ski-doo®

1998

Shop Manual

Volume 1

Tundra II LT
Touring E/LE
Formula S/S Electric/SL
Skandic 380/500

484 0680 00

ski-doo®

1998
Shop Manual

VOLUME 1

TUNDRA II LT
TOURING E/LE
FORMULA S/S ELECTRIC/SL
SKANDIC 380/500

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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair some 1998 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:

◆ WARNING

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

▼ CAUTION

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

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

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

This information relates to the preparation and use of Bombardier 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.

INTRODUCTION

This *Shop Manual VOLUME 1* covers the following Bombardier made 1998 snowmobiles:

MODELS	MODEL NUMBER
TUNDRA* II LT	3270
SKANDIC* 380 (Canada)	1240
SKANDIC* 380 (U.S.)	1241
SKANDIC* 380 (Europe)	1242
SKANDIC* 500 (Canada)	1237
SKANDIC* 500 (U.S.)	1238
SKANDIC* 500 (Europe)	1239
TOURING* E (Canada)	1234
TOURING* E (Europe)	1236
TOURING* LE (Canada)	1232
TOURING* LE (U.S.)	1233
FORMULA* S (Canada)	1226
FORMULA* S (Europe)	1227
FORMULA* S Electric	1228
FORMULA* SL (Canada)	1224
FORMULA* SL (U.S.)	1225

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Tundra II LT

Touring E/LE

Skandic 380/500

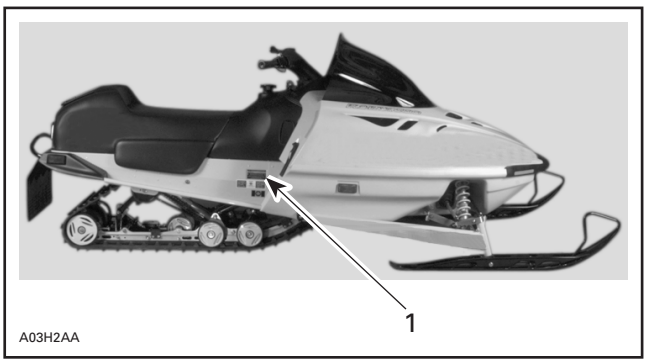
Formula S/SL

These are S-Series models.

TYPICAL — S-SERIES

VEHICLE SERIAL NUMBER

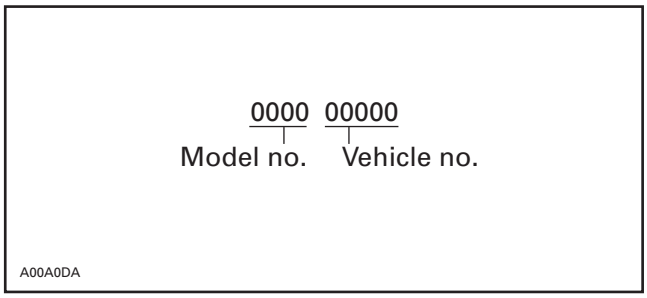
Vehicle Serial Number Location



TYPICAL

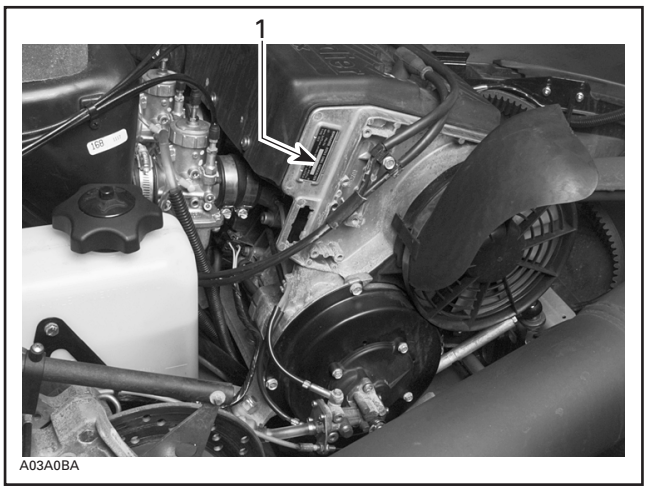
1. Vehicle serial number

Serial Number Meaning



ENGINE SERIAL NUMBER

Engine Serial Number Location



TYPICAL — FAN-COOLED ENGINES

1. Engine serial number

ARRANGEMENT OF THE MANUAL

The manual is divided into 11 major sections:

01 SERVICE TOOLS AND SERVICE PRODUCTS

02 LUBRICATION AND MAINTENANCE

03 TROUBLESHOOTING

04 ENGINE

05 TRANSMISSION

06 ELECTRICAL

07 REAR SUSPENSION

08 STEERING/FRONT SUSPENSION

09 BODY/FRAME

10 TECHNICAL DATA

ANNEXES

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

LIST OF ABBREVIATIONS USED IN THIS MANUAL

A	ampere
amp	ampere
A•h	ampere-hour
AC	alternate current
BDC	bottom dead center
BTDC	before top dead denter
°C	Celsius
CDI	capacitor discharge ignition
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
DC	direct current
DSA	direct shock action
°F	Fahrenheit
FC	fan cooled
fl. oz	fluid ounce
ft	foot
GRD	ground
H.A.C.	high altitude compensator
hal.	halogen
imp. oz	imperial ounce
in	inch
in^2	square inch
in^3	cubic inch
k	kilo (thousand)
kg	kilogram
km/h	kilometer per hour
kPa	Kilopascal
L	liter
lb	pound
lbf	pound (force)
lbf/in^2	pound per square inch
LH	left hand
m	meter
MAG	magneto
Max.	maximum
Min.	minimum
mL	milliliter
mm	millimeter
MPH	mile per hour
N	newton
N.A.	not applicable
no.	number
00.0	continuity
0.L	overload (open circuit)
O.D.	outside diameter
OPT	optional
oz	ounce
P/N	part number
PSI	pound per square inch
PTO	power take off
R	rectangular
RAVE	rotax adjustable variable exhaust
RPM	revolution per minute
RRIM	reinforced reaction injection molding
Sp. Gr.	specific gravity
ST	semi-trapez
TDC	top dead center
TRA	total range adjustable
U.S. oz	ounce (United States)
V	volt
Vac	volt (alternative current)

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

TYPICAL PAGE

Page heading indicates section and subsection detailed.

