifold, intake manifold cover, rotary valve cover can be checked for perfectly mating surfaces.

Lay part on a surface plate (marble, mirror or thick glass plate).

Holding down one end of part, try pushing down the other end.

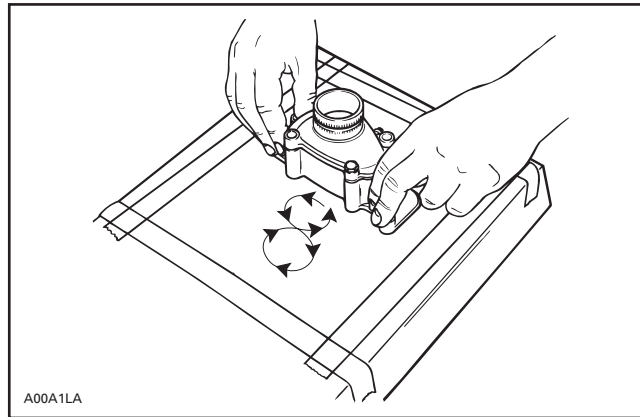
If any play is felt, part must be rectified.

## RECTIFYING SURFACES

Stick a fine sand paper sheet on the surface plate then lightly oil the sand paper.

Rub manifold mating surface on sand paper using 8-figure movements.

Sand until mating surface is perfectly straight.



## CHECKING CRANKSHAFT ALIGNMENT

Install a degree wheel (P/N 414 3529 00) on crankshaft end.

Remove both spark plugs.

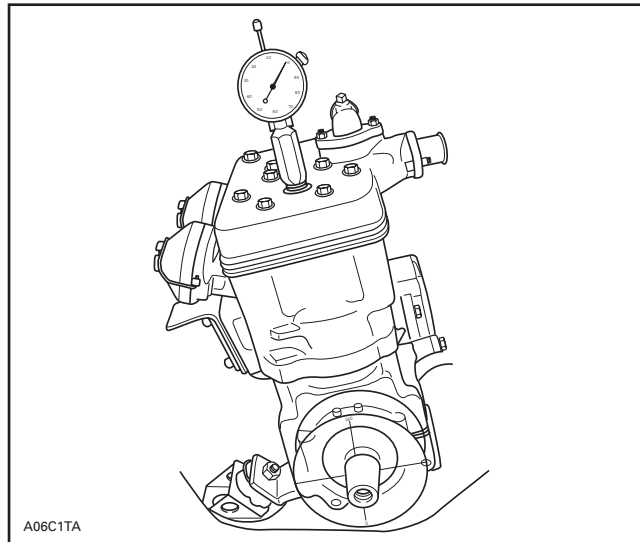
Install a TDC gauge (P/N 414 1047 00) in spark plug hole on MAG side.

Bring MAG piston at top dead center.

Rotate degree wheel (not crankshaft) so that 360° mark aligns with center of crankcase. Scribe a mark on crankcase.

Remove TDC gauge and install it on PTO side.

Bring PTO piston to top dead center.



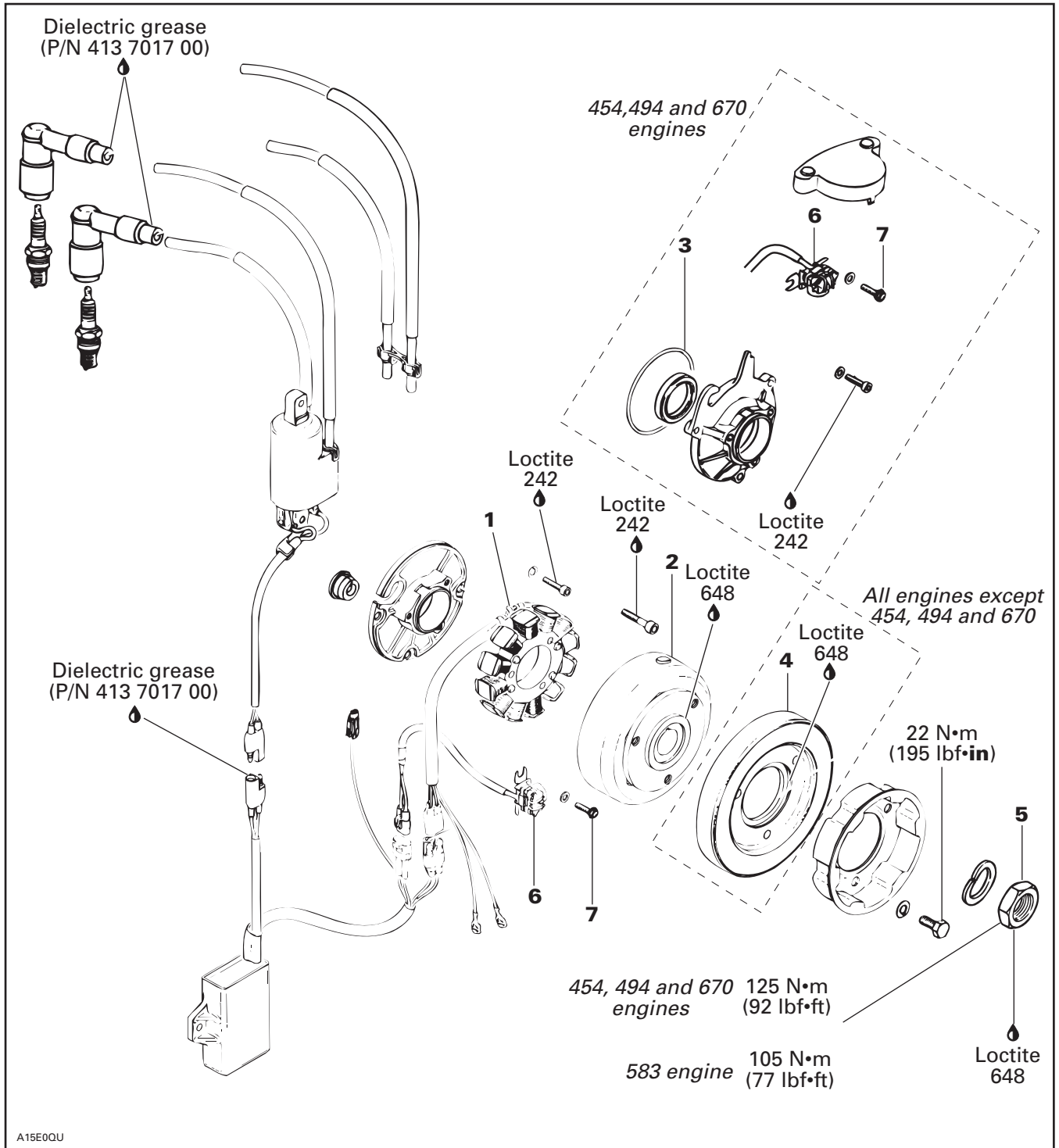
Interval between cylinders must be exactly 180°.

Any other reading indicates a misaligned (twisted) crankshaft.

# CDI SYSTEM

## NIPPONDENSO TRIGGER COIL IGNITION SYSTEM

454, 494, 583, and 670 Engines



## Section 03 ENGINE

### Sub-Section 05 (CDI SYSTEM)

○ **NOTE:** The following procedures can be done without removing the engine from chassis. To facilitate magneto removal, hold drive pulley with tool (P/N 529 0276 00).

CDI means Capacitor Discharge System.

## CLEANING

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



### CAUTION

Clean stator and magneto using only a clean cloth.

## DISASSEMBLY

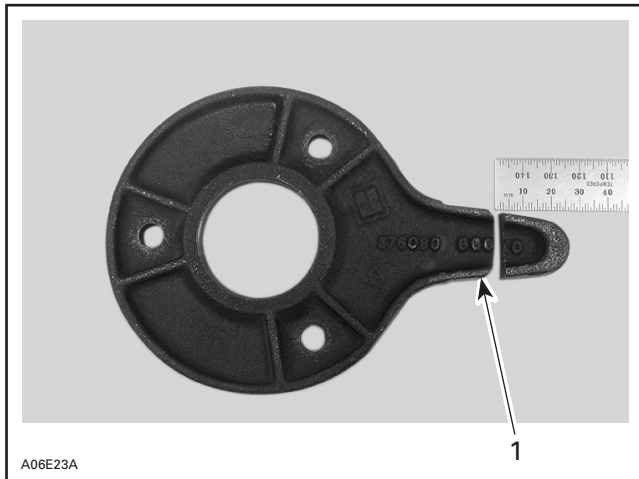
### 2,5, Magneto and Magneto Flywheel Nut

To gain access to magneto assembly, remove the following parts as needed on different engines:

- muffler
- rewind starter
- starting pulley

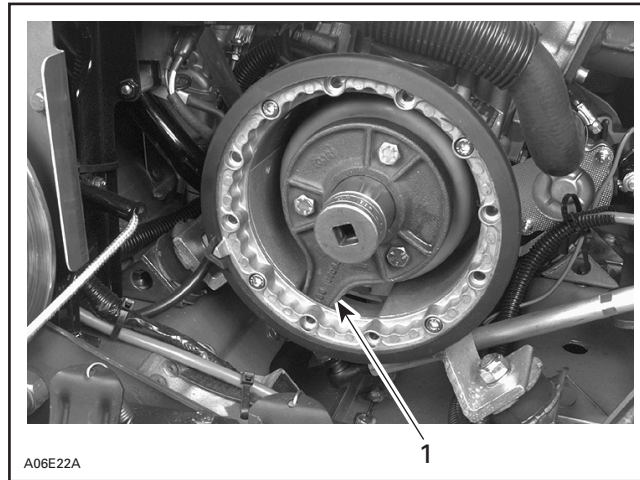
To remove magneto flywheel retaining nut:

Use magneto puller ring (P/N 420 8760 80) modified as shown.



1. Cut by 25 mm (1 in)

Install puller with its tab in magneto housing opening.



### TYPICAL

1. Tab in magneto housing opening

- Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

○ **NOTE:** To correctly remove a threadlocked fastener it is first necessary to tap on the fastener to break threadlocker bond. This will eliminate the possibility of thread breakage.

To remove magneto flywheel, install the puller (P/N 529 0225 00).

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

### 4, Hydro Damper Ass'y

Check for oil leaks and for noisy ring inside. Replaced it in both cases.

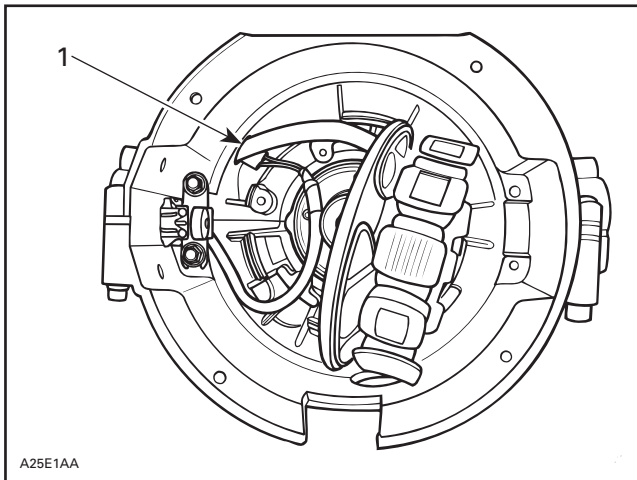
### 6,7, Trigger Coil and Screw

Magneto and stator plate must be removed before trigger coil removal.

To replace trigger coil:

- Disconnect trigger coil connector housing.
- Remove grommet from crankcase where trigger coil wire exits magneto housing.
- Remove retaining screws.
- Remove trigger coil and carefully pull wires.
- Thread magneto harness through crankcase hole before trigger coil harness.





1. Magneto harness through crankcase hole

- Install new trigger coil and other parts removed.

### Adjustment

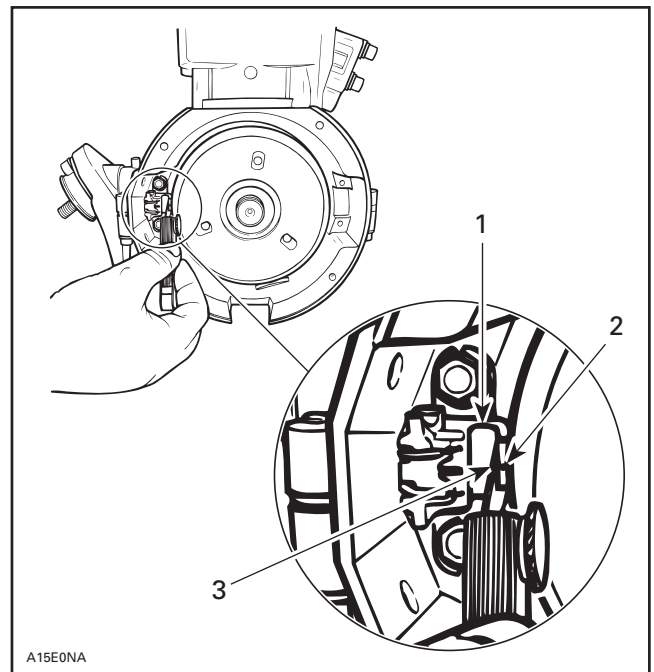
Whenever the trigger coil or the magneto flywheel is removed or replaced, the air-gap between the trigger coil and the flywheel protrusion must be checked and adjusted. The purpose of this adjustment is to obtain the minimum clearance between these parts — without touching at any RPM — so that the trigger coil produces its proper electrical output. Ignition timing must also be checked. Refer to IGNITION TIMING 05-03 then look for **Checking Ignition Timing**.

## ▼ CAUTION

Each time trigger coil air-gap is adjusted, ignition timing must be checked.

### Proceed as follows:

1. Rotate flywheel so that the protrusion aligns with trigger coil.
2. Using a feeler gauge of 0.75 mm (.030 in) min. 0.55 mm (.022 in) and max. 1.45 mm (.057 in) thick, check air-gap between center pole of trigger coil and flywheel protrusion.
3. If necessary, adjust by slackening retaining screws and moving trigger coil toward or away of protrusion.
4. Retighten screws and recheck air-gap.



### ADJUSTING TRIGGER COIL AIR-GAP

1. Trigger coil
2. Flywheel protrusion
3. Measure at center pole of trigger coil 0.75 mm (.030 in)

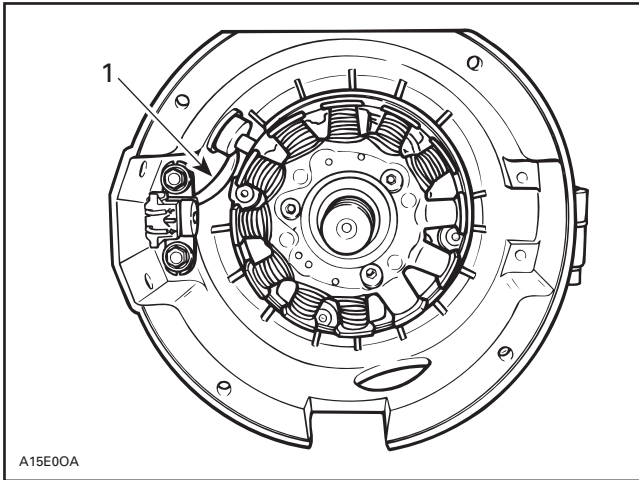
## 1, Stator

To replace stator:

- Disconnect the 3-wire connector (BLACK, RED and BLACK/RED wires).
- Disconnect both YELLOW wires.
- Remove grommet from crankcase where magneto harness exits magneto housing.
- Remove stator plate retaining screws.
- Remove stator plate with stator and carefully pull wires.
- Install new parts and other parts removed taking care not to squeeze trigger coil harness.

## Section 03 ENGINE

### Sub-Section 05 (CDI SYSTEM)

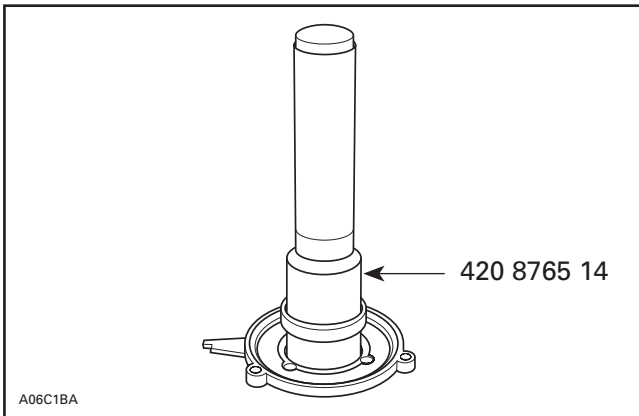


1. Trigger coil harness

## ASSEMBLY

### 3, Oil Seal

Use pusher (P/N 420 8765 14) to install oil seal into stator.



### 2,5, Magneto Flywheel and Nut

Clean crankshaft extension (taper) and apply Loctite 242 (blue) on taper, then position Woodruff key, flywheel and lock washer on crankshaft.

Clean nut threads and apply Loctite 242 (blue) then tighten nut 125 N•m (92 lbf•ft) for 454, 494 and 670 engines. Tighten nut to 105 N•m (77 lbf•ft) for 583 engine.

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



## CAUTION

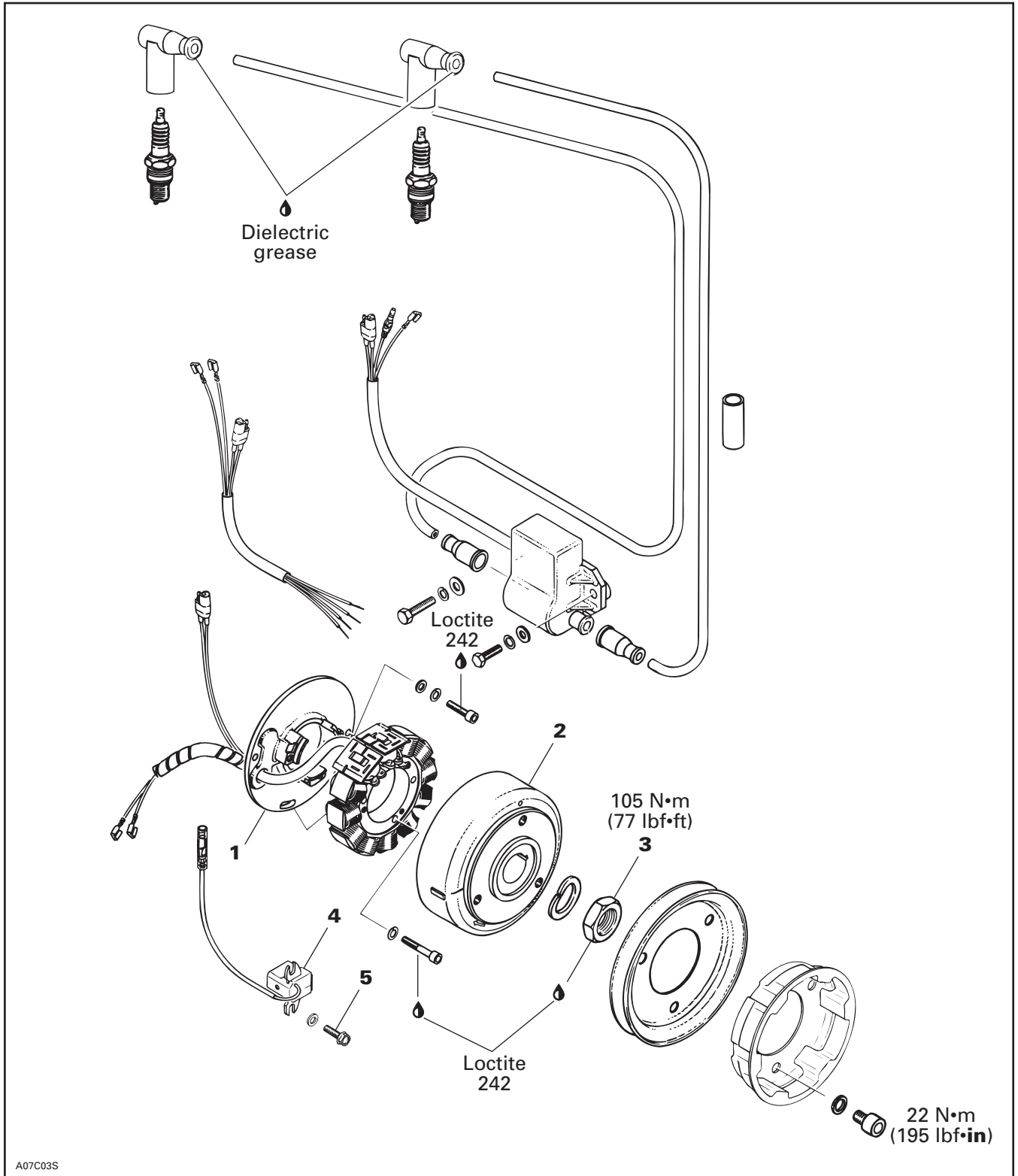
Do not use silicone "sealant", this product will corrode contacts.

### Ignition Timing

Check as described in IGNITION TIMING 05-03.

# DUCATI IGNITION SYSTEM

443 and 503 Engines



A07C03S

## Section 03 ENGINE

### Sub-Section 05 (CDI SYSTEM)

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

## CLEANING

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

### ▼ CAUTION

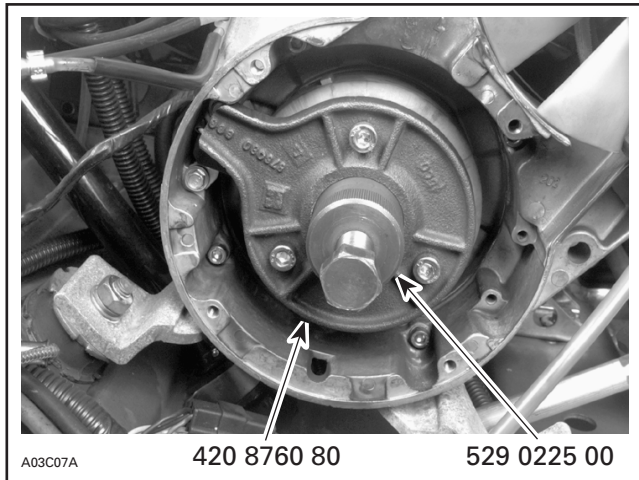
Clean armature and magneto using only a clean cloth.

## DISASSEMBLY

To gain access to magneto assembly, remove the following parts as needed on different engines:

- tuned pipe and muffler
- oil injection pump mounting plate from rewind starter
- rewind starter
- starting and V-belt pulleys

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



To remove magneto flywheel retaining nut **no. 3**, install puller ring (P/N 420 8760 80) and M8 x 20 screws.

- Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

○ **NOTE:** To correctly remove a threadlocked fastener it is first necessary to tap on the fastener to break threadlocker bond. This will eliminate the possibility of thread breakage.

To remove magneto flywheel **no. 2**, install the magneto puller (P/N 529 0225 00).

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

## REPAIR

To replace generator coil **no. 1**:

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

To replace trigger coil **no. 4**:

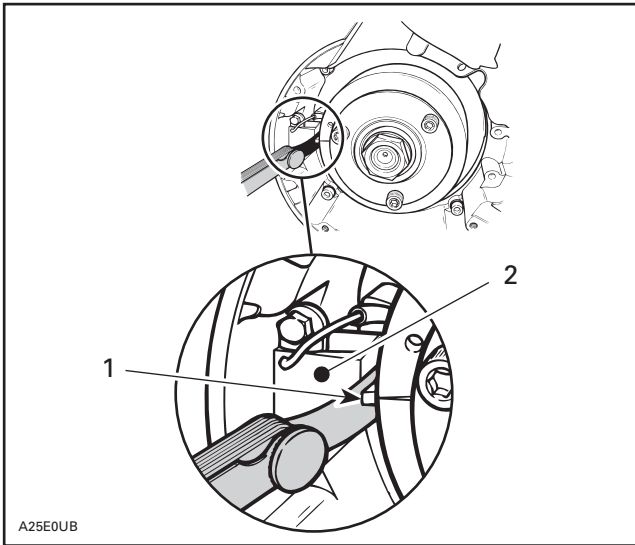
- Disconnect trigger coil wire (RED).
- Remove grommet from crankcase where trigger coil wire exits magneto housing.
- Remove retaining screws **no. 9**.
- Remove trigger coil and carefully pull wire.
- Install new trigger coil and other parts removed.

## Adjustment

Whenever the trigger coil or the magneto flywheel is removed or replaced, the air-gap between the trigger coil and the flywheel protrusion must be checked and adjusted. The purpose of this adjustment is to obtain the minimum clearance between these parts — without touching at any RPM — so that the trigger coil produces its proper electrical output. Ignition timing must also be checked.

### Proceed as follows:

1. Rotate flywheel so that one protrusion aligns with trigger coil.
2. Using a feeler gauge of 0.45 mm (.018 in) to 0.55 mm (.022 in) thick, check air-gap between center pole of trigger coil and flywheel protrusion.
3. If necessary, adjust by slackening retaining screws and moving trigger coil toward or away of protrusion.
4. Retighten screws and recheck air-gap.



**ADJUSTING TRIGGER COIL AIR-GAP**

1. Flywheel protrusion
2. Trigger coil

To replace armature:

- Disconnect the 2-wire connector (GREEN and WHITE wires).
- Disconnect YELLOW/BLACK and YELLOW wires.
- Remove grommet from crankcase where magneto harness exits magneto housing.
- Remove armature plate retaining screws.
- Remove armature plate with armature and carefully pull wires.
- Install new parts and other parts removed.

## ASSEMBLY

Clean crankshaft extension (taper).

Apply Loctite 242 (blue) on taper.

Position Woodruff key, flywheel and lock washer on crankshaft.

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

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



## CAUTION

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

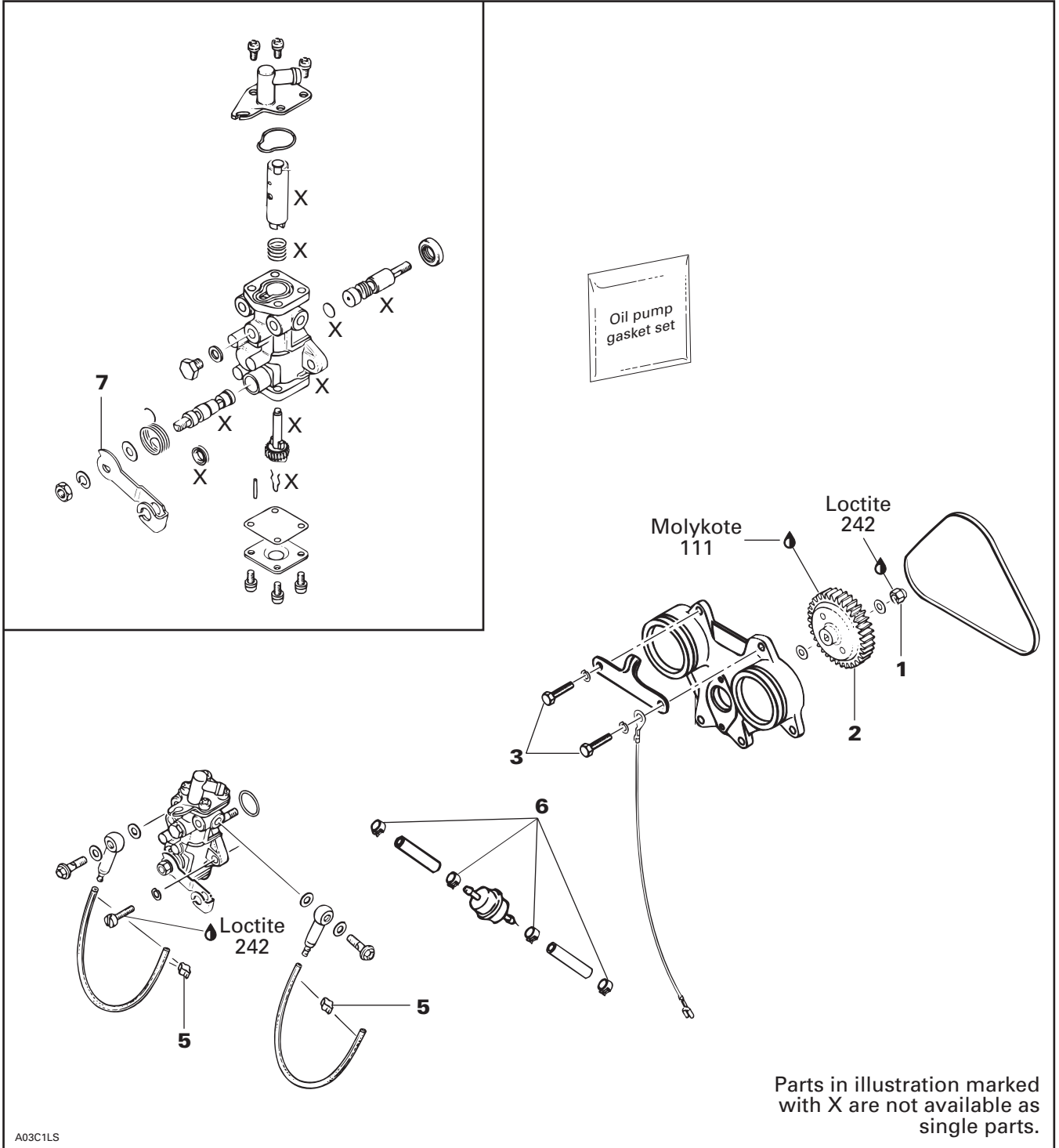
## Ignition Timing

Check as described in IGNITION TIMING 05-03.

# OIL INJECTION SYSTEM

## OIL INJECTION PUMP

454, 494, 583 and 670 Engines

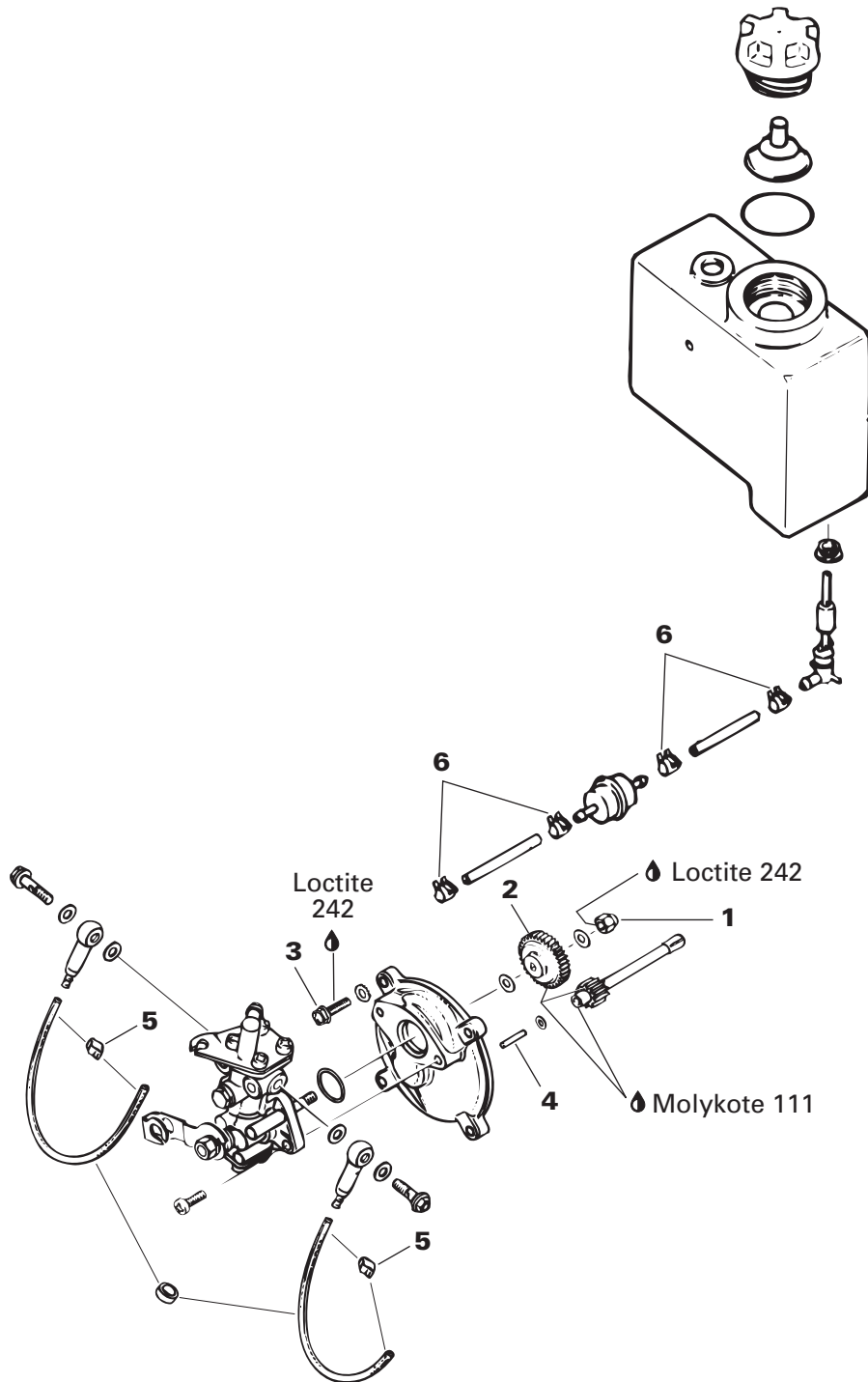


A03C1LS

## Section 03 ENGINE

### Sub-Section 06 (OIL INJECTION SYSTEM)

#### 443 and 503 Engines



A22C0DS

## OIL PUMP IDENTIFICATION

Different engines use different pumps. See identification on lever no. 7.

<b>▼ CAUTION</b>
Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
443 MX Z	E4
454	N4
494 Skandic WT LC	N4
494 Formula	N4
503 Skandic WT/SWT	E4
583 GT	N6
583 MX Z	N6
583 Summit	N2
670 MX Z	N6
670 Summit	N6

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

## CLEANING

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

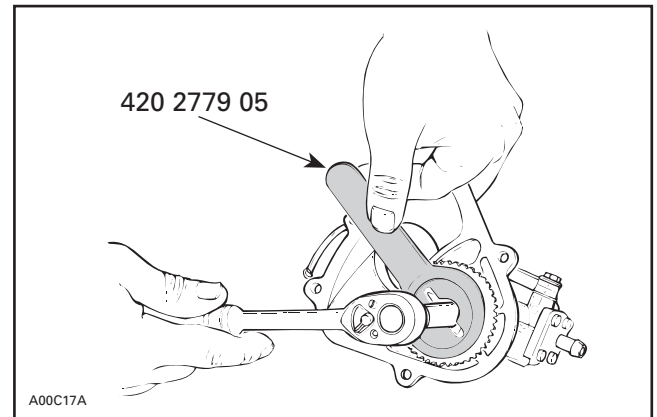
## DISASSEMBLY

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

### 1,2, Gear Retaining Nut and Oil Pump Gear

To remove gear retaining nut, first extract the needle roller with pliers then lock gear in place using one of the following gear holde:

ENGINE TYPE	TOOL P/N
443/454/494/503/583/670	420 2779 05



TYPICAL

## ASSEMBLY

### 2, Oil Pump Gear

At gear assembly, apply a light coat of Molykote 111 (P/N 413 7070 00) on gear teeth.

### 4, Needle Roller (fan cooled engine only)

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

### 5,6, Spring Clip and Clamp

Always check for spring clips and clamps tightness.

### 3, Screw

Torque to 9 N•m (80 lbf•in).

Make sure cable barrel is well seated in oil pump lever.

Secure barrel with plastic washer and circlip.

Verify cable and oil pump lever operation.

## ADJUSTMENT

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

### Synchronizing Pump with Carburetor:

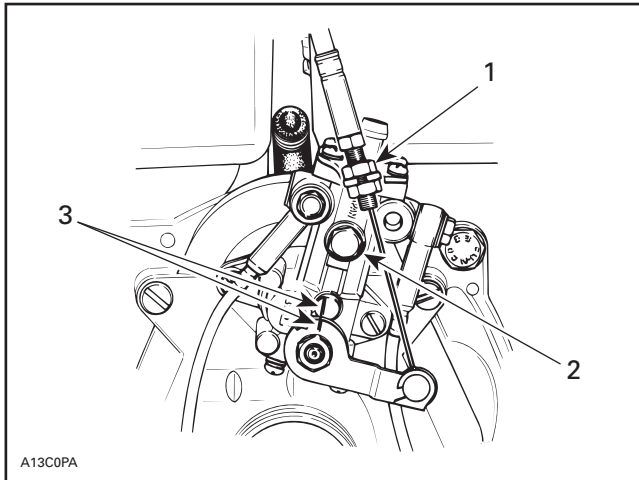
Eliminate the throttle cable free-play by pressing the throttle lever until a light resistance is felt, then hold in place. The aligning marks on the pump casting and on the lever must align. If not, loosen the adjuster nut and adjust accordingly.

Retighten the adjuster nut.



## Section 03 ENGINE

### Sub-Section 06 (OIL INJECTION SYSTEM)



1. Adjuster nut
2. Bleeder screw
3. Marks in line

#### ▼ 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

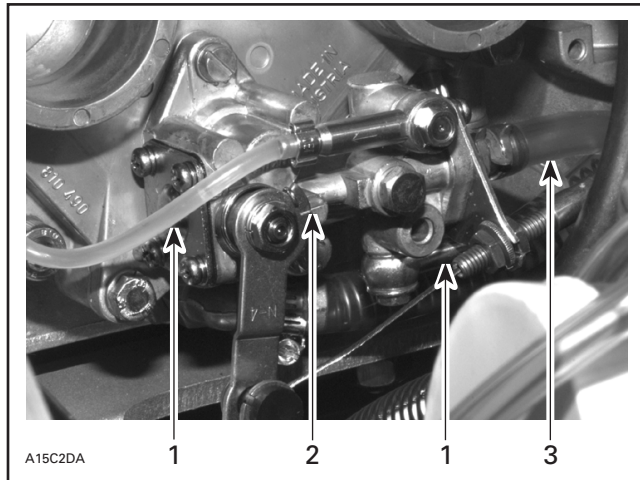
#### **S-Series Only**

Remove air silencer and move carburetors aside.

#### **All Models**

Bleed main oil line (between tank and pump) by loosening the bleeder screw until air has escaped from the line. Add injection oil as required.

Check also for proper pump lever adjustment. Marks must be aligned when throttle lever is activated just enough to take all cable play.

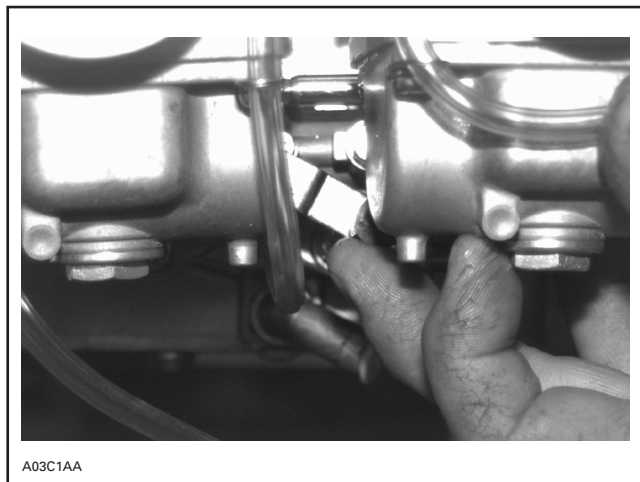


1. Small oil line
2. Marks aligned
3. Main oil line

Reinstall all parts except air silencer.

Bleed the small oil line between pump and intake manifold by running engine at idle while holding the pump lever in fully open position.

○ **NOTE:** If the air silencer has been reinstalled, make a J hook out of mechanical wire to lift the lever.



TYPICAL — ENGINE AT IDLE

#### **S-Series Only**

Reinstall air silencer.

#### ◆ WARNING

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

## CHECKING OPERATION

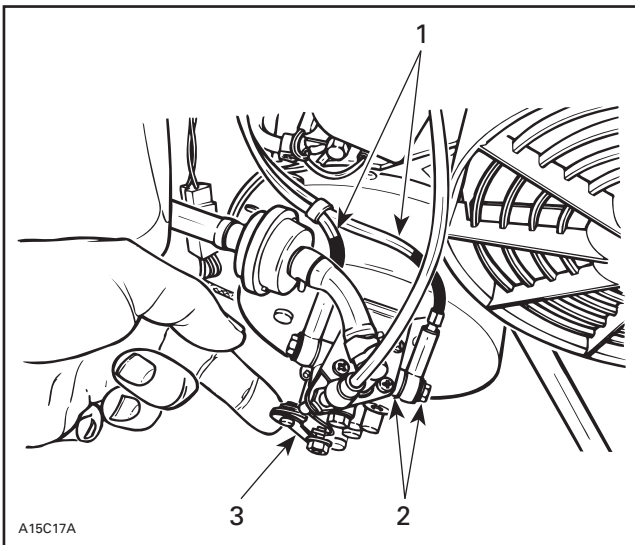
### On Vehicle

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

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

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

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



**TYPICAL — ENGINE AT IDLE**

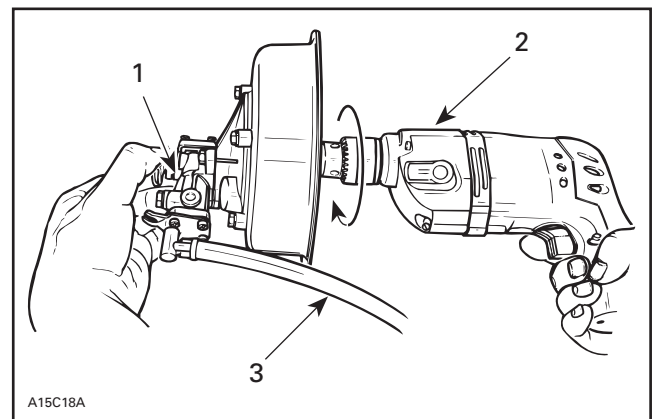
1. Oil columns advancing
2. Washer on each side
3. Fully open position

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

**○ NOTE:** Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in banjo fittings. For 599 engine check valve is integrated in injection nozzle. For 779 check valve is in oil line. Replace as necessary.

### Oil Pump Test Bench

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

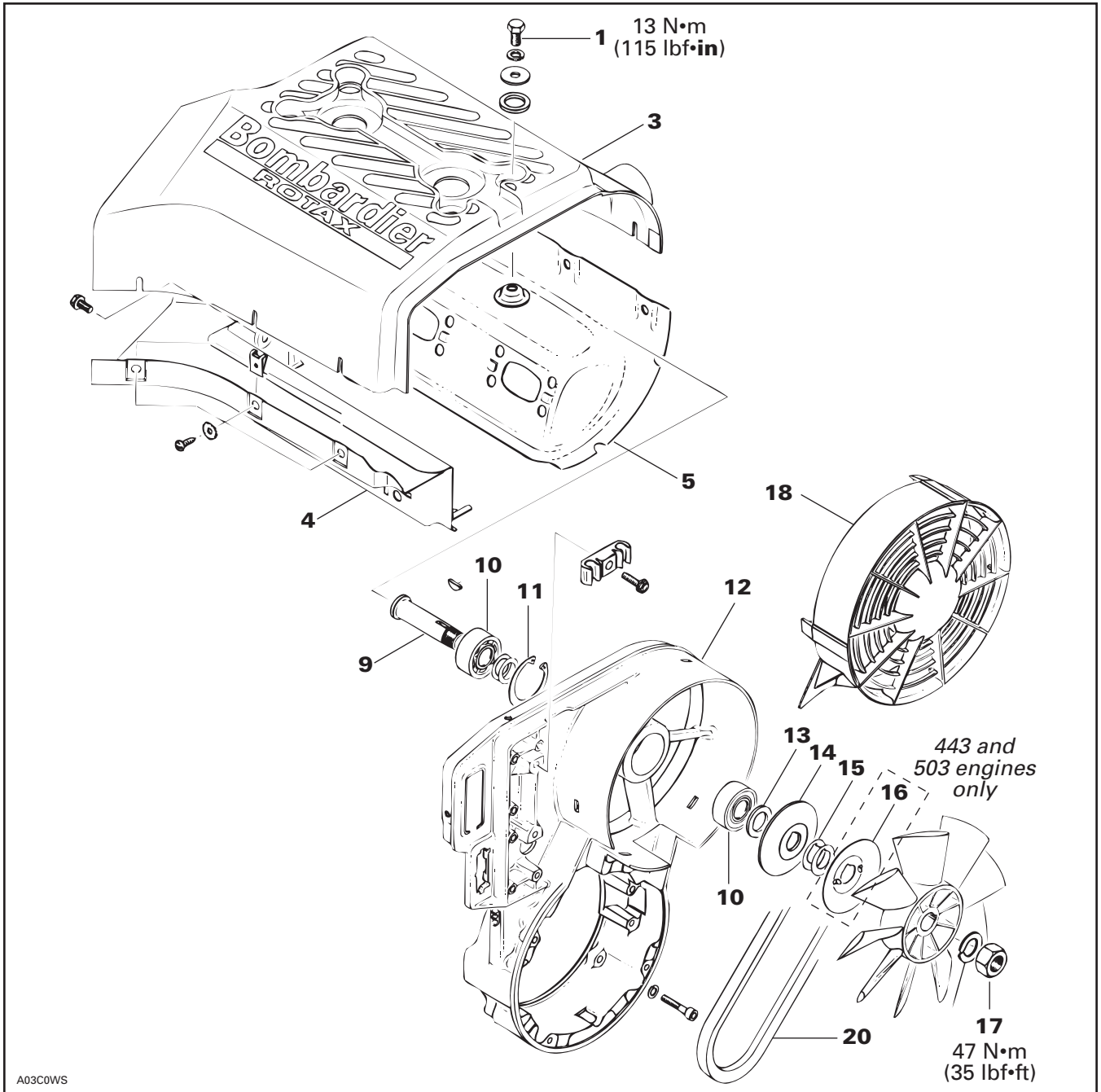


**TYPICAL**

1. Fully open position
2. Counterclockwise rotating drill
3. Main line

# AXIAL FAN COOLING SYSTEM

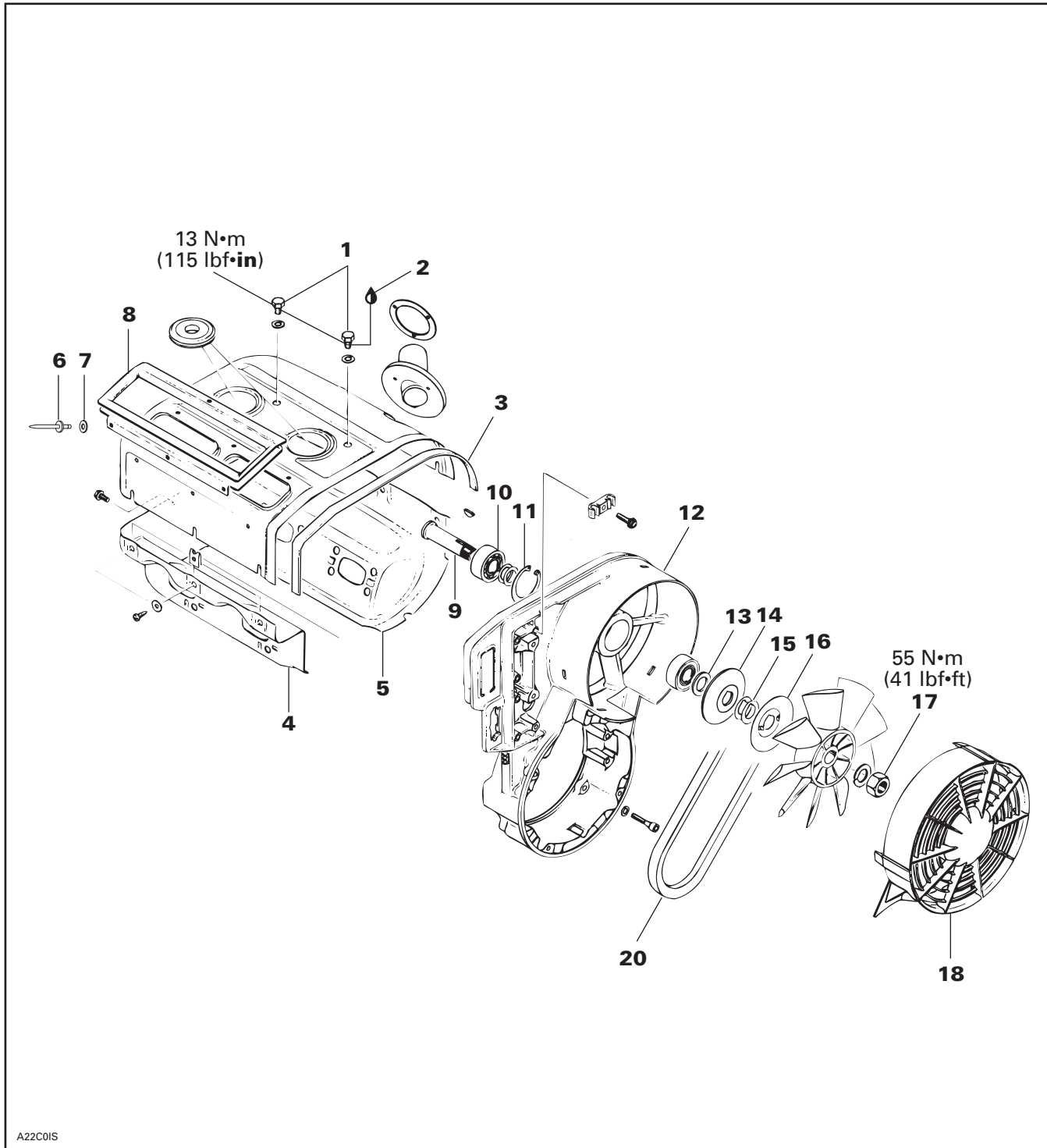
443 Engine



## Section 03 ENGINE

### Sous-section 07 (AXIAL FAN COOLING SYSTEM)

#### 503 Engine



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

**REMOVAL**

○ **NOTE:** To facilitate further disassembly, fan nut may be removed before removing fan housing.

Remove rewind starter, starting pulley, trigger coil wire from 4-connector housing then fan housing ass'y.

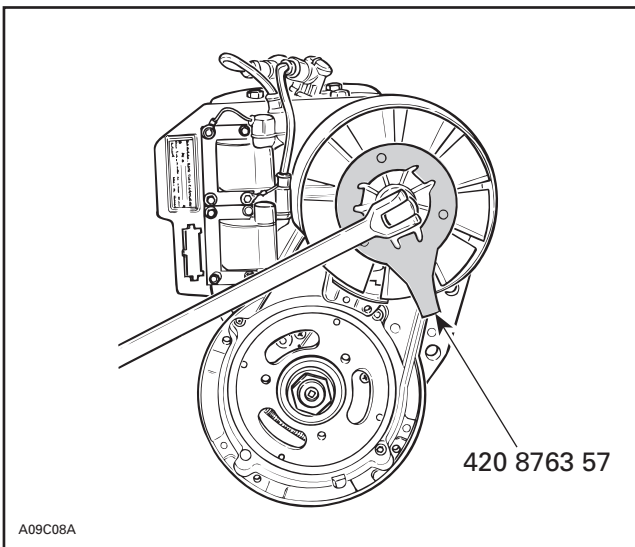
**CLEANING**

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

**DISASSEMBLY AND ASSEMBLY**

Remove fan protector.

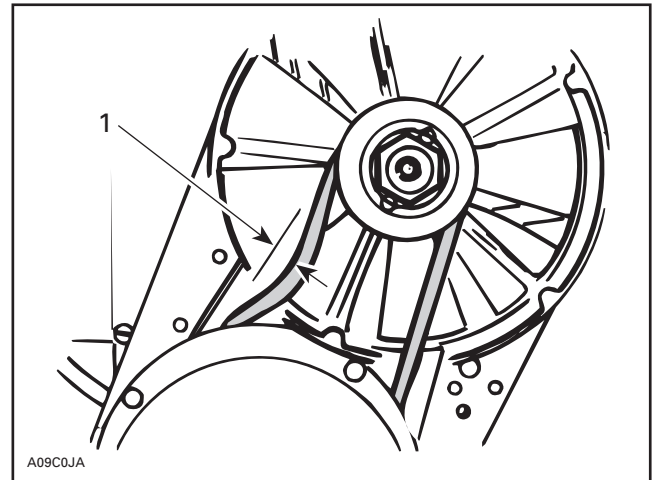
To remove or install fan pulley retaining nut no. 17, lock fan pulley with special holder wrench (P/N 420 8763 57). At assembly, torque nut to 65 N•m (48 lbf•ft).



TYPICAL

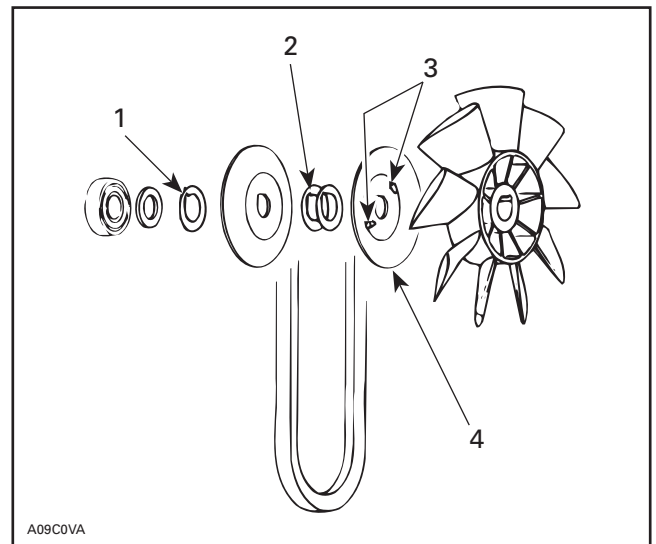
Fan belt deflection must be as specified when applying the proper force midway between pulleys.

ENGINE TYPE	BELT DEFLECTION	FORCE APPLIED
443	8.5 mm (11/32 in)	5 kg (11 lb)
503	9.5 mm (3/8 in)	



1. Deflection

To adjust tension, add or remove shim(s) no. 15 between pulley halves nos. 14 and 16. Install excess shim(s) between distance sleeve no. 13 and half pulley no. 14 (housing side).



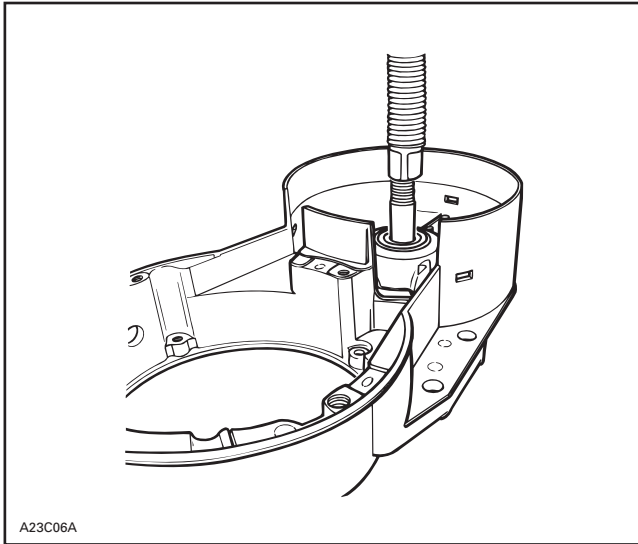
- 1. Unused shim(s) here
- 2. Adjust here
- 3. Positioning noses
- 4. Some engines only

Some engines have a separate metal pulley half instead of using back of fan as pulley half. On first mentioned engines, select pulley halves so that the one with 2 positioning noses will be on fan side. Ensure to insert these noses into fan notches.

## Section 03 ENGINE

### Sous-section 07 (AXIAL FAN COOLING SYSTEM)

Using a press, drive the fan shaft **no. 9** out.



Remove circlip **no. 11** then remaining bearing.

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

At assembly, apply a light coat of Loctite 242 (blue) on screw **no. 1** threads.

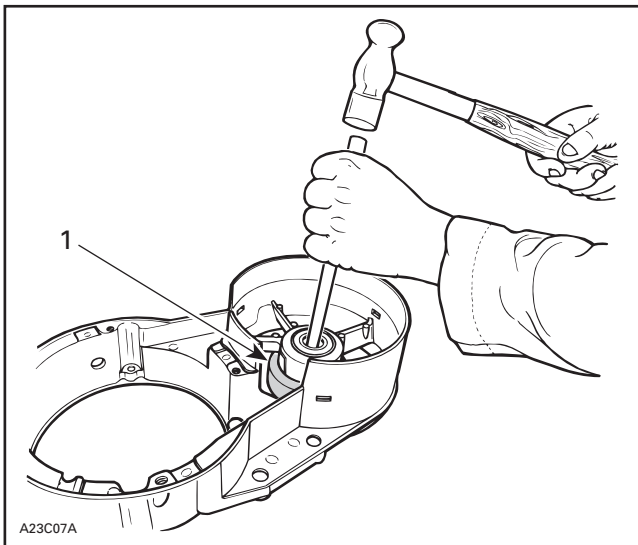
A gasket must be placed on both sides (inner and outer) of intake and exhaust holes of cylinder cowl **nos. 4 and 5**.

Reinstall fan protector **no. 18** properly.

#### ◆ WARNING

Always reinstall fan protector after servicing.

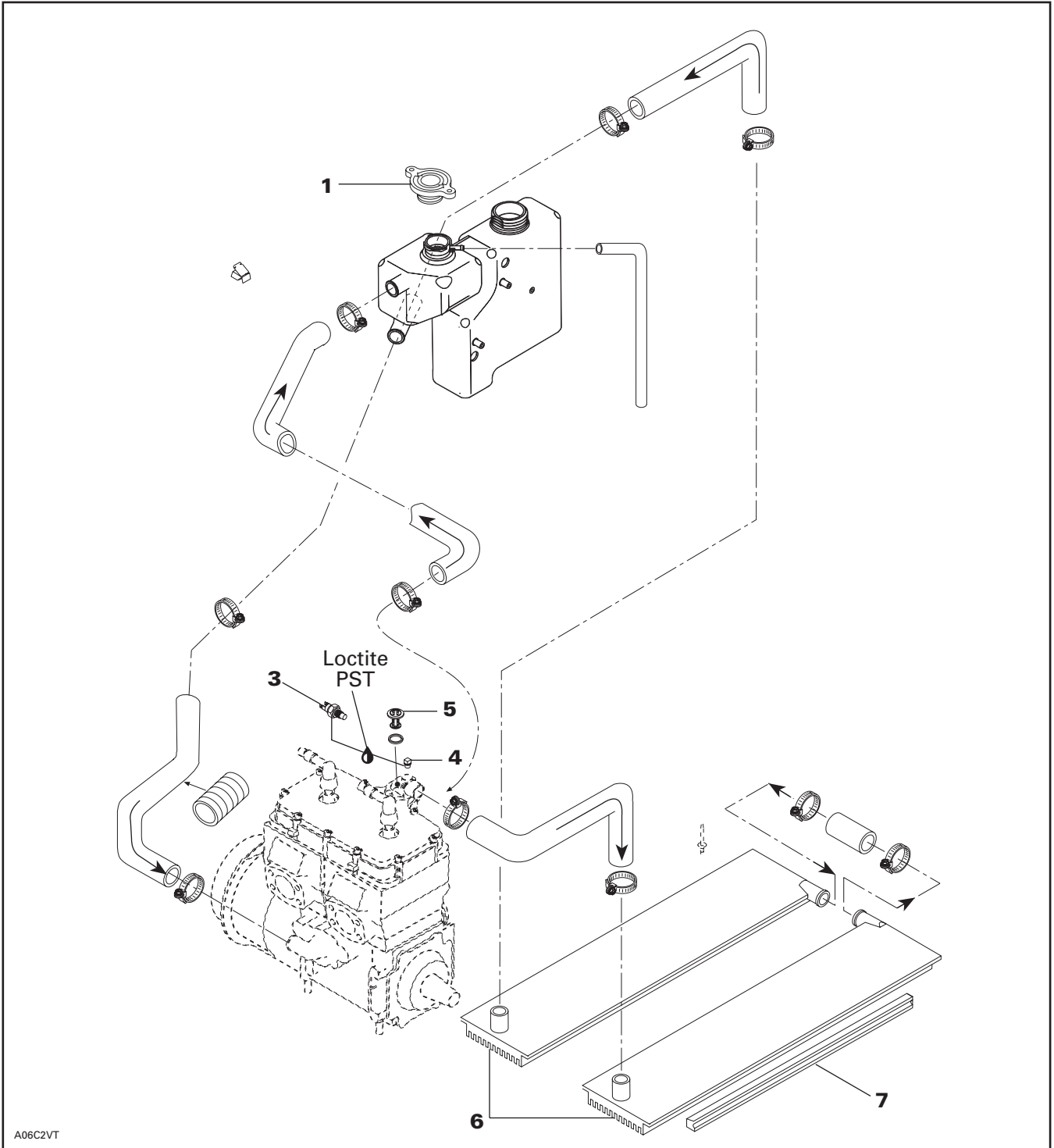
Support fan housing **no. 12** with a ring. With a punch, working all around bearing **no. 10** inner race, drive bearing out of fan housing. Keep shims for installation.



1. Ring supporting fan housing

# LIQUID COOLING SYSTEM

All S-Series Engines

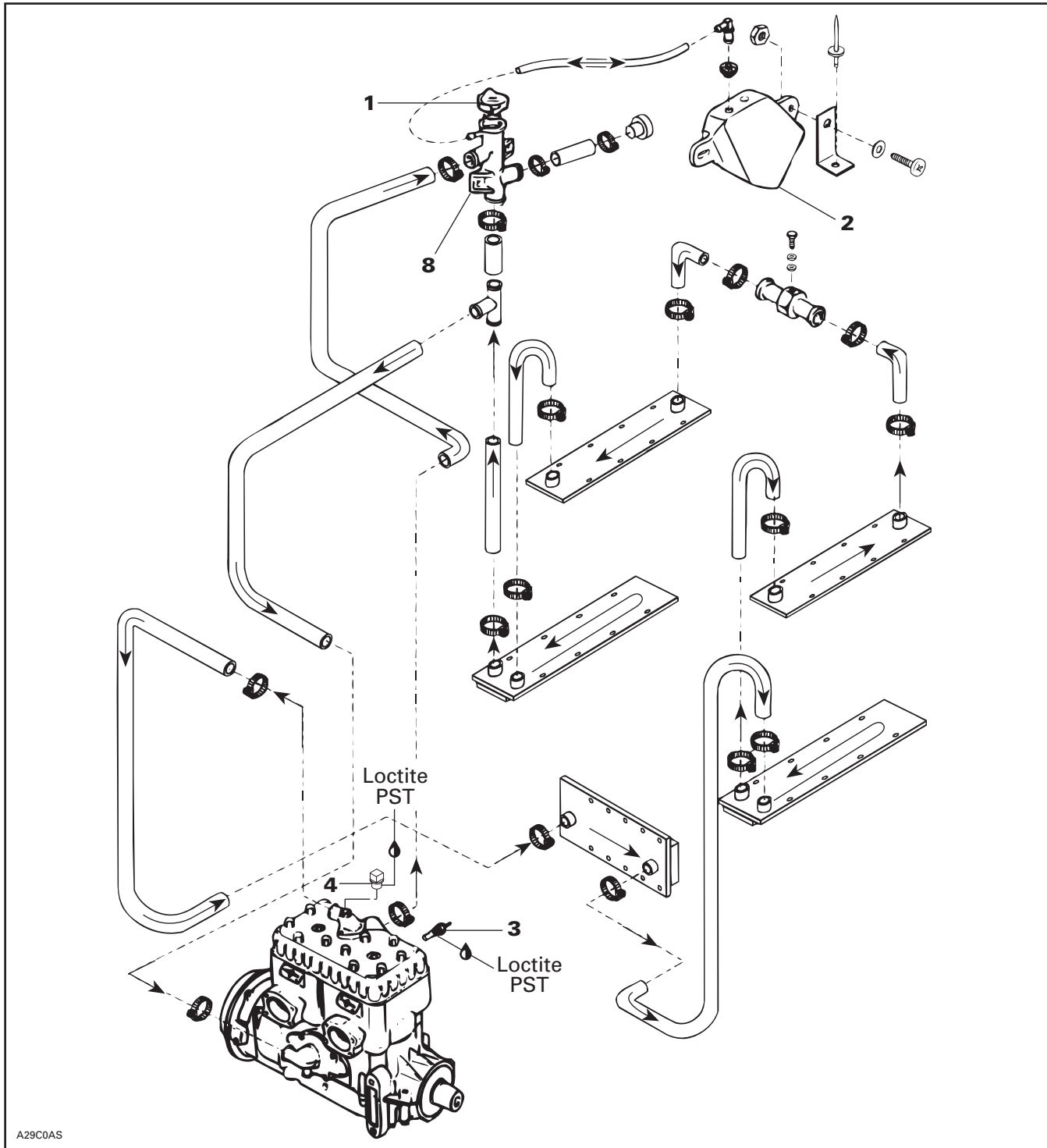


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# Section 03 ENGINE

## Sub-Section 08 (LIQUID COOLING SYSTEM)

### Skandic WT LC





## INSPECTION

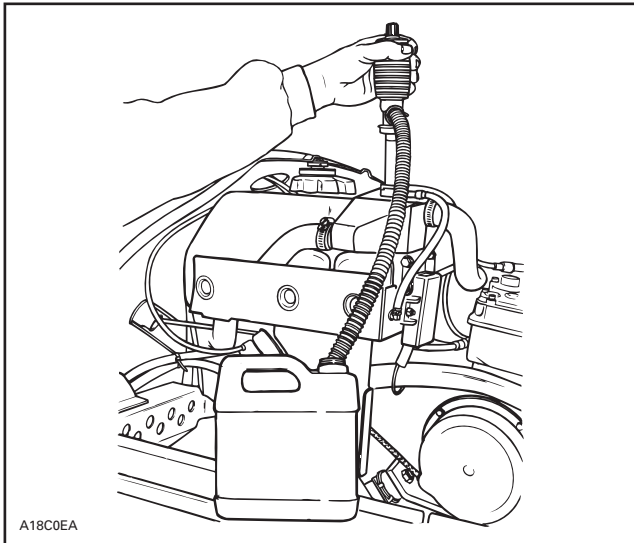
Check general condition of hoses and clamp tightness.

## DRAINING THE SYSTEM

### ◆ WARNING

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

To drain the cooling system, siphon the coolant mixture from the coolant tank. Use a primer pump with a plastic hose inserted as deep as possible into the lower hose.



TYPICAL

When the coolant level is low enough, lift the rear of vehicle to drain the radiators.

## DISASSEMBLY AND ASSEMBLY

### 3,4, Sender and Plug

Apply thread sealant on sender and plug to avoid leaks.

### 1, Pressure Cap

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

### 6,7, Radiator and Radiator Protector

Insert radiator protector into radiator C-rail and crimp C-rail at both ends. Refer to FRAME 09-02 for radiator removal.

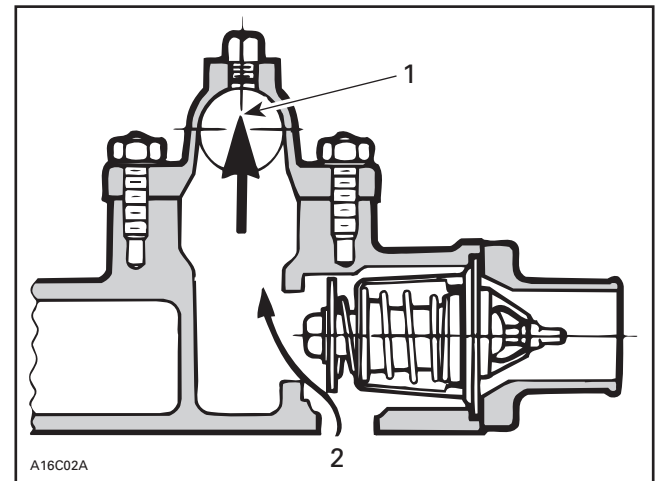
### 5, Thermostat

To check thermostat, put in water and heat water. Thermostat should open when water temperature reaches the following degree.

ENGINE	TEMPERATURE
454, 494, 583 and 670	42°C (108°F)

On 454, 494, 583 and 670 engines, the thermostat is a double action type.

a. Its function is to give faster warm up of the engine by controlling a circuit; water pump — engine — coolant tank. This is done by bypassing the radiator circuit.



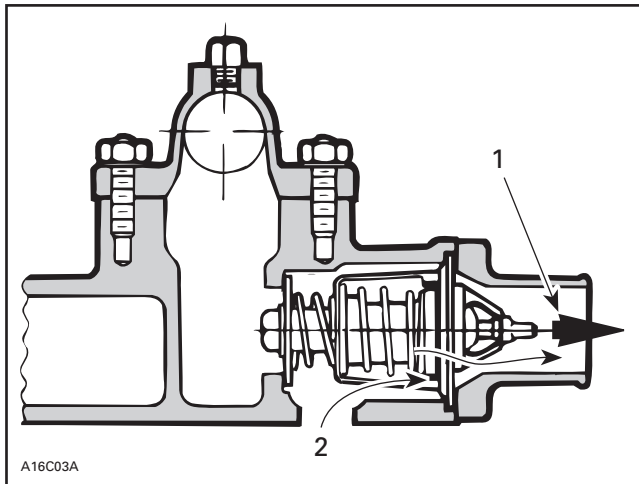
CLOSED THERMOSTAT, COLD ENGINE

1. To reservoir
2. From cylinders

b. When the liquid is warmed enough, the thermostat opens the circuit, water pump — engine — radiators coolant tank to keep the liquid at the desired temperature. (See the diagram of the exploded view).

## Section 03 ENGINE

### Sub-Section 08 (LIQUID COOLING SYSTEM)



OPEN THERMOSTAT, WARM ENGINE

1. To radiators
2. From cylinders

These 2 functions have the advantage of preventing a massive entry of cold water into the engine.

## 2, Overflow Coolant Tank

### **Skandic WT LC Only**

The coolant expands as the temperature (up to 90 – 100°C (195 – 212°F)) and pressure rise in the system. When the limiting system working pressure (cap) is reached (90 kPa (13 PSI)), the pressure relief valve in the pressure cap is lifted from its seat and allows coolant to flow through the overflow hose into the overflow coolant tank.

When the system temperature drops, the coolant contracts in volume and the pressure in the system is reduced. The coolant in the overflow coolant tank will then flow back into the filling neck **no. 8** through the vacuum relief valve in the pressure cap.

## COOLING SYSTEM REFILLING PROCEDURE

### Recommended Coolant

Use a blend of 60% antifreeze with 40% water. Do not reinstall pressure cap.

### ▼ CAUTION

To prevent rust formation or freezing condition, always replenish the system with 60% antifreeze and 40% water. Pure antifreeze without water freezes. Always use ethyl-glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

### System Capacity

Refer to TECHNICAL DATA 09-03.

## Refilling Procedure

### **S-Series**

With vehicle on a flat surface, engine cold, refill coolant tank up to cold level mark. Wait a few minutes then refill to mark. Install pressure cap. Run engine until thermostat opens then stop engine. Refill up to mark.

To make sure coolant flows through radiators, touch them by hand. They must feel warm.

Reinstall pressure cap.

When engine has completely cooled down, recheck coolant level in coolant tank and top up if necessary.

Check coolant concentration (freezing point) with proper tester.

### **Skandic WT LC**

Open cap and fill filler neck **no. 8** completely.

Tilt seat and unscrew bleeding screw on top of connecting hose. Coolant must flow. Refill through filler neck **no. 8** as necessary.

Reinstall bleeding screw.

Proceed the same for bleeding screw on thermostat housing.

Start engine and let it warm until thermostat opens.

To make sure coolant flows through radiators, touch them by hand. They must feel warm.

Turn engine off. Let it cool down for 15 to 20 minutes.

Open cap and refill filler neck completely.

Start engine and let it idle. Do not race engine.

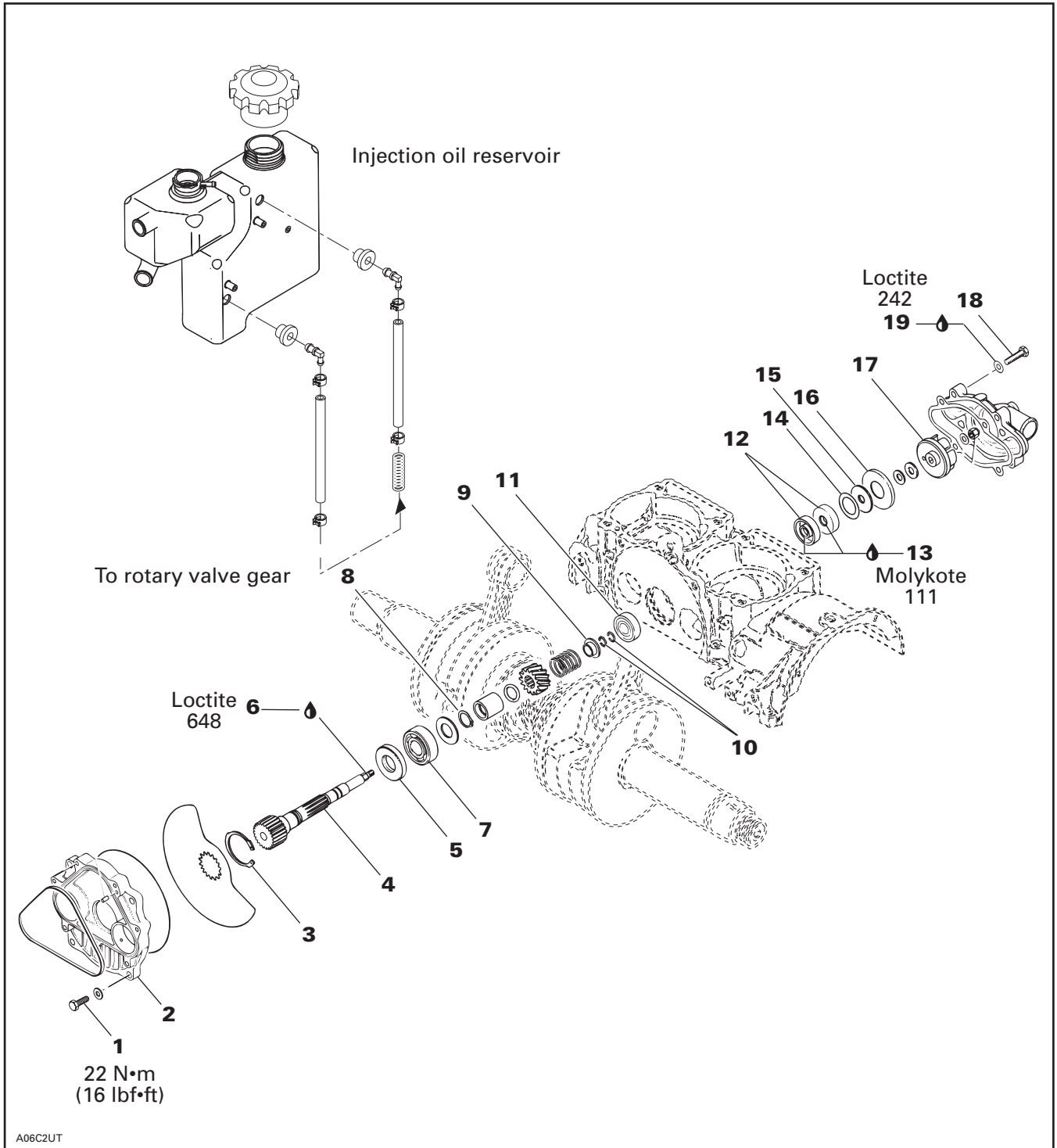
If coolant level gets down, add more coolant in filler neck.

Turn off engine and close cap.

**IMPORTANT:** After first drive let engine completely cool down. Check that coolant level is at top of filler neck. Add coolant as necessary. This is to ensure that coolant circulation from and back to overflow coolant tank works properly. Overflow coolant tank should be half full when engine is cold.

# ROTARY VALVE, COOLANT PUMP AND RESERVOIR

454, 494, 583 and 670 Engines



A06C2UT

TYPICAL

## Section 03 ENGINE

### Sub-Section 09 (ROTARY VALVE, COOLANT PUMP AND RESERVOIR)

○ **NOTE:** Some verifications can be performed with engine in vehicle. Refer to ENGINE DIMENSION MEASUREMENT 03-04.

## GENERAL

Engine must be removed from vehicle to work on rotary valve shaft/components. Refer to **Removal and installation** of appropriate engine for procedures.

Bottom end must be opened to remove rotary valve shaft.

## CLEANING

Discard all seals and O-rings.

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

## DISASSEMBLY

### 1,2, Screw and Rotary Valve Cover

○ **NOTE:** Before removing rotary valve, check valve timing as described in **Rotary valve timing** at the end of this sub-section.

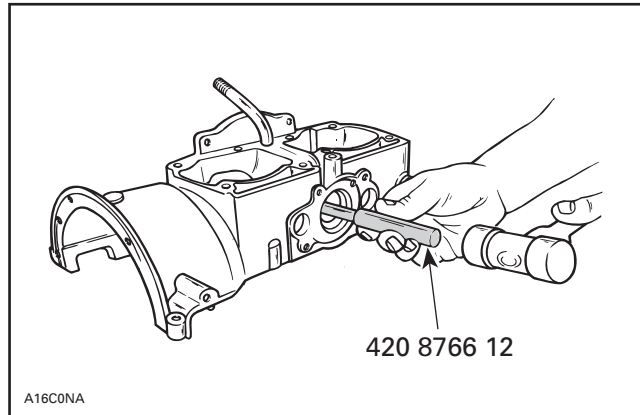
Unscrew 4 retaining screws and withdraw rotary valve cover and valve.

### 3,17, Circlip and Pump Impeller

#### ▼ CAUTION

Bottom end must be opened to remove rotary valve shaft.

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

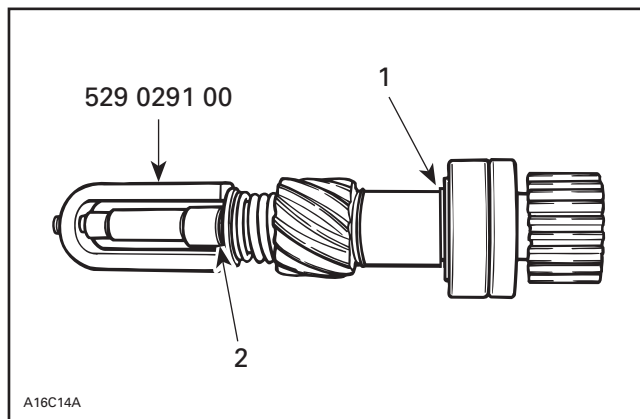


#### ▼ CAUTION

To prevent damage to the end of the rotary valve shaft, use pusher (P/N 420 8766 12).

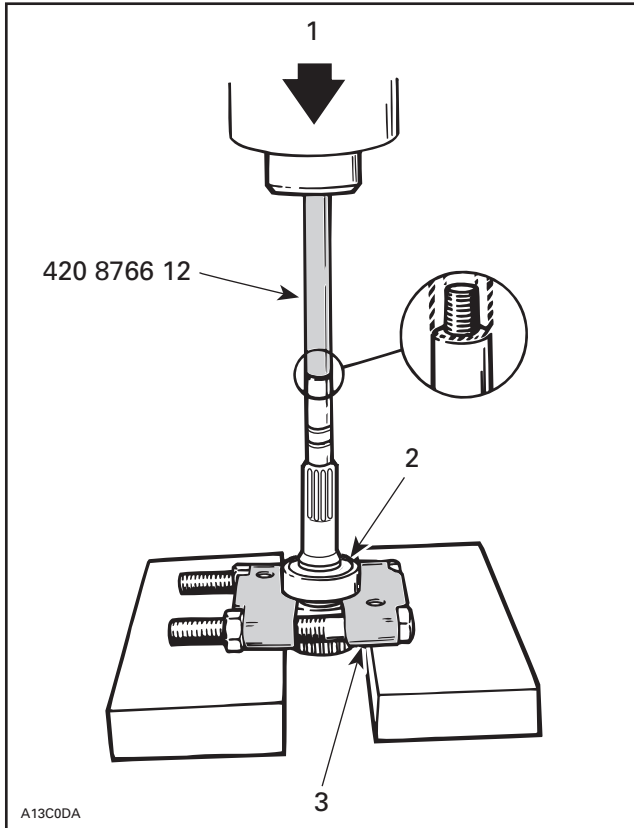
### 8,9,10, Circlip and Spring Retaining Cup

If it is necessary to disassemble components of rotary valve shaft assembly, compress spring retaining cup with rotary valve circlip tool (P/N 529 0291 00) in order to remove circlip. Remove gear and distance sleeve then external circlip.



1. External circlip
2. Circlip

To remove bearing, use a bearing puller (ex.: Snap-on no. CJ 950) and pusher (P/N 420 8766 12) as illustrated.



1. Press
2. Bearing
3. Bearing puller. Ex.: Snap-on no. CJ 950

**▼ CAUTION**

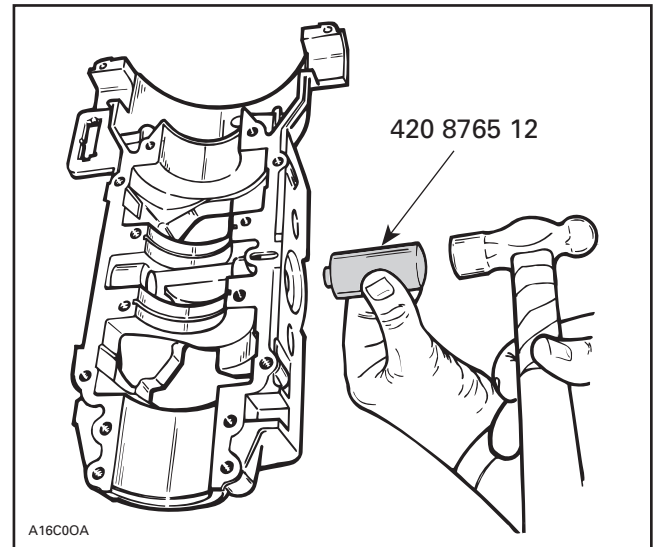
Ensure that the rotary valve shaft is perfectly perpendicular with the press tip or damage will occur.

**14,15,16, Shim, Rubber Washer and Support Plate**

Pry support plate out of crankcase and remove rubber washer and shim.

**11,12,14,15, Bearing 6201 and Seal**

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



**INSPECTION**

Inspect rotary valve cover for warpage. Small deformation can be corrected by surfacing with fine sand paper on a surface plate. Surface part against oiled sand paper.

Inspect bearings. Check for scoring, pitting, chipping or other evidence of wear. Make sure plastic cage (on bigger bearing) is not melted. Rotate them and make sure they turn smoothly.

Check for presence of brass fillings in gear housing.

Visually check gear wear pattern. It should be even on tooth length all around. Otherwise it could indicate a bent shaft; check deflection. Replace gear if damaged.

Refer to ENGINE DIMENSION MEASUREMENT 03-04.

**ASSEMBLY**

Assembly is essentially the reverse of disassembly procedures. However pay particular attention to the following.

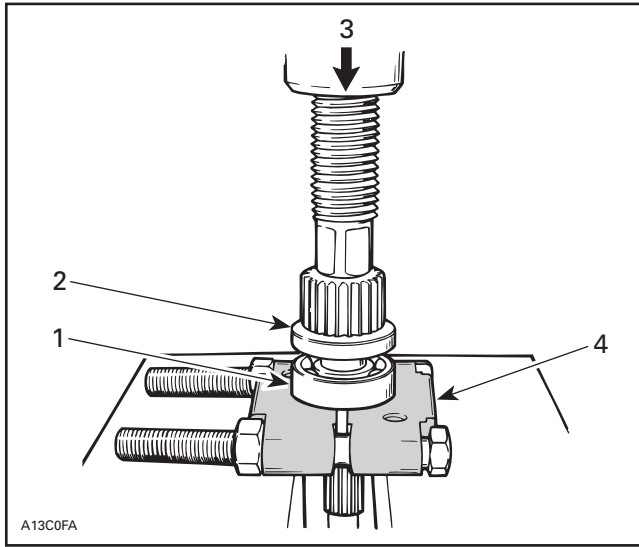
**4,5,7, Rotary Valve Shaft, Seal and Bearing 6203**

At assembly apply lithium grease on seal lips. Position the seal with shielded portion against splines of shaft.

Install bearing as illustrated.

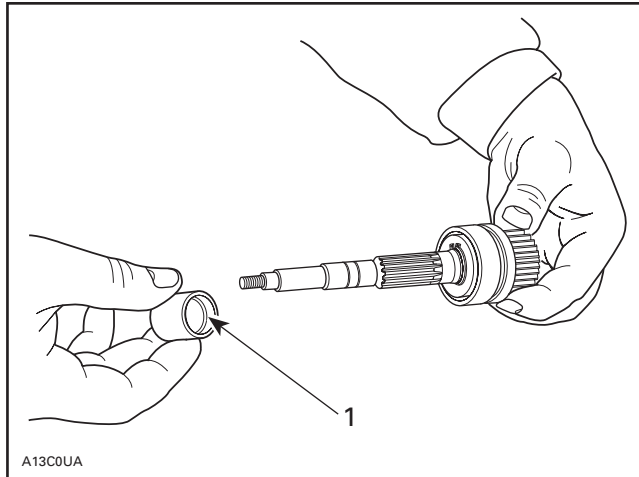
## Section 03 ENGINE

### Sub-Section 09 (ROTARY VALVE, COOLANT PUMP AND RESERVOIR)



1. Bearing
2. Shielded portion of seal here
3. Press
4. Bearing puller. Ex.: Snap-on no. CJ 950

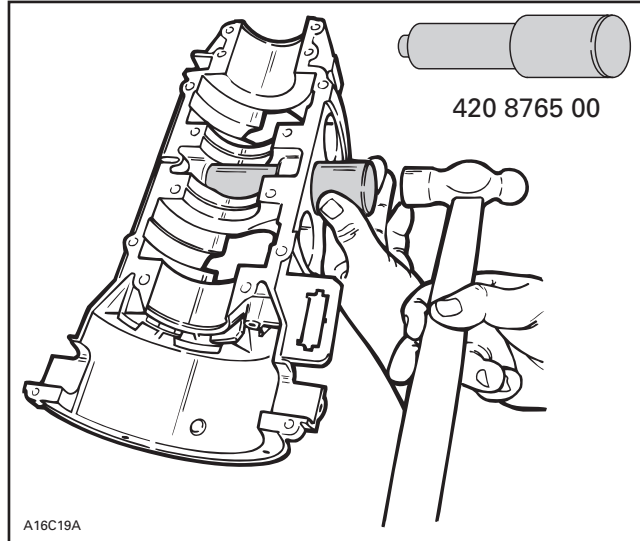
Install distance sleeve with its counterbore first.



1. Counterbore first

#### 11, Bearing 6201

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



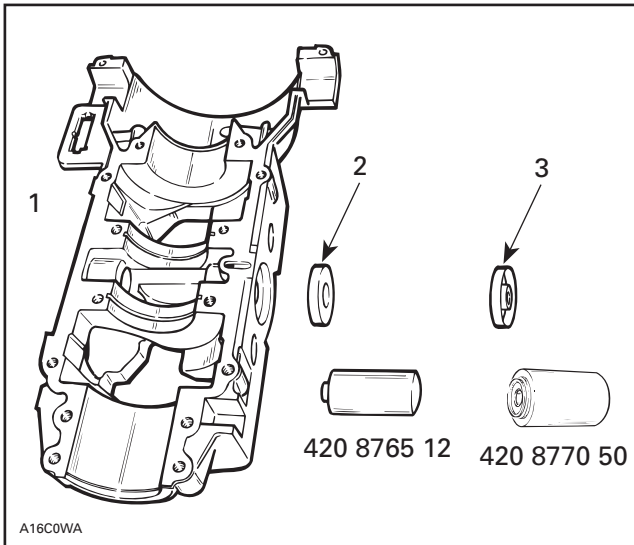
**NOTE:** Bearing shielded side must be facing rotary valve.

Refer to **Rotary valve timing** at the end of this sub-section to properly install gear on rotary valve shaft.

#### 12,13,14,15, Seals, Shim, Rubber Washer and Molykote Grease

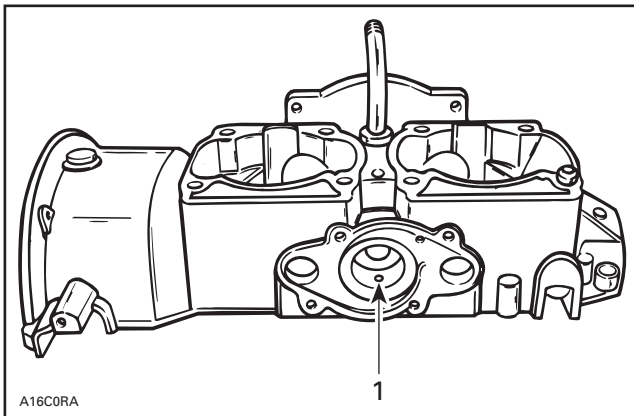
To install seals on water pump side proceed as follows:

- Apply Molykote 111 (P/N 413 7070 00) on lip both seals.
- Position **oil seal** shielded portion towards pump impeller. Drive in place with a seal pusher (P/N 420 8765 12).
- Position **coolant seal** shielded portion towards rotary valve. Drive in place with the rotary valve shaft seal pusher (P/N 420 8770 50).



- 1. Rotary valve side
- 2. Oil seal
- 3. Coolant seal

Make sure not to obstruct draining hole. Position seals so that hole is between them.



- 1. Draining hole

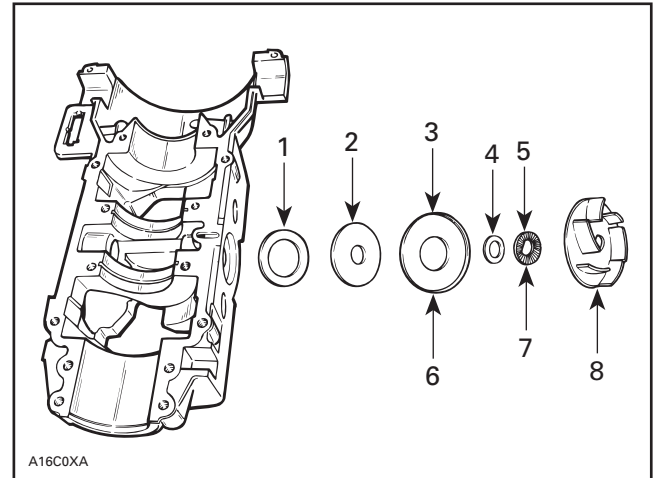
**CAUTION**

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

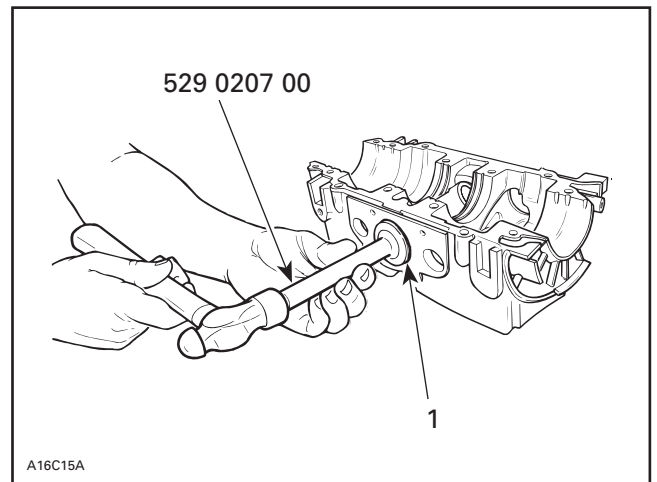
**NOTE:** The draining hole is used to detect seal malfunction. If you notice oil or coolant at the exit of the draining hole, this means that oil seal or coolant seal leaks.

- Install large shim and pack space with Molykote 111 (P/N 413 7070 00).

- Install rubber washer then support plate with its flange towards pump impeller. Use impeller support plate pusher (P/N 529 0207 00) for proper installation.
- Install small thrust washer then friction washer positioning its grooves against pump impeller.



- 1. Large shim
- 2. Rubber washer
- 3. Support plate
- 4. Small thrust washer
- 5. Friction washer
- 6. Flange this side
- 7. Grooves this side
- 8. Pump impeller



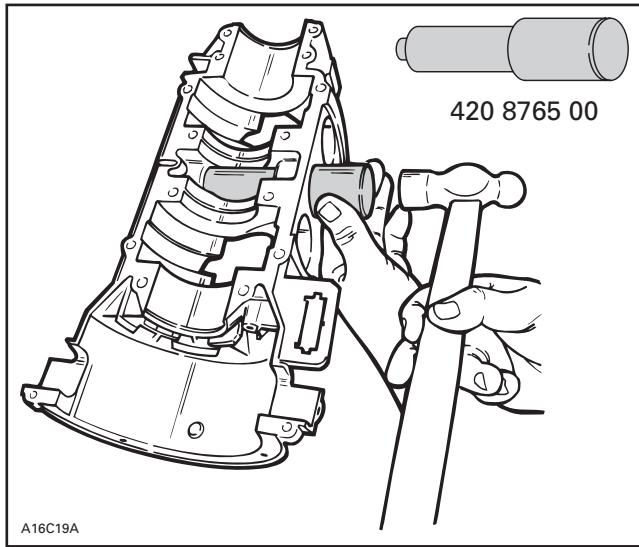
- 1. Support plate

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



## Section 03 ENGINE

### Sub-Section 09 (ROTARY VALVE, COOLANT PUMP AND RESERVOIR)



#### 18,19, Pump Housing Bolt and Loctite 242 (Blue)

Apply Loctite 242 (blue) on bolt threads.

#### Rotary Valve

The rotary valve controls the opening and closing of the inlet ports. Therefore its efficiency will depend on the precision of its installation.

#### IDENTIFICATION OF THE ROTARY VALVE

There is no identification code on the valve. To find out the duration, place an angle finder on the valve and measure the valve cut-out angle.

Engine Type	Rotary Valve P/N 420 924 XXX	Valve Duration (Cut-out Angle) °
454	502	159
494	509	147
583 MX Z, GT and Formula 583/Z	502	159
583 Summit	509	147
670	500	164

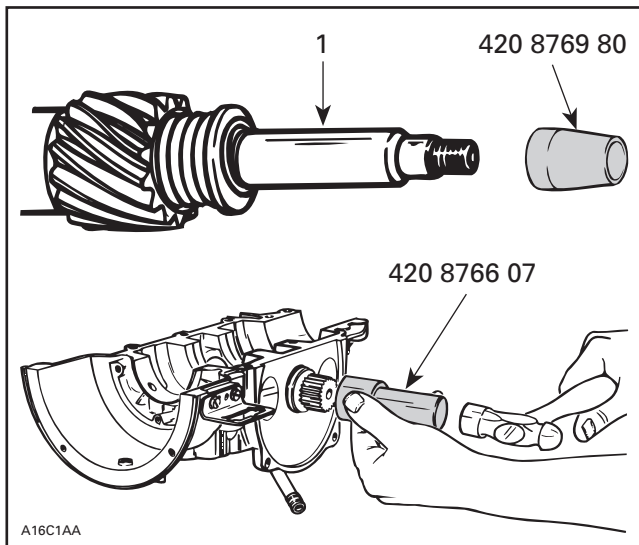
#### 4,6, Rotary Valve Shaft and Loctite 648

#### ▼ CAUTION

Crankcase halves must be separated and crankshaft must not be present to install rotary valve shaft ass'y in crankcase.

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

- rotary valve seal pusher (P/N 420 8766 07)
- seal protector sleeve (P/N 420 8769 80)



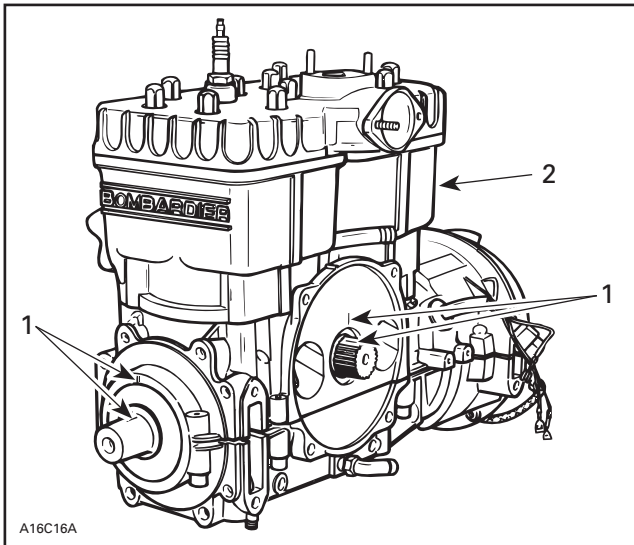
1. Rotary valve shaft

Apply Loctite 648 (P/N 420 8997 88) on shaft threads.

#### ROTARY VALVE TIMING

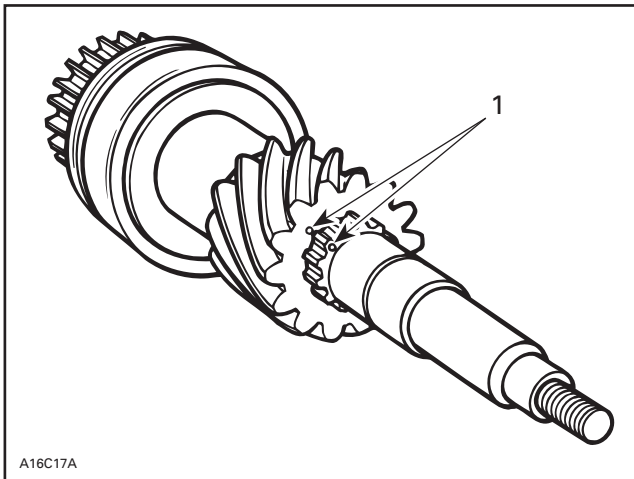
At disassembly, before removing rotary valve, note original rotary valve timing: it may be out of specifications by 1 to 4 degrees of retard or advance. To do so bring MAG piston to TDC and scribe a mark on crankshaft end at top (12 o'clock) and also on upper crankcase half.

Mark position of rotary valve shaft gear in relation to upper crankcase.



1. Mark here
2. MAG piston at TDC

After removing rotary valve shaft but before disassembling, mark brass gear in relation to shaft.



1. Mark here

These marks will be useful to time rotary valve exactly to the specifications.

**NOTE:** Tolerance of rotary valve timing is  $\pm 5$  degrees.

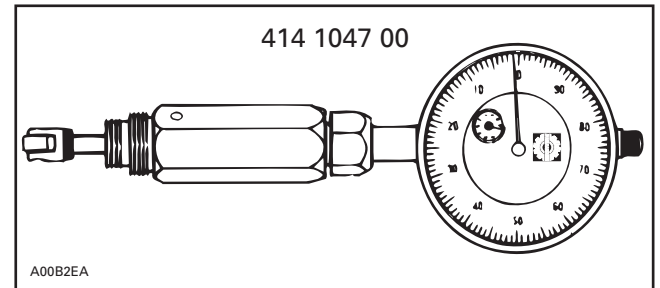
When the same crankcase is reassembled, the first timing method is to be followed. However since replacement crankcases do not have timing marks (ridge), the second method is required. Take note that the second method is more accurate and may be used any time.

### Installation

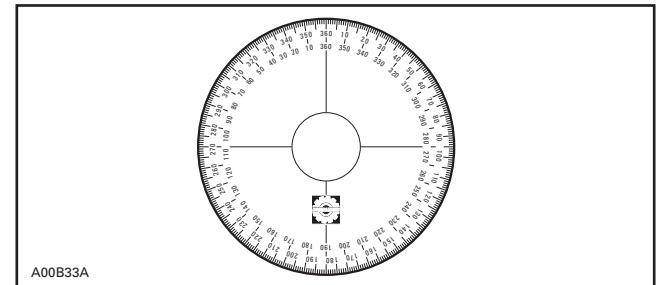
To correctly install rotary valve, proceed as follows:

- Turning crankshaft, bring **MAGneto side** piston to Top Dead Center.

Use a dial indicator (P/N 414 1047 00).



A degree wheel (P/N 414 3529 00) is required to measure rotary valve opening and closing angles in relation with **MAGneto side** piston. Degree wheel will be installed on rotary valve shaft for measurements.



Rotary valve must be set as specified in TECHNICAL DATA 09.

For the following instructions, use these specifications as example:

OPENING: 132° BTDC

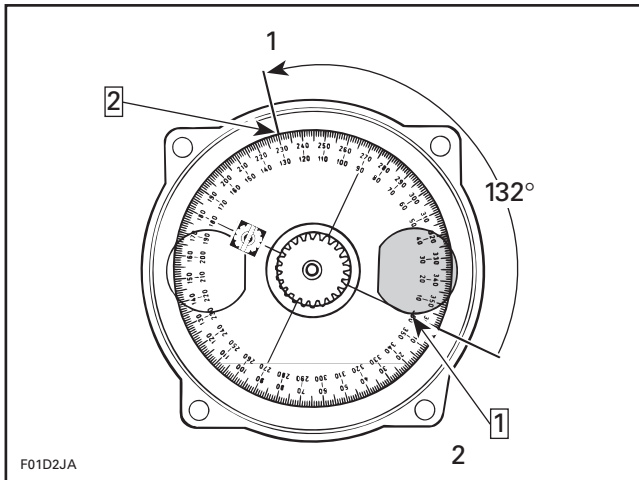
CLOSING: 52° BTDC

Proceed as follows:

- Turning crankshaft, bring **MAGneto side** piston to Top Dead Center as done before with a crankcase having a ridge.
- For opening mark, first align 360° line of degree wheel with **BOTTOM** of **MAGneto side** inlet port. Then, find 132° line on degree wheel and mark crankcase at this point.

## Section 03 ENGINE

### Sub-Section 09 (ROTARY VALVE, COOLANT PUMP AND RESERVOIR)

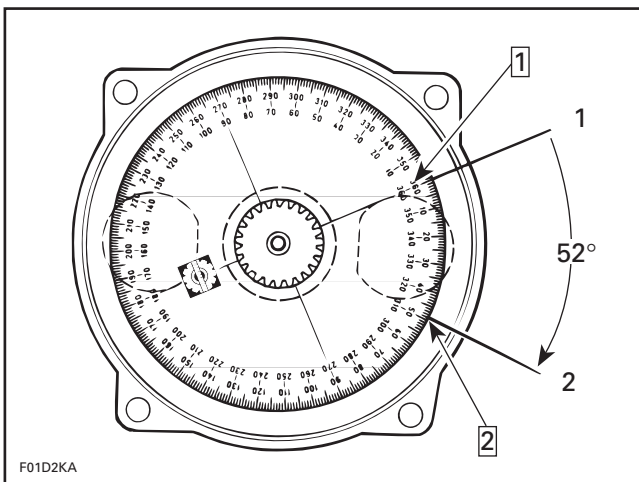


Step 1: Align 360° line of degree wheel here

Step 2: Find 132° on degree wheel and mark here

1. Opening mark
2. Bottom of MAGneto inlet port

- For **closing** mark, first align 360° line of degree wheel with TOP of MAGneto side inlet port. Then, find 52° line on degree wheel and mark crankcase at this point.



Step 1: Align 360° line of degree wheel here

Step 2: Find 52° on degree wheel and mark here

1. Top of MAGneto inlet port
2. Closing mark

- Position rotary valve on shaft splines to have edges as close as possible to marks.

**NOTE:** Rotary valve is asymmetrical. Therefore, try turning it inside out then reinstall on splines to determine best installation position.

Apply injection oil on rotary valve before closing rotary valve cover.

### To Time Rotary Valve Exactly to Specifications

**NOTE:** If desynchronization (out of spec.) is unknown, install rotary valve to determine it before proceeding with the following.

#### First Method

Turn crankshaft to bring **MAG** piston to TDC. Scribed marks of crankshaft and upper crankcase must align. These marks were scribed to determine desynchronization.

Install brass gear on rotary valve shaft with its marked spline 4 positions (splines) away for one degree of desynchronization. Turn in the opposite direction of desynchronization. For instance, a rotary valve is retarded by 2.5°, turn brass gear by 10 splines counterclockwise.

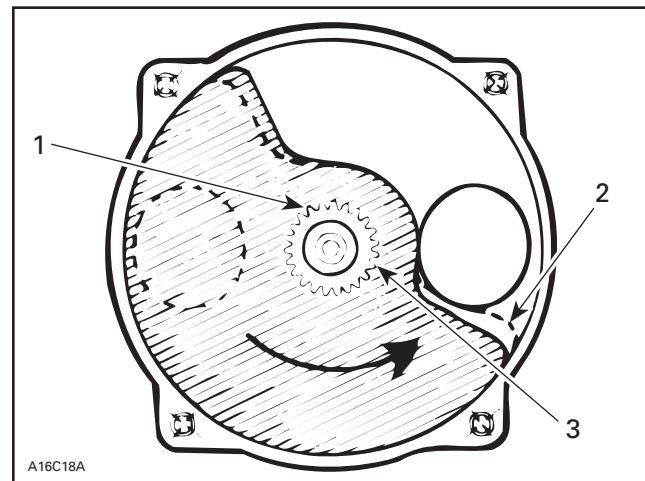
#### Second Method

Turn crankshaft to bring **MAG** piston to TDC. Scribed marks of crankshaft and upper crankcase must align. These marks were scribed while determining desynchronization.

For each degree of desynchronization, rotary valve shaft should be turned in the opposite direction by about 5 splines on the rotary valve gear.

Note position of rotary valve gear mark when brass gear disengages worm gear of crankshaft at removal of rotary valve shaft. From this position, turn shaft accordingly then reinstall.

For instance, take a valve advanced by 2°.



1. Position of mark when brass gear disengages worm gear

2. Advanced by 2°

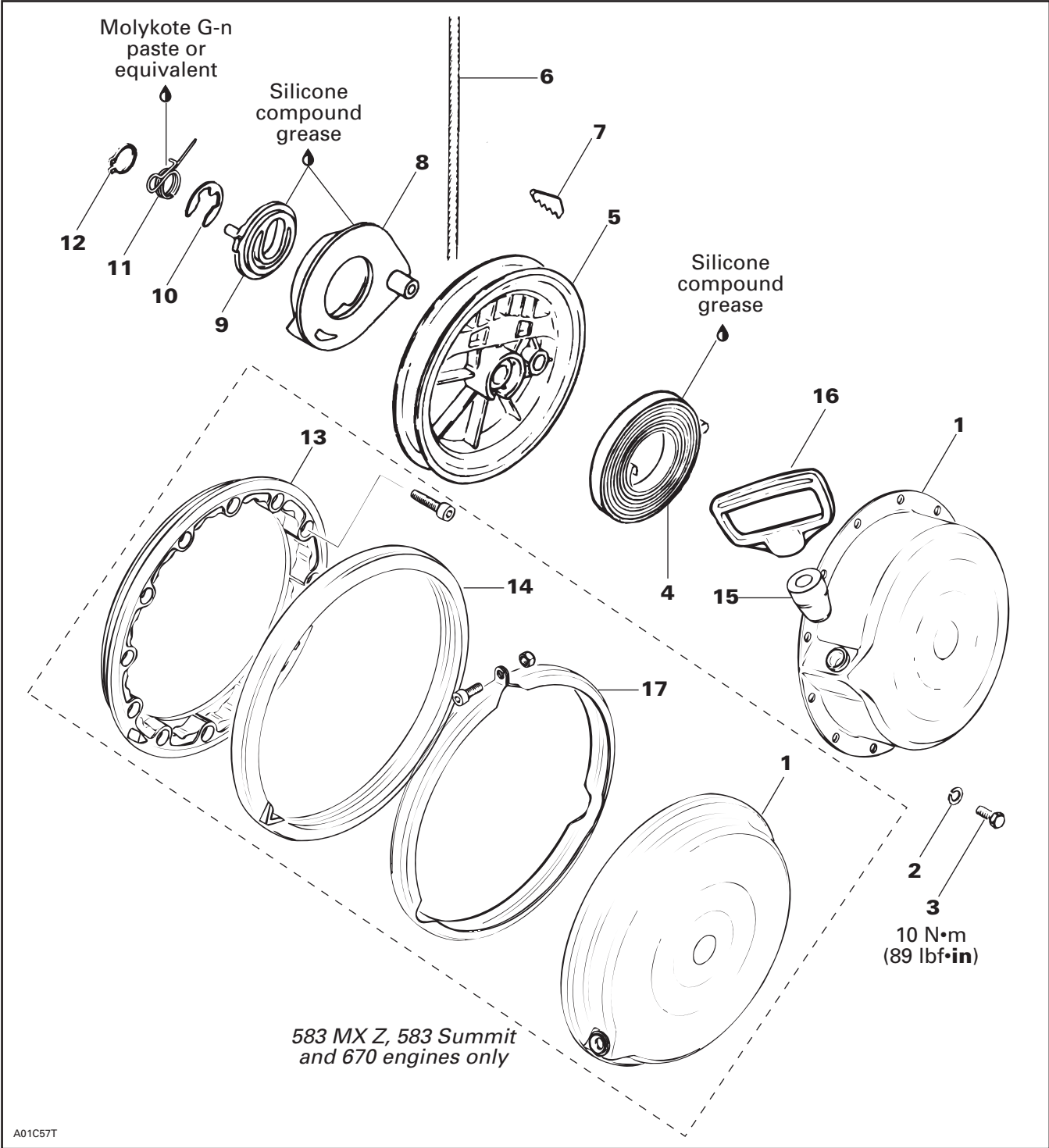
3. Position of mark before installation (about 10 splines from original position)

### 1,2, Screw and Rotary Valve Cover

Install O-ring and cover then torque screws to 22 N•m (16 lbf•ft) in a criss-cross sequence.

# REWIND STARTER

All Models



A01C57T

TYPICAL

## Section 03 ENGINE

### Sub-Section 10 (REWIND STARTER)

## REMOVAL

Using a small screwdriver, extract rope knot from starter grip **no. 16**. Cut rope close to knot. Tie a knot near starter.

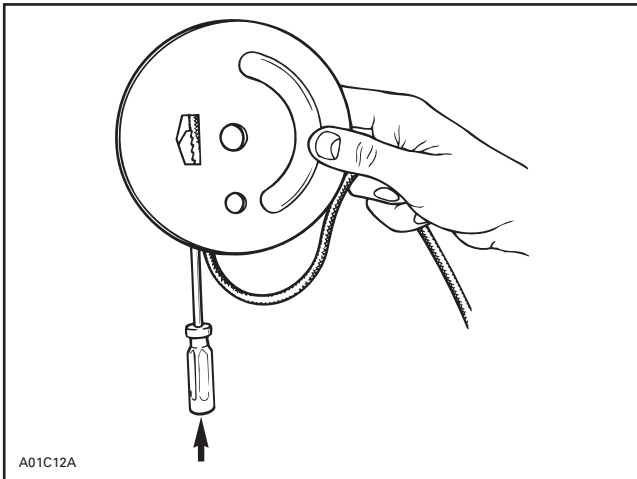
Remove screws **no. 3** and washers **no. 2** securing rewind starter **no. 1** to engine then remove rewind starter.

On fan cooled models with oil injection pump remove pump from rewind starter cover.

## DISASSEMBLY

To remove rope from rewind starter mechanism:

- First remove locking ring **no. 12**, locking spring **no. 11**, circlip **no. 10**, pawl lock **no. 9** and pawl **no. 8**.
- Remove sheave **no. 5** from starter housing **no. 1**.
- Disengage key **no. 7** and pull out rope **no. 6**.



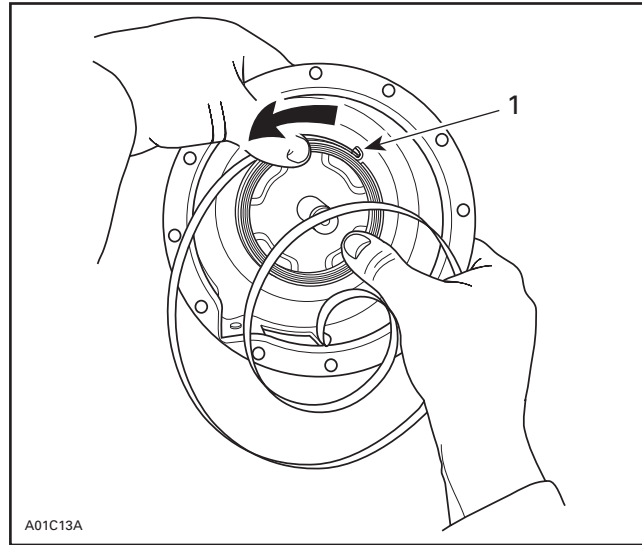
GENTLY TAP ON KEY

## ASSEMBLY

At assembly, position spring **no. 4** outer end into spring guide notch then wind the spring counter-clockwise into guide.

### ◆ WARNING

Since the spring is tightly wound inside the guide it may fly out when rewind is handled. Always handle with care.



1. Outer end into guide notch

○ **NOTE:** Due to dust accumulation, rewind starter must be periodically cleaned, inspected and relubricated.

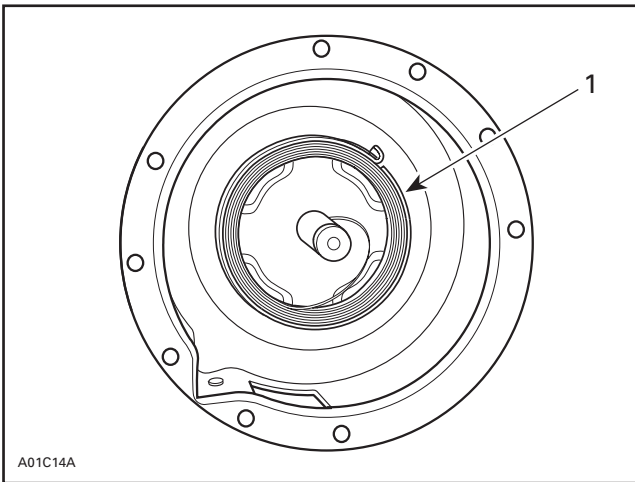
### ▼ CAUTION

It is of the utmost importance that the rewind starter spring(s) be lubricated periodically using specific lubricants. Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly with silicone compound grease (P/N 420 8970 61) and position into starter housing as illustrated.

### ▼ CAUTION

This lubricant must NOT be used on rewind starter locking spring as it does not stay on under vibration.

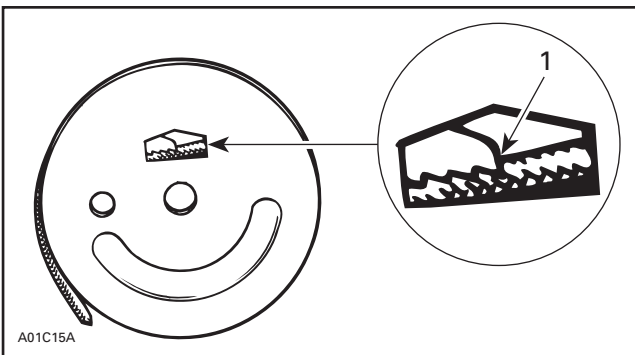


1. Grease inside spring guide

**▼ CAUTION**

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

To install a new rope no. 6: insert rope into sheave no. 5 orifice and lock it with the key no. 7 as illustrated.



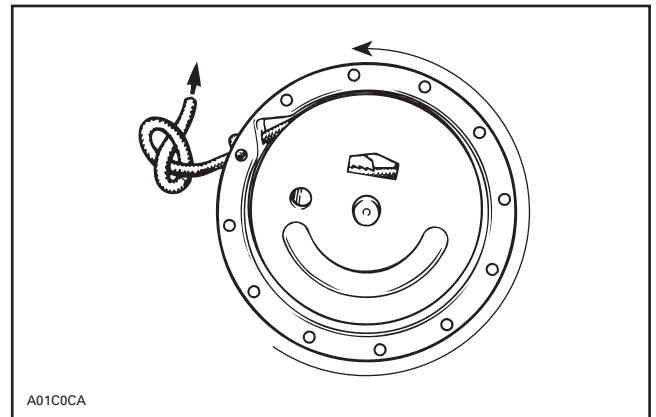
1. Push to lock

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 rewind spring hook.

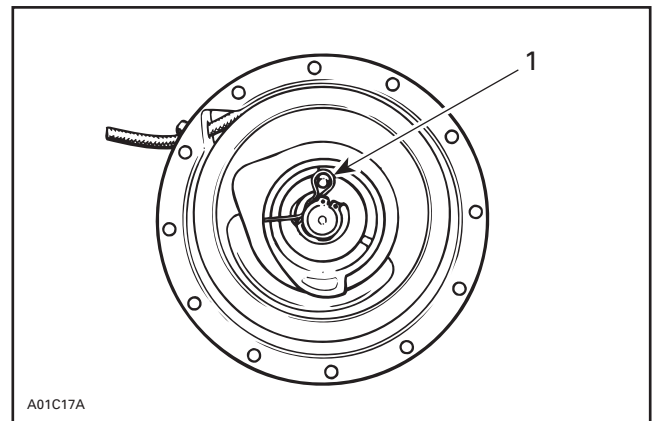
Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

Pull the rope out of the starter housing and temporarily make a knot to hold it. One turn preload will give 7 turns of tension when fully extended.



Position pawl no. 8, pawl lock no. 9 and circlip no. 10.

Install locking spring no. 11 and lubricate with MOLYKOTE G-n paste from Dow Corning® or equivalent.



1. Spring coated with MOLYKOTE G-n paste

Install locking ring.

**▼ CAUTION**

This lubricant must NOT be used on rewind springs as it does not stay on when dry.

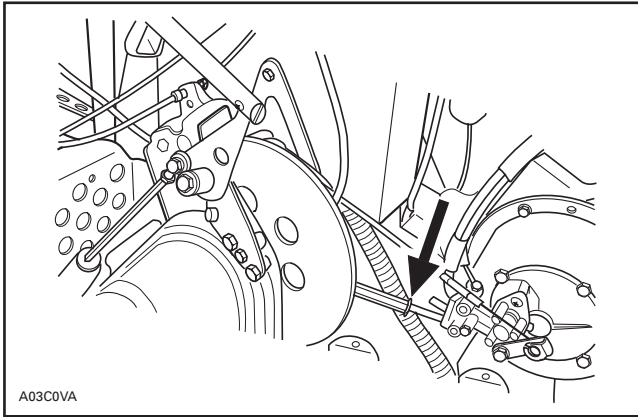
## INSTALLATION

On fan cooled models with oil injection pump, re-install oil pump on rewind starter assembly.

Thread starter rope no. 6 through rope guide when applicable.

## Section 03 ENGINE

### Sub-Section 10 (REWIND STARTER)



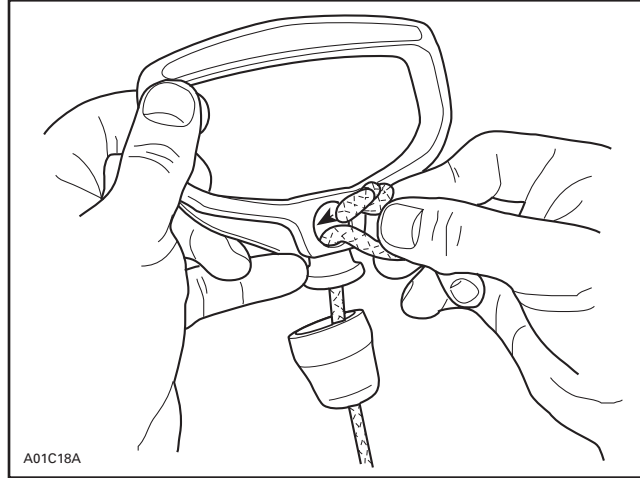
**All Engines Except 583 MX Z, 583 Summit and 670**

Reinstall rewind starter assembly on engine.

**583 MX Z, 583 Summit and 670 Only**

Install rewind starter on damper ring matching notches and embosses.

Prior to installing starter grip no. 16 on new rope, it is first necessary to fuse the rope end with a lit match. pass rope through rubber buffer no. 15 and starter grip and tie a knot in the rope end. fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.



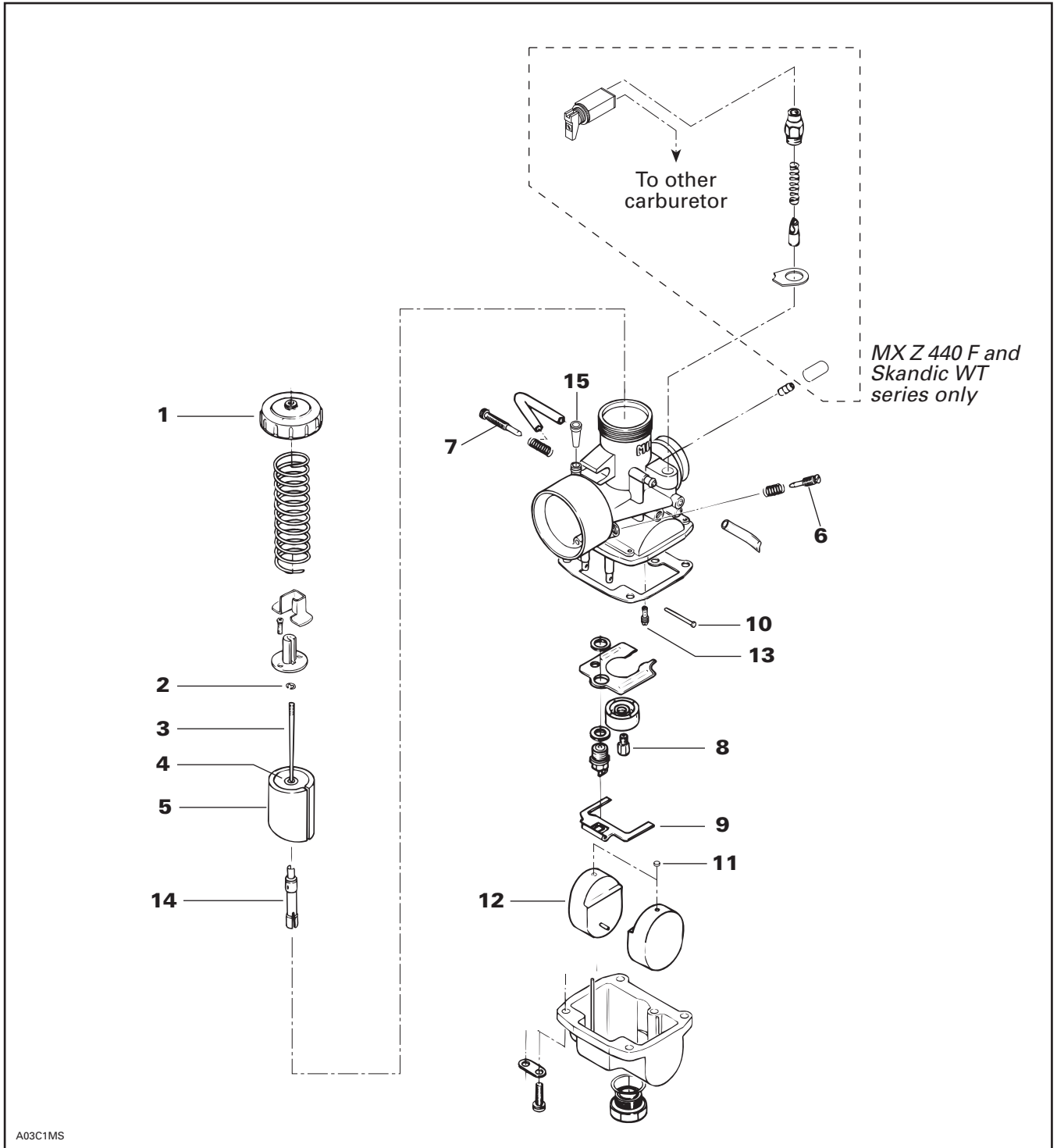
TYPICAL



1. Notch

# CARBURETOR AND FUEL PUMP

All Models



A03C1MS



## Section 03 ENGINE

### Sub-Section 11 (CARBURETOR AND FUEL PUMP)

## REMOVAL

Remove air silencer(s). Refer to BATTERY 05-05.

Disconnect fuel inlet line.

Disconnect primer line from carburetor on some models.

Disconnect choke cable on some models.

Unscrew carburetor cover **no. 1** then pull out throttle slide **no. 5** from carburetor.

### ◆ WARNING

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

Disconnect throttle cable from throttle slide.

Untighten rubber flange clamps then remove carburetor from engine.

## CLEANING AND INSPECTION

The entire carburetor should be cleaned with a general solvent and dried with compressed air before disassembly.

### ▼ CAUTION

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

Carburetor body and jets should be cleaned in a carburetor cleaner following manufacturer's instructions.

### ◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as they are flammable and explosive.

## 15, Filter

Check for clogged filter. Clean or replace as required.

Check inlet needle tip condition. If worn, the inlet needle and seat must be replaced as a matched set.

○ **NOTE:** Install needle valve for snowmobile carburetor only. It is designed to operate with a fuel pump system.

Check throttle slide for wear. Replace as necessary.

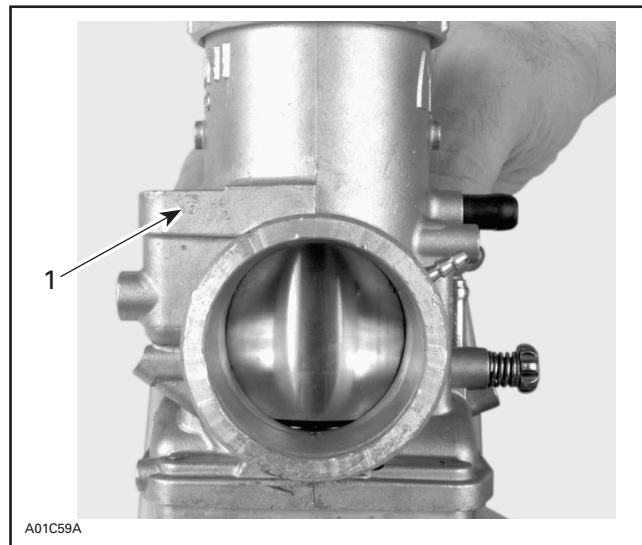
Check idle speed screw straightness. Replace as necessary.

Check for fuel soaked into float **no. 12**; replace as necessary.

Check float for cracks or other damages affecting free movement; replace as necessary.

## IDENTIFICATION

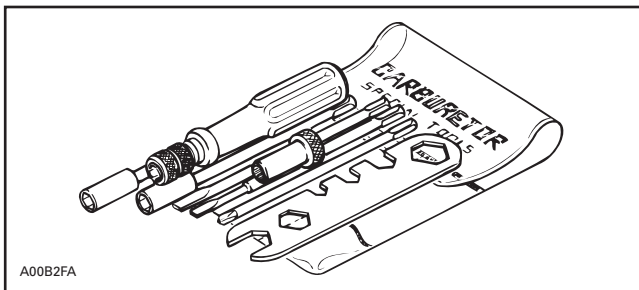
All carburetors are identified on their body.



1. Identification: 34-482

**DISASSEMBLY AND ASSEMBLY**

**NOTE:** To ease the carburetor disassembly and assembly procedures it is recommended to use carburetor tool kit (P/N 404 1120 00).



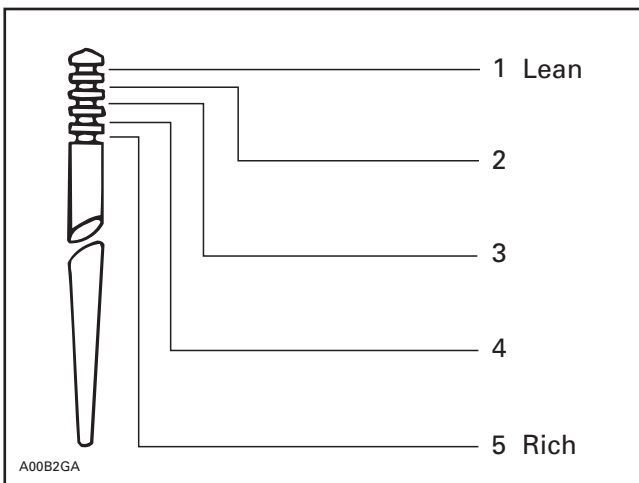
**2,3, E-clip and Needle**

Remove screws from needle retaining plate to withdraw the needle.

The position of the needle in the throttle slide is adjustable by means of an E-clip inserted into 1 of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

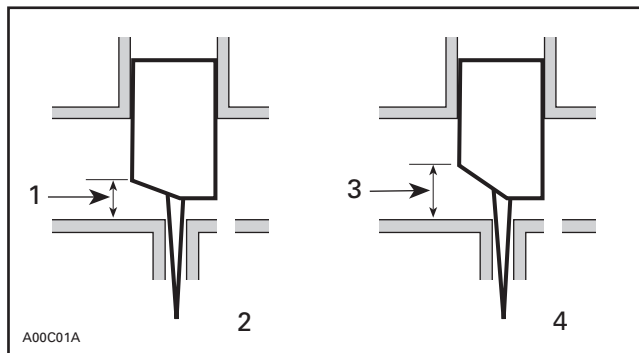
**NOTE:** The last digit of the needle identification number gives the recommended position of the E-clip **from the top** of the needle.

Example: **6DH4-3**  
 Needle identification      ↑      ↑      Recommended position of the E-clip from top



**CLIP POSITIONS**

The size of the throttle slide cut-away affects the fuel mixture between 1/8 to 1/2 throttle opening.



- 1. Low cut-away low
- 2. Rich mixture
- 3. High cut-away high
- 4. Lean mixture

**8, Main Jet**

The main jet installed in the carburetor has been selected for a temperature of -20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. Always check spark plug tip and/or piston dome color to find out correct jetting.

**CARBURETOR FLOAT LEVEL ADJUSTMENT**

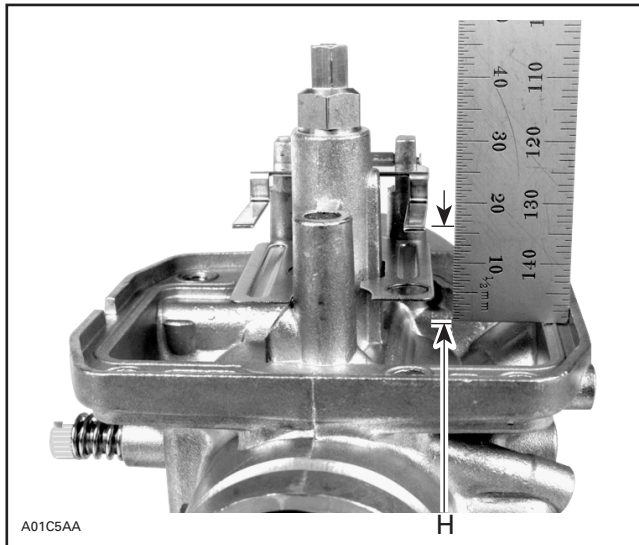
**9,10, Float Arm and Float Arm Pin**

Correct fuel level in float chamber is vital toward maximum engine efficiency. To check for correct float level proceed as follows:

- Make sure that float arm is symmetric — not distorted.
- Remove float bowl and gasket from carburetor.
- With carburetor chamber upside-down on a level surface, measure height H between bowl seat and **top** edge of float arm. Keep ruler perfectly vertical and in line with main jet hole.

## Section 03 ENGINE

### Sub-Section 11 (CARBURETOR AND FUEL PUMP)



A01C5AA

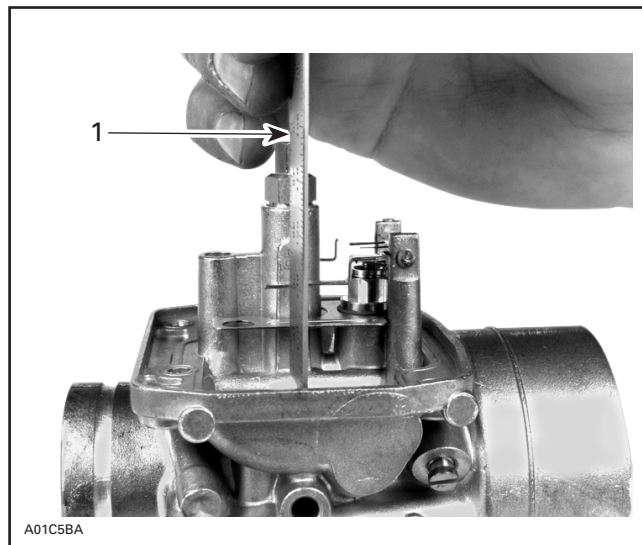
TYPICAL

H: Float height

CARBURETOR MODEL	FLOAT HEIGHT H	
	± 1 mm	(± .040 in)
MX Z 440 F	23.9	(.941)
MX Z 440	23.9	(.941)
MX Z 583	18.1	(.713)
MX Z 670	18.1	(.713)
Formula 500/500 DL	18.1	(.713)
Formula 583	18.1	(.713)
Formula Z	18.1	(.713)
Summit 500	18.1	(.713)
Summit 583	18.1	(.713)
Summit 670	18.1	(.713)
Grand Touring 500	18.1	(.713)
Grand Touring 583	18.1	(.713)
Skandic WT/SWT	23.9	(.941)
Skandic WT LC	23.9	(.941)

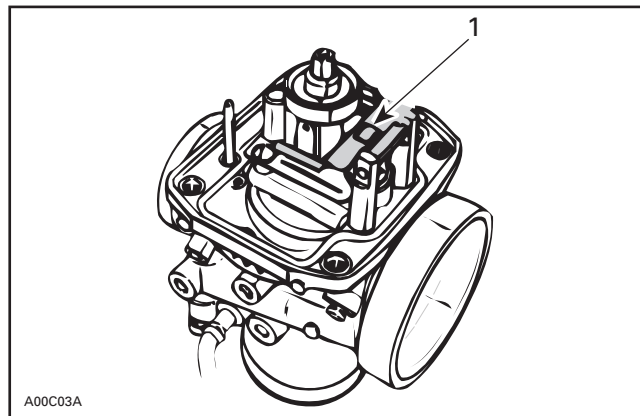
#### To Adjust Height H:

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



A01C5BA

1. Ruler vertical and in line with main jet

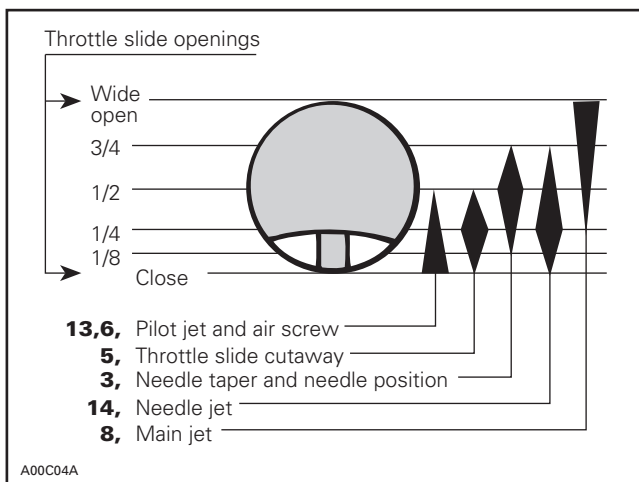


A00C03A

1. Contact tab

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

Note that the wider part of symbol corresponds to the opening mostly affected. For instance, throttle slide cut-away begins to function at closed position but it is most effective at 1/4 opening and decreases up to 1/2 opening.



VIEW FROM AIR INTAKE OPENING

NOTE: For fine tuning refer to TECHNICAL DATA 09 and to SPARK PLUG 05-03.

NOTE: For high altitude regions, the High Altitude Technical Data Booklet (P/N 484 0648 00 and 484 0545 00 for binder) gives information about calibration according to altitude and temperature.

## INSTALLATION

### CAUTION

Never allow throttle slide(s) to snap shut.

To install carburetor on engine, inverse removal procedure.

However, pay attention to the following:

- Inspect throttle cable and housing prior to installation.

On applicable models, make sure to align tab of carburetor and air intake silencer (if applicable) with notch of adaptor(s). On applicable models, install adaptor with up mark facing up.

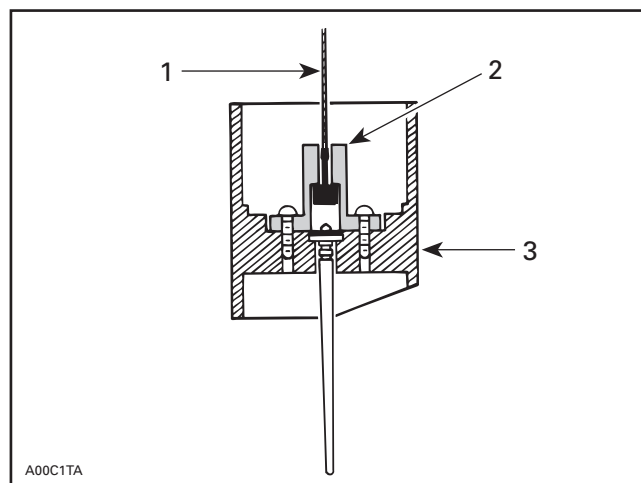
### CAUTION

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.

Install clamps in a way that their tightening bolts are staggered — not aligned.

Hook throttle cable into the needle retainer plate.

NOTE: Do not obstruct hole in throttle slide when installing needle retaining plate. This is important to allow air escaping through and thus allowing a quick response.



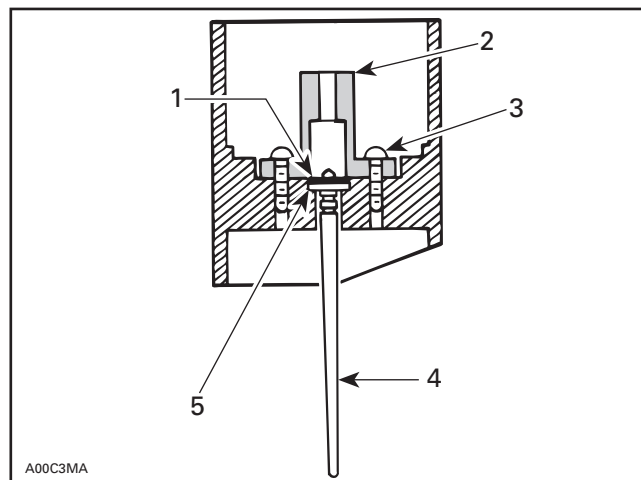
CENTER POST TYPE

1. Throttle cable
2. Needle retaining plate
3. Throttle slide

Make sure the nylon packing no. 4 is installed on all applicable throttle slides.

### CAUTION

Serious engine damage can occur if this notice is disregarded.



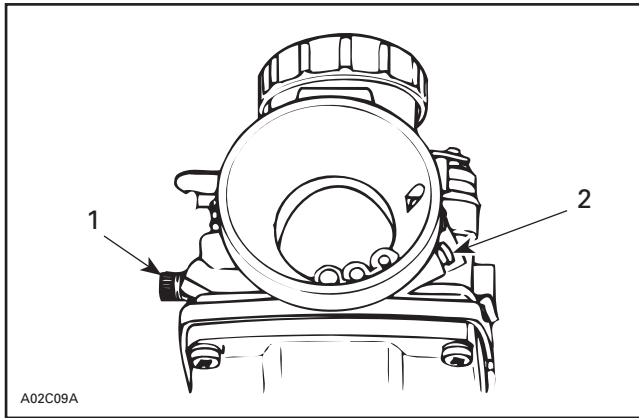
CENTER POST TYPE

1. E-clip
2. Needle retaining plate
3. Screw
4. Needle
5. Nylon packing

## Section 03 ENGINE

### Sub-Section 11 (CARBURETOR AND FUEL PUMP)

## CARBURETOR ADJUSTMENTS



1. Idle speed screw
2. Air screw

### 6, Air Screw Adjustment

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

Turning screw in clockwise enrichens mixture and conversely, turning it out counterclockwise leans mixture.

Refer to TECHNICAL DATA 09 for the specifications.

### Carburetor Synchronization

#### **Twin Carburetor Models Only**

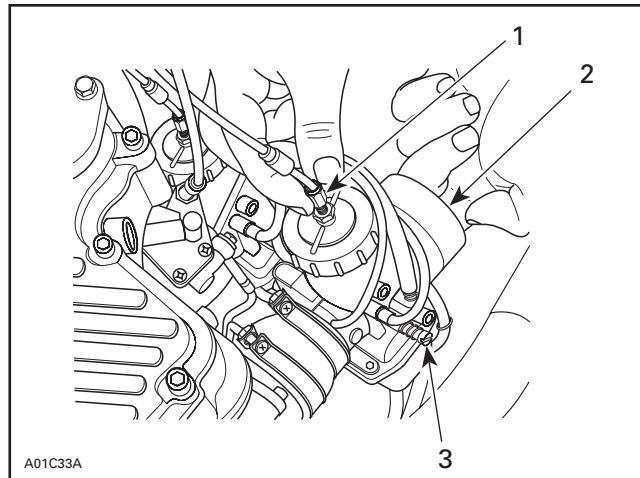
Both carburetor slides must start to open at the same time.

Completely unscrew idle speed screw on both carburetors.

Unlock cable adjustment lock nut then screw in adjuster until throttle slide bottoms out. Proceed the same for both carburetors.

Unscrew cable adjuster to eliminate all cable play but without raising throttle slide. Proceed with care on both carburetors then tighten jam nuts. Both carburetor slide must start to open at the same time, depress throttle lever to check it and turn cable adjuster as required.

Check throttle slide position at wide open throttle. Throttle slide must be flush or 1 mm (.040 in) lower than carburetor **outlet** bore. At that same position, check that throttle slide does not contact carburetor cover. Turn cable adjuster and recheck synchronization.



#### **TYPICAL**

1. Screw in and out until no cable free play exists
2. Check that throttle side does not move
3. Idle speed screw completely unscrewed

### ▼ CAUTION

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 or other components in throttle mechanism.

### Throttle Slide Adjustment

#### **All Models**

### ◆ WARNING

Ensure the engine is turned OFF, prior to performing the throttle slide adjustment

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

The following method should be used with engine turned off:

- **Idle speed** screw must be completely unscrewed. It must not contact throttle slide.

Turn the **idle speed** screw clockwise until it contacts the throttle slide then continue turning 2 additional turns.

**Twin Carburetor Models Only**

Repeat on the other one. This will ensure identical throttle slide preliminary idle setting. Recheck carburetor synchronization. Adjust idle by turning both idle speed screws of the same amount.

**CAUTION**

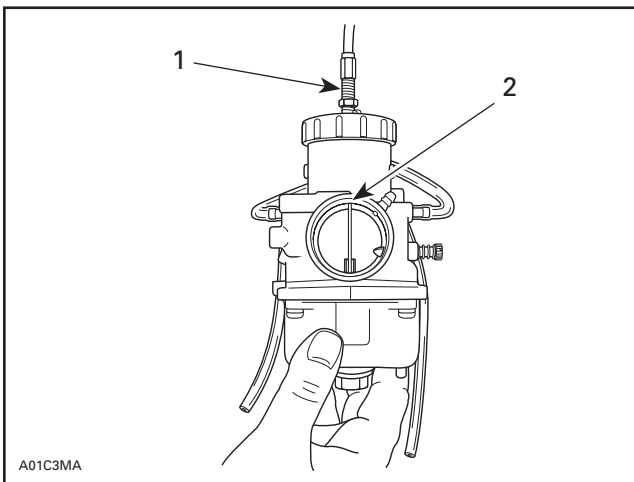
On twin carburetor models, make sure both carburetors start to operate simultaneously. Beside do not interchange carburetors, the jetting may be different on each side. A red dot is printed on one carburetor and on the engine. Match the carburetor and the engine dots when applicable.

**CAUTION**

On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 03-06.

**All Models**

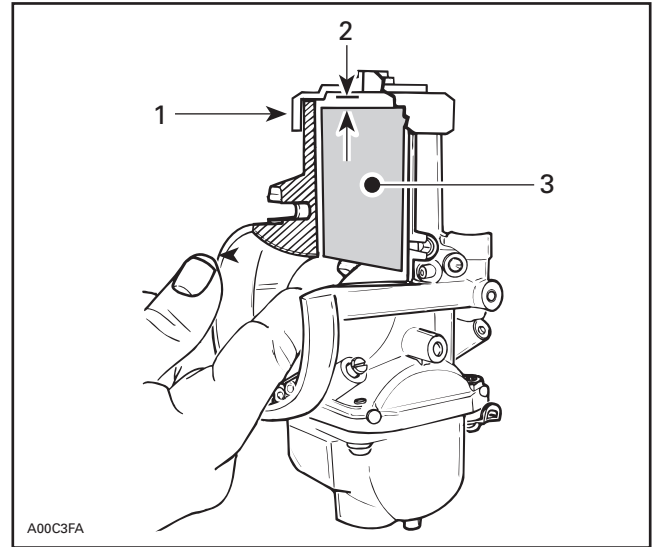
Throttle slide must be flush or 1.0 mm (.040 in) lower than the top of carburetor outlet bore (engine side).



**THROTTLE LEVER AGAINST HANDLE GRIP**

1. Throttle cable adjuster
2. Throttle slide flush or 1.0 mm (.040 in) lower than carburetor outlet bore (engine side)

Once carburetor adjustment is performed, check that **with the throttle lever fully depressed**, there is a free play between the carburetor cover and top of throttle slide.



**THROTTLE LEVER AGAINST HANDLE GRIP**

1. Cover
2. Free play
3. Throttle slide

**WARNING**

This gap is very important. If the throttle slide rests against the carburetor cover at full throttle opening, this will create too much strain and may damage the throttle cable or other components in throttle mechanism.

On twin-carburetor models: Recheck carburetor synchronization.

**CAUTION**

On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 03-06.

**PRELIMINARY IDLE SPEED ADJUSTMENT**

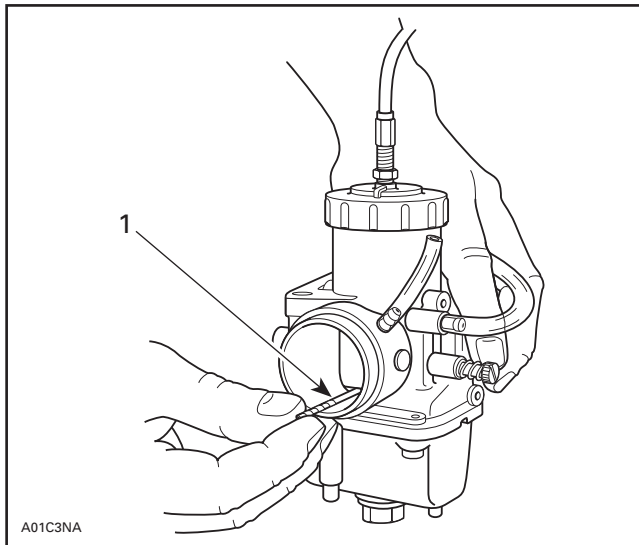
Adjust throttle slide height (see table) by turning idle speed screw **no. 7**.

Final adjustment (engine running at idle speed) should be within 1/2 turn of idle speed screw from preliminary adjustment.

## Section 03 ENGINE

### Sub-Section 11 (CARBURETOR AND FUEL PUMP)

Models	Throttle Slide Height mm (in)
MX Z 440 F	1.5 (.059)
MX Z 440	1.8 (.071)
MX Z 583	2.0 (.078)
MX Z 670	2.1 (.083)
Formula 500/500 DL	1.8 (.071)
Formula 583	2.0 (.078)
Formula Z	2.0 (.078)
Summit 500	2.0 (.078)
Summit 583	2.3 (.090)
Summit 670	2.3 (.090)
Grand Touring 500	1.8 (.071)
Grand Touring 583	2.0 (.078)
Skandic WT/SWT	1.3 (.051)
Skandic WT LC	1.5 (.059)



TYPICAL

1. Drill bit used as gauge for throttle slide height

## IDLE SPEED FINAL ADJUSTMENT

### 7, Idle Speed Screw

Start engine and allow it to warm then adjust idle speed to specifications by turning **idle speed** screw clockwise to increase engine speed or counterclockwise to decrease it.

**NOTE:** On twin-carburetor models: Turn adjustment screw the same amount to keep carburetors synchronized.

Refer to TECHNICAL DATA 09 for the specifications.

### ▼ CAUTION

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

## CHOKE

### **MX Z 440F and Skandic WT/SWT/WT LC**

#### Choke Plunger Adjustment

Adjust cable length to obtain a slight contact between plunger and tool (P/N 529 0321 00). Retighten lock nut.

## HAC SYSTEM

### **Summit Only**

HAC (High Altitude Compensator) is a maintenance free device.

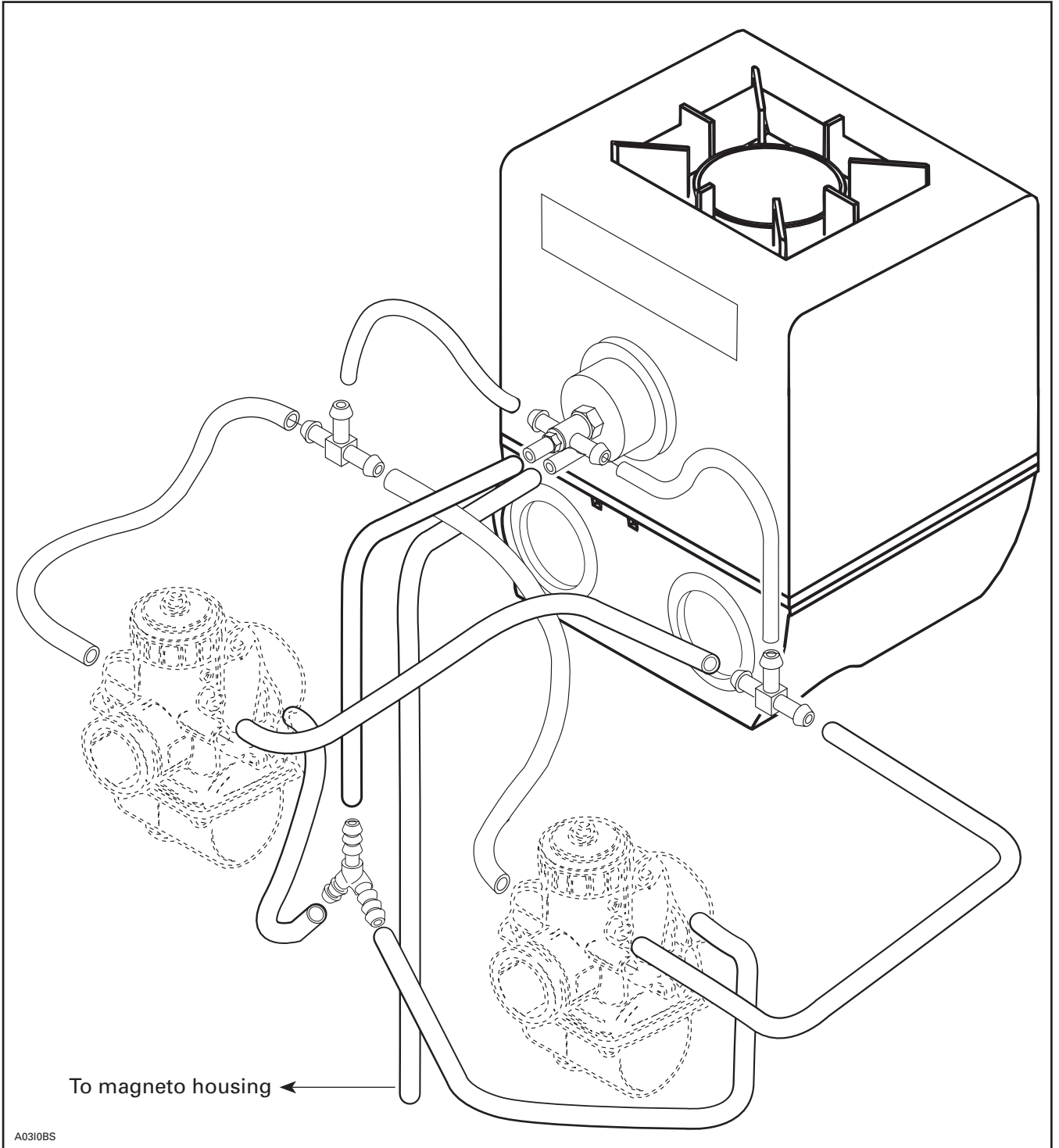
No adjustment and verification can be done on HAC.

If HAC is suspected to be faulty, replace it and check for improvement.

Hoses connected to HAC must not be altered in length or size. Check for kinked or loose hoses. Tighten or replace as necessary. See below illustrations for routing.

Nut holding T-fitting must be torqued to 6 N•m (53 lbf•in).

**HAC SYSTEM**



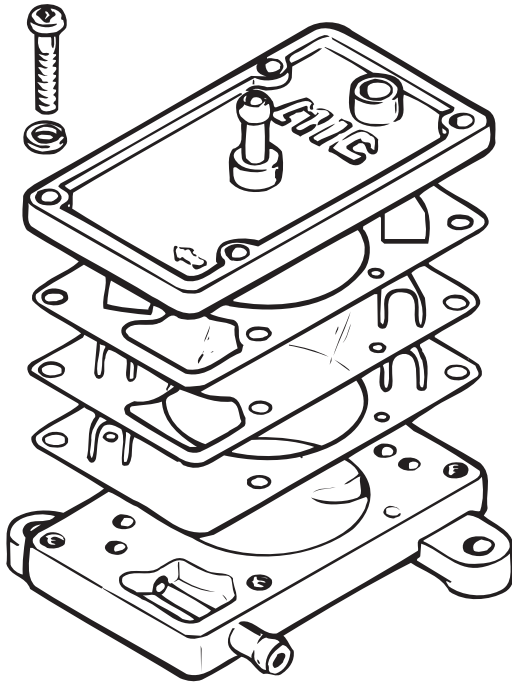


**Section 03 ENGINE**

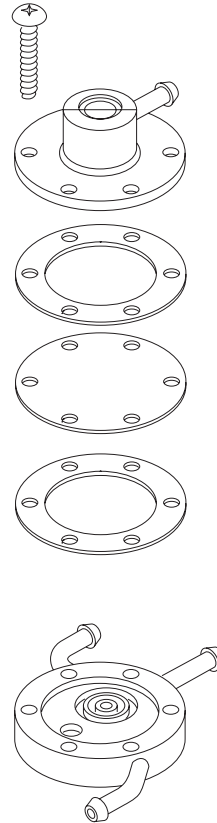
**Sub-Section 11 (CARBURETOR AND FUEL PUMP)**

**FUEL PUMP**

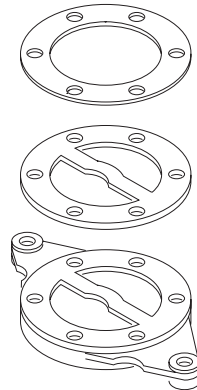
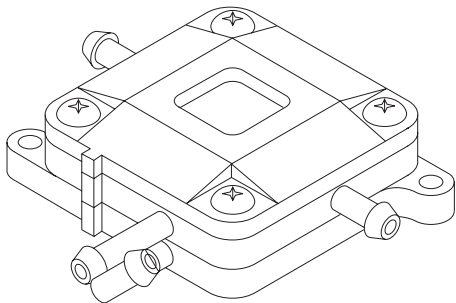
*443/503 engines*



*454 engine*



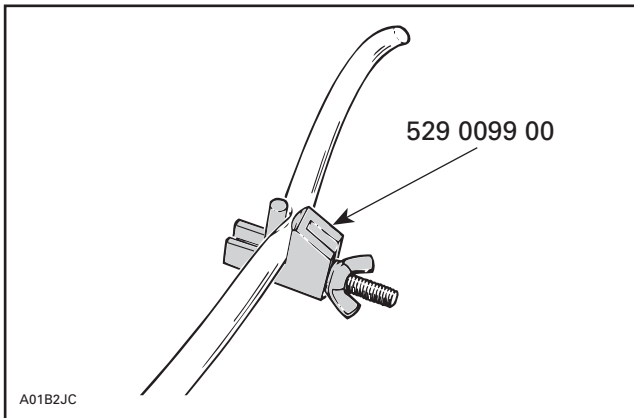
*583, 599, 670 and 779 engines*



A06C39T

## REMOVAL

Install a hose pincer (P/N 529 0099 00) on fuel supply line close to pump inlet.



Disconnect fuel outlet line(s).

Disconnect impulse line.

Remove screws securing fuel pump.

## PUMP VERIFICATION

Check fuel pump valves operation as follows:

Connect a clean plastic tubing to the inlet nipple and alternately apply pressure and vacuum with pump of leak test kit. 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 2 outlets, plug 1 outlet with finger while checking outlet valve.

Check impulse diaphragm and gasket on high-supply fuel pump with twin outlets as follows:

Connect a clean plastic tubing to the impulse nipple and plug vent hole on top cover. Either apply pressure or vacuum. The diaphragm/gasket must not leak.

## CLEANING AND INSPECTION

The entire pump should be cleaned with general purpose solvent before disassembly.

Fuel pump components should be cleaned in general purpose solvent and dried with compressed air.

### ◆ WARNING

Solvent with a low flash point such as gasoline, naphtha, benzol, etc., should not be used as each is flammable and explosive.

Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.

**High-supply pump with twin outlets:** Thoroughly clean filter on top cover. Replace pump if too dirty.

## INSTALLATION

To install, inverse removal procedure.

### ◆ WARNING

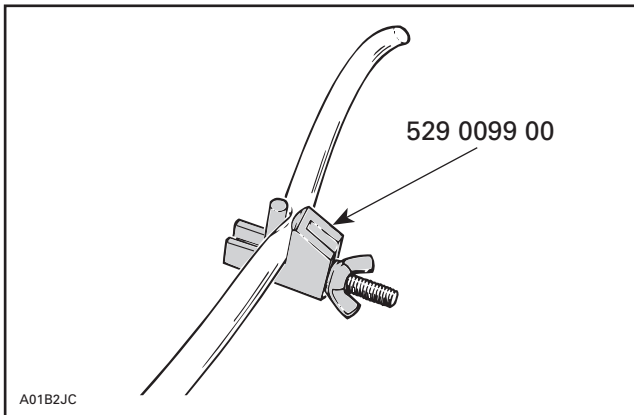
Pressure test to ensure there is no leak in fuel system.

# FUEL TANK AND THROTTLE CABLE

## Fuel Tank Lines

### ◆ WARNING

When draining a fuel tank or whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 529 0099 00) or equivalent device. Fuel is flammable and explosive under certain conditions. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.



## Impulse/Fuel Lines Spring Clips (all models)

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

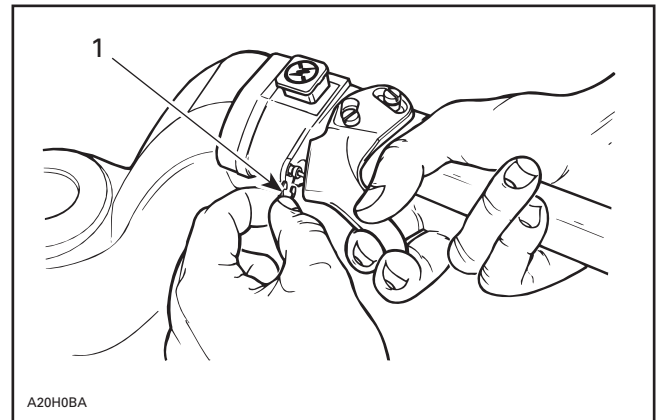
## Throttle Cable Circlip at Handlebar (all models)

Put silicone grease (P/N 413 7017 00) around cable barrel. Locate circlip as per illustration.

### ◆ WARNING

If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

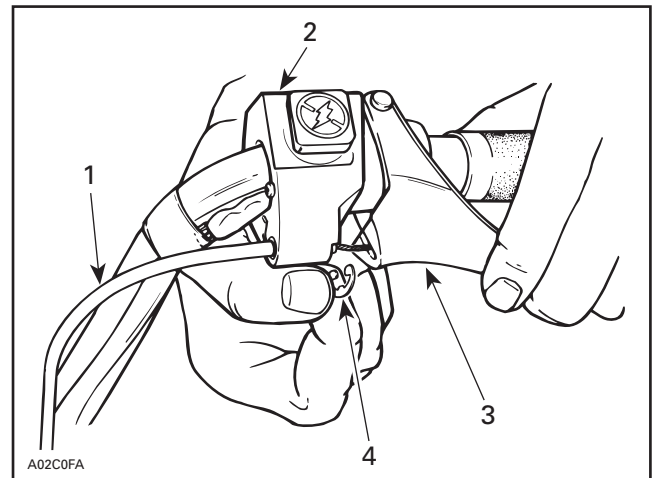
## Models with Easy Action Throttle Lever



TYPICAL

1. Circlip

## Other Models



TYPICAL

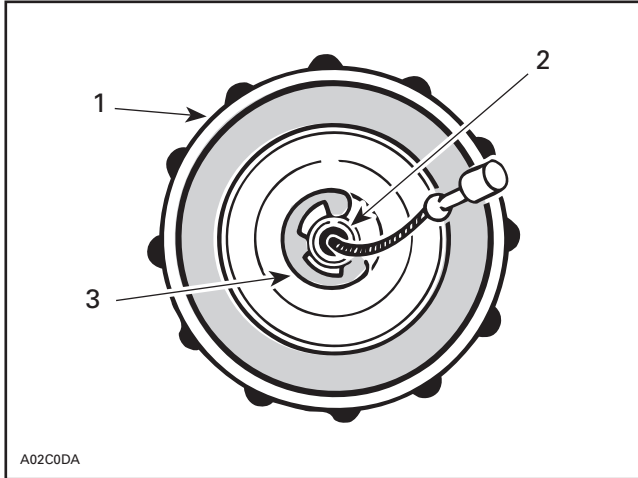
1. Throttle cable housing
2. Throttle handle housing
3. Throttle handle
4. Circlip

## Section 03 ENGINE

### Sub-Section 12 (FUEL TANK AND THROTTLE CABLE)

#### Throttle Cable O-ring and Retaining Ring at Carburetor (some models)

Locate O-ring outside of carburetor cover and retaining ring inside.



1. Carburetor cover
2. Throttle cable housing
3. Retaining ring

Adjust throttle cable as specified in CARBURETOR AND FUEL PUMP 03-11.

#### Throttle Cable Routing

### CAUTION

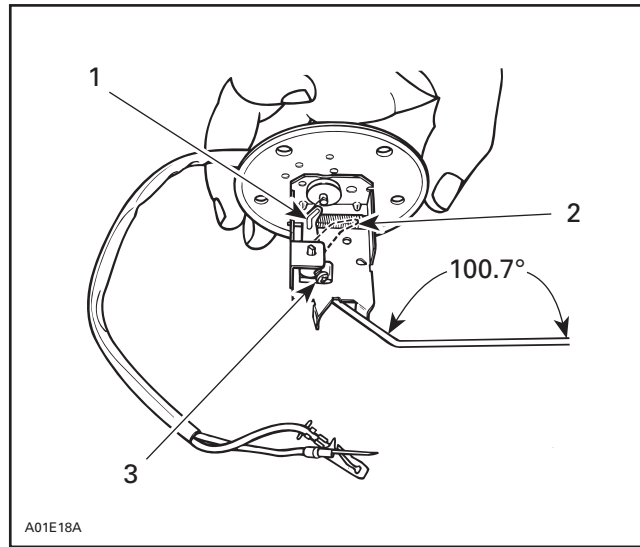
Check that throttle cable is routed away from sharp, edges, hot or vibrating parts. When turning steering while engine is running, idle speed must not vary.

#### Fuel Level Sensor

##### **Grand Touring 500/583 and Formula Z**

#### INSPECTION

Visually inspect the condition of connectors and wiring throughout the circuit. Connections must be clean and tight, and wiring free of damage. Repair as necessary. Use silicone dielectric grease to prevent corrosion at the connectors. Operate the engine to see if the problem has been corrected. If not, remove fuel level sensor from fuel tank and check rod angle ( $100.7^\circ$ ), resistance at full position ( $3 \pm 2 \Omega$ ) and resistance at empty position ( $110 \pm 7 \Omega$ ).



1. Full position ( $3 \pm 2 \Omega$ )
2. Empty position ( $110 \pm 7 \Omega$ )
3. Loosen to adjust

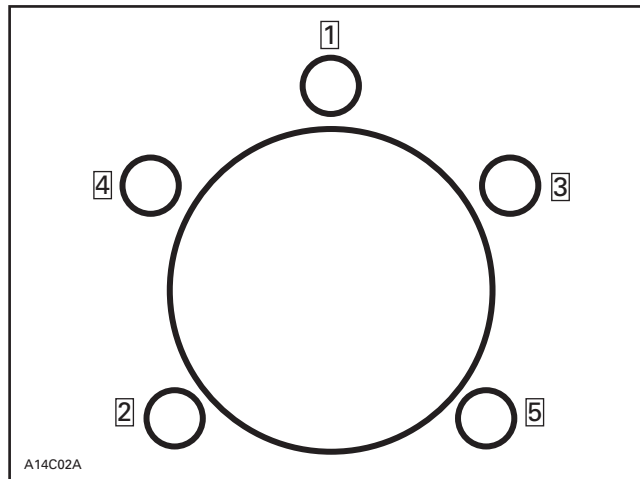
#### FUSE REPLACEMENT

A 0.25 ampere fuse protects fuel level sensor circuitry. Remove seat to gain access.

#### Fuel Level Sensor Screws

##### **Grand Touring 500/583 and Formula Z**

Torque fuel level sensor retaining screws to 1 N•m (8 lbf•in) in the sequence shown and then to 2.5 N•m (22 lbf•in), using the same sequence.



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## Section 04 TRANSMISSION

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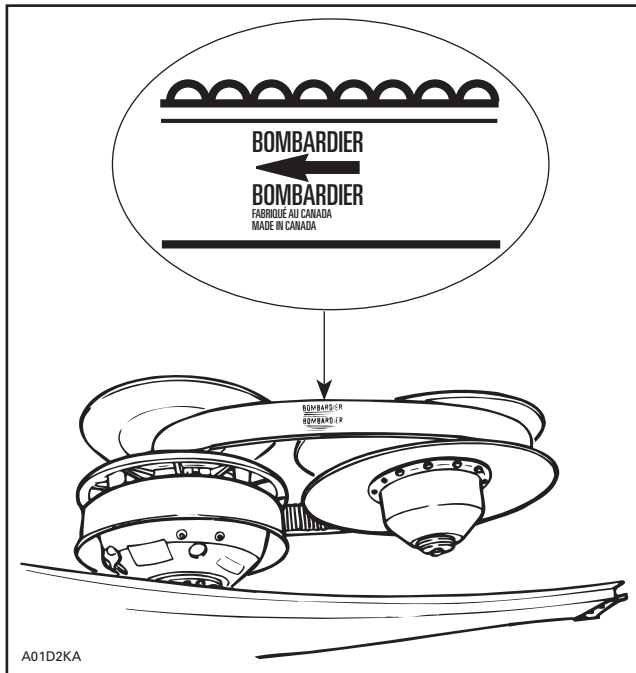
# DRIVE BELT

## 1997 APPLICATION CHART

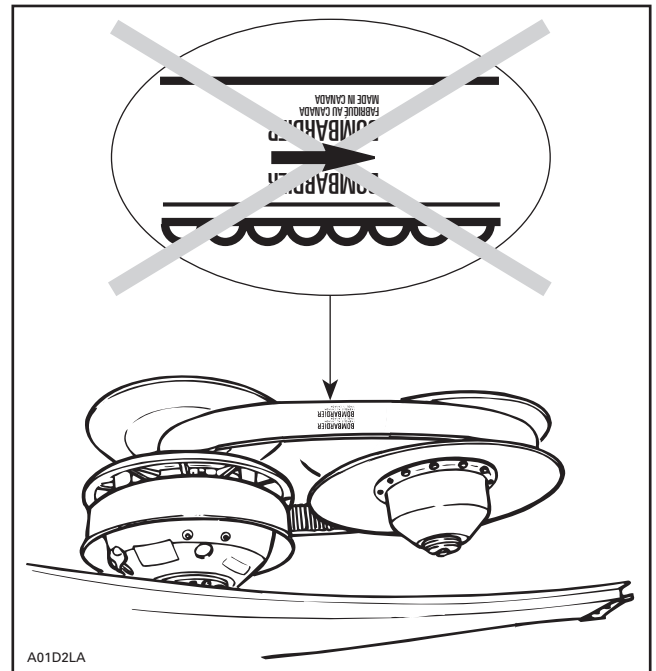
MODEL	PART NUMBER	WIDTH (NEW) ± 0.25 mm (.010 in)	MINIMUM WIDTH (WEAR LIMIT)
SUMMIT 583/670 AND MX Z 670	415 0603 00	35 mm (1-3/8")	33 mm (1-19/64")
SUMMIT 500, GRAND TOURING 500/583, FORMULA 500/500DL/583/Z AND MX Z 440/583	415 8607 00	34.7 mm (1-23/64")	32.3 mm (1-17/64")
SKANDIC WT/SWT/WT LC	414 6338 00	34.6 mm (1-23/64")	32 mm (1-1/4")
MX Z 440F	415 0606 00	34.7 mm (1-23/64")	32.3 mm (1-17/64")

### ROTATION DIRECTION

The maximum drive belt life span is obtained when the drive belt is installed as shown. This will ensure that correct direction of rotation is respected.



**CORRECT**



**INCORRECT**

**NOTE:** For used drive belt, mark and reinstall in the same position.

## Section 04 TRANSMISSION

### Sub-Section 02 (DRIVE BELT)

## DRIVE BELT DEFLECTION MEASUREMENT

**NOTE:** The drive belt deflection measurement must be performed each time a new drive belt is installed.

**NOTE:** To obtain an accurate drive belt deflection measurement, it is suggested to allow a break-in period of 50 km (30 mi).

Before checking the belt deflection, ensure vehicle has the proper belt (Refer to the application chart).

Adjust pulley distance and alignment. Refer to 04-05 PULLEY DISTANCE AND ALIGNMENT.

To obtain maximum vehicle performance, the belt tension must be adjusted according to specifications shown in the accompanying chart.

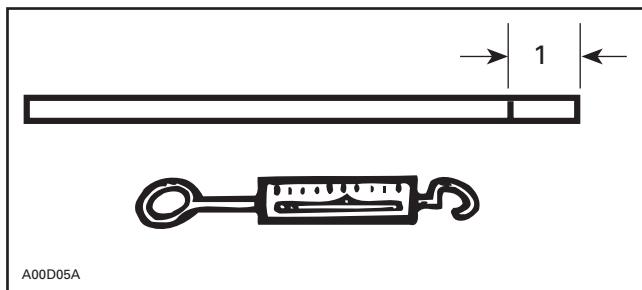
MODEL	DEFLECTION mm (in)	FORCE kg (lb)	HEIGHT† OVER DRIVEN PULLEY
All Models	32 ± 5 (1-1/4 ± 13/64)	11.3 (25)	0 - 1.5 mm (0 - 1/16")

†FOR REFERENCE ONLY

### To Check Tension

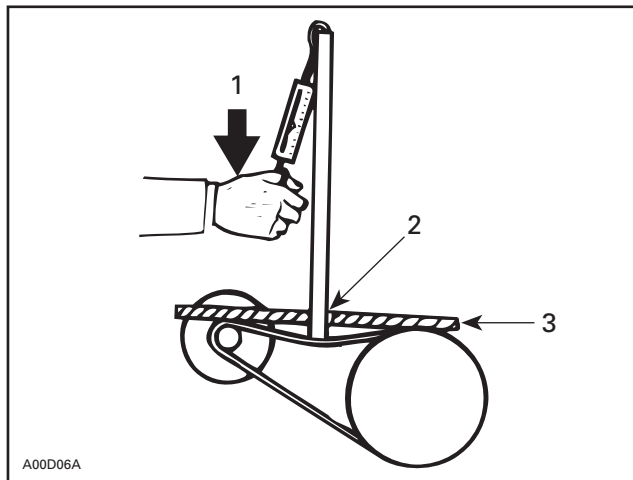
Position a reference rule on drive belt.

### Wooden Stick and Spring Scale Method:



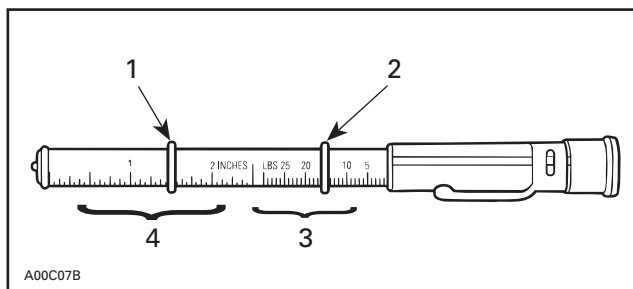
1. Mark specified deflection

Using spring scale and stick, apply specified force on drive belt halfway between pulleys as shown.



1. Force
2. Read deflection here
3. Reference rule

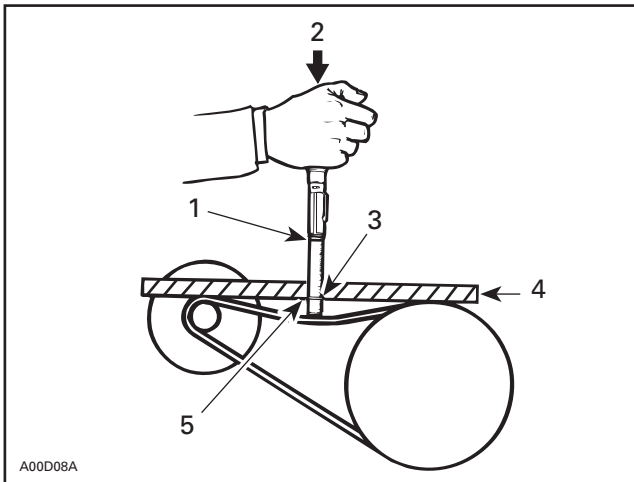
Or use the belt tension tester (P/N 414 3482 00).



1. Lower O-ring
2. Upper O-ring
3. Force (Read Down)
4. Deflection (Read Up)

1. Slide lower O-ring of deflection scale to specified measure.
2. Slide upper O-ring to zero on the force scale.
3. Apply pressure until lower O-ring is flush with edge of rule and read force on the upper scale at top edge of O-ring.





- 1. Upper O-ring
- 2. Force
- 3. Lower O-ring
- 4. Reference rule
- 5. Deflection

## DEFLECTION ADJUSTMENT

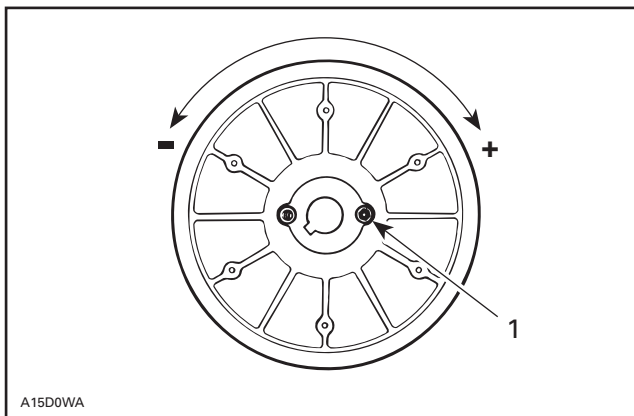
### S-Series

Adjust pulley distance according to specification, refer to PULLEY DISTANCE AND ALIGNMENT 04-05, then adjust drive belt deflection using Allen screws, as shown.

To increase deflection: turn Allen screws clockwise.

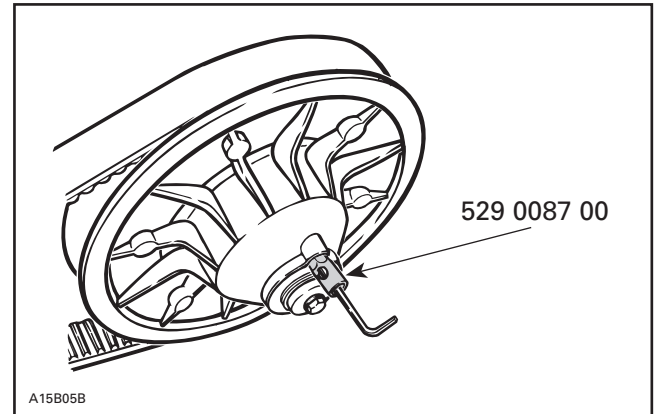
To decrease deflection: turn Allen screws counterclockwise.

**NOTE:** Turn Allen screws 1/4 turn at a time, then rotate driven pulley to allow drive belt to settle in pulley. Check deflection, repeat as required.



- 1. Allen screw with jam nut

Allen screws should be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 0087 00).



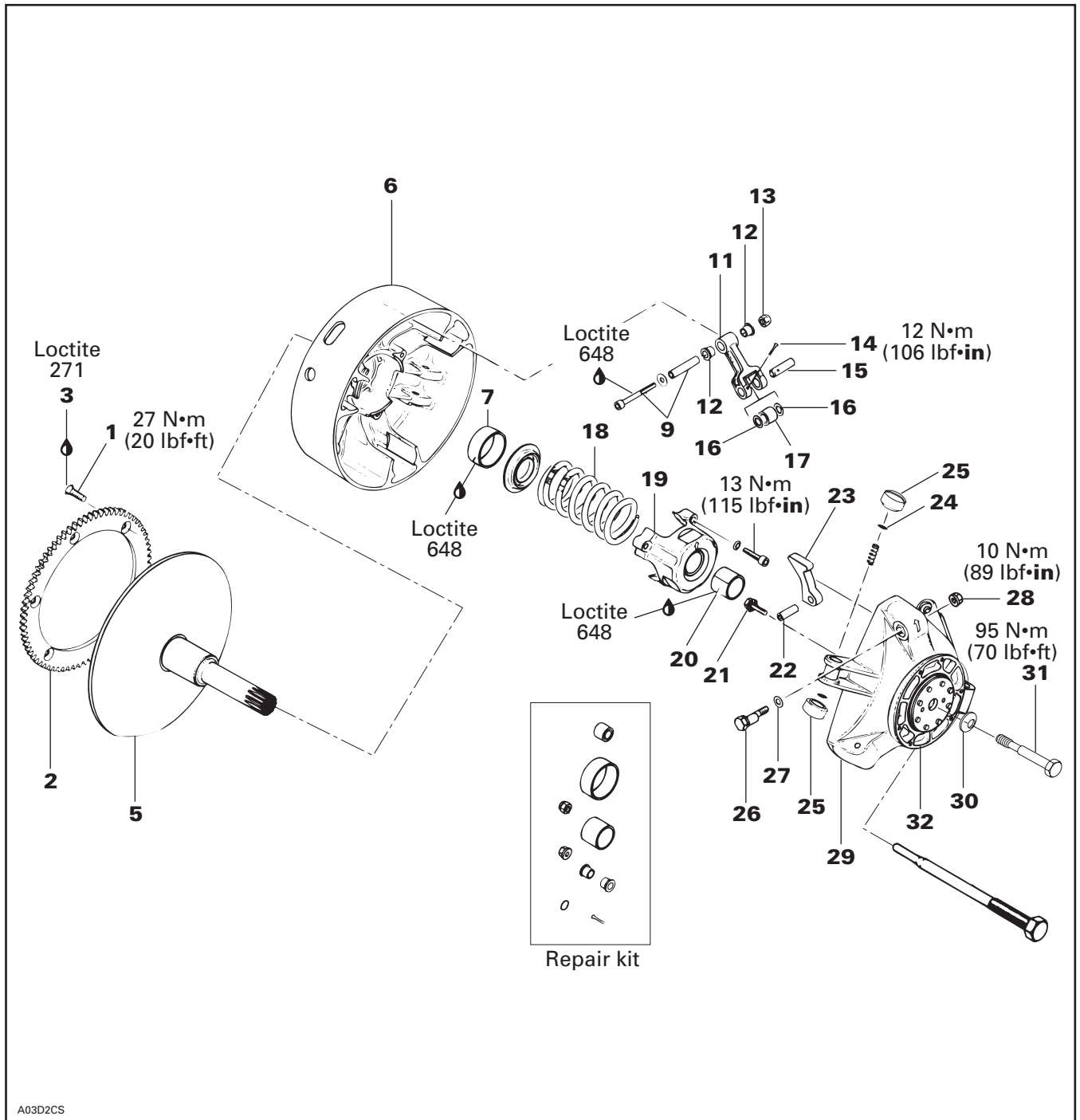
Restrain Allen screws with the wrench and tighten nut with the socket using socket handle provided in tool box.

# DRIVE PULLEY

## TRA

All Models

○ NOTE: This is a lubrication free drive pulley.



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## Section 04 TRANSMISSION

### Sub-Section 03 (DRIVE PULLEY)

## GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. The High Altitude Technical Data booklet (P/N 484 0648 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

### ▼ CAUTION

Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance. Verify spring specifications before installation. Do not only refer to the spring color code.

○ NOTE: TRA clutch stands for Total Range Adjustable clutch.

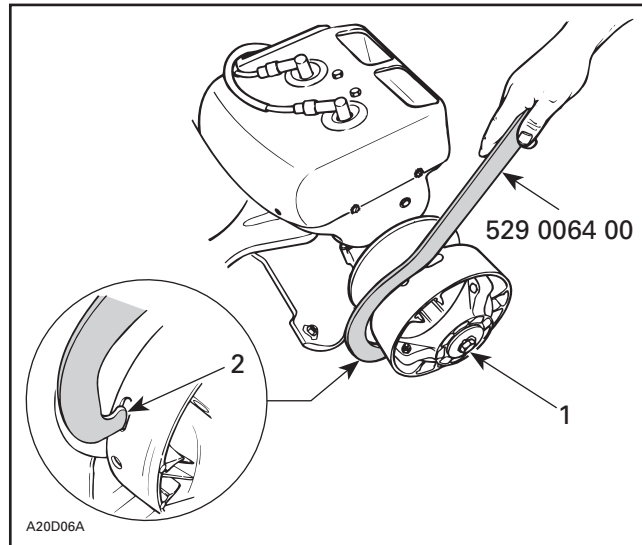
### ◆ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer, or other such qualified person. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

## REMOVAL

### 30,31, Conical Spring Washer and Screw

Use clutch holder (P/N 529 0064 00).



#### TYPICAL

1. Retaining screw
2. Insert in any slot

○ NOTE: Sliding half can be removed while fixed half remains on crankshaft.

### ◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Remove retaining screw.

To remove drive pulley ass'y and/or fixed half from engine, use puller (P/N 529 0079 00) for 443, 503 and 583 engines. Use puller (P/N 529 0224 00) for 454, 494 and 670 engines.

### ▼ CAUTION

These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley have the same type of threads (metric vs imperial) prior to fully tighten.

To Remove Drive Pulley Ass'y:  
 Retain drive pulley with clutch holder.  
 Install puller in pulley shaft then tighten.

**DISASSEMBLY**

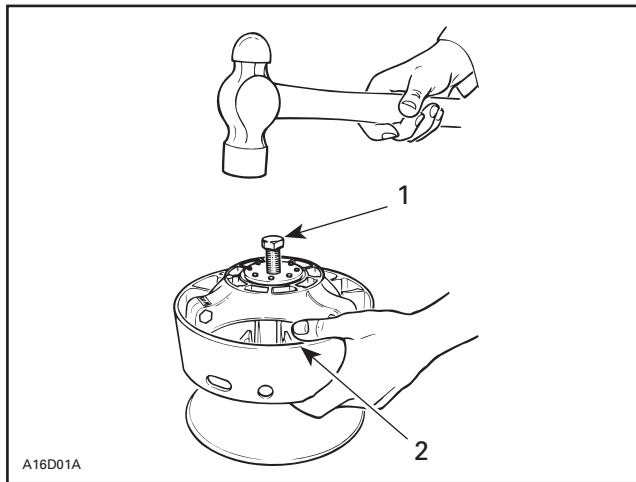
**1,2, Screw and Ring Gear**

▼ <b>CAUTION</b>
Retaining screws must be heated before dis-assembly.

**5,6, Fixed and Sliding Half**

▼ <b>CAUTION</b>
Do not tap on governor cup.

Screw puller into fixed half shaft about 13 mm (1/2 in). Raise drive pulley and hold it by the sliding half while knocking on puller head to disengage fixed half.



1. Puller
2. Holding sliding half

○ **NOTE:** No components marking is required before disassembling this drive pulley since it has factory mark and arrows as indexing reference.

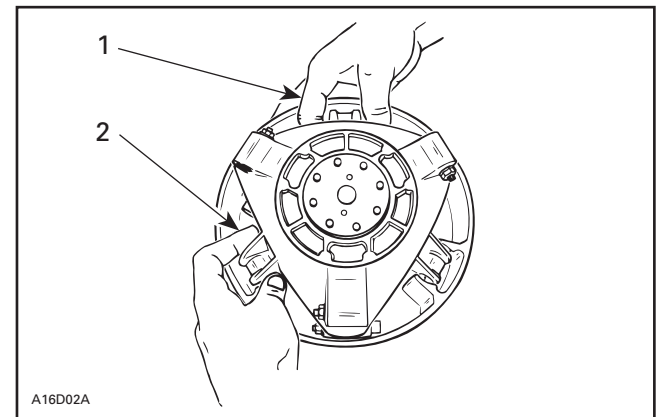
**25,29, Slider Shoe and Governor Cup**

Carefully lift governor cup until slider shoes come at their highest position into guides.

Hold a slider shoe set then carefully lift its housing and remove them. Proceed the same way for other housings lifting one at a time.

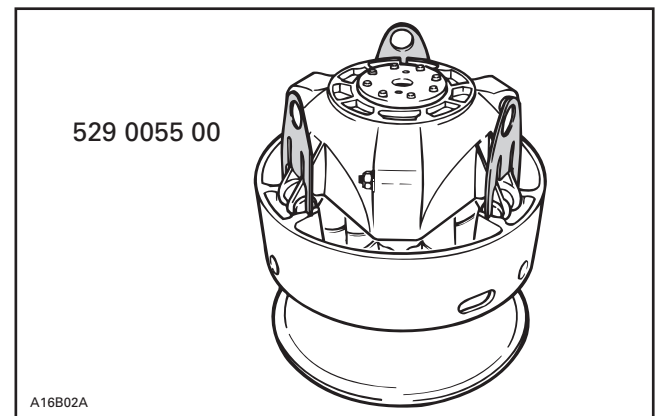
**32, Cushion Drive**

▼ <b>CAUTION</b>
Do not disassemble cushion drive. Governor cup and cushion drive are factory balanced as an assembly.



1. Hold slider shoes
2. Lift one housing at a time

○ **NOTE:** To ease disassembly, forks (P/N 529 0055 00) should be used to hold slider shoes prior to removing governor cup.



## Section 04 TRANSMISSION

### Sub-Section 03 (DRIVE PULLEY)

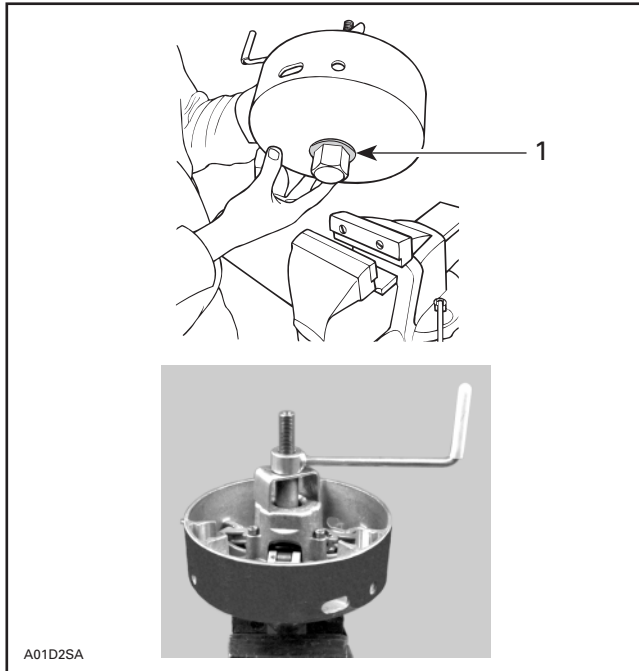
#### 19, Spring Cover Ass'y

It is pushed by clutch spring pressure.

#### ◆ WARNING

Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools.

Use spring compressor (P/N 529 0151 00).



1. Washer must be here

Install tools as shown. Remove 3 Allen screws retaining spring cover then unscrew compressor.

#### CLEANING

##### 5,6, Fixed and Sliding Half

Clean pulley faces and shaft with fine steel wool and dry cloth.

##### 5, Fixed Half and Crankshaft End

Parts must be at room temperature before cleaning.

Using a paper towel with cleaning solvent (P/N 413 7082 00), clean crankshaft tapered end and the taper inside the fixed half of the drive pulley, crankshaft threads and retaining screw threads.

#### ◆ WARNING

This procedure must be performed in a well ventilated area.

#### ▼ CAUTION

Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all hardened oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

#### ▼ CAUTION

Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent (P/N 413 7082 00).

Wipe off the mounting surfaces with a clean, dry paper towel.

#### ▼ CAUTION

Mounting surfaces must be free of any oil, cleaner or towel residue.

#### 7,20, Bushing

Only use petrol base cleaner when cleaning bushings.

#### ▼ CAUTION

Do not use acetone to clean bushing.

## INSPECTION

Drive pulley should be inspected annually.

### 16,17, Thrust Washer and Roller

Check roller for roundness of external diameter. Check thrust washer for thickness wear. Replace as required.

#### ▼ CAUTION

Ensure rollers are in good condition. Replace as required.

### 9,12, Fitting Bolt Ass'y and Flanged Bushing

Check for wear, replace as required. When installing old style flanged bushing (made of black plastic), use a size "O" (letter) drill bit to ream inside diameter.

### 24,25, O-ring and Slider Shoe

Check if O-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

### 5,29, Fixed Half and Governor Cup

Inspect splines and free play between both parts. Maximum free-play is 0.5 mm (.020 in) measured at calibration screw radius. Replace if required.

### 7,20, Sliding Half and Spring Cover Bushing

Visually inspect coating. Replace if worn.

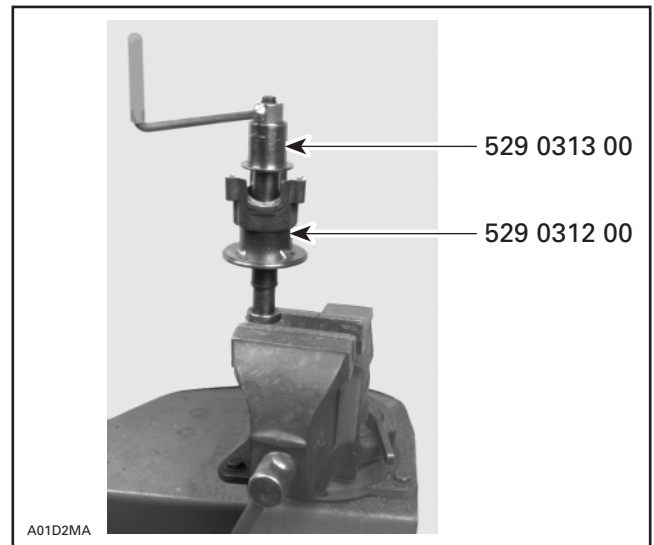
#### Sliding Half Bushing Replacement

These bushings can be replaced using tools which are not available at time of printing.

#### Spring Cover Bushing Replacement

Under normal use there is no need to replace this bushing.

Use tools (P/N 529 0313 00 and 529 0312 00) to remove old bushing.



#### ▼ CAUTION

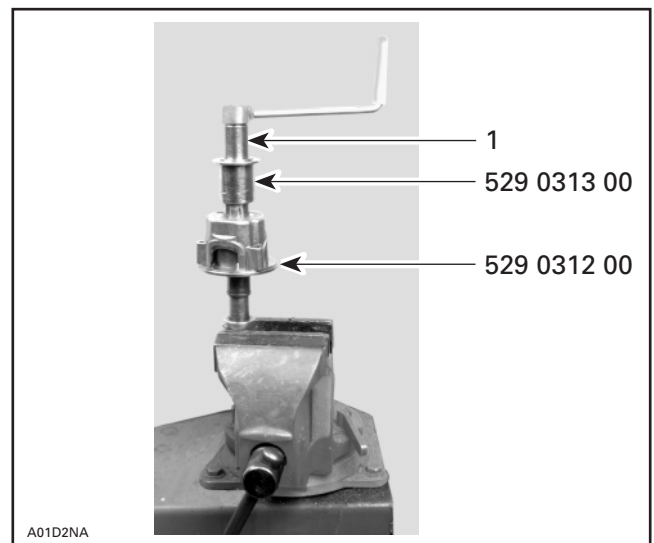
Bushing must be bonded with retaining compound.

Apply retaining compound Loctite 648 outside of bushing then press it down to counterbore from outside end. Use spring compressor (P/N 529 0151 00) and appropriate tools.

#### ▼ CAUTION

Insert bushing from outside (governor side) of spring cover.

Start driving bushing into spring cover.

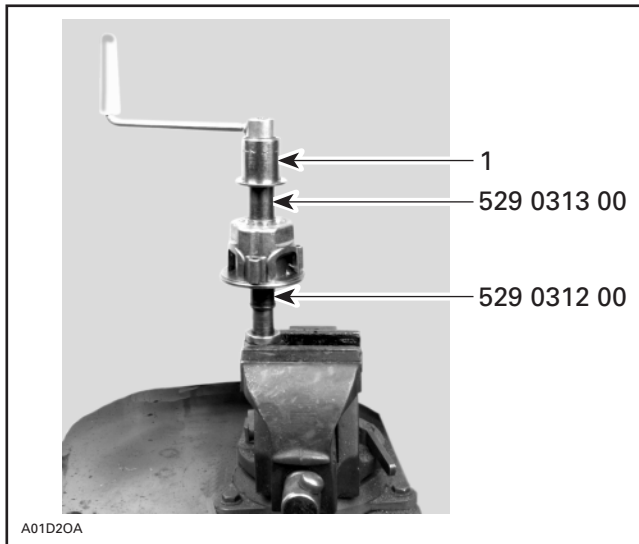


1. Note upper tool side

## Section 04 TRANSMISSION

### Sub-Section 03 (DRIVE PULLEY)


Press bushing.



A01D20A

1. Note upper tool side.

## ASSEMBLY

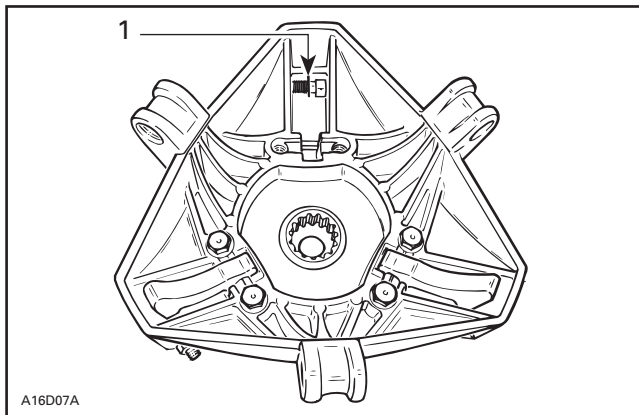
 **NOTE:** This drive pulley is lubrication free. Do not lubricate any component.

### 1,2,3, Screw, Ring Gear and Loctite 271

Apply Loctite 271 (P/N 413 7029 00) on threads and then torque to 27 N•m (20 lbf•ft).

### 26,27,28, Calibration Screw, Washer and Locking Nut

When installing calibration screw, make sure to install washer as shown.



A16D07A

1. Washer

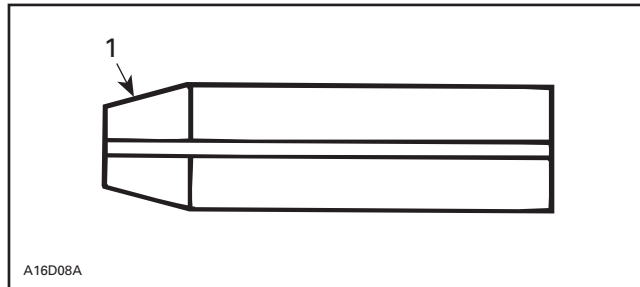
Torque locking nut to 10 N•m (89 lbf•in).

### 15, Pin

Always use the same type of pin as originally installed when servicing. Different types have different weights for calibration purpose. Refer to TECHNICAL DATA 09-03.

### 21,22,23, Ramp, Dowel Tube and Screw

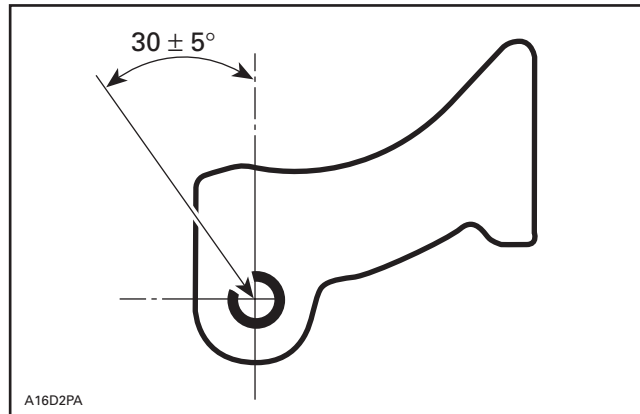
Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.



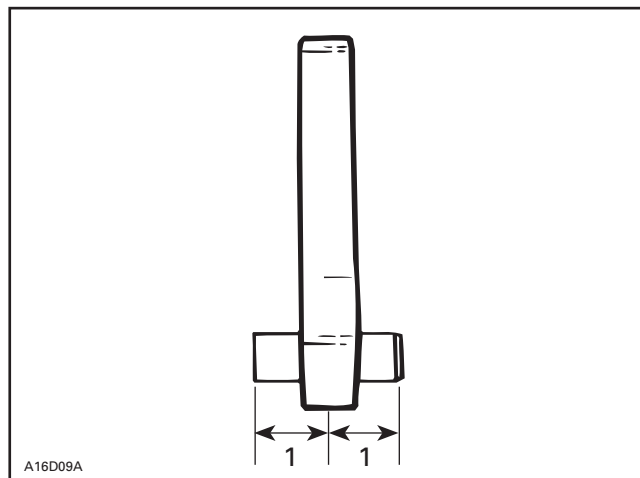
A16D08A

1. Chamfered side

Position dowel tube split at the illustrated angle.



A16D2PA



A16D09A

1. Equal distance

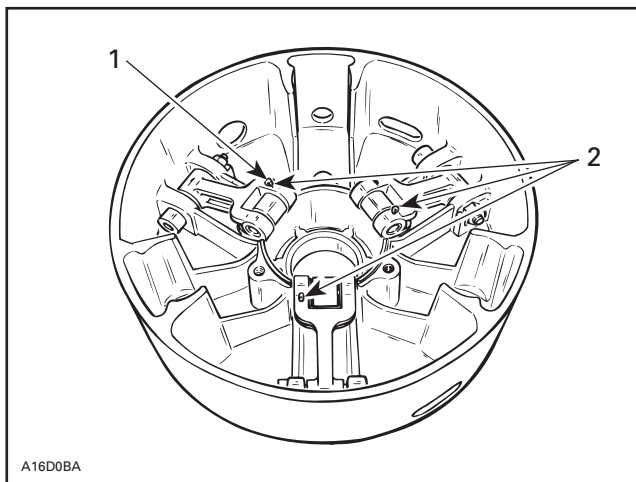
Torque screws to 10 N•m (89 lbf•in).

### 9,11,13,14, Screw, Lever Ass'y, Nut and Cotter Pin

Always install lever assemblies so that cotter pins are at the shown side. Besides install cotter pin head on top when lever is sat at bottom of sliding half. Bend cotter pin ends to sit perfectly against lever.

**◆ WARNING**

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, clutch misbalancing will occur because of levers difference.



1. Head on top
2. All on the same side

**▼ CAUTION**

Lever assemblies must be installed so that cotter pins are on the same side.

Torque nuts to 12 N•m (106 lbf•in).

**▼ CAUTION**

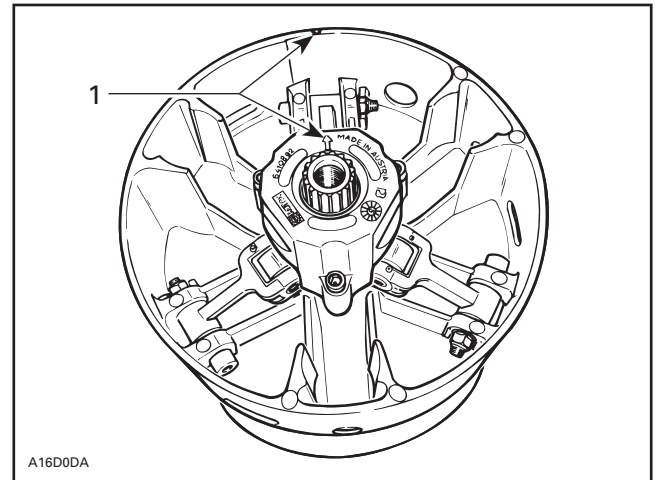
Lever ass'y and rollers must move easily after installation.

### 5,6,18,19, Fixed Half, Sliding Half, Spring, Spring Cover and Screw

To install spring cover, use spring compressor (P/N 529 0151 00).

Assemble fixed and sliding halves. Note that fixed halves have different cone angle. Match cone angle with crankshaft.

Lift sliding half against spring cover and align spring cover arrow with sliding half mark.

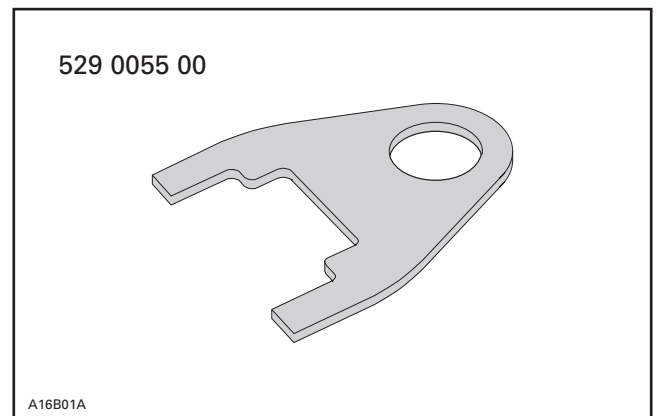


1. Align

Install and torque screws to 13 N•m (115 lbf•in).

### 6,25,29, Sliding Half, Slider Shoe and Governor Cup

To install governor cup, use following tool:



Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

**▼ CAUTION**

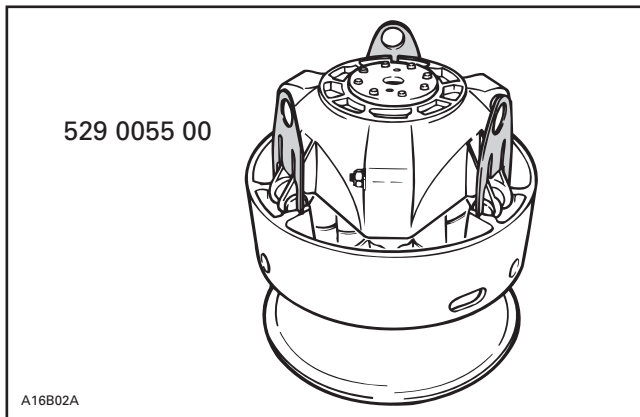
Make sure O-rings are installed on slider shoes and their grooves are positioned vertically.