Subsection title indicates beginning of the subsection.

Italic subtitle above exploded view indicate pertaining models.

Exploded view assists you in identifying parts and related positions.

Drop represents a liquid product to be applied to a surface. In this case Loctite 271 to screw threads.

Bold face number indicates special procedure concerning this part.

Illustration number for publishing process.

Dotted box contains parts of a particular model in this case the short track models only.

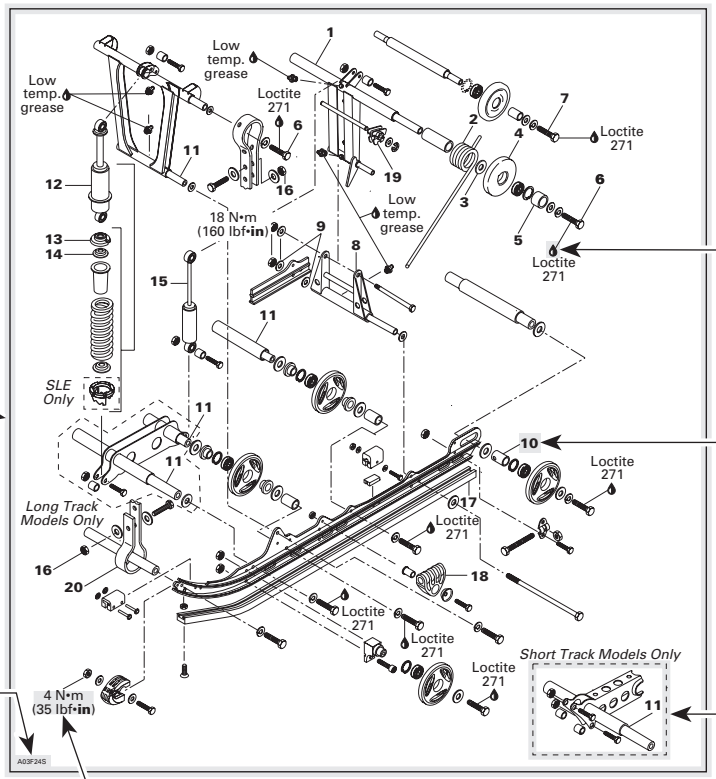
Tightening torque nearby fastener. In this case, nut must be torqued to 4 N•m or 35 lbf•**in**.

Page numbering system:
07: REAR SUSPENSION section
01: SUSPENSION SC-10 SPORT, TOURING AND MOUNTAIN subsection
1: First page of this subsection

Section 07 REAR SUSPENSION
Subsection 01 (SUPENSION SC-10 SPORT, TOURING AND MOUNTAIN)

SUSPENSION SC-10 SPORT, TOURING AND MOUNTAIN

Grand Touring 500/580, Formula 500/583 and Summit 500



07-01-1

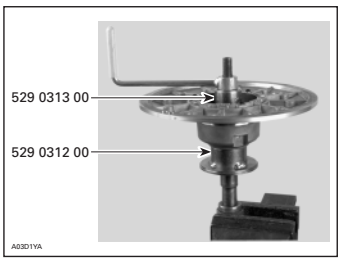
▼ CAUTION

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

A01A28S

TYPICAL PAGE

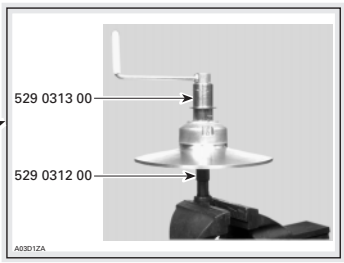
Turn puller handle and sliding half at once to extract the bushing.



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.

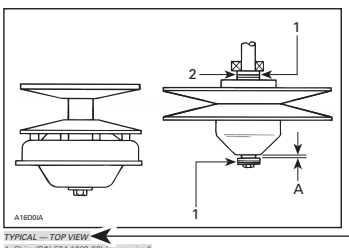
F-Series and S-Series Only

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 puley. 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)

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 subsection. In this case it concerns pulleys adjustment.

Illustration always follows text to which it pertains.

Subtitle indicates a particular procedure for the named part.

Number following part name refers to exploded view at beginning of subsection.

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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 diferences 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
TUNDRA II LT	480 1439 00
SKANDIC 380/500	480 1440 00
TOURING E/LE	480 1441 00
FORMULA S FORMULA S Electric	480 1447 00
FORMULA SL	480 1448 00

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

1995-1998 *Specification Booklet* (P/N 484 0685 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.

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

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	**M4**	18
3	M4	27
4	**M5**	35
5		44
6		53
7		62
8	M6	71
9	M6	80
10	**M6**	89
11	M6	97
12	M6	106
13		115
14		124
15		133
16		142
17		150
18		159
19		168

N•m	FASTENER SIZE (8.8)	Lbf•ft
20		15
21	M8	15
22	M8	16
23	**M8**	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

N•m	FASTENER SIZE (8.8)	Lbf•ft
39		29
40		30
41		30
42		31
43	M10	32
44	M10	32
45	M10	33
46	M10	34
47	M10	35
48	**M10**	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
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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	**M12**	59
81	M12	60
82	M12	60
83	M12	61

N•m	FASTENER SIZE (8.8)	Lbf•ft
84	M12	62
85		63
86		63
87		64
88		65
89		66
90		66
91		67
92		68
93		69
94		69
95		70
96		71
97		72
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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	**M14**	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

We would be pleased if you could communicate to Bombardier any suggestions you may have concerning our publications.