Install fork (P/N 529 0055 00) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



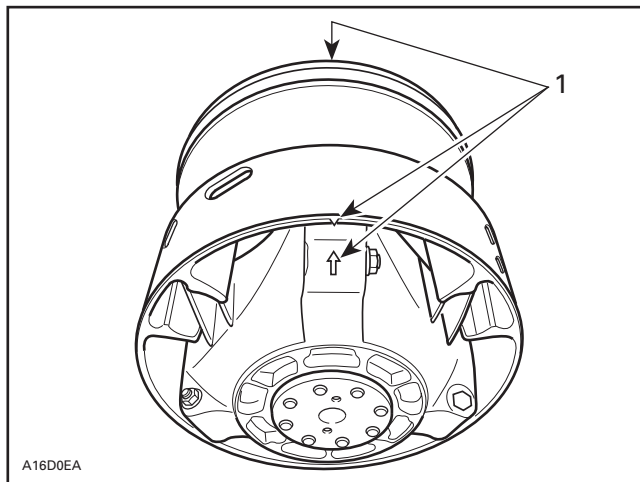
## Section 04 TRANSMISSION

### Sub-Section 03 (DRIVE PULLEY)



Make sure to align governor cup arrow with sliding half and fixed half mark.

**NOTE:** If fixed half has no mark, align governor cup mark with segment no. 1 of inner half. Segments are identified on engine side.



1. Align

Carefully slide governor cup into sliding half. Align mark of governor cup with mark of fixed half.

Remove forks and push governor cup so that its splines engage with fixed half shaft splines.

#### ▼ CAUTION

Make sure splines of both parts are fully engaged.

## INSTALLATION

### ◆ WARNING

Do not apply anti-seize or any lubricant on crankshaft and drive pulley tapers.

### ◆ WARNING

Never use any type of impact wrench at drive pulley removal and installation.

Clean mounting surfaces as described in CLEANING above.

### Drive Pulley Ass'y

The installation procedure must be strictly adhered to as follows.

Install drive pulley on crankshaft extension.

Install conical washer with its concave side towards drive pulley then install screw.

### ◆ WARNING

Never substitute lock washer and/or screw with jobber ones. Always use Bombardier genuine parts for this particular case.

Use clutch holder. See removal procedure.

Torque screw to 90 to 100 N•m (66 to 74 lbf•ft).

Install drive belt and belt guard.

Raise and block the rear of the vehicle and support it with a mechanical stand.

### ◆ WARNING

Ensure that the track is free of particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure nobody is standing near the vehicle.

Accelerate the vehicle at low speed (maximum 30 km/h (20 MPH) and apply the brake, repeat 5 times.

Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

**◆ WARNING**

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

**DRIVE PULLEY ADJUSTMENT**

The drive pulley is factory calibrated to transmit maximum engine power at a predefined RPM. Factors such as ambient temperature, altitude or surface condition may vary this critical engine RPM thus affecting snowmobile efficiency.

This adjustable drive pulley allows setting maximum engine RPM in the vehicle to maintain maximum power.

Calibration screws should be adjusted so that actual maximum engine RPM in vehicle matches with the maximum horsepower RPM given in TECHNICAL DATA 09-02.

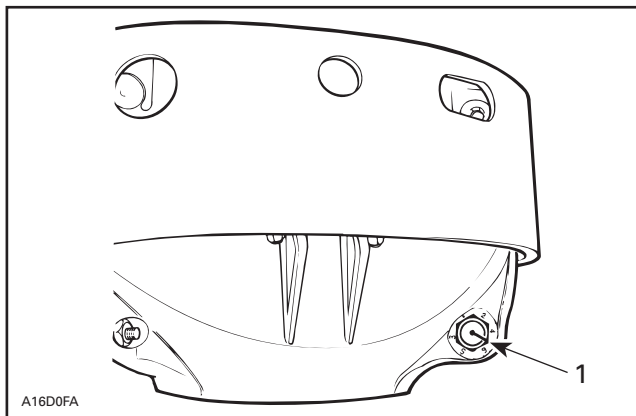
○ **NOTE:** Use precision digital tachometer for engine RPM adjustment.

○ **NOTE:** The adjustment has an effect on high RPM only.

To adjust, modify ramp end position by turning calibration screws.

**26,28,29, Calibration Screw, Locking Nut and Governor Cup**

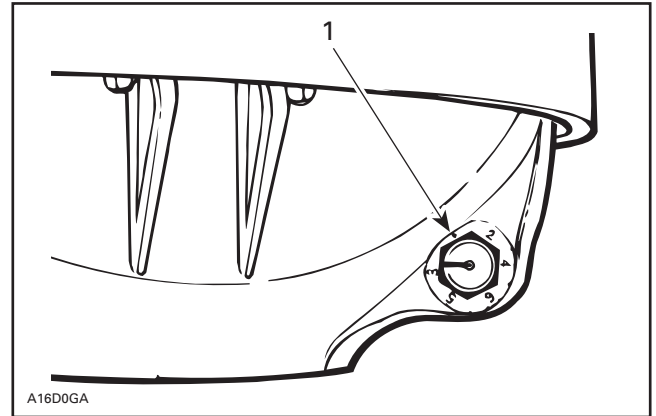
Calibration screw has a notch on top of its head.



1. Notch

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 there is no stamped number (due to its location on casting).

See TECHNICAL DATA 09-03 for original setting.



1. Position 1 (not numbered)

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

Example:

Calibration screw is set at position 3 and is changed to position 5. So maximum engine RPM is increased by about 400 RPM.

**To Adjust:**

Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•in).

**▼ CAUTION**

Do not completely remove calibration screw or its inside washer will fall off.

**▼ CAUTION**

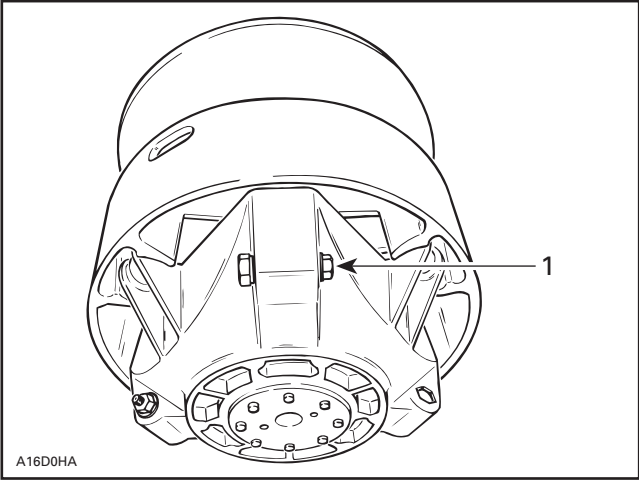
Always adjust all 3 calibration screws and make sure they are all set at the same number.

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**Section 04 TRANSMISSION**

**Sub-Section 03 (DRIVE PULLEY)**

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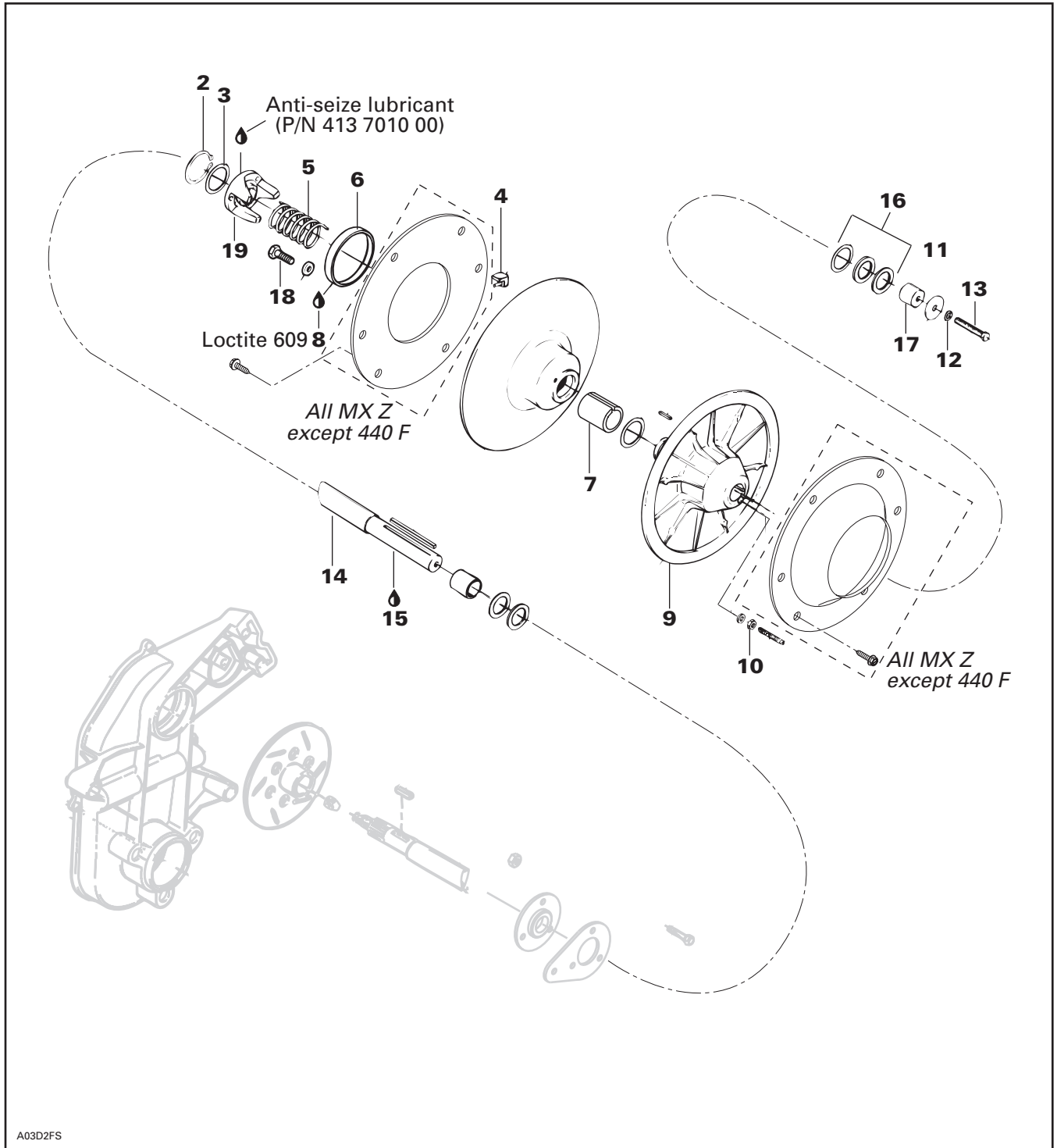


A16D0HA

1. Loosen just enough to permit rotating of calibration screw

# DRIVEN PULLEY

*S-Series*

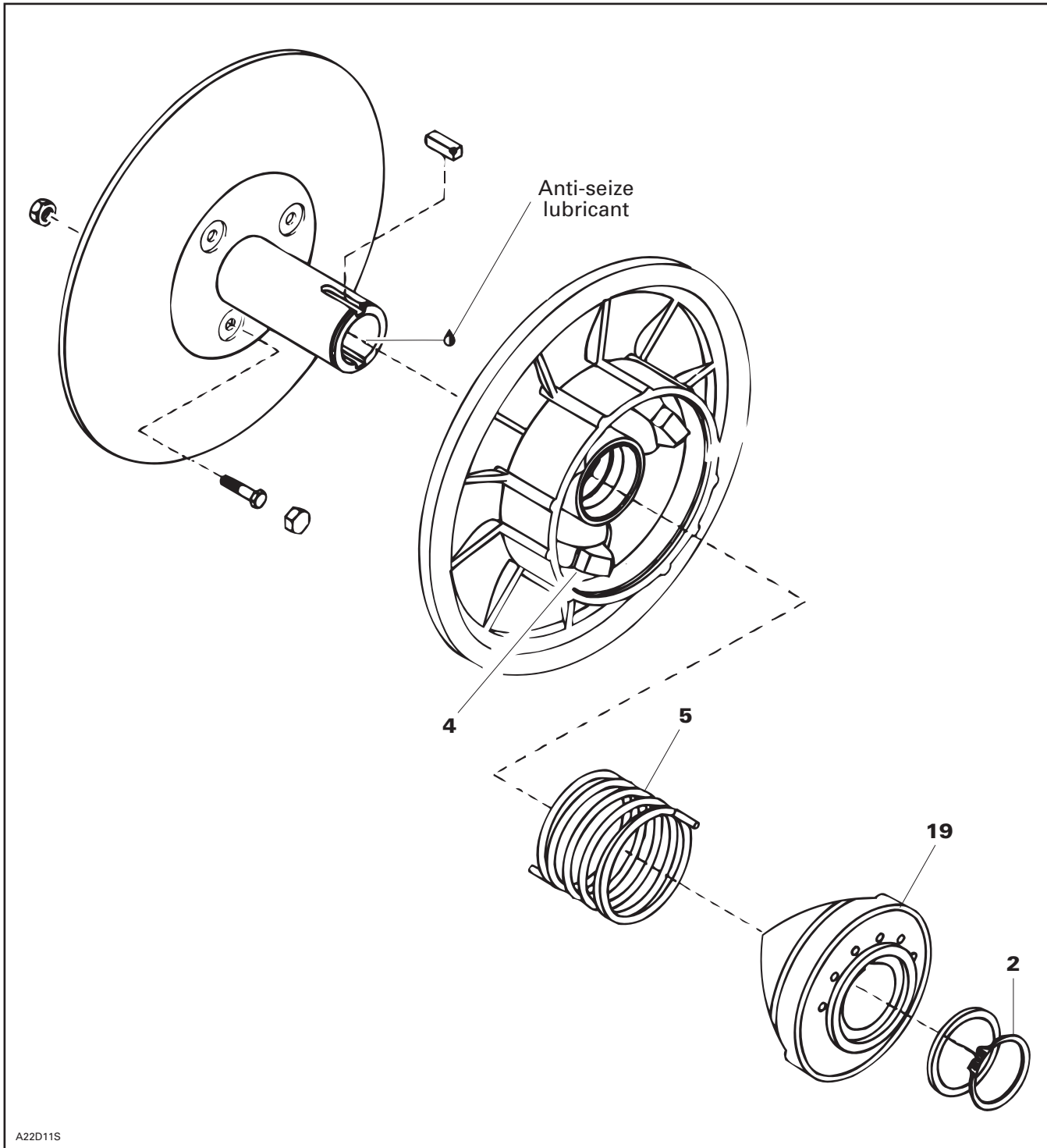


A03D2FS

## Section 04 TRANSMISSION

### Sub-Section 04 (DRIVEN PULLEY)

#### Skandic WT/SWT/WT LC



## REMOVAL

Remove belt guard and drive belt from vehicle.

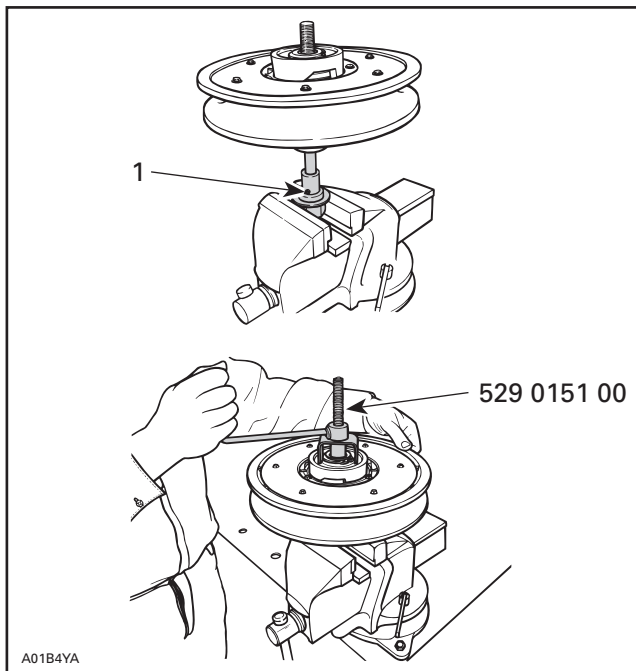
Remove the cap screw **no. 13**, lock washer **no. 12**, washer **no. 11**, extension **no. 17** and shims **no. 16** then pull the driven pulley from the countershaft.

### 14, Countershaft

Should countershaft **no. 14** removal be required, refer to BRAKE 04-06 then look for **Countershaft and Brake Disc Removal**.

## DISASSEMBLY

Use spring compressor (P/N 529 0151 00).



*TYPICAL*

1. Insert this pin in keyway

Remove snap ring **no. 2** and washer **no. 3** to disassemble the outer cam and the 2 pulley halves.

## ◆ WARNING

Driven pulley cam is spring loaded, use above mentioned tool.

## CLEANING

### 6,7, Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing moves to cam or shaft surface. A teflon over teflon running condition occurs, leading to low friction. So it is normal to see gray teflon deposit on cam or shaft. Do not remove that deposit, it is not dust.

When a dust deposit has to be removed from the cam or the shaft, use dry cloth to avoid removing transferred teflon.

### Pulley Half Cleaning

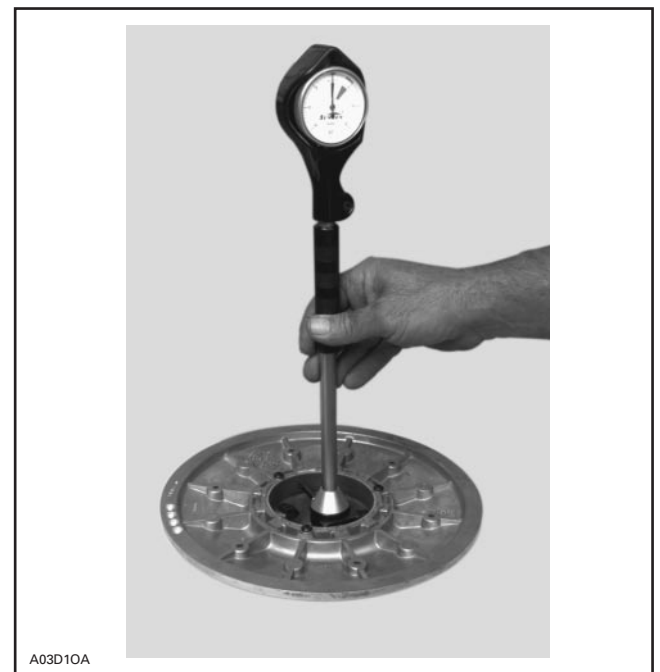
Use Loctite Safety Solvent (P/N 413 7082 00).

## INSPECTION

### 6,7, Bushings

Check for cracks, scratch and for free movement when assembled to fixed half.

Using a dial bore gauge measure bushing diameter. Measuring point must be at least 5 mm (1/4 in) from bushing edge.



## Section 04 TRANSMISSION

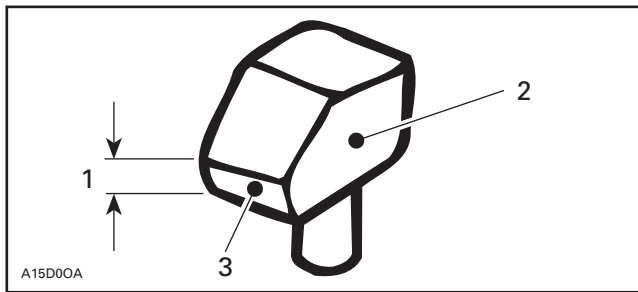
### Sub-Section 04 (DRIVEN PULLEY)

Replace bushing(s) if worn more than specified.

DRIVEN PULLEY BUSHING WEAR LIMIT mm (in)	
Small bushing	38.30 (1.508)
Large bushing	89.15 (3.510)

#### 4, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



1. Measure thickness of slope base here
2. Sliding pulley side
3. Slope base

#### Bushing Replacement

##### Large Bushing

Remove Allen screws if applicable. Heat to break Loctite bond.

Remove all 3 slider shoes.



Install support plate (P/N 529 0311 03) inside sliding half.

Place puller (P/N 529 0311 02) below bushing.

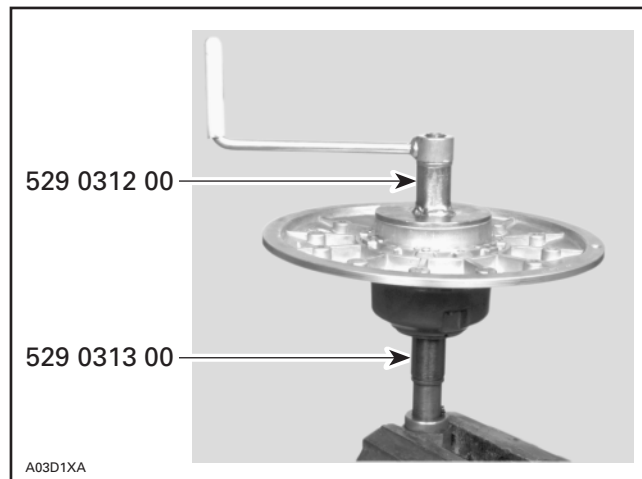


Mount puller screw head in a vise.

Turn pulley half by hand to extract old bushing.

Before bushing installation, file sliding half bore to remove burrs from crimping areas.

Coat bushing outside diameter with Loctite 609 (P/N 413 7031 00). Place new bushing on sliding half and slightly tap to engage squarely the bushing in the sliding. Use tools (P/N 529 0312 00 and 529 0313 00) to install bushing.



Install 3 Allen screws **no. 18** and washers supplied with the new bushing.

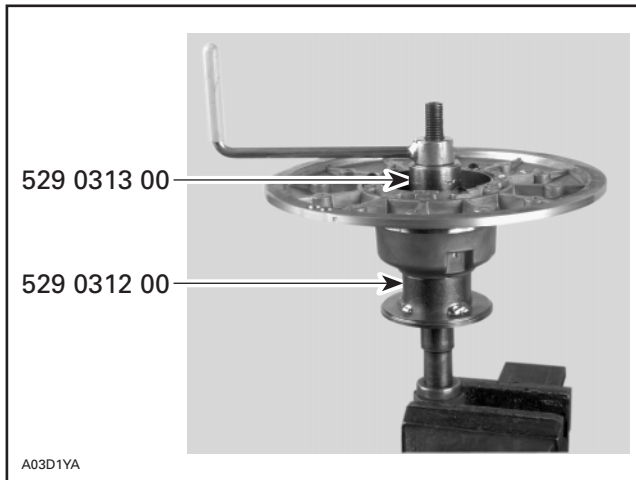
##### Small Bushing

**NOTE:** Following procedure can be done with a press using the same tools.

Install puller in a vise.

Heat bushing area.

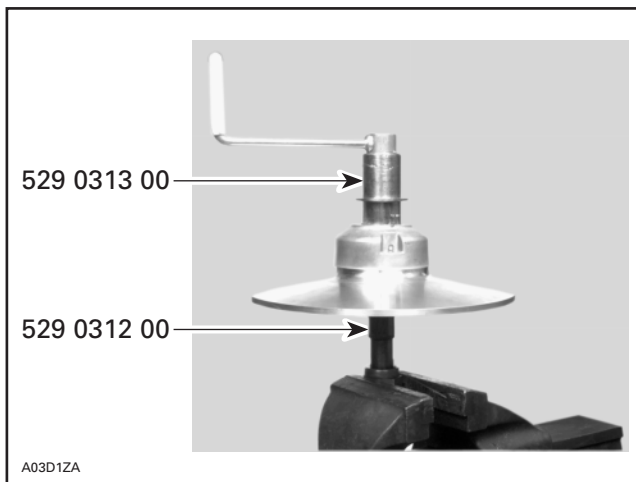
Turn puller handle and sliding half at once to extract the bushing.



**IMPORTANT:** Large bushing retaining screws and washers must be removed before small bushing installation.

Coat bushing outside diameter with Loctite 609 (P/N 413 7031 00).

Install bushing as following photo.



## ASSEMBLY

### 4, Cam Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on the cam.

Assemble driven pulley components by reversing the disassembly procedure.

### 19, Cam

Coat cam interior with anti-seize lubricant.

## INSTALLATION

### 14,15, Countershaft and Anti-seize Lubricant

#### ▼ CAUTION

Always apply anti-seize lubricant (P/N 413 7010 00) on the countershaft before final pulley installation.

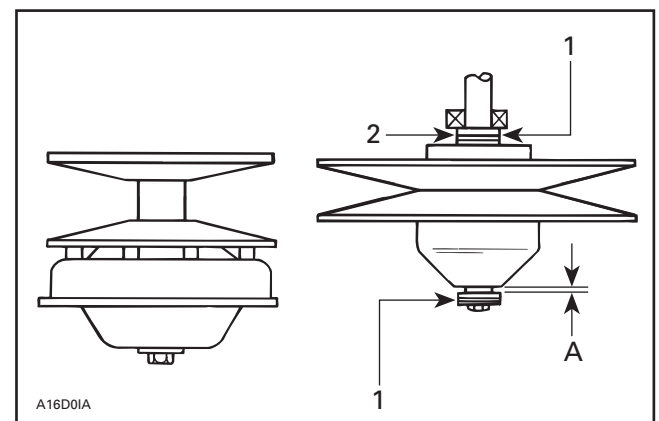
#### *F-Series and S-Series Only*

Should installation procedure be required, refer to BRAKE 04-06 then look for **Brake Disc and Countershaft Bearing Adjustment**.

Reinstall the pulley on the countershaft by reversing the removal procedure.

#### *All Models*

Check end play of driven pulley on countershaft by pushing pulley towards outer housing so that the inner shims (P/N 504 1082 00) contact it. Measure end play at the mounting screw end between shim(s) and pulley. See illustration.



TYPICAL — TOP VIEW

- 1. Shim (P/N 504 1082 00) (as required)
- 2. Contact
- A. 0 to 1 mm (0 to 3/64 in)

### 13, Pulley Retaining Screw

Torque to 25 N•m (18 lbf•ft).



**Section 04 TRANSMISSION**  
**Sub-Section 04 (DRIVEN PULLEY)**

**ADJUSTMENT**

Refer to PULLEY DISTANCE AND ALIGNMENT 04-05 to adjust pulley distance. Adjust drive belt height in driven pulley to obtain specified belt deflection.

**5, Spring**

**General**

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher to compensate for spring setting. Specifications in TECHNICAL DATA 09-03 are applicable after break-in period (about 10 hours of use.)

**Spring Torsional Pre-Load**

To check spring pre-load adjustment, use spring scale hook (P/N 529 0065 00) and a spring scale.

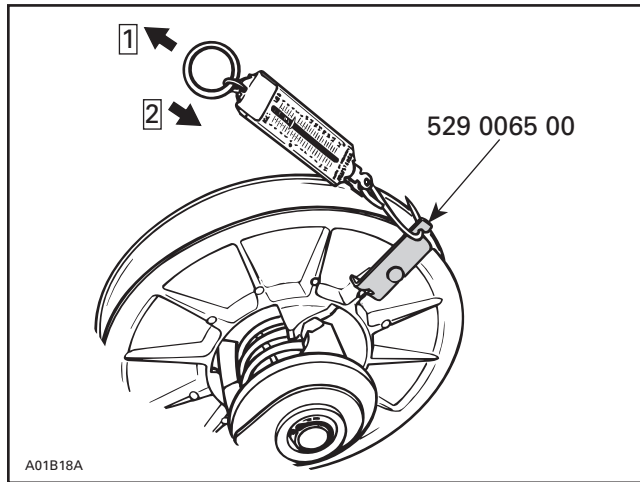
Remove drive belt.

Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicularly with pulley axle.

Take 1<sup>st</sup> measurement when sliding half begins to turn. Rotate sliding half to 10 mm (3/8 in) of rotation. Hold fish scale at this position. Slowly release tension from fish scale and take 2<sup>nd</sup> measurement when sliding half begins to return. Spring pre-load is the average measurement between these 2.

$$\frac{1^{\text{st}} \text{ measurement (when opening)} + 2^{\text{nd}} \text{ measurement (when closing)}}{2} = \text{Spring pre-load}$$

$$\text{Example: } \frac{3.8 \text{ kg (8.4 lb)} + 3.4 \text{ kg (7.5 lb)}}{2} = 3.6 \text{ kg (8 lb)} \text{ Actual spring pre-load}$$

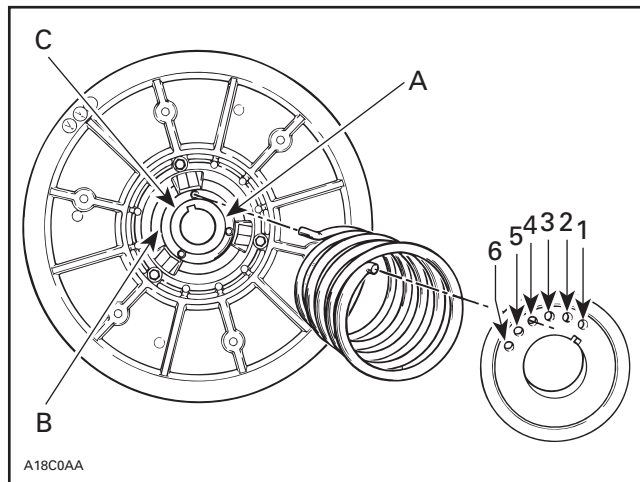


**TYPICAL**

- Step 1: 1<sup>st</sup> measurement
- Step 2: 2<sup>nd</sup> measurement

To adjust spring pre-load, relocate spring end in cam, moving it clockwise to increase the pre-load and counterclockwise to decrease it. Refer to TECHNICAL DATA 09-03.

**NOTE:** If spring pre-load can not be adjusted, try to relocate the other end of spring in sliding pulley (holes A, B, C).



Letters and numbers shown in illustration are actual letters and numbers embossed on parts

**NOTE:** Always recheck torsional pre-load after adjusting.

## Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 04-05 and DRIVE BELT 04-02 to perform adjustments.

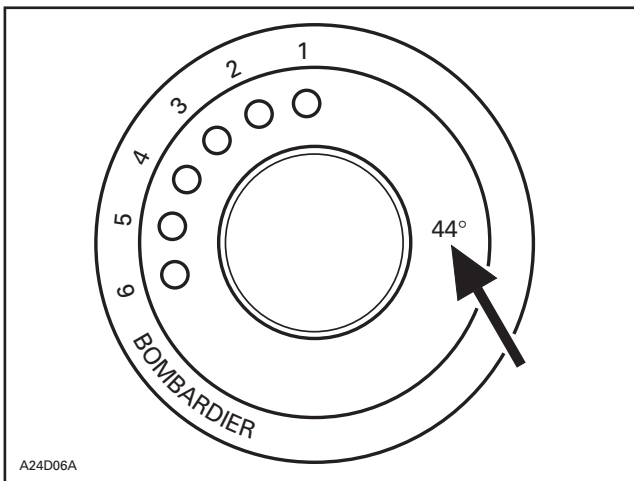
### ▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

## 3, Outer Cam

Make sure to install proper cam. Refer to TECHNICAL DATA 09-03.

Cam angle is identified on cam.



○ **NOTE:** For high altitude regions, the High Altitude Technical Data Booklet (P/N 484 0648 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

# PULLEY DISTANCE AND ALIGNMENT

## GENERAL

The pulley distance we will refer to in this section, is the space separating the drive and driven pulley outside diameters (Z measurement).

This basic distance is provided as an assembly guide and indicates the dimensions between which satisfactory belt deflection will be obtained.

Both pulley distance adjustment and pulley alignment must be carried out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

### ▼ CAUTION

Before checking pulley adjustment, the rear suspension must be mounted on the vehicle and track tension/alignment must be done. Always check pulley adjustment after suspension is adjusted.

### ◆ WARNING

Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

All pulley alignment specifications refer to:

X = Distance between straight bar and drive pulley fixed half edge, **measured between pulleys.**

Y = Distance between straight bar and drive pulley fixed half edge, **measured at the end of straight bar.**

Z = Distance between outside diameter of pulleys.

## GENERAL PROCEDURE

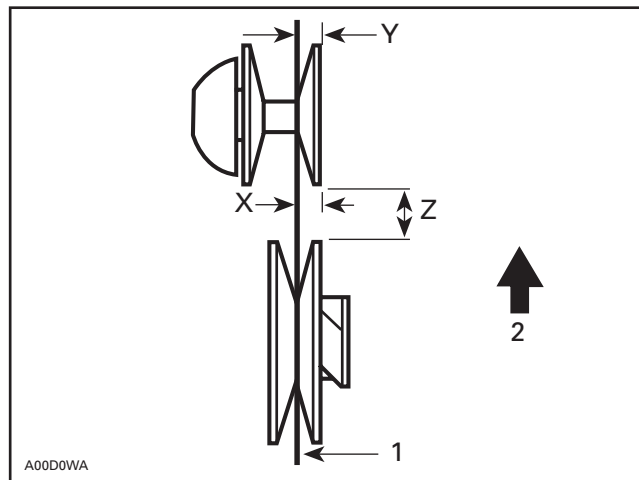
Remove belt guard and drive belt.

By turning and pushing the sliding half, open the driven pulley. Insert a straight bar 9.5 mm (.375 in) square, 48 cm (19 in) long or the proper alignment template into the opened driven pulley.

## Measuring Procedure

### Using Straight Bar:

Always measure distances X and Y from the farther straight bar side (including its thickness to the fixed half edge.)



1. Straight bar
2. Front of vehicle

The distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

## Nominal Value Procedure and Quick Alignment and Distance Check

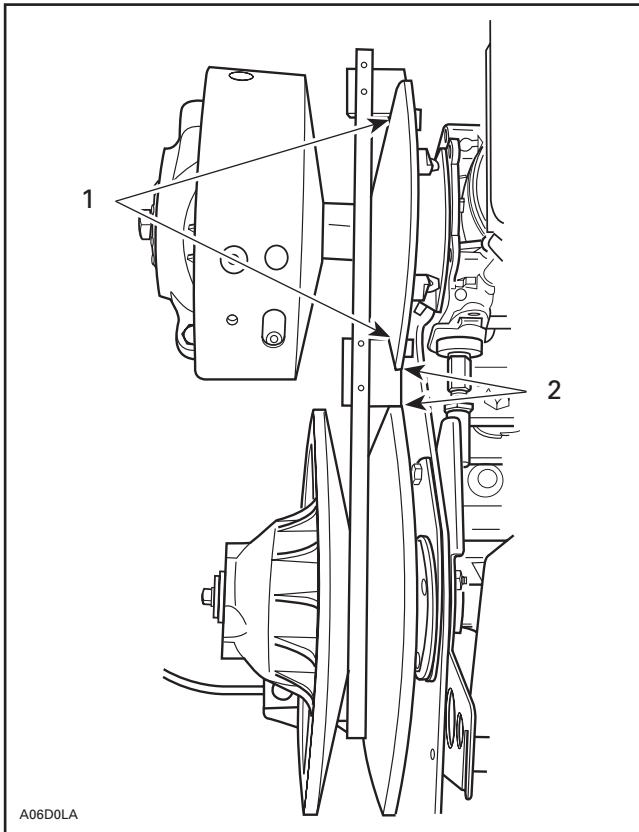
Alignment template tabs must fully contact fixed half of drive pulley.

Pulley distance is correct when tab contacts both pulley halves.

Refer to below chart for proper alignment template.

## Section 04 TRANSMISSION

### Sub-Section 05 (PULLEY DISTANCE AND ALIGNMENT)



#### Drive Belt Deflection

○ NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT 04-02 to adjust drive belt deflection.

#### ▼ CAUTION

This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

#### TYPICAL

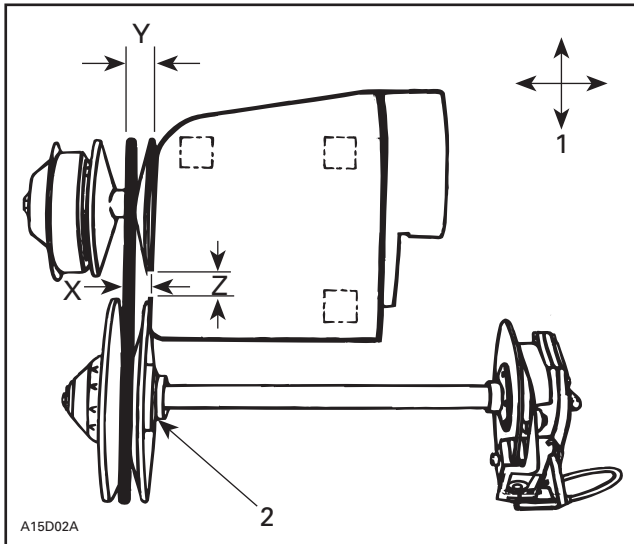
1. Contact (alignment)
2. Contact (distance)

## PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART

MODEL	PULLEY DISTANCE	OFFSET		ALIGNMENT TEMPLATE ① P/N
	Z	X	Y-X	
	+ 0, - 1 mm (+ 0, - 0.040 in)	± 0.50 mm (0.020 in)	± 0.5 mm (0.020 in)	
TRA Equipped S-Series	16.5 (0.650)	35.0 (1.380)	1.5 (0.060)	529 0267 00
Skandic WT/SWT/WT LC	32.75 (1.289)	36.25 (1.427)	1.5 (0.060)	529 0310 00

① Alignment templates have been made according to pulley alignment nominal values. However, they do not take into account allowed tolerances for alignment specifications. They are used as GO/NO GO gauges for quick alignment and pulley distance check and as templates to reach alignment nominal values.

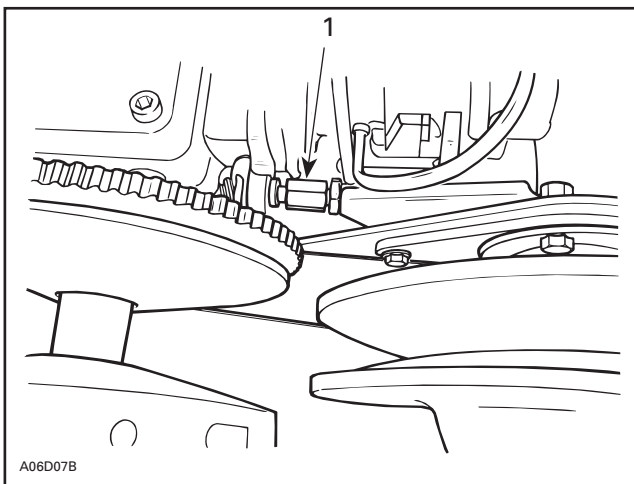
**S-Series**



**TYPICAL**

- 1. Engine movement
- 2. Contact

**NOTE:** Prior to performing pulley adjustment, loosen torque rod nut to allow engine movement. Engine supports have tendency to stick to frame, work engine loose prior to aligning.



- 1. Loosen

**Pulley Distance Adjustment Method**

**Engine Movement**

The engine support has slotted mounting holes. Move engine to obtain specified distance between pulleys.

**Pulley Alignment Method**

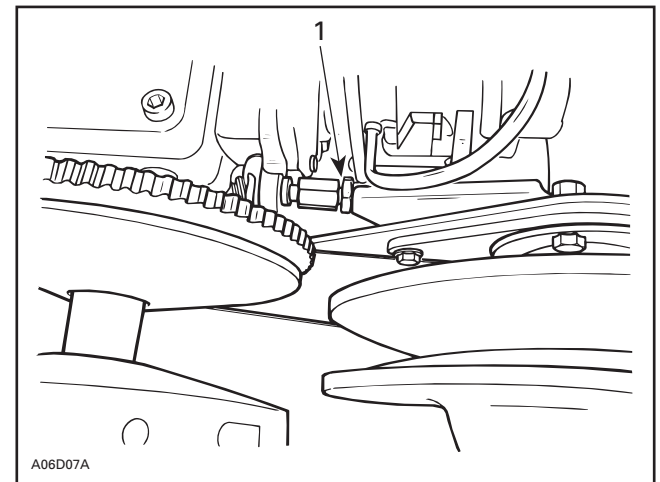
**Driven Pulley Movement**

When engine slotted mounting holes do not allow to set proper pulley offset X, adjust with shims (P/N 504 1082 00) between pulley and counter-shaft bearing support (pulley pushed toward brake disc).

**Engine Movement**

Loosen the 4 bolts retaining engine support to the frame. Position engine to obtain the specified alignment.

**NOTE:** After alignment, adjust torque rod so it slightly contacts stopper plate. Do not over tighten, it will disalign pulleys.

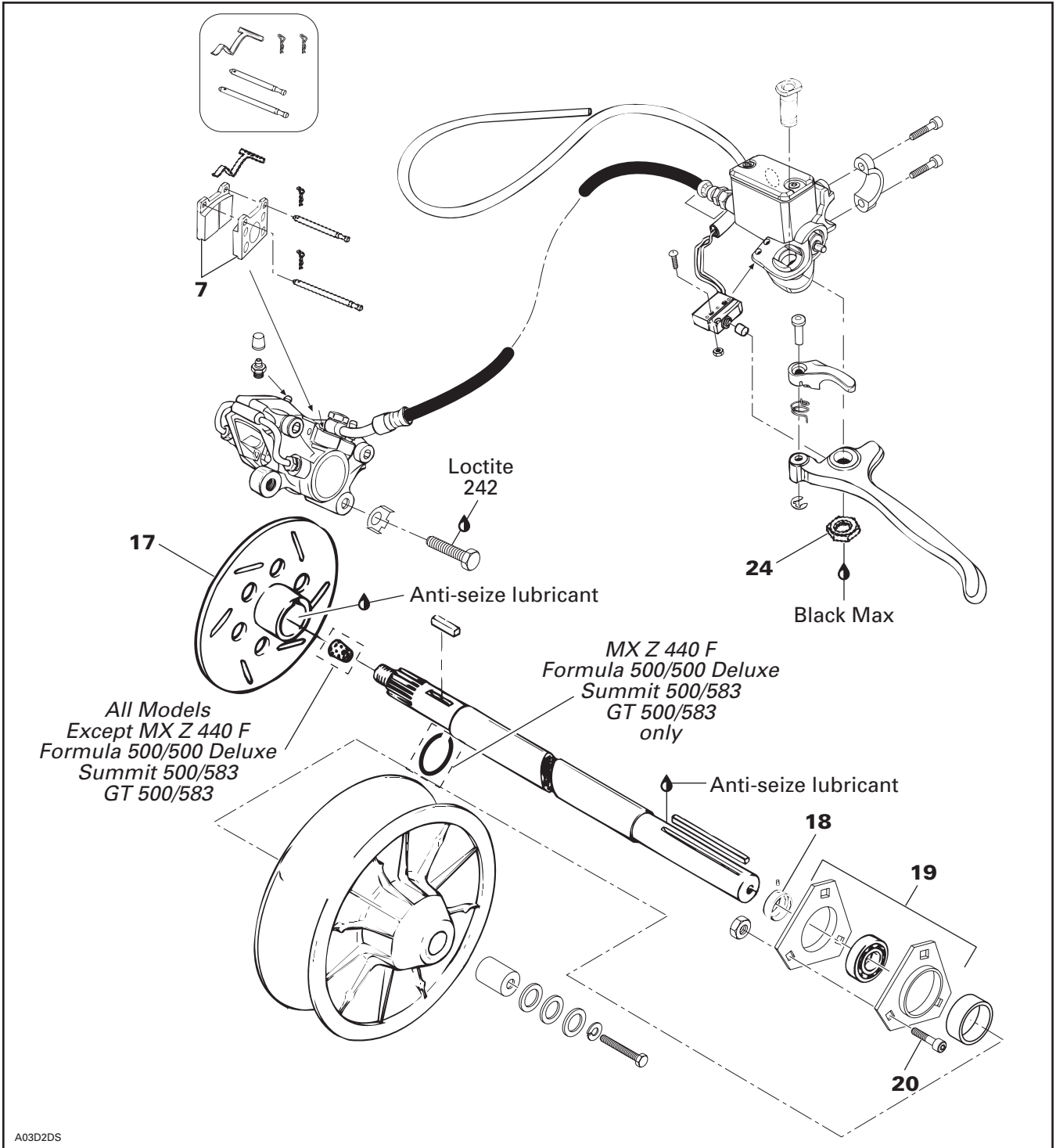


- 1. Retighten

# BRAKE

## HYDRAULIC DISC BRAKE

S-Series



## Section 04 TRANSMISSION

### Sub-Section 06 (BRAKE)

## REMOVAL

### BRAKE DISC REMOVAL

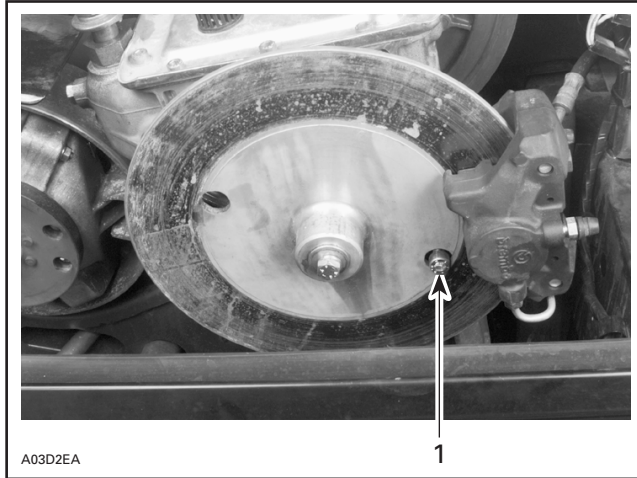
#### **S-Series**

Brake disc can be withdraw without removing caliper. Proceed as follows:

- Remove belt guard, belt and driven pulley.
- Remove air silencer.
- Unbolt bearing support no. 19 from chassis.
- Open chaincase and remove upper sprocket.

#### **MX Z 440 F, Formula 500/500 Deluxe, Summit 500/583 and GT 500/583 Only**

- Pull countershaft toward driven pulley side to gain access to clip no. 25.
- Remove clip no. 25 on countershaft.



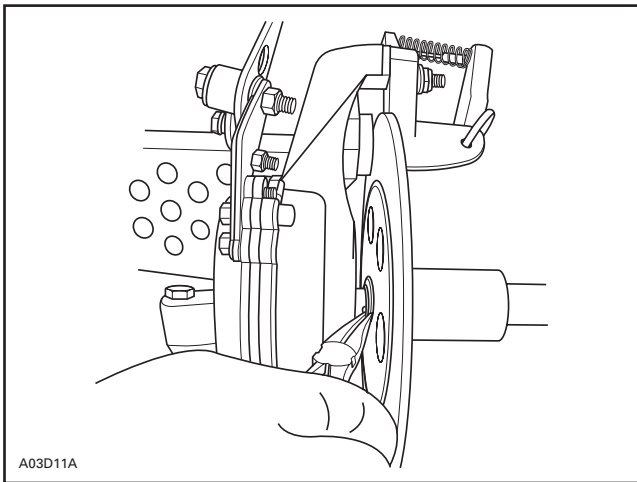
1. Allen screw through disc hole

- Unbolt disc.

### COUNTERSHAFT REMOVAL

#### **S-Series**

Proceed the same as for brake disc removal but unlock bearing collar no. 18 on driven pulley side.

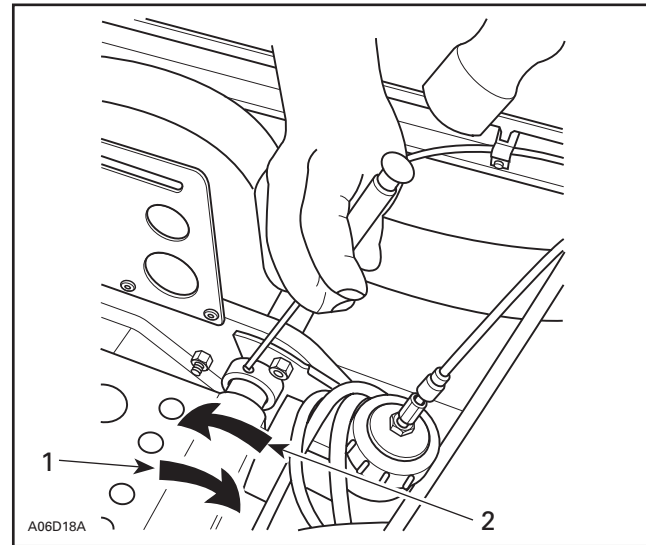


#### **S-Series**

- Pull countershaft toward driven pulley side to free from chaincase and disc.
- Remove disc.

#### **Skandic WT/SWT/WT LC**

- Remove caliper by unscrewing M6 Allen screws through disc hole.

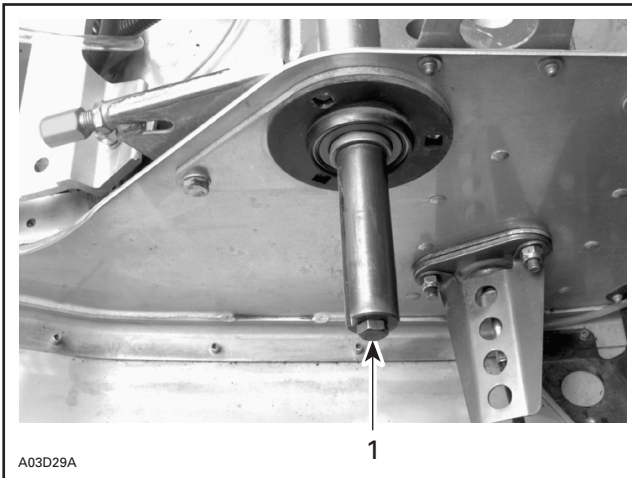


1. Lock  
2. Unlock

Unbolt bearing support no. 19 then install screw on countershaft.

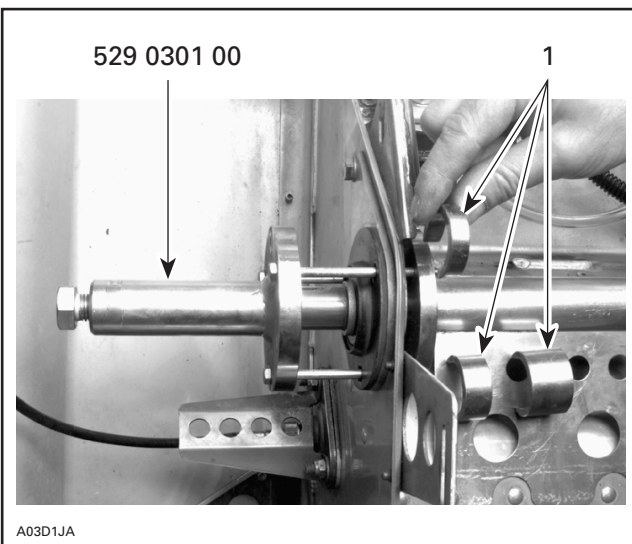
## Section 04 TRANSMISSION

### Sub-Section 06 (BRAKE)



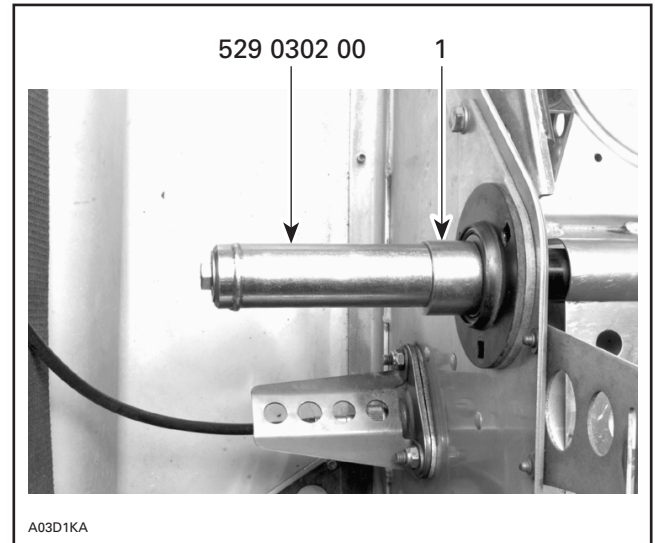
1. Screw

Pull bearing to driven pulley side out of countershaft, using remover (P/N 529 0301 00). Begin with only the remover then add a spacer of different width as the bearing comes out.



1. Spacers

To install bearing on countershaft, use installer (P/N 529 0302 00) and spacer(s) from remover as required.



1. Spacer

## DISASSEMBLY

Only brake pads are available as spare parts. If caliper or master cylinder are damaged, replace each of them as an assembly.

## CLEANING

Clean all metal components in a general purpose solvent. Thoroughly dry all components before assembling.

### ▼ CAUTION

Do not clean brake pads in solvent. Soiled brake pads must be replaced by new ones.

## INSPECTION

### 7, Brake Pad

Brake pads must be replaced when lining is 1 mm (1/32 in) thick or less.

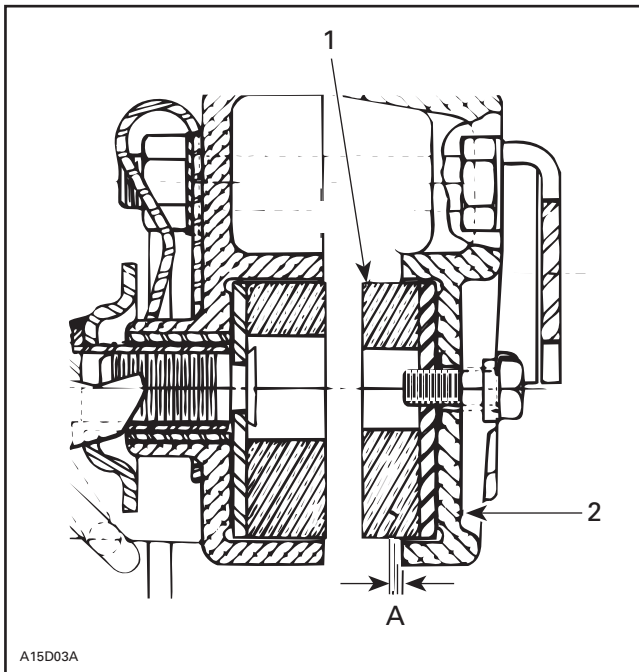
### ▼ CAUTION

Brake pads must always be replaced in pairs.



## Section 04 TRANSMISSION

### Sub-Section 06 (BRAKE)



#### TYPICAL

1. Fixed pad
  2. Inner caliper
- A. 1 mm (1/32 in) minimum

### 17, Brake Disc

Check for scoring, cracking or heat discoloration, replace as required.



### CAUTION

Brake disc should never be machined.

## ASSEMBLY

### 24, Brake Lever Lock Nut

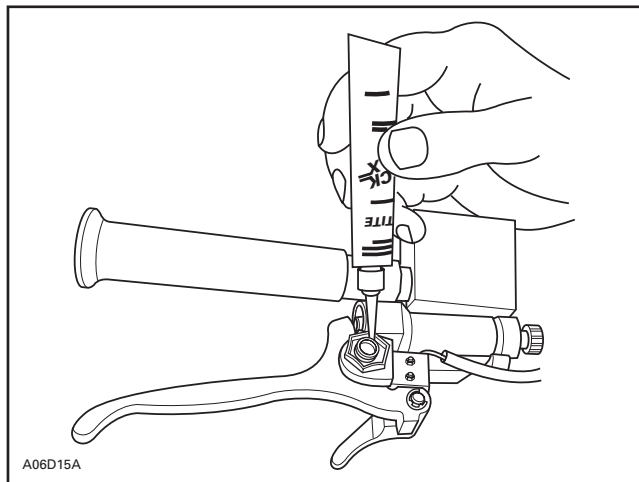


### WARNING

Always install a new nut when servicing.

Tighten nut to 3.0 N•m (27 lbf•in). Check free movement of brake lever.

Apply Loctite Black Max Gel (Loctite item no. 18398) over nut and on bolt threads.



## INSTALLATION

To install brake, reverse removal procedure paying attention to the following.



### WARNING

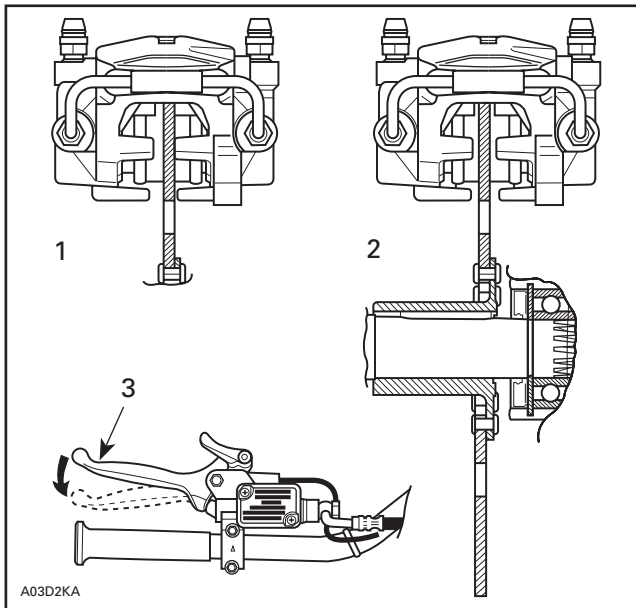
Avoid getting oil on brake pads. Do not lubricate or apply antirust or antifreeze solution in brake cable.

### 7, Brake Pad

#### **All Models with Hydraulic Brake**

After brake pads installation, brake disc must be centered in caliper. Apply brake then check for proper brake disc positioning.

Push on appropriate caliper piston in order to move pad inward allowing proper brake disc positioning.



1. Brake disc not centered
2. Brake disc centered
3. Apply brake before checking

Apply brake then recheck.

## 17, Brake Disc

### **S-Series**

Apply anti-seize lubricant (P/N 413 7010 00) on shaft.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

### **Skandic WT/SWT/WT LC**

See photo of removal procedure for proper disc mounting position.

## ADJUSTMENT

### Countershaft Bearing

#### **S-Series**

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing **no. 19** and ensure that countershaft is properly aligned, then tighten 3 retaining screws.

○ **NOTE:** A misaligned countershaft will result in difficulty to center the bearing in its support.

Refer to DRIVE AXLE 06-04 then look **Chaincase Perpendicularity Adjustment**.

Torque castellated nut of upper sprocket to 53 N•m (39 lbf•ft).

### ▼ CAUTION

Upper sprocket castellated nut must be tightened **before** adjusting bearing collar.

Slide collar **no. 18** towards bearing and turn, by hand, to engage the eccentric. This should require about a quarter turn.

Turn collar in direction of countershaft rotation until collar and inner race lock together.

Insert a punch into collar hole and strike sharply in the same direction to lock firmly.

Apply Loctite 242 (P/N 413 7030 00) on set screw threads, then tighten.

Close chaincase referring to CHAINCASE 04-07.

## BLEEDING

Change brake fluid once a year.

Bleed brake system as follows:

Keep sufficient DOT 4 (DOT 3 for normal use) brake fluid in reservoir at all times.

### ▼ CAUTION

Use only DOT 4 brake fluid for heavy duty or racing applications.

Install a hose on left side bleeder. Route this hose to a container.

Pump a few times brake lever and while holding brake lever depressed, open bleeder and check for air to escape.

Repeat with the same bleeder until no air appears in hose.

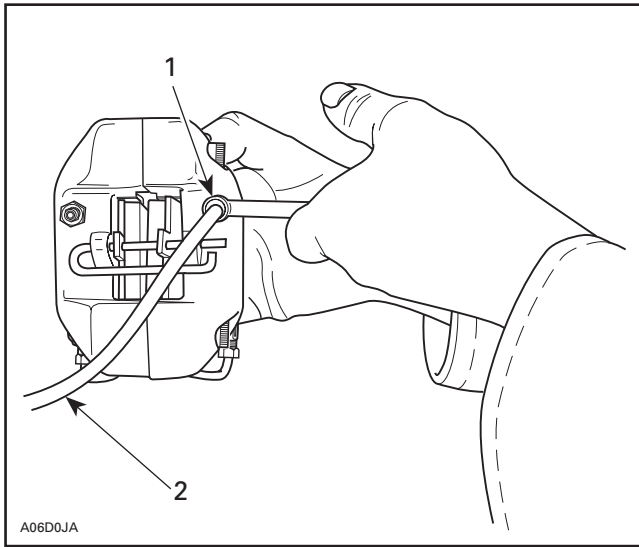
Proceed the same way with the right side bleeder.

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## Section 04 TRANSMISSION

### Sub-Section 06 (BRAKE)

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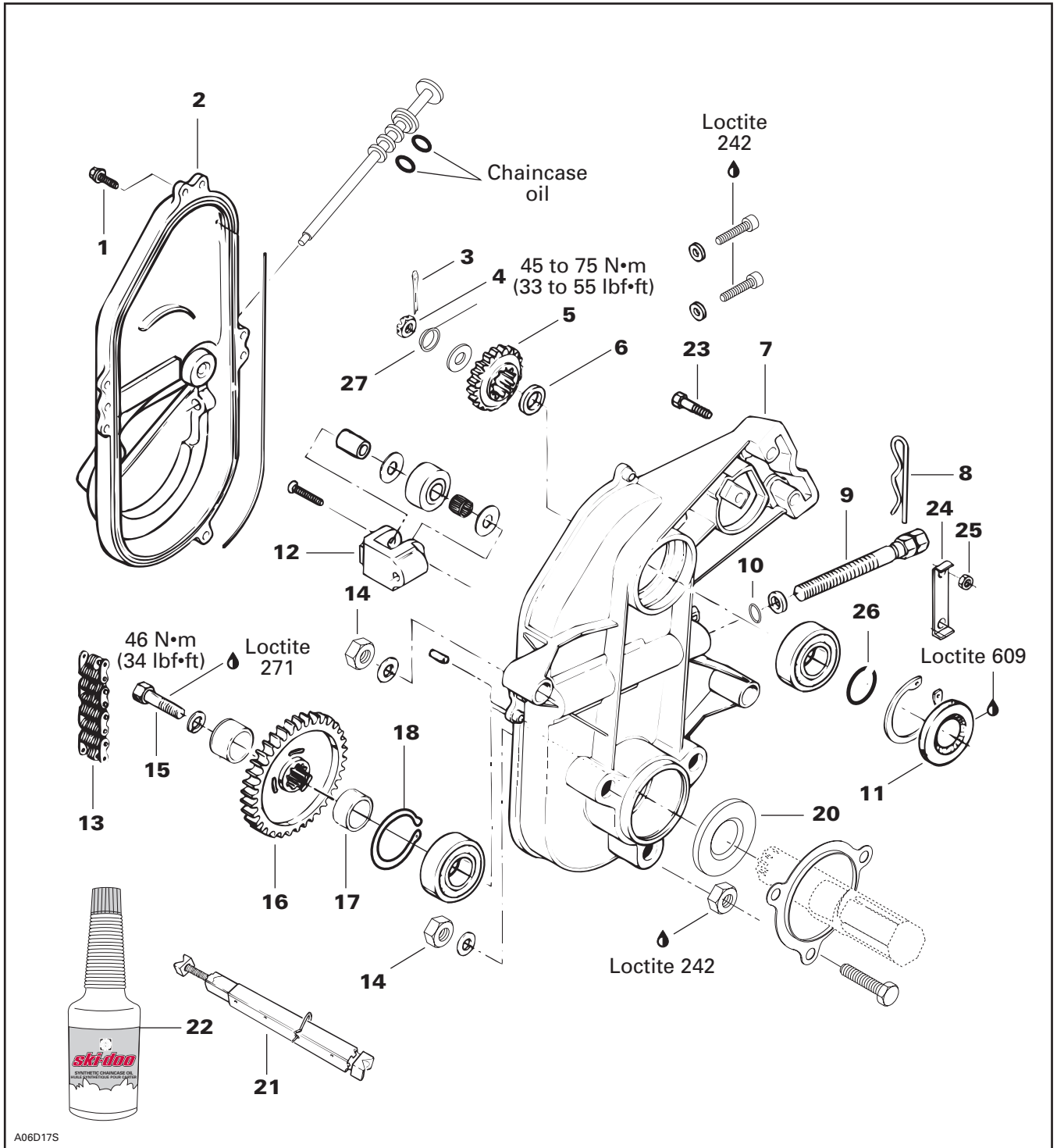
- A06D0JA
1. Open bleeder
  2. Clear hose to catch used brake fluid

### Brake Light

There is no adjustment on these models. Check that switch is securely installed.

# CHAINCASE

*S-Series Without Reverse Gear*



A06D17S

## Section 04 TRANSMISSION

### Sub-Section 07 (CHAINCASE)

## REMOVAL

To remove chaincase proceed as follows.

Remove tuned exhaust pipe and muffler.

### ◆ WARNING

Never remove exhaust components when engine is hot.

Remove hair pin **no. 18**. Release drive chain tension by unscrewing tensioner adjustment screw.

Drain oil by removing chaincase cover **no. 2**.

### 3,4,5,6,13,16,17, Cotter Pin, Nut, Sprocket, Shim and Drive Chain

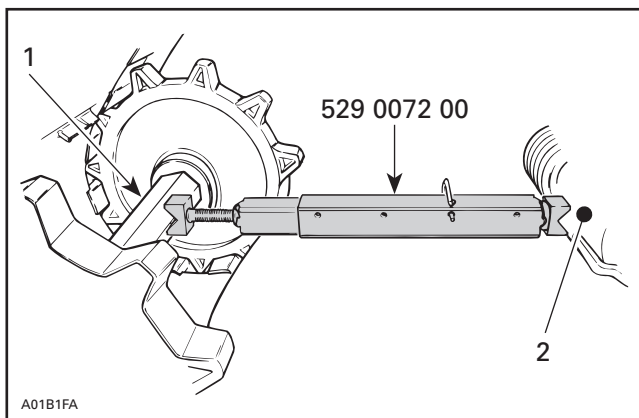
Remove cotter pin **no. 3**, nut **no. 4**, washer **no. 27** retaining upper sprocket **no. 5** and screw **no. 15** retaining lower sprocket **no. 16**. Pull sprockets and drive chain simultaneously. Remove shims **nos. 6** and **17**.

○ **NOTE:** Should countershaft removal be required, refer to BRAKE 04-06 then look for Brake disc.

Remove 5 nuts **no. 14**. Three nuts are behind the lower sprocket.

Unfold locking tab **no. 24**, unscrew nuts **no. 25** then remove caliper retaining screws **no. 23**.

Release track tension, use drive axle holder **no. 21** (P/N 529 0072 00).



#### TYPICAL

1. Drive axle
2. Suspension cross shaft

Pry out drive axle oil seal **no. 20** from chaincase.

Pull chaincase from drive axle and countershaft.

Using 2 large screwdrivers inserted between chaincase **no. 7** and frame, pry complete assembly from vehicle.

## INSPECTION

Visually inspect the chain for cracked, damaged or missing links. Check for worn or defective bearings, sprockets and chain tensioner components.

### ◆ WARNING

If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

## GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Refer to TECHNICAL DATA 09-03 for gear ratios.

### ▼ CAUTION

Gear ratio modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

○ **NOTE:** For high altitude regions, the High Altitude Technical Booklet (P/N 484 0648 00 and P/N 484 0545 00 for binder) gives information about calibration according to altitude.

## INSTALLATION

Reverse removal procedure and pay attention to the following. Replace oil seals, gaskets and O-rings.

Refer to DRIVE AXLE 06-04 for drive axle axial play adjustment.

### 11, Oil Seal

Clean chaincase bore with Loctite Safety Solvent (P/N 413 708200) then apply Loctite 609 to oil seal mounting surface (outside).

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the chaincase edge.

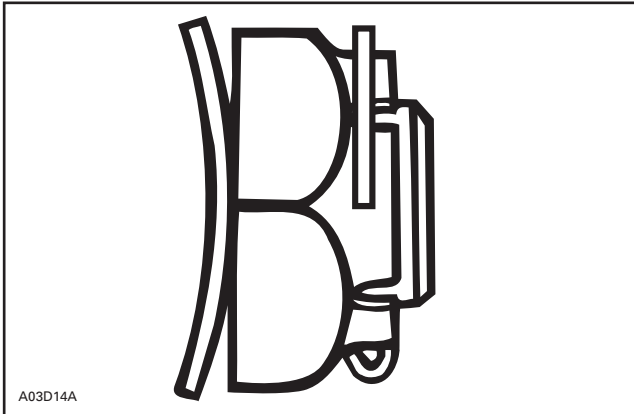
○ **NOTE:** Should installation procedure for countershaft be required, refer to BRAKE 04-06 then look for Brake disc and Countershaft bearing adjustment.

### 5,16, Sprockets

Position the sprockets with the writing facing the chaincase cover.

### 27, Conical Spring Washer

Install washer with its concave side towards drive pulley.

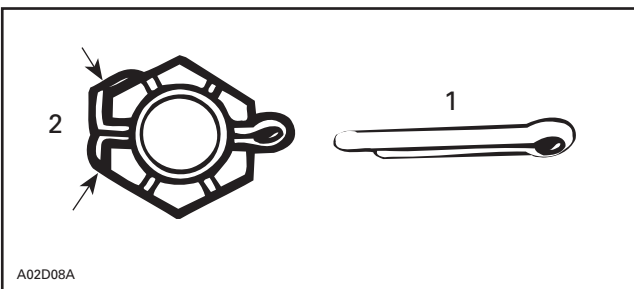


### 4, Upper Sprocket Castellated Nut

Torque to 45 to 90 N•m (33 to 66 lbf•ft).  
Install new cotter pin in the position shown.

<b>▼ CAUTION</b>
When removing a cotter pin always replace with a new one.

<b>▼ CAUTION</b>
Cotter pin will rub on chaincase cover if installed otherwise.



1. New
2. Fold cotter pin over castellated nut flats only

### 18, Circlip

<b>▼ CAUTION</b>
It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.

### DRIVE CHAIN ADJUSTMENT

○ **NOTE:** Brake disc key must be in good condition before checking chain free play.

### 10, O-ring

Replace O-ring **no. 10** on tensioner adjustment screw. Fully tighten tensioner adjustment screw **by hand**, then back off only far enough for hair pin to engage in locking hole.

This initial adjustment should provide 3-5 mm (1/8-13/64 in) free-play when measured at the outer circumference of the brake disc.

<b>▼ CAUTION</b>
Free-play must not exceed 5 mm (13/64 in), readjust if necessary.

<b>◆ WARNING</b>
If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

### 22, Chaincase Oil

Pour 250 mL (8.5 fl. oz) of synthetic chaincase oil (P/N 413 8033 00) into chaincase.

○ **NOTE:** Chaincase oil capacity is 250 mL (8.5 fl. oz).

Check oil level with the dipstick then add if required. Remove metal particles from magnet.

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## Section 04 TRANSMISSION

### Sub-Section 07 (CHAINCASE)

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*TYPICAL*

1. Dipstick

○ **NOTE:** Chaincase must be in its proper position when checking oil level.

## ADJUSTMENT

### Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT 04-05.

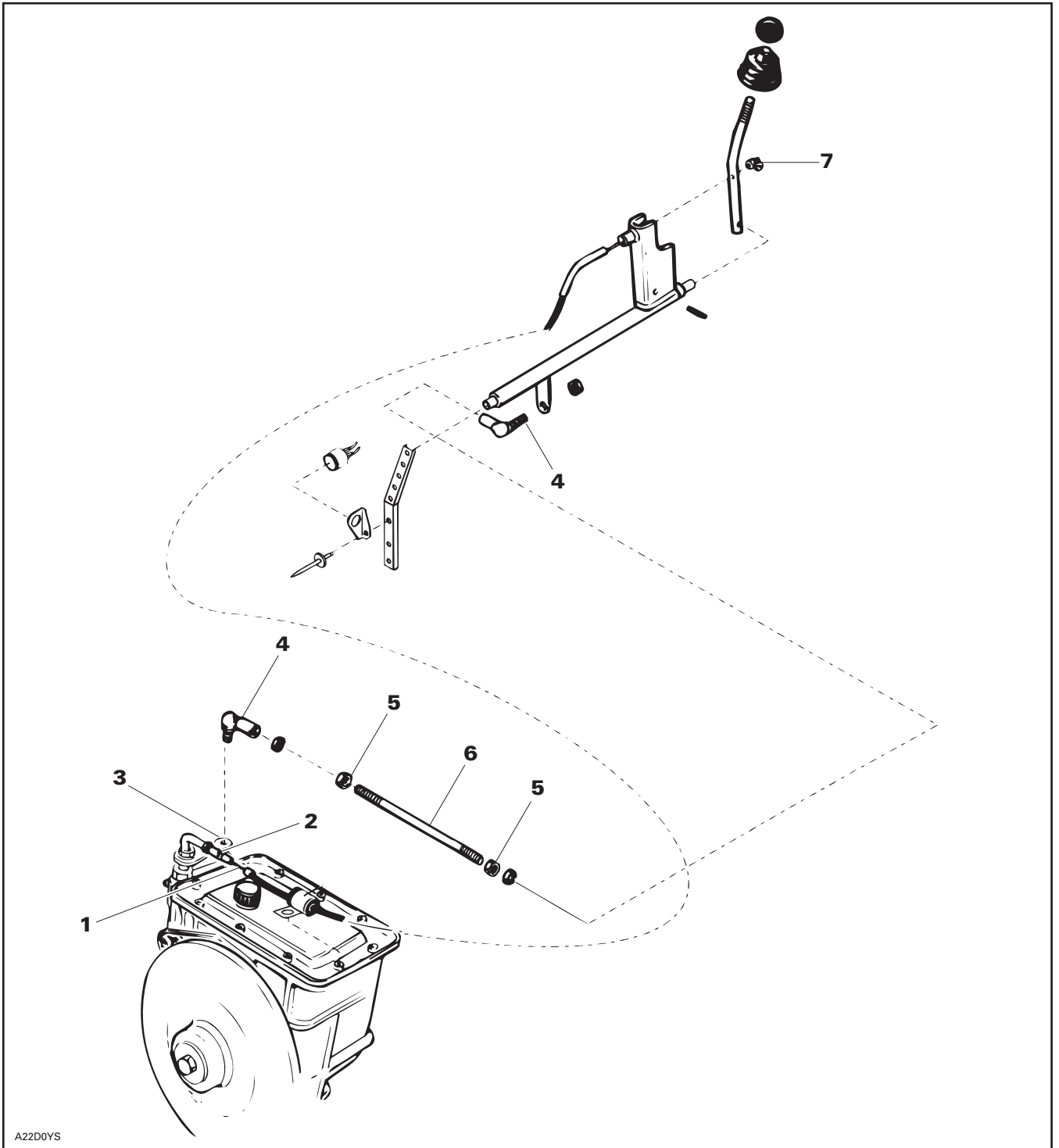
### Track Tension and Alignment

Refer to TRACK 06-05.

# GEARBOX

## 3-SPEED GEARBOX (SHIFTER MECHANISM)

*Skandic WT/WT LC*



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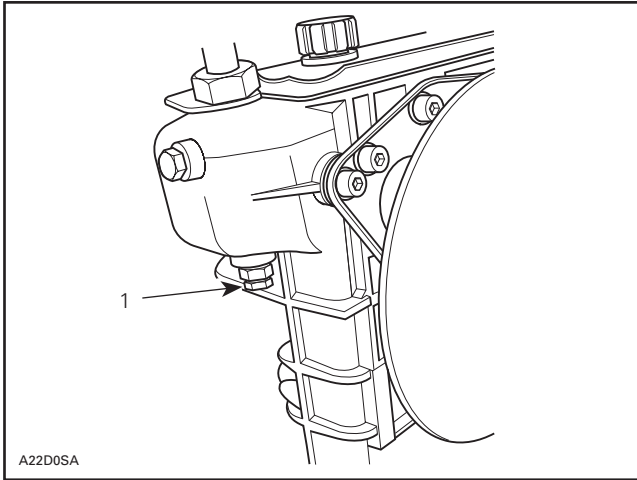
## Section 04 TRANSMISSION

### Sub-Section 08 (GEARBOX)

## REMOVAL

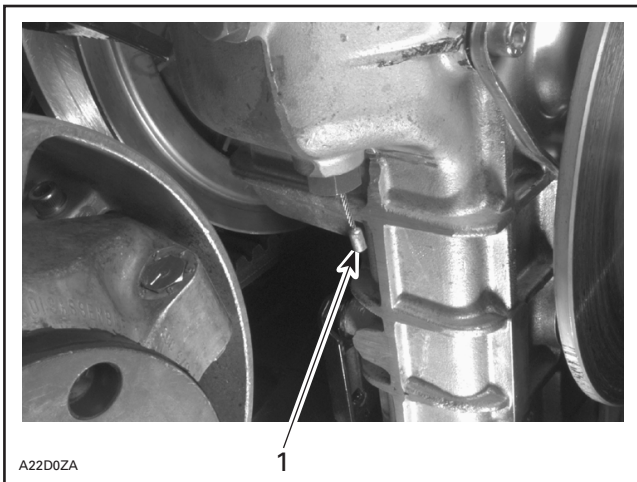
### 1,2, Cable and Cable Housing

Remove screw from underneath top portion of transmission. Remove cable barrel from shifter: see last photo.



1. Remove this screw

Pull out cable from underneath top portion of transmission.

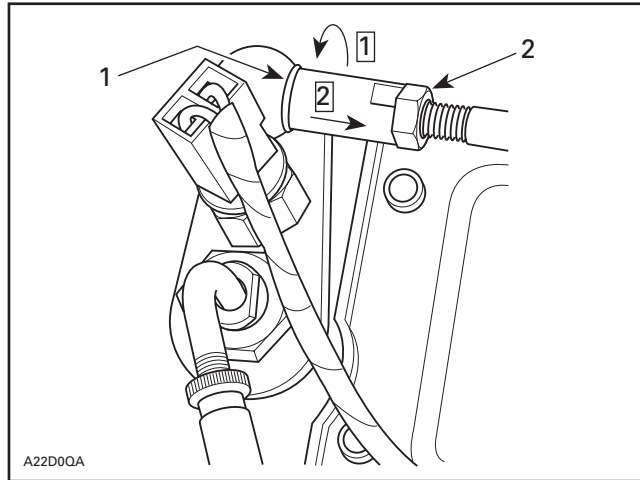


1. Cable

## ADJUSTMENT

### 6, Tie Rod

Loosen tie rod lock nut. Remove clip.  
Unfasten tie rod end.



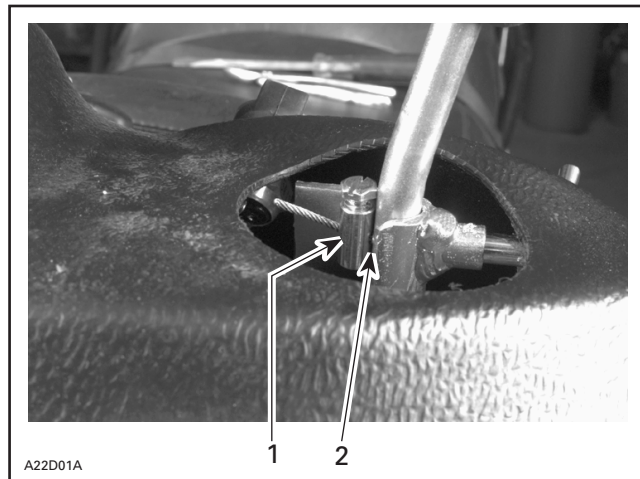
1. Clip  
2. Lock nut

Adjust tie rod length in a way that gear shift lever does not contact console. Check 2<sup>nd</sup> gear position. Retighten ball joint lock nuts.

### 1, Cable

With gear shift lever in neutral position, there should be no cable free play.

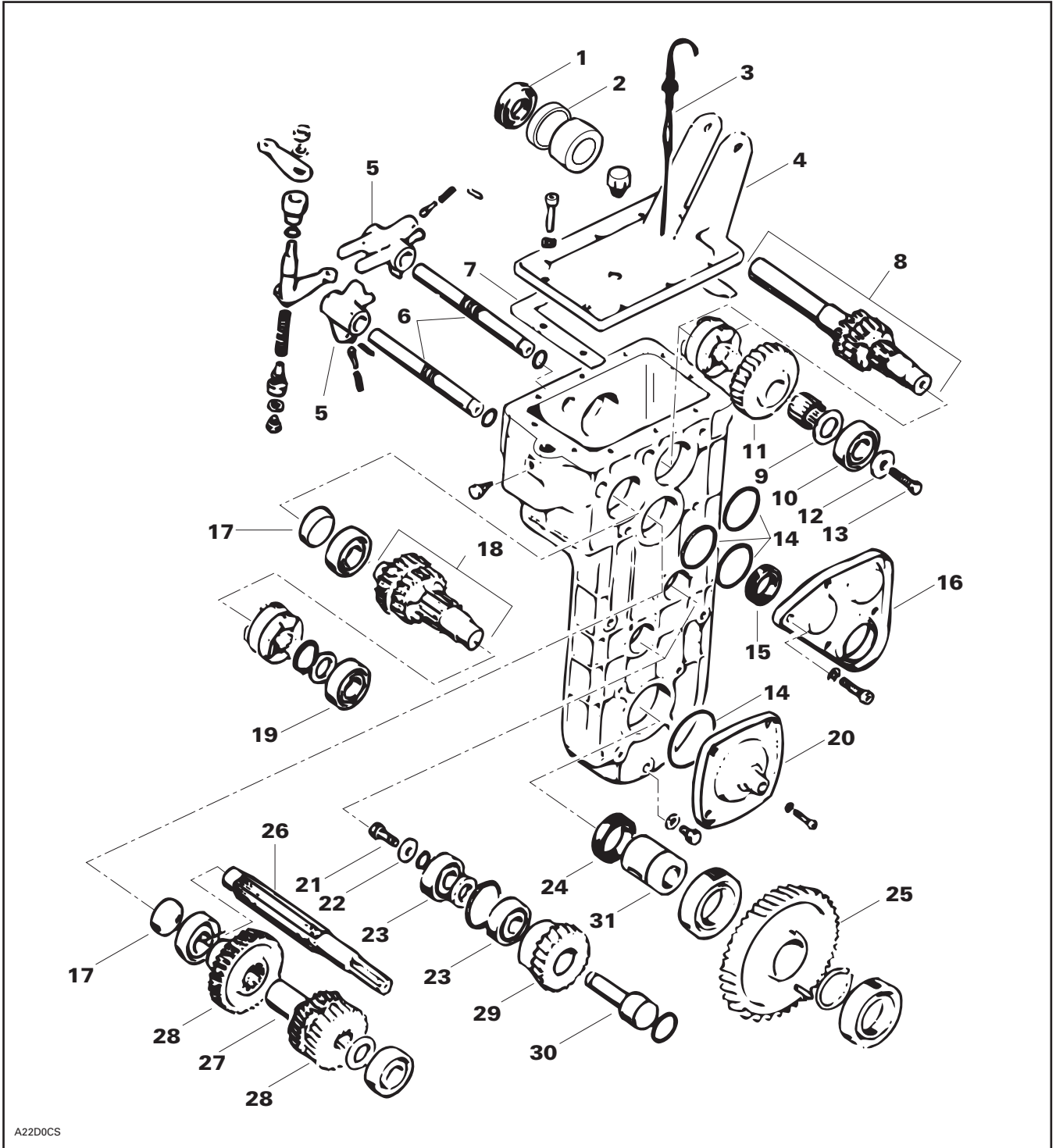
Adjust reverse lock out cable by cable housing adjuster **no. 2**. If more adjustment is needed, slacken or tighten cable barrel accordingly.



1. Cable barrel  
2. No free play

### 3-SPEED GEARBOX

Skandic WT/SWT/WT LC



A22D0CS

## Section 04 TRANSMISSION

### Sub-Section 08 (GEARBOX)

## REMOVAL

Remove brake disc and driven pulley. Unfasten shifting rod and cable. See above CABLE REMOVAL.

Remove rear suspension.

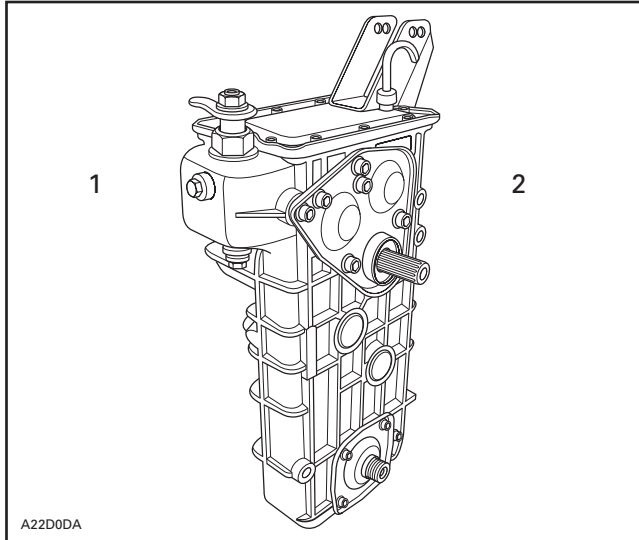
Remove angle drive and square pin.

Remove RH end bearing then push drive axle toward right side.

Unbolt gearbox from chassis.

## DISASSEMBLY

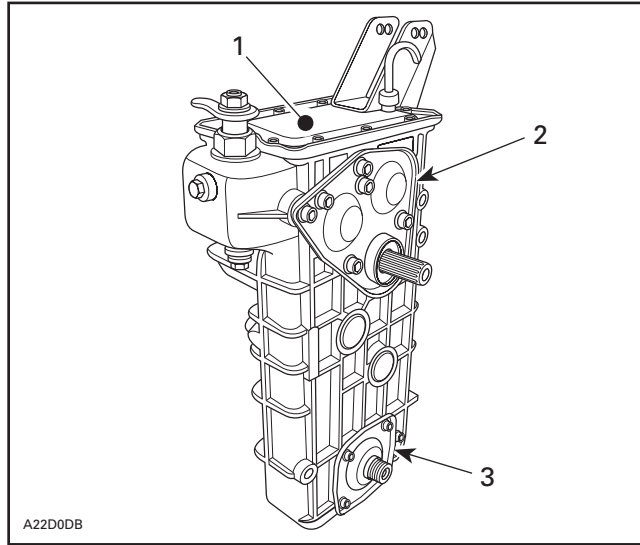
For the following procedure, right hand side refers to driven pulley side and left hand side to brake disc side.



1. RH side driven pulley side
2. LH side brake disc side

### 3,4,7,14,16,20, Dipstick, Top Cover, Gasket, O-ring, Upper Side Cover and Lower Side Cover

Remove dipstick. Unfasten top cover, upper side cover and lower side cover from gearbox housing.

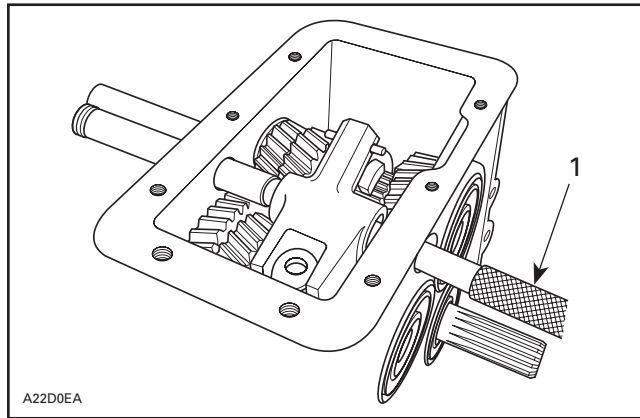


1. Top cover
2. Upper side cover
3. Lower side cover

Discard O-rings and top gasket.

### 5,6, Fork and Fork Axle

Using a pusher, drive out from LH side both fork axles starting with top one. Remove forks.



1. Pusher

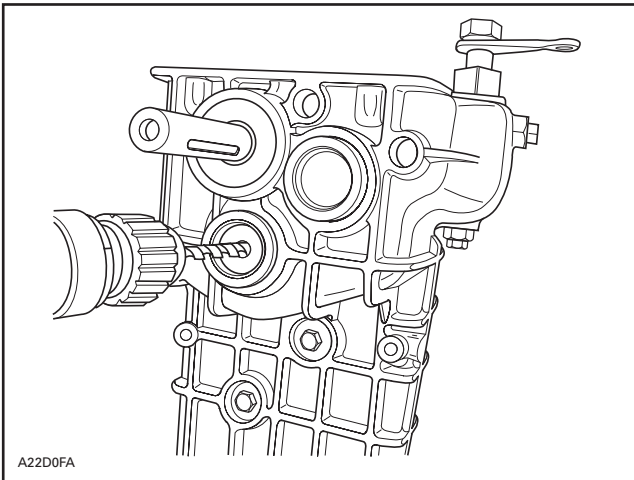
### 12,13, Washer and Screw

Remove screw and washer from driven pulley shaft end.

### 17, Plug

Drill a 10 mm (3/8 in) dia. hole through brake shaft plug.

**Section 04 TRANSMISSION**  
**Sub-Section 08 (GEARBOX)**



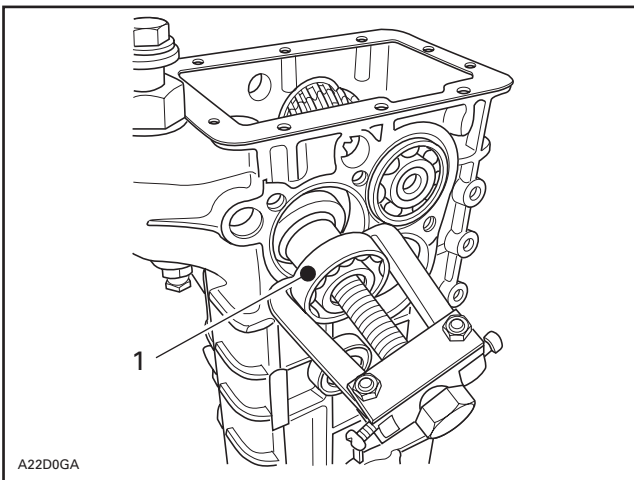
**18,19,26,27,28, Reverse Shaft, LH Side Bearing, Brake Shaft, Sleeve and Gear**

Drive brake shaft out of gearbox housing.  
Remove sleeve.

○ **NOTE:** Brake shaft gears remain in gearbox housing.

Proceed the same for reverse shaft plug.

Drive reverse shaft out until its LH side bearing is free. Use a puller to extract this bearing.



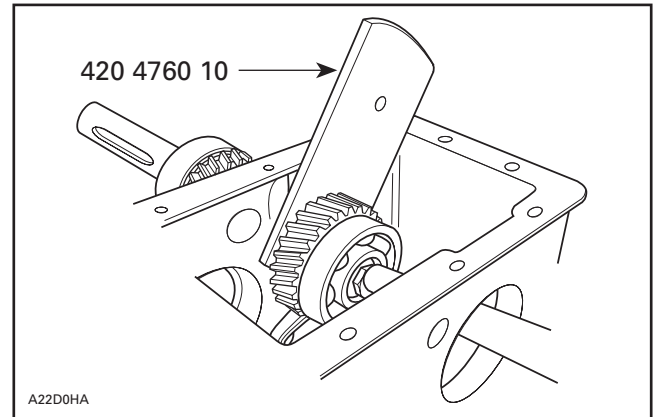
1. Extract reverse shaft LH side bearing

Remove reverse shaft from gearbox housing. Remove brake shaft gears.

**1,2,8,9, Oil Seal, Circlip, Driven Pulley Shaft and Shim**

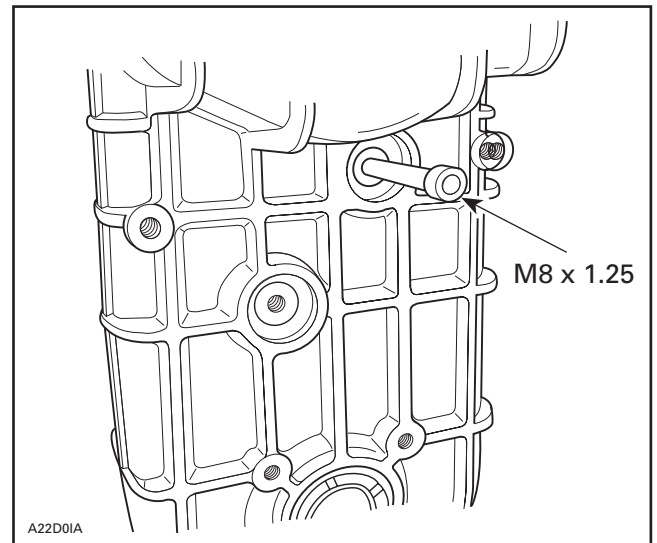
Pry oil seal out of gearbox housing. Remove snap ring.

Drive out driven pulley shaft. Use alignment tool (P/N 420 4760 10) as a supporting plate to extract last gear and bearing. Spacer will fall into gearbox housing.



**21,22,29,30, Screw, Washer, Intermediate Gear and Intermediate Axle**

Remove screws and washers from both intermediate axles. Fasten a long M8 x 1.25 screw in axle end then drive it out, beginning with top one.



Remove intermediate gears.

Do not disassemble bearings of intermediate gears needlessly.

**24,25, Bottom Seal and Lower Gear**

Pry out bottom seal from gearbox housing.

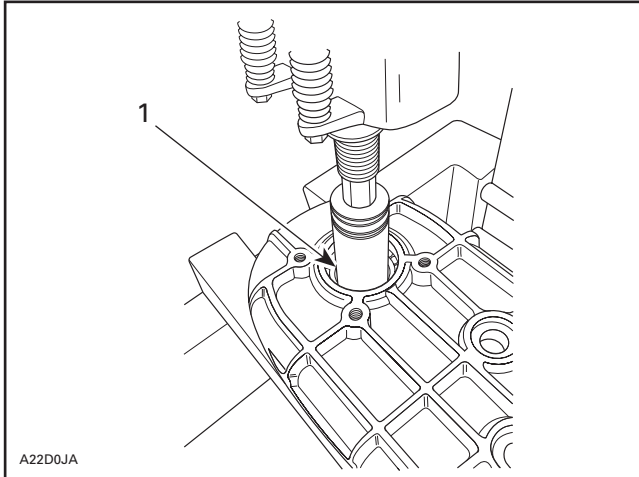
Using a press, drive out lower gear from left side.

## Section 04 TRANSMISSION

### Sub-Section 08 (GEARBOX)

#### ▼ CAUTION

Do not push against inner bearing race.



1. Push against gear shoulder

## INSPECTION

Check bearing condition. There must be no discoloration, missing rollers or balls, broken cages, etc. Check sprocket teeth.

## ASSEMBLY

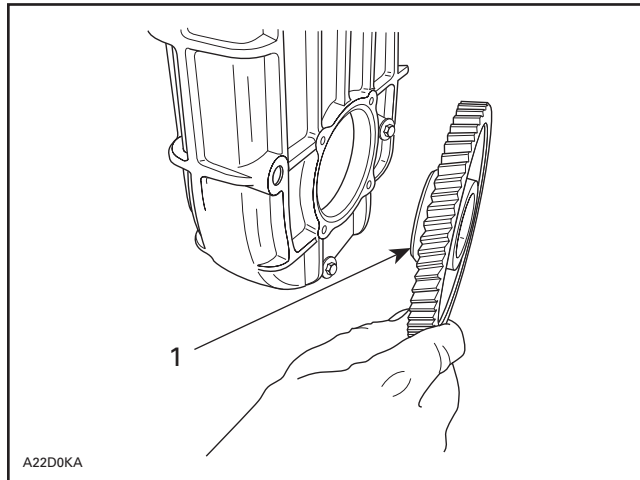
Reverse disassembly procedure, paying attention to the following:

### 31, Output Shaft

Install output shaft with its hollow side (no splines) on RH side.

### 25,29, Lower Gear and Intermediate Gear

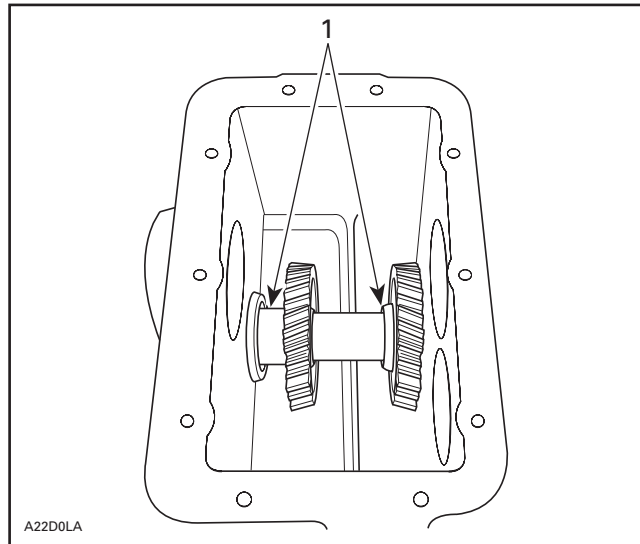
Install all gears with their shoulder towards RH side.



1. Gear shoulder towards RH side

### 18,19,26,27,28, Reverse Shaft, LH Side Bearing, Brake Shaft, Sleeve and Gear

Install brake shaft taking care that gear shoulders face RH side.

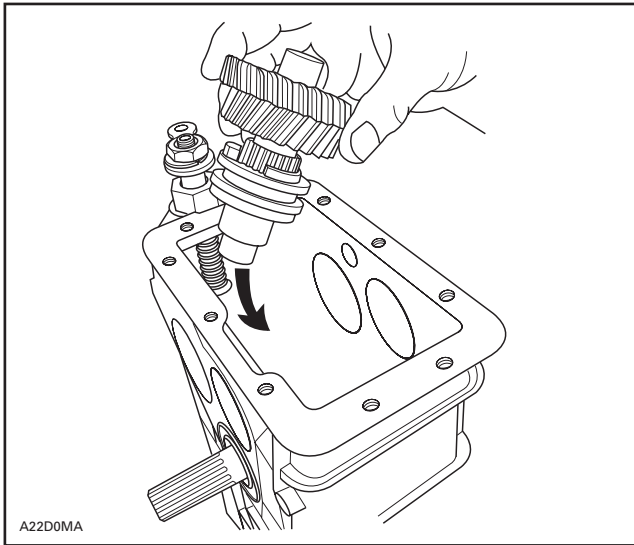


1. Gear shoulders face RH side

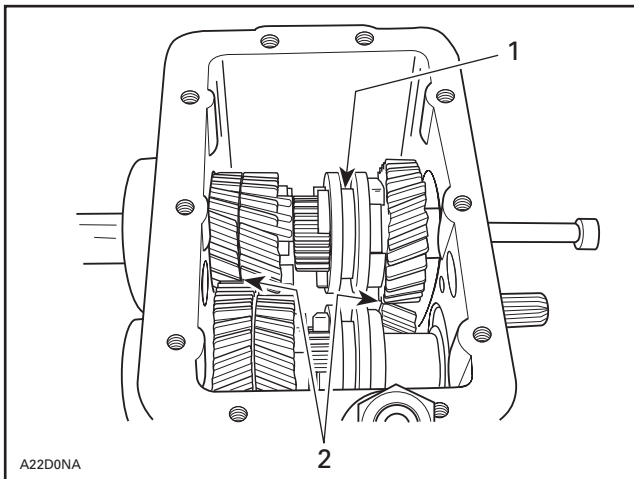
Install reverse shaft, its smaller end first.

## Section 04 TRANSMISSION

### Sub-Section 08 (GEARBOX)



Install shim and bearing on LH side.  
Install driven pulley shaft, sliding sleeve then gear.  
Turn brake shaft during installation and check that gears mesh.

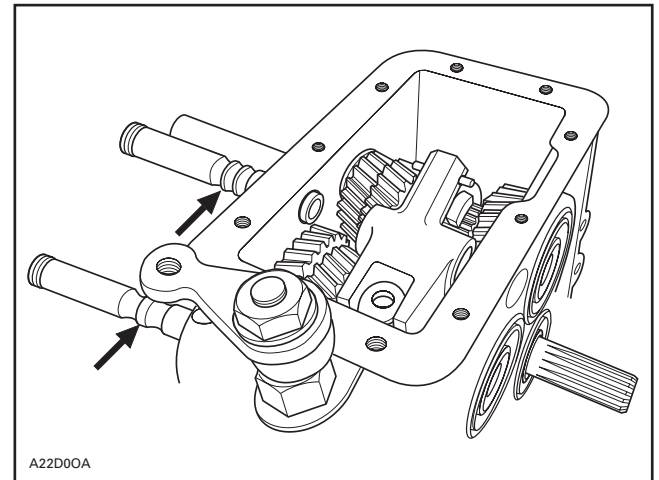


1. Sliding sleeve
2. Gears mesh

Install shim, bearing and circlip.

### 5,6, Fork and Fork Axle

Mount forks and fork axles using a screwdriver to hold index ball. See illustration for fork axle positions.

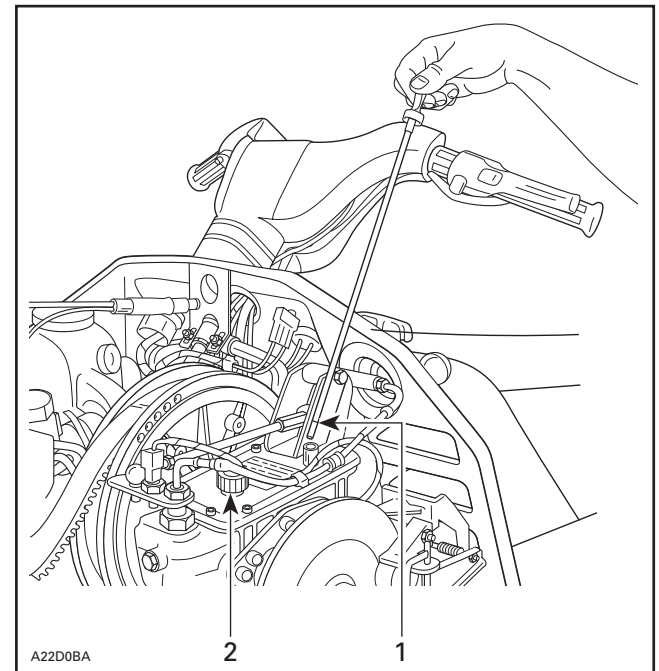


## INSTALLATION

Reverse removal procedure. Check pulley alignment.

## OIL LEVEL

To check, pull dipstick. Oil should reach level mark.