Bombardier SERVICE PUBLICATIONS REPORT

Publication title and year _____ Page_____

Machine_____ Report of error ❑ Suggestion ❑

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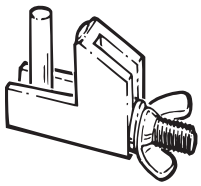
SERVICE TOOLS

This is a list of tools to properly service Ski-Doo snowmobile models specified on cover page. The list includes both the mandatory tools and the optional tools that are ordered separately. The list of Service Products, both mandatory and optional, are not part of any kit and must all be ordered separately. If you need to replace or add to your tool inventory these items can be ordered through the regular parts channel.

NOTE: The numbers outlined in black (example: **1**) are reference numbers to tools from other divisions (Sea-Doo Watercraft and/or Sea-Doo Jet Boats). Matching reference numbers indicate the same tool is being used even if the part numbers are different.

ENGINE — MANDATORY SERVICE TOOLS

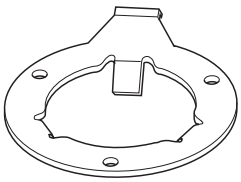
Hose pincher (2) **2**
(P/N 529 0099 00)



A01B2I4

APPLICATION
All vehicles.

Fan holder **3**
P/N 420 8763 57)



A00C0Q4

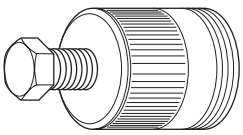
APPLICATION
377, 443 and 503 engines.

Magneto puller ring **4**
(P/N 420 8760 80)

A00C1R4

APPLICATION
All engines.

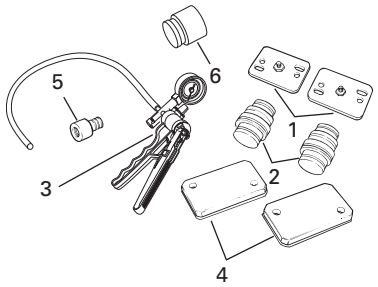
Magneto puller **5**
(P/N 529 0225 00)



A00C1A4

APPLICATION
All engines.

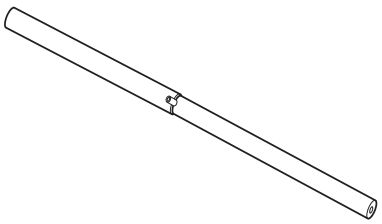
Engine leak tester kit **14**
(P/N 861 7491 00)



A01B2D4

APPLICATION
All engines.

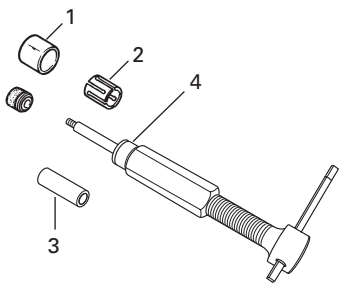
Choke plunger tool **19**
(P/N 529 0321 00)



A01C5D4

APPLICATION
All models equipped with choke.

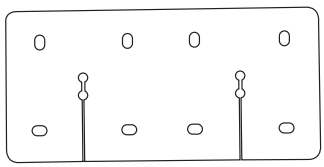
Piston pin puller **16**
(P/N 529 0290 00)



A01B4H4

APPLICATION
All engines.

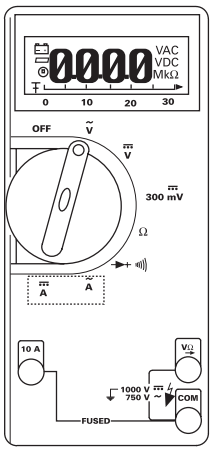
Rubber pad **17**
(P/N 529 0234 00)



A01B4C4

APPLICATION
All cageless bearing engines (277 and 503).

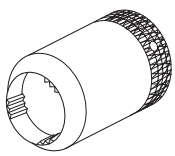
Fluke multimeter **242**
(P/N 529 0220 00)



F01B1O4

APPLICATION
All models.

Choke nut tool **782**
(P/N 529 0322 00)



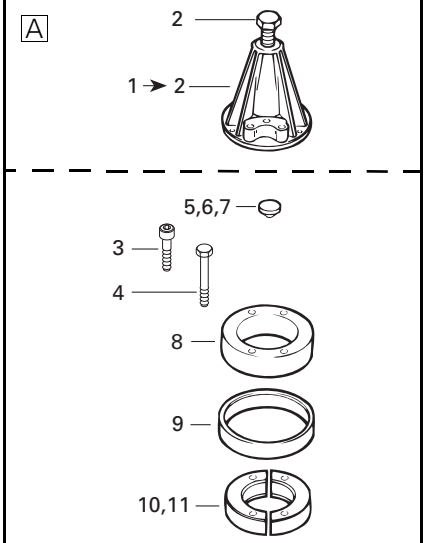
A01B554

APPLICATION
All models equipped with a choke.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

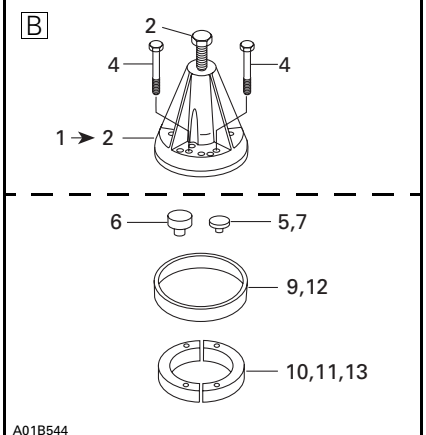
The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

1-2) Crankshaft bearing puller with screw **200**
(P/N 420 8762 98)



APPLICATION
277, 377, 443 and 503 engines.

1-2) Crankshaft bearing puller with screw **250**
(P/N 420 8776 35)

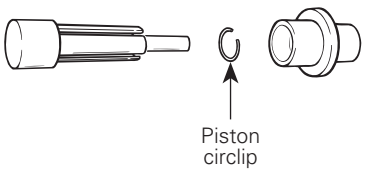


APPLICATION
277, 377, 443 and 503 engines.

Use with crankshaft bearing pullers A (P/N 420 8762 98) or B (P/N 420 8776 35).		
2) Bolt (M16 x 1.5 x 150) For either A or B pullers.	(P/N 420 9407 55)	**258**
3) Screw M8 x 40 (4) A puller MAG side, B puller MAG and PTO side.	(P/N 420 8406 81)	**559**
4) Screw M8 x 70 (4) A puller only, PTO side.	(P/N 420 8412 01)	**560**
5) Crankshaft protector PTO A or B puller; all engines.	(P/N 420 8765 52)	**259**
6) Crankshaft protector MAG A or B puller; all engines.	(P/N 420 8765 57)	**554**
8) Distance ring PTO A puller; 377, 443 and 503 engines.	(P/N 420 8765 69)	**557**
9) Puller ring Use with half rings (P/N 420 9774 75 or 420 2760 25).	(P/N 420 9774 90)	**555**
10) Half ring (2) A or B puller; for 72 mm O.D. bearings.	(P/N 420 9774 75)	**556**
11) Half ring A or B puller; for 62 mm O.D. bearings.	(P/N 420 2760 25)	**558**
12) Puller ring For half rings (P/N 420 9774 79).	(P/N 420 9774 94)	**251**
13) Half ring B puller only; 80 mm O.D. bearings.	(P/N 420 9774 79)	**252**

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

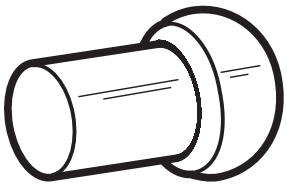
Piston circlip installer **202**
A) (P/N 529 0169 00)



A01B1P4

APPLICATION
A) All engines.

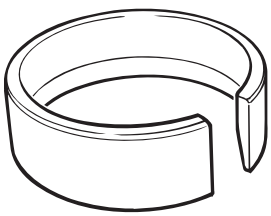
Piston pin/connecting rod bearing centering tool **203**
(P/N 529 0091 00)
NOTE: New diameter is 9.65 mm (.380 in).



A01B1R4

APPLICATION
All engines.

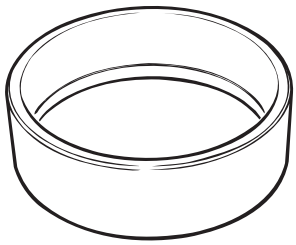
Ring compressor
A) (P/N 420 8760 90) **204**
(62 mm)
B) (P/N 420 8769 70) **206**
(72 mm)



A01B1T4

APPLICATION
A) 377 and 443 engines.
B) 503 engine.

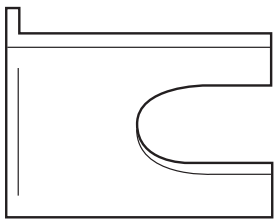
Magneto coil centering ring **209**
(P/N 420 8769 22)



A01B1V4

APPLICATION
All engines with Nippondenso CDI (160 W).

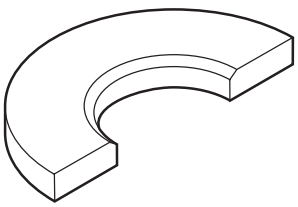
Crankshaft feeler gauge **216**
(P/N 420 8766 20)



A00C114

APPLICATION
377, 443 and 503 engines.

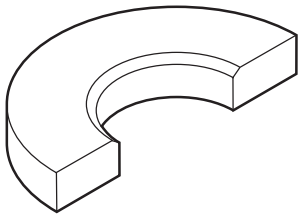
Crankshaft distance gauge (5.7 mm) **217**
(P/N 420 8768 22)



A00C294

APPLICATION
377 and 443 engines.

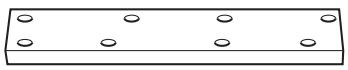
Crankshaft distance gauge (12.7 mm) **218**
(P/N 420 8768 24)



A00C3A4

APPLICATION
503 engine.

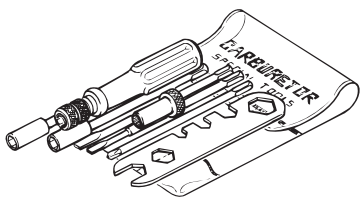
Cylinder aligning tool
A) (P/N 420 8761 71) **221**
(on intake side)



A00B084

APPLICATION
A) 377, 443 and 503 engines.

Mikuni carburetor tool kit **222**
(P/N 404 1120 00)

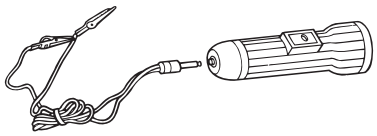


A00B2F4

APPLICATION
All models.