### TYPICAL

1. Level mark
2. Filler plug

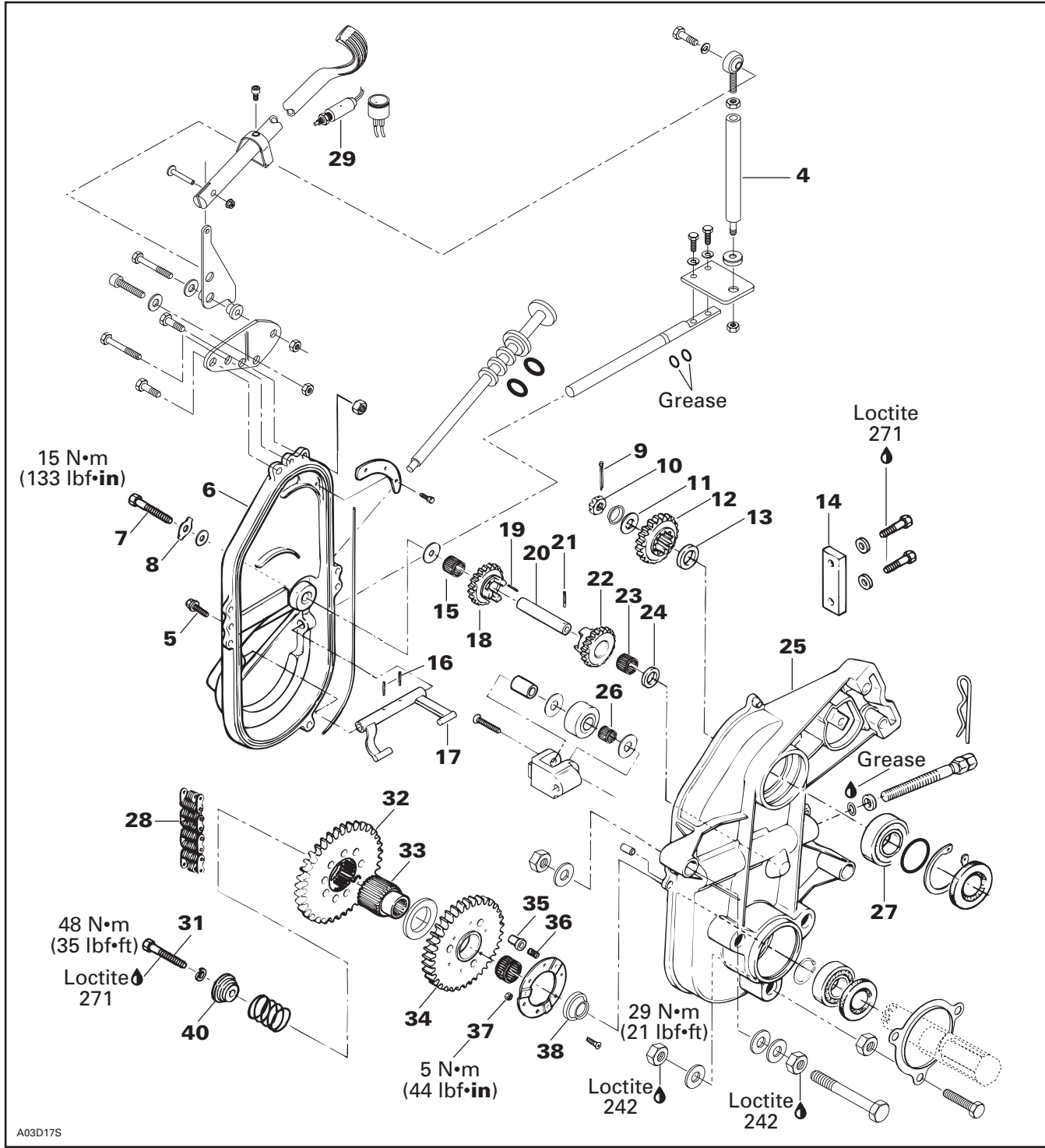
To fill, remove filler plug from top of transmission. Refill as required using Bombardier synthetic chaincase oil (P/N 413 8028 00).

# Section 04 TRANSMISSION

## Sub-Section 08 (GEARBOX)

### 2-SPEED GEARBOX

Grand Touring 500/583



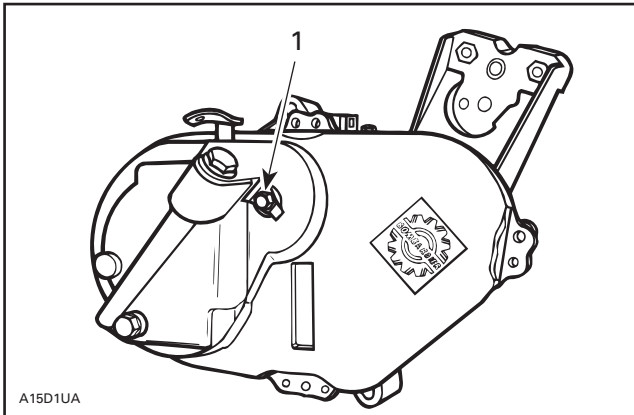
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## DISASSEMBLY

**NOTE:** It is possible to see the sliding gear in motion through oil gauge hole.

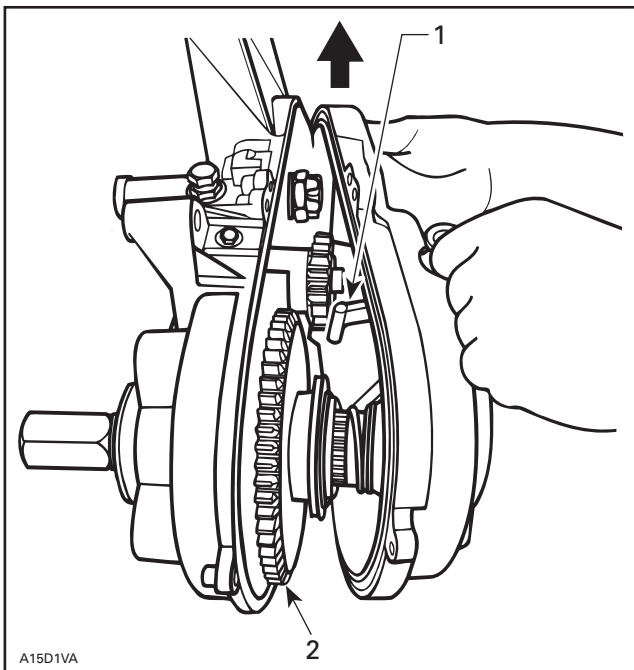
Unbolt gear shift linkage from shifter.

Unscrew cover screws **no. 5** as well as reverse axle screw **no. 7**.



1. Reverse axle screw

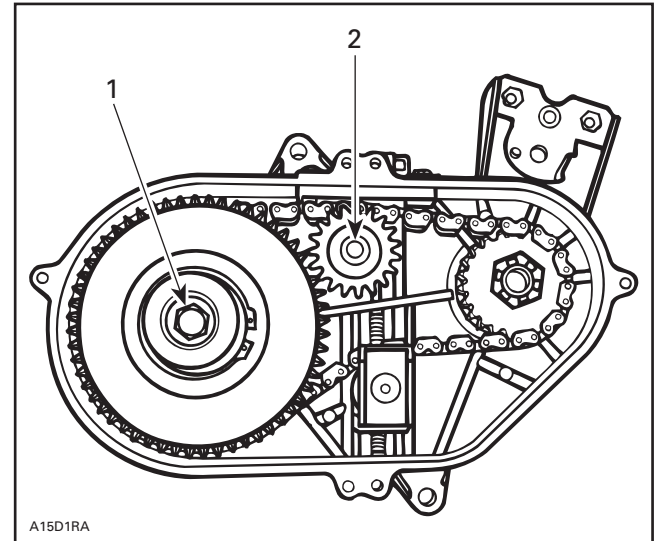
Separate cover **no. 6** from housing and move it toward the front in order to disengage fork from sliding gear.



1. Fork  
 2. Sliding gear

Slacken chain tension, unscrew sliding gear retaining screw **no. 31**, then remove sliding gear **no. 32**.

First remove 19-tooth reverse gear **no. 18** and then remove reverse axle **no. 20**.



1. Sliding gear screw  
 2. Reverse axle

Remove coupling shaft **no. 33**, 44-tooth sprocket **no. 34**, spacer **no. 38** and chain **no. 28**.

First unscrew castellated nut **no. 10**, then remove 22-tooth sprocket **no. 12**.

Force 2 spring pins **no. 16** out to disengage fork **no. 17** from its axle.

## INSPECTION

### 14, Chain Slider

Replace slider if maximum wear is 1.0 mm (.039 in) at contact point.

### Bearings

Check bearing condition. There must be no discoloration, missing rollers, broken cages, etc.

### Sprockets and Gears

Check teeth.

## ASSEMBLY

Reinstall drive shaft.

Reinstall gearbox housing.

**NOTE:** Adjustment screw can only be installed when housing is removed.

Do not reuse removed oil seals. Replace them by new ones.



## Section 04 TRANSMISSION

### Sub-Section 08 (GEARBOX)

Install drive axle with track then bearing and circlip in chaincase bore. Install spacer **no. 38** with its large outer diameter against sprocket, 44-tooth sprocket **no. 34**, coupling shaft **no. 33**, cap **no. 40** and screw **no. 31**.

Place a 25 cm (10-inch) rule against sprockets. Maximum allowable offset is 1 mm (.040 in).

a. If upper sprocket is too far in, possible causes are:

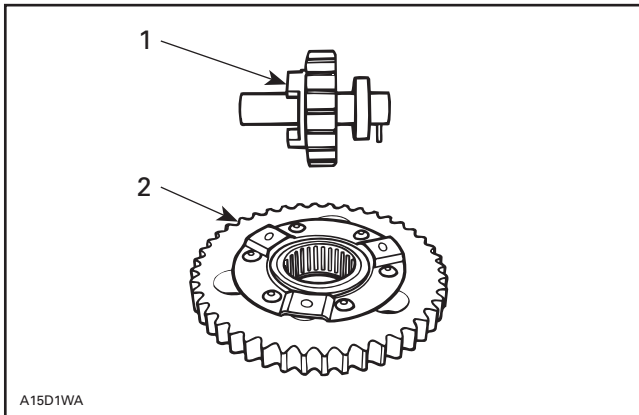
1. Countershaft bearing on driven pulley side may be too far in. To check, pull out bearing using countershaft bearing remover (P/N 529 0301 00) then recheck sprocket alignment. Use bearing installer (P/N 529 0302 00) to reposition bearing. Bearing housing (triangle) must be against frame without preload.
2. Add shim(s) between chaincase and frame and reposition bearing on driven pulley side accordingly.

b. If upper sprocket is too far out, check:

If there are too many shims between chaincase and frame. Remove shims accordingly and reposition bearing on driven pulley side.

Press needle bearing in 44-tooth sprocket. Assemble drive pins **no. 35** and their spring **no. 36** on 44-tooth sprocket. Tighten nut **no. 37** to 5 N•m (44 lbf•in) in a criss-cross sequence.

Insert spring pin **no. 21** in reverse axle up to inside diameter. Press needle bearing in 19-tooth sprocket. Install ring **no. 24** and 19-tooth sprocket on reverse axle.



1. Reverse axle ass'y  
2. Sliding gear ass'y

Install shim **no. 13**, 22-tooth sprocket (drive) **no. 12** and washer **no. 11** then tighten castellated nut **no. 10** and conical spring washer. Secure with a new cotter pin.

Install chain **no. 28**, 44-tooth sprocket **no. 34** and its spacer **no. 38**. Spacer's large outer diameter must be against sprocket. Insert coupling shaft **no. 32** in 44-tooth sprocket.

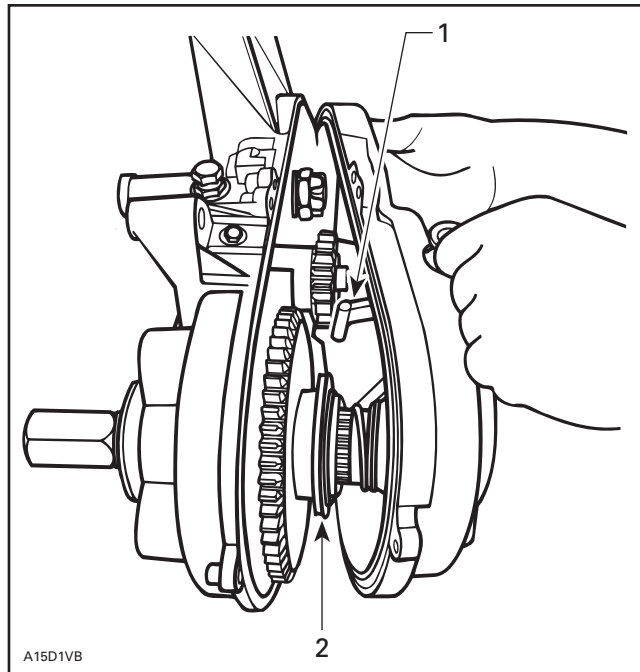
Install needle bearing **no. 15** (wider one) in reverse gear **no. 18**.

Install reverse axle **no. 20** (assembly) making sure to properly position spring pin in housing slot. Install alignment rod **no. 19**, reverse gear **no. 18** and spacer **no. 24**. Drive sprocket hole and driven gear hole must be aligned to insert alignment rod.

Mount chain tensioner (assembly) to adjustment screw already fixed to gearbox. Assemble fork **no. 17** to axle using spring pins **no. 16**. Apply grease on O-rings.

## 6, Cover

Join cover (assembly) to housing. Make sure fork tabs are behind sliding sprocket thrust washer.



1. Fork tabs  
2. Thrust washer

## ▼ CAUTION

Gearbox cover must completely lay against housing.

### 5,7,8, Screws and Locking Tab

Tighten screws in a criss-cross sequence starting with the one above reverse axle. Install reverse axle screw and bend locking tab against screw head flat. Bolt shift linkage to shifter.

## ADJUSTMENT

### 28, Chain

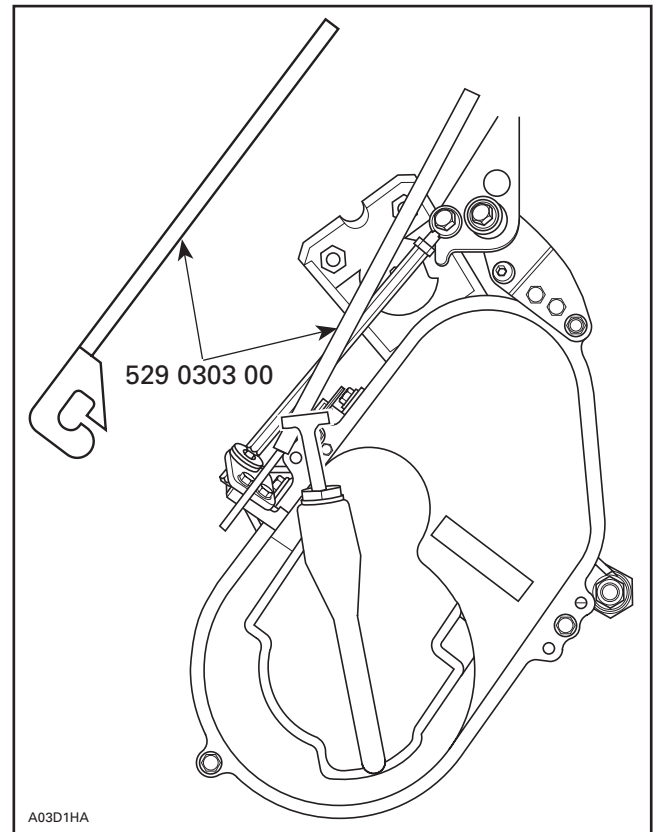
Fully tighten adjustment screw by hand, then back off only far enough for hair pin to engage in locking hole.

### 4, Gear Shift Linkage

1. Check proper fit of handle in console.
2. Shift into reverse gear.

○ **NOTE:** If it is impossible to shift into reverse gear, shorten tie-rod and try again. If it is still impossible, check if the fork engages in the sliding gear or disassemble the cover to inspect components.

3. Completely slacken ball joint lock nut on the gear shift linkage.
4. Using tool (P/N 529 0303 00) to push and hold down tie-rod plate to make sure transmission is in reverse gear. Pull shifter handle in reverse position making sure all slack is removed. Lengthen tie-rod until it contacts the rubber washer then add an additional turn.



○ **NOTE:** It is normal to feel a light friction when shifting into gear.

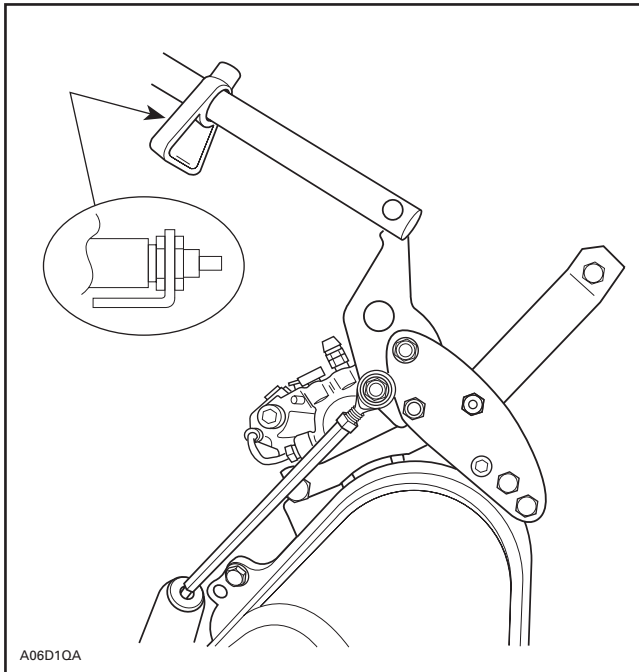
5. Statically test transmission operation in forward and reverse positions.
6. Hold linkage and tighten ball joint jam nut.

### 29, Alarm Switch

Adjust backup alarm so that it sounds when transmission is in reverse gear while engine is running.

## Section 04 TRANSMISSION

### Sub-Section 08 (GEARBOX)



## OIL CHANGE

Place a container under bottom pan (gearbox side).

Unbolt gear shift linkage from fork axle. Unbolt and remove cover by separating it from housing and by moving it toward the front in order to release fork from sliding sprocket.

Clean cover interior.

**NOTE:** It is normal to find metallic particles stuck to dipstick magnet. If bigger pieces of metal are found, disassemble and check all parts.

Reinstall cover as previously described during assembly.

Fill housing with chaincase oil (P/N 413 8019 00). Oil capacity is 250 mL (8.5 oz).

Check oil level with dipstick. With dipstick unscrewed, oil level must be between MIN. and MAX. marks.



1. Dipstick

Shifter can be put in reverse position to ease removal of dipstick.

# DRIVE CHAIN

## SILENT CHAIN

For 1997 there are 2 types of silent chain. One is 11-plate wide and the other (stronger) is 13-plate wide. Do not interchange sprockets. Fit chain on sprockets to make sure using right ones according to width. Refer to TECHNICAL DATA 09-03.

○ **NOTE:** No work (separation, lengthening) can be done on the silent chain type.

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# WIRING DIAGRAMS

MODEL	WIRING DIAGRAM PAGE	HEADLIGHT (watt)	TAILLIGHT (watt)	ELECTRICAL SYSTEM OUTPUT (watt)
MX Z 440 F	Annex 1	60/55 hal.	8/27	240
MX Z 440/583/670	Annex 2	60/55 hal.	8/27	220
Formula 500 DELUXE	Annex 3	60/55 hal.	8/27	220
Formula 500/583 Summit 500/583/670	Annex 4	60/55 hal.	8/27	220
Formula Z	Annex 5	60/55 hal.	8/27	220
Grand Touring 550/583	Annex 6	60/55 hal.	8/27	220
Skandic WT/SWT	Annex 7	60/55 hal.	8/27	240
Skandic WT LC	Annex 8	60/55 hal.	8/27	240

hal. = halogen

## CHART CODES

### Wiring Color Code

The first color of a wire is the main color, second color is the stripe.

Example: YL/BK is a YELLOW wire with a BLACK stripe.

COLOR CODE	
BK — BLACK	GN — GREEN
WH — WHITE	GY — GREY
RD — RED	VI — VIOLET
BL — BLUE	OR — ORANGE
YL — YELLOW	BR — BROWN

## Section 05 ELECTRICAL

### Sub-Section 02 (WIRING DIAGRAMS)

Following table shows wire colors related to electrical circuits.

WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	



## Connector Location

Connectors on wiring diagrams carry the letter C followed by a number. Use this code with wiring diagram legend to find connector location on vehicle.

## UNPLUGGING CONNECTORS

Always unplug connectors by pulling on housing not on wire.

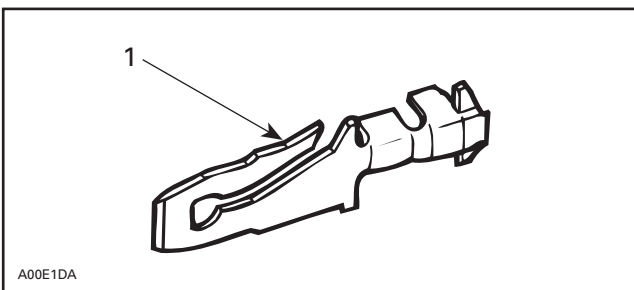


TYPICAL

## TAB AND RECEPTACLE CONNECTORS REMOVAL

### Tab Connector

It is locked in its housing by a spring tab on its side. Removal is done by squeezing this tab.

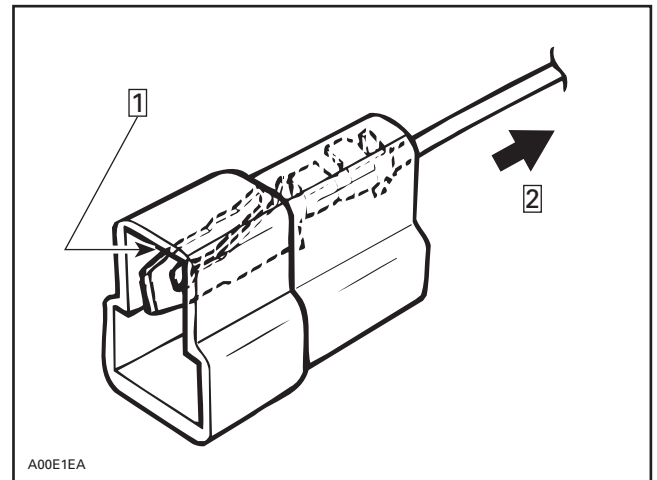


TAB CONNECTOR

1. Locking tab

To remove:

- Insert a screwdriver or Snap-on TT 600-5 from opposite side of wire and pry locking tab.
- While holding locking tab pried, pull connector toward wire side.



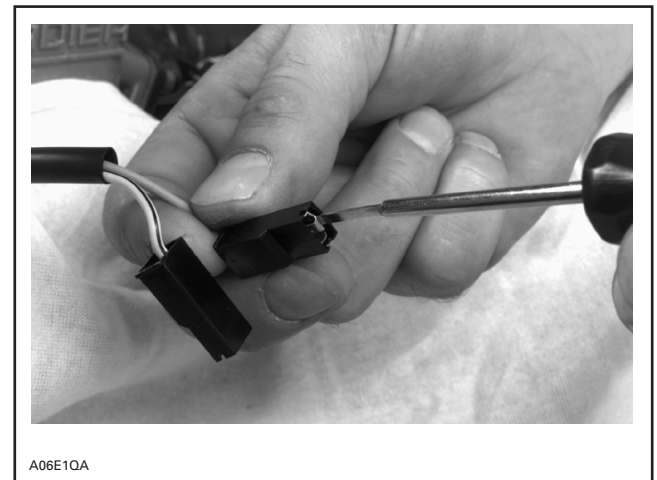
Step 1: Insert screwdriver here

Step 2: Pull this side

### Locking Receptacle Connector

To remove:

- Insert tool Snap-on TT 600-5 in access opening then pull housing toward wire side.



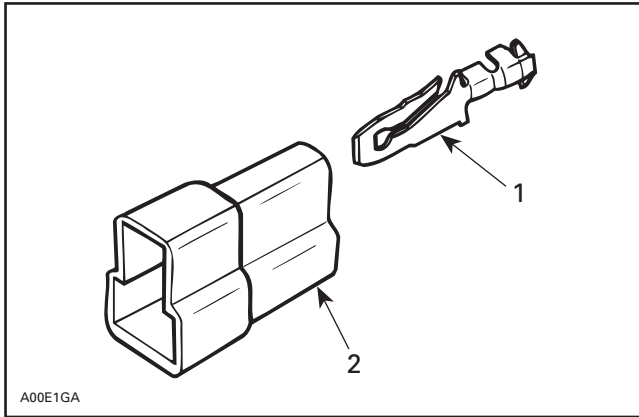
## TAB AND RECEPTACLE CONNECTORS INSTALLATION

Prior to installing, make sure locking tab is sufficiently lifted to properly lock.

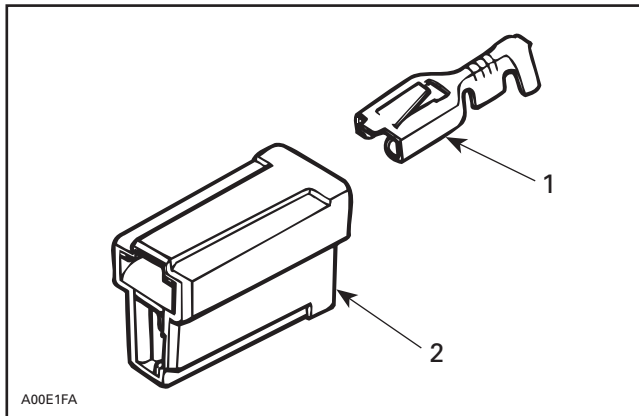
Insert tab and receptacle connectors in their respective housings as shown in following illustrations. Push sufficiently so that they snap. Try pulling wire to ensure they are properly locked.

## Section 05 ELECTRICAL

### Sub-Section 02 (WIRING DIAGRAMS)



1. Tab
2. Housing



#### TYPICAL

1. Receptacle
2. Housing

## ACCESSORIES INSTALLATION

On all **electric start models**: The direct current (DC) utilizes the snowmobile frame as ground "wire" while all alternating current (AC) consumers (lights, heated grips, fuel gauge, etc.) utilize a separate ground wire.

Never interconnect AC and DC grounds as an AC voltage drop will result. When installing accessories on **any** snowmobile, connect their wires directly to the **YELLOW** and **YELLOW/BLACK** lighting coil wires.

Even if **manual start models** have an AC ground to the chassis (on voltage regulator), all accessories utilize a ground wire isolated from chassis. When an electric starter kit is installed, the voltage regulator and its ground wire are replaced by a voltage rectifier/regulator unit permitting a completely isolated AC circuit.

### ◆ WARNING

Never secure electrical wires/cables with fuel lines. Keep wires away from any rotating, moving, heating, vibrating or sharp edge. Use proper fastening devices as required.

# IGNITION TIMING

## DUCATI CDI SYSTEM

### 443 and 503 Engine Types

Proper ignition timing is determined by trigger coil position.

If for any reason, ignition timing accuracy is suspected, it can be checked as follows.

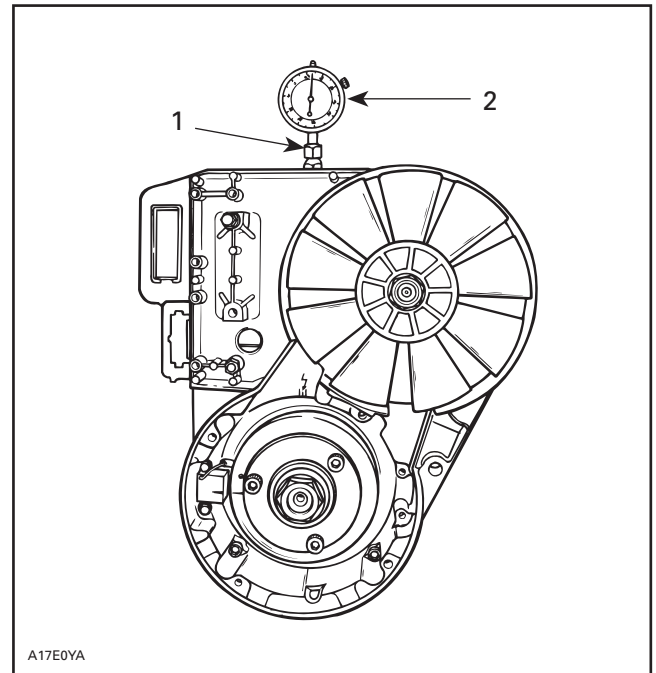
### Verifying Magneto Flywheel Timing Mark Position

Prior to checking the timing, it may be necessary to verify the position of the timing mark on the magneto flywheel, for the following reasons:

1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel.

To verify the position of the timing mark on the magneto flywheel, proceed as follows:

1. Clean the area around the spark plugs, and remove them.
2. Remove the rewind starter from the engine.
3. Install the TDC gauge in the spark plug hole, (magneto/generator side) and adjust as follows:
  - a. Position the magneto flywheel at approximately TDC.



#### INSTALLATION OF TDC GAUGE

1. Adaptor lock nut
  2. Gauge on MAG side cylinder
- b. Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
  - c. Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
  - d. Position the dial face toward the magneto/generator. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.
4. Locate the piston TDC position as follows:
    - a. Slowly rotate the magneto flywheel back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
    - b. Rotate the dial face so that "0" is in line with the needle when it stops moving.
    - c. Again, slowly rotate the magneto flywheel back and forth across TDC and adjust the dial face to "0", until the needle always stops exactly at "0" before changing direction.

## Section 05 ELECTRICAL

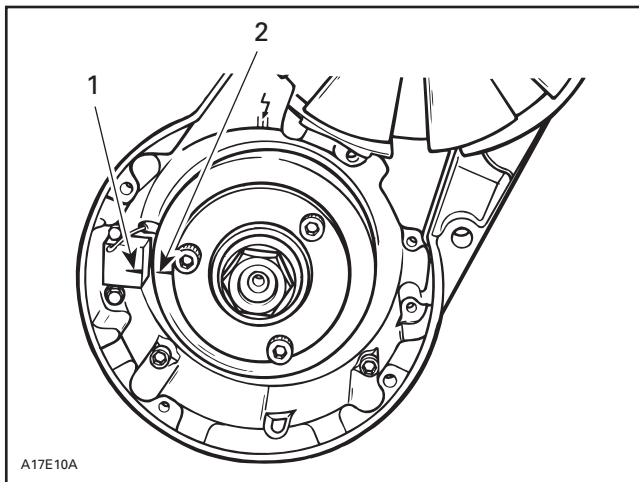
### Sub-Section 03 (IGNITION TIMING)

d. "0" now indicates exact TDC.

5. Verify the position of the timing mark on the magneto flywheel as follows:

**NOTE:** When checking timing, certain procedures require that the magneto flywheel be turned in a clockwise direction, viewed facing the magneto/generator. If it is necessary to turn back (counterclockwise) for any reason, rotate the magneto flywheel at least one-quarter turn counterclockwise, and then rotate it clockwise. The last magneto flywheel movement when making a critical check must always be in a clockwise direction, to ensure that the slack in engine moving parts is taken-up.

- Rotate the magneto flywheel counterclockwise, one-quarter turn then carefully rotate it clockwise until the needle indicates the specified measurement. Refer to TECHNICAL DATA 09-02.
- Verify that the magneto flywheel mark perfectly aligns with the mark on the trigger coil, refer to illustration.
- If the marks do not align, check magneto flywheel and trigger coil part numbers and check Woodruff key condition. If all parts are the appropriate ones and if Woodruff key is in good condition, continue the procedure.

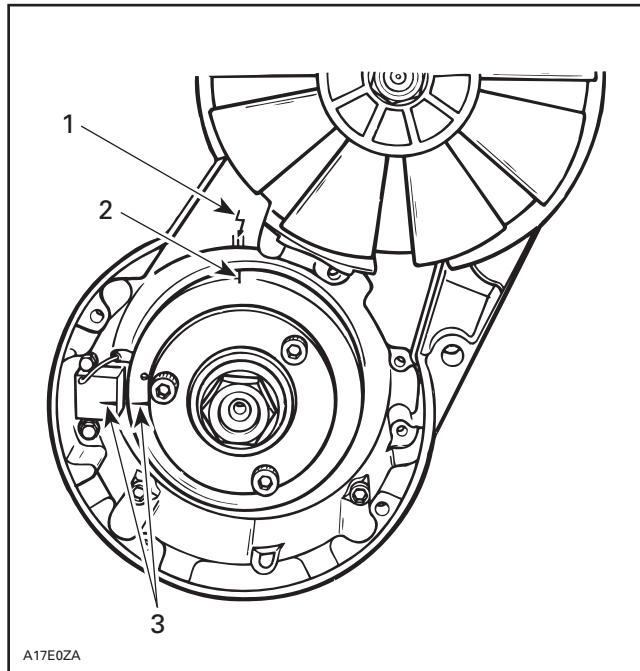


1. Trigger coil mark
2. Magneto flywheel mark

**NOTE:** These marks cannot be used to check dynamic (with engine running) ignition timing with a timing light: a new mark must be scribed on magneto flywheel for this purpose.

6. Scribe a new mark on magneto flywheel as follows.

- Remove the fan cover from the engine.
- Maintain magneto flywheel so that previous marks remain aligned.
- Scribe or punch a mark on magneto flywheel so that it perfectly aligns with the arrow on crankcase, refer to illustration. This new timing mark should be used for future timing checks (dynamic timing).
- Reinstall rewind starter.
- Check the timing with a timing light.



1. Crankcase arrow
2. Scribe a mark here
3. Maintain verified timing marks aligned (static timing)

### Checking Ignition Timing

Use timing light (P/N 529 0319 00).

To check the ignition timing, refer to illustration and proceed as follows:

**NOTE:** Engine should be cold when checking timing. Do not idle engine for more than 20 seconds and make checks quickly.

◆ **WARNING**

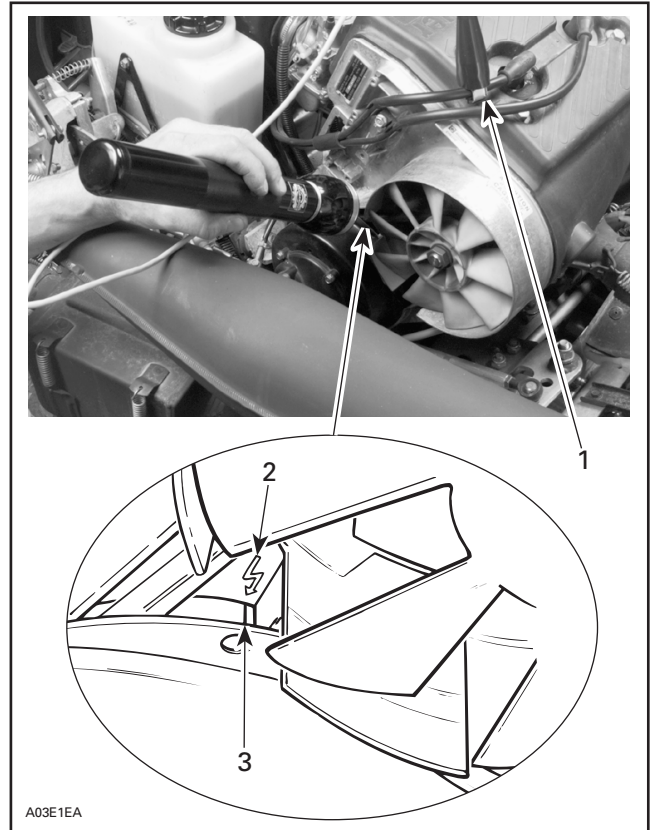
Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

1. Connect the timing light pick-up to a spark plug cable and the power connections to the battery.

○ **NOTE:** To avoid an incorrect reading due to parallax, view the magneto flywheel and the crankcase timing marks in a straight line.

2. Start the engine and raise the engine speed at least to 2000 RPM while observing the timing marks, refer to illustration. The magneto flywheel mark scribed previously and the crankcase arrow should be perfectly aligned. If the marks do not align, a faulty trigger coil (check proper grounding of coil) or a faulty CDI module could be the cause: substitute one part at a time and recheck timing marks (check connectors condition prior to substituting any part).

○ **NOTE:** Ignition timing may be verified when engine speed is anywhere within 2000-6000 RPM.



**CHECKING IGNITION TIMING**

1. Timing light pick-up on MAG side
2. Crankcase arrow
3. Magneto flywheel mark

3. Install parts which were removed.

## Section 05 ELECTRICAL

### Sub-Section 03 (IGNITION TIMING)

## NIPPONDENSO TRIGGER COIL SYSTEM

### 454, 494, 583, and 670 Engine Types

Ignition timing is adjusted by movement of trigger coil. On 583 engine raising position of trigger coil retards ignition. Lowering position of trigger coil advances ignition. On 454, 494 and 670 engines, moving trigger coil to right retards ignition and moving to left advances ignition.



### CAUTION

Each time ignition timing is adjusted by moving trigger coil, air-gap must be adjusted.

Refer to CDI MAGNETO 04-05 then look for **Trigger Coil Adjustment** after adjusting ignition timing.

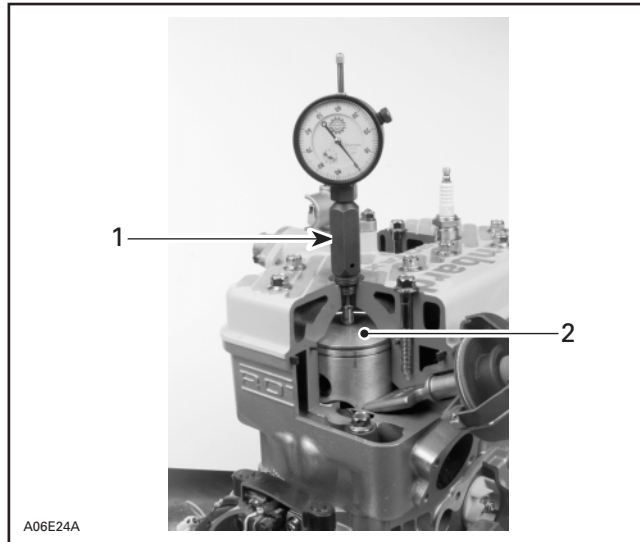
### Verifying Magneto Flywheel Timing Mark Position

Prior to checking the timing, it may be necessary to verify the position of the timing mark on the magneto flywheel, for the following reasons:

1. To detect a missing or broken magneto flywheel Woodruff key which would allow a change of timing to occur, with eventual break down of the engine.
2. To correctly locate and mark a timing mark on a new service magneto flywheel.
3. To verify the correct location of the factory timing mark.
4. To detect a wrong magneto flywheel.

To verify the position of the timing mark on the magneto flywheel or to scribe a timing mark, proceed as follows:

1. Clean the area around the spark plugs, and remove them.
2. Remove the rewind starter from the engine.
3. Install the TDC gauge in the spark plug hole, (magneto side) and adjust as follows:
  - a. Position the magneto flywheel at approximately TDC.



A06E24A

#### TYPICAL

1. TDC gauge on MAG side
2. MAG side piston at TDC

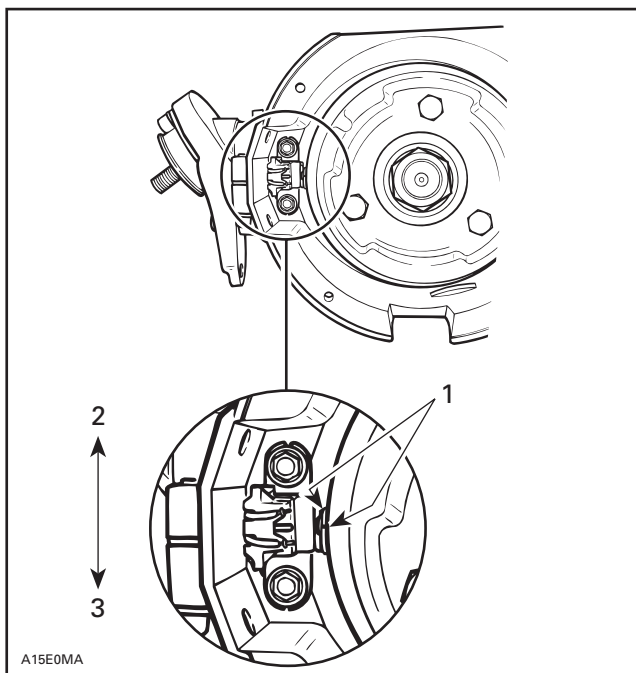
- b. Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
  - c. Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
  - d. Position the dial face toward the magneto. Move the gauge down until the needle just begins to move, then move down a further 5 or 6 mm (approximately 1/4 in). Tighten adaptor lock nut by hand.
4. Locate the piston TDC position as follows:
    - a. Slowly rotate the magneto flywheel back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
    - b. Rotate the dial face so that "0" is in line with the needle when it stops moving.
    - c. Again, slowly rotate the magneto flywheel back and forth across TDC and adjust the dial face to "0", until the needle always stops exactly at "0" before changing direction.
    - d. "0" now indicates exact TDC.

**Section 05 ELECTRICAL**  
Sub-Section 03 (IGNITION TIMING)

5. Verify the position of the timing mark on the magneto flywheel as follows:

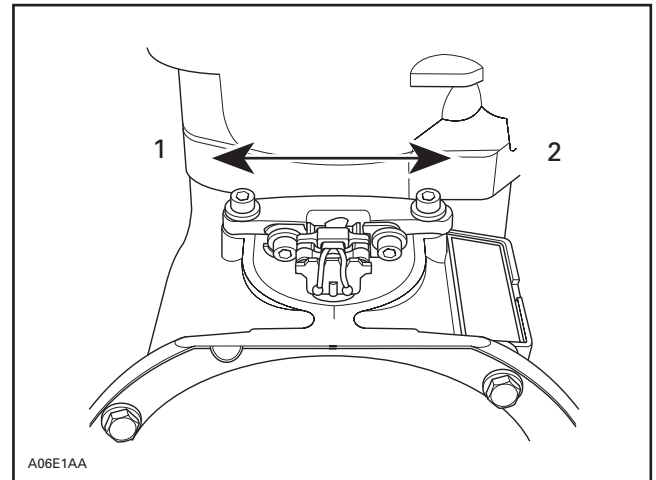
**NOTE:** When checking timing, certain procedures require that the magneto flywheel be turned in a clockwise direction, viewed facing the magneto. If it is necessary to turn back (counterclockwise) for any reason, rotate the magneto flywheel at least one-quarter turn counterclockwise, and then rotate it clockwise. The last magneto flywheel movement when making a critical check must always be in a clockwise direction, to ensure that the slack in engine moving parts is taken-up.

- a. Rotate the magneto flywheel counterclockwise, one-quarter turn then carefully rotate it clockwise until the needle indicates the specified measurement, indicated in TECHNICAL DATA 09-02.
- b. Make sure that the dot **located on the side of the magneto flywheel protrusion** perfectly aligns with center of trigger coil core, refer to illustration.
- c. If the marks do not align, loosen trigger coil screws and move trigger coil to align dot with center of trigger coil core.



**583 ENGINE**

1. Dot aligned with center of trigger coil core
2. Retard
3. Advance



**454, 494 AND 670 ENGINES**

1. Advance
2. Retard

**NOTE:** These marks can not be used to check dynamic (with engine running) ignition timing with a timing light: an other mark is scribed on magneto flywheel or damper for this purpose. When flywheel protrusion dot aligns with center of trigger coil core, flywheel mark and crankcase center mark must be aligned.

### Checking Ignition Timing

Use timing light (P/N 529 0319 00).

To check the ignition timing, refer to illustration and proceed as follows:

**NOTE:** Engine should be cold when checking timing. Do not idle engine for more than 20 seconds and make checks quickly.

### ◆ WARNING

Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

1. Connect the timing light pick-up to a spark plug cable and the power connections to the battery.

**NOTE:** To avoid an incorrect reading due to parallax, view the magneto flywheel and the crankcase timing marks in a straight line.

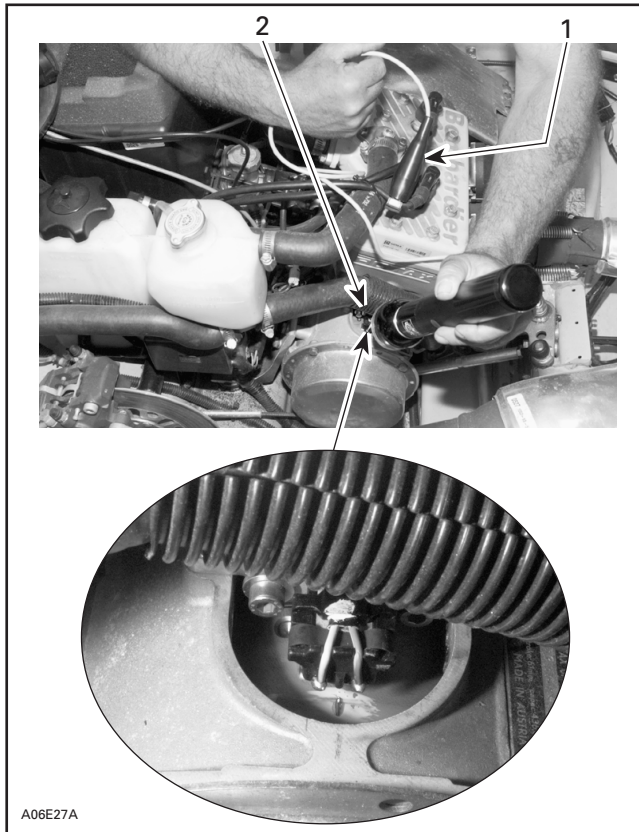
2. Start the engine and point timing light straight in line with the crankcase timing mark. Bring engine to 6000 RPM for a brief instant.

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## Section 05 ELECTRICAL

### Sub-Section 03 (IGNITION TIMING)

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#### **TYPICAL**

1. Timing light pick-up on MAG side
2. Timing inspection hole

The magneto/damper mark must be aligned with center mark. If not, move trigger coil as explained above and recheck ignition timing. Tolerance is  $\pm 1^\circ$ .

If the marks still do not align, a faulty trigger coil (check proper grounding of coil) or a faulty CDI module could be the cause: substitute one part at a time and recheck timing marks (check connectors condition prior to substituting any part).



# SPARK PLUGS

## NGK SPARK PLUG

*All Models*

### NGK SPARK PLUG NUMBERING SYSTEM

Bombardier is using the NGK spark plug type on most of the 1997 snowmobile models.

The heat range identification system is:

High number —————▶ hot plug

Low number —————▶ cold plug

### 1997 REFERENCE CHART

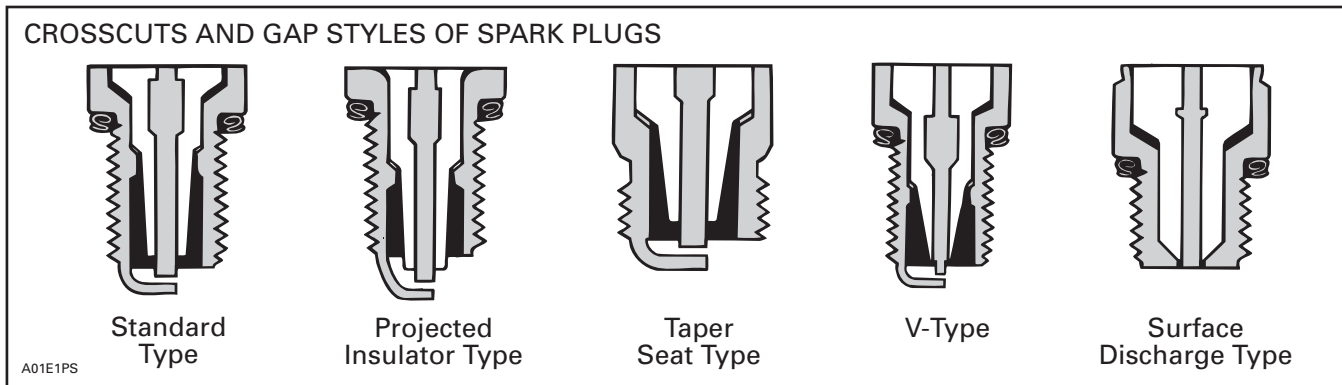
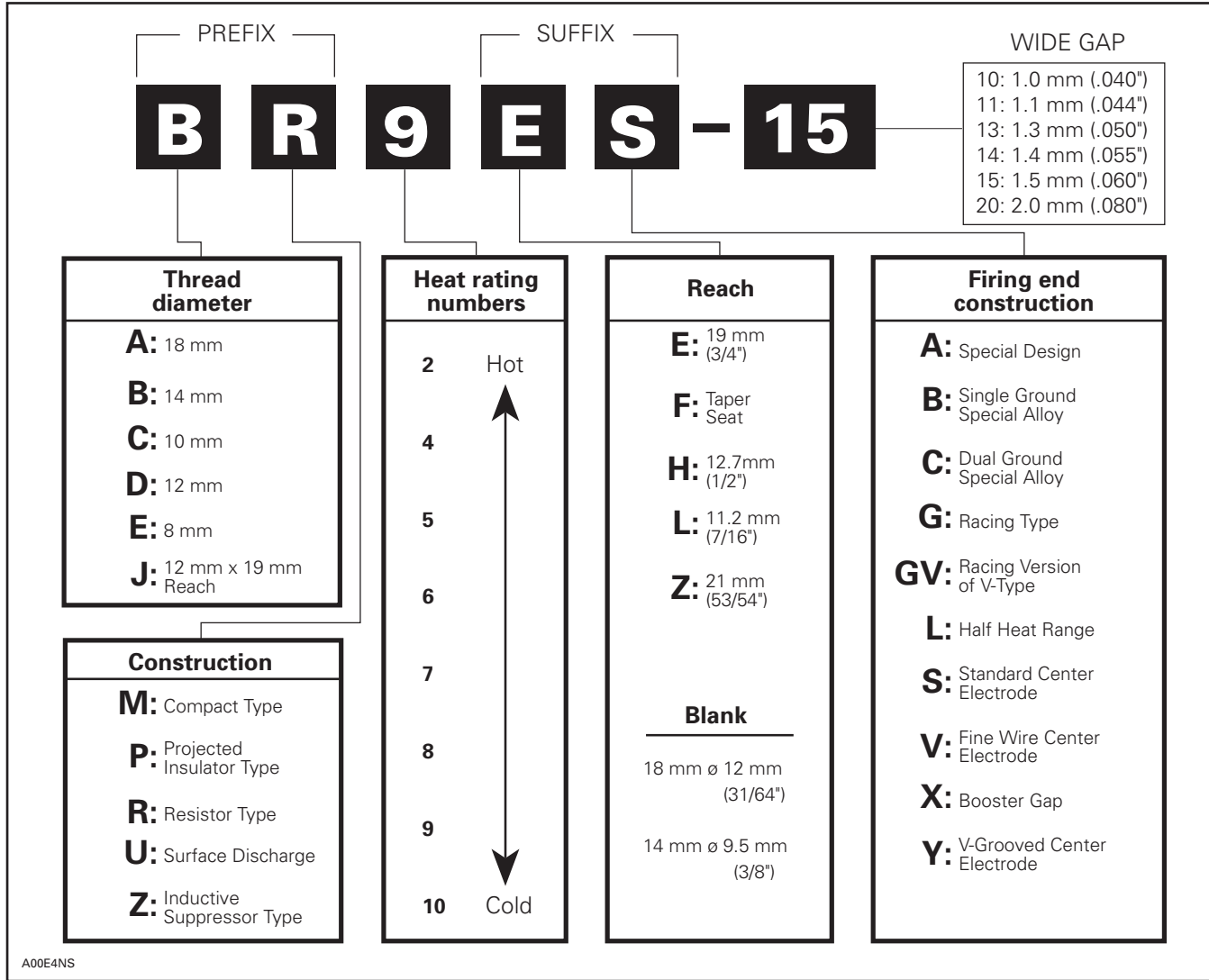
NGK spark plugs used on 1997 Bombardier snowmobiles covered in this manual:

- BR8ES
- BR9ES

# Section 05 ELECTRICAL

## Sub-Section 04 (SPARK PLUGS)

### DESIGN SYMBOLS USED IN NGK SPARK PLUGS



## DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurize air then completely unscrew.

### ◆ WARNING

Whenever using compressed air, always wear protective eye wear.

## HEAT RANGE

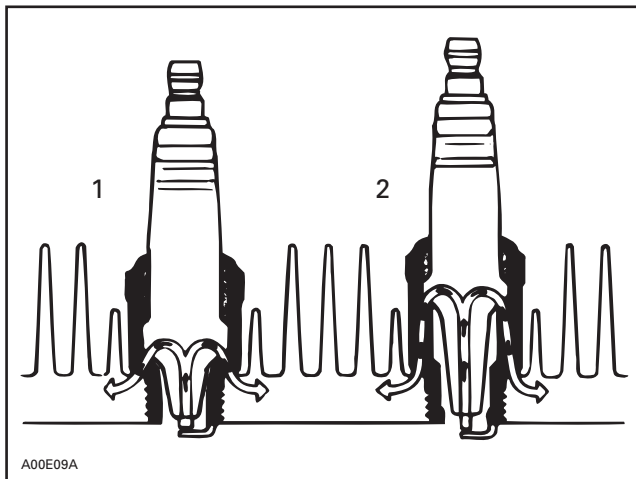
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

The longer the heat path between the electrode tip to the plug shell, the hotter the spark plug operating temperature will be — and inversely, the shorter the heat path, the colder the operating temperature will be.

A “cold” type plug has a relatively short insulator nose and transfers heat very rapidly into the cylinder head.

Such a plug is used in heavy duty or continuous high speed operation to avoid overheating.

The “hot” type plug has a longer insulator nose and transfers heat more slowly away from its firing end. It runs hotter and burns off combustion deposits which might tend to foul the plug during prolonged idle or low speed operation.



1. Cold  
2. Hot

### ▼ CAUTION

Severe engine damage might occur if a wrong heat range plug is used.

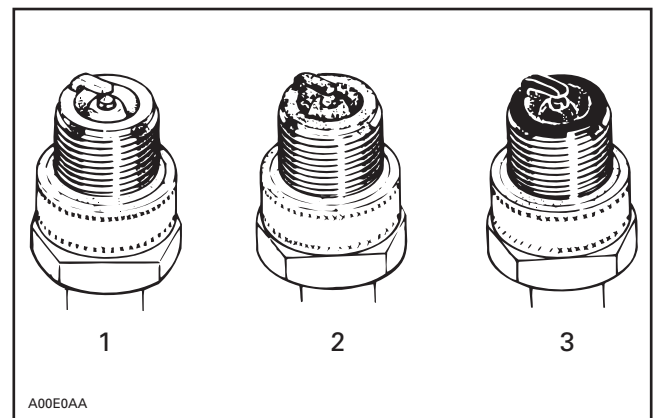
A too “hot” plug will result in overheating and pre-ignition, etc.

A too “cold” plug will result in fouling (shorting the spark plug) or may create carbon build up which can heat up red-hot and cause pre-ignition or detonation.

## FOULING

Fouling of the spark plug is indicated by irregular running of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption. This is due to a loss of compression. Other possible causes are: prolonged idling, or running on a too rich mixture due to a faulty carburetor adjustment or incorrect fuel and/or fuel mixing. The plug face of a fouled spark plug has either a dry coating of soot or an oily, glossy coating given by an excess either of oil or of oil with soot. Such coatings form a conductive connection between the center electrode and ground.

## SPARK PLUG ANALYSIS



1. Overheated (light grey)  
2. Normal (brownish)  
3. Fouled (black)

The plug electrode (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 electrode and the piston dome.

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## Section 05 ELECTRICAL

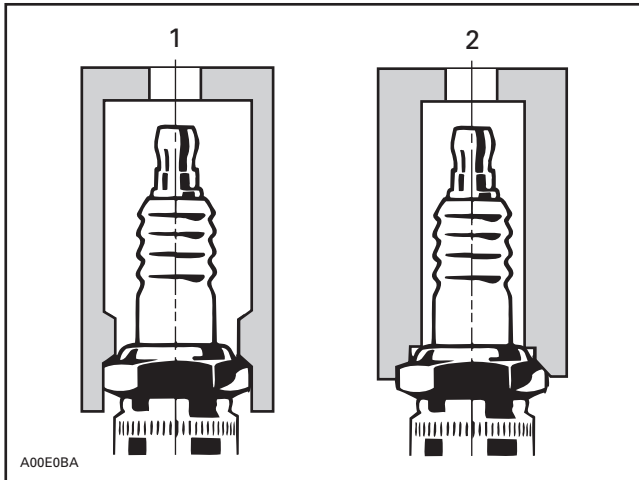
### Sub-Section 04 (SPARK PLUGS)

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## SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

1. Using a wire feeler gauge, set electrode gap according to TECHNICAL DATA 09-02.
2. Apply anti-seize lubricant (P/N 413 7010 00) over the spark plug threads to prevent possible seizure.
3. Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



1. *Proper socket*
2. *Improper socket*

## SPARK PLUG TIGHTENING TORQUE

Models	Spark plugs	Torque N•m (lbf•ft)
All models	NGK	27 (20)

# BATTERY

## REMOVAL

*All Models*

◆ **WARNING**

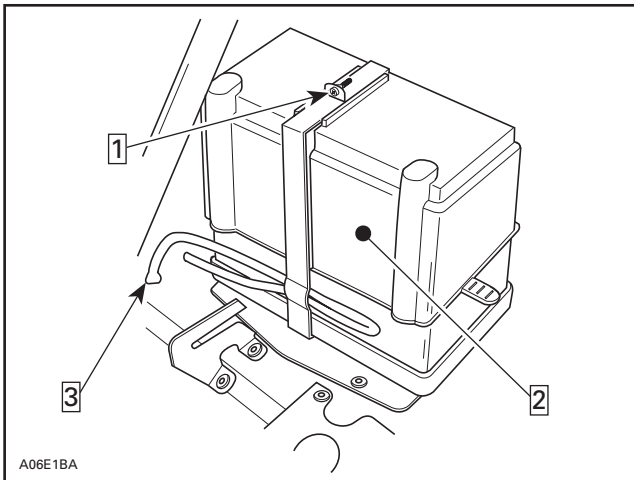
Battery BLACK negative cable must always be disconnected first and connected last.

◆ **WARNING**

Never charge or boost battery while installed on vehicle.

### **S-Series**

- Remove air silencer.
- Unfasten retaining strips.
- Open strips and lift battery protective boot.
- Remove vent tube.

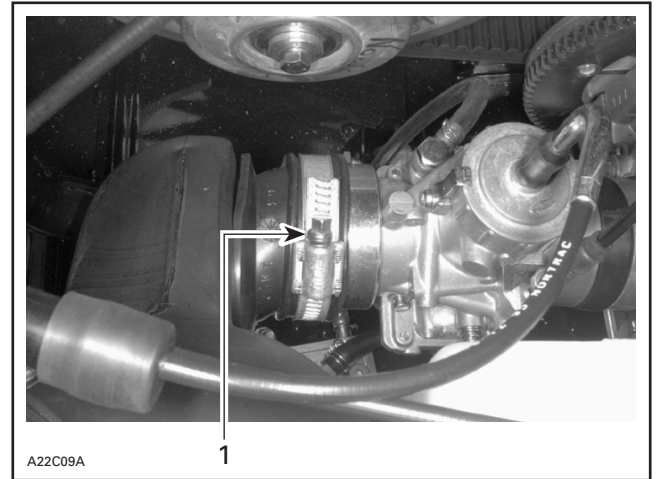


- Step 1 : Unfasten and open
- Step 2 : Lift protective boot
- Step 3 : Remove vent tube

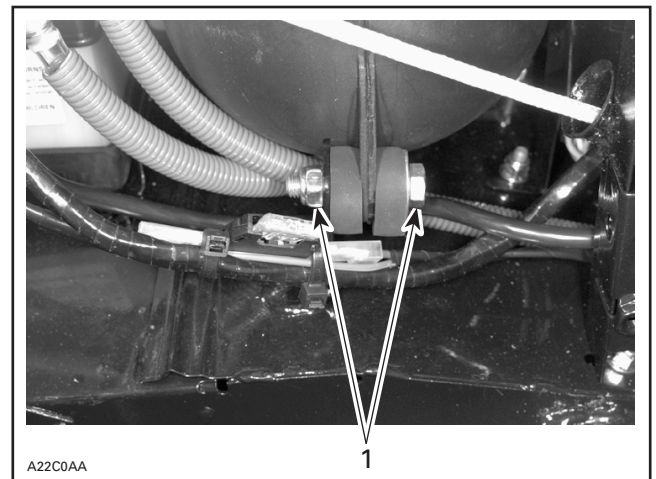
On all models, a special vented rivet is fixed to the chassis in order to plug the vented tube from the battery

### **Skandic WT**

- Remove air intake silencer.



1. Loosen clamp

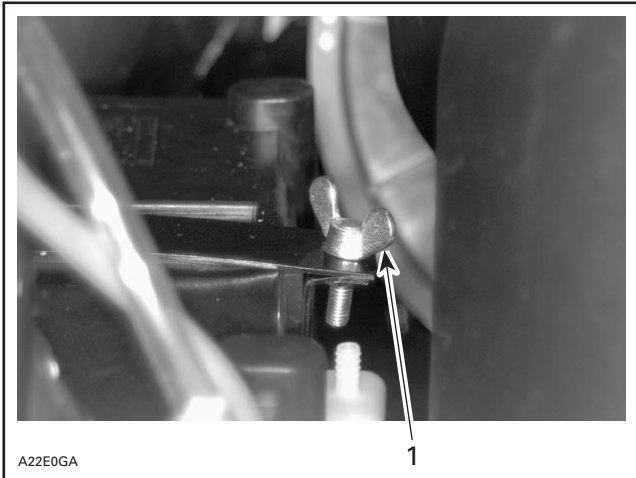


1. Remove bolt and lock nut

Unfasten battery brackets and remove battery.

## Section 05 ELECTRICAL

### Sub-Section 05 (BATTERY)



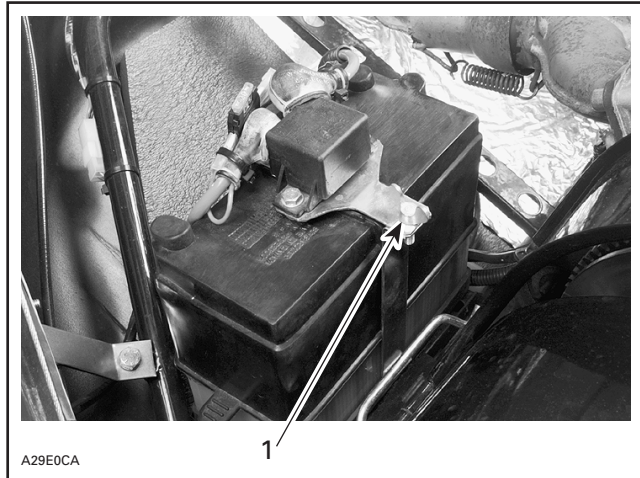
A22E0GA

1

1. Wing screw

#### **Skandic SWT**

Remove battery bracket and remove battery from vehicle.



A29E0CA

1

1. Wing screw

#### **All Models**

Withdraw battery from vehicle being careful not lean it so that electrolyte flows out of vent tube.



A29E0DA

#### **Skandic WT LC**

Unscrew wing screw and remove bracket with solenoid.

Remove battery cover and remove battery from vehicle.

### ▼ CAUTION

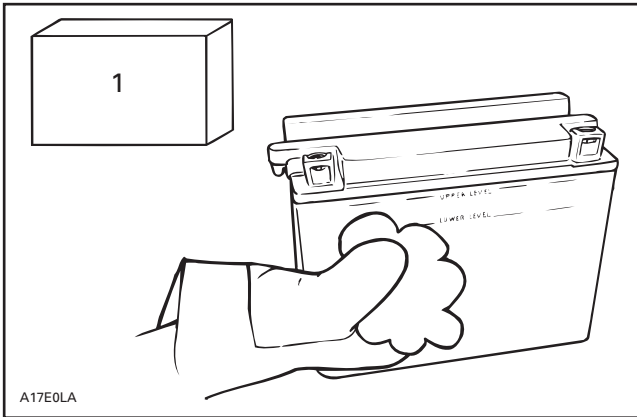
Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

### CLEANING

Clean the battery, battery casing, vent tube, 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.



1. Baking soda

Remove corrosion from battery cable terminals and battery posts using a firm wire brush.

### INSPECTION

Visually inspect battery casing for cracks or other possible damage. If casing is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

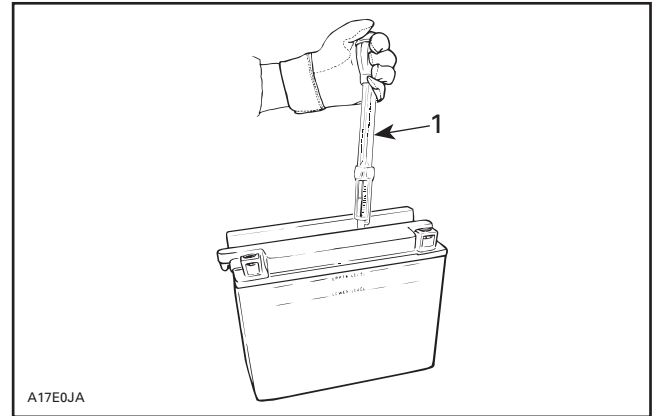
<b>◆ WARNING</b>
Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

<b>◆ WARNING</b>
Battery caps do not have vent holes. Make sure that vent tube is not obstructed.

### HYDROMETER TEST



1. Specific gravity 1.260

A hydrometer measures the charge of a battery in terms of specific gravity of the electrolyte. Most hydrometers give a true reading at 27°C (80°F).

In order to obtain correct readings, adjust the initial reading by **adding** .004 points to the hydrometer readings for each 5.5°C (10°F) **above 27°C (80°F)** and by **subtracting** .004 point for every 5.5°C (10°F) **below 27°C (80°F)**.

This chart will be useful to find the correct reading.

ELECTROLYTE TEMPERATURE		OPERATION TO PERFORM	
°C	°F		
38	100	add	.008 to the .004 reading
32	90		
27	80	correct reading	
21	70	subtract	.004 from the .008 reading
16	60		
10	50		
4	40		
-1	30		
-7	20		
-12	10		
-18	0		
-23	-10		
-29	-20		
-34	-30		
-40	-40		

## Section 05 ELECTRICAL

### Sub-Section 05 (BATTERY)

#### EXAMPLE NO. 1

Temperature below 27°C (80°):

Hydrometer Reading: 1.250

Electrolyte temperature: -7°C (20°F)

Subtract .024 Sp. Gr.

Corrected Sp. Gr. is 1.226

#### EXAMPLE NO. 2

Temperature above 27°C (80°F):

Hydrometer Reading: 1.235

Electrolyte temperature: 38°C (100°F)

Add .008 Sp. Gr.

Corrected Sp. Gr. is 1.243.



### CAUTION

Do not install a partially charged battery on a snowmobile since the casing might crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the charge of the battery.

Temperature-corrected Specific Gravity	Battery Charge	Freezing Point of Electrolyte	
1.260	Fully Charged	-59°C	(-74°F)
1.230	3/4 Charged	-40°C	(-40°F)
1.200	1/2 Charged	-27°C	(-16°F)
1.170	1/4 Charged	-18°C	(0°F)
1.110	Discharged	-7°C	(+19°F)

## BATTERY STORAGE

Disconnect and remove battery from the vehicle.

Check electrolyte level in each cell, add distilled water up to upper level line.



### CAUTION

Do not overfill.

The battery must always be stored in fully charged condition. If required, charge until specific gravity of 1.260 is obtained.



### CAUTION

Battery electrolyte temperature must not exceed 50°C (122°F). The casing should not feel hot.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 413 7017 00) or petroleum jelly on terminals.

Clean battery casing and caps using a solution of baking soda and water. Do not allow cleaning solution to enter battery, otherwise it will destroy the electrolyte. Rinse battery with clear water and dry well using a clean cloth.

Store battery on a wooden shelf in a cool dry place. Such conditions reduce self-discharging and keep fluid evaporation to a minimum.

During the storage period, recheck electrolyte level and specific gravity readings at least every 40 days. As necessary, keep the battery at its upper level line and near full charge as possible (trickle charge).

## ACTIVATION OF NEW BATTERY



### WARNING

Never charge or boost battery while installed on vehicle.



### CAUTION

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

A new battery is factory fresh dry charged. For storage purposes, it is fitted with a temporary sealing tube.

Do not remove the sealing tube or loosen battery caps unless activation is desired.

In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

Perform the following operations anytime a new battery is to be installed.

1. Remove the sealing tube from the vent elbow. Install vent tube, included in the battery kit, to battery elbow.

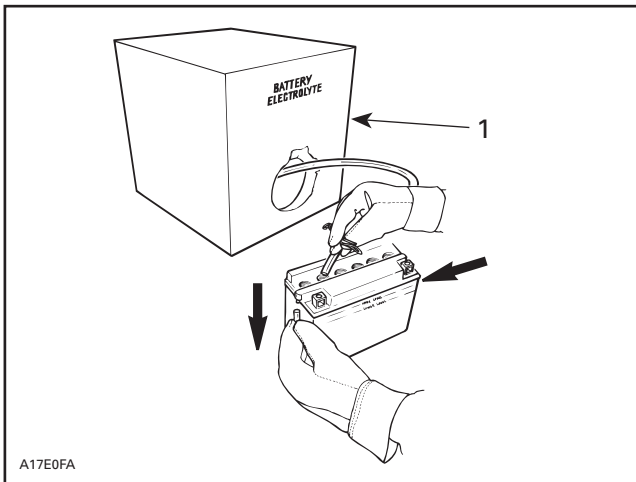


### WARNING

Failure to remove the sealing tube could result in an explosion.

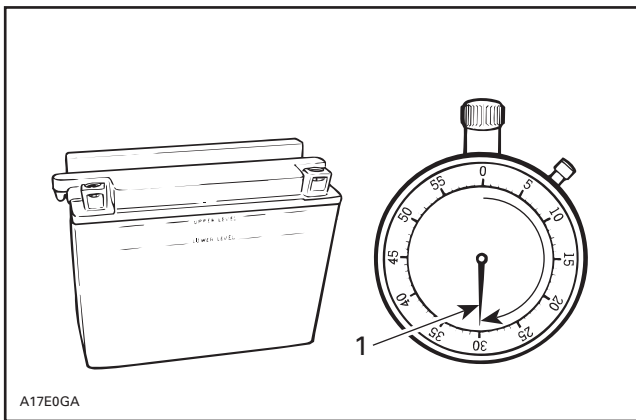


**Section 05 ELECTRICAL**  
**Sub-Section 05 (BATTERY)**



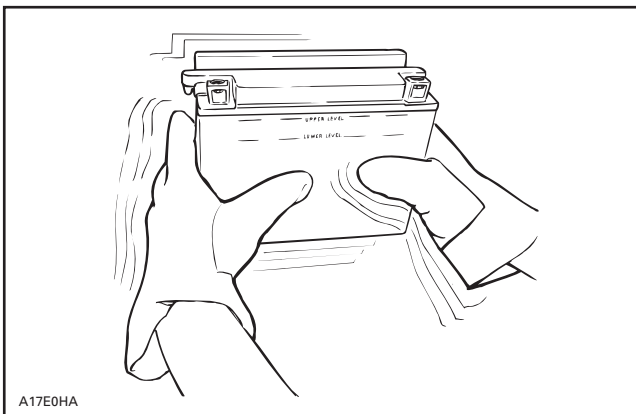
1. Battery electrolyte

2. Remove caps and fill battery to UPPER LEVEL line with electrolyte (specific gravity: 1.260 at 20°C (68°F)).
3. Allow the battery to stand for 30 minutes MINIMUM so that electrolyte soak through battery cells.



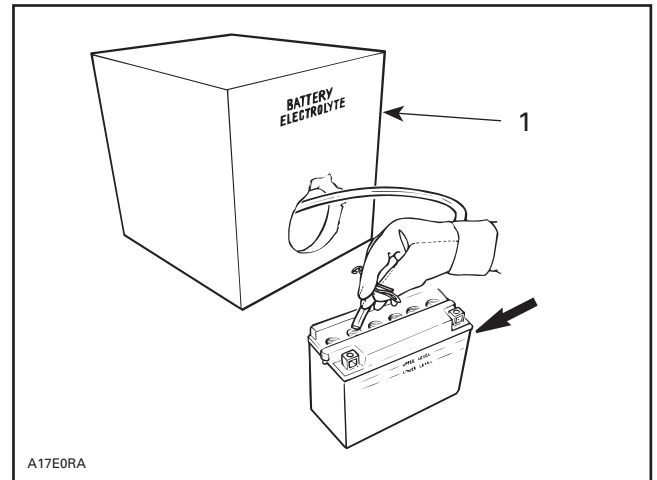
1. 30 minutes

4. Allow gas bubbles to escape by lightly shaking battery by hand.



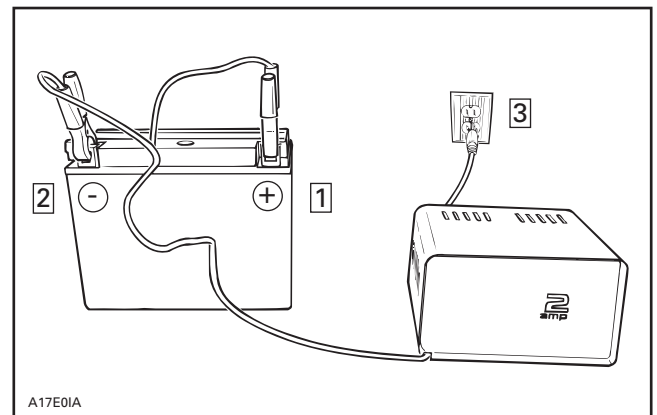
A17E0HA

5. Readjust the electrolyte level to the UPPER LEVEL line.



1. Battery electrolyte

6. Connect a 2 A battery charger for 10 to 20 hours.



A17E0IA

**CAUTION**

If charging rate raises higher than 2.4 A reduce it immediately. If cell temperature rises higher than 50°C (122°F) (if the casing feels hot) discontinue charging temporarily or reduce the charging rate.

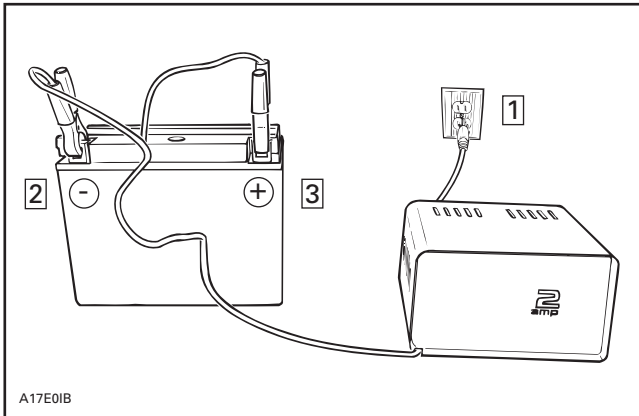
**WARNING**

Gases given off by a battery being charged are highly explosive. Always charge in a well ventilated area. Keep battery away from cigarettes or open flames. Always turn battery charger off prior to disconnecting cables. Otherwise a spark will occur and battery might explode.

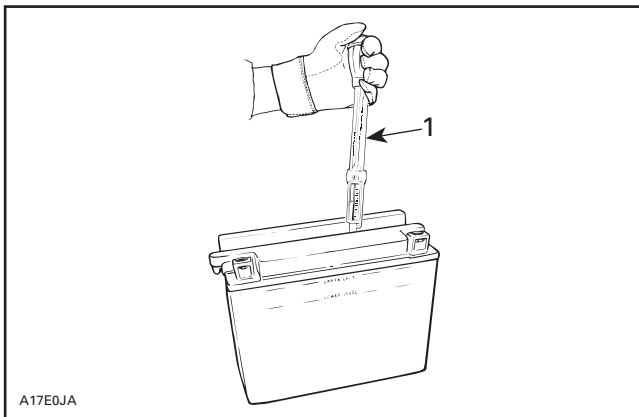
## Section 05 ELECTRICAL

### Sub-Section 05 (BATTERY)

7. Disconnect battery charger.

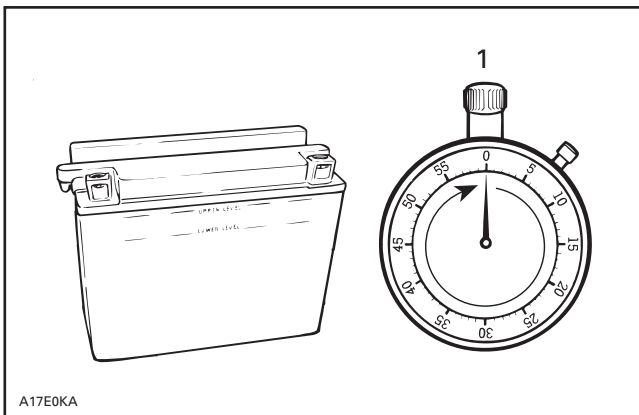


8. Test battery state of charge. Use a hydrometer.



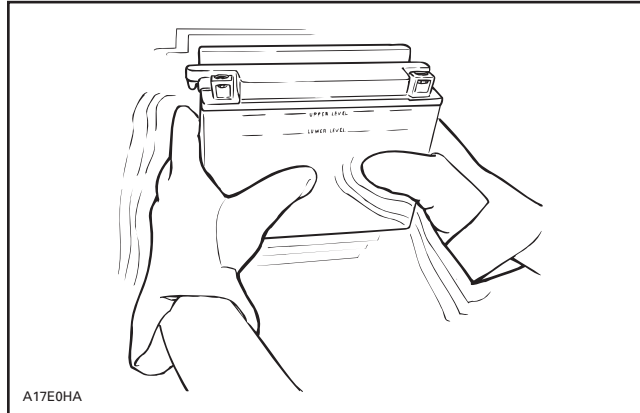
1. Specific gravity 1.260

9. Let battery settle for one hour.

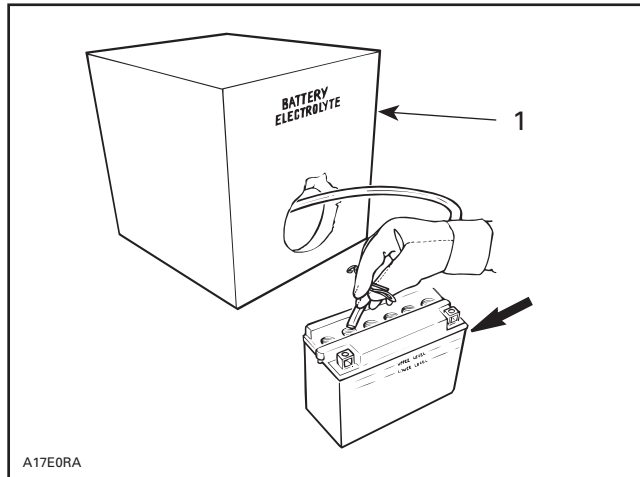


1. 60 minutes

10. Allow gas bubbles to escape by lightly shake battery.

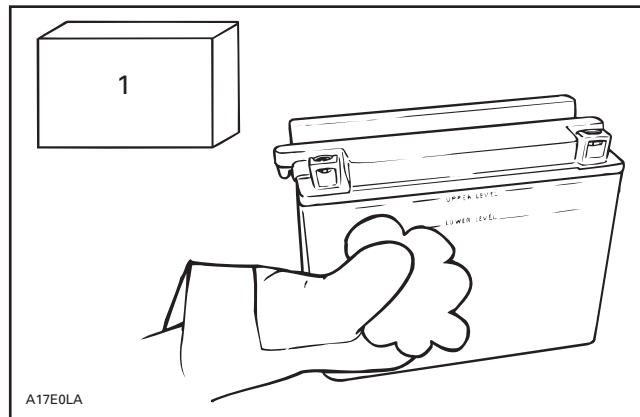


11. Readjust electrolyte level.



1. Battery electrolyte

12. Reinstall caps and clean any electrolyte spillage using a solution of baking soda and water.



1. Baking soda

**▼ CAUTION**

Do not allow cleaning solution to enter battery interior since it will destroy the electrolyte.

○ **NOTE:** It is recommended to verify the battery charge once a month. If necessary, fully charge battery.

## SERVICING

### Electrolyte Level

Since a battery has been activated (see above), add distilled water to top up electrolyte.

## TIPS FOR CHARGING A USED BATTERY

**▼ CAUTION**

Prior to charging the battery, always remove it from the vehicle to prevent electrolyte spillage.

For best results, battery should be charged when the electrolyte and the plates are at room temperature. A battery that is cold may not accept current for several hours after charging begun.

Do not charge frozen battery. If the battery charge is very low, the battery may freeze. If it is suspected to be frozen, keep it in a heated area for about two hours before charging.

**◆ WARNING**

Do not place battery near open flame.

The time required to charge a battery will vary depending some factors such as:

- Battery temperature: The charging time is increased as the temperature goes down. The current accepted by a cold battery will remain low. As the battery warms up, it will accept a higher rate of charge.

- State of charge: Because the electrolyte is nearly pure water in a completely discharged battery, it cannot accept current as well as electrolyte. This is the reason the battery will not accept current when the charging cycle first begins. As the battery remains on the charger, the current from the charger causes the electrolytic acid content to rise which makes the electrolyte a better conductor and then, the battery will accept a higher charging rate.
- Type of charger: Battery chargers vary in the amount of voltage and current that they can supply. Therefore, the time required for the battery to begin accepting measurable current will also vary.

### Charging a Very Flat or Completely Discharged Battery:

Unless this procedure is properly followed, a good battery may be needlessly replaced.

- Measure the voltage at the battery posts with an accurate voltmeter. If it is below 10 volts, the battery will accept current at very low rate, in term of milliamperes, because electrolyte is nearly pure water as explained above. It could be some time before the charging rate increases. Such low current flow may not be detectable on some charger ammeters and the battery will seem not to accept any charge.
- Only for this particular case, set the charger to a high rate.

○ **NOTE:** Some chargers have a polarity protection feature which prevents charging unless the charger leads are connected to the correct battery terminals. A completely discharged battery may not have enough voltage to activate this circuitry, even though the leads are connected properly. This will make it appear that the battery will not accept a charge. Follow the charger manufacturer's instruction telling how to bypass or override this circuitry so that the charger will turn on and charge a low-voltage battery.

- Since the battery chargers vary in the amount of voltage and current they provide, the time required for the battery to accept measurable charger current might be up to approximately 10 hours or more.
- If the charging current is not up to a measurable amount at the end of about 10 hours, the battery should be replaced.

## Section 05 ELECTRICAL

### Sub-Section 05 (BATTERY)

- If the charging current is measurable before the end or at the end of about 10 hours, the battery is good and charging should be completed in the normal manner as specified in **Activation of a new battery**.
- It is recommended that any battery recharged by this procedure be load tested prior to returning it to service.

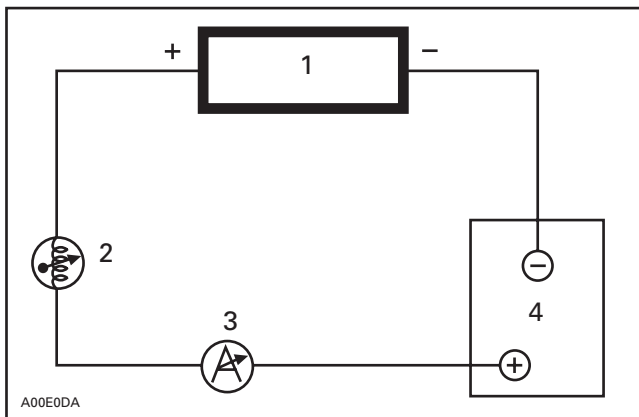
## BATTERY CHARGING EQUIPMENT

The battery charger should have an adjustable charging rate. Variable adjustment is preferred, but a unit which can be adjusted in small increments is acceptable.

The battery charger must be equipped with an ammeter capable of accurately measuring current of less than one ampere.

If the present charger is not adjustable to the proper current values, a rheostat can be connected in series with the battery to provide adjustment. 12 Ohm, 50 watt rheostat, such as OHMITE — 0314 or MALLORY 50K 12P, are available from electronic parts supply shops and they are suitable for use with most chargers if the peak current is to be held below 2 amps.

If you need an accurate ammeter, we recommend the use of: SHURITE — 5202 (0 to 3 amps) or — 5203 (0 to 5 amps) available from electronic parts supply shops.



1. Charger
2. Rheostat 12Ω 50W
3. Ammeter
4. Battery

For a service application and a permanent installation, both ammeter and rheostat can be built into a small box adjacent to your charger.

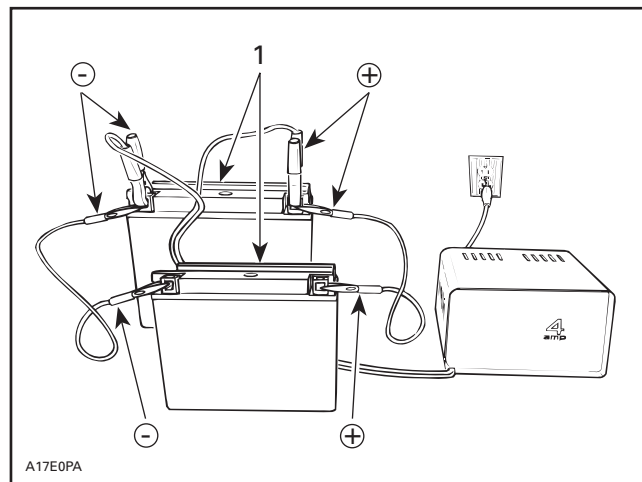
### ▼ CAUTION

Adequate ventilation **MUST** be provided to cool the rheostat.

## Charging 2 or More Batteries at a Time

Connect all positives together and use a charger with a capacity (rated) equal to: number of battery to be charged multiply by 2 A.

For example: charging five batteries at a time requires a 10 A rated charger ( $5 \times 2 \text{ A} = 10 \text{ A}$ ).



TYPICAL

1. 2 batteries = 4 A

## INSTALLATION OF BATTERY

Ensure vent tube is properly installed on battery elbow.

Connect vent tube to vehicle fitting on front frame.

Route RED positive cable behind retaining strip and connect it to positive battery terminal. Connect RED wire (coming from ignition switch).

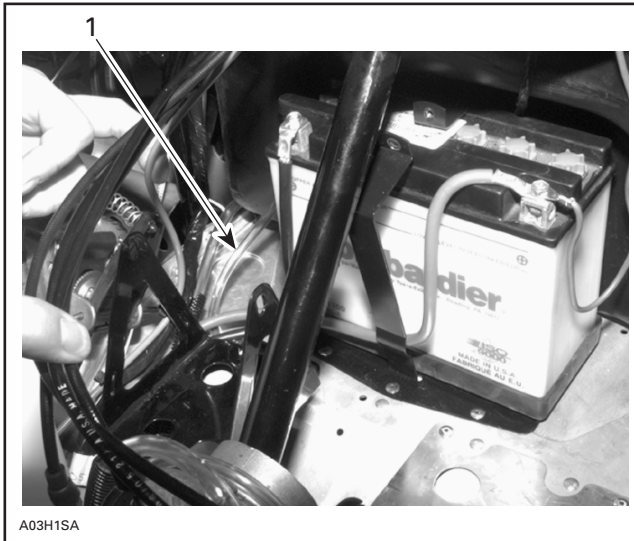
Connect BLACK negative cable LAST.

**▼ CAUTION**

Negative battery terminal should always be disconnected FIRST and reconnected LAST.

Apply silicone dielectric grease (P/N 413 7017 00) on battery posts and connectors.

**S-Series**

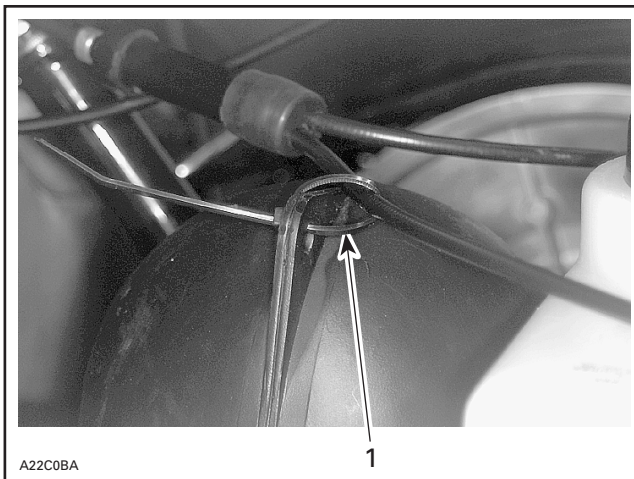


**BATTERY CONNECTION — S-SERIES**

1. Vent tube on fitting

**Skandic WT/SWT/WT LC**

See photos in removal procedures for proper battery installation.



**AIR SILENCER INSTALLATION — SKANDIC WT**

1. Locking tie

**All Models**

Ensure that vent tube is not kinked or blocked then install protective boot over battery.

Close and fasten retaining strips.

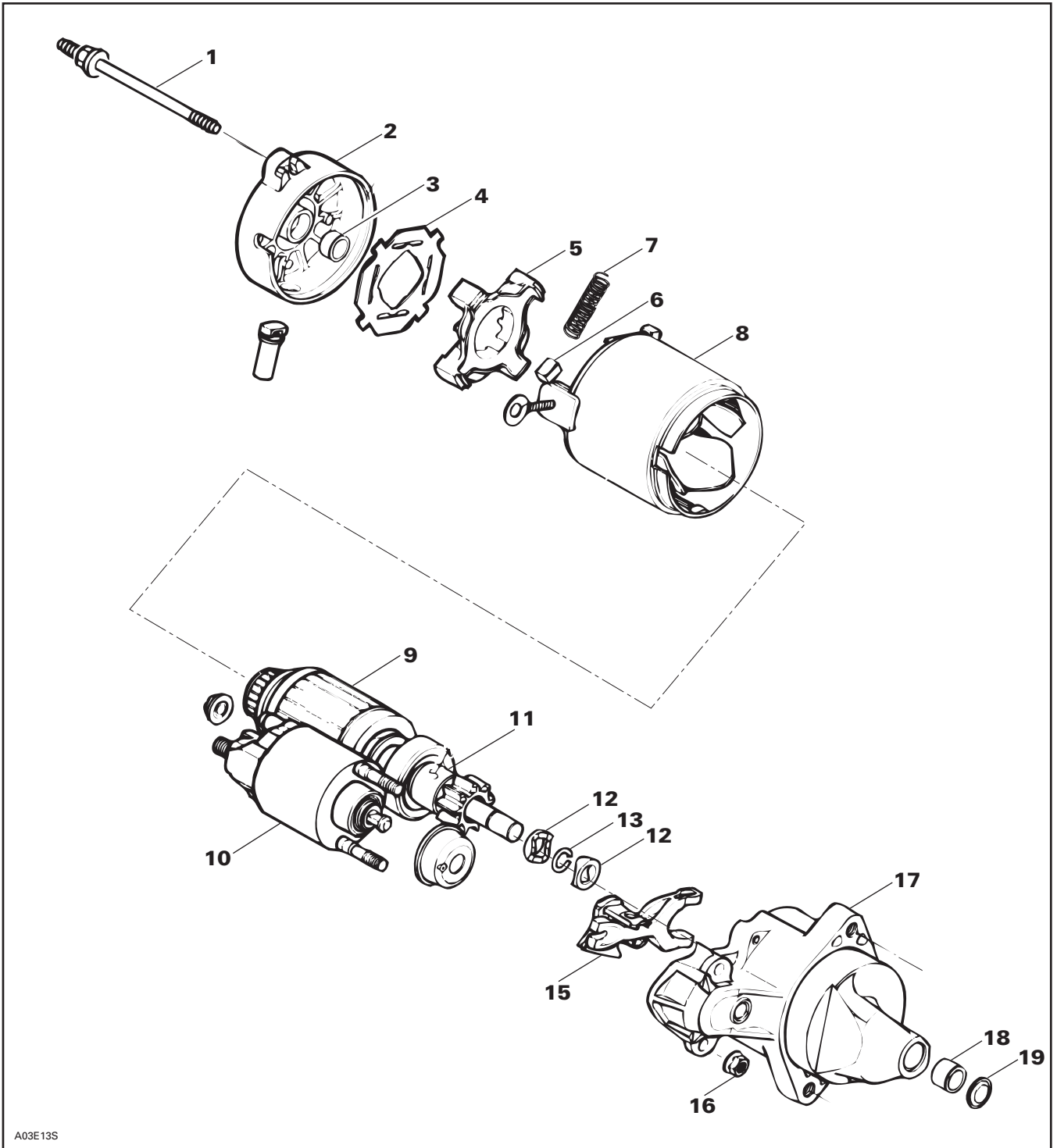
Reinstall air silencer.

Fasten spark plug cables to fan housing.

Reinstall throttle cable to air silencer. See removal illustration.

# ELECTRIC STARTER

*S-Series with Electric Starting and Skandic WT/SWT*



A03E13S

## Section 05 ELECTRICAL

### Sub-Section 06 (ELECTRIC STARTER)

## REMOVAL

- Disconnect BLACK ground cable from battery.
- Disconnect RED positive cable from battery.

### ◆ WARNING

Always disconnect ground cable first and connect last.

- Disconnect RED cable and RED/GREEN wire from starter solenoid switch.
- Remove starter from engine.

## DISASSEMBLY

Disconnect bare wire linking starter and solenoid. Remove nuts **no. 16** then solenoid switch **no. 10** by lifting and pulling to disengage from drive lever **no. 15**.

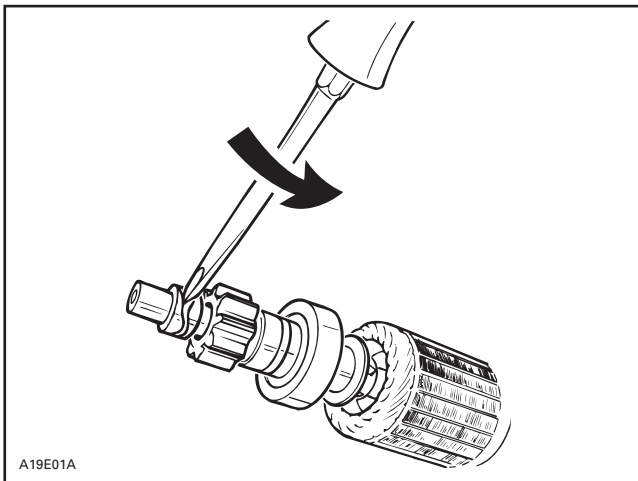
Unscrew starter longer screws **no. 1** then pull yoke **no. 8** with end frame **no. 2** to separate from drive housing **no. 17**.

Pull armature **no. 9** with drive lever **no. 15**.

Remove insulator **no. 4** then brush springs **no. 7** being careful not to lose them since they will be projected out.

Pull brush holder **no. 5** from yoke **no. 8**.

Insert blade of a small screwdriver between stop collars.



Twist screwdriver to separate stop collars **no. 12** thus giving access to circlip **no. 13**.

Remove outer collar, circlip then inner collar.

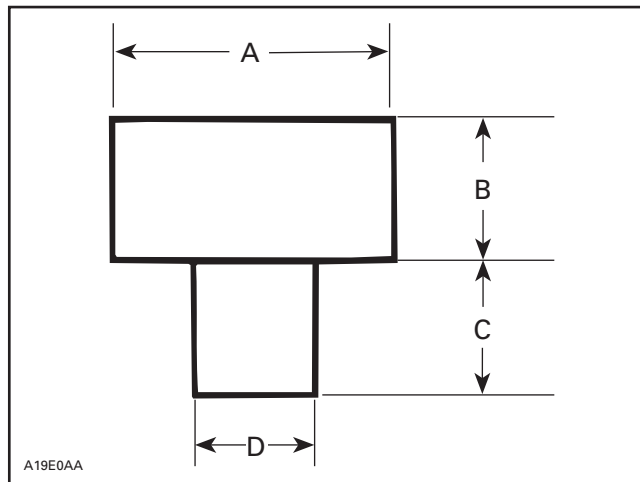
Remove overrunning clutch **no. 11**.

Check the wear on bushing **no. 18** by measuring the amount of radial play between the armature shaft and the bushing.

The radial play should not exceed 0.20 mm (0.008 in). If greater, replace the bushing. To replace, press out the old one toward bushing cover and press in a new one with a bushing pusher. The correct size of the bushing pusher to use is given on next illustration.

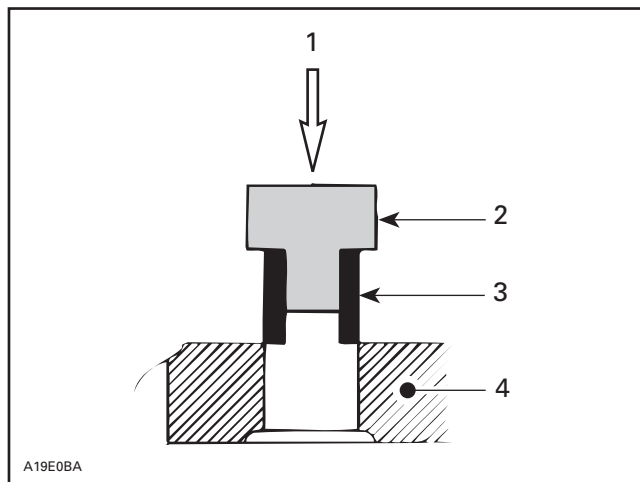
### ▼ CAUTION

Support drive housing adequately to prevent damage when pressing bushing.



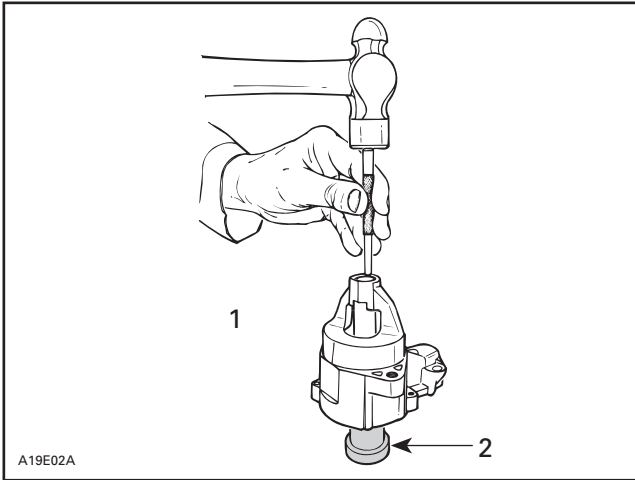
#### BUSHING PUSHER

- A. 16 mm (5/8 in) dia.
- B. 13 mm (1/2 in)
- C. 11 mm (7/16 in)
- D. 11.0 mm (.433 in)



- 1. Press-in
- 2. Bushing pusher
- 3. Bushing
- 4. Drive housing

Install bushing cover no. 19 then, using a punch, stake bushing cover in place.



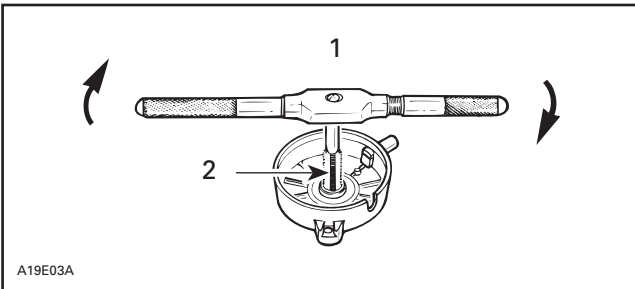
1. Stake bushing cover
2. Support

### 3, Bushing (end frame)

Check the wear on bushing no. 3 by measuring the amount of radial play between the armature shaft and the bushing.

The radial play should not exceed 0.20 mm (.008 in). If greater, replace bushing as follows:

Using a 12 mm tap, cut threads into bushing so that the tap contacts the end frame. Continue to rotate tap until the bushing comes free.



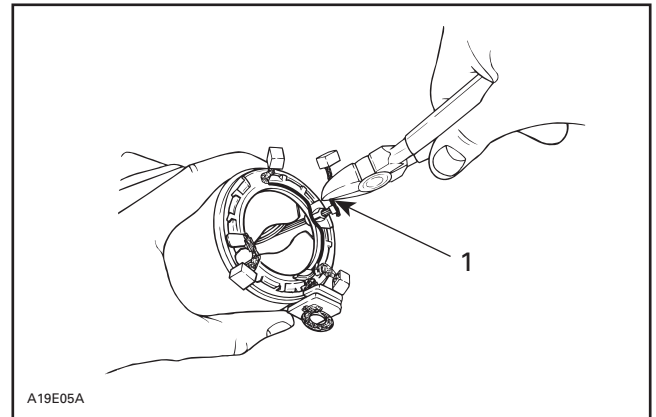
1. Turn until bushing goes out
2. 12 mm tap

To install new bushing, use the same bushing pusher as for drive housing bushing installation.

### 6, Brush

To replace brush no. 6, proceed as follows:

Cut brush wire close to connector at the welded portion.



1. Cut close to connector

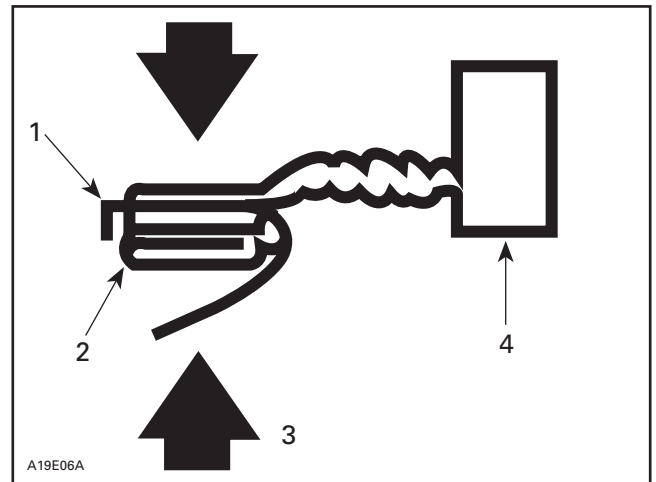
Remove burrs with a file on the remaining welded portion.