ENGINE (continued) — RECOMMENDED SERVICE TOOLS

Circuit tester (continuity light) **223**
(P/N 414 0122 00)



A00C214

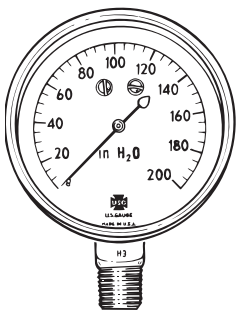
APPLICATION
All models.

Stroboscopic timing light **225**
(P/N 529 0319 00)

A00B4F4

APPLICATION
All engines.

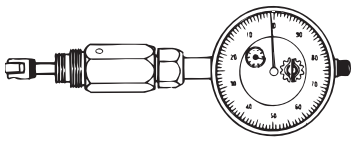
Air pressure gauge, 0-200 inch of water **227**
(P/N 529 0104 00)



A18B034

APPLICATION
For pressure testing gauge.

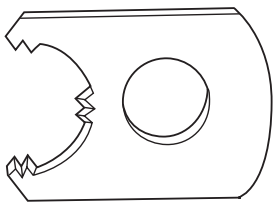
Dial indicator (TDC gauge) **230**
(P/N 414 1047 00)



A00B4E4

APPLICATION
All engines.

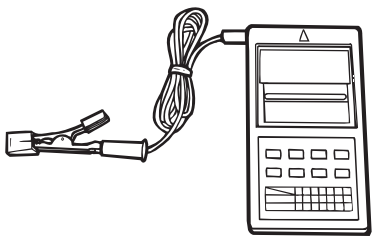
Injection pump gear holder **234**
(P/N 420 8766 95)



A00B314

APPLICATION
377, 443 and 503 engines.

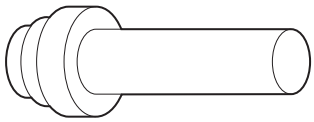
Digital/induction type tachometer **237**
(P/N 529 0145 00)



F01B1G4

APPLICATION
All engines.

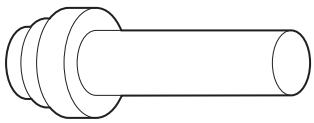
MAG seal pusher **243**
(P/N 420 2778 75)



A00C0V4

APPLICATION
277 engine.

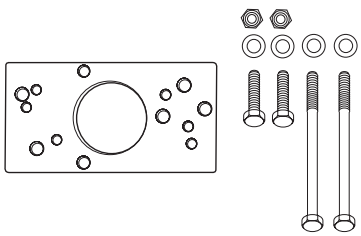
PTO seal pusher **244**
(P/N 420 8766 60)



A00C0V4

APPLICATION
277 engine.

Base puller plate kit **245**
(P/N 529 0249 00)



A05C0M4

APPLICATION
277 engine.

Exhaust spring installer/ remover **253**
(P/N 529 0281 00)

A00C3S4

APPLICATION
All models.

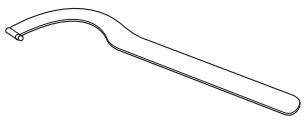
TRANSMISSION — MANDATORY SERVICE TOOLS

Clutch holder **51**
(P/N 529 0064 00)

A01B154

APPLICATION
All TRA drive pulleys.

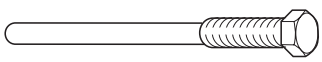
Clutch holder **79**
(P/N 529 0276 00)



A02B034

APPLICATION
Bombardier Lite drive pulley.

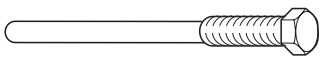
Drive pulley puller **53**
(P/N 529 0314 00)



A18B044

APPLICATION
Bombardier Lite drive pulley.

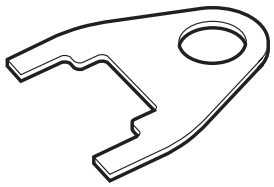
TRA drive pulley puller **55**
(P/N 529 0079 00) (25 mm)



A18B044

APPLICATION
TRA drive pulley.

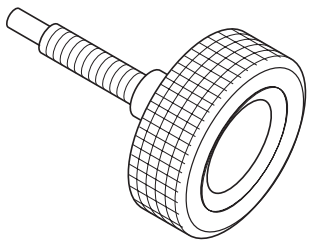
Forks (3) **57**
(P/N 529 0055 00)



A16B014

APPLICATION
All vehicles equipped with a TRA drive pulley.

Drive belt installer **58**
(P/N 529 0172 00)



A00A1A4

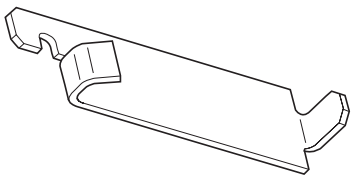
APPLICATION
All models except Tundra II LT.

Transmission alignment bar
A) (P/N 529 0267 00) **78**
B) (P/N 529 0269 00) **60**
C) (P/N 529 0300 00) **80**

A01B4D4

APPLICATION
A) S-Series with TRA.
B) Tundra II LT.
C) S-Series with Bombardier Lite.

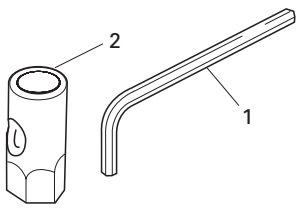
Spring scale hook (long) **84**
(P/N 529 0309 00)



A00B4A4

APPLICATION
S-Series.

Drive belt tension adjuster tool **63**
(P/N 529 0087 00)



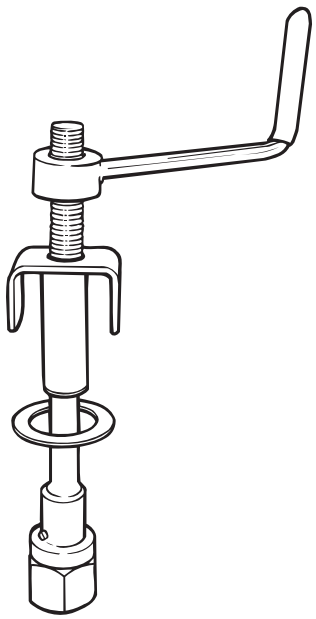
A15B044

APPLICATION
S-Series.