**▼ CAUTION**

**Be careful not to damage plastic portion of yoke.**

Place spare brush plate edge against yoke connector edge (welded portion).

Crimp plate over yoke connector with a pair of pliers.



1. Plate edge
2. Yoke connector
3. Crimp
4. Spare brush

Solder the crimped portion.



## Section 05 ELECTRICAL

### Sub-Section 06 (ELECTRIC STARTER)

#### ▼ CAUTION

Do not overheat and quickly perform soldering to prevent solder from flowing to the brush through the wire. Preferably use a heat sink.

## CLEANING AND INSPECTION

Refer to the end of this sub-section.

## ASSEMBLY

Prior to assembling, coat sliding surfaces and moving parts on armature shaft splines, overrunning clutch, solenoid switch plunger, drive lever and bushings with G.E. Versilube G 321 (P/N 413 7040 00) lubricant.

Proceed as follows for assembling.

Secure drive housing in a vise.

#### ▼ CAUTION

Do not overtighten since housing might be damaged.

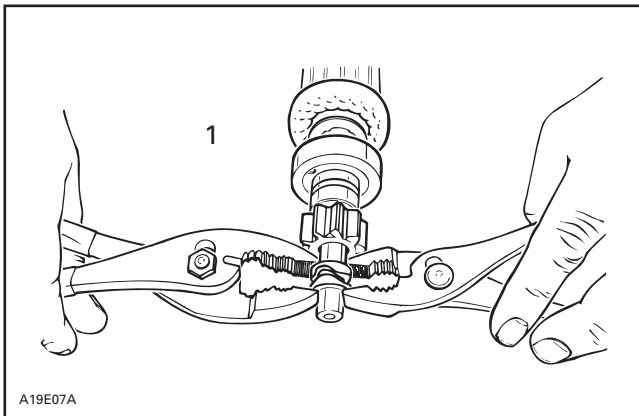
Install overrunning clutch onto armature shaft. Insert inner collar onto shaft. Install a new circlip.

#### ▼ CAUTION

Always install a new circlip when servicing.

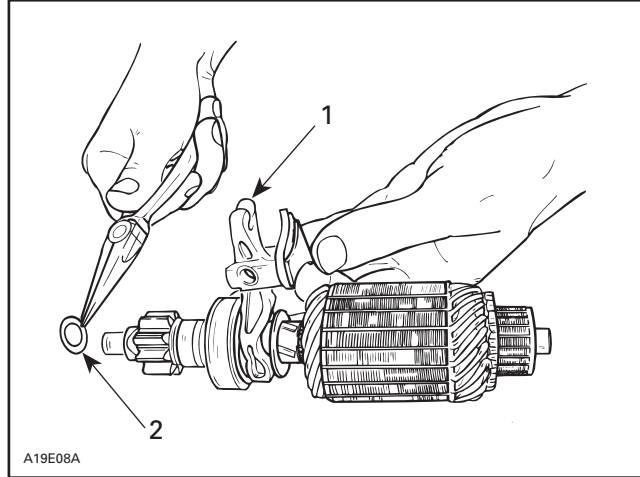
Insert outer collar being careful to match protrusions with notches of collars.

Using a pair of pliers on each side of stop collars, squeeze evenly until collars sit over circlip.



1. Squeeze evenly

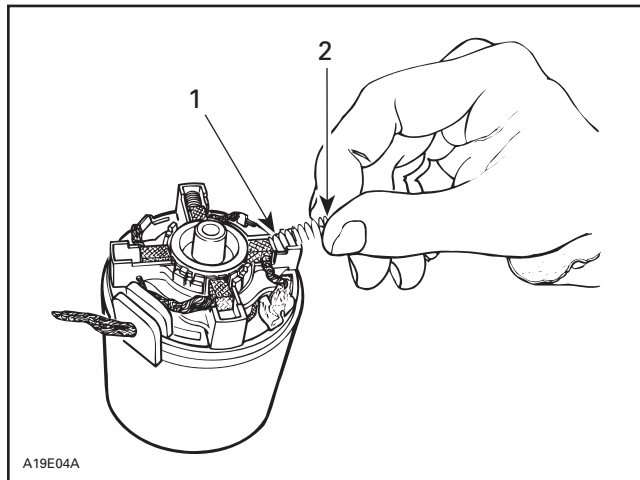
Install thrust washer against outer stop collar. Place drive lever onto overrunning clutch then insert into drive housing.



1. Install on overrunning clutch  
2. Install thrust washer

Slide yoke over armature.

Install brush holder then brushes in their housings. Insert springs as follows: place one end of spring against brush, compress, then push the other end of spring onto its housing. Repeat for remaining springs.



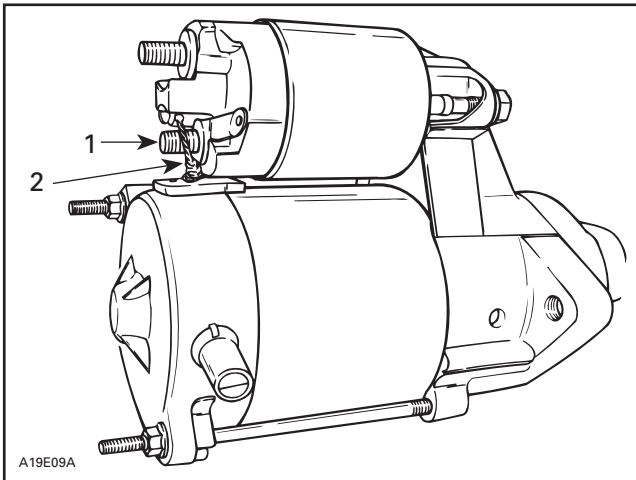
1. This end first  
2. Push this end to complete

Secure insulator over brushes and springs. Properly install end frame and tighten screws.

Insert solenoid plunger inside of drive lever fork and secure to drive housing.

Connect starter bare wire to solenoid.

○ NOTE: Connect this wire on the shorter solenoid stud.



- 1. Shorter stud
- 2. Bare wire

## INSTALLATION

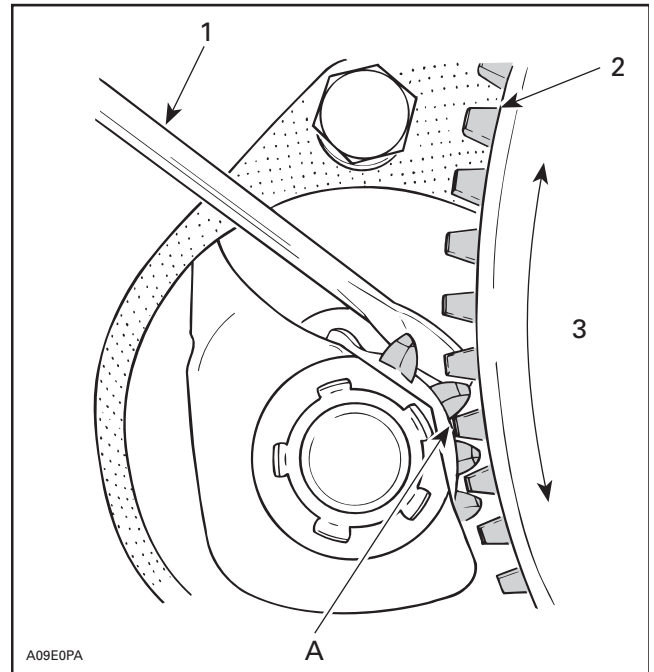
Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

Install starter.

**NOTE:** Check proper engaging depth of starter pinion teeth to ring gear teeth (see illustration). Install hardened washers (P/N 503 0079 00) between engine and starter supports accordingly.

### ▼ CAUTION

All starter bracket fasteners must be secured with Loctite 271 (P/N 413 7074 00).



- 1. Screwdriver pulling starter pinion
- 2. Ring gear
- 3. No excessive backlash
- A. 0.5 to 1.5 mm (.020 to .060 in)

Connect the RED battery cable and the red wire to the large terminal of the solenoid. Connect RED/GREEN wire to small terminal of solenoid.

Connect BLACK cable to battery.

### ◆ WARNING

Always disconnect ground cable first and connect last.

## Section 05 ELECTRICAL

### Sub-Section 06 (ELECTRIC STARTER)

## CLEANING AND INSPECTION

### CLEANING



#### CAUTION

Armature starter yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Clean brushes and holder with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holder clean using compressed air.



#### WARNING

Always wear safety goggles when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth.

Clean engine starter gear teeth and drive unit (clutch).

**NOTE:** Bushings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

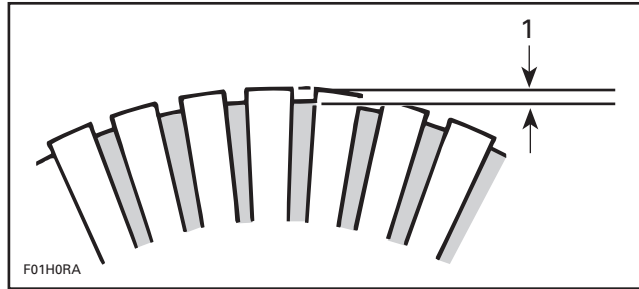
### INSPECTION

#### Armature

**NOTE:** An ohmmeter may be used for the following testing procedures, except for the one concerning the shorted windings in the armature.

Check the commutator for roughness, burnt or scored surface. If necessary, turn the commutator on a lathe, enough to remove grime only.

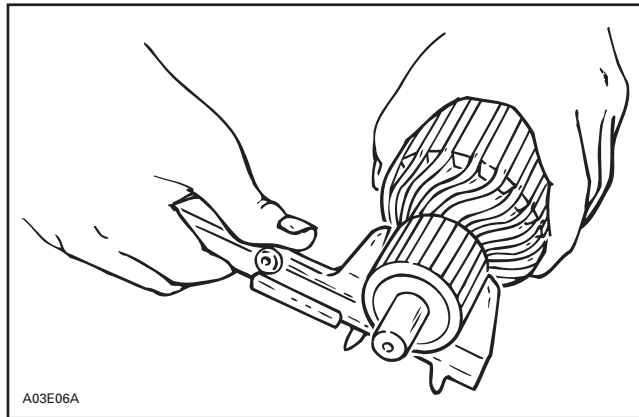
Check the commutator for mica depth. If the depth is less than 0.20 mm (0.008 in), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.



1. Commutator undercut 0.20 mm (.008 in)

Check the commutator out-of-round condition with V Blocks and an indicator. If the commutator out-of-round is more than 0.40 mm (.016 in), the commutator should be turned on a lathe.

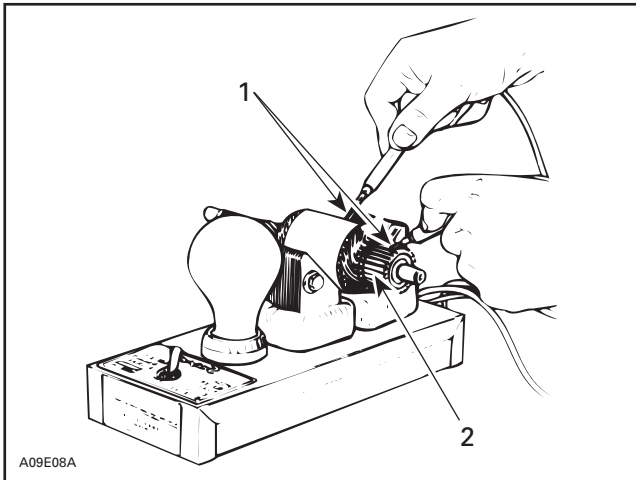
Check commutator outer diameter. If less than specified value, replace.



MODEL	WEAR LIMIT
S-Series	27 mm (1.063 in)

#### Test for Ground Circuit in the Armature:

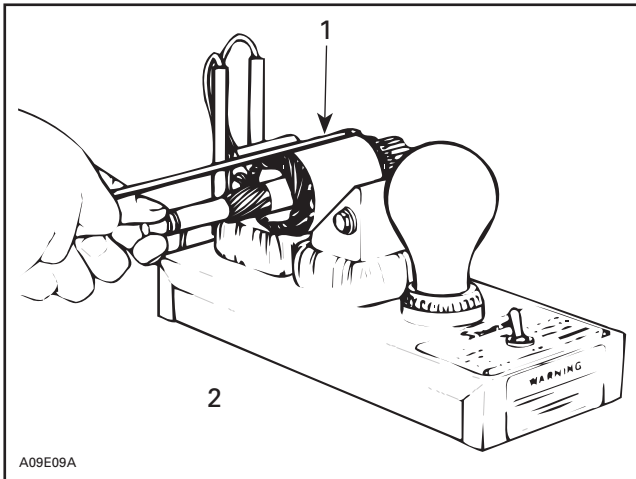
Use growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded. Replace armature if so.



1. Test probes  
2. Commutator bars

**Test Armature for Shorted Winding:**

When the armature is rotated in the growler with a steel strip (hack-saw blade) held above it, the strip will vibrate over that area of the armature which has short circuit. Replace armature if so.



1. Steel strip (hack-saw blade)  
2. Growler

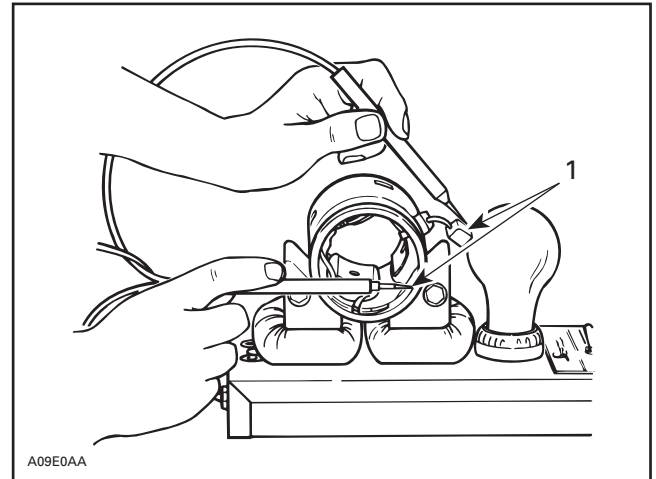
**Test the Armature for Open Circuit:**

Use growler test probes. Place one test probe on a commutator bar and the other test probe on the neighboring bar. Repeat this operation for all bars, moving one test probe at a time. If the growler lamp does not turn on, the armature circuit between these two bars is opened. The armature should be replaced or repaired; open circuits most often occur at the commutator riser where coils are soldered. (Burnt commutator bars are usually an indication of an open-circuit armature coil.)

**Field Windings and Brushes**

**Test the Field Winding for Open Circuit:**

Use growler test probes. Place one test probe on the negative brush and the other test probe on the yoke. If growler lamp does not turn on, the field winding has an open-circuit. The yoke has to be repaired or replaced.



1. Test probes

Check the dynamic brake winding for open circuit by placing one test probe on the positive brush and the other probe on the negative brush.

If growler lamp does not turn on, the winding circuit is open-circuit and the yoke has to be repaired or replaced.

**Brush Holder**

Check the brush holder for insulation using growler test probes. Place one test probe on the insulated brush holder and the other test probe on the brush holder plate. If the growler lamp turns on, the brush holder has to be repaired or replaced.

**Brush Length**

Measure brush length. If less than the specified value, replace them.

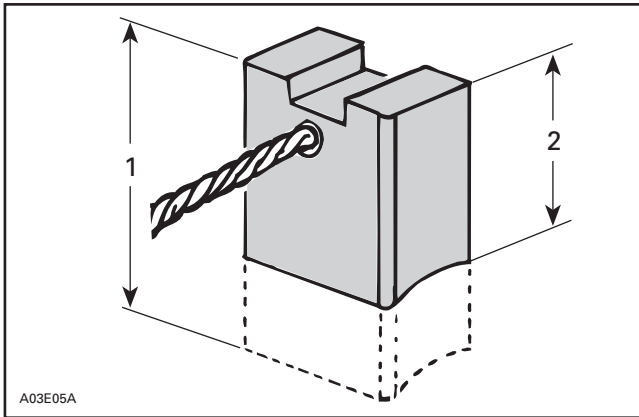
MODEL	LENGTH	
	New	Wear limit
S-Series Skandic WT/SWT	10 mm (.400 in)	6 mm (.236 in)

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## Section 05 ELECTRICAL

### Sub-Section 06 (ELECTRIC STARTER)

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#### TYPICAL

1. New
2. Wear limit

### Overrunning Clutch

The pinion of the overrunning clutch should turn smoothly in the clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

Check the pinion teeth for wear and damage. If defective, replace.

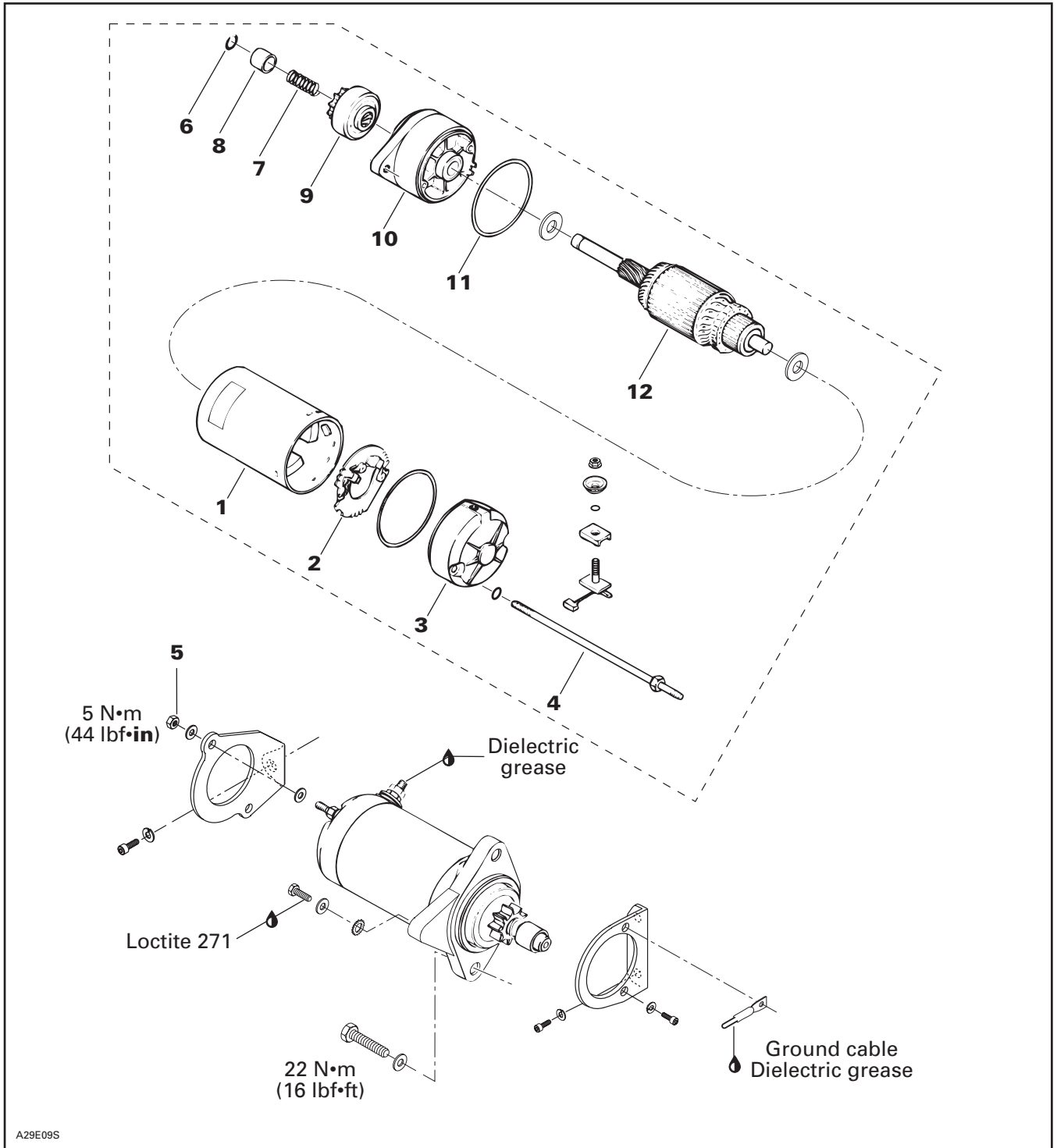
### SOLENOID SWITCH

Inspect connections and clean as necessary. Solenoid switch condition can be checked with an ohmmeter. Install test probes on **large** connectors of solenoid when it is activated (+ on RED/GREEN wire and — on solenoid body).

**IMPORTANT:** No current must be present on large cables when using ohmmeter, otherwise meter could be damaged.

**Section 05 ELECTRICAL**  
Sub-Section 06 (ELECTRIC STARTER)

**Skandic WT LC**



A29E09S

## Section 05 ELECTRICAL

### Sub-Section 06 (ELECTRIC STARTER)

## STARTER REMOVAL

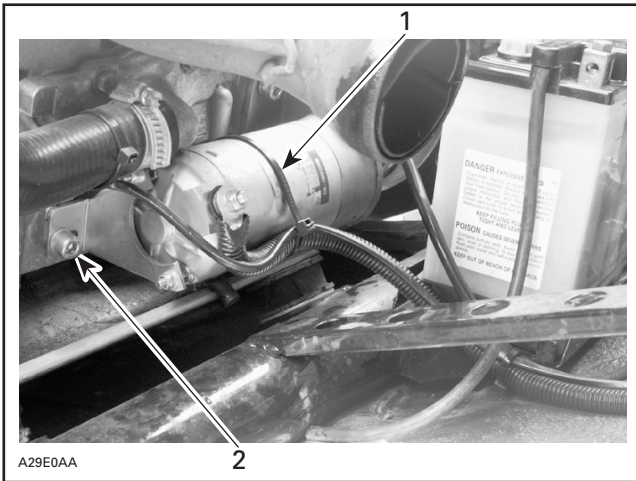
Disconnect BLACK cable ground connection from battery.

### ◆ WARNING

Always disconnect ground cable first and re-connect last.

Remove tuned pipe.

Cut locking tie retaining cable to starter.



1. Locking tie
2. Allen screw

Unplug positive cable from starter.

Unfasten Allen screw from rear of starter.

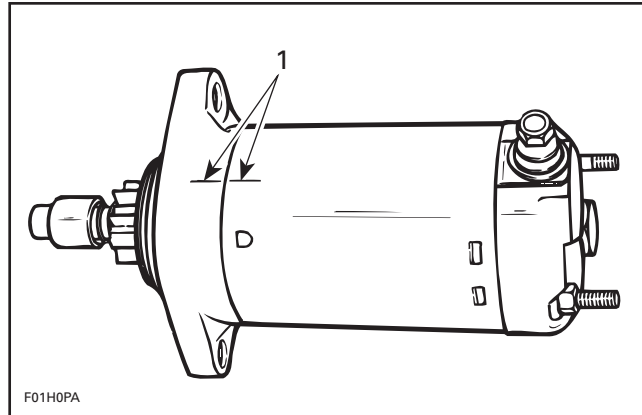
Remove 2 screws from front of starter. Top screw also retains positive cable.

Remove starter.

## STARTER DISASSEMBLY

### 1,2,3,4,5, Yoke, Brush Holder, End Frame, Through Bolt and Nut

Before disassembling, trace index marks on yoke and clutch housing to ease further assembly.



#### TYPICAL

1. Trace indexing marks

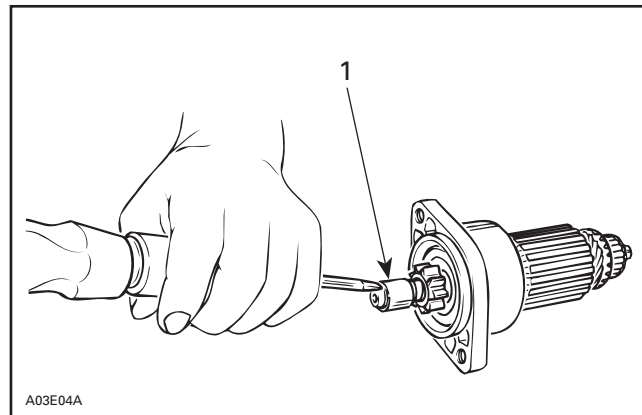
Remove starter support nuts then through bolts. Separate end frame from yoke assembly. Withdraw yoke assembly from armature.

Brush holder can be removed from end frame by unscrewing nut retaining terminal.

Check that the radial play between the armature shaft and end frame is not greater than 0.20 mm (.008 in). Replace end frame if so.

### 6,7,8, Circlip, Spring and Pinion Stop Collar

Tap the pinion stop collar using a screwdriver. Remove circlip. Disassemble pinion stop collar and spring.



1. Pinion stop collar

### 9,10,11,12, Clutch Ass'y, Housing, O-ring and Armature

Turn assembly clockwise to remove it from armature assembly.

Pull housing from armature.

## CLEANING

### ▼ CAUTION

Yoke ass'y and drive unit assembly must not be immersed in cleaning solvent.

Discard all O-rings and gasket.

Clean brushes and holders with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holders clean using compressed air.

### ◆ WARNING

Always wear safety glasses when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean, dry cloth.

Clean engine ring gear teeth and drive unit (clutch).

○ **NOTE:** Bushings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean, dry cloth.

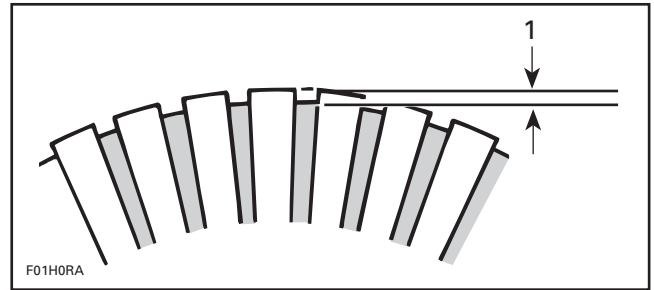
## PARTS INSPECTION

### Armature

○ **NOTE:** An ohmmeter may be used for the following testing procedures, except for the one concerning shorted windings in armature.

Check commutator for roughness, burnt or scored surface. If necessary, turn commutator on a lathe, enough to resurface only.

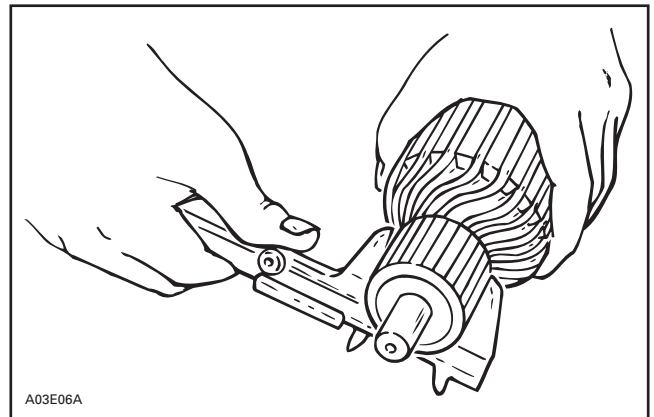
Check commutator for mica depth. If depth is less than 0.20 mm (.008 in), undercut mica. Be sure that no burrs are left and no copper dust remains between segments after undercutting operation is completed.



1. Commutator undercut 0.20 mm (.008 in)

Check commutator out of round condition with V-shaped blocks and an indicator. If commutator out of round is more than 0.40 mm (.016 in), commutator should be turned on a lathe.

Check commutator outer diameter. If less than 27 mm (1.063 in), replace.



### Brush Holder

Check brush holder for insulation using an ohmmeter. Place one test probe on insulated brush holder and the other test probe on brush holder plate. If continuity is found, brush holder has to be repaired or replaced.

### Brush Length

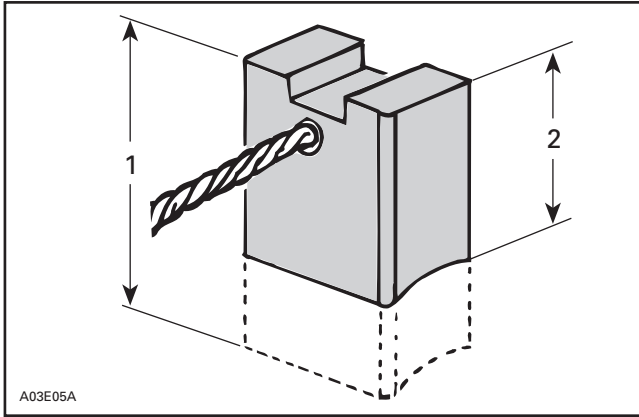
Measure brush length. If less than 8.5 mm (.335 in), replace them.

○ **NOTE:** New brush length is 12 mm (.472 in).



## Section 05 ELECTRICAL

### Sub-Section 06 (ELECTRIC STARTER)



A03E05A

1. New
2. Wear limit, 8.5 mm (.335 in)

### Overrunning Clutch

Pinion of overrunning clutch should turn smoothly in clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

Check pinion teeth for wear and damage. If defective, replace.

**NOTE:** Always check engine ring gear teeth for wear and damage. If defective replace ring gear. Refer to DRIVE PULLEY 04-03.

### STARTER ASSEMBLY

Reverse the order of disassembly to reassemble starter. However, attention should be paid to the following operations.

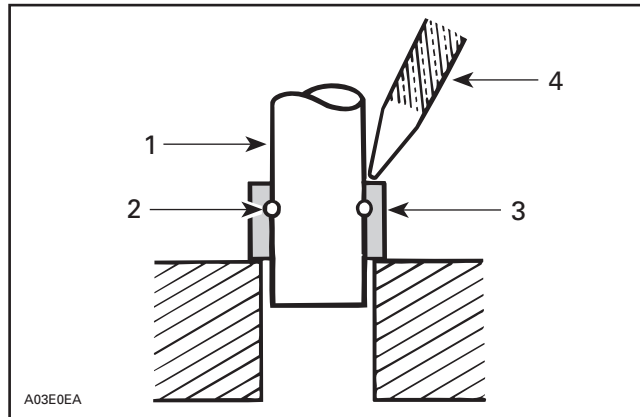
Prior to assembling, coat sliding surfaces on armature shaft splines, overrunning clutch and bushing with G.E. Versilube G 341 M or ESSO Beacon 325 lubricant or equivalent.

Apply motor oil on metal bushings.

### 6,8, Circlip and Pinion Stop Collar

After placing stop collar on armature shaft, fit circlip into armature shaft, then make sure that it is properly secured.

Slide stop collar over circlip and secure in place by punching it at 2 or 3 places.

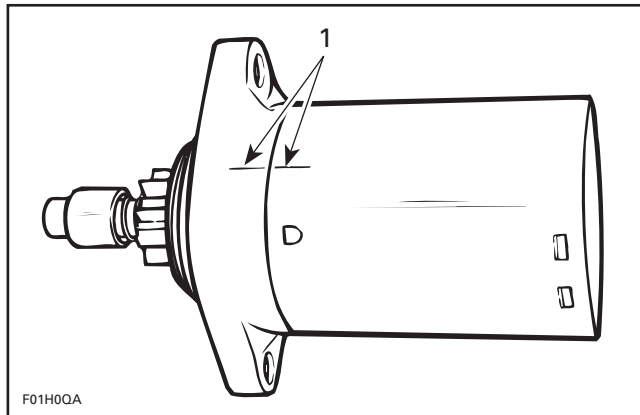


A03E0EA

1. Armature shaft
2. Circlip
3. Pinion stop collar
4. Punch

### 1,10, Housing and Yoke Ass'y

Align previously traced indexing marks.



F01H0QA

TYPICAL

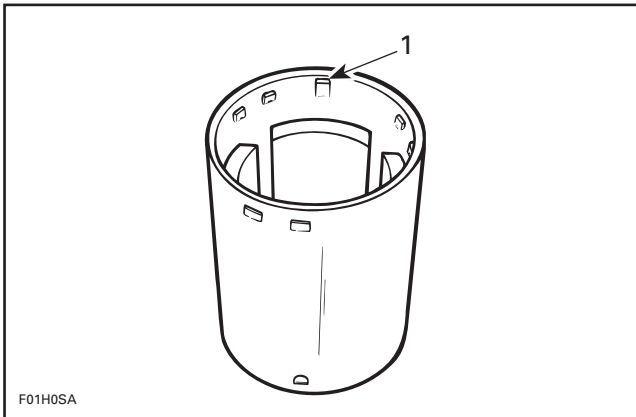
1. Align marks

### 1,3,4, Yoke Ass'y, End Frame and Through Bolt

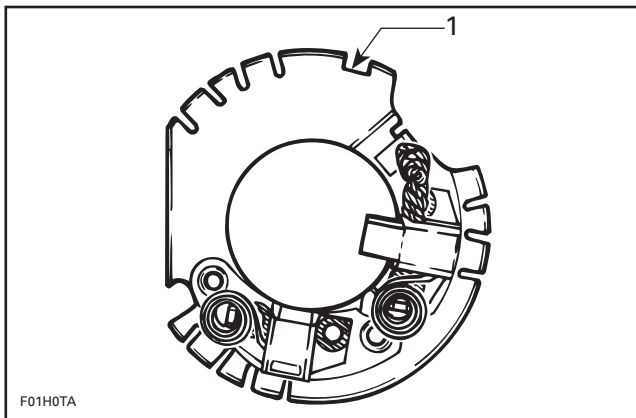
Open brushes and slide over commutator.

Align end frame locating notch with yoke locating protrusion and properly sit brush holder into yoke.

**Section 05 ELECTRICAL**  
**Sub-Section 06 (ELECTRIC STARTER)**

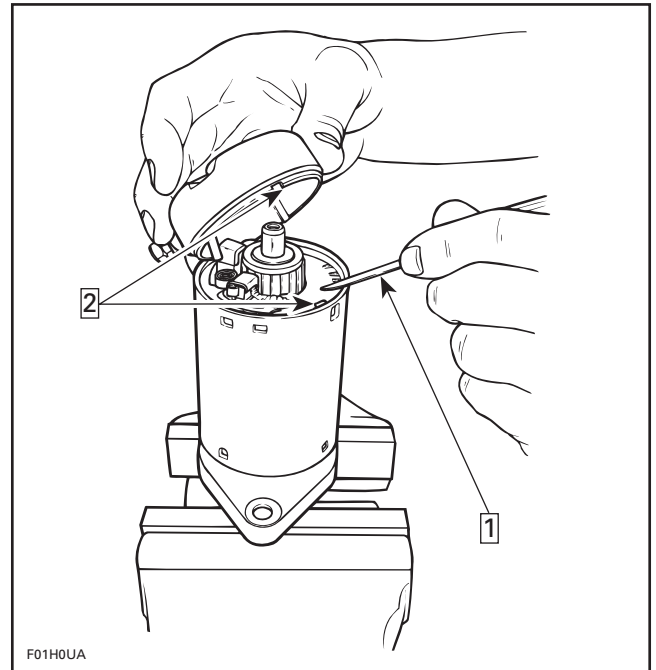


1. Locating protrusion is the higher one



1. Brush holder locating notch

To ease end frame installation, retain brush holder with a small screwdriver while installing end frame.



Step 1 : Retaining brush holder with a screwdriver  
Step 2 : Align here

Align end frame notch with brush holder notch/  
yoke protrusion.

**▼ CAUTION**

Make sure end frame fits perfectly on yoke.

**STARTER INSTALLATION**

Installation is essentially the reverse of removal procedure. However, pay particular attention to the following.

Make sure that starter and engine mating surfaces are free of debris. Serious trouble may arise if starter is not properly aligned.

**◆ WARNING**

Always connect RED positive cable first then BLACK negative cable last. Whenever connecting the RED positive cable to the starter motor make sure the battery cables are disconnected to prevent electric shock.

# TESTING PROCEDURE

## GENERAL

The following chart gives the engine types with their implemented system.

ENGINE TYPE	IGNITION SYSTEM	CHARGING SYSTEM OUTPUT
454, 494, 583 and 670	① NIPPONDENSO (CDI) TRIGGER COIL	220
443 and 503	② DUCATI (CDI)	240

### CDI System Identification

#### Nippondenso

The NIPPONDENSO CDI system has a separate ignition coil which is mounted on the reservoir cluster.

1. Ignition module is connected to the ignition generator coil via a 3-wire connector (RED, BLACK/RED and BLACK wires).

#### 583 Engine

Ignition module stamped P/N: 070000-2421

Ignition coil stamped P/N: 129700-2982

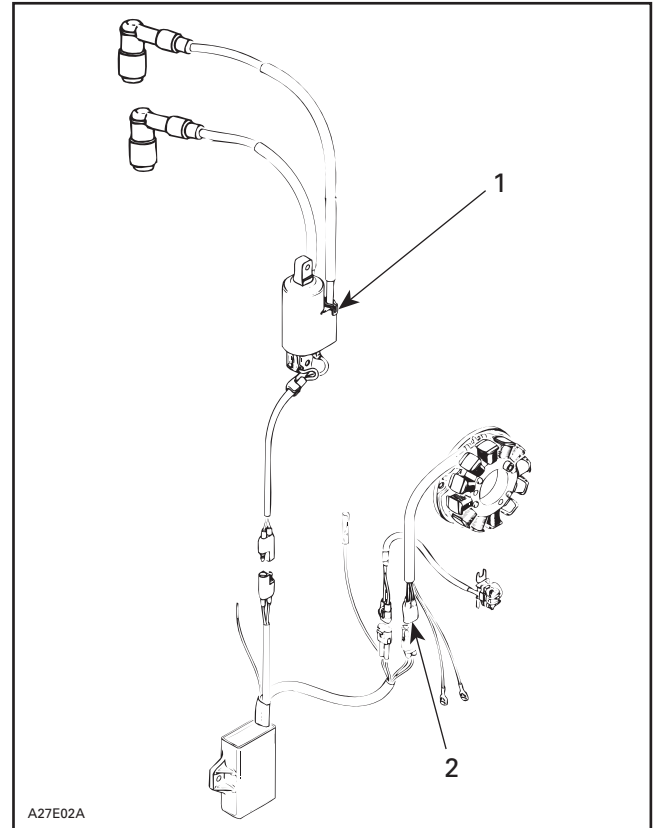
Flywheel stamped P/N: 032000-7860

#### 454, 494 and 670 Engines

Ignition module stamped P/N: 070000-2421

Ignition coil stamped P/N: 129700-2982

Flywheel stamped P/N: 032700-5900



① **NIPPONDENSO CDI TRIGGER COIL SYSTEM**

1. Separate ignition coil mounted on reservoir cluster
2. Three-wire connector (RED, BLACK/RED and BLACK)

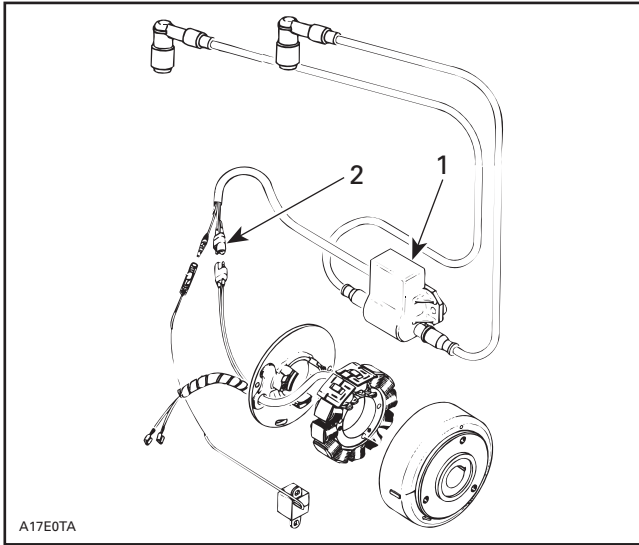
#### Ducati

The DUCATI CDI system has a combined ignition module/ignition coil which are mounted on oil reservoir support.

2. Ignition module is connected to the ignition generator coils via a 2-wire connector (GREEN and WHITE wires).

## Section 05 ELECTRICAL

### Sub-Section 07 (TESTING PROCEDURE)



#### ② DUCATI CDI SYSTEM

1. Combined ignition module/ignition coil mounted on air silencer below carburetor
2. Two-wire connector (GREEN/WHITE wires)

### Ignition System Testing Sequence

When dealing with ignition problems, the following items should be verified in this order.

#### Nippondenso

1. Spark occurrence/spark plug condition.
2. Electrical connections.
3. Engine stop/tether cord switches.
4. Ignition coil output.
5. Ignition module output.
6. Magneto output (ignition generator coil).

### ▼ CAUTION

Whenever replacing a component in ignition system, check ignition timing.

#### Ducati

1. Spark occurrence/spark plug condition.
2. Electrical connections.
3. Engine stop/tether cord switches.
4. Trigger coil output.
5. Magneto output (ignition generator coil).
6. Ignition coil output.
7. Ignition module.

### All Systems

The first 2 items can be checked with known automotive equipment and other items as follows.

### Engine Stop/Tether Cut-Out Switches Verification

#### Engine Stop Switch

Unplug stop switch connector from main harness then using an ohmmeter, connect test probes to BLACK/YELLOW and BLACK wires.

Measure resistance, it must be an open circuit in its operating position and close to 0 ohm when depressed.

#### Tether Cut-Out Switch

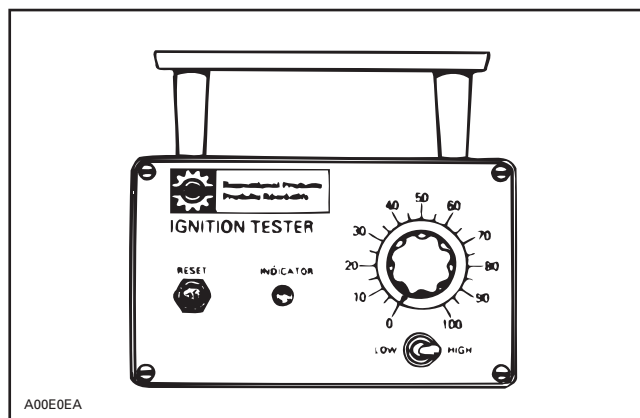
Unplug tether cut-out switch connector from main harness then using an ohmmeter, connect test probes to BLACK/YELLOW and BLACK wires.

Measure resistance, it must be an open circuit when cap is over switch and close to 0 ohm when removed.

### Magneto System Verification

System verification can be performed using the Bombardier ignition tester (P/N 419 0033 00), a digital ohmmeter or by substituting parts.

### USE OF BOMBARDIER IGNITION TESTER



○ **NOTE:** For more information about operating and maintenance of the tester, refer to its instruction manual.

## Test Condition

### All Tests are Performed on the Vehicle at Cranking Speed

Vigorous manual 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.

Always proceed in the following order:

1. Connect tester **P** and **N** clip leads as illustrated for each specific test.
2. Follow test procedure sequence.
3. After every test that lights the indicator lamp, **reset** the indicator circuit by depressing the reset button.

## Analysis of Test Results

### Indicator Lamp Lights at Specific Setting

Output is as specified. Test results should repeat 3 times. If readings do not repeat, output is erratic and cause should be investigated (loose connections or components etc.).

### Indicator Lamp Lights at Lower Setting

This indicates that the output is less than that designed to operate in a satisfactory manner. However, before coming to the conclusion of a faulty condition, be certain that correct engine cranking conditions were met before condemning the tested part.

### Indicator Lamp Does Not Light

One component is defective. Proceed as instructed to find defective component.

### Intermittent Ignition Problems

In dealing with intermittent problems there is no easy diagnosis. For example, problems that occur only at normal engine operating temperature have to be tested under similar conditions.

In most cases of temperature and/or vibration failure, only parts replacement can solve the problem as most of these failures return to normal when engine is not running.

## Multiple Problems

There is always the possibility of more than one faulty part. If after a component has been replaced, the problem still persists, carefully repeat the complete test procedure to find the other faulty part.

## Section 05 ELECTRICAL

### Sub-Section 07 (TESTING PROCEDURE)

## NIPPONDENSO CDI TRIGGER COIL SYSTEM TESTING

**Applicable to 454, 494, 583 and 670 Engine Types**

○ **NOTE:** Ensure ignition cut-out switches are properly working and they are in the ON position prior to performing the following tests.

### ◆ WARNING

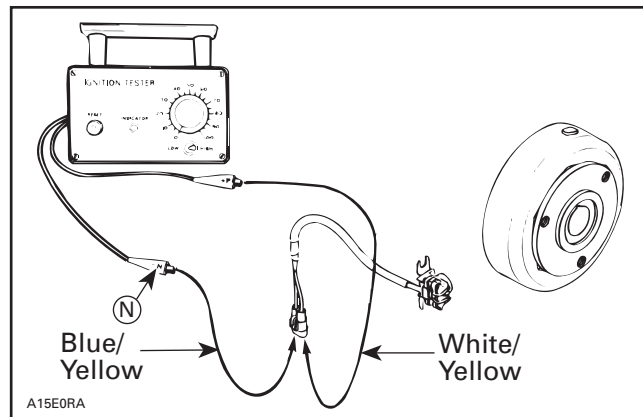
To prevent powerful electric shocks while cranking engine, do not touch neither electronic ignition components (ignition coil, high tension wire, wire harness, etc.) nor tester leads.

### TRIGGER COIL OUTPUT

1. Disconnect connector housing of trigger coil at ignition module.
2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	BLUE/YELLOW wire of trigger coil	LOW	15
P	WHITE/YELLOW wire of trigger coil		

3. Crank engine and observe indicator.
4. Push reset button and repeat step 3 twice.



TYPICAL

**Results:**

- a. **Indicator lamp lights:** Trigger coil output is up to specifications.
- b. **Indicator lamp does not light:** The problem is a faulty trigger coil or bad grounding.

### IGNITION COIL OUTPUT

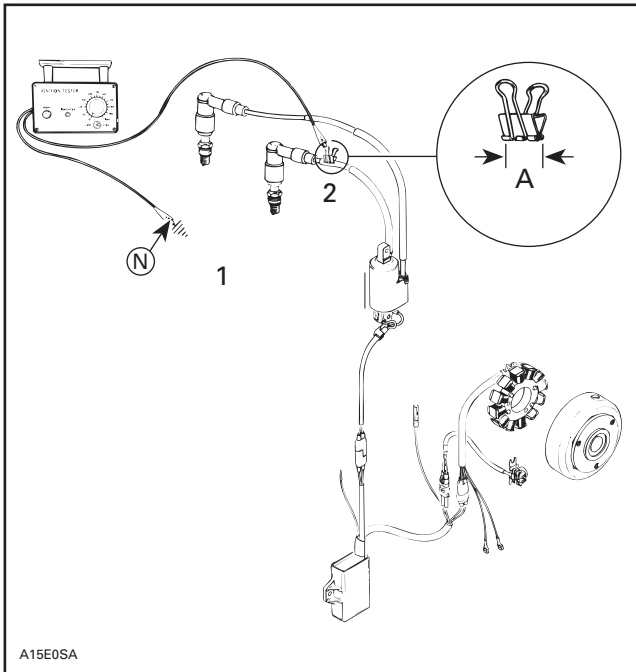
A paper clip of approximately 20 mm (3/4 in) will be used as a test adapter for the following test.

1. Install the test adapter to spark plug cable close to MAG side spark plug.
2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	Engine ground	LOW	45
P	Test adapter (paper clip) spark plug cable		

○ **NOTE:** Different reading occurs if N tester wire is connected to PTO or MAG side spark plug cable.

**Section 05 ELECTRICAL**  
**Sub-Section 07 (TESTING PROCEDURE)**



**TYPICAL**

1. Engine ground
2. MAG side
- A. 20 mm (3/4 in)

3. Crank engine and observe indicator.

○ **NOTE:** If engine starts, allow it to idle while observing indicator. Then, shut engine off.

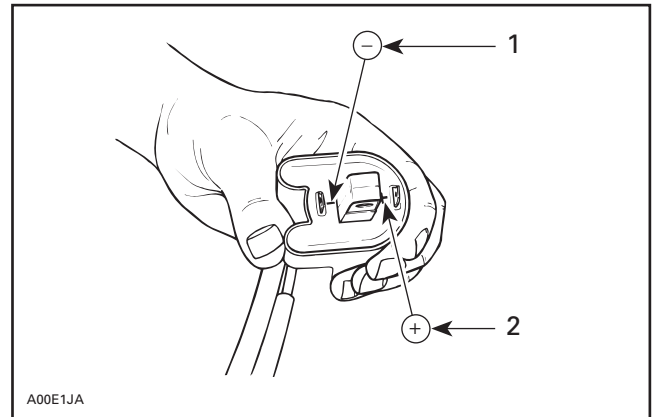
4. Push reset button and repeat step 3 twice.

**Results:**

- a. **Indicator lamp lights:** Ignition system is OK.
- b. **Indicator lamp does not light on one or both cylinder:** Proceed to following tests.

**IGNITION MODULE**

1. Disconnect both connectors at ignition coil.  
 At assembly, secure with new locking ties.
2. Connect an ignition coil (known as being in good condition) to the spark plug(s).
3. Connect CDI module to replacement ignition coil paying attention to connect the WHITE/BLUE wire to the positive (+) terminal and the BLACK wire to the negative (-) terminal.



1. Black
2. White/Blue

4. Slip plastic protectors out of coil terminals.

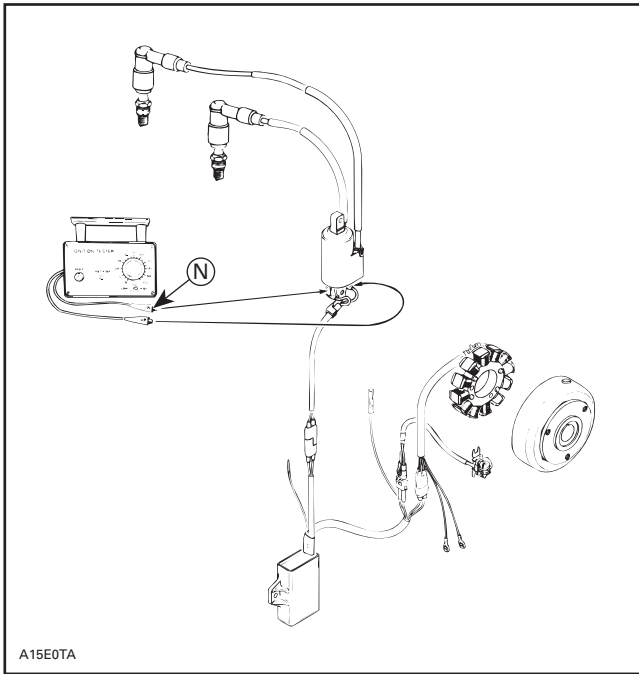
5. Connect tester wires to coil terminals then set switch and dial as follows:

○ **NOTE:** If necessary use jumper wires from coil terminals to tester wires.

Tester wires	Component wires	Tester switch position	Tester dial position
N	WHITE/BLUE wire (+) of ignition coil	LOW	85
P	BLACK wire (-) of ignition coil		

## Section 05 ELECTRICAL

### Sub-Section 07 (TESTING PROCEDURE)



TYPICAL

6. Crank engine and observe indicator.
7. Push reset button and repeat step 6 twice.

#### Results:

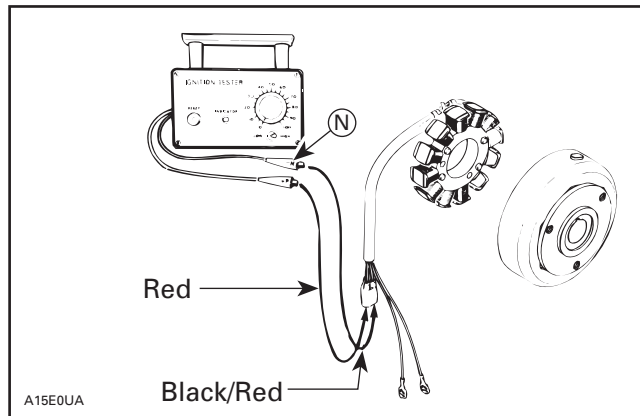
- Indicator lamp lights:** Ignition module output is up to specifications. The problem is a faulty ignition coil.
- Indicator lamp does not light:** Proceed to following test. If magneto output tests good, the problem is a faulty ignition module.

### MAGNETO OUTPUT (IGNITION GENERATOR COIL)

1. Disconnect the 3-wire connector between ignition module and magneto harness.  
At installation, secure with new locking ties.

2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	RED wire of magneto harness	LOW	85
P	BLACK/RED wire of magneto harness		



TYPICAL

3. Crank engine and observe indicator.
4. Push reset button and repeat step 3 twice.

### LIGHTING GENERATOR COIL OUTPUT

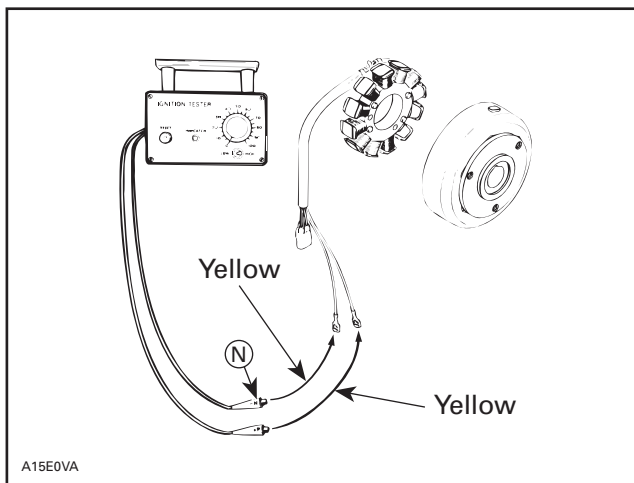
**NOTE:** The lighting generator coil is not part of the ignition system. It is a separate system that supplies current to the lighting system and AC-powered devices. However it can be tested with the same tester.

1. Disconnect wiring harness junction block at engine (the one with YELLOW wires).



2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	YELLOW wire of magneto harness	LOW	75
P	YELLOW wire of magneto harness		



3. Crank engine and observe indicator.
4. Push reset button and repeat step 3 twice.

**Results:**

- a. **Indicator lamp lights:** Lighting generator coil output is up to specifications.
- b. **Indicator lamp does not light:** Lighting generator coil is faulty.

---

**Section 05 ELECTRICAL****Sub-Section 07 (TESTING PROCEDURE)**

---

**SUMMARY TABLE**

Test to perform	Tester wires	Components wires	Switch	Dial
Trigger coil output	N	BLUE/YELLOW wire of trigger coil	LOW	15
	P	WHITE/YELLOW wire of trigger coil		
Ignition coil output	N	Engine ground	LOW	45
	P	Test adapter on MAG spark plug cable		
Ignition module output	N	WHITE/BLUE wire (+) of ignition coil	LOW	85
	P	BLACK wire (-) of ignition coil		
Magneto output (ignition generator coil)	N	RED wire of magneto harness	LOW	85
	P	BLACK/RED wire of magneto harness		
Lighting generator coil output	N	YELLOW wire of magneto harness	LOW	75
	P	YELLOW wire of magneto harness		

## RESISTANCE MEASUREMENTS

As an alternate method, magneto system components can be checked with a digital ohmmeter.

**NOTE:** All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

Disconnect connector at ignition coil and magneto junction. Measure resistance between each terminal. Refer to the following table for values and wire colors.

**NOTE:** An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter.

	PART NAME	WIRE COLOR*	RESISTANCE OHM	REMARKS
MAGNETO	Trigger coil	BL/YL with WH/YL	190 - 300	No display change means open circuit.
	Ignition generator coil	RD with BK/RD	10 - 17	
	Lighting generator coil	YL with YL	0.20 - 0.35	
IGNITION COIL	Primary winding	BK with WH/BL	0.3 - 0.7	Dis play showing zero (0) means short circuit.
	Secondary winding (spark plug cap remove)	End of each high tension wire	8 - 16 K (8000 - 16000)	
	Insulation	WH/BL with core	$\infty\Omega$	
		WH/BL with high tension wire		
SPARK PLUG CAP	Spark plug cap	—	4.5 - 5.5 K	

$\infty$ : Infinity (extremely large number)

\* 

COLOR CODE	
BK — BLACK	GN — GREEN
WH — WHITE	GY — GREY
RD — RED	VI — VIOLET
BL — BLUE	OR — ORANGE
YL — YELLOW	BR — BROWN

## Section 05 ELECTRICAL

### Sub-Section 07 (TESTING PROCEDURE)

## DUCATI CDI SYSTEM TESTING

(Applicable to 443 and 503 Engine Types)

**NOTE:** Ensure ignition cut-out switches are properly working and they are in the ON position prior to performing the following tests.

### WARNING

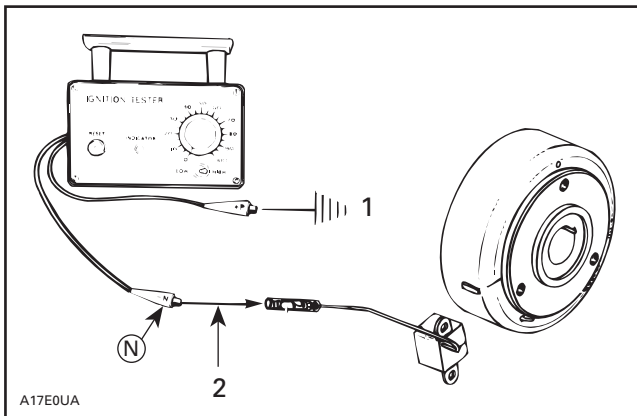
To prevent powerful electric shocks while cranking engine, do not touch neither electronic ignition components (ignition coil, high tension wire, wire harness, etc.) nor tester leads.

## TRIGGER COIL OUTPUT

1. Disconnect the connector of RED wire at ignition module.
2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	WHITE/RED wire of trigger coil	LOW	45
P	Engine ground		

3. Crank engine and observe indicator.
4. Push reset button and repeat step 3 twice.



1. Engine ground
2. White/Red

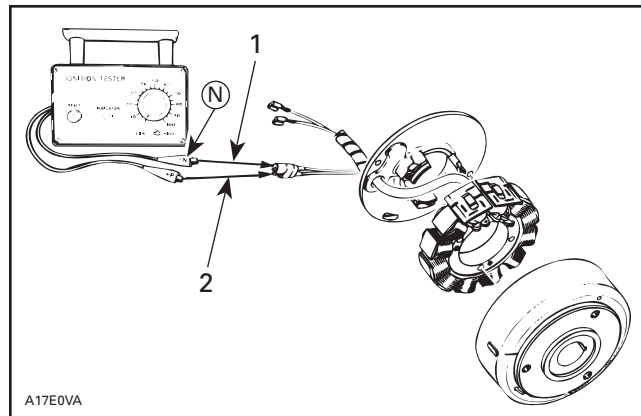
## Results:

- a. **Indicator lamp lights:** Trigger coil output is up to specifications.
- b. **Indicator lamp does not light:** The problem is a faulty trigger coil or bad grounding.

## MAGNETO OUTPUT (Ignition Generator Coil)

1. Disconnect the 2-wire connector between ignition module and magneto harness.
2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	GREEN wire of magneto harness	LOW	80
P	WHITE wire of magneto harness		



1. Green
2. White

3. Crank engine and observe indicator.
4. Push reset button and repeat step 3 twice.

## Results:

- a. **Indicator lamp lights:** Ignition generator coil output up to specifications.
- b. **Indicator lamp does not light:** The problem is a faulty ignition generator.

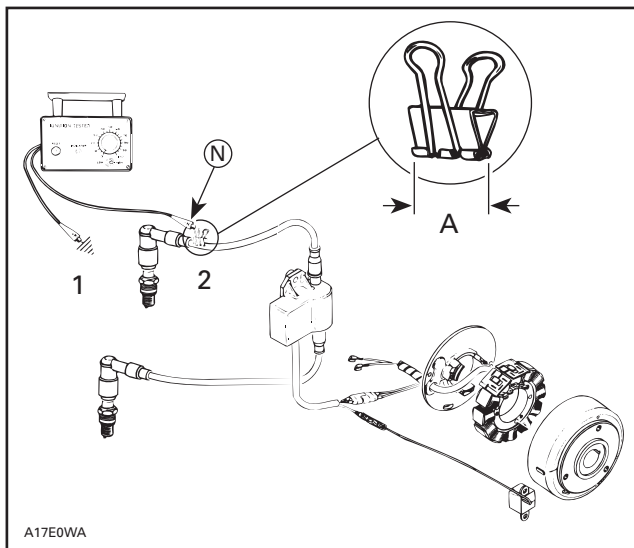
## IGNITION COIL OUTPUT

A paper clip of approximately 20 mm (3/4 in) will be used as a test adapter for the following test.

1. Clip the test adapter around spark plug cable close to MAG side spark plug.
2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	Test adapter (paper clip) on spark plug cable	LOW	80
P	Engine ground		

**NOTE:** Different reading occurs if N tester wire is connected to PTO side spark plug cable.



1. Engine ground
2. MAG side
- A. 20 mm (3/4 in)

3. Crank engine and observe indicator.

**NOTE:** If engine starts, allow it to idle while observing indicator. Then, shut engine off.

4. Push reset button and repeat step 3 twice.

### Results:

- a. **Indicator lamp lights:** Ignition system is OK.
- b. **Indicator lamp does not light on one or both cylinder:** The problem is a faulty ignition coil/module.

## IGNITION MODULE

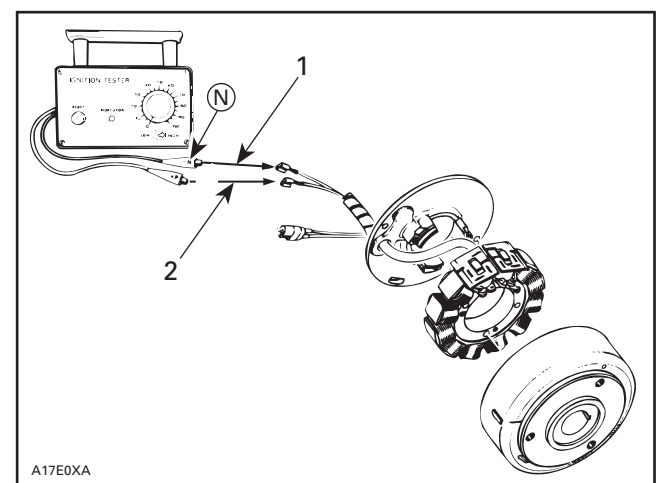
Ignition module can not be tested with the Bombardier ignition tester. When other components test good, the module is probably faulty. Try a new module.

## LIGHTING GENERATOR COIL OUTPUT

**NOTE:** The lighting generator coil is not part of the ignition system. It is a separate system that supplies current to the lighting system and AC-powered devices. However it can be tested with the same tester.

1. Disconnect wiring harness junction block at engine (the one with YELLOW and YELLOW wires).
2. Connect tester wires then set switch and dial as follows:

Tester wires	Component wires	Tester switch position	Tester dial position
N	YELLOW wire of magneto harness	LOW	80
P	YELLOW wire of magneto harness		



1. Yellow
2. Yellow

3. Crank engine and observe indicator.
4. Push reset button and repeat step 3 twice.

---

## Section 05 ELECTRICAL

### Sub-Section 07 (TESTING PROCEDURE)

---

#### Results:

- a. **Indicator lamp lights:** Lighting generator coil output is up to specifications.
- b. **Indicator lamp does not light:** Lighting generator coil is faulty.

#### SUMMARY TABLE

Test to perform	Tester wires	Component wires	Switch	Dial
Trigger coil output	N	WHITE/RED wire of trigger coil	LOW	45
	P	Engine ground		
Magneto output (ignition generator coil)	N	GREEN wire of magneto harness	LOW	80
	P	WHITE wire of magneto harness		
Ignition coil output	N	Test adapter on MAG spark plug cable	LOW	70
	P	Engine ground		
Lighting generator coil output	N	YELLOW wire of magneto harness	LOW	80
	P	YELLOW wire of magneto harness		

## RESISTANCE MEASUREMENTS

As an alternate method, magneto system components can be checked with a digital ohmmeter.

○ **NOTE:** All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

Disconnect connector at ignition coil and magneto junction. Measure resistance between each terminal. Refer to the following table for values and wire colors.

○ **NOTE:** An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter.

	PART NAME	WIRE COLOR*	RESISTANCE OHM	REMARKS
MAGNETO	Trigger coil	RD with engine ground	140 - 180	No display change means open circuit.
	Ignition generator coil	WH with GN	230 - 330	
	Lighting generator coil	YL with YL	0.23 - 0.28	
IGNITION COIL	Secondary winding ① (spark plug cap removed)	End of each high tension wire	5.1 - 6.3 K (5100 - 6300)	Display showing zero (0) means short circuit.
SPARK PLUG CAP	Spark plug cap	—	4.5 - 5.5 K	

①: The primary winding of ignition coil can not be measures because there is no external connection.

* COLOR CODE	
BK — BLACK	GN — GREEN
WH — WHITE	GY — GREY
RD — RED	VI — VIOLET
BL — BLUE	OR — ORANGE
YL — YELLOW	BR — BROWN

---

## Section 05 ELECTRICAL

### Sub-Section 07 (TESTING PROCEDURE)

---

## VOLTAGE REGULATOR INSPECTION

A faulty voltage regulator is often responsible for frequent burned bulbs.



### CAUTION

Never run an engine with a faulty or inoperative voltage regulator. This could damage the DUCATI CDI module.

## TESTING PROCEDURE

The regulator ground must be checked to ensure the circuit is complete. If necessary, connect a good ground wire from the regulator to the engine.

### A) Quick Test Without Voltmeter



### CAUTION

Do not perform this test on engines that have a DUCATI CDI system.


If a voltmeter is not available, a visual test can be performed with satisfactory results.

Disconnect **all** lights and electric equipment.

While engine is running, disconnect and connect regulator connector several times checking for a spark.

A spark on regulator terminal indicates a good and working regulator.

### B) Voltmeter Test

 **NOTE:** Use a voltmeter able to read alternating current (AC). For accurate reading, use a RMS voltmeter.

Connect a wire of the voltmeter to a BLACK/YELLOW wire.

Connect the other wire of the voltmeter to a YELLOW wire.

Lift the rear of vehicle and support with a mechanical stand.

Start the engine at an idle without opening the throttle.



### WARNING

Ensure the track is free of particles which might be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no-one is standing in close proximity to the vehicle.


Slowly open the throttle and accelerate the engine to increase the RPM.

If the meter reads over 15 volts, the regulator is defective and must be replaced.



### CAUTION

Do not increase the RPM so the voltage exceeds 15 V as the bulb(s) will burn.

 **NOTE:** Whatever the voltmeter type used (peak voltage or RMS) the voltage must not exceed 15 V (a defective regulator will allow voltage to exceed 15 V as engine RPM is increased).



## **INSPECTION OF AC CIRCUIT ISOLATION**

### ***All Electric Start Models***

If AC circuit is not isolated from frame, headlamp beam will weaken.

### **INSPECTION**

Disconnect regulator/rectifier.

Connect one digital ohmmeter probe (needle ohmmeter will not offer enough precision) to frame and other probe to one of 2 yellow magneto wires.

Measured resistance must be infinite. If such is not the case, it means there is a connection between AC circuit and DC circuit.

Disconnect one accessory at the time to identify the faulty circuit.

---

## Section 05 ELECTRICAL

### Sub-Section 07 (TESTING PROCEDURE)

---

## INSPECTION OF HEATING ELEMENTS

### *All Models Except Skandic WT/SWT/WT LC*

All measurements must be performed at 21°C (70°F).

#### Throttle Lever Heating Element

##### Resistance Measurement

HIGH INTENSITY	YELLOW/BLACK wire BROWN wire	1.96 to 3.64 ohms
LOW INTENSITY	YELLOW/BLACK wire BROWN/YELLOW wire	8.05 to 14.95 ohms

##### Current Measurement

HIGH INTENSITY	BROWN wire	0.23 Amp. minimum
LOW INTENSITY	BROWN/YELLOW wire	0.13 Amp. minimum

#### Handlebar Grip Heating Element

##### Resistance Measurement

HIGH INTENSITY	YELLOW/BLACK wire ORANGE wire	8.73 to ① 10.67 ohms
LOW INTENSITY	YELLOW/BLACK wire ORANGE/VIOLET wire	17.7 to ① 20.7 ohms

### *Skandic WT/SWT/WT LC*

#### Throttle Lever Heating Element

##### Resistance Measurement

BLACK wire BLACK wire	48 ohms
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#### Handlebar Grip and Heating Element

##### Resistance Measurement

BLACK wire BLACK wire	9.6 ohms ①
--------------------------	------------

① When measuring resistance at terminals the actual value will be half the measurement in table. The reason for that is the elements are connected in parallel. Therefore the total resistance is half the resistance of one element.

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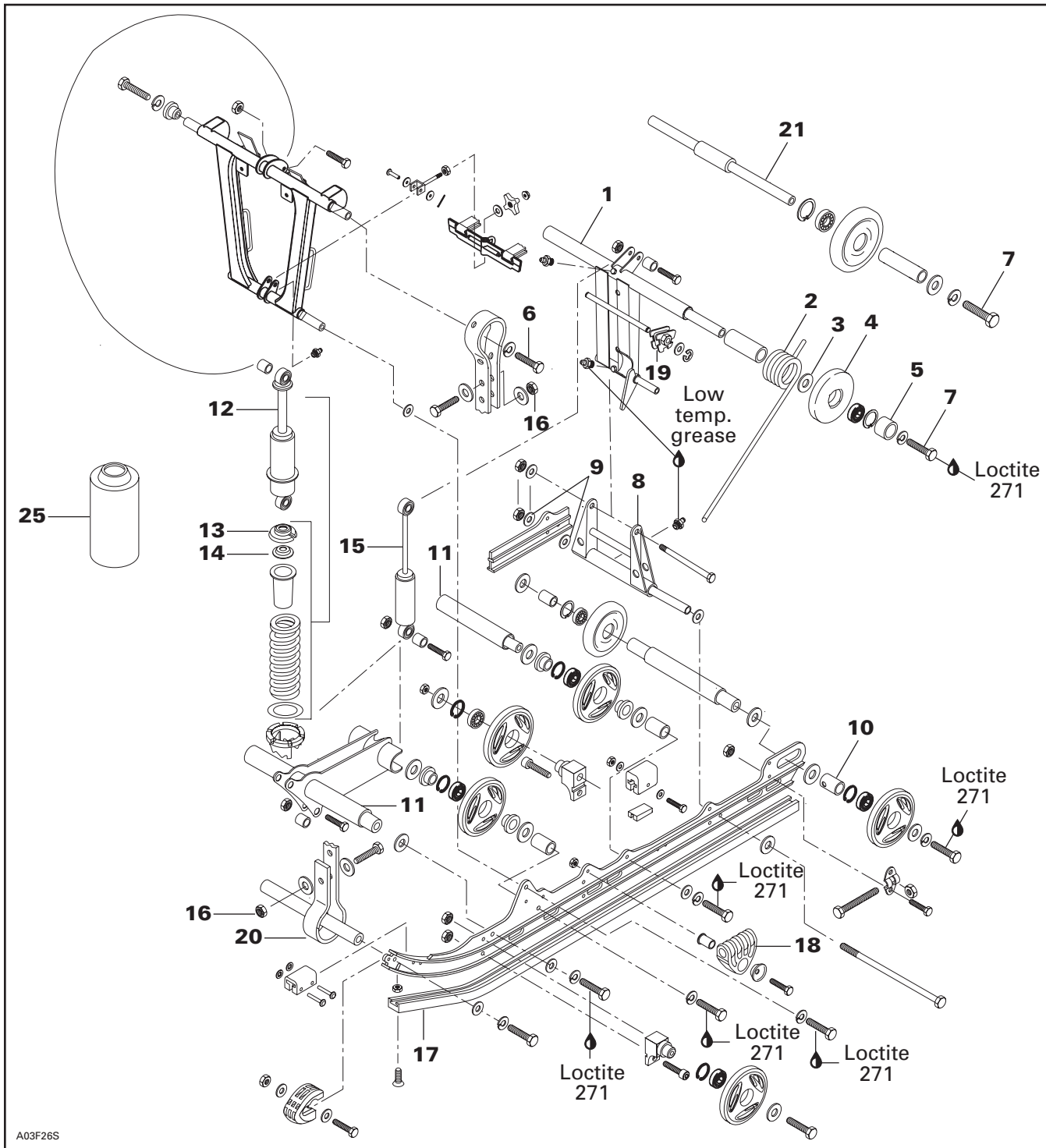
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# SC-10 SUSPENSIONS (ALL VERSIONS)

SC-10 Sport on MX Z 440 F, Formula 500/500 DELUXE/583

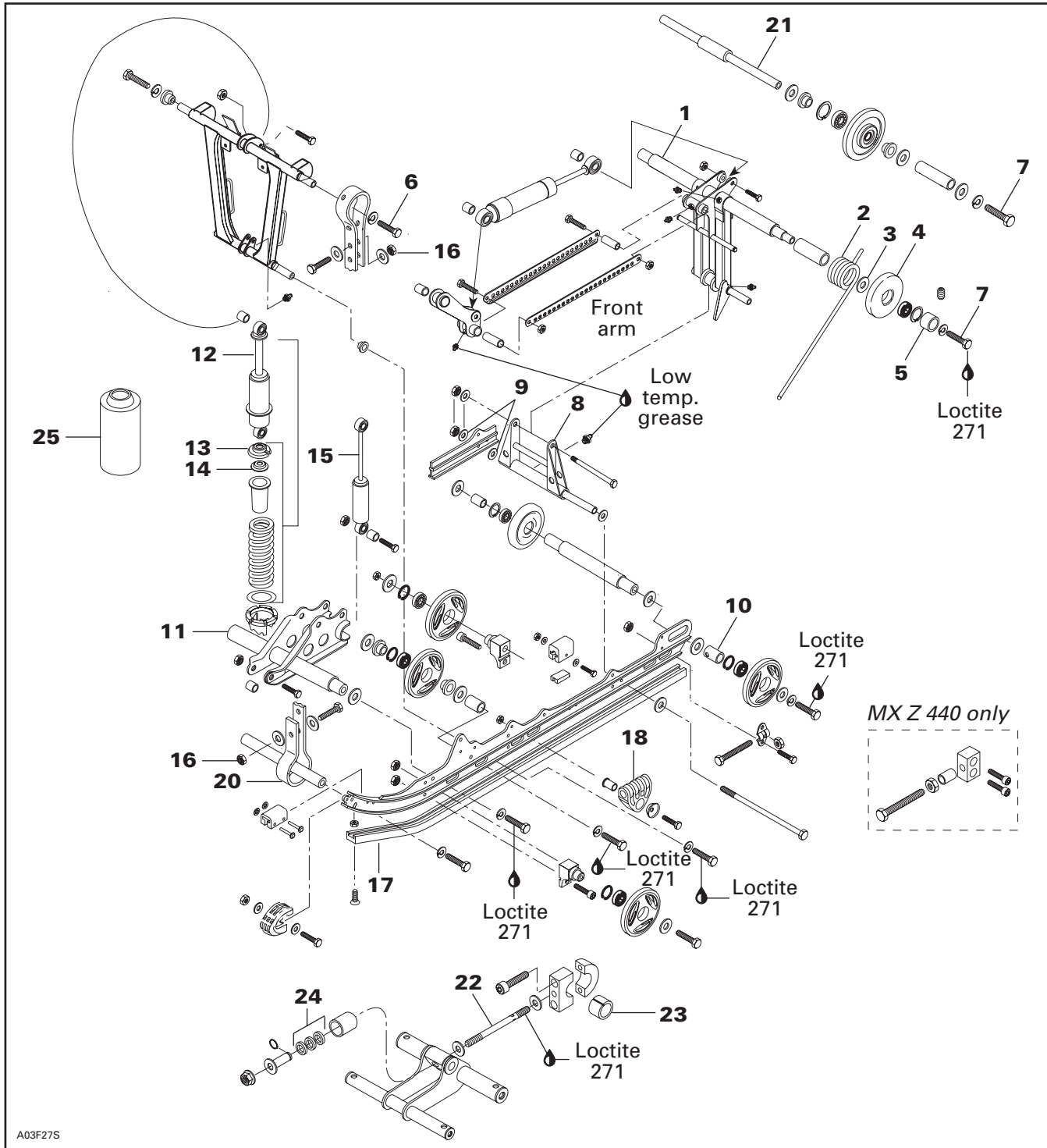


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# Section 06 REAR SUSPENSION

## Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

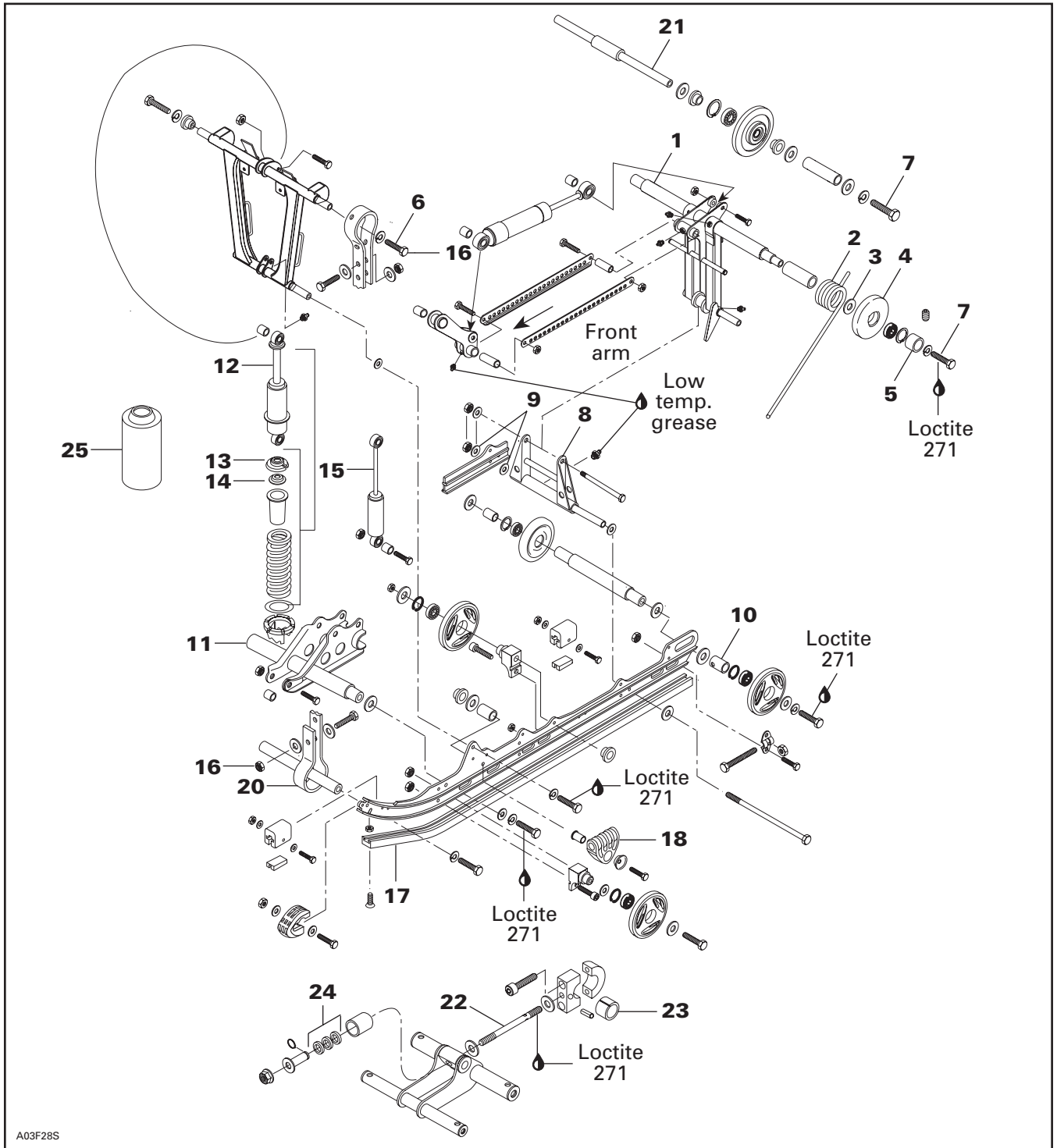
### SC-10 Cross-country on MX Z 440/583/670



# Section 06 REAR SUSPENSION

## Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

### SC-10 High-performance on Formula Z and Grand Touring 583

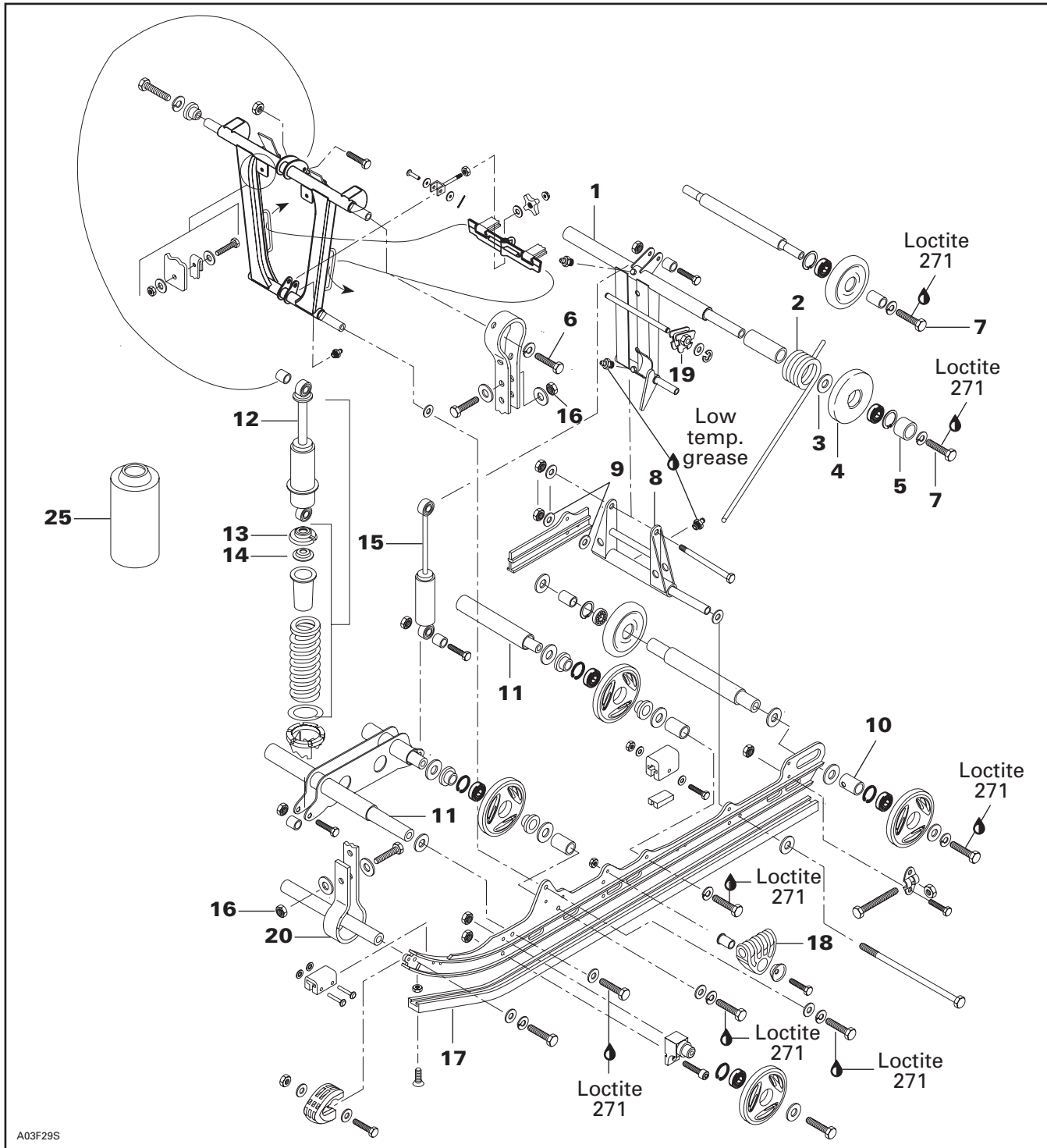


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# Section 06 REAR SUSPENSION

## Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

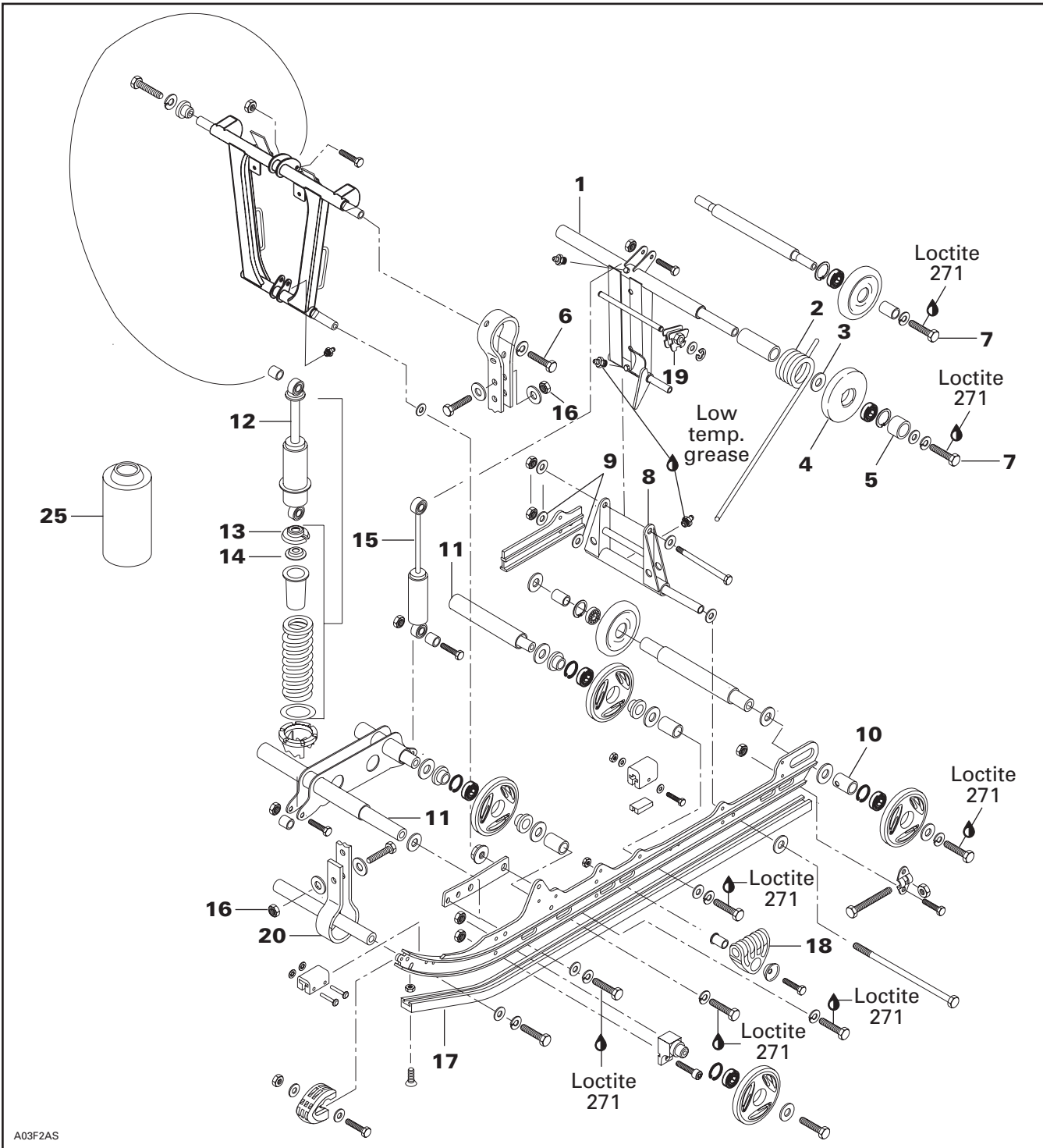
### SC-10 Mountain on Summit 500/583/670



A03F29S

**Section 06 REAR SUSPENSION**  
Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

**SC-10 Touring on Grand Touring 500**



A03F2AS



## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

## COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

### 21, Rear Axle

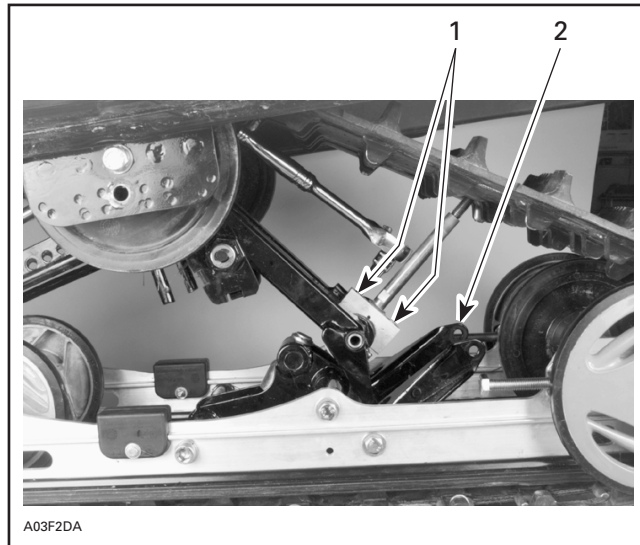
Completely loosen track tension.

Unscrew one rear idler wheel screw.

Pull out rear axle from opposite side of offset inner wheel. Proceed on either sides for models with 4 wheels on rear axle.

At assembly, temporarily loosen rear shackle lower pivot nut and ACM (Acceleration and Control Modulator) support rear bolt.

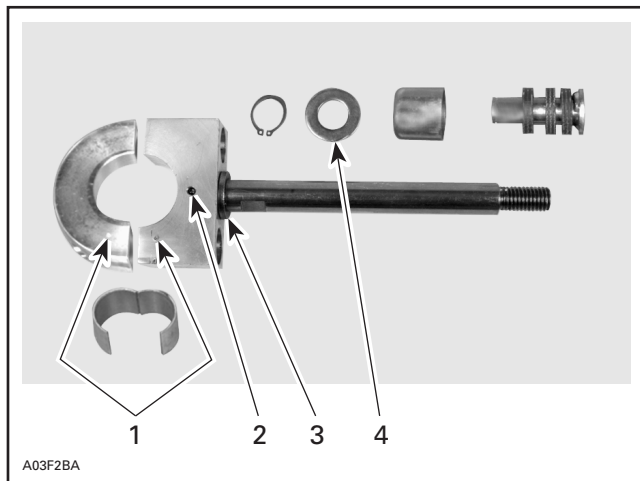
Align spacer hole with adjusting bolt.



A03F2DA

1. Block ass'y Allen screw
2. Schackle

Unscrew block ass'y Allen screws



A03F2BA

1. Marks
2. Roll pin
3. Smaller washer
4. Larger washer

### 23, Cushion

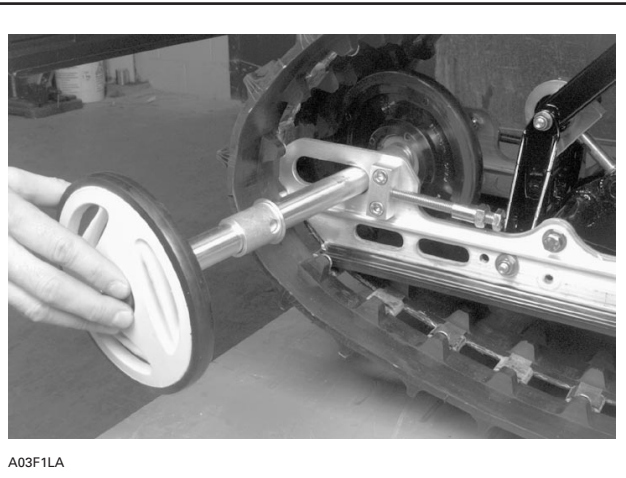
Separate pivot block.

Remove cushion.

Apply lithium grease on cushion at reassembly.

At assembly, match marked side of both pivot blocks.

When cup is disassembled, it may be too difficult to install circlip before reinstalling this assembly. Install all parts and the circlip loosely around threaded rod. Compress rear of vehicle or lift the front to easily install circlip in its groove.



A03F1LA

TYPICAL

### SC-10 HP and XC

### 22, Threaded Rod

**NOTE:** Do not disassemble threaded rod ass'y needlessly.

Lift rear of vehicle.

Unhook rear springs.

Unscrew threaded rod nut.

Remove through bolt from shackle.

Swing shackle rearward.

Collapse suspension in order to disengage threaded rod from its support.

**25, ACM Support**

Remove threaded rod ass'y. Loosen rear axle screw on one side and rear shackle screws.

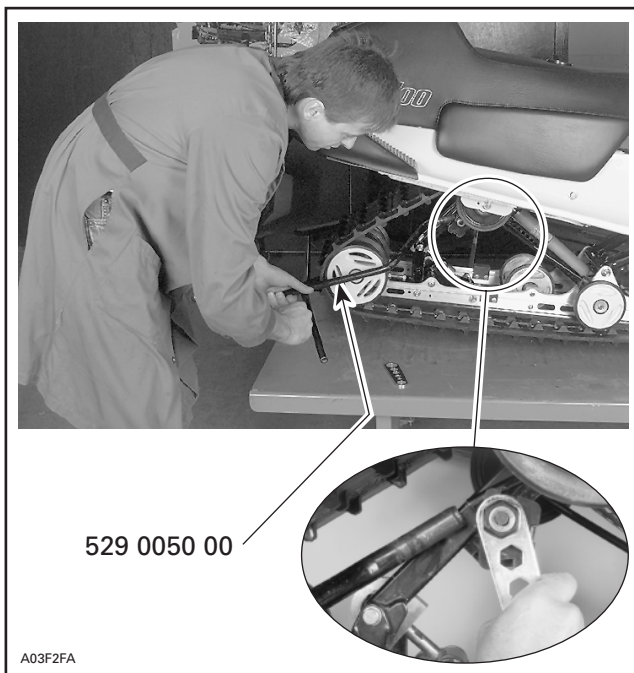
Unbolt MCA support and remove it.

Remove cup.

**15, Rear Shock**

Lift rear of vehicle.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 0050 00), remove left spring from adjusting cam.



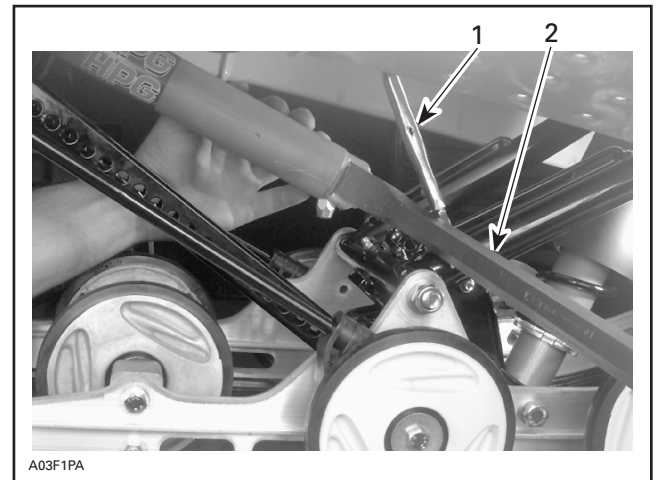
Remove nut on top end of shock.

Remove nut on bottom end of shock. Pry up shock bottom end to ease removing bolt (gas shock only). See installation illustration below.

Installation is reverse of removal procedure. To easily compress gas shock absorber, use a pry bar and locking pliers as a stopper.

**▼ CAUTION**

Take care not to damage grease fitting.



1. Locking pliers
2. Pry bar

**All Models****12, Front Shock**

Unfasten one end of stopper strap.

Unbolt shock and remove it.

**MX Z 440 Only**

At installation, Schrader valve must face rearward and rubber boot opening forward.

**All Models****2, Rear Spring**

Remove spring ends from adjusting cams.

Unbolt rear arm top axle from chassis.

**All Liquid Cooled Models**

Unscrew set screws from locking ring at each end of top axle.

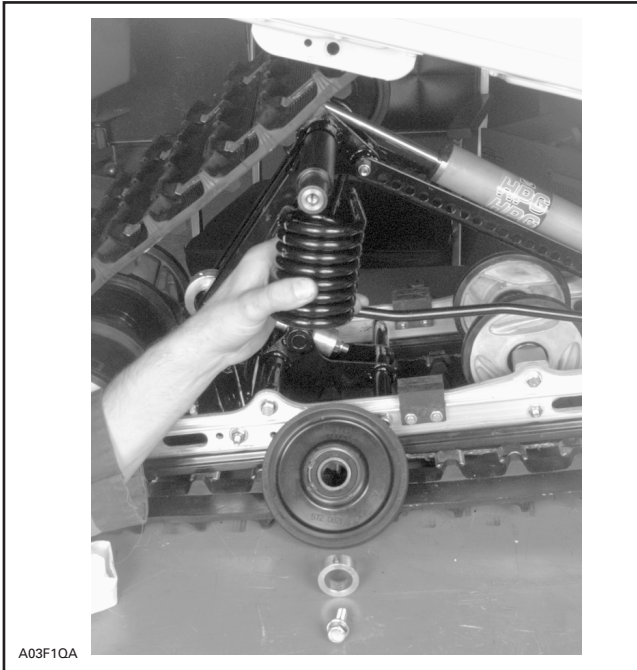
**All Models**

Remove locking rings (spacers on fan cooled models) and top idler wheels.

Remove springs.

## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))



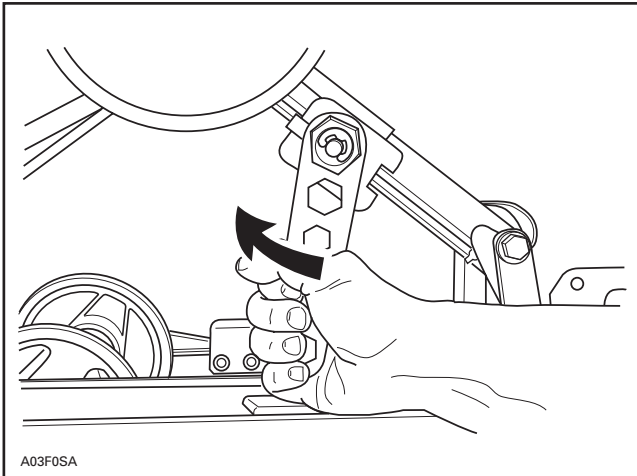
TYPICAL

At reassembly, wheel circlip must face outward.

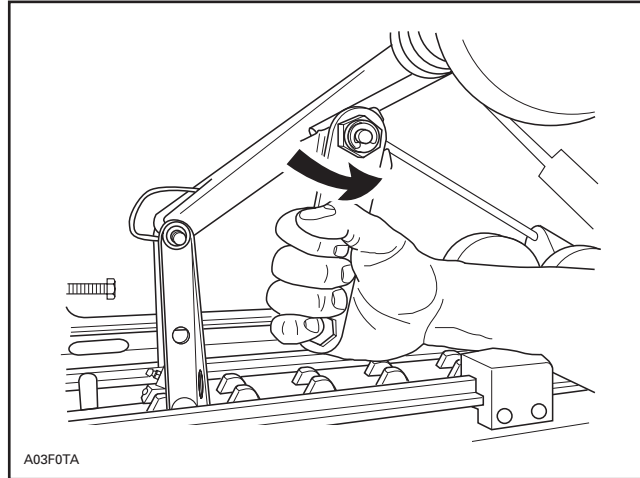
## REMOVAL

### 19, Cam

Decrease spring preload by turning LH cam clockwise and RH cam counterclockwise.



LH SIDE SHOWN



RH SIDE SHOWN

Lift rear of vehicle and support it off the ground.  
Loosen track tension.

### 7, Screw

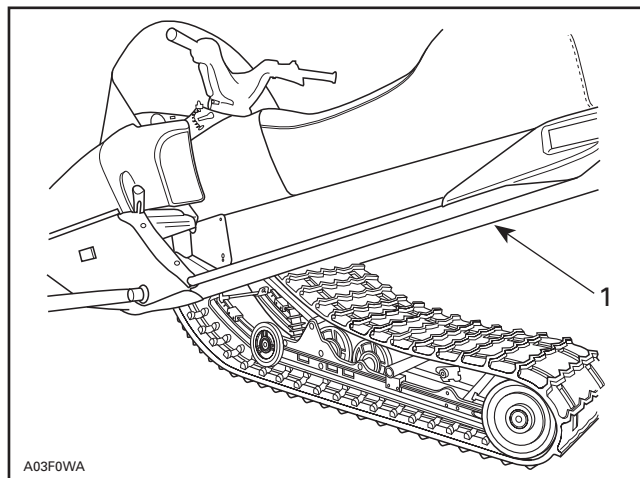
Unscrew rear arm top axle from chassis.

**NOTE:** To prevent axle from turning when unscrewing screws assembled with threadlocker, proceed as follows:

- Knock on screw head and/or heat to break threadlocker bond.
- Loosen one screw then retighten.
- Remove the opposite screw.
- Remove the first one.

Unscrew center idler wheel axle from tunnel then remove.

Lift rear of vehicle at least 1 m (3 ft).



1. At least 1 m (3 ft)

## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

#### 6, Screw

Remove both screws retaining front arm to tunnel.

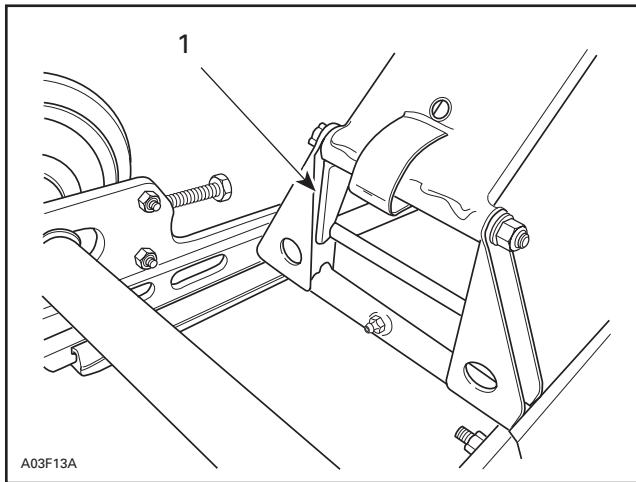
Remove suspension.

### DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to TRACK 06-05.

#### 1, Rear Arm

At installation, rear arm stroke limiter must be on rear side.



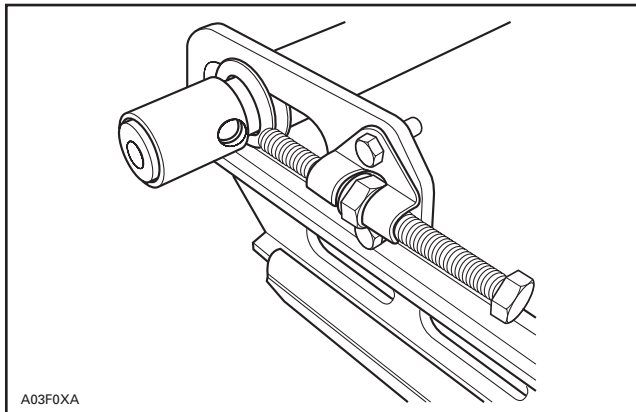
1. Stroke limiter on rear side

#### 8,9, Pivot Arm and Flat Washer

At installation pivot arm grease fitting must face rearward.

#### 10, Outer Bushing

At installation, hole must face adjustment screw.



#### 11, Axle

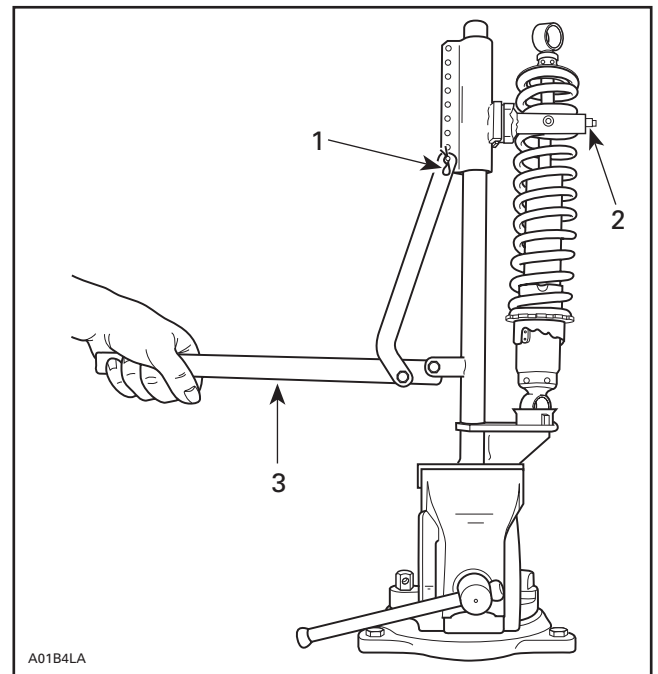
Note position of axles at disassembly. Axles with a paint stripe serve as idler wheel axles. These are more precise than those used as pivot axles. Idler wheel axles can be used as pivot axles but the opposite is not true.

#### 12,13,14, Front Shock, Spring Stopper and Cap

Use shock spring remover (P/N 529 0271 00) in a vise. Mount shock in it and turn shock so that spring coils matched spring compressor.

Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

Push down on handle until it locks. Remove spring stopper and cap then release handle.

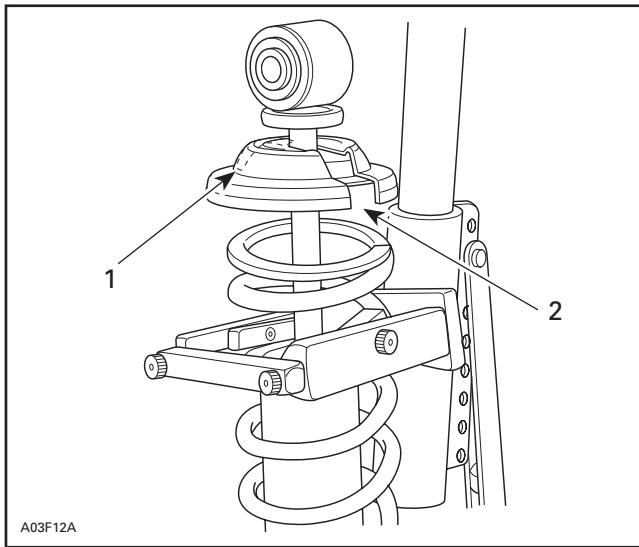


1. Clevis pin
2. Bar
3. Handle horizontal

At installation, cap opening must be 180° from spring stopper opening.

## Section 06 REAR SUSPENSION

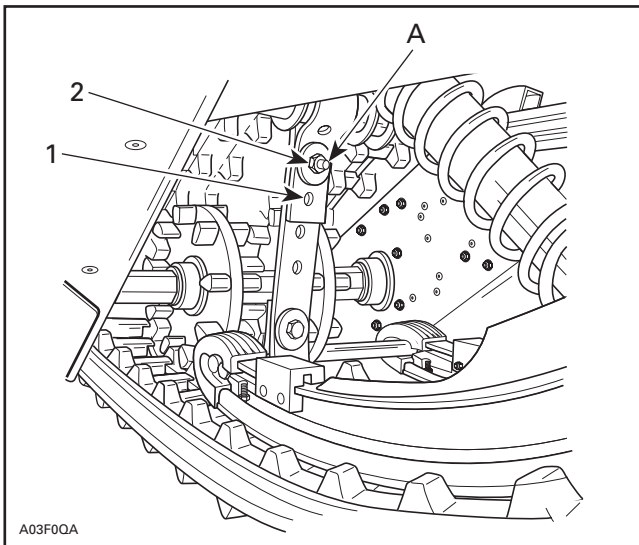
### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))



1. Cap opening
2. Spring stopper opening

#### 20, Stopper Strap

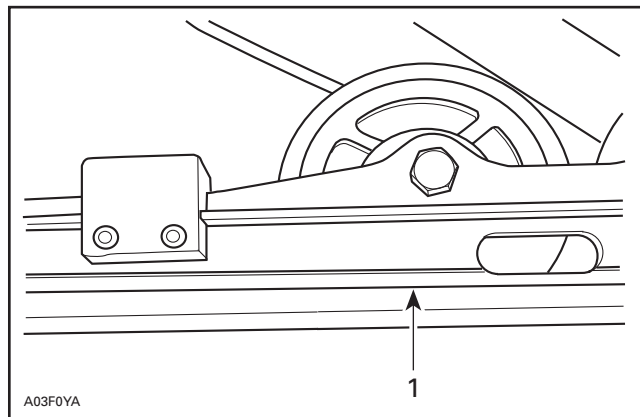
Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through proper hole from the end. Refer to TECHNICAL DATA 09-03. Torque nut to 11 N•m (97 lbf•in).



1. 1<sup>st</sup> hole
2. 2<sup>nd</sup> hole
- A. 11 N•m (97 lbf•in)

#### 17, Slider Shoe

Replace slider shoes when it is worn to the line.



1. Wear limit line

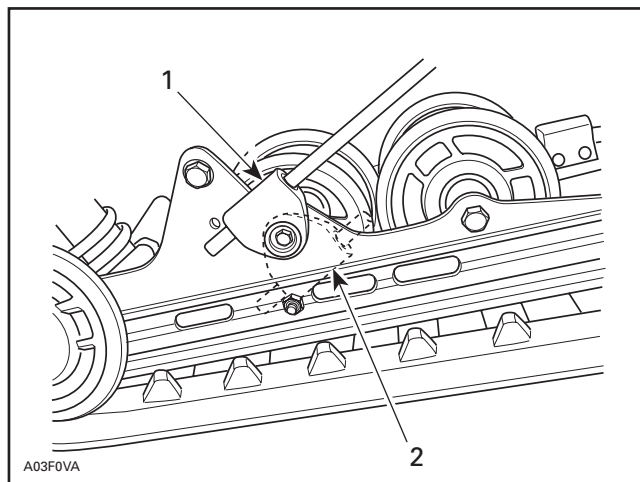
### ▼ CAUTION

Slider shoes must always be replaced in pairs.

#### 18, Spring Support

### ▼ CAUTION

To avoid track damage, spring supports must be mounted upward.



RIGHT SIDE SHOWN

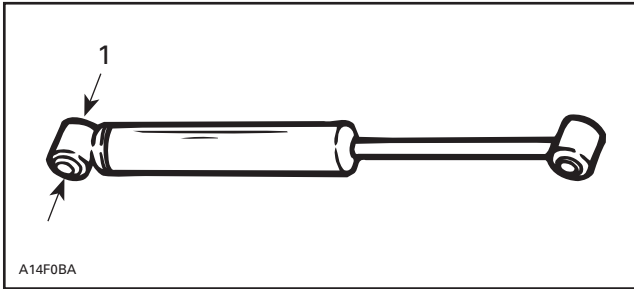
1. Right position: upward
2. Wrong position

## SHOCK ABSORBER INSPECTION

**All Models Equipped with Hydraulic Shock**

○ NOTE: Hydraulic shocks are black or dark gray painted.

Secure the shock body end in a vise with its rod upward.



1. Clamp

**▼ CAUTION**

Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

Pay attention to the following conditions that will denote a defective shock:

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

**All Models Equipped with Gas Pressurized Shock**

**NOTE:** Gas pressurized shocks are light gray painted.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. Renew as required.

If suspecting an internal gas leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward.

Let it stand for 5 minutes.

Completely push down the shock rod then release.

Rod must come out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

If suspecting a frozen gas shock proceed as follows:

Place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance, compare to a new shock. If shock is frozen it will be much more difficult to compress than for the new one.

**SHOCK ABSORBER SERVICING**

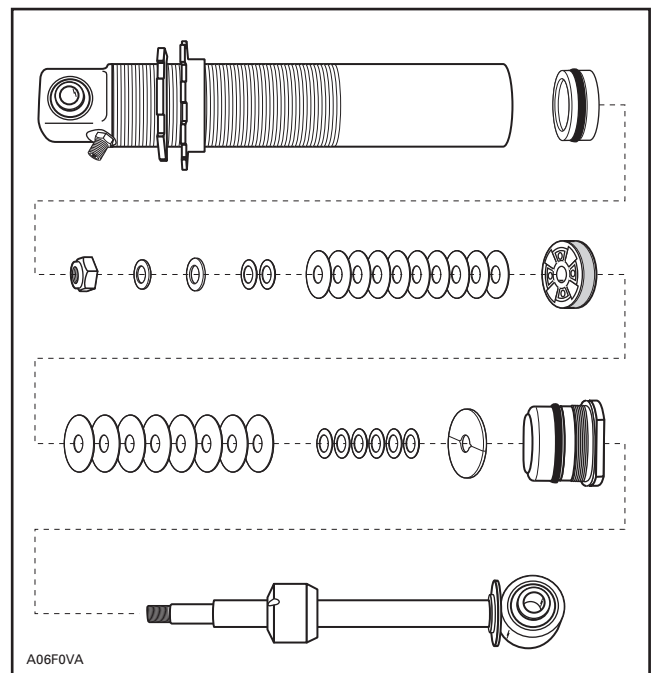
**HPG, T/A (Take Apart) Shock Servicing**

**MX Z 440 Only**

This damper is completely rebuildable. It offers the options of replacing valves or revalving and/or the option of replacing seals (should it be needed).

Although the adjustments are internal, rather than external as in the MVA, the rider is able to select the exact damping adjustment required for his/her riding style.

Bombardier offers 2 valving adjustment options through normal parts channels. A standard setting with each damper (either from parts or on the snowmobile) and a cross country setting, which will offer a stiffer or harder ride for high speed riding or racing.



## Section 06 REAR SUSPENSION

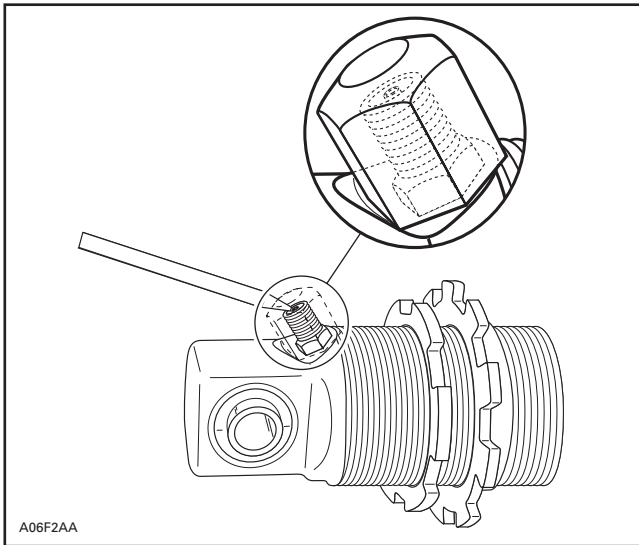
### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

#### Disassembly and Assembly

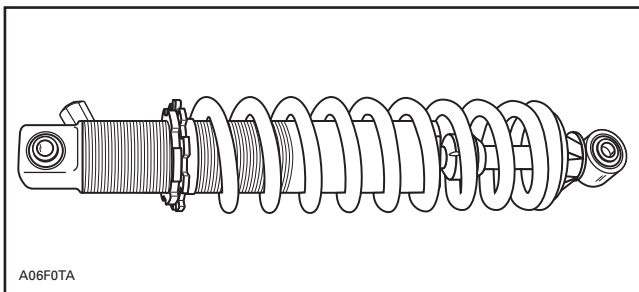
Release N<sub>2</sub> (nitrogen) pressure from the damper Schrader valve.

#### ◆ WARNING

Nitrogen gas is under extreme pressure. Use caution when releasing this gas volume. Protective eye wear should be used.



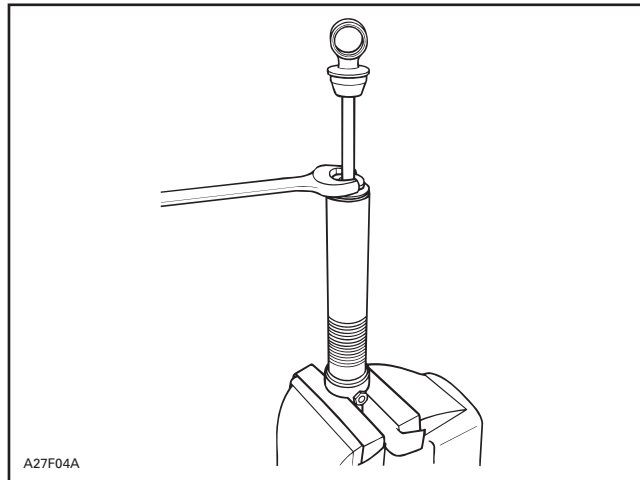
Use tools (P/N 861 7439 00) to remove damper spring by unthreading spring pre-load rings, then removing spring retainer.



TYPICAL

Holding damper assembly in bench vise, unthread seal assembly from damper body using a 32 mm (1.25 in) spanner wrench. This assembly uses a right hand thread.

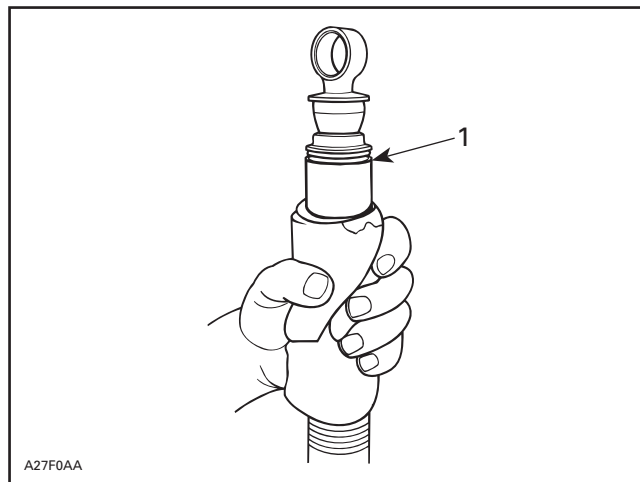
○ NOTE: Before unscrewing pre-load rings, mark position for reinstallation. For factory adjustment refer to the end of this section.



TYPICAL

With the seal assembly removed, slowly lift and remove damper rod assembly from the damper body.

○ NOTE: Remove damper rod assembly slowly to reduce oil spillage and prevent piston seal damage by damper body threads. Wrap the damper body with a shop cloth to capture possible overflow oil while removing the damper piston.



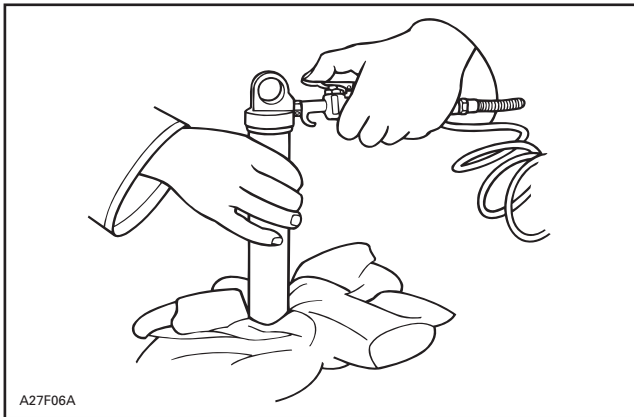
1. Oil flows

Discard old oil into storage container. Never reuse damper oil during shock rebuild.

Remove Schrader valve core. Using compressed air pressure, carefully remove floating piston from damper body. Hold shop cloth over damper body opening to catch released floating piston. Allow room for floating piston to leave damper body.

## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))



A27F06A

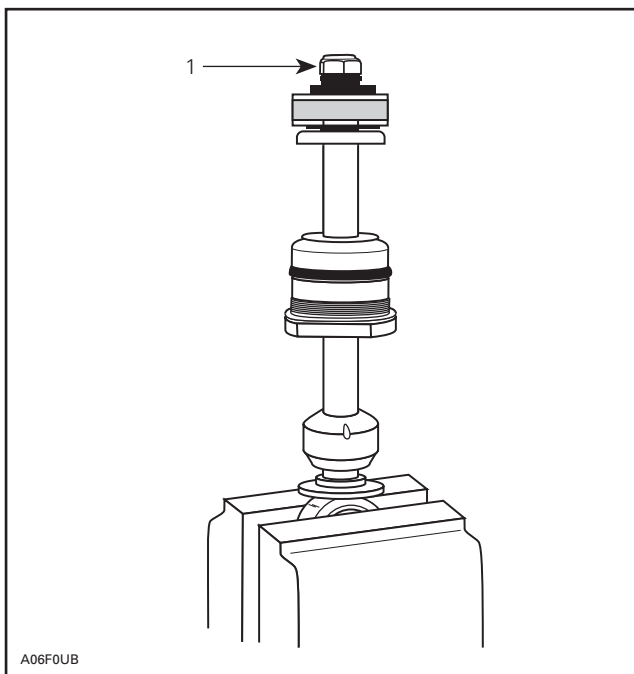
TYPICAL

### ◆ WARNING

Whenever using compressed air, use an O.S.H.A. approved air gun and wear protective eye wear.

Thoroughly clean, with a typical cleaning solution, and blow dry using low pressure air. Carefully inspect the damper body for any imperfections or signs of wear in the damper bore. Replace damper body if wear is identified.

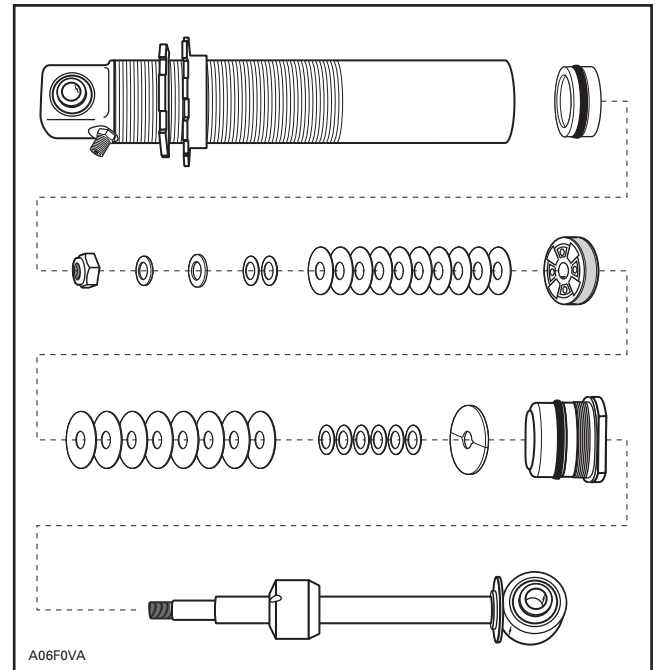
Holding the damper rod assembly in a bench vise, begin piston and valve removal.



A06F0UB

1. Damper shaft nut torque 11-13 N•m (96-108 lbf•in)

Always arrange parts removed in the sequence of disassembly.



A06F0VA

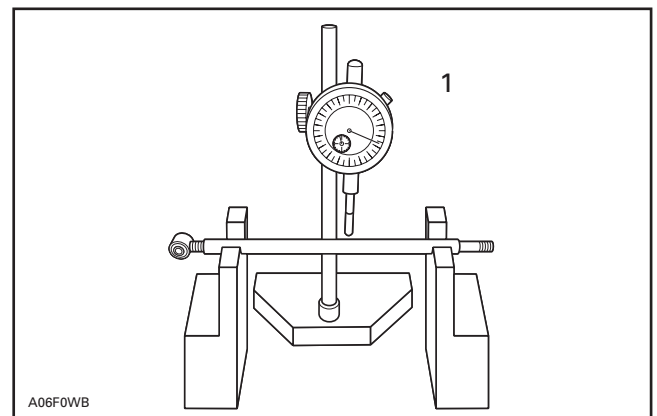
○ **NOTE:** As a general rule we suggest replacing the damper rod lock-nut after 4 rebuilds to ensure good locking friction.

○ **NOTE:** If revalving is to be done, it is imperative that you identify the original shim pack (size and number of shims). The seal carrier need not be removed if only revalving is to be done.

Shims can be measured by using a vernier caliper or a micrometer.

The damper rod is constructed of a plated shaft design. This damper shaft must be inspected for any visible wear on the surface of the damper rod.

Another check that must be completed if damper seal leakage has been noticed, is damper rod "run-out". This damper rod must not exceed .025 mm (.001 in).



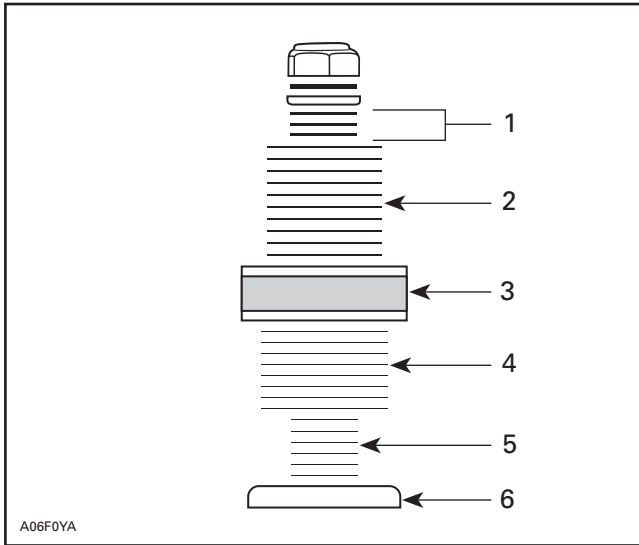
A06F0WB

1. Maximum deflection 0.025 mm (.001 in)



## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))



**NOTE:** The following reference numbers are referring to above illustration.

After the new or replacement shim pack has been selected, reassemble in the reverse order of disassembly. Torque piston nut **no. 1** to 11-13 N•m (96-108 lbf•in).

### ▼ CAUTION

The damper rod nut **no. 1** can only be reused 4 times, then, must be replaced. Do not substitute this part for non — O.E.M.

Washer (s) **no. 2** are used as required to allow adequate threads for damper rod nut.

Install valve stopper **no. 3** with its round edge down.

**NOTE:** Rebound shim stack **no. 4** must not reach into threads of damper shaft. Washer **no. 2** under damper shaft nut is used to prevent damper shaft nut from bottoming on shock rod shoulder.

Rebound damping options from Bombardier include a x-country kit.

### Rebound

Approximately 0.203 mm (.008 in) clearance **no. 4** must be allowed between shim stack **no. 5** and valve stopper **no. 3**.

Whenever tuning for more rebound damping always use 26 mm (1.02 in) shims against piston to properly close piston orifice holes. More thin shims will offer less damping than a few thick shims of the same overall thickness.

Tuning for less damping it is important to remember, never use less than 3 × 26 mm (1.02 in) shims against piston. This will guard against fatigue breakage.

Piston **no. 6** options include 4 pistons, 0, 2, 4, 6, slits for rebound damping bleeds. These bleed slits will offer a damping variation to the function of the shims.

### Compression

Whenever tuning for more compression damping always use 30 mm (1.18 in) shims **no. 7** against piston to properly close piston orifice holes. Two thin shims will offer less damping than one thick shims of the equal thickness.

Tuning for less damping it is important to remember, never use less than 3 shims against piston. This will guard against fatigue breakage.

One 0.114 mm spacer washers **no. 8** minimum (2 or more recommended) should always be used between shim stack and valve stopper washer. This will allow needed room for the valve shims to function.

Compression valve stop **no. 9** must have slots facing shim stack.

### General Information

Over damping is a common error by suspension tuners. When operating an over-damped snowmobile, you will experience a packing of the suspension. The over-damping will not allow the suspension to recycle to full extension after an obstacle compresses the suspension. This situation will eventually bottom the suspension (pack up) and not allow it to cycle properly.

Under damping can result in insufficient or uncontrolled damping. This condition would allow the damper to move freely (unrestricted) in both directions. The most noticeable symptom will be a bouncing of the snowmobile when encountering bumps.

**NOTE:** Careful inspection of the damping shims should be completed. Any bent shims must be replaced to insure redamping (valving) will be in perfect order.

Under damping symptoms can be mistaken for an aerated shock due to low gas pressure. Although it is exceptional, the gas pressure should be checked.

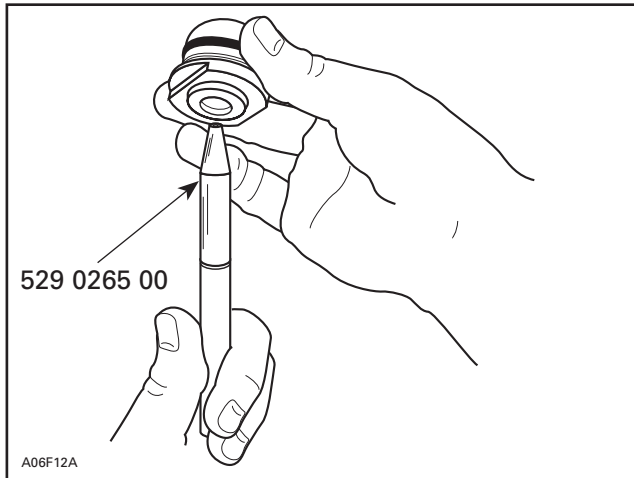
## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

If the seal carrier assembly is replaced, use seal pilot (P/N 529 0265 00) to guide seal over damper shaft. Lubricate seal carrier guide pilot before use.

<b>CAUTION</b>
<b>Failure to use seal pilot will result in seal damage.</b>

Reassemble damper rod assembly, using care to properly assemble shim packs as required for your damping needs.



SHIM EQUIVALENCE FOR SAME DIAMETER			
THICKNESS mm	SHIM QUANTITY		
0.114	11	5.6	2.4
0.152	4.7	2.4	1
0.203	2	1	
0.254	1		

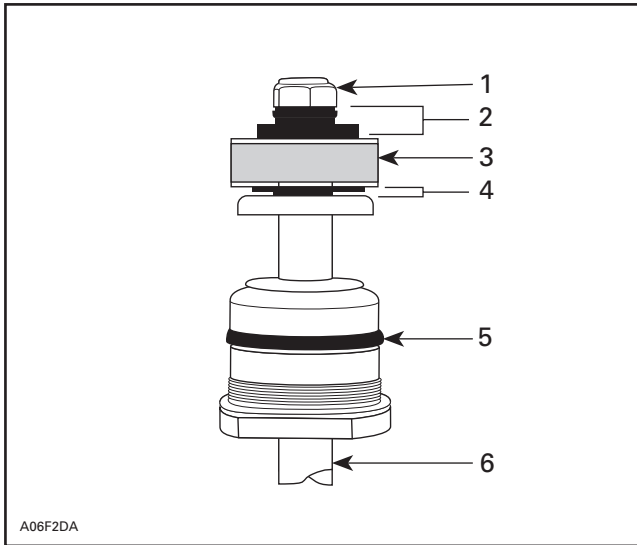
FRONT			
	QTY	D mm (in)	Thick mm (in)
Spacer	1	12 mm (0.472 in)	0.023 mm (0.008 in)
Extension shims	5	26 mm (1.020 in)	0.203 mm (0.008 in)
Piston slit	4		
Compression shims	8	30 mm (1.180 in)	0.152 mm (0.006 in)
Spacer	2	15 mm (0.590)	0.114 mm (0.0045 in)

CENTER			
	QTY	D mm (in)	Thick mm (in)
Spacer	1	12 mm (0.472 in)	0.023 mm (0.008 in)
Extension shims	8	26 mm (1.020 in)	0.152 mm (0.006 in)
Piston slit	4		
Compression shims	10	30 mm (1.180 in)	0.203 mm (0.008 in)
Spacer	3	16 mm (0.630)	0.203 mm (0.008 in)

REAR			
	QTY	D mm (in)	Thick mm (in)
Spacer	1	15 mm (0.590 in)	0.023 mm (0.008 in)
Extension shims	10	26 mm (1.02 in)	0.152 mm (0.006 in)
Piston slit	2		
Compression shims	7	30 mm (1.180 in)	0.203 mm (0.008 in)
Spacer	3	15 mm (0.590)	0.203 mm (0.008 in)

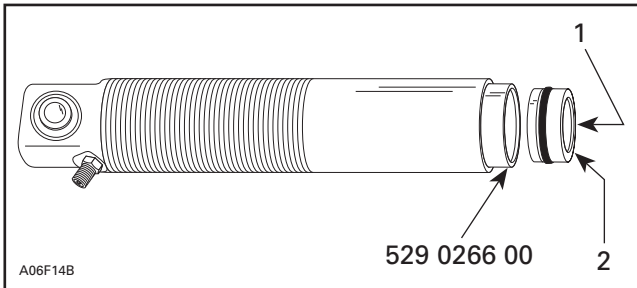
## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))



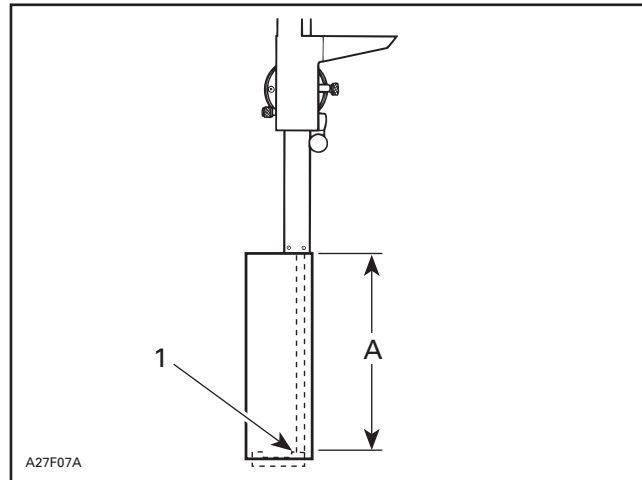
1. Damper nut torqued to 11-13 N•m (96-108 lbf•in)
2. Rebound shim pack
3. Piston
4. Compression shim pack
5. O-ring visual inspection seal carrier assembly
6. Damper rod

Reinstall floating piston into damper body. Use molybdenum disulfide grease (example: molykote GN paste (P/N 413 7037 00)) to ease O-ring past damper body threads with floating piston guide (P/N 529 0266 00).



1. Push (slowly) by hand
2. Hollow side of floating piston must face rod side

○ NOTE: Lubricate inside of piston guide with molykote GN paste (P/N 413 7037 00).



1. Top of the piston
- A. Required distance

Install floating piston to depth of 151 mm (5.94 in) for front damper, 190 mm (7.48 in) for rear damper and 141 mm (5.55 in) for center damper. Measure from the top edge of the damper body.

○ NOTE: If the floating piston is installed too far into the damper body, light air pressure through Schrader valve (with core removed) will move piston outward.

#### ◆ WARNING

Whenever using compressed air exercise extreme caution, cover damper opening with shop cloth to reduce chance of possible injury.

#### ▼ CAUTION

Moisture laden compressed air will contaminate the gas chamber and rust floating piston.

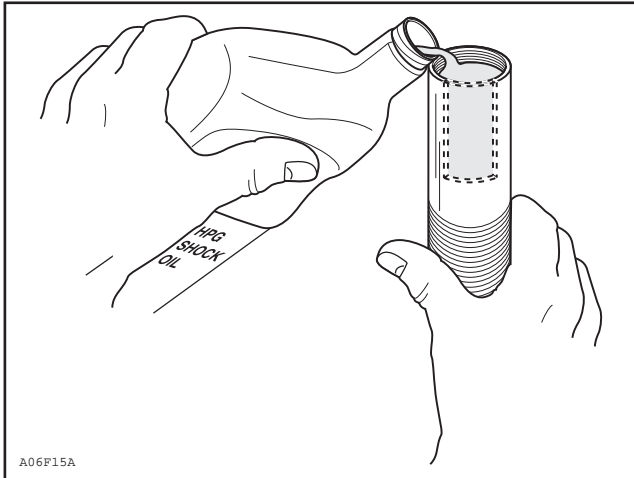
#### ◆ WARNING

Always wear protective eye wear whenever using compressed air.

Replace shock oil with Bombardier HPG shock oil, (P/N 413 7094 00), to approximately 10 mm (.393 in), from the base of seal carrier threads.

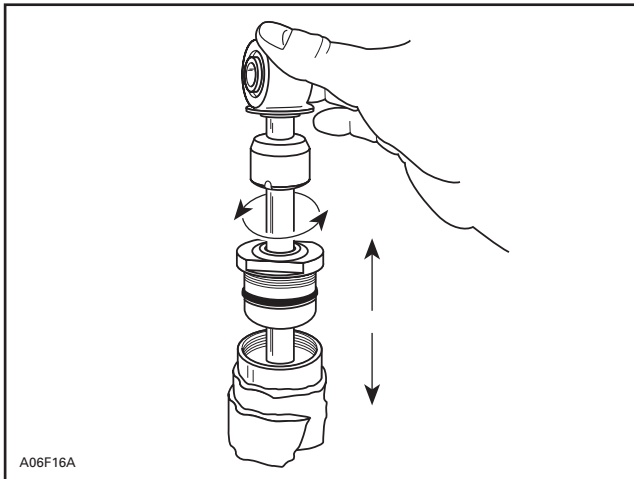
## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))



○ **NOTE:** Reinstall Schrader valve core before next step.

Install damper rod assembly into the damper body. Lightly oil damper piston seal ring with shock oil to ease installation.



Seal carrier should be installed close to piston assembly. Careful inspection of damper oil capacity is required to insure that no air is in damper body during assembly.

○ **NOTE:** Some shock oil will overflow when installing damper for assembly. Wrap damper with shop cloth to catch possible overflow oil.

#### ▼ CAUTION

Use care when passing piston into damper body at damper body threads.

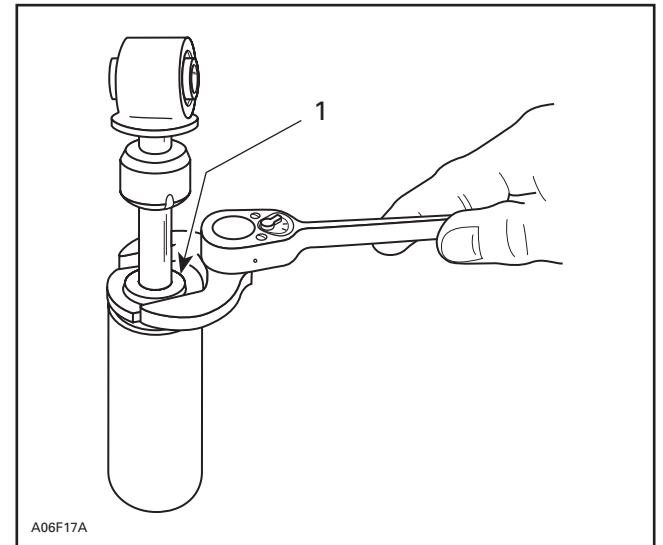
Slight oscillation of damper rod may be required to allow piston to enter damper body bore.

Slowly push piston into damper body. Slight up and down movement may be required to allow all air to pass through piston assembly.

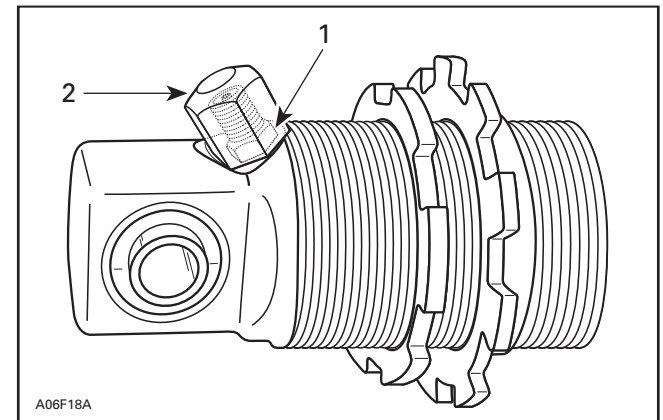
○ **NOTE:** Fast installation of the damper rod may displace the floating piston from its original position. This must not occur if the damper is expected to perform as designed.

With damper rod piston into oil volume, re-top damper oil volume. Oil level should be to damper body thread base.

Seal carrier assembly can now be threaded into damper body. This should be done slowly to allow weepage of shock oil from body while installing.



1. Torque seal carrier to 88-98 N•m (64-72 lbf•ft)



1. Schrader valve 1.5-2 N•m (13-17 lbf•in)  
2. Schrader cap 5-6.5 N•m (44-57 lbf•in)

#### Gas Pressure Adjustment

Nitrogen (N<sub>2</sub>) can now be added to damper body. Reinstall Schrader valve.

## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

Preset your pressure regulator to 2070 kPa (300 PSI) nitrogen (N<sub>2</sub>), this gas pressure will restore the correct pressure for your damper.

#### ▼ CAUTION

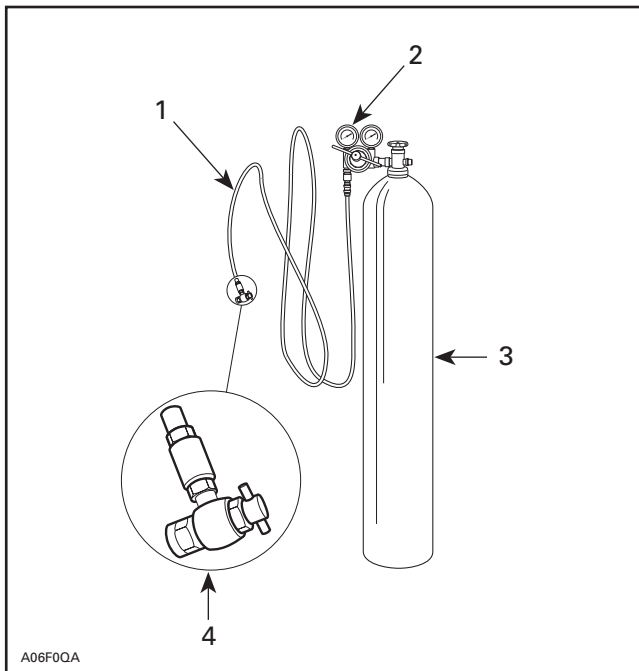
Do not exceed the recommended pressure values.

#### ◆ WARNING

Whenever working with high pressure gas, use eye wear protection. Never direct gas pressure toward anybody.

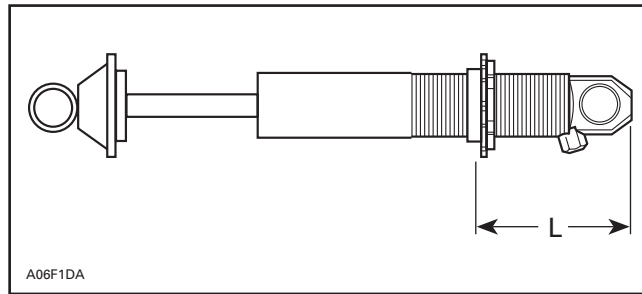
○ **NOTE:** Carefully inspect damper for gas or oil leaks. Any leaks must be corrected before continuing.

Damper gas pressure can be confirmed by using a pressure gauge available through your local industrial gas supplier.



1. Automotive type air pressure hose
2. Two stage regulator, delivery pressure range 2070 KPa (300 PSI)
3. High pressure cylinder filled with industrial grade nitrogen
4. Valve tip

Reinstall damper spring retainer, then your spring. Next, thread the spring pre-load rings up to the spring. Set pre-load according to recommended spring length specifications. Your damper is now ready for reinstallation to your snowmobile.



L: FRONT = 76 mm (3 in)

CENTER = 70 mm (2-3/4 in)

#### Miscellaneous Information

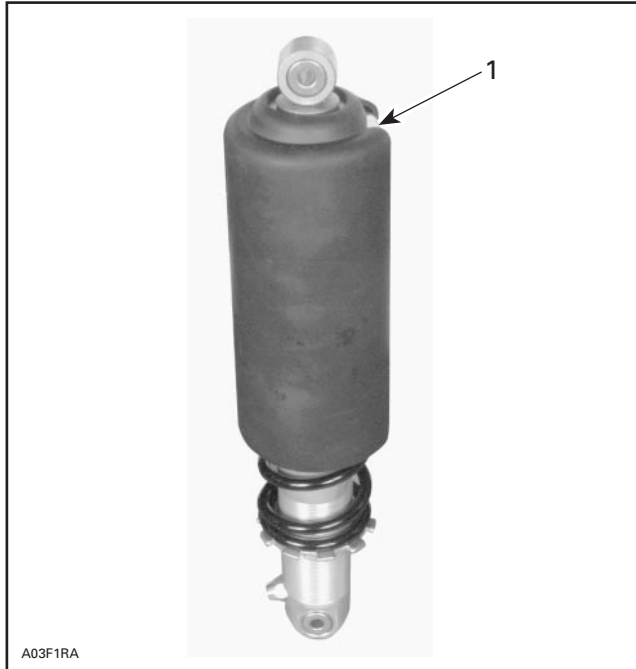
- Never substitute the nitrogen gas fill for another gas product. The nitrogen gas has been selected because of its inert qualities. As well as being a dry gas (moisture free), it will not contaminate the gas chamber portion of the damper.
- When selecting shim stacks, 2 thin shims of equal thickness to one thick shim will offer less resistance than one thick shim. Refer to SHIM EQUIVALENCE FOR SAME DIAMETER table above.
- Whenever building a rebound shim stack, always use 26 mm (1.02 in) diameter shims against the piston. No less than 3 shims should be used in any valve stack to prevent bending or breakage. Approximately .203 mm (.008 in) clearance should be allowed between shim stack and valve stopper washer.
- Whenever building a compression shim stack, always use 30 mm (1.181 in) diameter shims against the piston. No less than 3 shims should be used in any valve stack to prevent bending or breakage. One .114 mm spacer washer minimum (2 or more recommended) should be used between shim stack and valve stopper.

## Section 06 REAR SUSPENSION

### Sub-Section 02 (SC-10 SUSPENSIONS (ALL VERSIONS))

#### 25, Protector

At assembly, mount protector with its notch toward front.



1. Notch

#### INSTALLATION

Install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

Bolt front arm, rear arm then center top idler wheel axle.

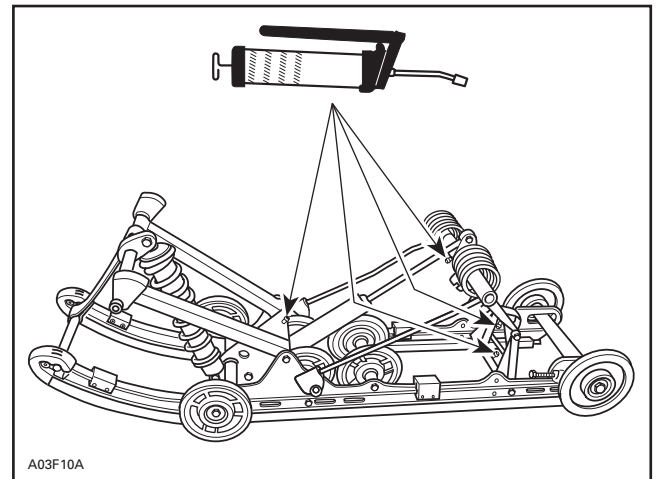
Adjust track tension.

#### RIDE ADJUSTMENT

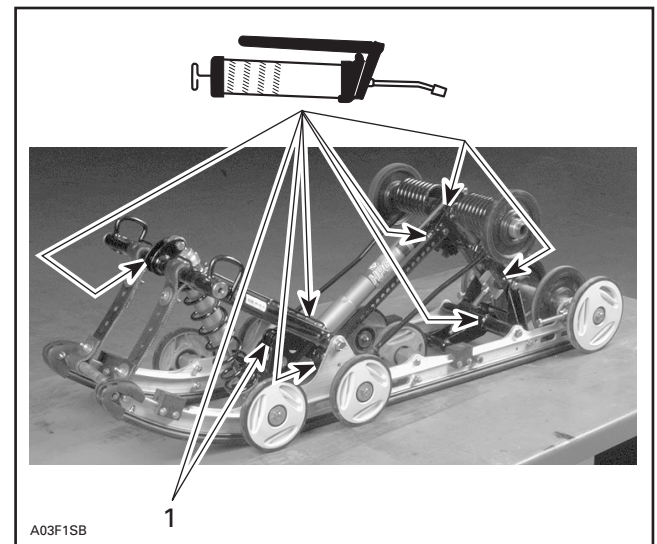
Refer to *Operator's Guide*.

#### LUBRICATION

Lubricate front and rear arms at grease fittings using low temperature grease (P/N 413 7061 00).



SC-10 SPORT, MOUNTAIN AND TOURING: 4 GREASE FITTING

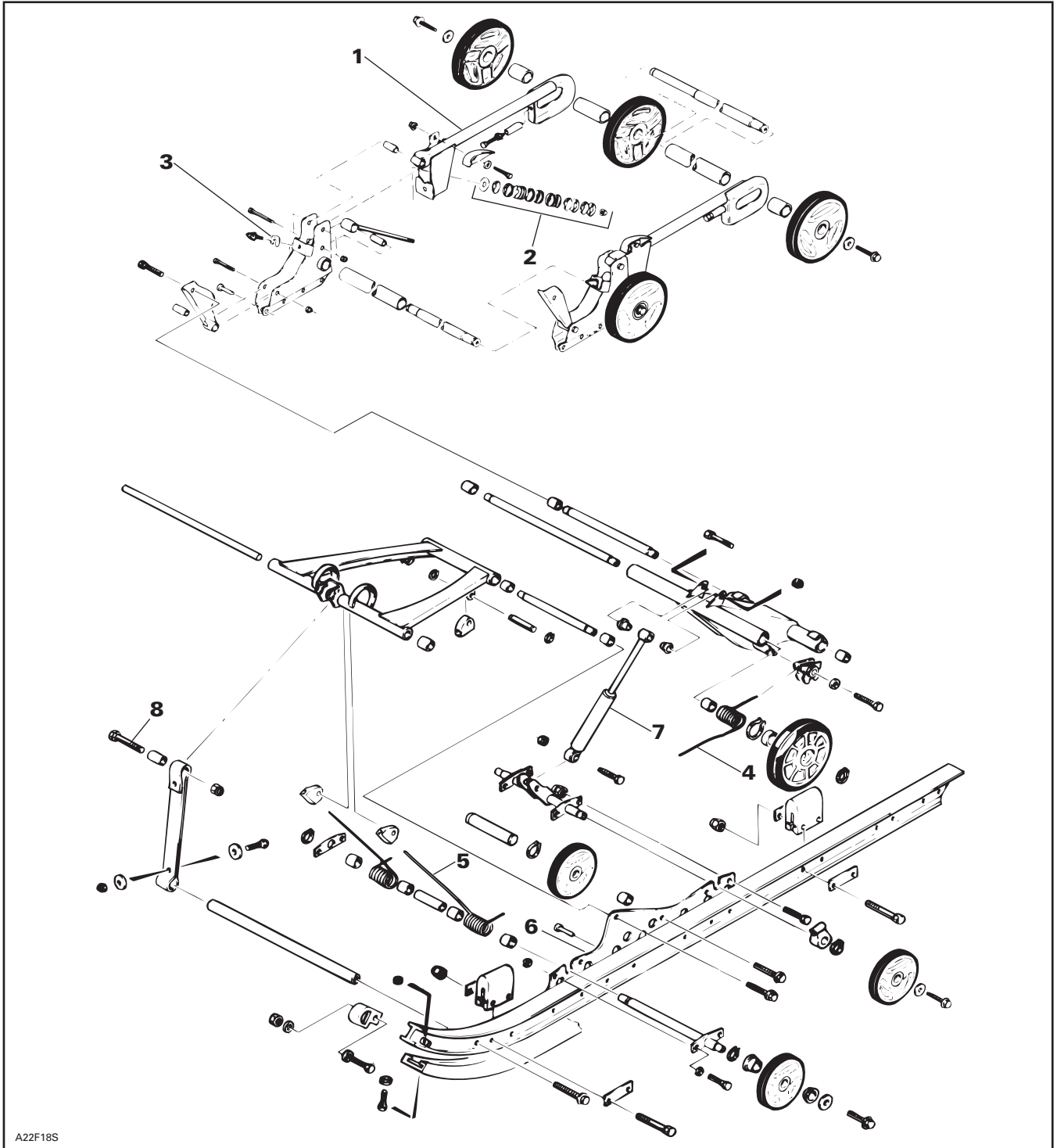


SC-10 XC AND HP: 7 GREASE FITTINGS

1. Only the GT 583 has this 8<sup>th</sup> grease fitting

# SKANDIC WT SUSPENSION

Skandic WT/SWT/WT LC



A22F18S

**Section 06 REAR SUSPENSION**  
**Sub-Section 03 (SKANDIC WT SUSPENSION)**

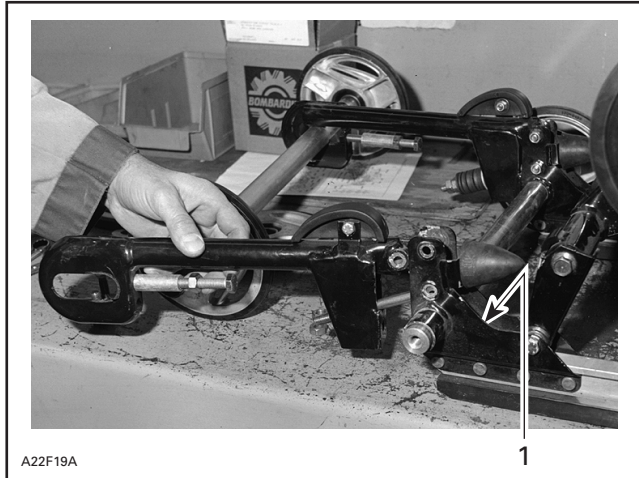
**REMOVAL**

Release track tension.  
 Lift rear of vehicle and support it off the ground.  
 Unbolt front arm then rear arm.

**NOTE:** To prevent cross shaft from turning when unscrewing screws assembled with threadlocker, proceed as follows:

- Knock on screw head to break threadlocker bond.
- Loosen one screw then retighten.
- Remove the opposite screw.
- Remove the first one.

Remove suspension ass'y.

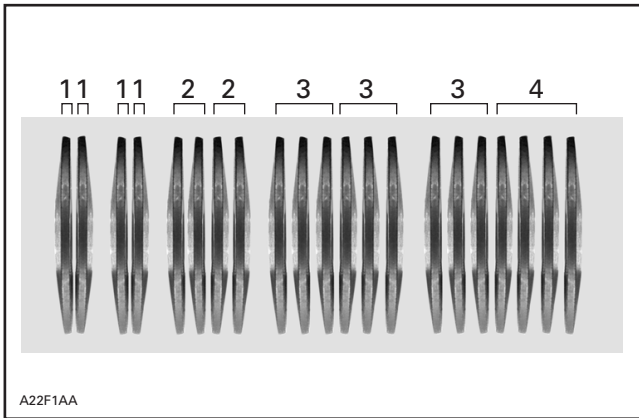


A22F19A

1. Support

**2, Conical Washer**

At installation, position conical washers as shown.



A22F1AA

WASHER QUANTITY AND MOUNTING POSITION



A22F1EA

**DISASSEMBLY AND ASSEMBLY**

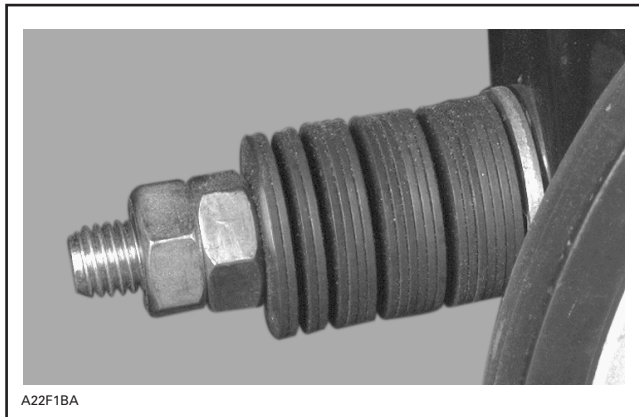
**1, Extension**

Remove nuts and conical washers from the eye bolt adjuster. Remove bolt retaining eye bolt adjuster to support.

Remove rear idler wheel on appropriate side.

Remove idler wheel from support.

Unbolt extension from its support.



A22F1BA



**Section 06 REAR SUSPENSION**  
Sub-Section 03 (SKANDIC WT SUSPENSION)

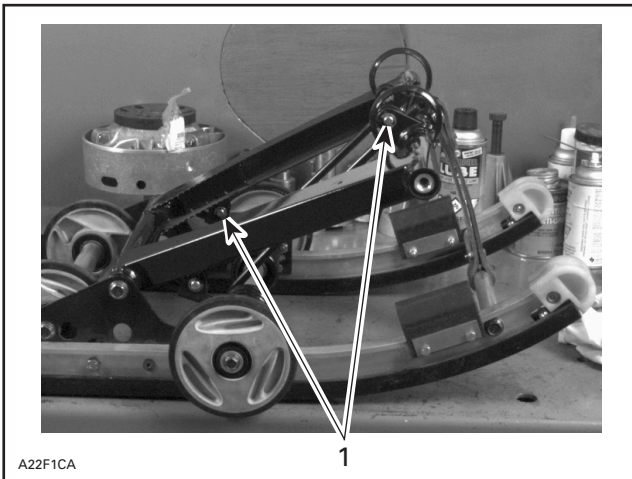
Tighten nut 3/4 turn after contacting washers for better deep snow performance. Maximum pre-load is 3 turns after nut touching washers. This last adjustment is for trail riding with or without a load and for pulling a load.

#### 4, Rear Spring

Remove top idler wheels.  
Unscrew one end of shock.  
Remove spring.

#### 5, Front Spring

Remove circlips retaining spring support to top and bottom of front arm.  
Holding spring end, remove lock pin of top spring support then bottom support lock pin.  
Unbolt front idler wheel axle.  
Remove idler wheel on side where axle retaining plate is not welded.  
Remove springs.



A22F1CA

1. Circlips

#### 6, Support Plate

Drill rivets to remove support plate. Use a 8 mm (21/64 in) drill bit.



A22F1DA

Rivets can be substituted by M8 x 20 bolts and nuts.

#### 8, Stopper Strap Bolt

Install it in center hole of front arm.

#### 3, Horse-Shoe Washer

For deep snow riding, do not install washer nor rubber stoppers.

For trail riding with passenger and/or weight, install 1 washer under each rubber stoppers.

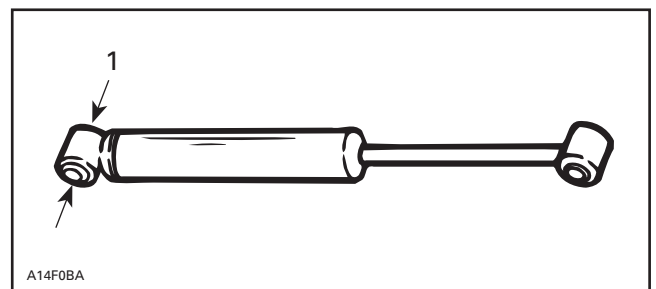
For trail riding with heavy load and/or pulling a load, use 2 washers under each rubber stoppers.

#### 7, Shock

Install shock with its rod upward.

### SHOCK ABSORBER SERVICING

Secure the shock body end in a vise.



A14F0BA

TYPICAL

1. Clamp

---

## **Section 06 REAR SUSPENSION**

### **Sub-Section 03 (SKANDIC WT SUSPENSION)**

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#### **CAUTION**

**Do not clamp directly on shock body.**

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke then check that it moves smoothly and with uniform resistance.

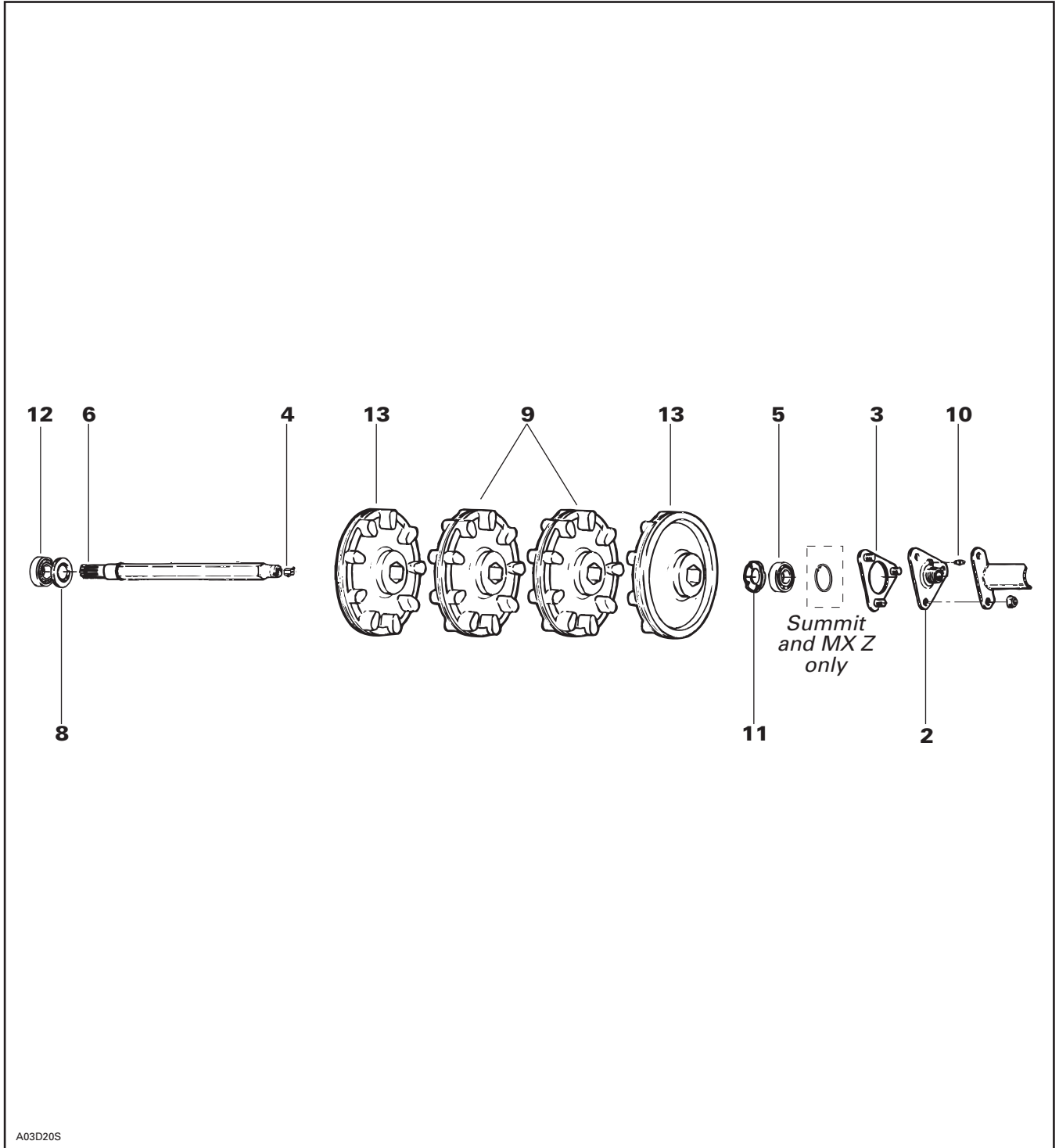
Pay attention to the following conditions that will denote a faulty shock:

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme ends of stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any fault is present.

# DRIVE AXLE

*S-Series*

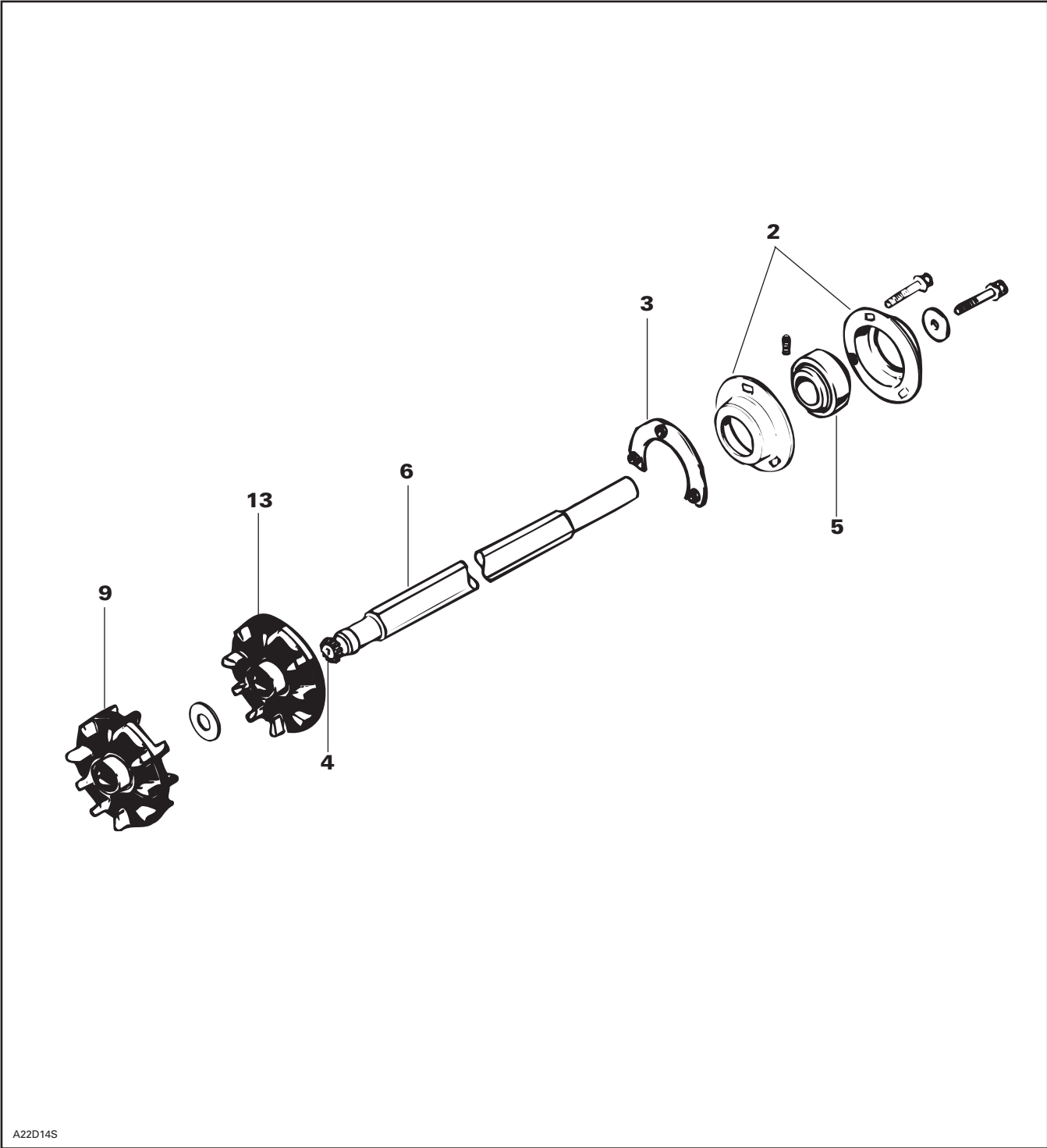


A03D20S

**Section 06 REAR SUSPENSION**

**Sub-Section 04 (DRIVE AXLE)**

**Skandic WT**



A22D14S

## REMOVAL

### **All Models Except Skandic WT/SWT/WT LC**

Drain oil from chaincase or gearbox. Release drive chain tension. Remove chaincase cover.

Raise and block rear of vehicle off the ground.

Remove suspension. Refer to SC-10 SUSPENSION 06-02.

### **2,8, End Bearing Housing and Seal**

Remove angle drive unit and coupling cable. On Summit and MX Z, remove circlip from drive axle.

Remove chain and sprocket then circlip and bearing from drive axle.

Pry oil seals from chaincase and end bearing housing.

### **6,9,13, Drive Axle and Sprocket**

Release drive axle sprocket from track and at the same time, pulling the drive axle towards the end bearing housing side.

Remove drive axle from vehicle.

### **Skandic WT/SWT/WT LC Only**

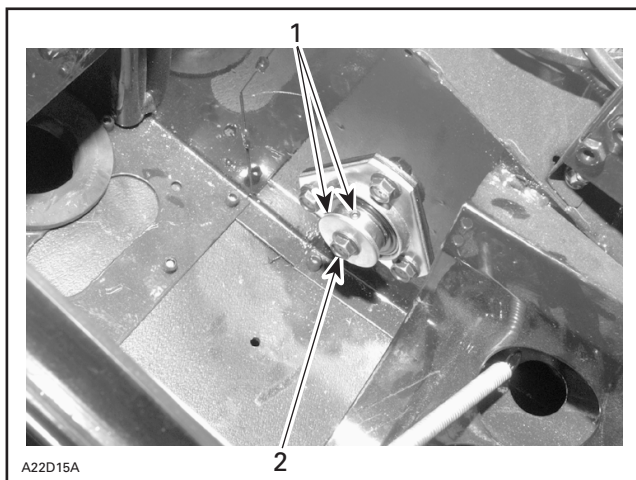
Drain gearbox.

Raise and block rear of vehicle off the ground.

Remove suspension. Refer to SKANDIC WT SUSPENSION 06-03.

Remove muffler. Unfasten screw from drive axle end. Loosen both Allen screws from end bearing.

Remove 3 screws retaining end bearing then remove inner plate.

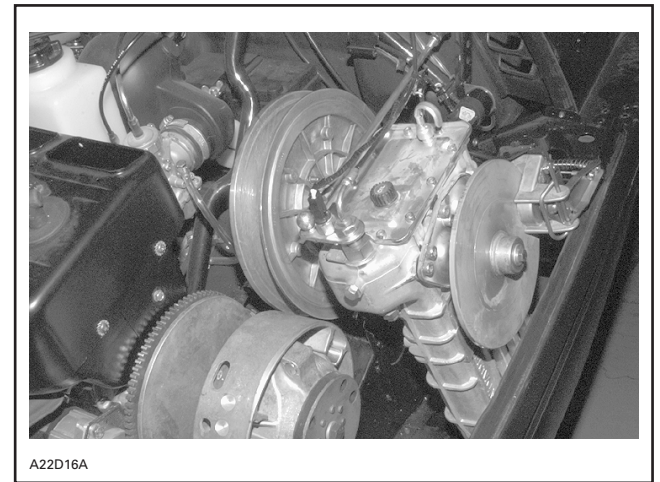


1. Allen screws  
2. Screw

Remove angle drive and square pin from bottom of gearbox.

Remove belt guard and belt.

Loosen gearbox retaining screws then move gearbox sideways. Do not remove brake mechanism nor driven pulley.



Remove drive axle.

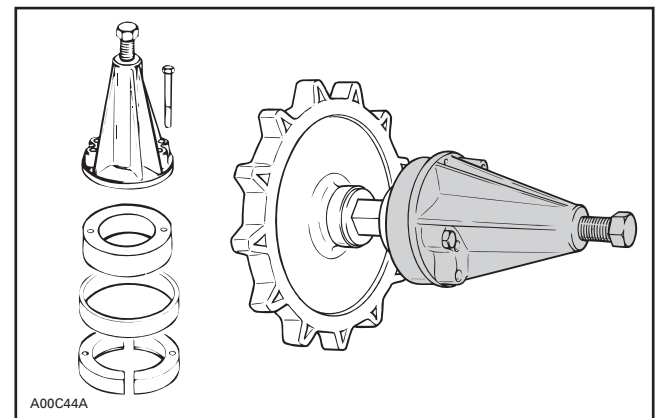
## DISASSEMBLY

### **4, Speedometer Drive Insert**

Remove speedometer drive insert.

### **5,12, Bearing**

To remove bearings, use puller assembly, ring and half rings as illustrated.

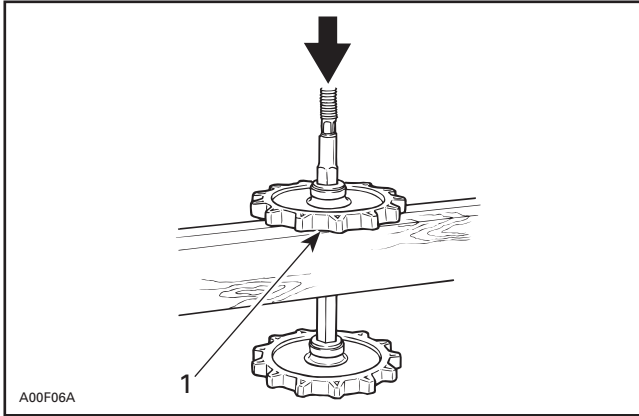


## Section 06 REAR SUSPENSION

### Sub-Section 04 (DRIVE AXLE)

#### 9,13, Sprocket and Half-Sprocket

To remove press fit sprockets, use a press and a suitable support as illustrated.



TYPICAL

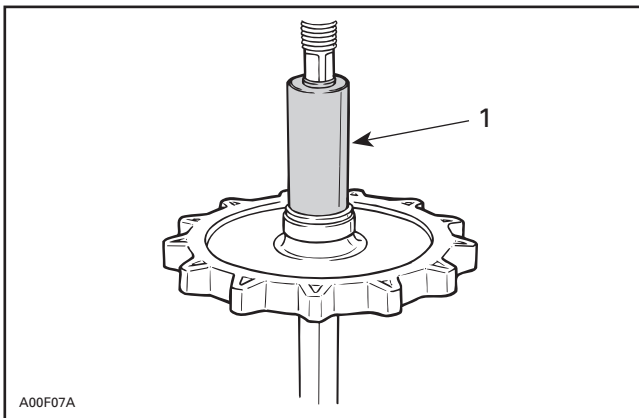
1. Support sprocket near hub

**NOTE:** Two different types of sprocket press fit can be found. Ensure to replace ring reinforced sprockets with the same type.

#### ASSEMBLY

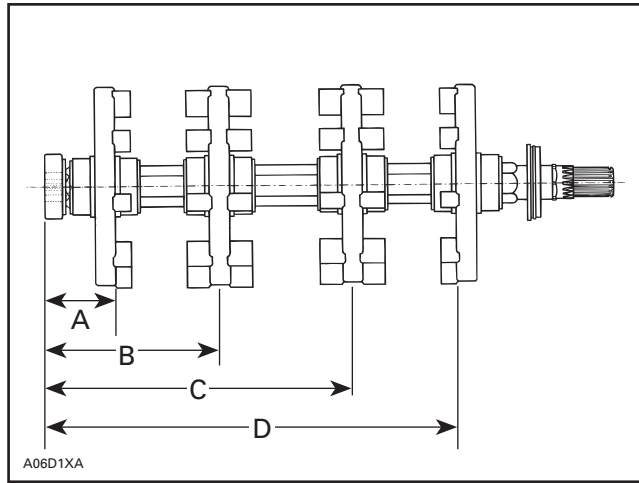
#### 8,9,13, Drive Axle and Sprocket

To assemble press fit sprockets, use a press and a suitable pipe as illustrated. Sprockets must be assembled according to the following dimensions.



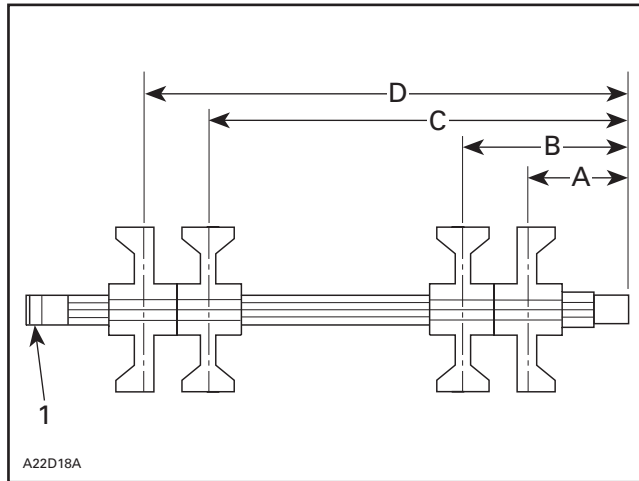
1. Pipe

#### S-Series



- A. 65.8 mm (2-19/32 in)
- B. 159.3 mm (6-17/64 in)
- C. 282.3 mm (11-7/64 in)
- D. 375.8 mm (14-51/64 in)

#### Skandic WT/SWT/WT LC



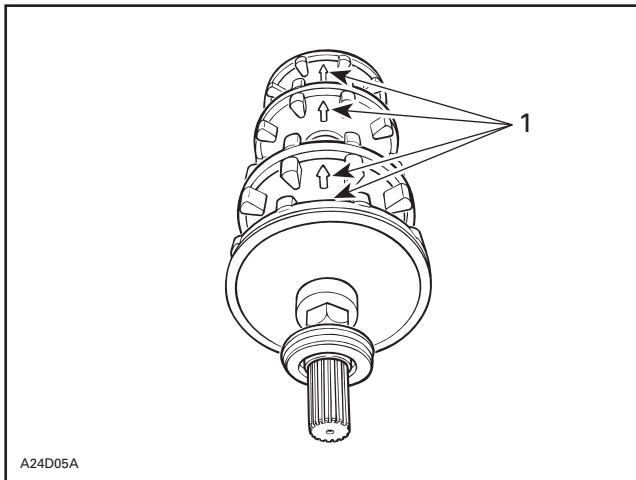
- 1. Gearbox side
- A. 93 mm (3-21/32 in)
- B. 156.5 mm (6-5/32 in)
- C. 398.5 mm (15-11/16 in)
- D. 462 mm (18-3/16 in)

#### All Models

Ensure to align indexing marks of each sprocket when assembling.

## Section 06 REAR SUSPENSION

### Sub-Section 04 (DRIVE AXLE)

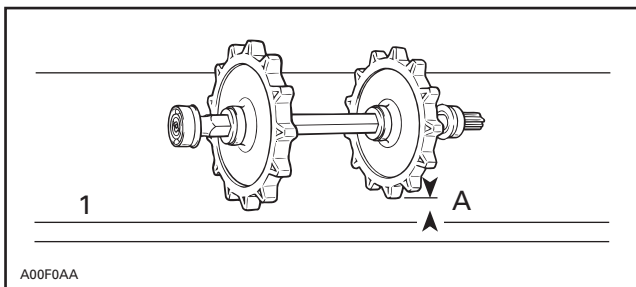


#### TYPICAL

1. Indexing marks aligned

The maximum desynchronization for the sprockets is 1.5 mm (1/16 in).

To check this tolerance, place axle assembly on a plane surface and measure the gap between sprocket tooth and surface.



1. Plane surface

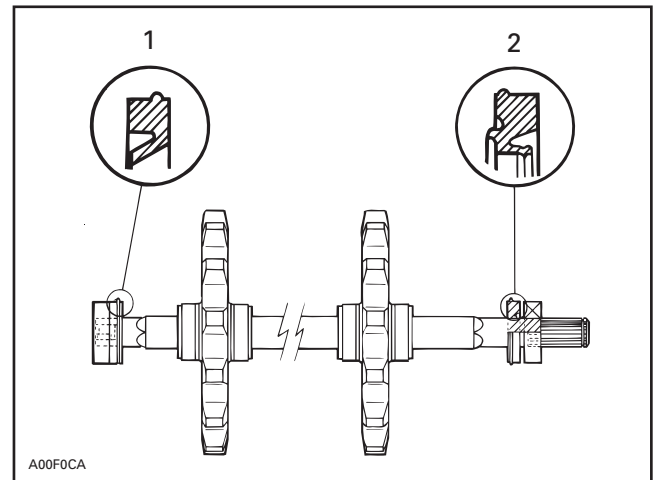
A. 1.5 mm (1/16 in) MAXIMUM

### ▼ CAUTION

The same sprocket must not be pressed twice on the axle. If synchronization is found to be defective, use a new sprocket.

#### 6,8, Drive Axle and Seal

When assembling drive axle, always position a new seal on each end of drive axle (if applicable). Locate seal lip as illustrated.



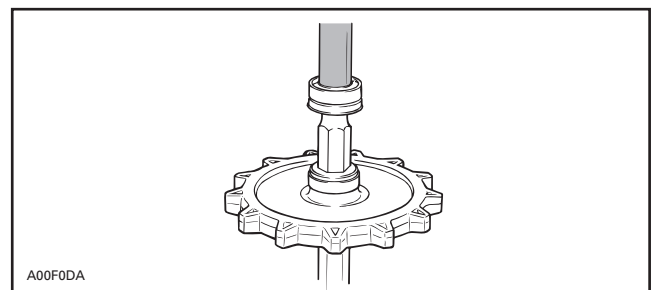
1. Grease seal type
2. Oil seal type

#### 11, Bearing Protector

At assembly, flat side of bearing protector must be against bearing.

#### 5,12, Bearing

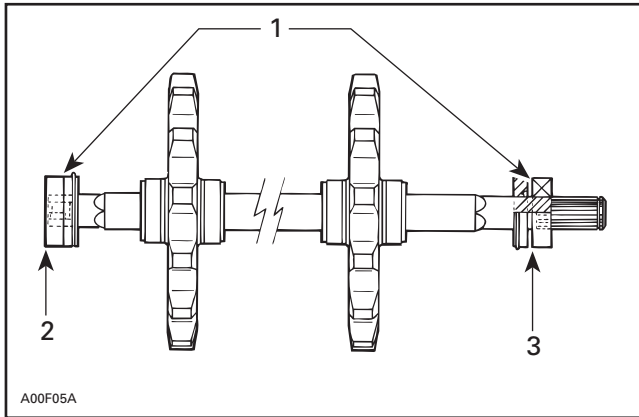
Always push bearing by inner race.



The bearing on the splined side of axle must be pushed until it is seated on shaft shoulder. The end bearing housing bearing must be flush with end of drive axle. Each bearing must have its shield facing the sprocket.

## Section 06 REAR SUSPENSION

### Sub-Section 04 (DRIVE AXLE)



1. Bearing shield on this side
2. Flush with drive axle
3. Seated on shaft shoulder

## AXIAL PLAY

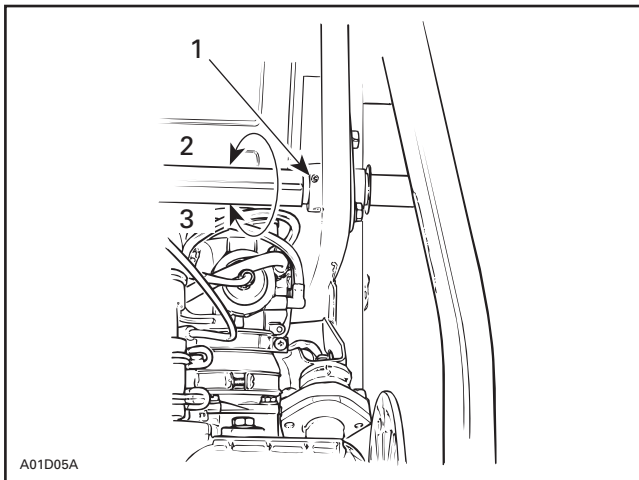
### S-Series

Ensure there is no deformation of the sheet metal around the end bearing housing. Straighten as required.

Before attempting to adjust the drive axle axial play, check the chaincase perpendicularity as follows:

### CHAINCASE PERPENDICULARITY ADJUSTMENT

- Remove driven pulley.
- Slacken bearing collar set screw and working from the driven pulley side, turn bearing collar clockwise.

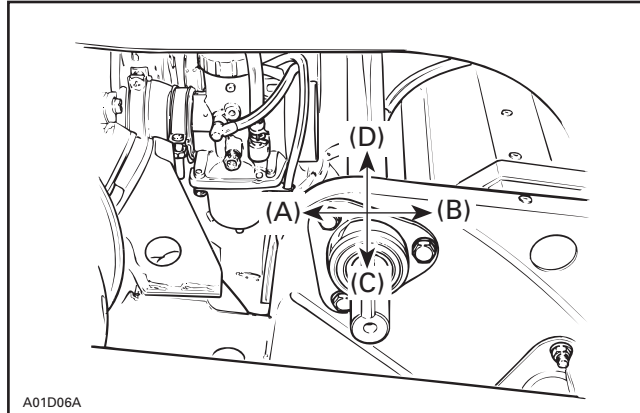


### TYPICAL

1. Set screw
2. Slacken
3. Tighten

- Extract bearing from its support.

Wrong chaincase perpendicularity will make it difficult to correctly install the bearing in its support due to the countershaft and support misalignment.



### TYPICAL

- Add shim(s) (P/N 504 0398 00) between chaincase and frame to obtain easy bearing installation.

## CAUTION

When installing one shim or more between chaincase and frame, secure with 50 mm long screws.

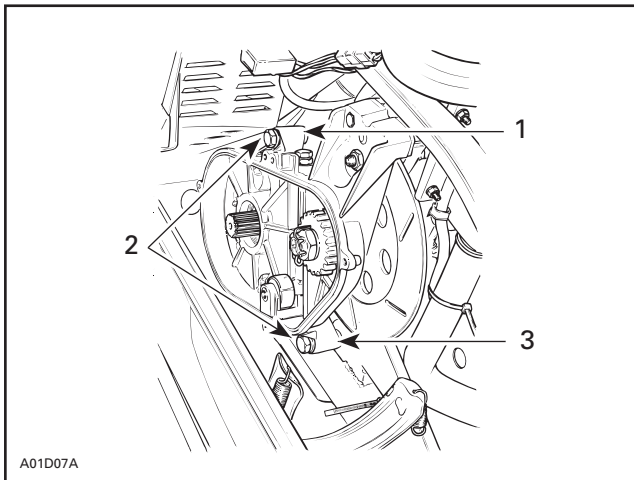
	BEARING POSITION			
	(A) TOWARD FRONT OF VEHICLE	(B) TOWARD REAR OF VEHICLE	(C) TOWARD BOTTOM OF VEHICLE	(D) TOWARD TOP OF VEHICLE
SHIM LOCATION	LOWER	UPPER	UPPER	LOWER

This chart can be use as a "starting point" to correct the chaincase perpendicularity.



## Section 06 REAR SUSPENSION

### Sub-Section 04 (DRIVE AXLE)

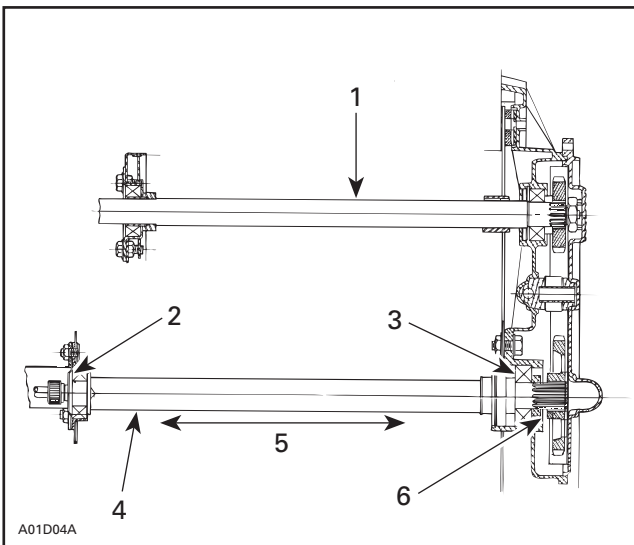


#### TYPICAL

1. Upper shim location
2. 50 mm long screws when installing one shim or more
3. Lower shim location

– Do not reinstall the driven pulley at this time.

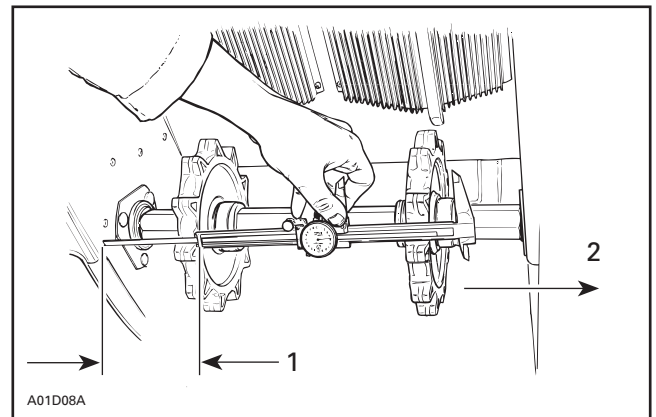
#### AXIAL PLAY ADJUSTMENT



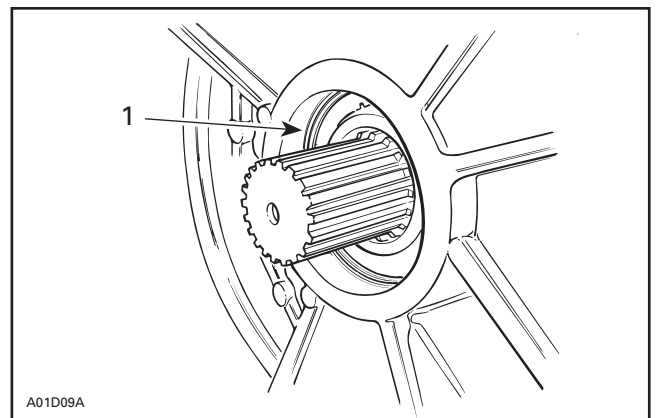
#### TOP VIEW

1. Countershaft
2. Shim position on end bearing housing side
3. Shim position on chaincase side
4. Drive axle
5. Axial play
6. Shim between sprocket and spacer

– Push the drive axle toward chaincase and take note of the distance between the sprocket and tunnel.



1. Distance between sprocket and tunnel
2. Drive axle pushed toward chaincase



1. No gap all around

– Pull drive axle toward the end bearing housing and take note of the measurement between sprocket and tunnel.

The drive axle axial play is the difference between these 2 measurements.

– Repeat this procedure 2 or 3 times to obtain an accurate measurement.

The allowable drive axle axial play is 0 to 1.5 mm (0 to .060 in).

The drive axle axial play, as calculated above, should be within the allowable axial play, add shim(s) accordingly.

– Remove drive axle, install required shim(s) as per the **shim position** chart, reinstall drive axle without the suspension and track.

#### SHIM POSITION

Shim position is important to maintain proper sprocket alignment.

## Section 06 REAR SUSPENSION

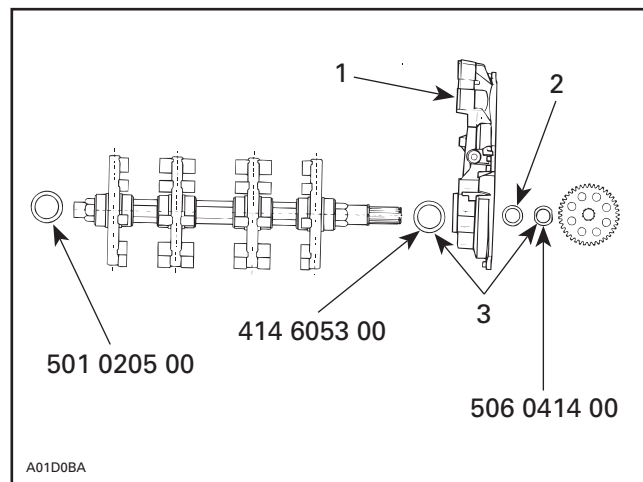
### Sub-Section 04 (DRIVE AXLE)

#### ▼ CAUTION

Install shim(s) following the pattern shown in the chart.

SHIM(S) REQUIRED	SHIM POSITION AND QUANTITY	
	END BEARING HOUSING SIDE	CHAINCASE SIDE
1	1	
2	1	1
3	2	1

When installing shims between the chaincase and the drive axle bearing, there must be same quantity of shims between the drive chain sprocket and spacer.



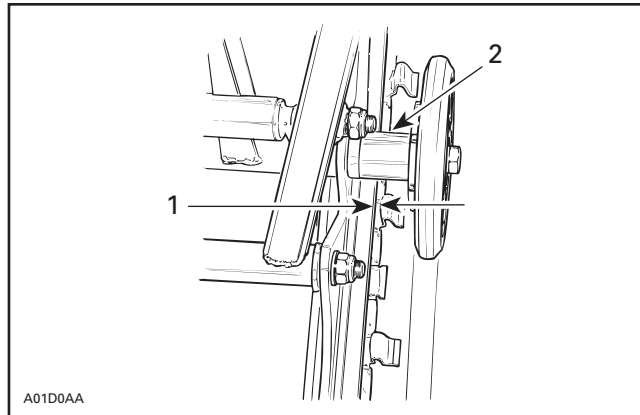
1. Chaincase
2. Spacer
3. Same quantity

- Doublecheck drive axle axial play as described above.
- Modify total shim thickness as required.
- Reinstall track and suspension. Adjust track tension and alignment.

**NOTE:** Center the track suspension to ensure that the alignment check made in the next step is accurate.

- To center, grasp the track suspension and move it sideways, left and right. Position the track suspension at the midpoint of its sideways movement.

- Check track front alignment by measuring the gap, on each side between guide cleat and the slider shoe, behind the suspension front axle as shown.



1. Distance between guide cleat and slider shoe
2. Suspension front axle

If the difference between each side exceeds 3 mm (1/8 in), redistribute drive axle shims as follows:

DIFFERENCE BETWEEN EACH SIDE	DRIVE AXLE SHIM REDISTRIBUTION
3 to 4.5 mm (1/8 to 3/16 in)	Remove 1 shim from larger gap side. Add 1 shim on smaller gap side.
4.5 to 6 mm (3/16 to 1/4 in)	Remove 2 shims from larger gap side. Add 2 shims on smaller gap side.

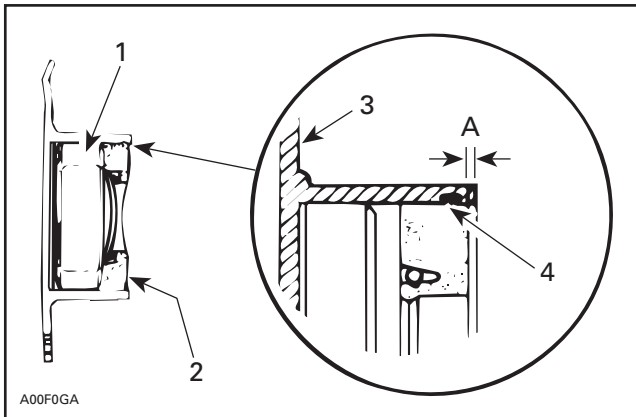
## INSTALLATION

### 4, Speedometer Drive Insert

If the drive axle to be installed is a new part and the vehicle is equipped with a speedometer, a correct size speedometer drive insert must be installed into the axle end. Ensure that insert is flush with end of axle.

Position drive axle assembly into location. Install end bearing housing. Install spacer (if applicable) between bearing and lower chaincase sprocket.

Install chaincase and position seals (if applicable), making sure that a gap of approximately 2 mm (1/16 in) exists between end of bearing housing and each seal.



**SIDE VIEW**

- 1. Bearing
- 2. Seal
- 3. Housing
- 4. Seal lip
- A. 2 mm approx.

### 3, Retainer Ring

Make sure that welded nuts are toward inside of tunnel.

Lock drive axle sprocket with a circlip.

Reinstall the chaincase cover.

Refill with chaincase oil. Refer to TECHNICAL DATA 09-03.

Install the suspension. Refer to TRACK 06-05 and adjust track tension and carry out track alignment procedure.

## LUBRICATION

### 15, Grease Fitting

Lubricate end housing bearing with low temperature grease (P/N 413 7061 00).

## ADJUSTMENT

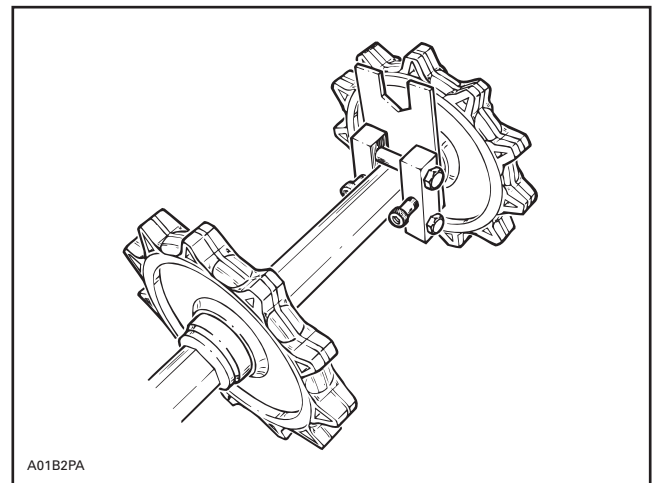
### Sprocket/Track Alignment

**CAUTION**

Do not temper with sprocket/track alignment if frame or suspension is damaged.

Sprockets might be repositioned to fit lugs without removing drive axle.

Use drive axle sprocket adjuster kit (P/N 861 7257 00).



TYPICAL

# TRACK

## TRACK TYPE APPLICATION

Refer to TECHNICAL DATA section 09-03.

## GENERAL

This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

## INSPECTION

Visually inspect track for:

- cuts and abnormal wear
- broken rods
- broken or missing track cleats

If track is damaged or rods are broken, replace track. For damaged or missing cleats, replace by new ones, using cleat remover (P/N 529 0287 00). Use small-cleat installer (P/N 529 0085 00).

<b>WARNING</b>
<p>Do not operate a snowmobile with a cut, torn or damaged track.</p>

## REMOVAL

### **S-Series**

Remove the following parts:

- speedometer cable
- muffler
- chaincase cover
- suspension
- drive axle seal
- end bearing housing
- sprockets and chain
- drive axle (toward end bearing housing)
- track

### **Skandic WT/SWT/WT LC**

Remove the following parts:

- rear suspension
- muffler

- RH drive axle end bearing
- angle drive and square pin

Move transmission sideways. Do not remove brake mechanism nor driven pulley. Refer to SKANDIC WT SUSPENSION 06-03.

Remove drive axle then track.

## INSTALLATION

### **All Models**

Reverse the removal procedure.

**NOTE:** When installing the track, respect rotation direction indicated by an arrow on track thread.

Check sprocket/track alignment as described in DRIVE AXLE 06-04.

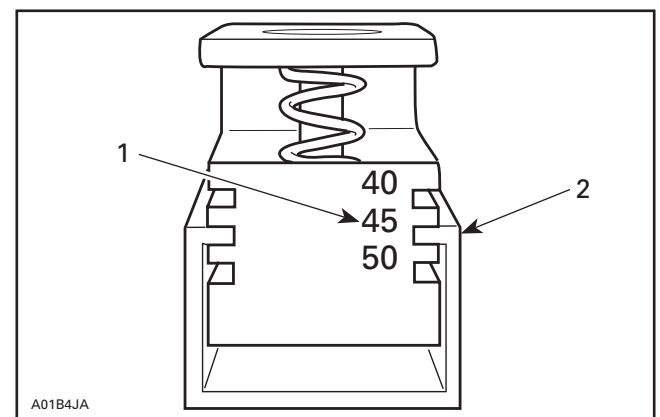
## Track Tension and Alignment

Track tension and alignment are inter-related. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

### Tension

Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap half-way between front and rear idler wheels. Measure between slider shoe and bottom inside of track.

When using the track tension gauge (P/N 529 0215 00), slide U shape extrusion to proper deflection.

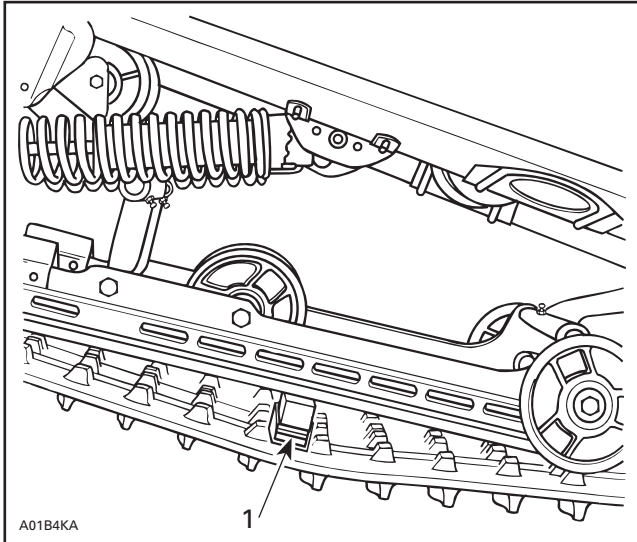


1. Example: 45 mm
2. Extrusion

## Section 06 REAR SUSPENSION

### Sub-Section 05 (TRACK)

Insert pre-set gauge between slider shoe and track. Allow gauge to settle by forcing track up and down. Track tension is as specified when edge of gauge reaches lign.



TYPICAL

1. Lign

○ **NOTE:** Lightly oil track tension gauge center pin to avoid sticking.

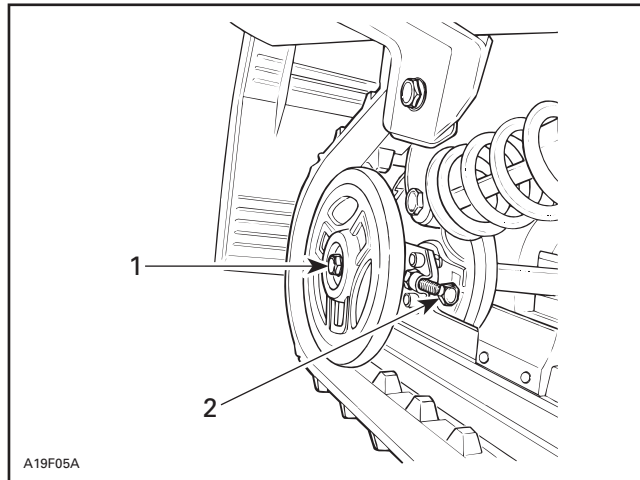
#### All Models

45 to 50 mm (1-25/32 to 1-31/32 in) when exerting a downward pull of 7.3 kg (16 lb).

### ▼ CAUTION

Too much tension will result in power loss and excessive stress on suspension components. If too loose, the track will have a tendency to thump.

To adjust, loosen the rear idler wheel retaining screws then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



TYPICAL

1. Retaining screw  
2. Adjuster bolt

### Alignment

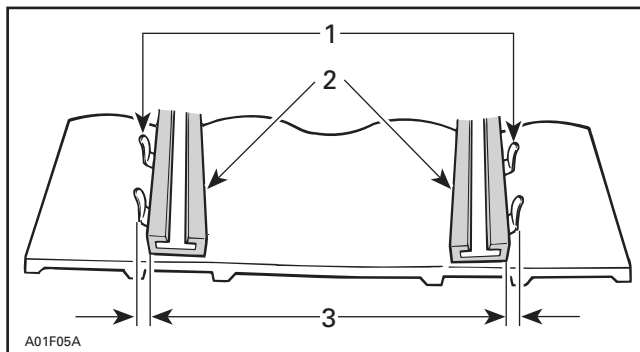
### ◆ WARNING

Before checking track tension, ensure that the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

#### All Models

With rear of vehicle supported off the ground, start engine and allow the track to rotate **slowly**.

Check that the track is well centered; equal distance on both sides between edges of track guides and slider shoes.



1. Guides  
2. Slider shoes  
3. Equal distance

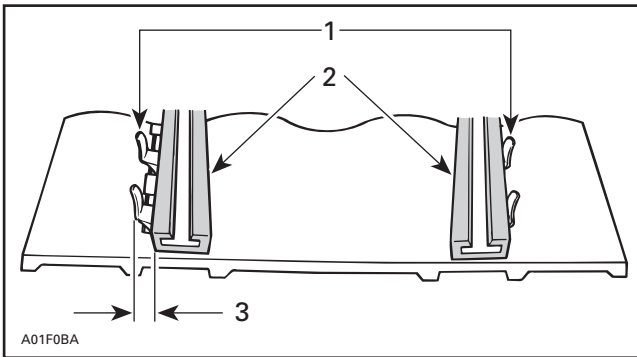
## Section 06 REAR SUSPENSION

### Sub-Section 05 (TRACK)

#### ◆ WARNING

Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track.