Parts included:
1) Hex wrench (P/N 420 8767 30
2) Socket wrench (P/N 529 0150 00)

TRANSMISSION (continued) — MANDATORY SERVICE TOOLS

Spring compressor **64**
(P/N 529 0186 00)
Parts included in the kit:
1) Spring compressor (P/N 529 0151 00)



A01B334

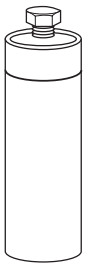
APPLICATION (1)
All models.

Tension tester **74**
(P/N 414 3482 00)

A00C074

APPLICATION
All models.

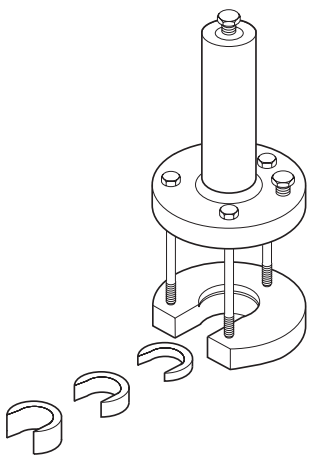
Countershaft bearing installer **83**
(P/N 529 0302 00)



A00A194

APPLICATION
S-Series.

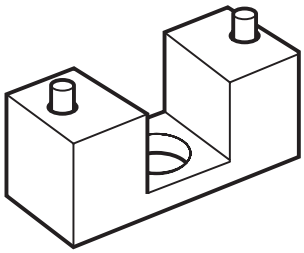
Countershaft bearing remover **82**
(P/N 529 0301 00)



A00A274

APPLICATION
S-Series.

Spring cover tool **81**
(P/N 529 0273 00)



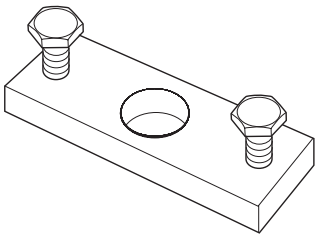
A01B4M4

APPLICATION
Bombardier Lite drive pulley.

TRANSMISSION (continued) — RECOMMENDED SERVICE TOOLS

The following tools are highly recommended to optimize your basic tool kit and reduce repair time.

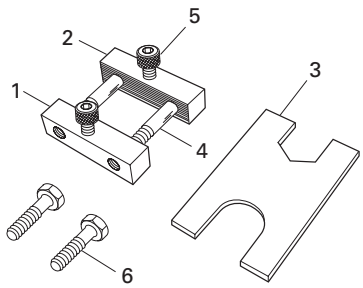
Cam pusher **309**
(P/N 529 0129 00)



A18B064

APPLICATION
Tundra II LT.

Drive axle sprocket adjuster **340**
(P/N 861 7257 00)



A01B2O4

APPLICATION
All vehicles.

Parts included in the kit:

1) Block with threads
   (P/N 529 0107 00)
2) Block without threads
   (P/N 529 0108 00)
3) Plate
   (P/N 529 0106 00)
4) Bolt M10 (2)
   (P/N 222 0075 65)
5) Allen screw M8 (2)
   (P/N 222 9830 65)
6) Screw M8 (2)
   (P/N 222 0825 65)

NOTE: When the tool is to be use between tunnel and sprocket use screw M8.

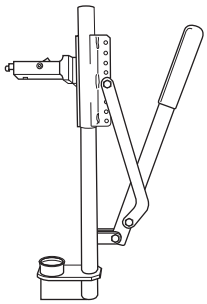
Transmission adjuster **504**
(P/N 529 0303 00)

A03D1T4

APPLICATION
Vehicles equipped with "push-pull shifter" reverse transmission.

SUSPENSION — MANDATORY SERVICE TOOLS

Shock spring removal kit **65**
(P/N 529 0271 00)
Replacement clevis pin
(P/N 414 5284 00)



A01B4O4

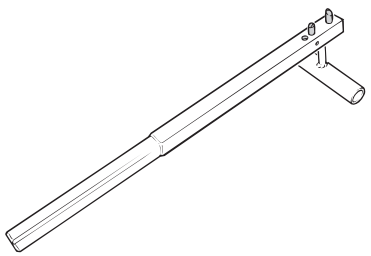
APPLICATION
All suspensions with coil spring.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

A) Track cleat remover **345**
(P/N 529 0082 00)

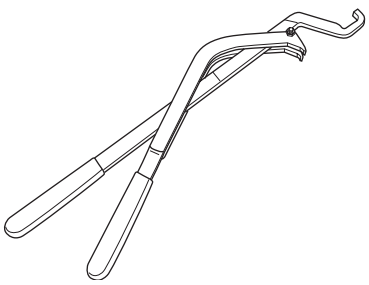
Pins **346**
(P/N 529 0082 04)

NOTE: Pins can be rotated 180° depending on whether the tool is used by a left-hander or right-hander.



A01B1J4

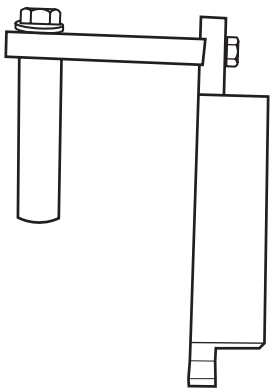
B) TRA track cleat remover **254**
(P/N 529 0287 00)



A01F224

APPLICATION
A) Tundra II LT.
B) S-Series.

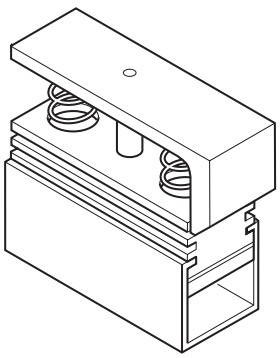
Camber angle tool **343**
(P/N 529 0216 00)
NOTE: Angle finder with a magnetic base must be used.
Suggestion: K-D tool no. 2968



A06B024

APPLICATION
All DSA front suspensions.

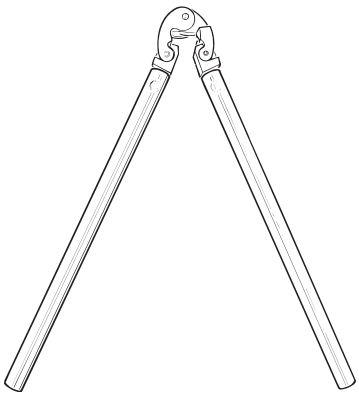
Track tension gauge **342**
(P/N 529 0215 00)



A00B3X4

APPLICATION
All models.

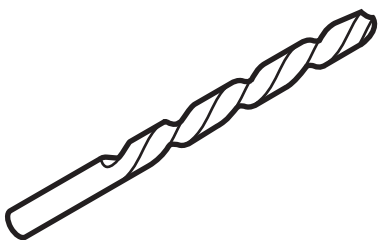
Track cleat installer
A) (P/N 529 0085 00) **347**
Narrow
B) (P/N 529 0288 00) **255**
Narrow



A01B1M4

APPLICATION
A) Tundra II LT.
B) S-Series.

Drill bit **508**
(P/N 529 0318 00)

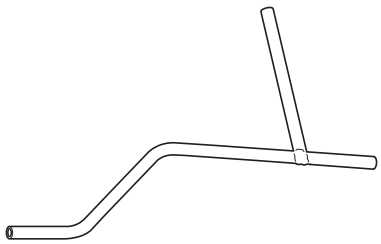


A01B564

APPLICATION
All 3/16 inch rivets.

SUSPENSION (continued) — RECOMMENDED SERVICE TOOLS

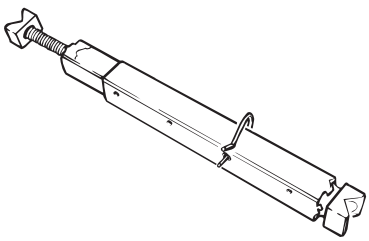
Spring installer (bar) **326**
(P/N 529 0050 00)



A00C1I4

APPLICATION
Tundra II LT and S-Series.

Drive axle holder **333**
(P/N 529 0072 00)



A01B1E4

APPLICATION
All models.

VEHICLES — RECOMMENDED SERVICE TOOLS

Protective mat
(P/N 529 0306 00)

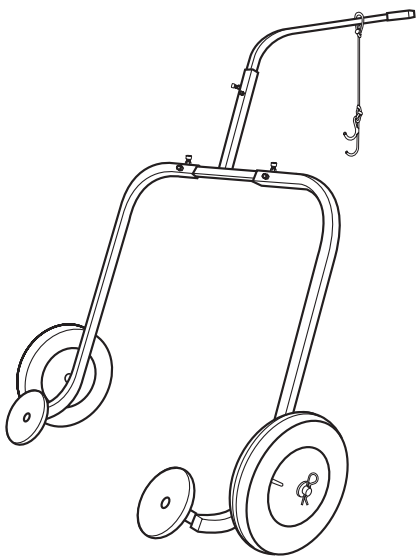
503

A01B45W

APPLICATION
All models.

Dolly
(P/N 529 0299 00)

348

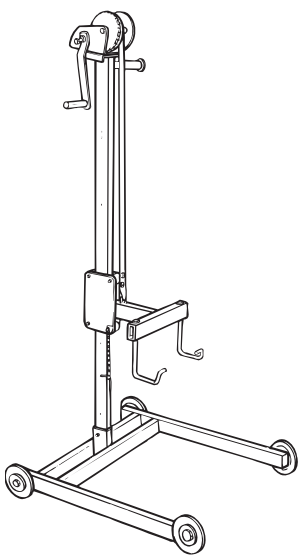


A00B4CJ

APPLICATION
All models.

Snowmobile jack
(P/N 529 0200 00)

341



A01A1JJ

APPLICATION
All models.

SERVICE PRODUCTS

NOTE: The numbers outlined in black (example: **1**) are reference to tool numbers from other divisions (Sea-Doo Watercraft and/or Sea-Doo Jet Boats). Matching reference numbers indicate the same tool is being used, even if the part numbers are different.

MANDATORY SERVICE PRODUCTS

151

Retaining compound
(P/N 413 7031 00)
Loctite® RC/609
Retaining compound (10 mL) (green)

A00B2S4

APPLICATION

Used for retaining bushings, bearings in slightly worn housing or on shaft.

152

Paste gasket
(P/N 413 7027 00)
Loctite® 515
Gasket eliminator (50 mL)

A00B2T4

APPLICATION

Crankcase halves, chaincase and gearbox mating surfaces.

154

Medium-strength threadlocker
(P/N 413 7030 00)
Loctite® 242
Threadlocker (10 mL) (blue, medium strength)

A00B324

APPLICATION

Flywheel nut, crankcase studs, etc.

155

High strength threadlocker
(P/N 413 7074 00)
Loctite® 271
Threadlocker (10 mL) (red, high strength)

A00B2U4

APPLICATION

Fasteners and studs up to 1 in diameter.