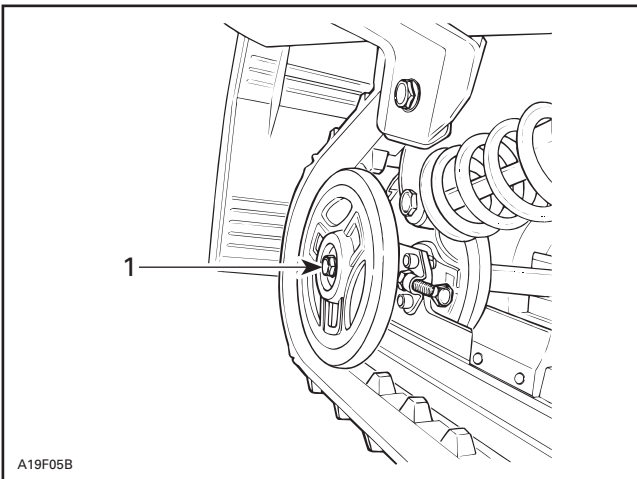
To correct, stop engine then tighten the adjuster bolt on side where guides are farthest to slide. Re-check alignment.



1. Guides
2. Slider shoes
3. Tighten on this side

○ NOTE: Torque retaining screw to 48 N•m (35 lbf•ft) after adjustment.

Tighten the idler wheel retaining screws.



TYPICAL

1. Retighten

Restart engine, rotate track **slowly** and recheck alignment.

#### Track Cleat

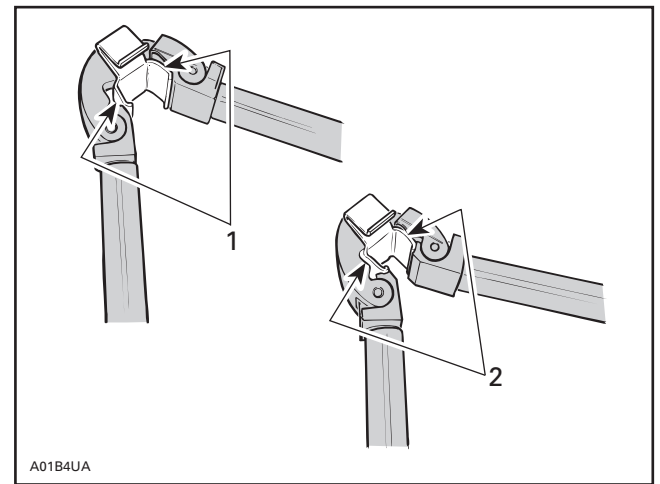
##### Removal

- Raise rear of vehicle off the ground and lift snowguard then rotate track to expose a cleat to be replaced.
- Using track cleat remover (P/N 529 0087 00) for all models.

##### Installation

○ NOTE: Keep the same pitch between guide cleats.

- Place new cleat in position and using small track cleat installer (P/N 529 0085 00) bend cleat then push tabs into rubber.



TYPICAL

1. First step
2. Second step (to push tabs into rubber)

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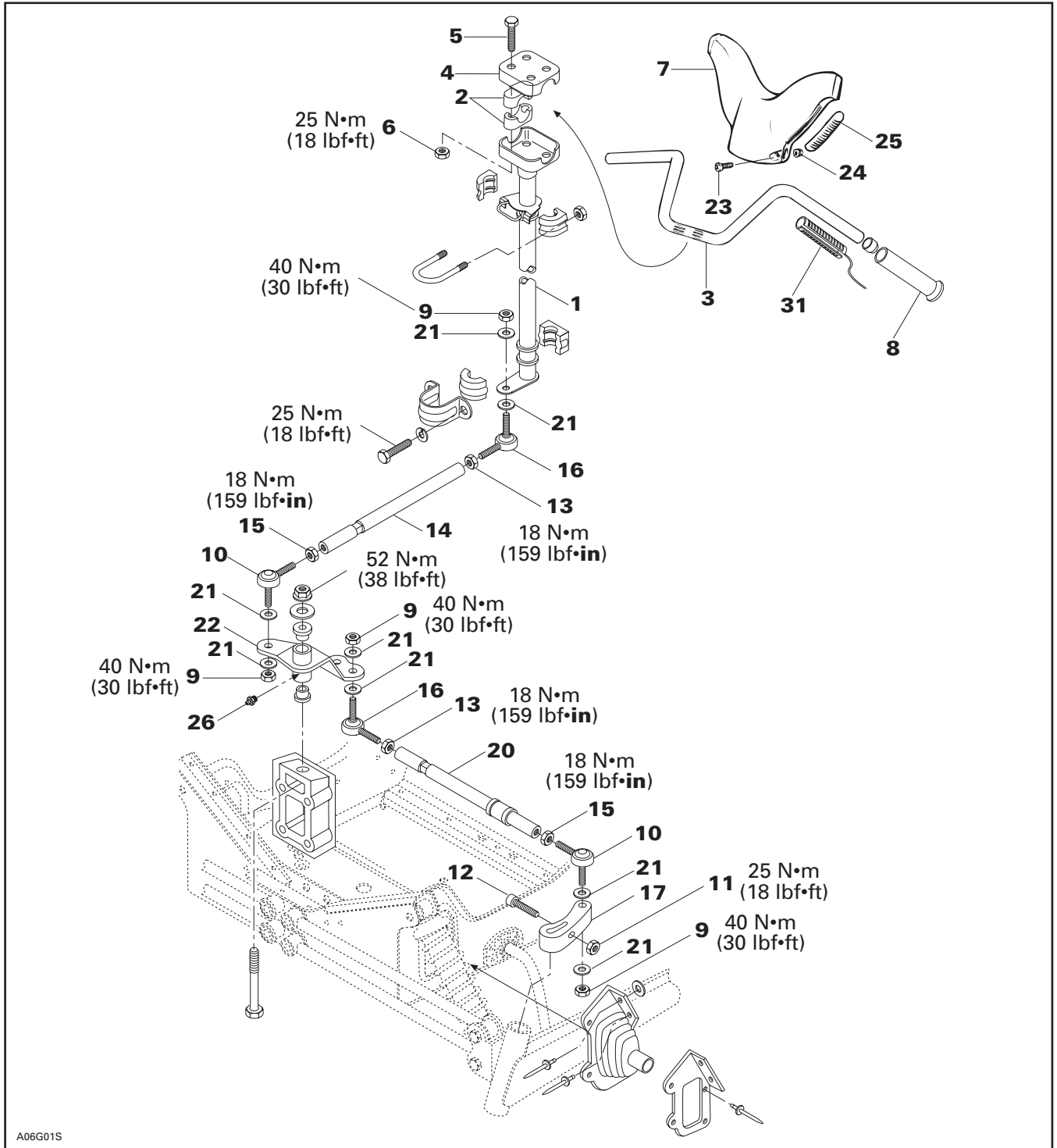
<b>STEERING SYSTEM</b> .....	<b>07-02-1</b>
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# STEERING SYSTEM

S-Series



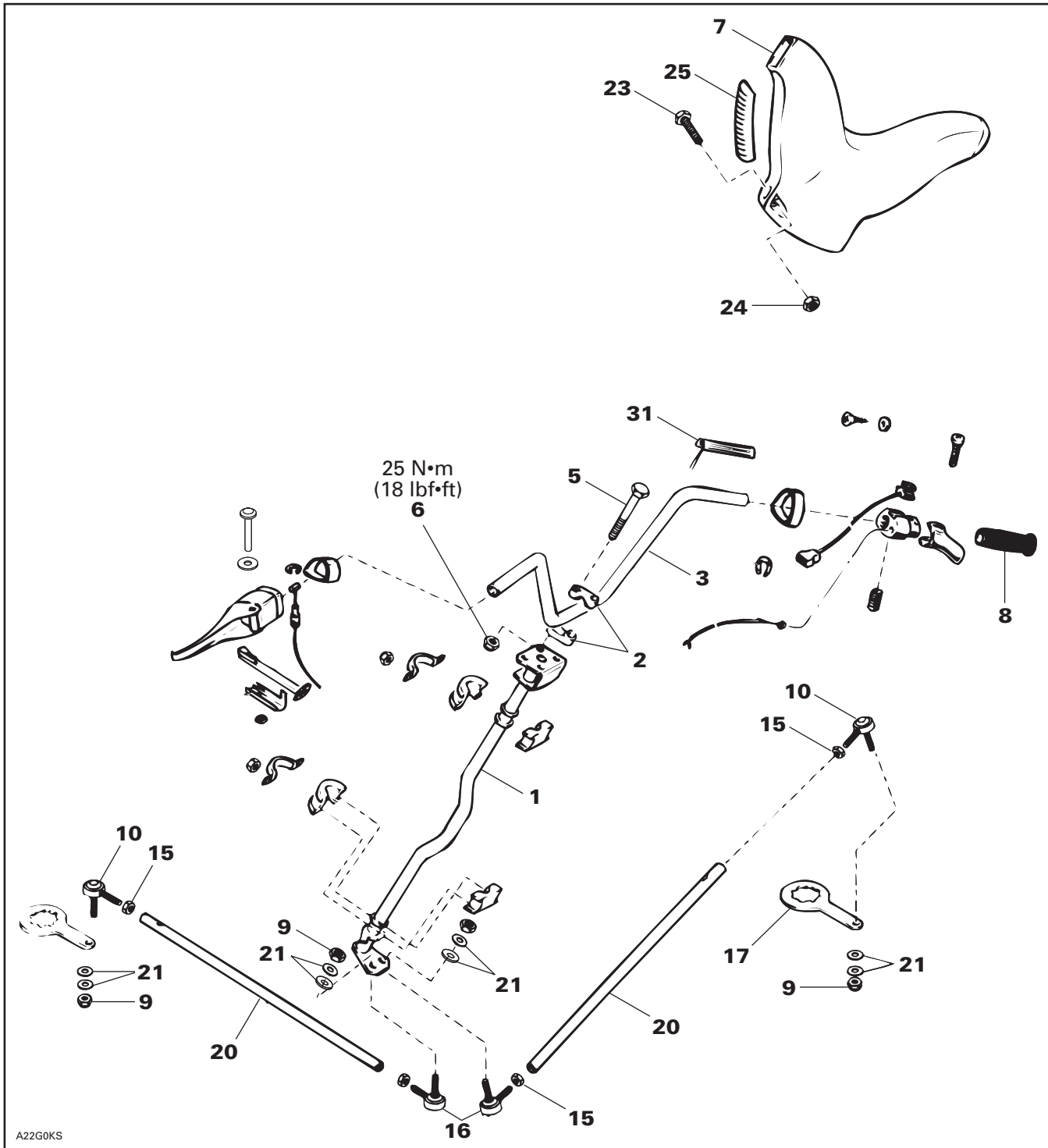
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# Section 07 STEERING/FRONT SUSPENSION

## Sub-Section 02 (STEERING SYSTEM)

### Skandic WT



## INSPECTION

Check skis and runner shoes for wear, replace as necessary. (See section 07-03).

### 17, Steering Arm and Ski Leg

Make sure steering arm and ski leg splines interlock.

#### ◆ **WARNING**

Any parts having worn splines have to be replaced with new ones.

Check the general condition of the steering system components for wear. Replace if necessary.

## DISASSEMBLY AND ASSEMBLY

### 8, Grip

Grips can be removed and installed without any damage by injecting compressed air into the handlebar or by heating them with a heat gun.

### 1, Steering Column

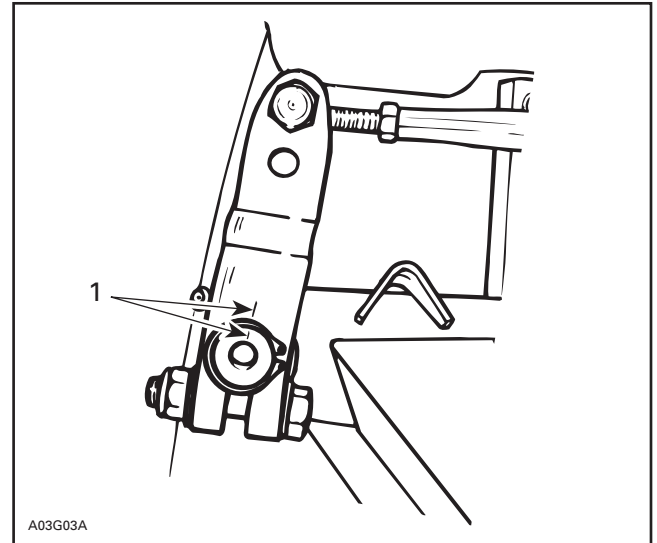
Remove steering pad then handlebar ass'y.

To gain access remove the air intake silencer and carburetor(s).

Detach the short tie rod (under the engine) from the steering column.

### 17, Steering Arm

To maintain correct steering geometry for reassembling, punch mark the steering arm and ski leg before disassembly.



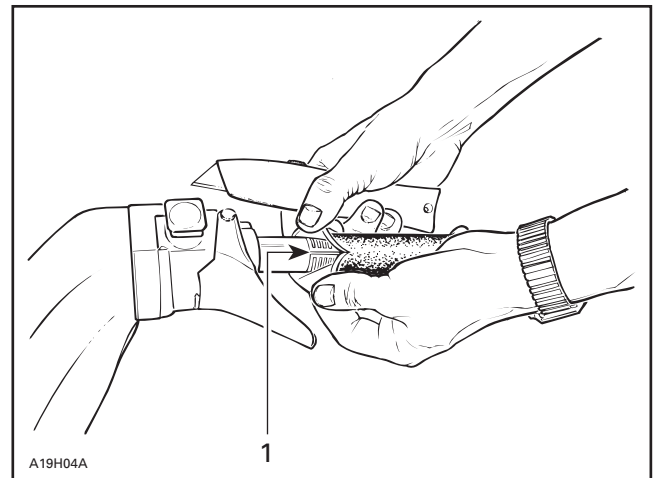
TYPICAL

1. Punch marks

### 31, Heating Grip Element

On vehicles is equipped with heating, the grips, might be unremovable as explained above, in this case, carefully proceed as follows to prevent damaging the heating elements.

Locate the element wires inside the handlebar; look through end of grip. Start cutting the grip exactly opposite the element wires and immediately peel it open to locate the gap in the heating element, as shown.



1. Gap in the heating element opposite the wires

Continue cutting along the gap and remove the grip. If required, slowly peel heating element from handlebar and remove it.

## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 02 (STEERING SYSTEM)

To install, stick the heating element to the handlebar making sure the wires do not interfere with operation of the accelerator or brake handle.

#### ◆ WARNING

Never use lubricants (e.g. soap, only grease, etc.) to install the handlebar grip, use a mix of soap and water. Mix 40 parts of water with one part of dish washing soap (recommended: Ultra Joy, Sunlight or Palmolive).

Heat the grip with a heater gun or a spot light to ease installation. Insert new grip with a rubber mallet.

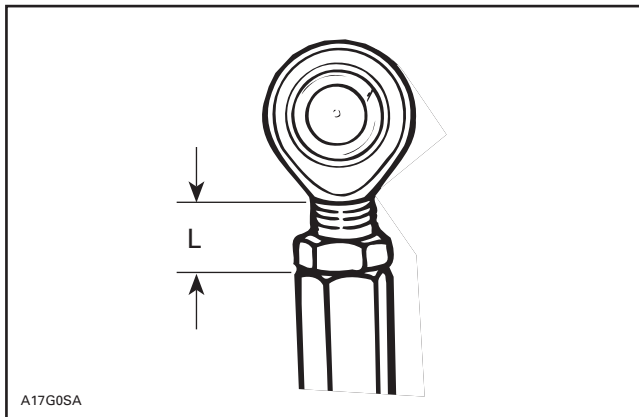
## INSPECTION

Refer to TESTING PROCEDURE 05-07.

### 10,16, Ball Joint (Left Hand and Right Hand Threads)

Inspect ball joint ends for wear or looseness, if excessive, replace them.

Screw threaded end of the ball joint into the tie rod. The maximum external threaded length not engaged in the tie rod must not exceed the value L in the following thread length chart:



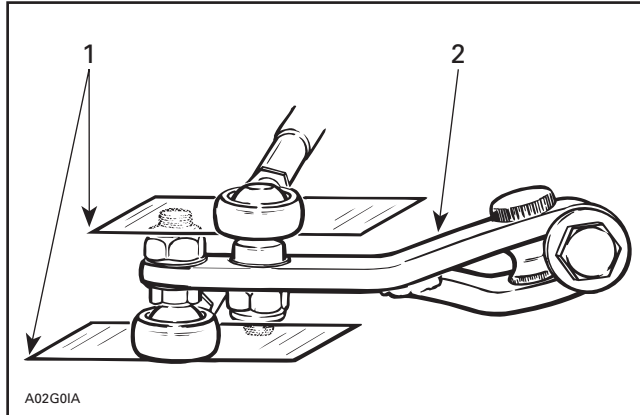
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TYPICAL

MODEL	L	
	mm	(in)
All	20	(25/32)

The ball joint should be restrained when tightening the tie rod end lock nut. Align it so the tie rod end is parallel to the steering arm when assembled on the vehicle, refer to the following illustration.

For proper torque specifications refer to the specific exploded view for the vehicle being serviced.



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TYPICAL

1. Parallel with steering arm
2. Steering arm

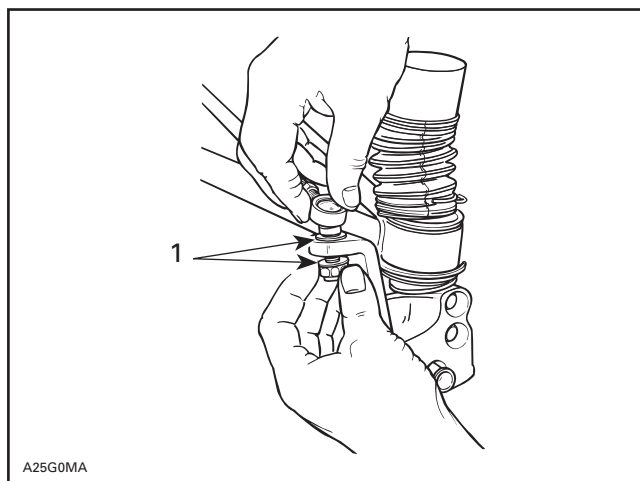
#### ◆ WARNING

The cut off section of the ball joint must run parallel with the steering arm. When tightening lock nuts, restrain ball joint with appropriate size wrench. Ensure not too many threads are kept outside of the tie rod according to the thread length chart.

### 21, Hardened Washer

#### All Models Except Skandic WT

Install a hardened washer on each side of the arm.



A25G0MA

TYPICAL

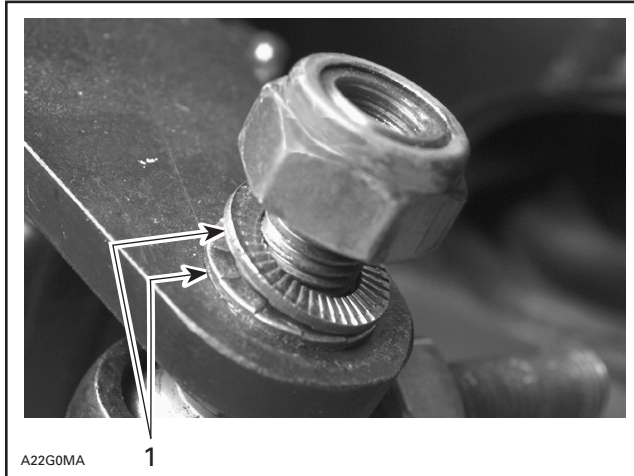
1. Hardened washers

## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 02 (STEERING SYSTEM)

#### **Skandic WT Only**

Install special washers (locking disks) with teeth facing each others.



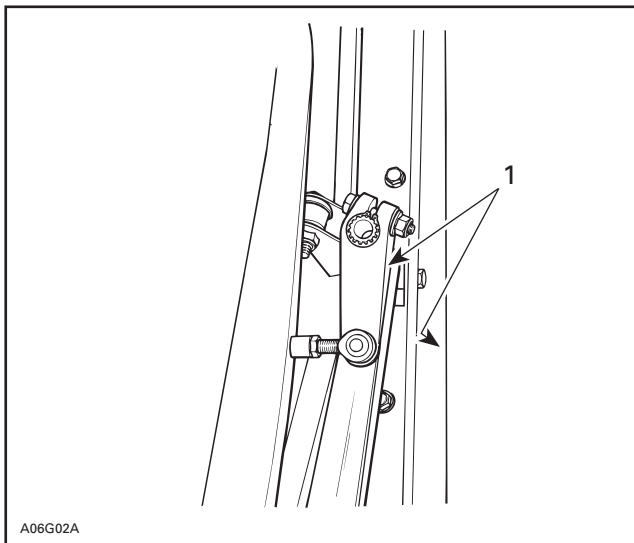
1. Large teeth

#### **All Models Except Skandic WT**

#### **17, Steering Arm**

The steering arm angles should be equal on both sides when skis are parallel with vehicle.

Steering arm must run parallel to ski.



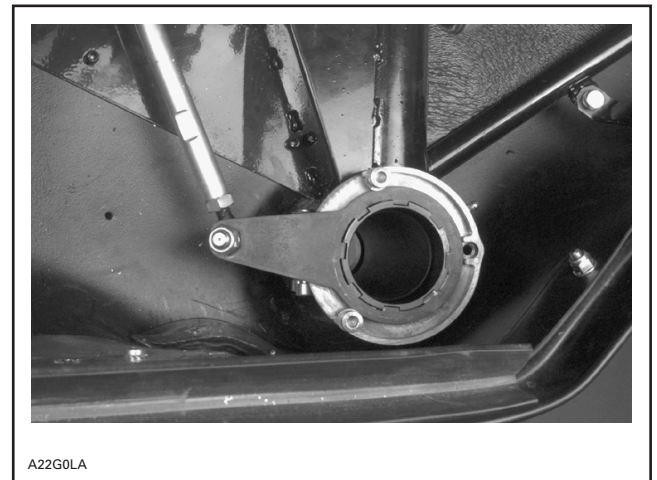
TYPICAL

1. Parallel

Tighten the steering arm pinch bolt to the torque specified in the exploded view.

#### **Skandic WT Only**

Install steering arm at mid-travel position when handlebar is facing straight ahead.

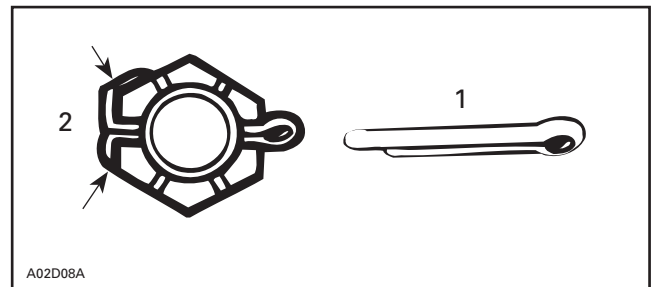


#### **9,13,15, Ball Joint Nut and Jam Nut**

Tighten ball joint, nuts and jam nuts to specified torque (see exploded view).

#### **9, Vehicles with a Castle Nut**

After proper torque has been applied to the ball joint nut, insert a cotter pin through the hole in the tie rod end bending the ends around the nut as shown in the following illustration.



1. New

2. Fold cotter pin over castellated nut flats only

#### **11,12, Steering Arm Nut and Bolt**

Tighten steering arm nuts to specified torque (see exploded view).

### ADJUSTABLE HANDLEBAR

#### **1,3, Steering Column and Handlebar**

If applicable, remove the steering clamp and nuts holding the handlebar to the steering column.

#### **2,4,5,6, Handlebar Support, Steering Clamp, Bolt and Nut**

Install the handlebar support, steering clamp, the 4 screws and nuts to the column, as illustrated.

## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 02 (STEERING SYSTEM)

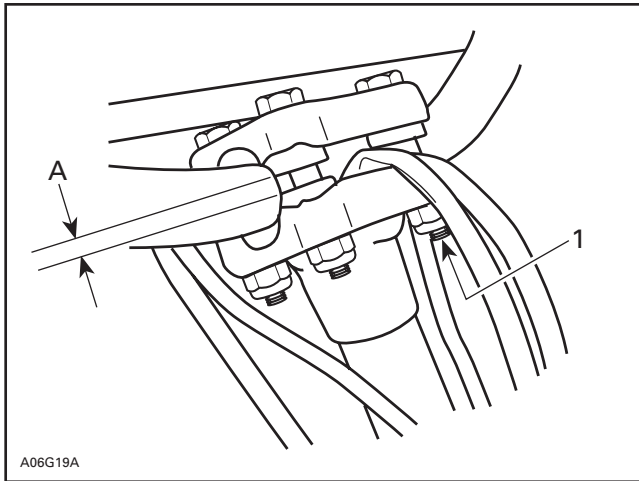
See applicable exploded view for each model.

Adjust the steering handlebar to the desired position.

Lock the handlebar in place by tightening the 4 nuts as specified in the illustrations.

#### ▼ CAUTION

Tighten the nuts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps.



TYPICAL

1. Torque to 26 N•m (19 lbf•ft)
- A. Equal gap all around

#### ◆ WARNING

Avoid contact between the brake handle and the windshield by NOT adjusting the handlebar too high.

#### ◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.

### 7,23,24,25, Steering Pad, Bolt, Nut and Rubber Attachment

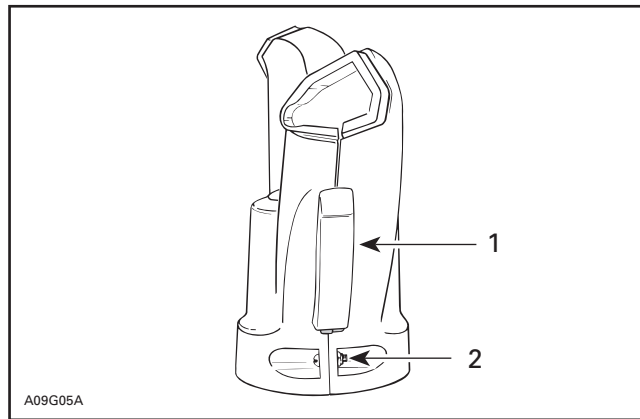
#### ▼ CAUTION

Prior to installation, perform handlebar adjustment.

Properly fit the steering pad to the handlebar. Assemble using the 2 rubber attachments, nuts and bolts where applicable.

#### ◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.



1. Rubber attachment
2. Nut and bolt (where applicable)

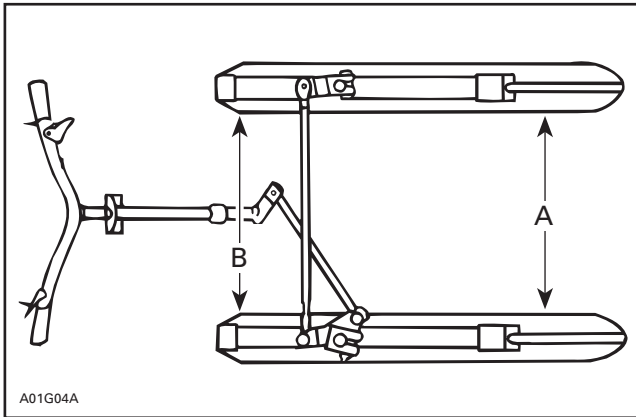
## STEERING ADJUSTMENT (SKIS)

### Definitions

#### TOE-OUT:

A difference measured between the front edge of the skis "A" and rear edge "B" as viewed from the top. It is adjustable.

**Section 07 STEERING/FRONT SUSPENSION**  
**Sub-Section 02 (STEERING SYSTEM)**



**CAMBER:**

A specific inward or outward tilt angle of ski leg compared to a vertical line when viewing the vehicle from front. **This angle is adjustable on some models only.**

**Adjustments**

**S-Series**

Adjustments should be performed following this sequence:

- Pivot arm centering.
- Set camber angle (some models).
- Check for a horizontal handlebar.
- Set toe-out.

**DSA System**

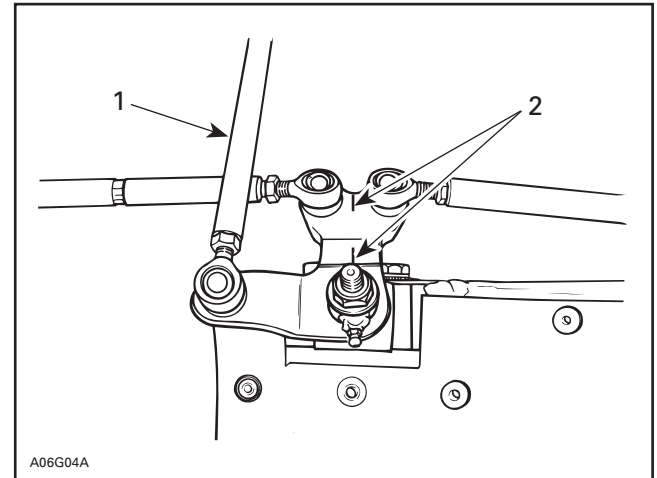
**PIVOT ARM CENTERING**

<p><b>◆ WARNING</b></p>
<p>Do not attempt to adjust straight ahead ski position by turning the ball joint on tie rod <b>no. 14</b>.</p>

**13,14,15,22, Jam Nut, Tie Rod and Pivot Arm**

With handlebar in straight ahead position, the center of the pivot arm must be in line with the end of the bolt. Loosen the jam nuts on tie rod **no. 14** (LH threads on steering column end) and turn tie rod accordingly. Align and retighten the jam nuts to **18 N•m (159 lbf•in)**.

<p><b>◆ WARNING</b></p>
<p>Never lengthen tie rod so that threaded portion of ball joint exceeds 20 mm (25/32 in).</p>



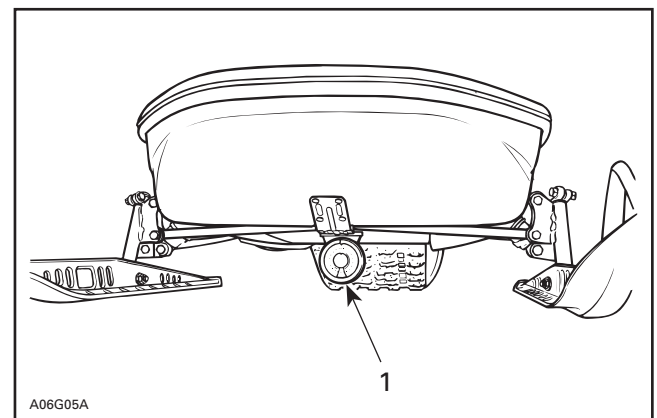
1. Tie rod no. 14
2. Center of pivot arm in line with bolt end

**CAMBER**

○ **NOTE:** On vehicles without adjustable radius arms (**no. 7**) the camber is not adjustable.

○ **NOTE:** Identical adjustments are required on both sides of the vehicle.

- Make sure the vehicle is leveled by placing an angle finder under the main frame member as shown on the following illustration.



1. Angle finder

Using special tool (P/N 529 0216 00) mounted to the ski leg position the angle finder on the tool as shown in the following illustration. An alternate location for the angle finder if the special tool is not available is the outside of the ski leg housing.

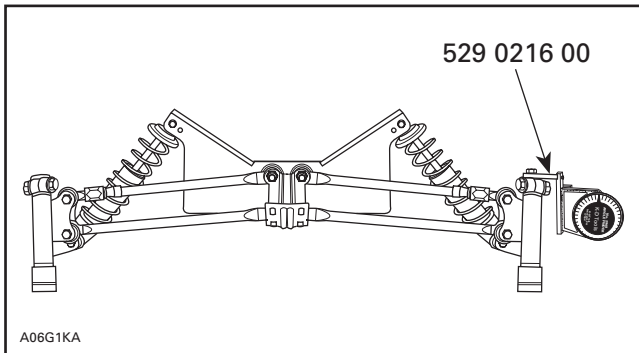
## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 02 (STEERING SYSTEM)

Adjust the camber to  $0^\circ \pm 0.5^\circ$ .

#### ▼ CAUTION

Angle finder must sit square against swing arm. Positioning angle finder against weld bead or decal may result in false reading.



TYPICAL — DSA CAMBER ADJUSTMENT SET-UP

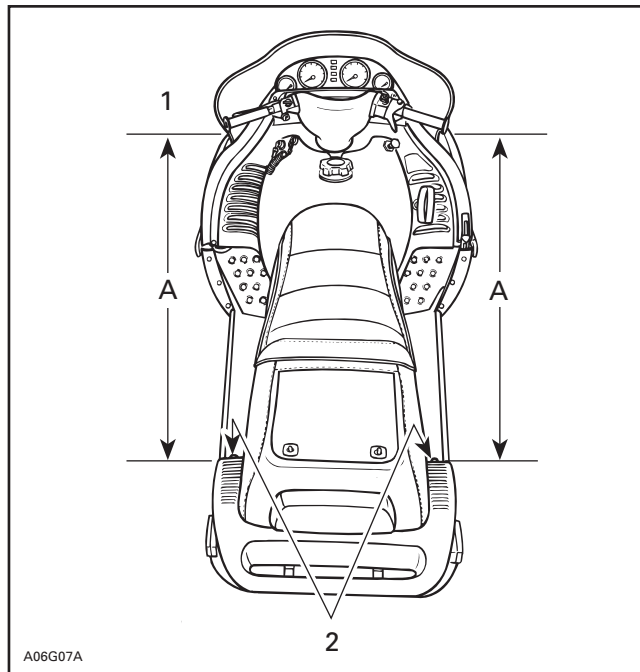
#### Adjusting

- Loosen lock nut on both lower control arms.
- Unbolt both upper control arms at ski leg housing. Turn tie rod half turn at a time to obtain a vertical ski leg ( $0^\circ \pm 0.5^\circ$ ). Bolt upper control arms.

#### HANDLEBAR AND SKI TOE-OUT

Check that handlebar is horizontal when skis are in straight ahead position by measuring from the extremities of the grips to the rearmost edge of the tunnel, as shown.

○ **NOTE:** The reference point must be the same relative to each side.



TYPICAL

1. Equal distance A on each side
2. Same reference point (rivet)

Adjustment is performed by adjusting length of left and right tie rods no. 20.

#### ◆ WARNING

Do not attempt to adjust skis straight ahead position by turning ball joint on tie rod no. 14.

#### Procedure:

- Loosen jam nuts no. 13 and no. 15 of both tie rods no. 20.
- Turn the tie rod on one side to shorten its length.
- Lengthen the other one by turning it exactly the same amount, so that toe-out is not changed.

#### ◆ WARNING

Never lengthen tie rod so that threaded portion of ball joint exceeds 20 mm (25/32 in).

- Close front of skis manually to take all slack from steering mechanism.

○ **NOTE:** A rubber cord must be hooked in front of skis to keep them closed.

## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 02 (STEERING SYSTEM)

#### Skandic WT Only

- Skis should have a toe-out of 10 mm (3/8 in) when they are in a straight-ahead position and the vehicle is resting on the ground.

○ **NOTE:** To make sure skis are in a straight-ahead position, place a straight edge against pre-adjusted track and measure the distance between front and rear of skis and straight edge. Distances should be equal. After the ski toe-out adjustment, distance at front of ski must be 5 mm (3/16 in) more than at rear on both sides for a total toe-out of 10 mm (3/8 in).

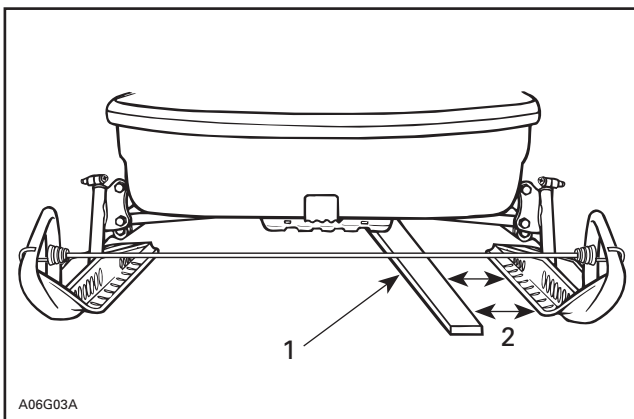
#### S-Series

Toe-out is 0 mm (0 in) when skis are in a straight-ahead position and the front of vehicle is lifted off the ground.

○ **NOTE:** To make sure skis are in a straight-ahead position, place a straight edge against pre-adjusted track and measure the distance between front and rear of skis and straight edge. Distances should be equal. After the ski toe-out adjustment, distance must be equal.

#### All Models

To reduce tolerance when measuring, set one ski to proper toe-out then measure from that ski to the opposite ski.



#### TYPICAL

1. Straight edge
2. Measure here

## LUBRICATION

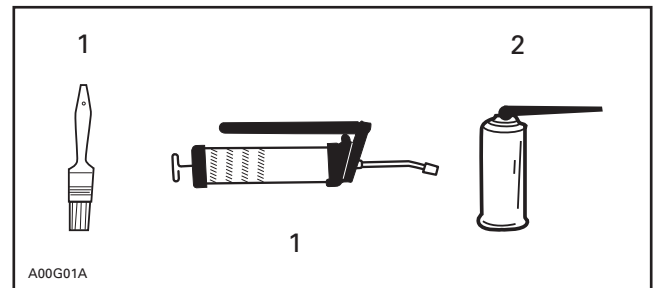
### ◆ WARNING

Do not lubricate throttle and/or brake cable, housing and spring coupler bolts.

### 26, Grease Fittings

Only use low temperature grease (P/N 413 7061 00).

The following symbols will be used to show what type of lubricant should be used at the suitable locations.



1. Low temperature grease
2. Penetrating lubricant (P/N 293 6000 16)

#### Lubricate:

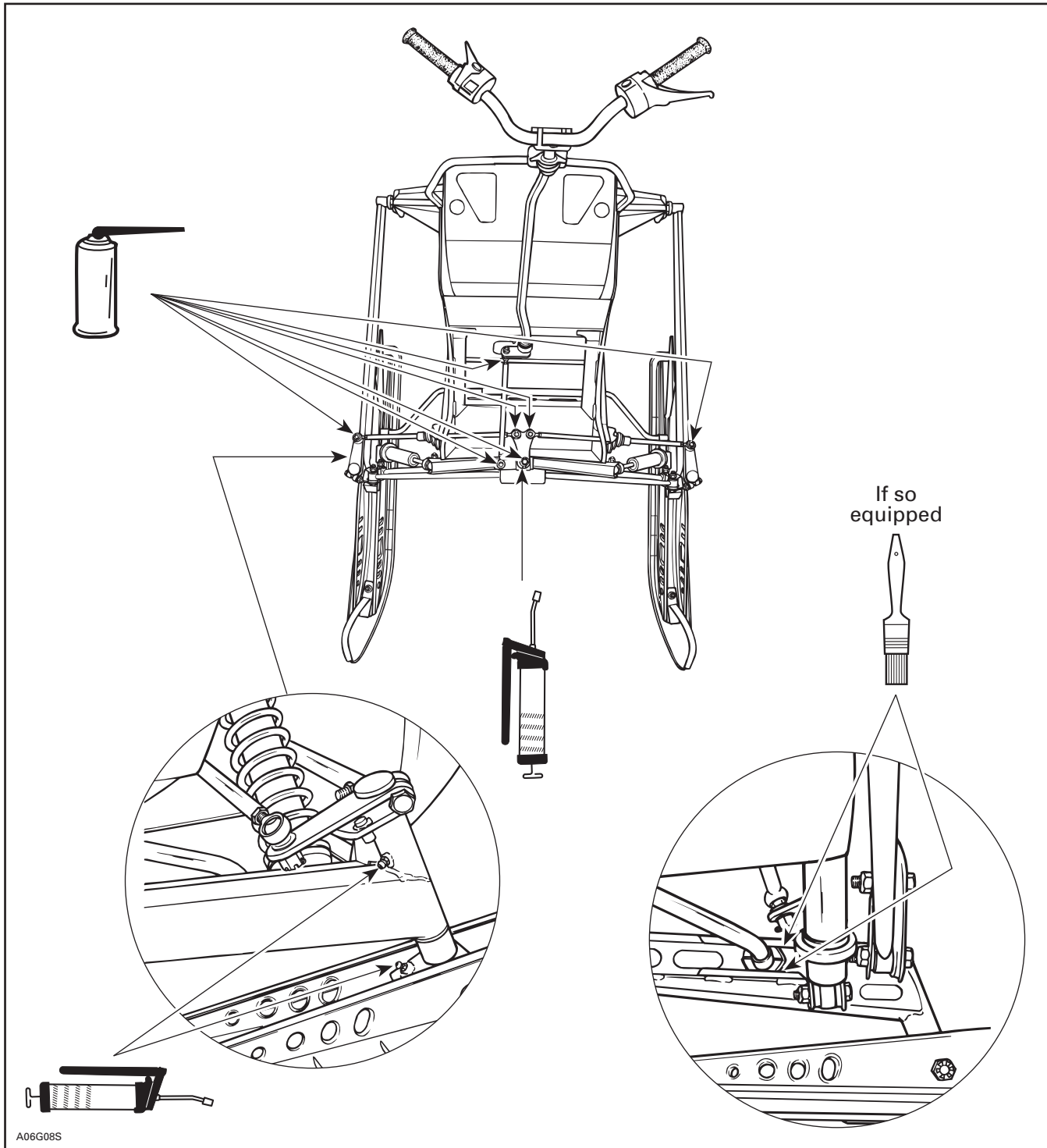
- Steering column.
- Upper and lower control arms drop link and tie rod ends.
- Grease ski legs, ski pivots and idler arm.
- Coat stabilizer sliders with grease, and oil their ball joints if so equipped.



## Section 07 STEERING/FRONT SUSPENSION

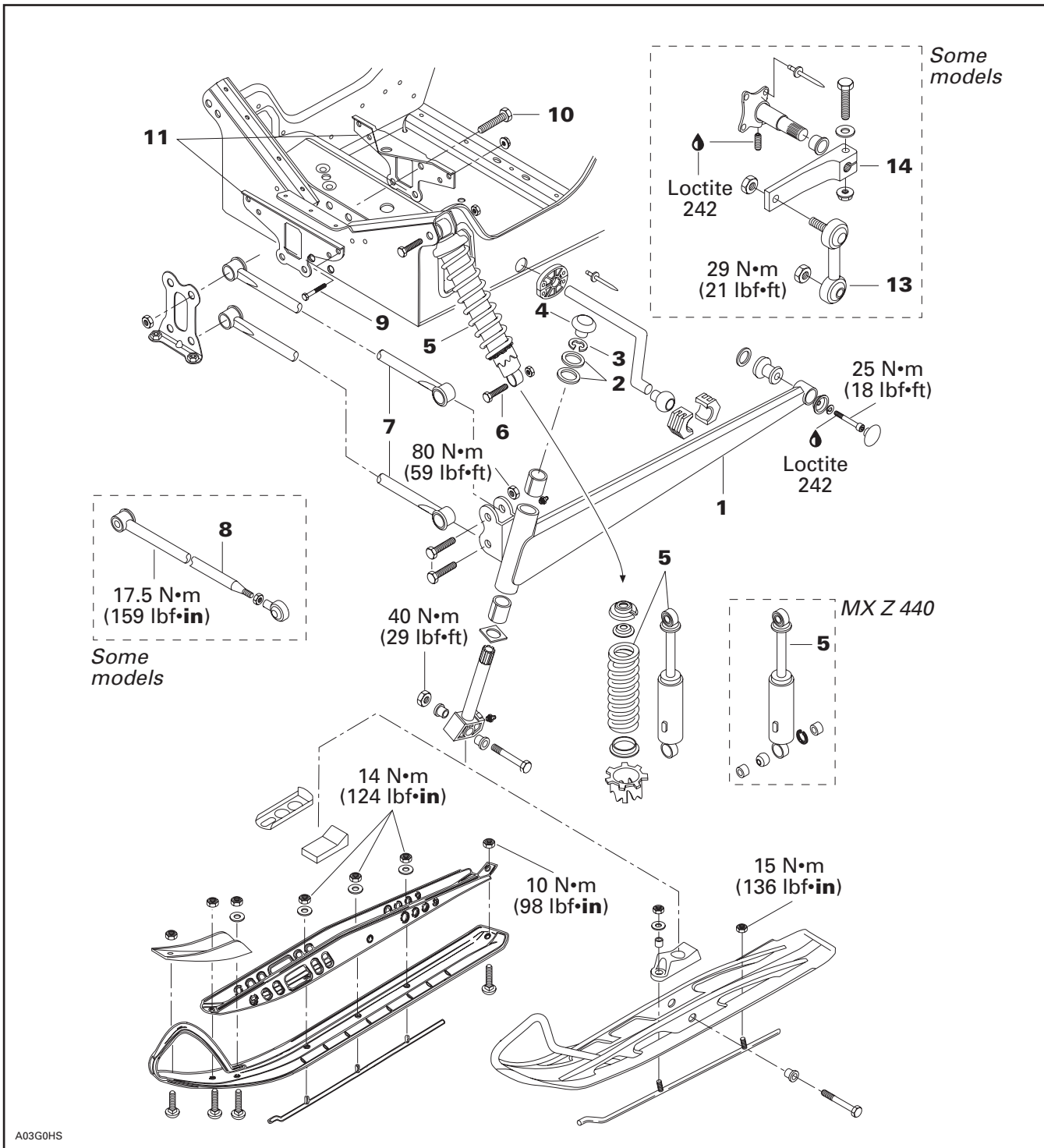
### Sub-Section 02 (STEERING SYSTEM)

#### S-Series



# SUSPENSION AND SKI SYSTEM

*S-Series*



## Section 07 STEERING/FRONT SUSPENSION

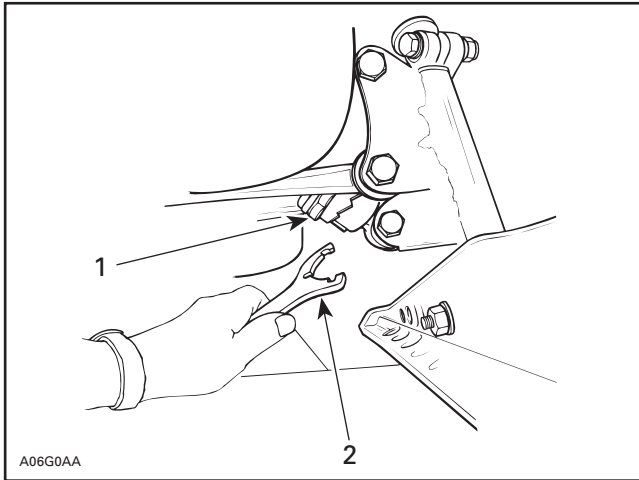
### Sub-Section 03 (SUSPENSION AND SKI SYSTEM)

## DISASSEMBLY

### 5, Shock

Lift front of vehicle and support it off the ground.

Reduce spring preload by turning adjusting ring accordingly with the adjustment wrench in vehicle tool box.



1. Shock cam
2. Adjustment wrench

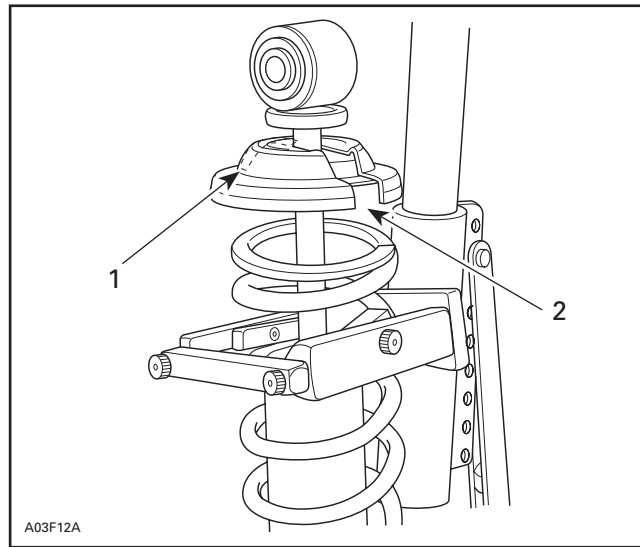
Remove lower bolt then upper bolt of shock.

For shock spring disassembly use shock spring remover (P/N 529 0271 00) in a vise. Mount shock in it and turn shock so that spring coils matched spring compressor.

Close and lock the bar. Adjust the handle horizontal position by changing the position of the clevis pin.

Push down on the handle until it locks. Remove spring stopper and cap then release handle.

When installing the cap opening must be 180° from the spring stopper opening.



1. Cap opening
2. Spring stopper opening

### 1, Swing Arm

Lift front of vehicle and support it off the ground.

Remove cap, circlip then slacken steering arm bolt and pull up steering arm. Note shim positions. Ski leg may fall off from swing arm.

Unbolt lower end of shock from swing arm.

Unbolt radius rod.

### 14, Lever

#### **Models with Adjustable Stabilizer Bar**

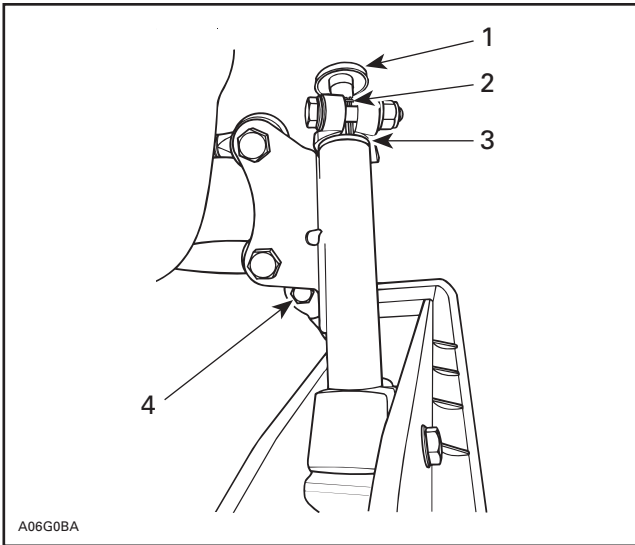
Unbolt tie rod no. 13 ball joint from swing arm, do not change stabilizer adjustments at this time.

Unbolt rear of swing arm from frame.

Pull swing arm off the vehicle. Stabilizer bar will disengage ball joint at swing arm inside rails.

## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 03 (SUSPENSION AND SKI SYSTEM)



1. Cap no. 4
2. Circlip no. 3
3. Shims no. 2
4. Bolt retaining lower end of shock no. 6

## INSPECTION

Check all rubber cushions for crack and wear. Replace as required.

Check straightness of splines and proper interlocking with steering arm. Replace as required.

Check for straightness of swing arm. Replace as required.

Check for clogged grease fittings. Clean or replace as required.

Check for proper action of sliding blocks in swing arm.

Check skis and runners for wear, replace as necessary.

Check condition of ski stopper. Replace it when deteriorated.

To check condition of shock, refer to SC-10 SUSPENSIONS 06-02 then look for **Shock Absorber Inspection**.

## INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply low temperature grease (P/N 413 7061 00) to ski leg components.

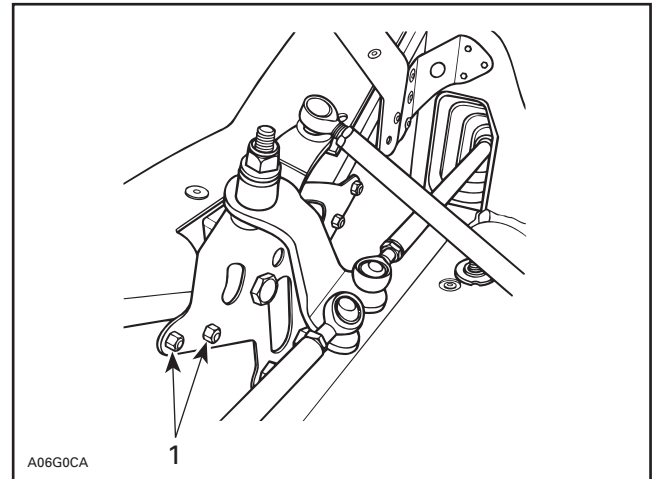
Tighten nuts and screws to proper torque as mentioned in exploded view.

## 7,8, Upper and Lower Half Arms

Position half arms and tie rods horizontally before tightening nuts.

## 9,10,11, Bolt, Nut and Link Plate

Attach link plate to frame with additional nuts and bolts, if applicable.

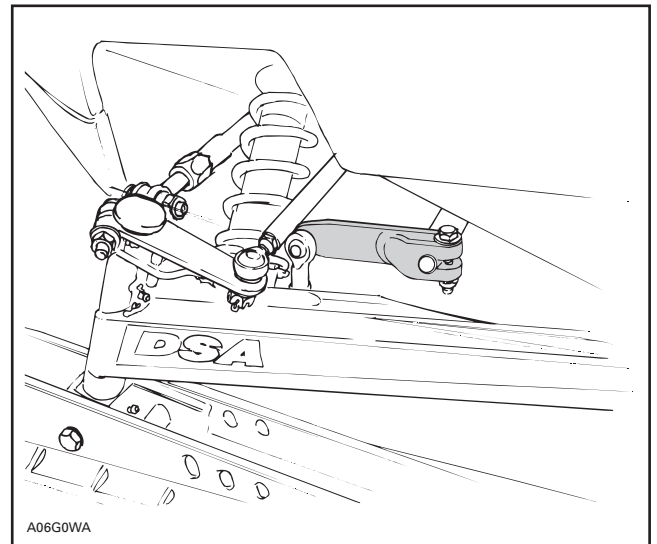


### SOME MODELS

1. Nuts and bolts

## 13,14, Tie Rod and Lever

Install levers on both sides at same angle (about horizontal).

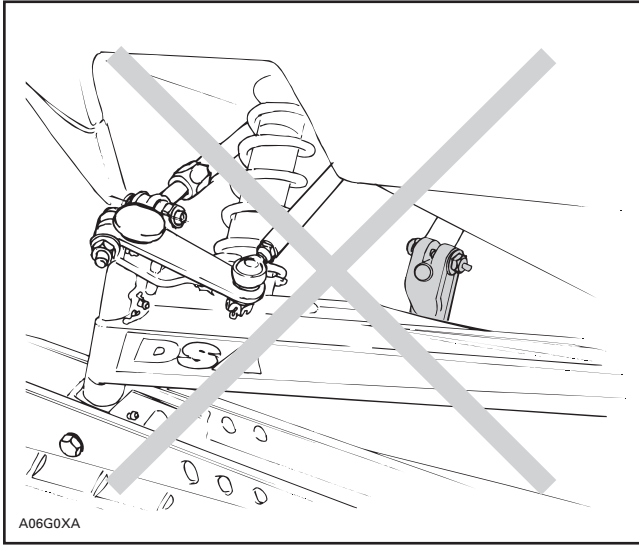


### TYPICAL

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**Section 07 STEERING/FRONT SUSPENSION**  
Sub-Section 03 (SUSPENSION AND SKI SYSTEM)

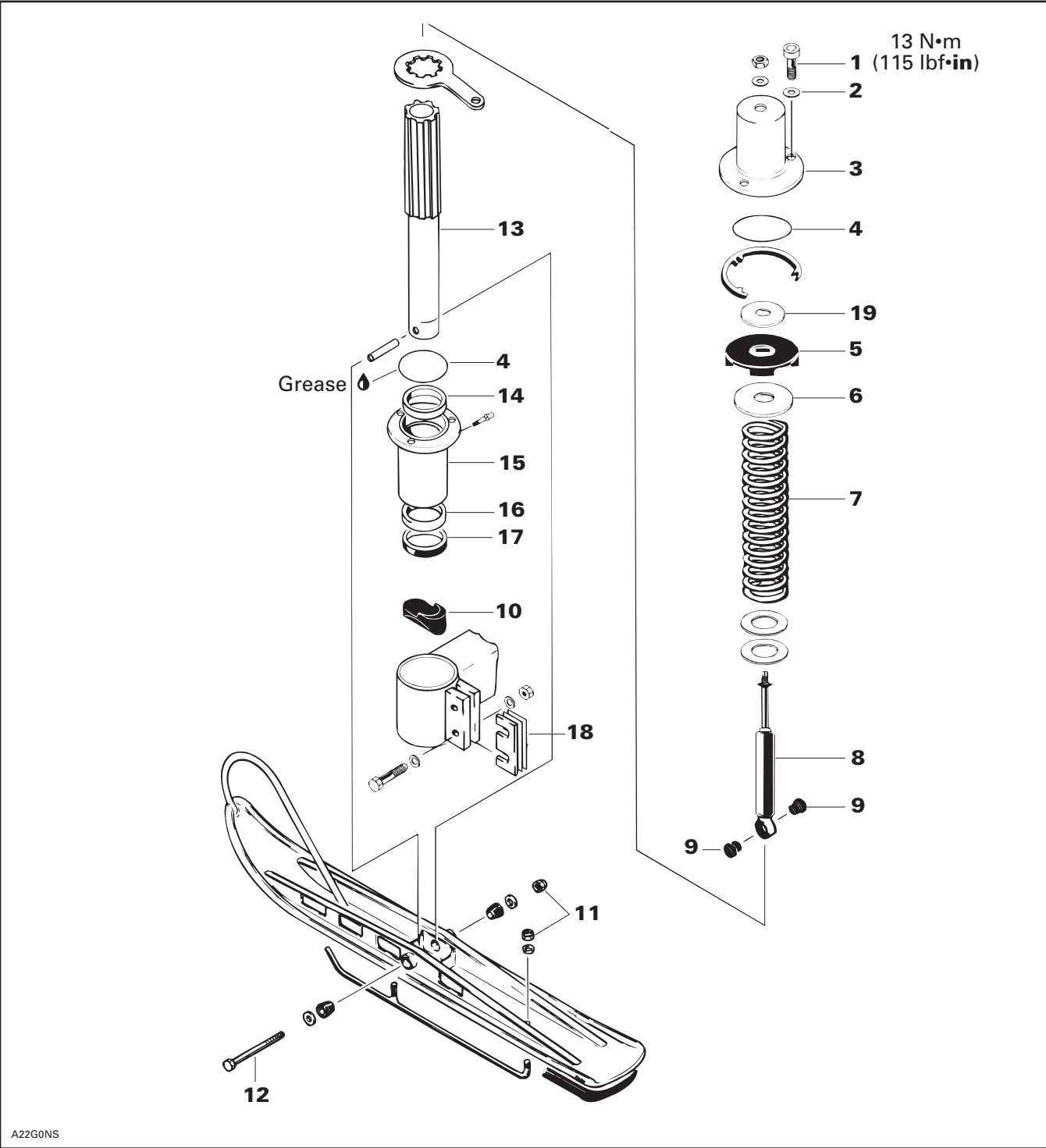
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*WRONG POSITION*

**Section 07 STEERING/FRONT SUSPENSION**  
Sub-Section 03 (SUSPENSION AND SKI SYSTEM)

**Skandic WT**



A22G0NS

## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 03 (SUSPENSION AND SKI SYSTEM)

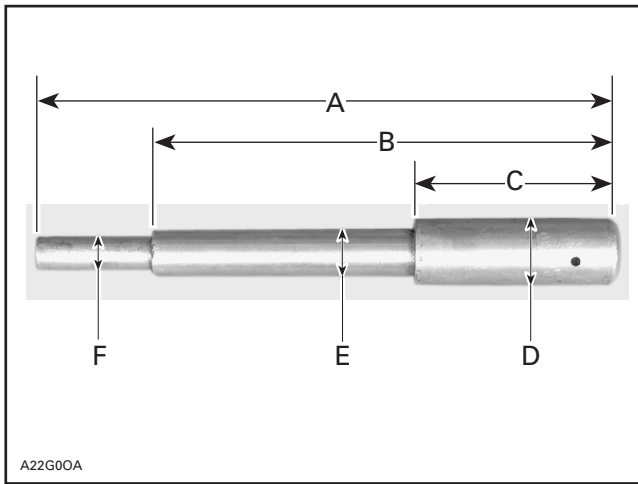
## ON-VEHICLE COMPONENT VERIFICATION

### 8, Shock

Lift front of vehicle and support off the ground.

Remove ski bolt and nut.

Remove steel bushing from ski using a pusher. See pusher dimensions below.



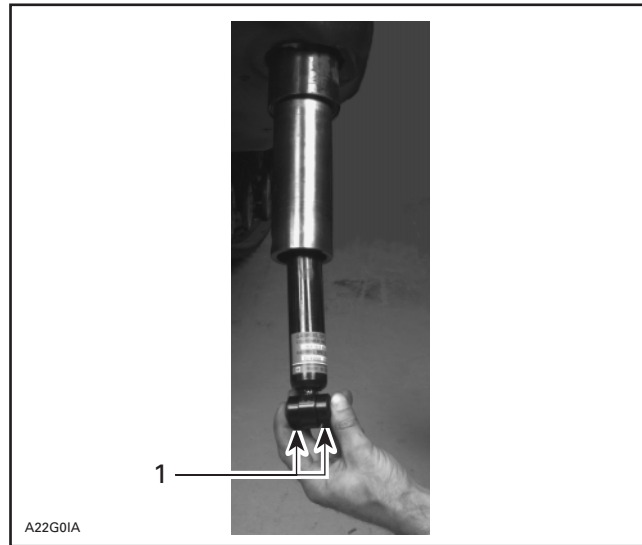
A22G00A

- A. 220 mm (8.66 in)
- B. 180 mm (7.09 in)
- C. 70 mm (2.75 in)
- D. 25 mm (1.0 in)
- E. 15 mm (.59 in)
- F. 9 mm (.35 in)



A22G0PA

Unfasten rod nut then pull out shock from bottom. Check shock as described below in **inspection**. At installation, make sure bushings are in place.

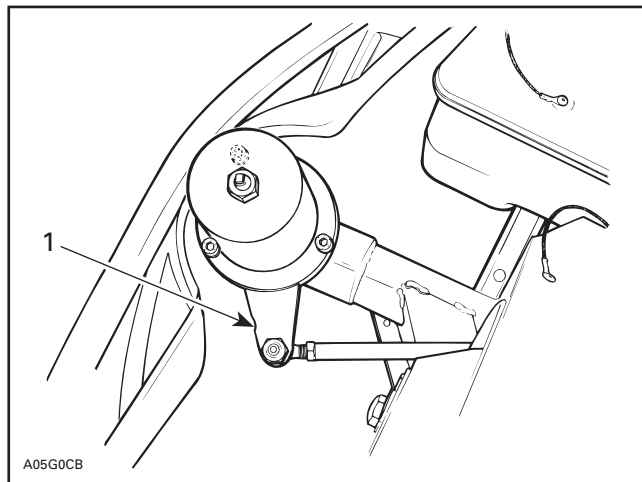


A22G01A

1. Bushings

### 7, Spring

Unscrew shock piston pin nut then remove washer. Unscrew 3 Allen screws retaining cover **no. 3**, then remove stopper **no. 5**, washers **no. 6**, washer **no. 19**.

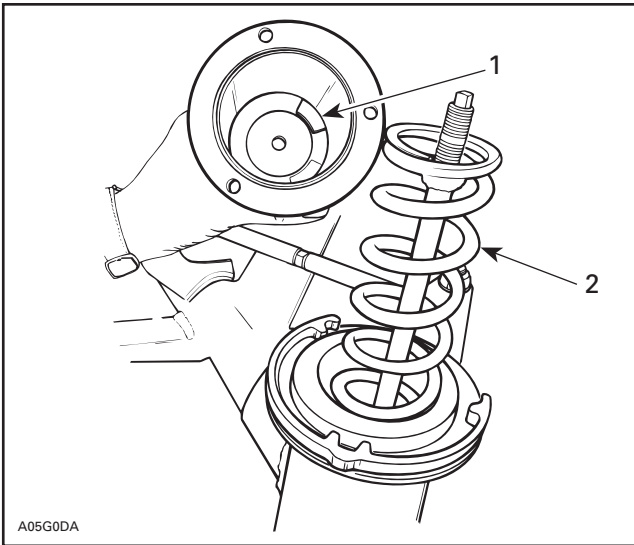


A05G0CB

1. Allen screws

○ **NOTE:** These washers and stopper can be wedged in cover.

**Section 07 STEERING/FRONT SUSPENSION**  
Sub-Section 03 (SUSPENSION AND SKI SYSTEM)



1. Washers and stopper wedged in cover
2. Spring

Pull out spring.

### Suspension Free Operation

Remove cover and check for free movement of ski leg by lifting end of ski.

### DISASSEMBLY

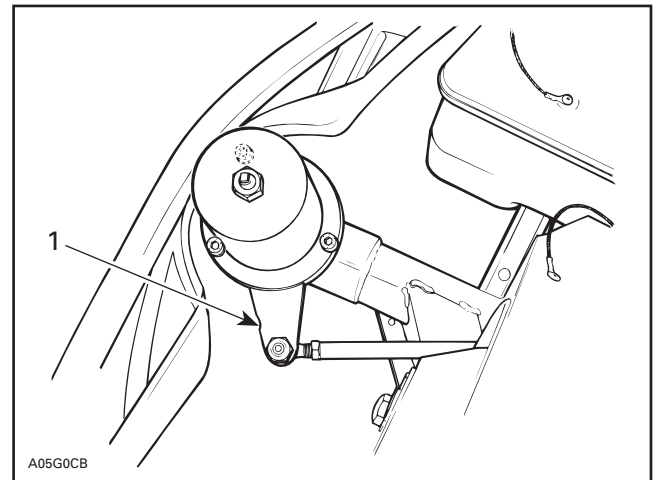
Lift front of vehicle and support off the ground.

#### 1,2,3,5,6,9,11,12, Bolt, Lock Washer, Cover, Stopper, Bushing and Nut

Remove ski bolt, nut, bushings and ski.

Unscrew shock piston pin nut then remove washer. Shock will fall off the ski leg.

Unscrew 3 Allen screws retaining cover, then remove stopper and washers.

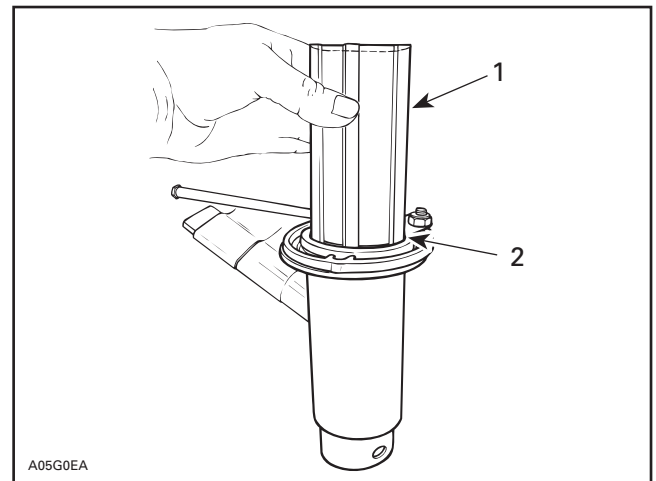


1. Allen screws

**NOTE:** These washers and stopper can be wedged in cap.

#### 4,13,14,16,17, O-ring, Ski Leg, Bushing and Seal

Pull up ski leg. Steering arm will not interfere.



1. Pull up ski leg
2. Steering arm in place

Remove seal and O-rings. Drive out bushing if worn out.

### 15, Leg Housing

Unbolt leg housing. Keep shim(s) no. 18 for further installation. Using a pry bar spread clamp and pull up leg housing.



## Section 07 STEERING/FRONT SUSPENSION

### Sub-Section 03 (SUSPENSION AND SKI SYSTEM)



TYPICAL

## INSPECTION

### 13, Ski Leg

Check straightness of ski leg. Check for scored or scratched surface. Replace as required.

### 5, Stopper

Check condition of stopper. Replace it when deteriorated.

### Grease Fitting

Ensure that grease fittings are not clogged.

### 10, Stopper

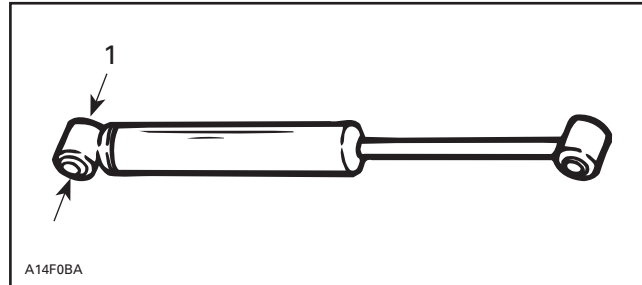
Check stopper for crack or deterioration. Replace as required.

### 13, Ski Leg

Check that splines on ski leg and steering arm interlock properly with no excessive free play. Renew as necessary.

## 8, Shock Absorber

Secure the shock body end in a vise with its rod upward.



1. Clamp

## ▼ CAUTION

Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke with its rod upward. Check that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a defective shock:

- A skip or a hang back when reversing stroke at mid travel.
- Seizing or binding condition except at extreme end of either stroke.
- Oil leakage.
- A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

## INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply low temperature grease (P/N 413 7061 00) as illustrated in exploded view above.

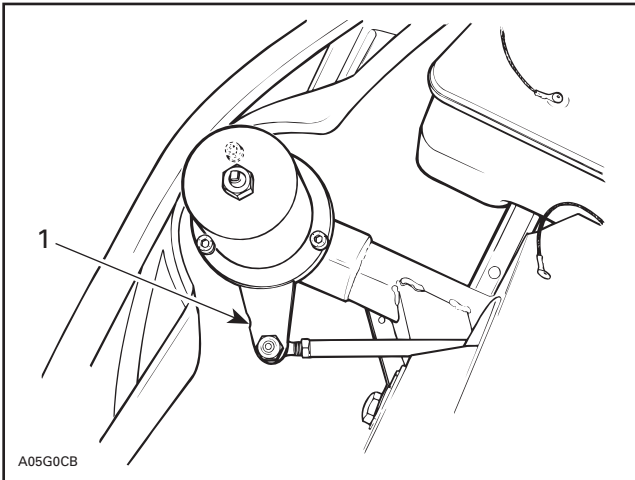
Tighten nuts and screws to proper torque as mentioned in exploded view.

Steering arm with the bent angle toward the bottom.

---

**Section 07 STEERING/FRONT SUSPENSION**  
Sub-Section 03 (SUSPENSION AND SKI SYSTEM)

---



*TYPICAL*

1. *Bent angle toward the bottom*

**16,17, Seal**

Install seal before reinstalling ski leg.

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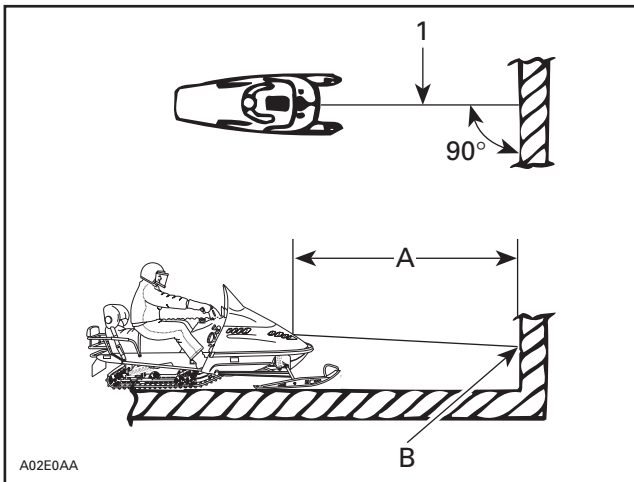
# BODY

## INSTALLATION AND ADJUSTMENT

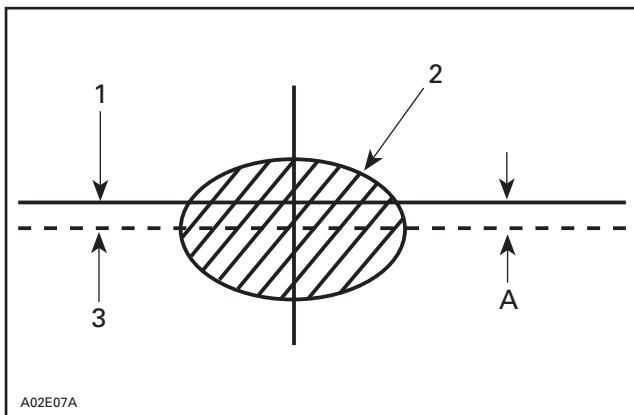
### HEADLAMP BEAM AIMING

Beam aiming is correct when center of high beam is 25 mm (1 in) below the headlamp horizontal center line, scribed on a test surface, 381 cm (12 ft 6 in) away.

Measure headlamp center distance from ground. Scribe a line at this height on test surface (wall or screen). Light beam center should be 25 mm (1 in) below scribed line.



- 1. Headlamp center line
- A. 381 cm (12 ft 6 in)
- B. 25 mm (1 in) below center line



- 1. Headlamp horizontal
- 2. Light beam (high beam) (projected on the wall)
- 3. Light beam center
- A. 25 mm (1 in)

### Required Conditions

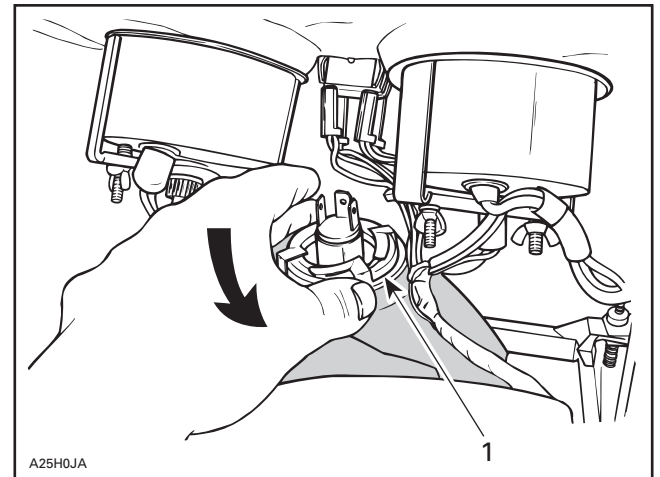
Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

Rider or equivalent weight must be on the vehicle.

Select **high beam**.

### BULB REPLACEMENT

If headlamp bulb is burnt, tilt cab and unplug the connector from the headlamp. Remove the rubber boot and unfasten the bulb retainer clips or locking ring.



### TYPICAL

- 1. Locking ring

Replace bulb. If the taillight bulb is burnt, expose the bulb by removing red plastic lens. To remove, unscrew the 2 retaining screws. Verify all lights after replacement.

### ▼ CAUTION

Never touch glass portion of an halogen bulb with bare fingers, as it shortens its operating life. If by mistake glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

## Section 08 BODY/FRAME

### Sub-Section 02 (BODY)

## DECAL

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.



### CAUTION

Do not apply isopropyl alcohol or solvent directly on decals.

## WINDSHIELD INSTALLATION

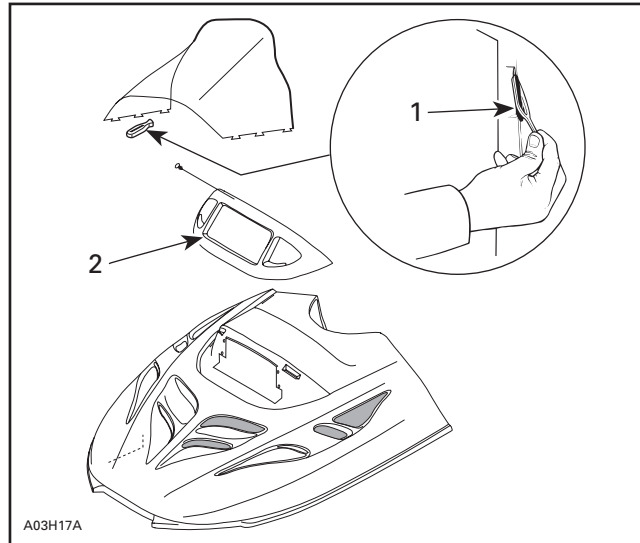
When peeling off the protective film some polyethylene particles may remain on the windshield. A soft clean cloth moistened with naphtha (camping equipment fuel) will easily remove the remaining particles.



### WARNING

Naphtha is flammable and explosive under certain conditions. Always manipulate in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity.

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 latches as shown.



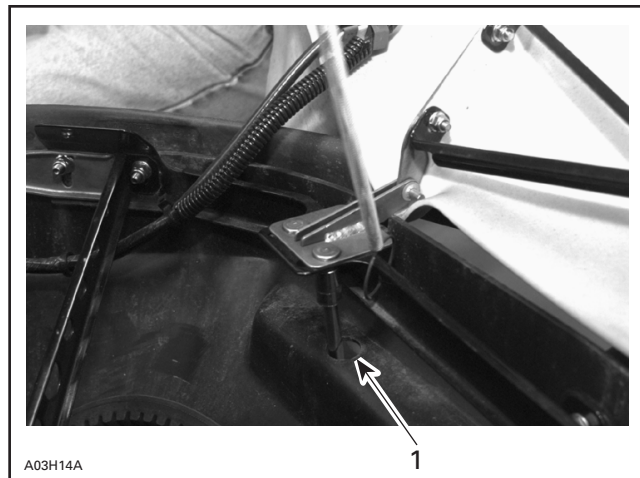
#### S-SERIES

1. Latch
2. Temporary remove headlamp molding for windshield installation

## HOOD

### S-Series

Working from within engine compartment, remove exterior nuts retaining both hinges. Then, close hood and remove interior nuts through the access holes.



1. Access hole

At installation, loosely install nuts, close hood then adjust before tightening interior nuts through access holes.

## BELT GUARD

### Disassembly and Assembly

○ NOTE: For additional information (ex.: exploded view) refer to the correspondent parts catalog.

#### ◆ WARNING

Engine should be running only with belt guard and/or pulley guard well secured in place.

### Inspection

#### **All Models**

Check belt guard and/or pulley guard mounting bosses, clips and retainers for wear.

## WIRING HARNESS

#### ◆ WARNING

Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

## CABLES

#### ◆ WARNING

Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating, or vibrating parts.

## PIPING

#### ◆ WARNING

Always ensure that the fuel, vent, primer, impulse, injection oil and rotary valve oil lines are properly fixed to their connectors, that they are not perforated or kinked and that they are properly routed away from any rotating, moving, heating or vibrating parts. Also check for leaks. Replace if required.

○ NOTE: Refer to proper *Parts Catalog* to find suitable clip part numbers.

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## Section 08 BODY/FRAME

### Sub-Section 02 (BODY)

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## PLASTIC MAINTENANCE AND REPAIR

### MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

To clean use a soft clean cloth and either soapy water or isopropyl alcohol.

To remove grease, oil or glue use isopropyl alcohol.

**▼ CAUTION**

Do not apply isopropyl alcohol or acetone directly on decals.

**▼ CAUTION**

The following products must not be used to clean or wax any of the plastic components used on the vehicles:

- gasoline
- brake fluid
- kerosene
- diesel fuel
- lighter fluid
- varsol
- naphtha
- acetone
- strong detergents
- abrasive cleaners
- waxes containing an abrasive or a cleaning agent in their formula

**▼ CAUTION**

Clean R.I.M. Metton® with isopropyl alcohol only. Never use cleaners or products containing chlorine.

Apply wax on glossy finish only. Protect the vehicle with a cover to prevent dust accumulation during storage.

**▼ CAUTION**

If for some reason the snowmobile has to be stored outside it is preferable to cover it with an opaque tarpaulin. This will prevent the sun rays from affecting the plastic components and the vehicle finish.

## REPAIR

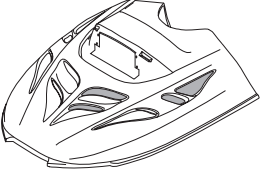
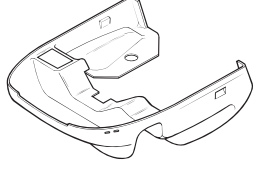
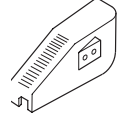
The very first step before repairing plastic materials is to find out exactly which type of material is involved. Refer to following chart.

**▼ CAUTION**

Consult chart and repair kit instructions carefully, some repair products are not compatible with certain plastics.

**◆ WARNING**

Polycarbonate windshields must never be repaired by welding or otherwise.

PART	MODEL	REPAIRABLE		
		FIBERGLASS	R.I.M. URETHANE	POLYETHYLENE
<b>HOOD</b>  <small>A06H194</small>	Skandic WT/SWT/WT LC			
	S-Series			
<b>BOTTOM PAN</b>  <small>A06H1A4</small>	Skandic WT/SWT/WT LC S-Series			
<b>SIDE PANEL AND REAR MOLDING</b>  <small>A06H1B4</small>	S-Series			



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## Section 08 BODY/FRAME

### Sub-Section 02 (BODY)

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## MATERIAL REPAIR PROCEDURE

### Fiberglass

This material is repairable and repaintable, using any one of several kits available on the market.

### R.I.M. Urethane

R.I.M. Urethane is light colored (tan) on the inside with a smooth surface.

#### ◆ WARNING

Material should be repaired and repainted in a well ventilated area only.

#### ▼ CAUTION

Clean R.I.M. with isopropyl alcohol or Crest Hi-Solv product. **Never** use cleaners or products that contain **chlorine**.

#### ▼ CAUTION

R.I.M. should never be exposed to temperatures exceeding 93°C (200°F).

○ **NOTE:** When working on a R.I.M. surface, never use a grinder or a high revolution tool such as an air or electric buffer. Use of such tools could overheat material and liberate agents in it thus causing a bad adhesion.

## REPAIR PROCEDURE FOR R.I.M. URETHANE

### Small Scratches

- Sand and scuff area.
- Feather out edges.
- Paint with a matching acrylic auto touch-up paint.

### Deep Scratches

- Sand and scuff area.
- Make a V groove using a knife or a rough round file.
- Clean surface with isopropyl alcohol or Crest Hi-Solv stock no. AH-S product.
- Cover with TP-E epoxy mixed in equal quantities.

- Heat the surface with a heater lamp placed at 38 cm (15 in) for a period of 15 minutes.
- Sand the repair using a smooth dry sand paper.
- Use the same product if a final finish is required.
- Clean surface with Crest Hi-Solv product.
- Apply a flexible primer such as Crest Prima Flex stock no. AP-F.
- Wait 10 minutes.
- Repaint (air dry during 72 hours (approximately)).

### Large Crack

- Sand and scuff outside and inside area by exceeding it 31.7 mm (1-1/4 in) on each side and 12.7 mm (1/2 in) at each end.
- Make a V groove (appr. 90°) on both sides of hood using a knife or a rough round file.
- Enlarge the crack to 2.4 mm (3/32 in) – 3.2 mm (1/8 in) using a sharp knife.
- Clean outside and inside surface with isopropyl alcohol or Crest Hi-Solv product.
- Repair inside surface first.
- Cover inside area with Crest TP-E epoxy.
- Apply a 50 mm × 30 mm (2 in × 1-1/4 in) patch. If no room for the patch, use tape.
- Cover exterior surface with same product. Damaged area should be slightly higher.
- Heat surface with a heater lamp placed at 38 mm (15 in) for a period of 15 minutes.
- Sand outside repair using a smooth dry sand paper.
- Use same product if a final finish is required.
- Apply a flexible primer.
- Wait 10 minutes.
- Repaint (air dry during 72 hours approximately).

○ **NOTE:** Both R.I.M. materials are high static plastics, painting must be done in a dust free area such as a paint booth.

**Section 08 BODY/FRAME****Sub-Section 02 (BODY)****CREST MAIN OFFICE AND MANUFACTURING PLANT**

**CREST INDUSTRIES, INC.**  
 3841 13<sup>th</sup> Street  
 Wyandotte, Michigan  
 48192

Phone: 313-283-4100  
 Toll Free: 1-800-822-4100  
 Fax: 1-800-344-4461  
 Fax: 313-283-4461

Crest products used in R.I.M. repair procedure are available from following locations:

**DISTRIBUTOR WAREHOUSE LOCATIONS**

<b>UNITED STATES</b>		<b>CANADA</b>
<p><b>CREST EAST COAST, INC.</b>            P.O. Box 550            1109 Industrial Parkway            Brick, New Jersey 08723            Phone: 908-458-9000            Fax: 908-458-5753</p> <p><b>CREST PRODUCTS, INC.</b>    <i>Shipping Address:</i>            125 Production Drive            Yorktown, Virginia 23693            Phone: 804-599-6572            Virginia: 1-800-572-5025            Outstate: 1-800-368-5033            Fax: 804-599-6630</p> <p><i>Mailing Address:</i>            P.O. Box 2018            Grafton, Virginia 23692</p> <p><b>CREST INDUSTRIES SOUTHEAST, INC.</b>    <i>Shipping Address:</i>            4300 Glen Haven Drive            Decatur, Georgia 30035            Phone: 404-288-4658            Toll Free: 1-800-552-0876            Fax: 404-288-4658</p> <p><i>Mailing Address:</i>            P.O. Box 254            Decatur, Georgia 30031</p>	<p><b>CREST INDUSTRIES, INC. (CREST MID-WEST)</b>              231 Larkin Williams Ind. Court            St. Louis, Missouri 63026            Phone: 314-349-4800            Toll Free: 1-800-733-2737            Fax: 314-349-4888            Toll Free Fax: 1-800-776-2737</p> <p><b>CREST MID WEST Regional Branch Warehouses</b>    <b>CREST INDUSTRIES, INC.</b>            P.O. Box 635            Mountain Home, Arkansas 72653            Phone: 501-491-5583            Toll Free: 1-800-733-2737</p> <p>4200 Jackson Street, Unit 9            Denver, Colorado 80216            Phone: 303-320-3900            Toll Free: 1-800-733-2737            Fax: 303-320-6509</p> <p><b>REM-CO DISTRIBUTING, INC.</b>              5625 S. Adams            Tacoma, Washington 98409            Phone: 206-474-5414            Toll Free: 1-800-735-7224            Fax: 206-474-7339</p>	<p><b>J2 PRODUCTS</b>            A Division of Sawill Ltd.              54 Audia Court, Unit 2A            Concord, Ontario, L4K 3N4</p> <p><i>Phone:</i>  <i>Toronto:</i> 416-665-1404  <i>Concord:</i> 905-669-9410  <i>Montréal:</i> 514-655-6505</p> <p><i>Fax:</i>            Concord: 905-669-9419            Montréal: 514-655-6505</p> <p><b>WHEEL-IN AUTOMOTIVE SUPPLY</b>    <i>Shipping Address:</i>            # 1, 3911A Brandon St. S.E.            Calgary, Alberta, T2G 4A7</p> <p>Office: 403-287-0775</p> <p><i>Mailing Address:</i>            P.O. Box 40036            929-42nd Avenue S.E.            Calgary, Alberta, T2G 5G5</p>

# FRAME

## FRAME CLEANING

**NOTE:** For aluminum frames use only aluminum cleaner and follow instructions on container. (Dursol cleaner or equivalent).

Clean frame and tunnel with appropriate cleaners and rinse with high pressure hose.

Touch up all metal spots where paint has been scratched off. Spray all bare metal parts of vehicle with metal protector.

## Seat Cleaning

For all models, it is recommend to clean the seat with a solution of **warm soapy water**, using a soft clean cloth.

### ▼ CAUTION

Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

## FRAME WELDING

Steel Frame:

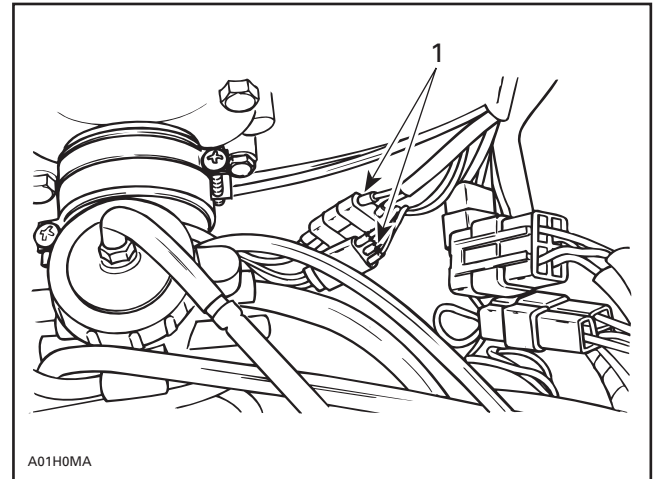
- electric welding
- amperage: 70-110 A
- voltage: 20-24 V
- rod: E-7014 (3/32 in)

Aluminum Frame: (refer to specialized welding shop)

- argon-oxygen/acetylene welding
- rod: ER-4043 (3/32 in)

### ▼ CAUTION

Before performing electrical welding anywhere on the vehicle, unplug the multiple connector at the electronic box. On models equipped with a battery, also unplug the negative cable. This will protect the electronic box and battery against damage caused by flowing current when welding.



TYPICAL

1. Unplug before electrical welding

### ▼ CAUTION

If welding is to be done near plastic material, it is recommended to either remove the part from the area or to protect it with aluminum foil to prevent damage.

## FRAME COMPONENT REPLACEMENT

### S-Series

### Drilling Procedure

When drilling self-piercing rivets, use Supertanium™ drill bit (P/N 529 0318 00), available in a 5 mm (3/16 in) size and shipped in packs of 2.

For proper drilling instructions and to prevent premature wear, follow the procedure below.

Always use a variable speed electric drill.

It is not necessary to center punch the rivet head, simply center the drill bit on the rivet and drill.

Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

**NOTE:** To increase bit life, use Bombardier synthetic chaincase oil (P/N 413 8033 00) as a cutting oil.

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## Section 08 BODY/FRAME

### Sub-Section 03 (FRAME)

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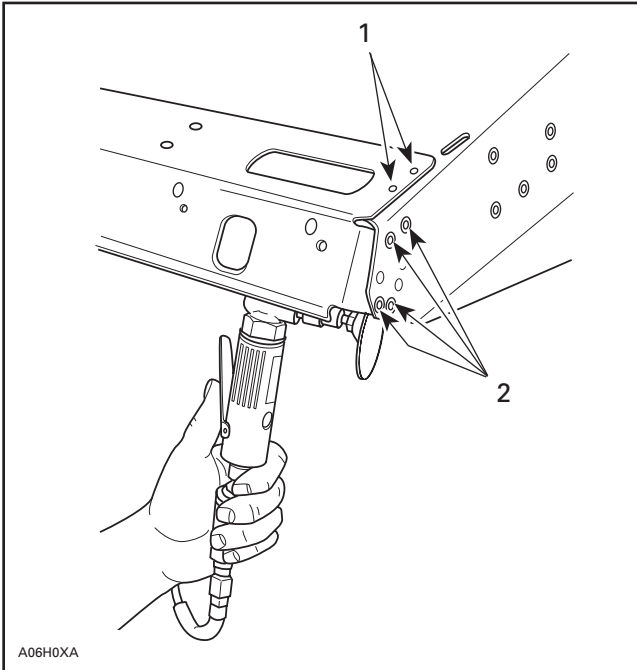
▼ **CAUTION**

High speed drilling will cause excessive heat which may destroy the cutting edge of the bit, therefore avoid using pneumatic drills.

## Grinding Procedure

### Rear Cap

Grind rivet heads from top of rear cap and underneath for side retaining rivets.



1. Rivets heads ground
2. Rivets to be ground from underneath

To remove rivet, strike with a punch from rivet head side.

Make a chamfer from underneath on all 4 corner holes.

# TECHNICAL DATA

## SI\* METRIC INFORMATION GUIDE

BASE UNITS			
DESCRIPTION	UNIT	SYMBOL	
length .....	meter .....	m	
mass .....	kilogram .....	kg	
force .....	newton .....	N	
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 .....	0.01
milli .....	m .....	one thousandth .....	0.001
micro .....	μ .....	one millionth .....	0.000001

CONVERSION FACTORS			
TO CONVERT	TO †	MULTIPLY BY	
in .....	mm .....	25.4	
in .....	cm .....	2.54	
in <sup>2</sup> .....	cm <sup>2</sup> .....	6.45	
in <sup>3</sup> .....	cm <sup>3</sup> .....	16.39	
ft .....	m .....	0.3	
oz .....	g .....	28.35	
lb .....	kg .....	0.45	
lbf .....	N .....	4.4	
lbf•in .....	N•m .....	0.11	
lbf•ft .....	N•m .....	1.36	
lbf•ft .....	lbf•in .....	12	
PSI (lbf/in <sup>2</sup> ) .....	kPa .....	6.89	
imp. oz .....	U.S. oz .....	0.96	
imp. oz .....	mL .....	28.41	
imp. gal .....	U.S. gal .....	1.2	
imp. gal .....	L .....	4.55	
U.S. oz .....	mL .....	29.57	
U.S. gal .....	L .....	3.79	
MPH .....	km/h .....	1.61	
Fahrenheit .....	Celsius .....	(°F – 32) ÷ 1.8	
Celsius .....	Fahrenheit .....	(°C × 1.8) + 32	

\*The international system of units abbreviates SI in all languages.







†To obtain the inverse sequence, divide by the given factor. To convert "mm" to "in", divide by 25.4.



**NOTE:** Conversion factors are rounded off to 2 decimals for easier use.







## Section 09 TECHNICAL DATA

### Sub-Section 02 (ENGINES)

		VEHICLE MODEL	MX Z 440 F	MX Z 440	MX Z 583	MX Z 670	
		ENGINE TYPE	443	454	583	670	
	Number of Cylinders		2	2	2	2	
	Bore		67.5 (2.6575)	67.5 (2.6575)	76.0 (2.992)	78.0 (3.071)	
	Stroke		61.0 (2.402)	61.0 (2.402)	64.0 (2.520)	70.0 (2.760)	
	Displacement		436.6 (26.64)	436.6 (26.6)	580.7 (35.44)	668.97 (40.82)	
	Compression Ratio (corrected)		6.4	6.6	6.7	6.2	
	Maximum Power Engine Speed ①		± 100 RPM	7000	8000	7900	7700
	Piston Ring Type		1 <sup>st</sup> /2 <sup>nd</sup>	ST/R	ST/R	ST/N.A.	ST/R
	Ring End Gap	new	mm (in)	0.2 (.008)	0.25 (.010)	0.25 (.010)	0.25 (.010)
		wear limit	mm (in)	1.0 (.039)	1.0 (.040)	1.0 (.040)	1.0 (.040)
	Ring/Piston Groove Clearance	new	mm (in)	0.04 (.0016)	0.04 (.0016)	0.04 (.0016)	0.04 (.0016)
		wear limit	mm (in)	0.2 (.0079)	0.2 (.0079)	0.2 (.0079)	0.2 (.0079)
	Piston/Cylinder Wall Clearance	new	mm (in)	0.06 (.0024)	0.1 (.0039)	0.11 (.0043)	0.08 (.0031)
		wear limit	mm (in)	0.2 (.008)	0.15 (.0059)	0.15 (.0059)	0.15 (.0059)
	Connecting Rod Big End Axial Play	new	mm (in)	0.2 (.0079)	0.39 (.0154)	0.39 (.0156)	0.39 (.0156)
		wear limit	mm (in)	1.0 (.0394)	1.2 (.0472)	1.2 (.0472)	1.2 (.0472)
Maximum Crankshaft End-play ②		mm (in)	0.3 (.0118)	0.3 (.0118)	0.3 (.012)	0.3 (.012)	
Maximum Crankshaft Deflection		mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0032)	0.08 (.0032)	
Rotary Valve Timing ③ and P/N 420 924 XXX		Opening Closing	N.A.	146° – 65° 502	140° – 71° 502	145° – 71° 500	
	Magneto Generator Output		W	240	220	220	
	Ignition Type			CDI	CDI	CDI	CDI
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES	NGK BR9ES
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)	0.45 (.018)
	Ignition Timing BTDC ④		mm (in)	1.68 (.066)	1.48 (.058)	1.75 (.069)	1.75 (.069)
	Trigger Coil ⑤		Ω	140 – 180	190 – 300	190 – 300	190 – 300
	Generating Coil ⑤		Ω	230 – 330	10 – 17	10 – 17	10 – 17
	Lighting Coil ⑤		Ω	0.23 – 0.28	0.2 – 0.35	0.2 – 0.35	0.2 – 0.35
	High Tension Coil ⑤	Primary	Ω	N.A.	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7
		Secondary	kΩ	5.1 – 6.3	8 – 16	8 – 16	8 – 16
	Carburetor Type		PTO/MAG	VM 34-479/480	VM 34-492/493	VM 40 92/93	VM 40 94/95
	Main Jet		PTO/MAG	205/195	240/210	280/260	300/270
	Needle Jet			159 P-0	159 P-8	224-AA2	224 AA-2
	Pilot Jet			35	40	60	60
	Needle Identification – Clip Position			6DH2-3	6FJ43-2	7ECY1-3	7EDY1-3
	Slide Cut-away			2.5	2.5	2.5	2.5
	Float Adjustment		± 1 mm (± .040 in)	23.9 (.94)	23.9 (.94)	18.1 (.71)	18.1 (.71)
	Air Screw Adjustment		± 1/16 Turn	1-1/2	0.5	2	2.25
	Idle Speed RPM		± 200 RPM	1650	1700	1800	1700
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87	Unleaded/87
	Gas/Oil Ratio			Injection	Injection	Injection	Injection
	Type			Axial Fan	Liquid	Liquid	Liquid
	Axial Fan Belt Adjustment	Deflection ⑥	mm (in)	8 – 9 (.31 – .35)	N.A.	N.A.	N.A.
		Force	kg (lbF)	5 (11)	N.A.	N.A.	N.A.
	Thermostat Opening Temperature		°C (°F)	N.A.	42 (108)	42 (108)	42 (108)
Radiator Cap Opening Pressure		kPa (PSI)	N.A.	90 (13)	90 (13)	90 (13)	
	Drive Pulley Retaining Screw			⑦	⑦	⑦	⑦
	Exhaust Manifold Nuts or Bolts			22 (16)	23 (17)	23 (17)	23 (17)
	Magneto Ring Nut			105 (77)	125 (92)	125 (92)	125 (92)
	Crankcase Nuts or Screws	M6	10 (7)	9 (6.5)	9 (6.5)	9 (6.5)	9 (6.5)
		M8	22 (16)	29 (21)	29 (21)	29 (21)	29 (21)
	Crankcase/Engine Support Nuts or Screws			38 (28)	40 (29)	40 (29)	40 (29)
	Cylinder Head Nuts			22 (16)	29 (21)	29 (21)	29 (21)
	Crankcase/Cylinder Nuts or Screws			N.A.	29 (21)	29 (21)	29 (21)
Axial Fan Shaft Nut			50 (37)	N.A.	N.A.	N.A.	







# Section 09 TECHNICAL DATA

## Sub-Section 02 (ENGINES)

		VEHICLE MODEL	FORMULA 500	FORMULA 500 DELUXE	FORMULA 583	FORMULA Z		
		<b>ENGINE TYPE</b>	<b>494</b>	<b>454</b>	<b>583</b>	<b>583</b>		
		Number of Cylinders	2	2	2	2		
		Bore mm (in)	69.5 (2.736)	69.5 (2.736)	76.0 (2.992)	76.0 (2.992)		
		Stroke mm (in)	65.8 (2.59)	65.8 (2.59)	64.0 (2.52)	64.0 (2.52)		
		Displacement cm <sup>3</sup> (in <sup>3</sup> )	499.3 (30.47)	499.3 (30.47)	580.7 (35.44)	580.7 (35.44)		
		Compression Ratio (corrected)	6.8	6.8	6.7	6.7		
		Maximum Power Engine Speed ① ± 100 RPM	7750	7750	7900	7900		
		Piston Ring Type 1 <sup>st</sup> /2 <sup>nd</sup>	ST/R	ST/R	ST/N.A.	ST/N.A.		
		Ring End Gap	new mm (in)	0.25 (.010)	0.25 (.010)	0.25 (.010)		
			wear limit mm (in)	1.0 (.040)	1.0 (.040)	1.0 (.040)		
		Ring/Piston Groove Clearance	new mm (in)	0.04 (.0016)	0.04 (.0016)	0.04 (.0016)		
			wear limit mm (in)	0.2 (.008)	0.2 (.008)	0.2 (.008)		
		Piston/Cylinder Wall Clearance	new mm (in)	0.11 (.0043)	0.11 (.0043)	0.11 (.0043)		
			wear limit mm (in)	0.15 (.006)	0.15 (.006)	0.15 (.006)		
		Connecting Rod Big End Axial Play	new mm (in)	0.39 (.0156)	0.39 (.0156)	0.39 (.0156)		
			wear limit mm (in)	1.2 (.048)	1.2 (.048)	1.2 (.048)		
		Maximum Crankshaft End-play ② mm (in)	0.3 (.0120)	0.3 (.0120)	0.3 (.012)	0.3 (.012)		
		Maximum Crankshaft Deflection mm (in)	0.08 (.0032)	0.08 (.0032)	0.08 (.0032)	0.08 (.0032)		
		Rotary Valve Timing ③ and P/N 420 924 XXX	Opening 135° – 64° Closing 509	135° – 64° 509	140° – 71° 502	140° – 71° 502		
		Magneto Generator Output W	220	220	220	220		
		Ignition Type		CDI	CDI	CDI	CDI	
		Spark Plug Make and Type		NGK BR9ES	NGK BR9ES	NGK BR9ES	NGK BR9ES	
		Spark Plug Gap mm (in)		0.45 (.018)	0.45 (.018)	0.45 (.018)	0.45 (.018)	
		Ignition Timing BTDC ④ mm (in)		1.81 (.071)	1.81 (.071)	1.75 (.069)	1.75 (.069)	
		Trigger Coil ⑤ Ω		190 – 300	190 – 300	190 – 300	190 – 300	
		Generating Coil ⑤ Ω		10 – 17	10 – 17	10 – 17	10 – 17	
		Lighting Coil ⑤ Ω		0.20 – 0.35	0.20 – 0.35	0.20 – 0.35	0.20 – 0.35	
		High Tension Coil ⑤		Primary Ω	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7
				Secondary kΩ	8 – 16	8 – 16	8 – 16	8 – 16
		Carburetor Type PTO/MAG	VM 38 345/346	VM 38 345/346	VM 38 349/350	VM 40 88/89		
		Main Jet PTO/MAG		310/290	310/290	280/270	280/260	
		Needle Jet		480-P3	480-P3	480-Q6	224 AA-2	
		Pilot Jet		50	50	50	60	
		Needle Identification – Clip Position		6FEY1-3	6FEY1-3	6BGY15-4	7ECY1-3	
		Slide Cut-away		2.5	2.5	2.5	2.5	
		Float Adjustment ± 1 mm (± .040 in)		18.1 (.71)	18.1 (.71)	18.1 (.71)	18.1 (.71)	
		Air Screw Adjustment ± 1/16 Turn		1.5	1.5	2.25	2.25	
		Idle Speed RPM ± 200 RPM		1800	1800	1800	1800	
		Gas Type/Pump Octane Number		Unleaded/87	Unleaded/87	Unleaded/87	Unleaded/87	
		Gas/Oil Ratio		Injection	Injection	Injection	Injection	
		Type		Liquid	Liquid	Liquid	Liquid	
		Axial Fan Belt Adjustment	Deflection ⑥ mm (in)	N.A.	N.A.	N.A.		
			Force kg (lbf)	N.A.	N.A.	N.A.		
		Thermostat Opening Temperature °C (°F)	42 (108)	42 (108)	42 (108)	42 (108)		
		Radiator Cap Opening Pressure kPa (PSI)	90 (13)	90 (13)	90 (13)	90 (13)		
		Drive Pulley Retaining Screw	⊘	⊘	⊘	⊘		
		Exhaust Manifold Nuts or Bolts		23 (17)	23 (17)	23 (17)	23 (17)	
		Magneto Ring Nut		125 (92)	125 (92)	125 (92)	125 (92)	
		Crankcase Nuts or Screws		M6	9 (6.5)	9 (6.5)	9 (6.5)	
				M8	29 (21)	29 (21)	23 (17)	
		Crankcase/Engine Support Nuts or Screws		40 (29)	40 (29)	40 (29)	40 (29)	
		Cylinder Head Nuts		29 (21)	29 (21)	29 (21)	29 (21)	
		Crankcase/Cylinder Nuts or Screws		29 (21)	29 (21)	29 (21)	29 (21)	
		Axial Fan Shaft Nut	N.A.	N.A.	N.A.	N.A.		

## Section 09 TECHNICAL DATA







### Sub-Section 02 (ENGINES)

		VEHICLE MODEL	SUMMIT 500	SUMMIT 583	SUMMIT 670	GRAND TOURING 500	
		<b>ENGINE TYPE</b>	<b>494</b>	<b>583</b>	<b>670</b>	<b>494</b>	
	Number of Cylinders		2	2	2	2	
	Bore		69.5 (2.736)	76.0 (2.992)	78.0 (3.071)	69.5 (2.736)	
	Stroke		65.8 (2.59)	64.0 (2.520)	70.0 (2.760)	65.8 (2.59)	
	Displacement		499.3 (30.47)	580.7 (35.44)	668.97 (40.82)	499.3 (30.47)	
	Compression Ratio (corrected)		6.8	6.7	6.2	6.8	
	Maximum Power Engine Speed ①		± 100 RPM	7750	7800	7700	7800
	Piston Ring Type		1 <sup>st</sup> /2 <sup>nd</sup>	ST/R	ST/N.A.	ST/R	ST/R
	Ring End Gap	new	mm (in)	0.25 (.010)	0.25 (.010)	0.25 (.0098)	0.25 (.010)
		wear limit	mm (in)	1.0 (.040)	1.0 (.040)	1.0 (.0394)	1.0 (.040)
	Ring/Piston Groove Clearance	new	mm (in)	0.04 (.0016)	0.04 (.0016)	0.04 (.0016)	0.04 (.0016)
		wear limit	mm (in)	0.2 (.0079)	0.2 (.0079)	0.2 (.0079)	0.2 (.0079)
	Piston/Cylinder Wall Clearance	new	mm (in)	0.11 (.0043)	0.05 (.0020)	0.08 (.0031)	0.11 (.0043)
		wear limit	mm (in)	0.15 (.006)	0.15 (.0059)	0.15 (.0059)	0.15 (.006)
	Connecting Rod Big End Axial Play	new	mm (in)	0.39 (.0156)	0.39 (.0154)	0.39 (.0154)	0.39 (.0154)
		wear limit	mm (in)	1.2 (.048)	1.2 (.0472)	1.2 (.0472)	1.2 (.048)
Maximum Crankshaft End-play ②		mm (in)	0.3 (.012)	0.3 (.0118)	0.3 (.0118)	0.3 (.012)	
Maximum Crankshaft Deflection		mm (in)	0.08 (.0032)	0.08 (.0031)	0.08 (.0031)	0.08 (.0032)	
Rotary Valve Timing ③ and P/N 420 924 XXX		Opening Closing	135° – 64° 509	135° – 64° 509	145° – 71° 500	135° – 64° 509	
	Magneto Generator Output		W	220	220	220	
	Ignition Type			CDI	CDI	CDI	
	Spark Plug Make and Type			NGK BR9ES	NGK BR9ES	NGK BR9ES	
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)	
	Ignition Timing BTDC ④		mm (in)	1.81 (.071)	1.75 (.069)	1.93 (.076)	
	Trigger Coil ⑤		Ω	190 – 300	190 – 300	190 – 300	
	Generating Coil ⑤		Ω	10 – 17	10 – 17	10 – 17	
	Lighting Coil ⑤		Ω	0.20 – 0.35	0.20 – 0.35	0.20 – 0.35	
	High Tension Coil ⑤	Primary	Ω	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7	
Secondary		kΩ	8 – 16	8 – 16	8 – 16		
	Carburetor Type		PTO/MAG	VM 38 (HAC) 363/364	VM 38 (HAC) 365/366	VM 40 (HAC) 90/91	
	Main Jet		PTO/MAG	400/380	340/330	380/370	
	Needle Jet			480-Q0	480 Q-6	224 AA-4	
	Pilot Jet			75	75	50	
	Needle Identification – Clip Position			6FEY1-3	6BGY15-4	7DP11-3	
	Slide Cut-away			2.5	2.5	2.5	
	Float Adjustment		± 1 mm (± .040 in)	18.1 (.71)	18.1 (.71)	18.1 (.71)	
	Air Screw Adjustment		± 1/16 Turn	2.0	2.25	2.25	
	Idle Speed RPM		± 200 RPM	1800	1900	1800	
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87	
Gas/Oil Ratio			Injection	Injection	Injection		
	Type			Liquid	Liquid	Liquid	
	Axial Fan Belt Adjustment	Deflection ⑥	mm (in)	N.A.	N.A.	N.A.	
		Force	kg (lbf)	N.A.	N.A.	N.A.	
	Thermostat Opening Temperature		°C (°F)	42 (108)	42 (108)	42 (108)	
Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	90 (13)	90 (13)		
	<b>ENGINE COLD</b> N·m (lb·ft)	Drive Pulley Retaining Screw		⑦	⑦	⑦	
		Exhaust Manifold Nuts or Bolts		23 (17)	23 (17)	23 (17)	
		Magneto Ring Nut		125 (92)	125 (92)	125 (92)	
		Crankcase Nuts or Screws		M6 M8	9 (6.5) 29 (21)	9 (6.5) 29 (21)	9 (6.5) 23 (17)
		Crankcase/Engine Support Nuts or Screws			40 (29)	40 (29)	40 (29)
		Cylinder Head Nuts			29 (21)	29 (21)	29 (21)
		Crankcase/Cylinder Nuts or Screws			29 (21)	29 (21)	29 (21)
		Axial Fan Shaft Nut			N.A.	N.A.	N.A.








# Section 09 TECHNICAL DATA

## Sub-Section 02 (ENGINES)

		VEHICLE MODEL	GRAND TOURING 583	SKANDIC WT/SWT	SKANDIC WT LC		
		ENGINE TYPE	583	503	494		
	Number of Cylinders		2	2	2		
	Bore		76.0 (2.992)	72.0 (2.835)	69.5 (2.736)		
	Stroke		64.0 (2.52)	61.0 (2.402)	65.8 (2.59)		
	Displacement		580.7 (35.44)	496.7 (30.31)	499.3 (30.47)		
	Compression Ratio (corrected)		6.7	6.2	6.8		
	Maximum Power Engine Speed ①		± 100 RPM	7900	6500	6800	
	Piston Ring Type		1 <sup>st</sup> /2 <sup>nd</sup>	ST/N.A.	ST/R	ST/R	
	Ring End Gap	new	mm (in)	0.25 (.010)	0.2 (.0079)	0.25 (.010)	
		wear limit	mm (in)	1.0 (.040)	1.0 (.0394)	1.0 (.040)	
	Ring/Piston Groove Clearance	new	mm (in)	0.04 (.0016)	0.04 (.0016)	0.04 (.0016)	
		wear limit	mm (in)	0.2 (.0079)	0.2 (.0079)	0.2 (.0079)	
	Piston/Cylinder Wall Clearance	new	mm (in)	0.11 (.0045)	0.9 (.0035)	0.11 (.0043)	
		wear limit	mm (in)	0.15 (.0059)	0.2 (.0079)	0.15 (.006)	
	Connecting Rod Big End Axial Play	new	mm (in)	0.39 (.0154)	0.2 (.0079)	0.39 (.0154)	
		wear limit	mm (in)	1.2 (.0480)	1.0 (.0394)	1.2 (.048)	
Maximum Crankshaft End-play ②		mm (in)	0.3 (.0120)	0.3 (.0118)	0.3 (.012)		
Maximum Crankshaft Deflection		mm (in)	0.08 (.0032)	0.08 (.0031)	0.08 (.0032)		
Rotary Valve Timing ③ and P/N 420 924 XXX		Opening Closing	140° – 71° 502	N.A.	148° – 52° 509		
	Magneto Generator Output		W	220	240	220	
	Ignition Type			CDI	CDI	CDI	
	Spark Plug Make and Type			NGK BR9ES	NGK BR8ES	NGK BR9ES	
	Spark Plug Gap		mm (in)	0.45 (.018)	0.45 (.018)	0.45 (.018)	
	Ignition Timing BTDC ④		mm (in)	1.75 (.069)	1.66 (.065)	1.81 (.071)	
	Trigger Coil ⑤		Ω	190 – 300	140 – 180	190 – 300	
	Generating Coil ⑤		Ω	10 – 17	230 – 330	10 – 17	
	Lighting Coil ⑤		Ω	0.2 – 0.35	0.23 – 0.28	0.20 – 0.35	
	High Tension Coil ⑤	Primary	Ω	0.3 – 0.7	N.A.	0.3 – 0.7	
Secondary		kΩ	8 – 16	5.1 – 6.3	8 – 16		
	Carburetor Type		PTO/MAG	VM 38 349/350	VM 32	VM 34	
	Main Jet		PTO/MAG	280/270	230	260/280	
	Needle Jet			480-Q6	159 O-0	159-P0	
	Pilot Jet			50	25	30	
	Needle Identification – Clip Position			6FEY1-3	6DH8-4	6DH4-3	
	Slide Cut-away			2.5	3.0	2.0	
	Float Adjustment		± 1 mm (± .040 in)	18.1 (.71)	23.9 (.94)	23.9 (.94)	
	Air Screw Adjustment		± 1/16 Turn	1.125	1.5	PTO 1.0/MAG 0.75	
	Idle Speed RPM		± 200 RPM	1800	1650	1900	
	Gas Type/Pump Octane Number			Unleaded/87	Unleaded/87	Unleaded/87	
	Gas/Oil Ratio			Injection	Injection	Injection	
	Type			Liquid	Axial Fan	Liquid	
	Axial Fan Belt Adjustment	Deflection ⑥	mm (in)	N.A.	9 – 10 (.35 – .39)	N.A.	
		Force	kg (lbf)	N.A.	5 (11)	N.A.	
	Thermostat Opening Temperature		°C (°F)	42 (108)	N.A.	42 (108)	
Radiator Cap Opening Pressure		kPa (PSI)	90 (13)	N.A.	90 (13)		
	ENGINE COLD N•m (lb•ft)	Drive Pulley Retaining Screw		④	⑦	⑦	
		Exhaust Manifold Nuts or Bolts		23 (17)	22 (16)	22 (16)	
		Magneto Ring Nut		125 (92)	105 (77)	125 (92)	
		Crankcase Nuts or Screws	M6	9 (6.5)	—	9 (6.5)	
			M8	23 (17)	22 (16)	21 (16)	
		Crankcase/Engine Support Nuts or Screws			40 (29)	39 (29)	40 (29)
		Cylinder Head Nuts			29 (21)	22 (16)	29 (21)
		Crankcase/Cylinder Nuts or Screws			29 (21)	N.A.	29 (21)
Axial Fan Shaft Nut			N.A.	48 (35)	N.A.		






## Section 09 TECHNICAL DATA

### Sub-Section 03 (VEHICLES)

		VEHICLE MODEL	MX Z 440 F	MX Z 440	MX Z 583	MX Z 670	
		<b>ENGINE TYPE</b>	<b>443</b>	<b>454</b>	<b>583</b>	<b>670</b>	
	Chain Drive Ratio		22/44	23/44	25/44	26/44	
	Chain	Pitch in	3/8	3/8	3/8	3/8	
		Type/Links Qty/Plates Qty		Silent/72/11	Silent 72 – 13	Silent 74 – 13	Silent 74 – 13
	Drive Pulley	Type of Drive Pulley		TRA	TRAC	TRAC	TRAC
		Ramp Identification		289 ⑤	283 ⑤	286 ⑤	286 ⑥
		Calibration Screw Position or Calibration Disc Quantity ⑤		3	3	3	3
		Spring Color		Blue/Green	Pink/White	Green/Blue	Violet/Yellow
		Spring Length $\pm 1.5$ mm ( $\pm 0.060$ in)		105.7 (4.16)	124.5 (4.9)	147.4 (5.80)	157.9 (6.22)
		Clutch Engagement $\pm 200$ RPM		3800	4400	4400	3800
	Driven Pulley Spring Preload $\pm 0.7$ kg ( $\pm 1.5$ lb)		6.1 (13.4)	7.0 (15.4)	7.0 (15.4)	5.4 – 6.8 (11.9 – 15.0)	
	Cam Angle degree		47°	44°	50°	50°	
	Pulley Distance Z $(+ 0, -1)$ mm ( $(+ 0, -1/32)$ in)		16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	
	Offset	X $\pm 0.4$ mm ( $\pm 1/64$ in)		35.0 (1-3/8)	35.0 (1-3/8)	35.0 (1-3/8)	35.0 (1-3/8)
		Y – X	MIN. – MAX. mm (in)	+ 1 (+ 0.039) + 2 (+ 0.079)	1.0 – 2.0 (0.039 – 0.079)	1.0 – 2.0 (0.039 – 0.079)	1.0 – 2.0 (0.039 – 0.079)
	Drive Belt Part Number (P/N)			414 0606 00	414 8607 00	414 8607 00	414 9182 00
	Drive Belt Width (new) ① mm (in)			34.7 (1-3/8)	34.9 (1-3/8)	34.9 (1-3/8)	35.2 (1-3/8)
	Drive Belt Adjustment	Deflection $\pm 5$ mm ( $\pm 13/64$ in)		32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
		Force ② kg (lbf)		11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width cm (in)		38.1 (15)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length cm (in)		307 (121)	307 (121)	307 (121)	307 (121)
Adjustment		Deflection mm (in)	40 – 55 (1-9/16 – 2-5/32)	40 – 55 (1-9/16 – 2-5/32)	35 – 40 (1-3/8 – 1-3/4)	35 – 40 (1-3/8 – 1-3/4)	
		Force ③ kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)	
Suspension Type		Track	SC10 Sport	SC10 XC	SC10 XC	SC10 XC	
		Ski	DSA	DSA	DSA	DSA	
	Length cm (in)		272.5 (107.3)	272.5 (107.3)	272.5 (107.3)	272.5 (107.3)	
	Width cm (in)		114.3 (45.0)	116.9 (46.0)	116.9 (46.0)	117.2 (46.1)	
	Height cm (in)		108 (42.5)	108 (42.5)	108 (42.5)	108 (42.5)	
	Ski Stance cm (in)		101.6 (40)	104.5 (41.0)	104 (41.0)	104.5 (41.0)	
	Mass (dry) kg (lb)		201 (442)	220 (485)	228 (502)	228 (502)	
	Ground Contact Area cm <sup>2</sup> (in <sup>2</sup> )		6629 (1028)	6629 (1028)	6629 (1028)	6629 (1028)	
	Ground Contact Pressure kPa (PSI)		2.97 (.437)	3.26 (.473)	3.37 (.489)	3.37 (.489)	
	Frame Material		Aluminum	Aluminum	Aluminum	Aluminum	
	Bottom Pan Material		Polyethylene	Impact Copolymer	Impact Copolymer	Impact Copolymer	
	Cab Material		RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane	
	Battery V (A•h)		N.A.	N.A.	N.A.	N.A.	
	Headlight W		H4 60/55	H4 60/55	H4 60/55	H4 60/55	
	Taillight and Stoplight W		8/27	8/27	8/27	8/27	
	Tachometer and Speedometer Bulb W		2 x 3	2 x 3	2 x 3	2 x 3	
	Fuel and Temperature Gauge Bulb W		N.A.	N.A.	N.A.	N.A.	
	Fuse	Starter Solenoid	A	N.A.	N.A.	N.A.	
		Tachometer	A	N.A.	N.A.	N.A.	
	Fuel Tank L (U.S. gal)		37 (9.8)	37.0 (9.8)	37.0 (9.8)	37.0 (9.8)	
	Chaincase/Gearbox mL (U.S. oz)		250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)	
	Cooling System L (U.S. oz)		N.A.	4.7 (159)	4.7 (159)	4.7 (159)	
	Injection Oil Reservoir L (U.S. oz)		2.55 (86)	2.8 (95)	2.8 (95)	2.8 (95)	






# Section 09 TECHNICAL DATA

## Sub-Section 03 (VEHICLES)

		VEHICLE MODEL	FORMULA 500	FORMULA 500 DELUXE	FORMULA 583	FORMULA Z	
		<b>ENGINE TYPE</b>	<b>494</b>	<b>494</b>	<b>583</b>	<b>583</b>	
		Chain Drive Ratio	23/44	23/44	25/44	25/44	
Chain	Pitch	in	3/8	3/8	3/8	3/8	
	Type/Links Qty/Plates Qty		Silent 72-11	Silent 72-11	Silent 74-11	Silent 74-13	
Drive Pulley	Type of Drive Pulley		TRAC	TRAC	TRAC	TRAC	
	Ramp Identification		281 Ⓢ	281 Ⓢ	286 Ⓢ	286 Ⓢ	
	Calibration Screw Position or Calibration Disc Quantity Ⓢ		3	3	3	3	
	Spring Color		Violet/Green	Violet/Green	Violet/Blue	Violet/Blue	
	Spring Length	± 1.5 mm (± 0.060 in)	133.5 (5.27)	133.5 (5.27)	114.6 (4.51)	114.6 (4.51)	
	Clutch Engagement	± 200 RPM	4200	4200	4100	4100	
Driven Pulley Spring Preload		± 0.7 kg (±1.5 lb)	7.0 (15.4)	7.0 (15.4)	7.0 (15.4)	7.0 (15.4)	
Cam Angle		degree	50°	50°	50°	50°	
Pulley Distance Z		(+ 0, -1) mm (+ 0, -1/32) in	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	
Offset	X	± 0.4 mm (± 1/64 in)	35.0 (1-3/8)	35.0 (1-3/8)	35.0 (1-3/8)	35.0 (1-3/8)	
	Y - X	MIN. - MAX. mm (in)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	
Drive Belt Part Number (P/N)			414 8607 00	414 8607 00	414 8607 00	414 8607 00	
Drive Belt Width (new) ①		mm (in)	34.90 (1-3/8)	34.90 (1-3/8)	34.90 (1-3/8)	34.90 (1-3/8)	
Drive Belt Adjustment	Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	
	Force ②	kg (lbf)	6.8 (15)	6.8 (15)	6.8 (15)	11.3 (25)	
Track	Width	cm (in)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	
	Length	cm (in)	307 (121)	307 (121)	307 (121)	307 (121)	
	Adjustment	Deflection	mm (in)	40 - 55 (1-9/16 - 1-11/64)	40 - 55 (1-9/16 - 1-11/64)	30 - 40 (1-9/16 - 1-3/4)	35 - 40 (1-3/8 - 1-3/4)
		Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
Suspension Type	Track		SC-10 Sport	SC-10 Sport	SC-10 Sport	SC10 HP	
	Ski		DSA	DSA	DSA	DSA	
	Length	cm (in)	272.5 (107.3)	272.5 (107.3)	272.5 (107.3)	272.5 (107.3)	
	Width	cm (in)	120.7 (47.5)	120.7 (47.5)	120.7 (47.5)	120.7 (47.5)	
	Height	cm (in)	108 (42.5)	112 (44)	108 (42.5)	108 (42.5)	
	Ski Stance	cm (in)	106.7 (42.0)	106.7 (42.0)	106.7 (42.0)	106.7 (42)	
	Mass (dry)	kg (lb)	212 (467)	228 (502)	223 (491)	227 (499)	
	Ground Contact Area	cm² (in²)	6793 (1053)	6503 (1008)	6793.4 (1053)	6793 (1053)	
	Ground Contact Pressure	kPa (PSI)	3.06 (.444)	3.29 (.477)	3.22 (.467)	3.28 (.476)	
	Frame Material		Aluminum	Aluminum	Aluminum	Aluminum	
	Bottom Pan Material		Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer	
	Cab Material		RRIM	RRIM	RRIM	RRIM Polyurethane	
	Battery	V (A•h)	N.A.	12 (22)	N.A.	N.A.	
	Headlight	W	H4 60/55	H4 60/55	H4 60/55	H4 60/55	
	Taillight and Stoplight	W	8/27	8/27	8/27	8/27	
	Tachometer and Speedometer Bulb	W	2 x 3	2 x 3	2 x 3	2 x 3	
	Fuel and Temperature Gauge Bulb	W	N.A.	N.A.	N.A.	3/3	
	Fuse	Starter Solenoid	A	N.A.	30	N.A.	N.A.
Tachometer		A	N.A.	N.A.	N.A.	N.A.	
	Fuel Tank	L (U.S. gal)	40 (10.6)	40 (10.6)	40 (10.6)	40 (10.6)	
	Chaincase/Gearbox	mL (U.S. oz)	250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)	
	Cooling System	L (U.S. oz)	4.7 (159)	4.7 (159)	4.7 (159)	4.7 (159)	
	Injection Oil Reservoir	L (U.S. oz)	2.8 (94.7)	2.8 (94.7)	2.8 (94.7)	2.8 (95)	






## Section 09 TECHNICAL DATA

### Sub-Section 03 (VEHICLES)

		VEHICLE MODEL	SUMMIT 500	SUMMIT 583	SUMMIT 670	GRAND TOURING 500	
		<b>ENGINE TYPE</b>	<b>494</b>	<b>583</b>	<b>670</b>	<b>494</b>	
	Chain Drive Ratio		22/44	22/44	23/44	23/44	
	Chain	Pitch in	3/8	3/8	3/8	3/8	
		Type/Links Qty/Plates Qty		Silent 72-11	Silent 72-13	Silent 72-13	Silent 72-11
	Drive Pulley	Type of Drive Pulley		TRAC	TRAC	TRAC	TRAC
		Ramp Identification		287 ⑤	285 ⑤	286 ⑤	228 ⑥
		Calibration Screw Position or Calibration Disc Quantity ⑤		5	5	5	3
		Spring Color		Pink/White	Green/Blue	Violet/Yellow	Violet/Violet
		Spring Length ± 1.5 mm (± 0.060 in)		124.5 (4.90)	147.4 (5.80)	157.9 (6.22)	107 (4.21)
		Clutch Engagement ± 200 RPM		4800	4500	4100	3500
	Driven Pulley Spring Preload ± 0.7 kg (±1.5 lb)		7.0 (15.4)	7.0 (15.4)	7.0 (15.4)	7.0 (15.4)	
	Cam Angle degree		50°	50°	50°	44°	
	Pulley Distance Z (+ 0, -1) mm ((+ 0, -1/32) in)		16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	16.5 (21/32)	
	Offset	X ± 0.4 mm (± 1/64 in)		35.0 (1-3/8)	35.0 (1-3/8)	35.0 (1-3/8)	35.0 (1-3/8)
		Y - X	MIN. - MAX. mm (in)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)
	Drive Belt Part Number (P/N)			415 8607 00	415 0603 00	415 0603 00	414 8607 00
	Drive Belt Width (new) ① mm (in)			34.7 (1-3/8)	35.0 (1-3/8)	35.0 (1-3/8)	34.90 (1-3/8)
	Drive Belt Adjustment	Deflection ± 5 mm (± 13/64 in)		32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
		Force ② kg (lbf)		11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)
	Track	Width cm (in)		38.1 (15.0)	38.1 (15.0)	38.1 (15.0)	38.1 (15.0)
		Length cm (in)		345.5 (136)	345.5 (136)	345.5 (136)	345.5 (136)
Adjustment		Deflection mm (in)	45 - 50 (1-3/4 - 1-31/32)	45 - 50 (1-3/4 - 1-31/32)	45 - 50 (1-3/4 - 1-31/32)	40 - 55 (1-9/16 - 2-5/32)	
		Force ③ kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)	
Suspension Type		Track	SC-10 Mountain	SC-10 Mountain	SC-10 Mountain	SC-10 Touring	
		Ski	DSA	DSA	DSA	DSA	
	Length cm (in)		291.9 (114.9)	291.9 (114.9)	291.9 (114.9)	291.9 (114.9)	
	Width cm (in)		108 (42.5)	108 (42.5)	108 (42.5)	120.7 (47.5)	
	Height cm (in)		108 (42.5)	108 (42.5)	108 (42.5)	122 (48)	
	Ski Stance cm (in)		94 (37)	94 (37)	94 (37)	106.7 (42.0)	
	Mass (dry) kg (lb)		225 (494)	231 (508)	233 (513)	245 (539)	
	Ground Contact Area cm² (in²)		7479.2 (1159.2)	7479.2 (1159.2)	7227.2 (1120.2)	7479.2 (1159.3)	
	Ground Contact Pressure kPa (PSI)		2.95 (.428)	3.03 (.439)	3.06 (.444)	3.21 (.465)	
	Frame Material		Aluminum	Aluminum	Aluminum	Aluminum	
	Bottom Pan Material		Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer	
	Cab Material		RRIM	RRIM	RRIM	RRIM	
	Battery V (A•h)		N.A.	N.A.	12 (22)	12 (22)	
	Headlight W		H4 60/55	H4 60/55	H4 60/55	H4 60/55	
	Taillight and Stoplight W		8/27	8/27	8/27	8/27	
	Tachometer and Speedometer Bulb W		2 x 3	2 x 3	2 x 3	2 x 3	
	Fuel and Temperature Gauge Bulb W		N.A.	N.A.	N.A.	3	
	Fuse	Starter Solenoid A	N.A.	N.A.	N.A.	30	
		Tachometer A	N.A.	N.A.	N.A.	N.A.	
	Fuel Tank L (U.S. gal)		40 (10.6)	40 (10.6)	40 (10.6)	40 (10.6)	
	Chaincase/Gearbox mL (U.S. oz)		250 (8.5)	250 (8.5)	250 (8.5)	250 (8.5)	
	Cooling System L (U.S. oz)		5.0 (169)	5.0 (169)	5.0 (169)	5.0 (169)	
	Injection Oil Reservoir L (U.S. oz)		2.8 (94.7)	2.8 (94.7)	2.8 (94.7)	2.8 (94.7)	

# Section 09 TECHNICAL DATA

## Sub-Section 03 (VEHICLES)

		VEHICLE MODEL	GRAND TOURING 583	SKANDIC WT	SKANDIC SWT	SKANDIC WT LC	
		<b>ENGINE TYPE</b>	<b>583</b>	<b>503</b>	<b>503</b>	<b>494</b>	
		Chain Drive Ratio	23/44	N.A.	N.A.	N.A.	
Chain	Pitch	in	3/8	N.A.	N.A.	N.A.	
	Type/Links Qty/Plates Qty		Silent 72-13	N.A.	N.A.	N.A.	
Drive Pulley	Type of Drive Pulley		TRAC	TRAC	TRAC	TRAC	
	Ramp Identification		285 Ⓢ	146 Ⓢ	146 Ⓢ	146 Ⓢ	
	Calibration Screw Position or Calibration Disc Quantity Ⓢ		3	3	4	2	
	Spring Color		Blue/Blue	Blue/Violet	Red/Yellow	Blue/Orange	
	Spring Length	± 1.5 mm (± 0.060 in)	99.6 (3.929)	96.6 (3.80)	87.9 (3.46)	132.6 (5.22)	
	Clutch Engagement		± 200 RPM	3800	3300	2900	3400
Driven Pulley Spring Preload		± 0.7 kg (±1.5 lb)	6.1 (13.45)	7 (15.4)	6 (13.2)	7 (15.4)	
Cam Angle		degree	47°	40°	40°	40°	
Pulley Distance Z		(+ 0, -1) mm (+ 0, -1/32) in	16.5 (21/32)	32.75 (1-19/64)	32.75 (1-19/64)	32.75 (1-19/64)	
Offset	X	± 0.4 mm (± 1/64 in)	35.0 (1-3/8)	36.25 (1-27/64)	36.25 (1-27/64)	36.25 (1-27/64)	
	Y - X	MIN. - MAX. mm (in)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	1.0 - 2.0 (0.039 - 0.079)	
Drive Belt Part Number (P/N)			414 8607 00	414 6338 00	414 6338 00	414 6338 00	
Drive Belt Width (new) ①		mm (in)	34.90 (1-3/8)	34.60 (1-3/8)	34.60 (1-3/8)	34.60 (1-3/8)	
Drive Belt Adjustment	Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)	
	Force ②	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)	
Track	Width		cm (in)	38.1 (15.0)	50.0 (19.7)	60.0 (23.6)	50.0 (19.7)
	Length		cm (in)	345.5 (136)	394 (155.1)	394 (155.1)	394 (155.1)
	Adjustment	Deflection	mm (in)	40 - 55 (1-9/16 - 2-5/32)	40 - 50 (1-9/16 - 1-31/32)	40 - 50 (1-9/16 - 1-31/32)	40 - 50 (1-9/16 - 1-31/32)
		Force ③	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
Suspension Type		Track	SC-10 Touring	Skandic WT	Skandic WT	Skandic WT	
		Ski	DSA	Telescopic Strut	Telescopic Strut	Telescopic Strut	
	Length		cm (in)	291.9 (114.9)	302.0 (118.9)	315.0 (124.0)	302.0 (118.9)
	Width		cm (in)	120 (47.5)	104.5 (41.1)	110.0 (43.3)	104.5 (41.1)
	Height		cm (in)	122 (48)	122 (48)	122 (48)	122 (48)
	Ski Stance		cm (in)	106.7 (42.0)	90.0 (35.4)	90.0 (35.4)	90.0 (35.4)
	Mass (dry)		kg (lb)	251 (553)	259 (569)	275 (605)	295 (627)
	Ground Contact Area		cm² (in²)	7479.2 (1159.3)	10792.5 (1672.8)	13986 (2167.8)	12335 (1911.9)
	Ground Contact Pressure		kPa (PSI)	3.29 (.477)	3.29 (.477)	1.93 (.280)	2.27 (.329)
	Frame Material			Aluminum	Steel	Steel	Steel
	Bottom Pan Material			Impact Copolymer	HD Polyethylene	HD Polyethylene	HD Polyethylene
	Cab Material			RRIM	Fiberglass	Fiberglass	Fiberglass
	Battery		V (A•h)	12 (22)	12 (22)	12 (22)	12 (22)
	Headlight		W	H4 60/55	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight		W	8/27	8/27	8/27	8/27
	Tachometer and Speedometer Bulb		W	2 x 3	2 x 3	2 x 3	2 x 3
	Fuel and Temperature Gauge Bulb		W	3	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid	A	30	30	30	30
		Tachometer	A	N.A.	N.A.	N.A.	N.A.
	Fuel Tank		L (U.S. gal)	40 (10.6)	40 (10.6)	40 (10.6)	40 (10.6)
	Chaincase/Gearbox		mL (U.S. oz)	250 (8.5)	500 (17)	500 (17)	500 (17)
	Cooling System		L (U.S. oz)	5.0 (169)	N.A.	N.A.	N.A.
	Injection Oil Reservoir		L (U.S. oz)	2.8 (94.7)	2.55 (86)	2.55 (86)	2.55 (86)

## ENGINE LEGEND

BTDC: Before Top Dead Center  
CDI: Capacitor Discharge Ignition  
CTR: Center  
K: Kilo (× 1000)  
MAG: Magneto Side  
N.A.: Not Applicable  
PTO: Power Take Off Side  
R: Rectangular  
ST: Semi-trapez

- ① The maximum horsepower RPM is applicable on the vehicle. It may be different under certain circumstances and **BOMBARDIER INC.** reserves the right to modify it without obligation.
- ② Crankshaft end-play is not adjustable on these models. Specification is given for verification purposes only.
- ③ Rotary valve to crankcase clearance: 0.27 – 0.48 mm (.011 – .019 in).
- ④ At 6000 RPM (engine cold) with headlamp turned on.
- ⑤ All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.
- ⑥ Force applied midway between pulleys to obtain specified tension deflection.
- ⑦ Drive pulley retaining screw: torque to 90 to 100 N•m (66 to 74 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km / h (20 MPH)) and apply the brake; repeat 5 times. Recheck the torque of 90 to 100 N•m (66 to 74 lbf•ft).

## VEHICLE LEGEND

DSA: Direct Shock Action  
RRIM: Reinforced Reaction Injection Molding  
TRAC: Total Range Adjustable Clutch  
N.A.: Not Applicable

- ① Minimum allowable width may not be less than 3.0 mm (1/8 in) of new drive belt.
- ② Force applied midway between pulleys to obtain specified tension deflection.
- ③ Force or downward pull applied to track to obtain specified tension deflection.
- ④ Coolant mixture: 60% antifreeze/40% water.
- ⑤ Lever with roller pin P/N 417 0043 03 (hollow).
- ⑥ Lever with roller pin P/N 417 0043 04 (solid).



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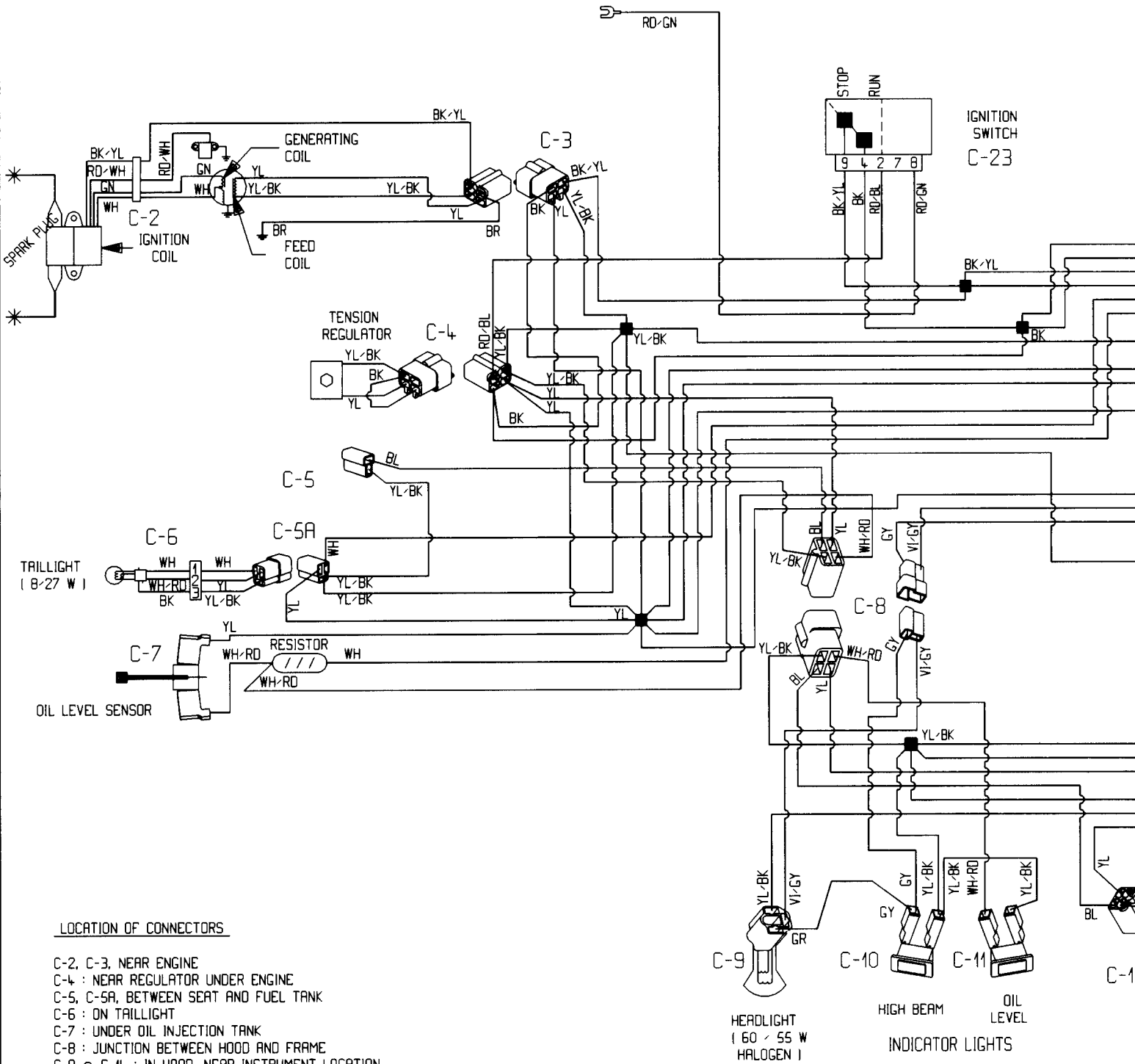


# **ANNEX 1      MX Z 440 F**

Following table shows wire colors related to electrical circuits.

WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	

# MXZ 440 F '97



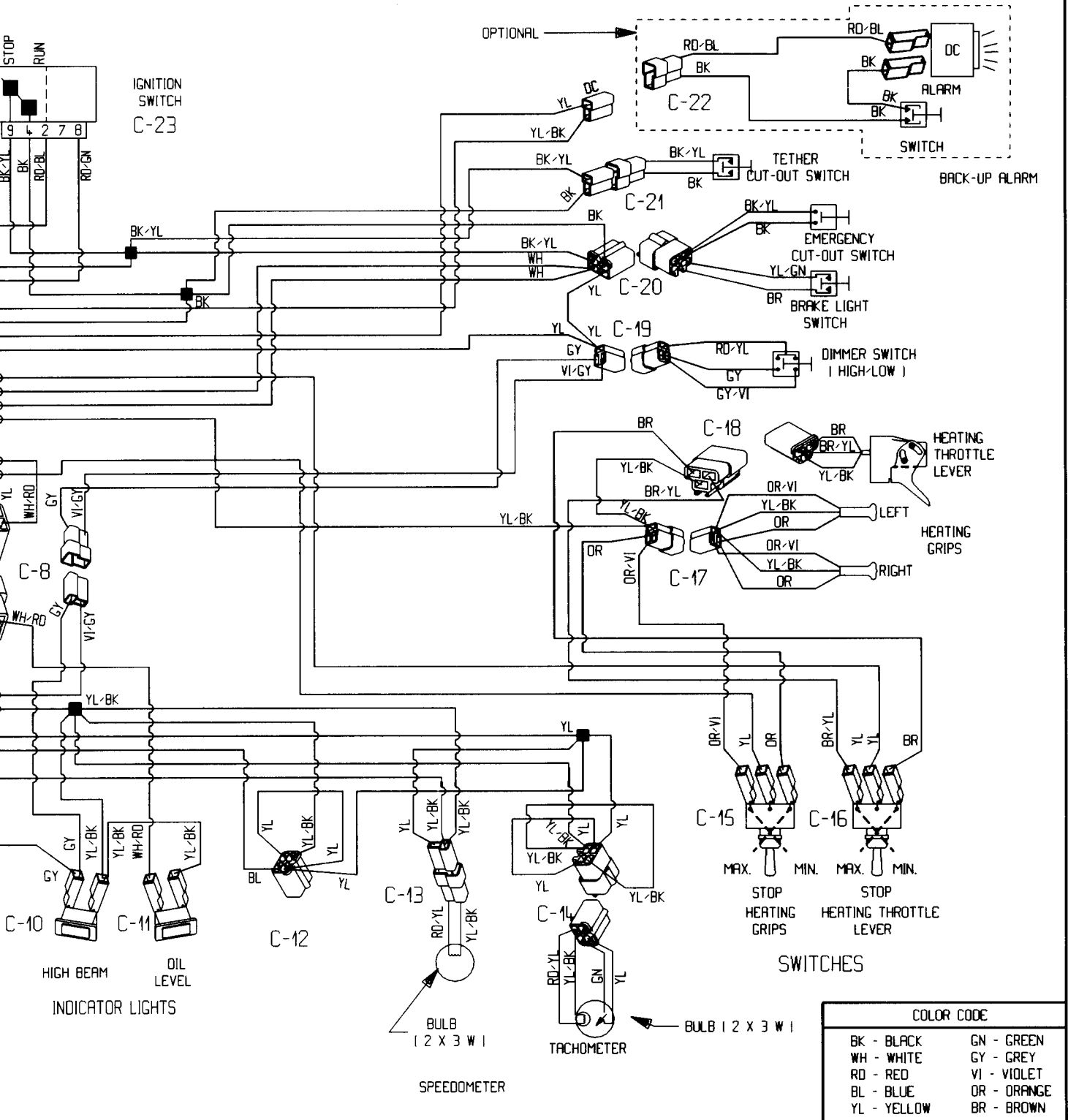
### LOCATION OF CONNECTORS

- C-2, C-3, NEAR ENGINE
- C-4 : NEAR REGULATOR UNDER ENGINE
- C-5, C-5A, BETWEEN SEAT AND FUEL TANK
- C-6 : ON TAILLIGHT
- C-7 : UNDER OIL INJECTION TANK
- C-8 : JUNCTION BETWEEN HOOD AND FRAME
- C-9 @ C-14 : IN HOOD, NEAR INSTRUMENT LOCATION
- C-15 @ C-21 : NEAR STEERING COLUMN, UNDER CONSOLE
- C-22 : ABOVE CHAINCASE
- C-23 : ON IGNITION SWITCH

■ = WELDED JOINT

# WARNING:

ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED.



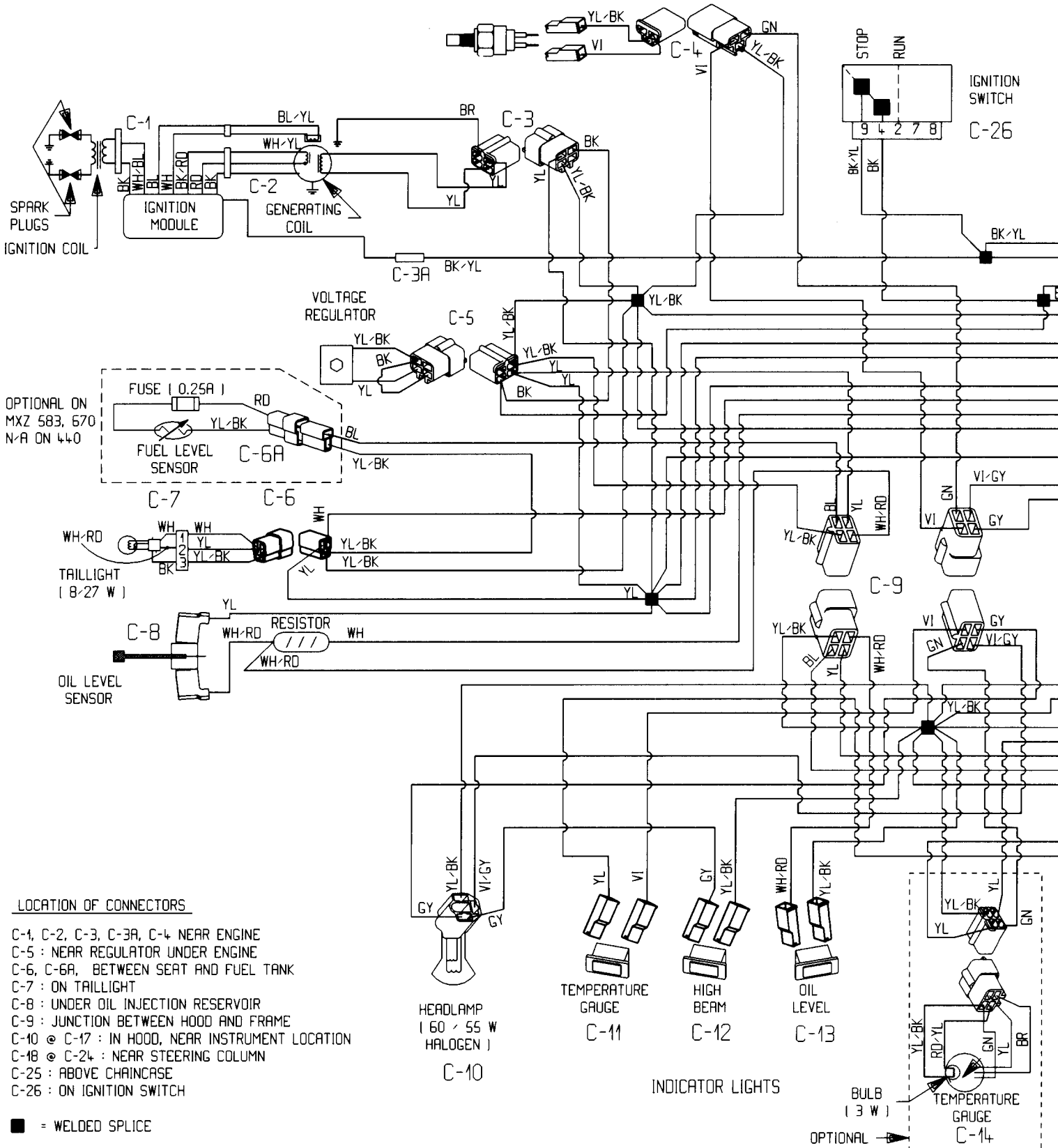
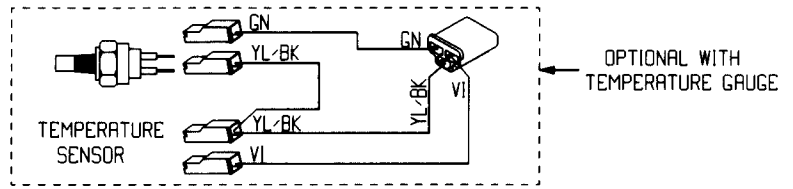
**ANNEX 2**

**MX Z 440/583/670**

Following table shows wire colors related to electrical circuits.

WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	

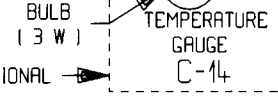
MX-Z 440 '97  
 MX-Z 583  
 MX-Z 670



LOCATION OF CONNECTORS

- C-1, C-2, C-3, C-3A, C-4 NEAR ENGINE
- C-5 : NEAR REGULATOR UNDER ENGINE
- C-6, C-6A, BETWEEN SEAT AND FUEL TANK
- C-7 : ON TAILLIGHT
- C-8 : UNDER OIL INJECTION RESERVOIR
- C-9 : JUNCTION BETWEEN HOOD AND FRAME
- C-10 @ C-17 : IN HOOD, NEAR INSTRUMENT LOCATION
- C-18 @ C-24 : NEAR STEERING COLUMN
- C-25 : ABOVE CHAINCASE
- C-26 : ON IGNITION SWITCH

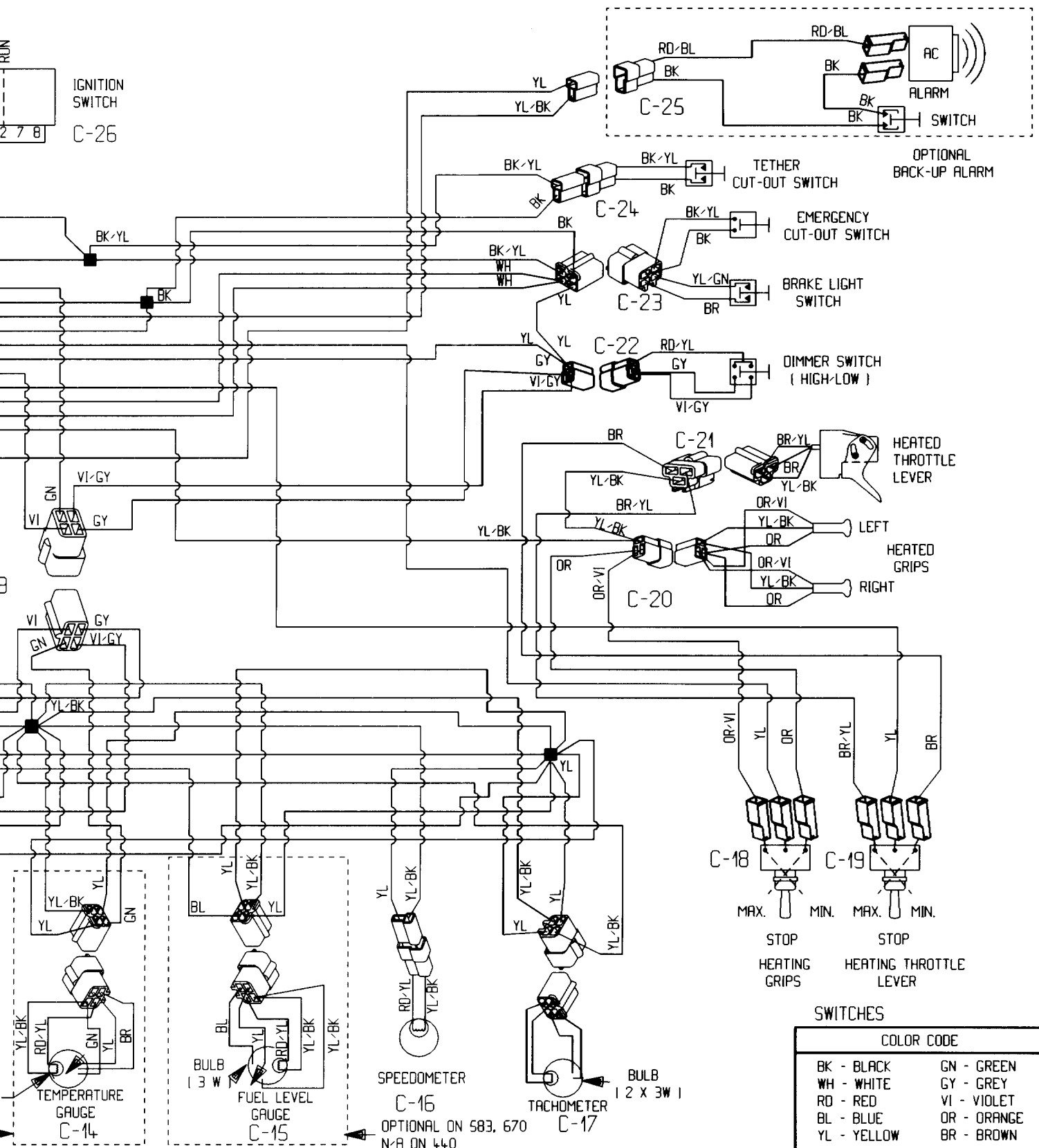
■ = WELDED SPLICE



AL WITH  
TURE GAUGE

# WARNING

- ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED



SWITCHES	
COLOR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN



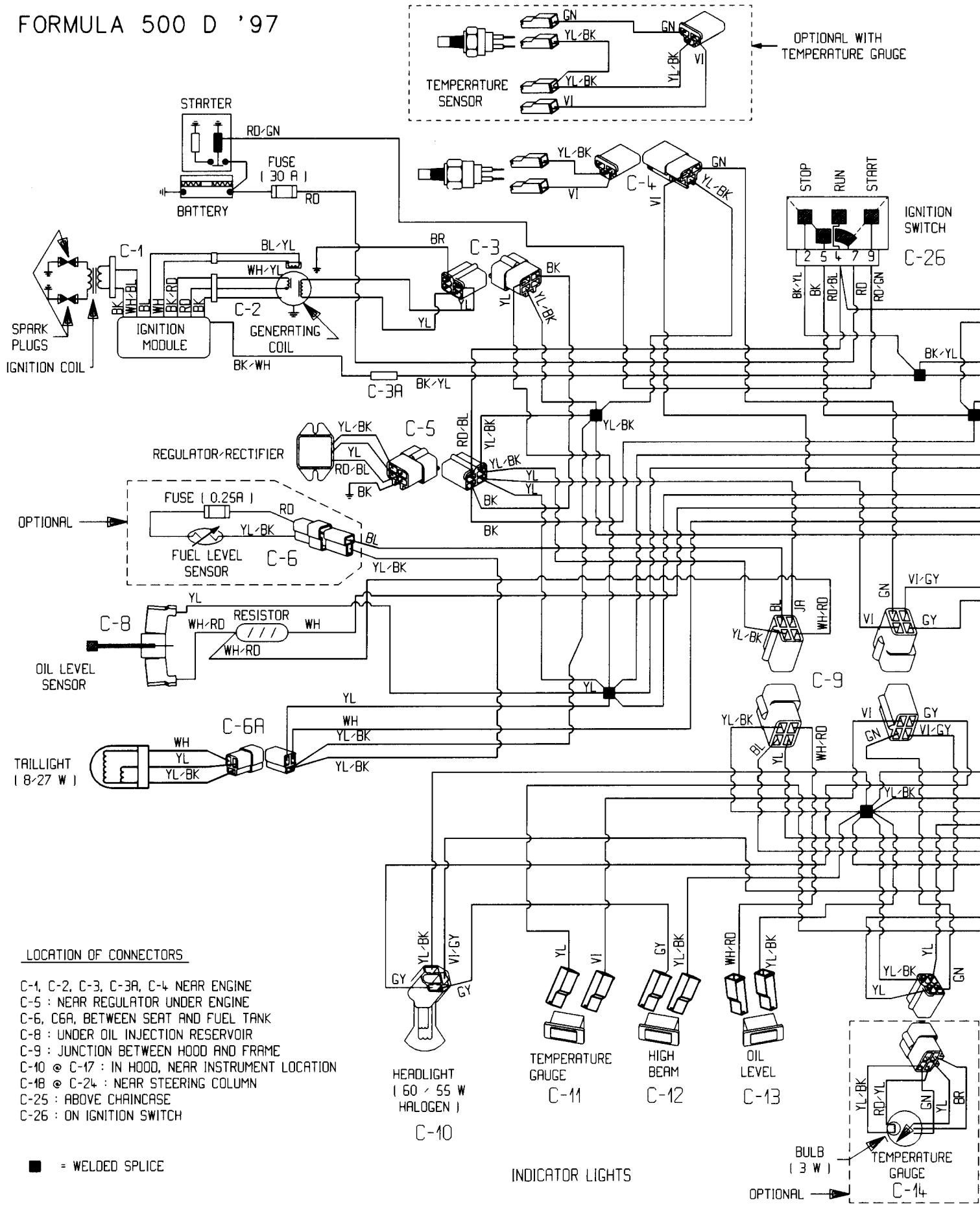
**ANNEX 3**

**FORMULA 500 DELUXE**

Following table shows wire colors related to electrical circuits.

WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	

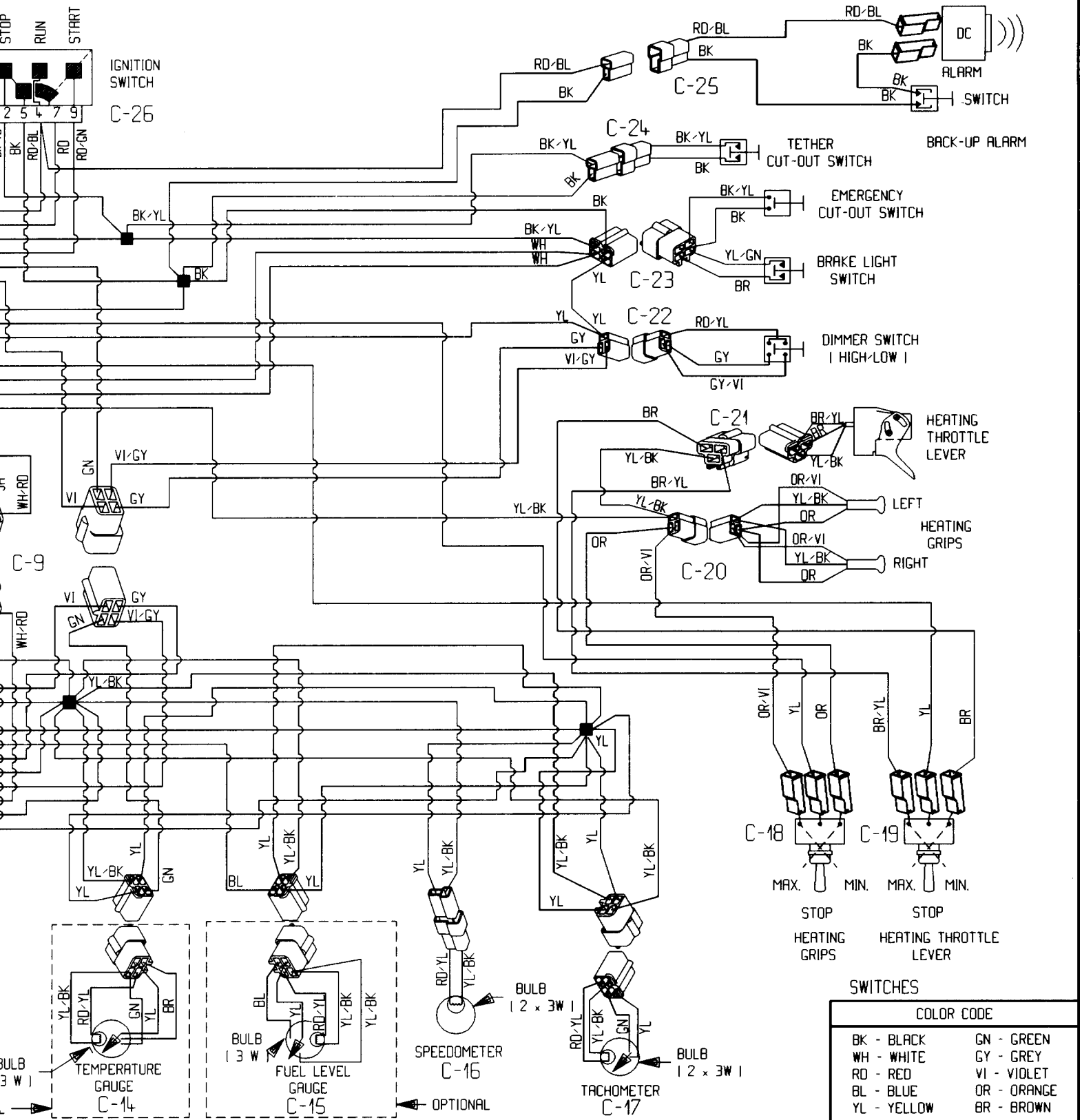
# FORMULA 500 D '97



OPTIONAL WITH  
TEMPERATURE GAUGE

# WARNING

- ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED



COLOR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN

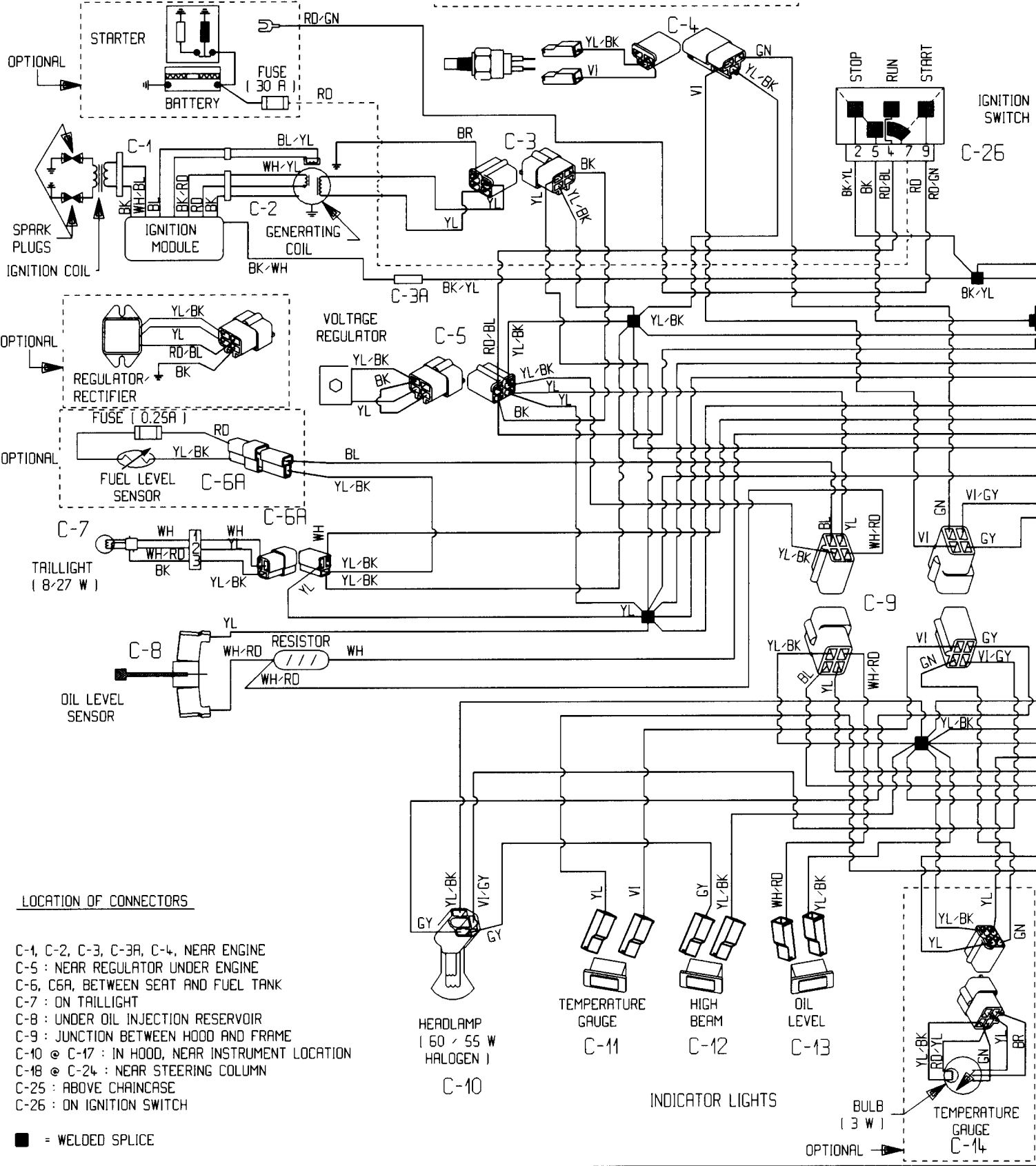
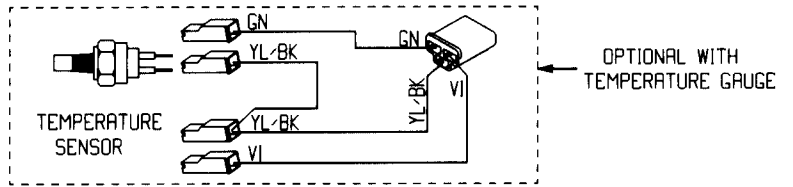
**ANNEX 4**

**FORMULA 500/583**  
**SUMMIT 500/583/670**

Following table shows wire colors related to electrical circuits.

WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	

SUMMIT 500/583/670 '97  
 FORMULA 500/583 '97



LOCATION OF CONNECTORS

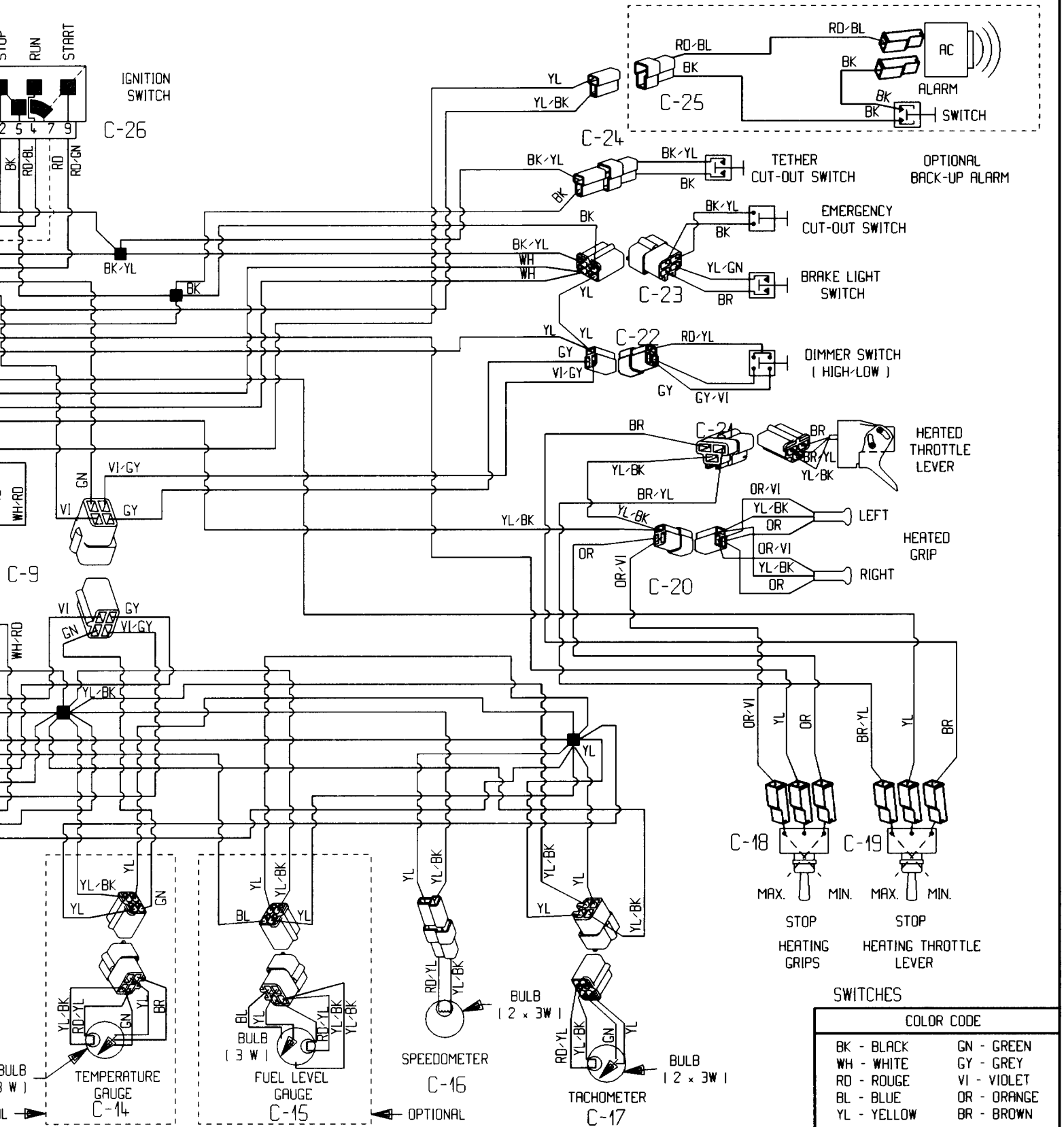
- C-1, C-2, C-3, C-3A, C-4, NEAR ENGINE
- C-5 : NEAR REGULATOR UNDER ENGINE
- C-6, C6A, BETWEEN SEAT AND FUEL TANK
- C-7 : ON TRAILLIGHT
- C-8 : UNDER OIL INJECTION RESERVOIR
- C-9 : JUNCTION BETWEEN HOOD AND FRAME
- C-10 @ C-17 : IN HOOD, NEAR INSTRUMENT LOCATION
- C-18 @ C-24 : NEAR STEERING COLUMN
- C-25 : ABOVE CHAINCASE
- C-26 : ON IGNITION SWITCH

■ = WELDED SPLICE

OPTIONAL WITH  
TEMPERATURE GAUGE

# WARNING :

ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED.





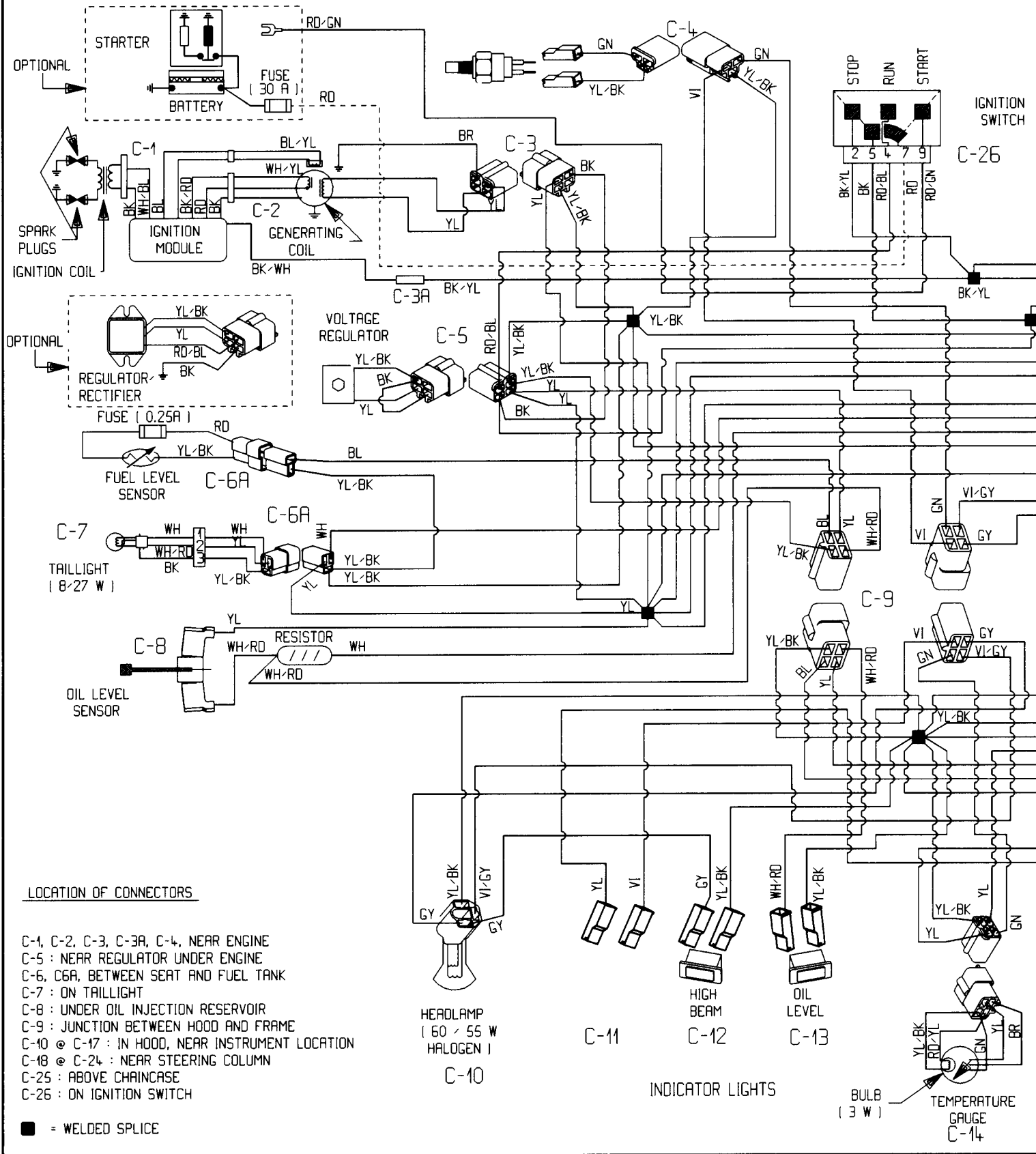
**ANNEX 5**

**FORMULA Z**

Following table shows wire colors related to electrical circuits.

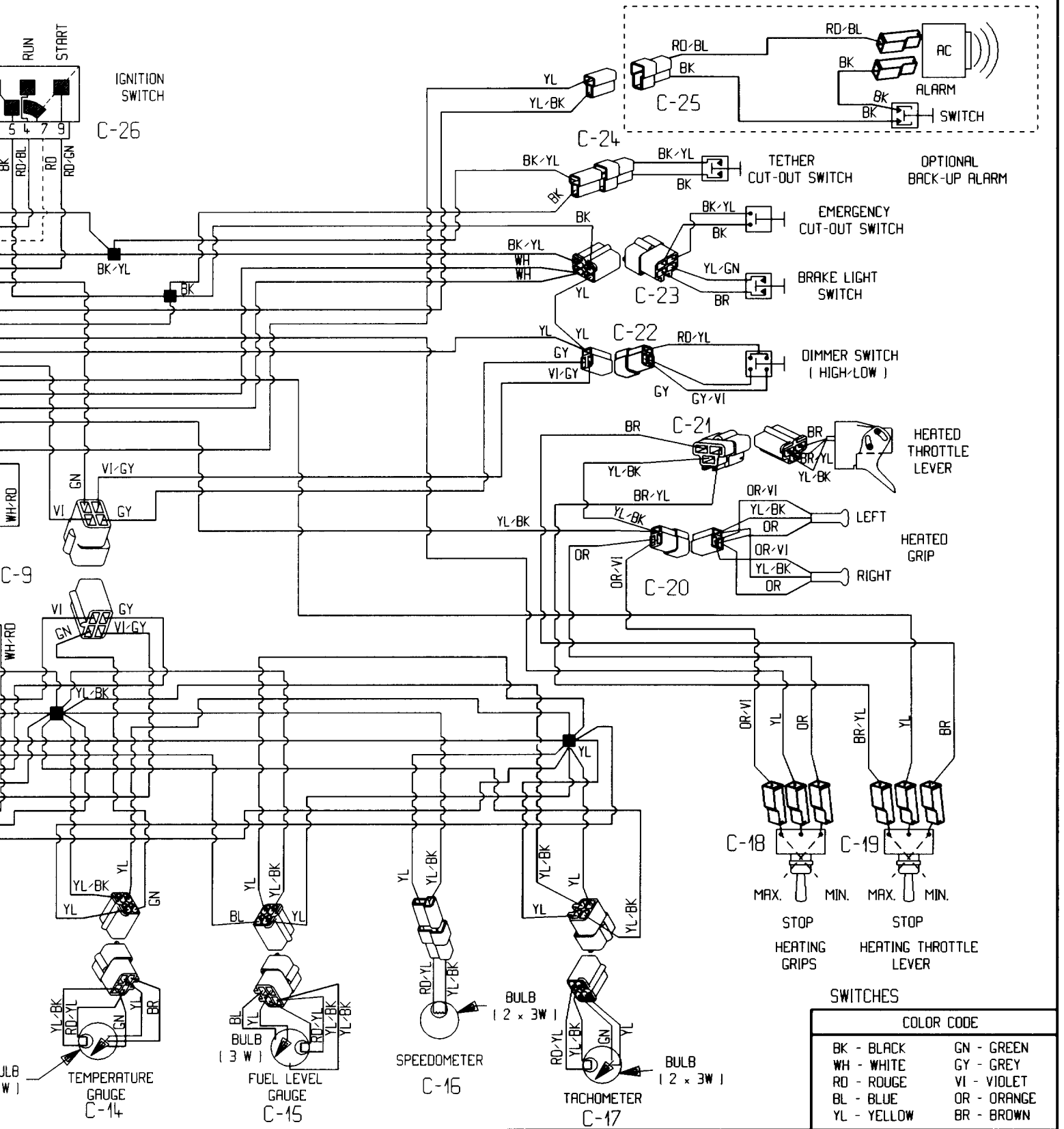
WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	

# FORMULA Z '97



# ◆ WARNING :

ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED.



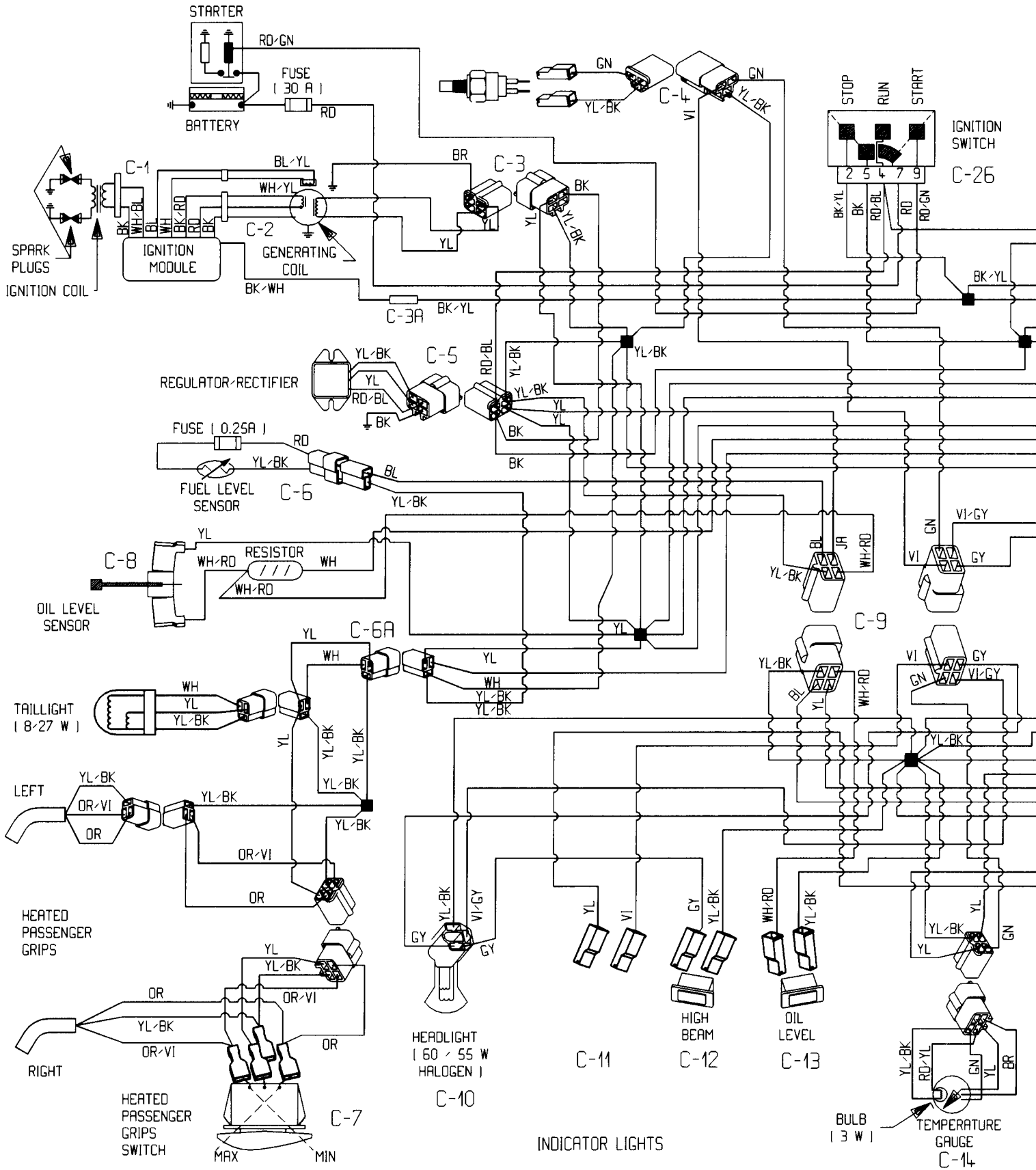
**ANNEX 6**

**GRAND TOURING 500/583**

Following table shows wire colors related to electrical circuits.

WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	

GRAND-TOURING 500 '97  
 GRAND-TOURING 583 '97

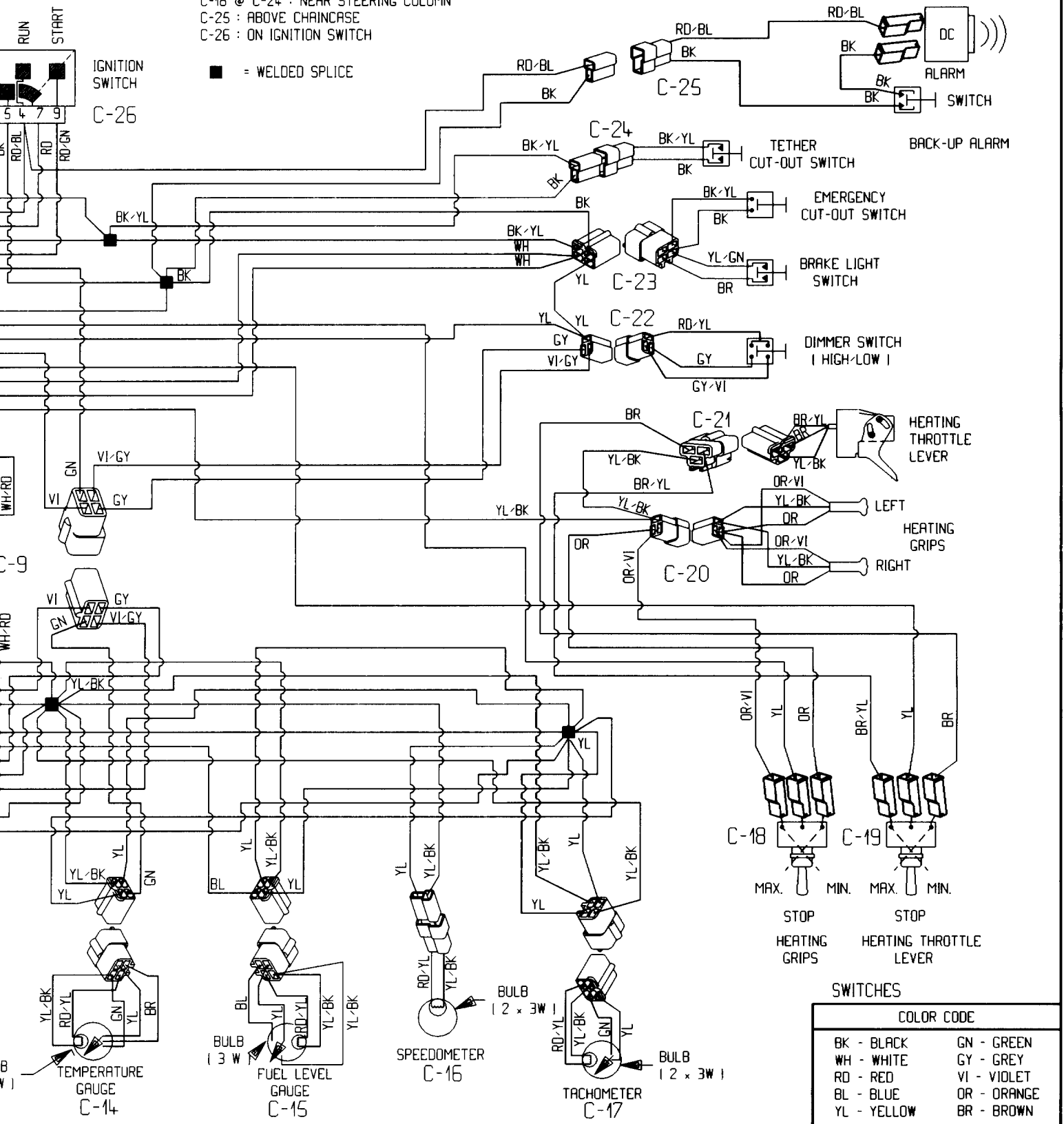


LOCATION OF CONNECTORS

- C-1, C-2, C-3, C-3A, C-4 NEAR ENGINE
- C-5 : NEAR REGULATOR UNDER ENGINE
- C-6, C6A, BETWEEN SEAT AND FUEL TANK
- C-7 : ON THE LUGGAGE RACK
- C-8 : UNDER OIL INJECTION RESERVOIR
- C-9 : JUNCTION BETWEEN HOOD AND FRAME
- C-10 @ C-17 : IN HOOD, NEAR INSTRUMENT LOCATION
- C-18 @ C-24 : NEAR STEERING COLUMN
- C-25 : ABOVE CHAINCASE
- C-26 : ON IGNITION SWITCH

# WARNING

- ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED



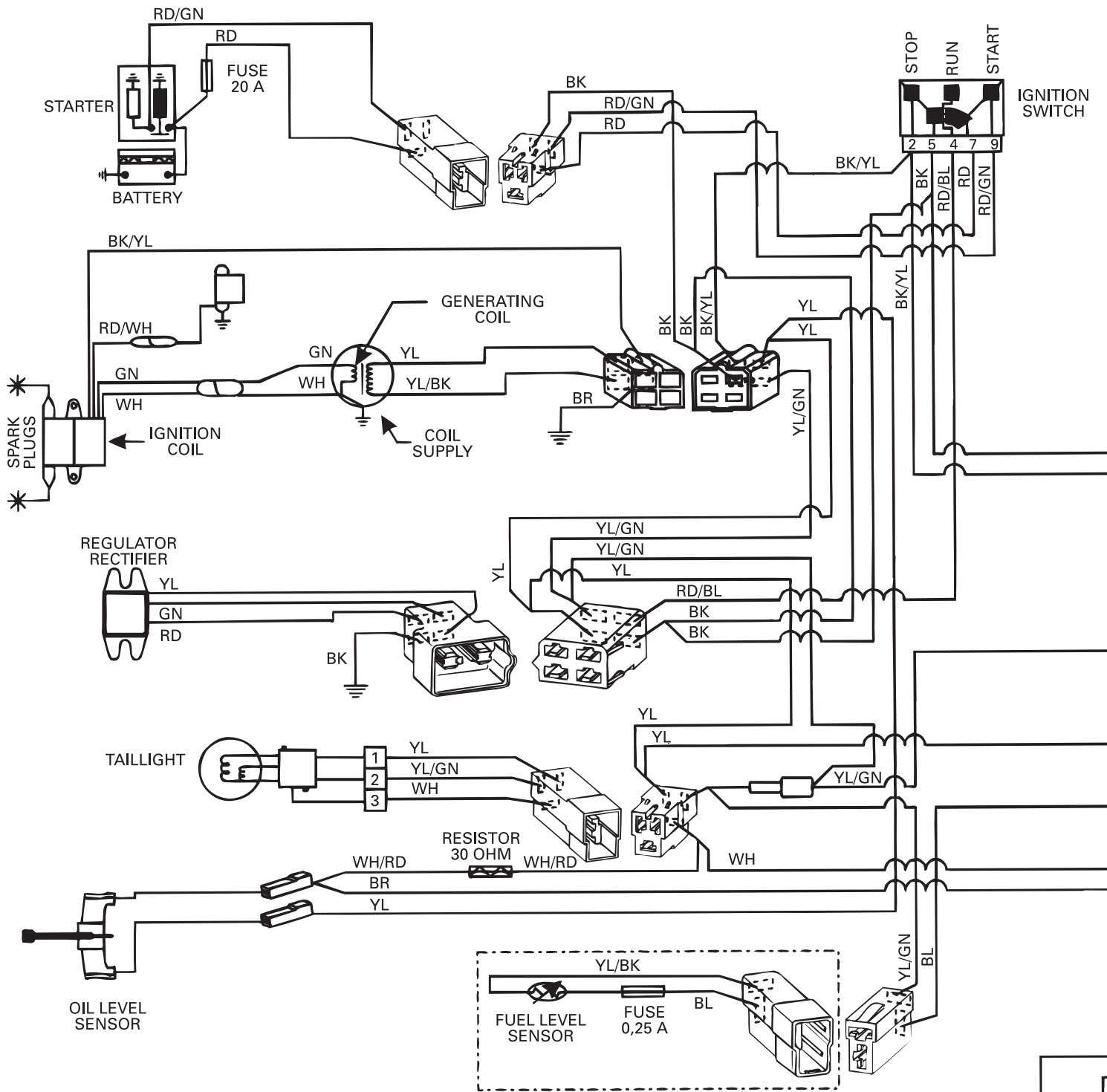


**ANNEX 7**

**SKANDIC WT/SWT**

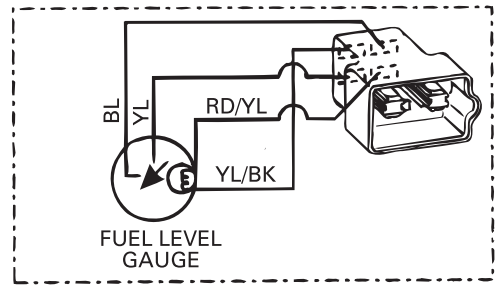
Following table shows wire colors related to electrical circuits.

WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (Big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (A.C.)	If shorted, magneto stops producing electricity.
RED	12 volts (D.C.) (+) For starter motor	
RED/GREEN	12 volts (D.C.) (+) For starter solenoid	
RED/BLUE	12 volts (D.C.) (+) Rectifier output	
GREY	12 volts (A.C.) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (A.C.) Low beam	
WHITE	12 volts (A.C.) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (A.C.) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (A.C.) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (A.C.) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (A.C.) Heated grips (min.)	
BROWN	12 volts (A.C.) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (A.C.) Heated throttle lever (min.)	
GREEN	12 volts (A.C.) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (A.C.) Engine overheating light.	

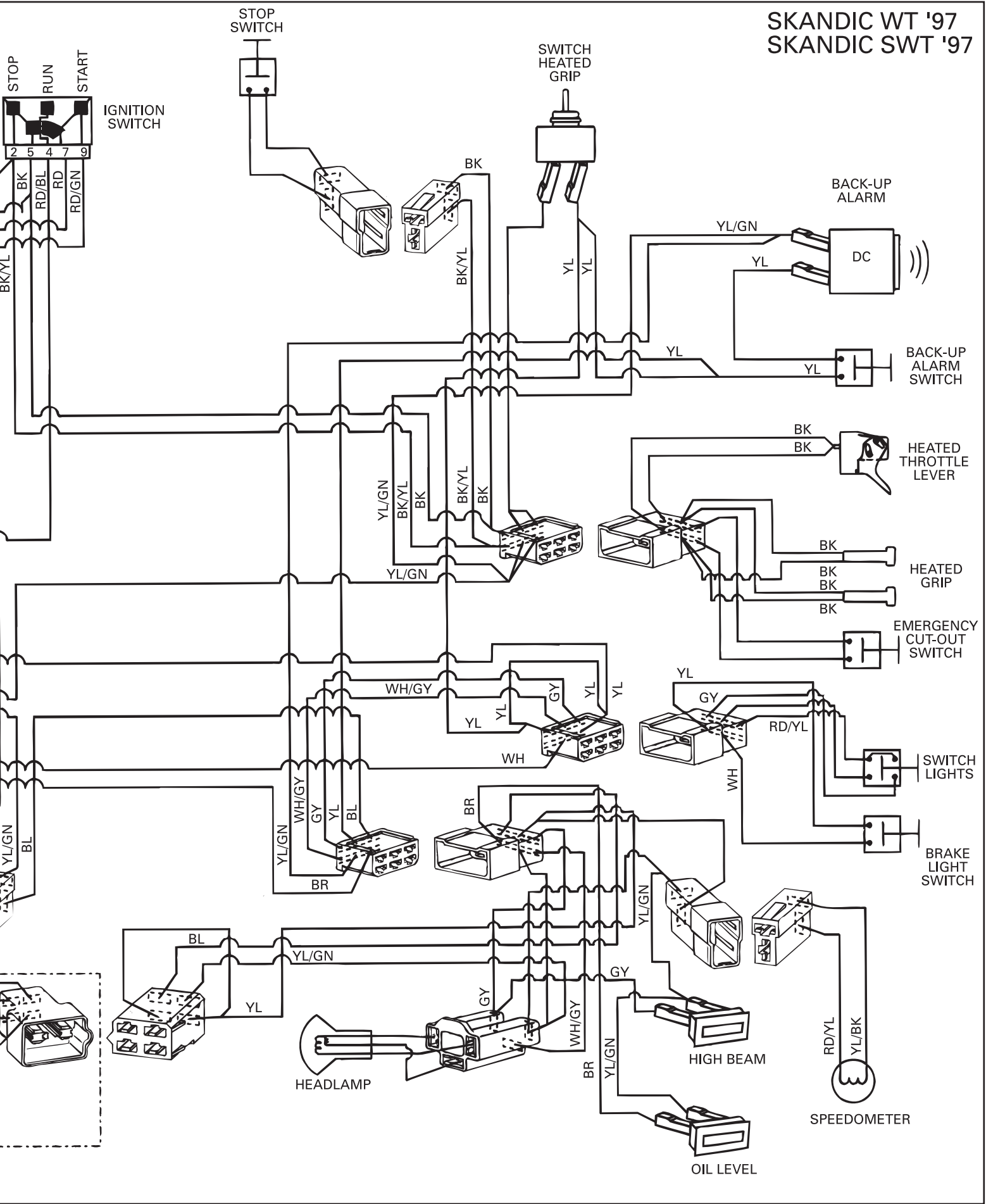


COLOR CODE	
BK - BLACK	GN - GREEN
WH - WHITE	GY - GREY
RD - RED	VI - VIOLET
BL - BLUE	OR - ORANGE
YL - YELLOW	BR - BROWN

**◆ WARNING**  
 ENSURE ALL TERMINALS ARE PROPERLY CRIMPED ON THE WIRES AND ALL CONNECTOR HOUSINGS ARE PROPERLY FASTENED.



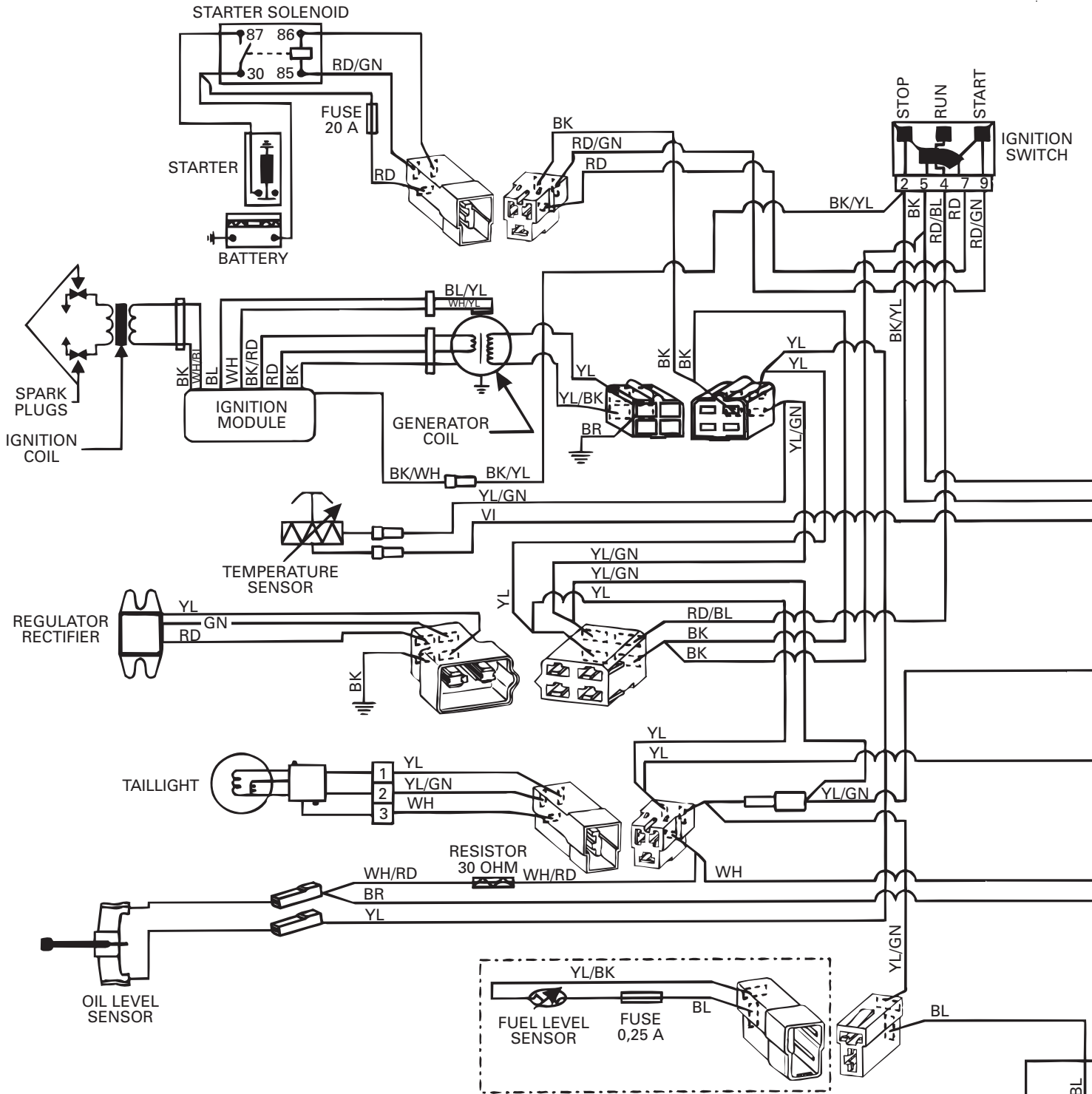
# SKANDIC WT '97 SKANDIC SWT '97



**ANNEX 8**

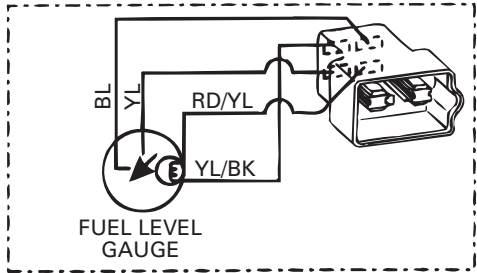
**SKANDIC WT LC**

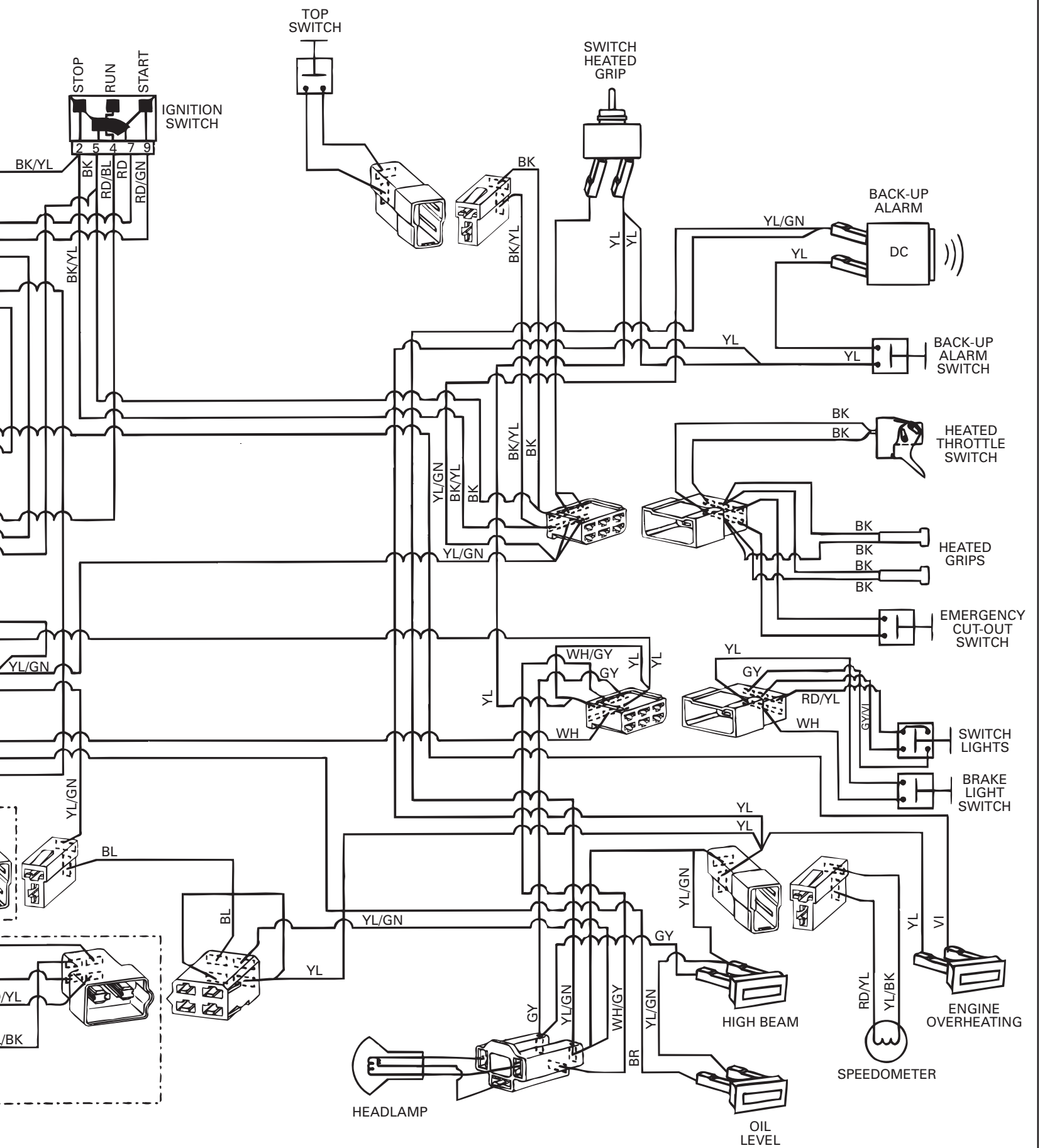
# SKANDIC WT LC '97



COLOR 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.





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