156

Gasket/paint remover
(P/N 413 7085 00)
Loctite® 79040 Chisel
510 g (18 oz)

A00B3L4

APPLICATION

Clean mating surfaces of cylinders and crankcase. Remove carbon in combustion chambers.

157

Cleaning solvent
(P/N 413 7082 00)
Loctite® 755-59
340 g (12 oz)

A00B3M4

APPLICATION

Clean carburetor parts and degrease all oily surfaces.

MANDATORY SERVICE PRODUCTS (continued)

Loctite® primer **158**
(P/N 413 7081 00)
Loctite® 764-56
Primer N
170 g (6 oz)

A00B3N4

APPLICATION

To prepare mating surfaces before applying paste gasket, retaining compound or threadlockers.

Silicone compound **159**
(P/N 420 8970 61)
Dow Corning® MS4

A00B3R4

APPLICATION

Lubricate pawl and pawl lock of rewind starter.

RECOMMENDED SERVICE PRODUCTS

Silicone dielectric grease (3 oz) **350**
(P/N 413 7017 00)

A00B1X4

APPLICATION
On all electric connections. High tension coil and spark plug connections. Connector housings, etc.

Grease LMZ no. 1 (400 g) **351**
(P/N 413 7075 00)

A00B1Y4

APPLICATION
Mainly used between regulators or rectifiers and upper column to transfer the heat build-up and to assure a good ground.

Chaincase oil (16 x 250 mL) **353**
(P/N 413 8019 00)

A00B2R4

APPLICATION
Chaincase lubricant on Tundra II LT.

Synthetic chaincase oil (12 x 355 mL) **354**
(P/N 413 8033 00)

A01B4Q4

APPLICATION
Chaincase lubricant on all models except Tundra II LT.

Blizzard oil (12 x 500 mL) **355**
(P/N 413 8031 00)

A00B2Q4

APPLICATION
All models.

Injection oil
(P/N 413 8029 00) (12 x 1 liter) **356**
(P/N 413 8030 00) (3 x 4 liter) **357**

F01B2H4

APPLICATION
All models.

Bombardier-Rotax Formula XP-S synthetic injection oil
(P/N 413 7110 00) (3 x 4 liter) **969**
(P/N 413 7107 00) (205 liters) **970**

F01B354

APPLICATION
All models.

RECOMMENDED SERVICE PRODUCTS (continued)

Bombardier-Rotax Formula XP-S synthetic injection oil
(P/N 413 7105 00)
(12 x 1 liter)

F01B2G4

APPLICATION
All models.

Pipe sealant **358**
(P/N 413 7023 00)
Loctite 592 (50 mL)

A00B2W4

APPLICATION
Engine plugs and senders.

Anti-seize lubricant **362**
(P/N 413 7010 00)
Loctite anti-seize lubricant 454 g (16 oz)

F01B174

APPLICATION
Unpainted surfaces of countershaft.

Bearing grease **363**
(400 g)
(P/N 413 7061 00)

A01B574

APPLICATION
For idler bearings, ski legs, seal interior lips drive axle bearings, suspension and steering, etc.

Storage oil **364**
(350 g spray can)
(12 x 350 g)
(P/N 496 0141 00)

A00B384

APPLICATION
All models.

Degreaser **365**
(P/N 413 7084 00)
Permatex® 48 TA
433 g (15 oz)

A00B3K4

APPLICATION
Engine, chaincase, pulleys and any greasy surfaces.

Gel instant adhesive **366**
(P/N 413 7083 00)
Loctite 454-40
20 g (.70 oz)

A00B3O4

APPLICATION
Isolating foam and rubber strip.

Tough adhesive **367**
(P/N 413 4083 00)
Loctite Black Max 38004
3 mL (.10 oz)

A00B3P4

APPLICATION
Shifter boot or grip.

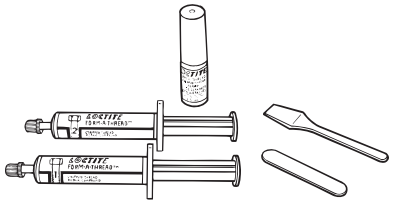
RECOMMENDED SERVICE PRODUCTS (continued)

Stripped threads repair kit **368**

(P/N 413 7086 00)

Loctite 81668

Form-A-thread 81668



A00A1J4

APPLICATION

Repair damaged threads of grade 5 (SAE) or 8.8 (metric) maximum. Do not use in applications where temperatures will exceed 149°C (300°F) or on critical assemblies.

HYLOMAR sealant (100 g) **369**

(P/N 413 7071 00)

A00B3F4

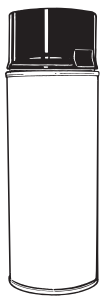
APPLICATION

To form an oil resistant seal (ex: gearbox).

Paint for frame touch-up **370**

(P/N 413 4010 00)

Black semi-gloss (spray can)



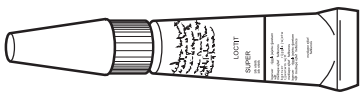
A00B3H4

APPLICATION

All models with a black frame.

General purpose instant adhesive Loctite 495 (3 g) **373**

(P/N 413 7032 00)



A00B2V4

APPLICATION

Rubber to metal bonding and most hard plastic.

Fuel stabilizer (12 x 8 oz) **375**

(P/N 413 4086 00)

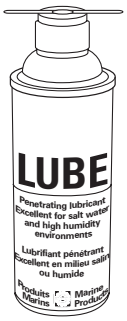
A00B3V4

APPLICATION

All models.

BOMBARDIER LUBE (12 x 14 oz) **378**

(P/N 293 6000 16)



A01B4P4

APPLICATION

Steering ball joints on all models.

Super Lube (grease) **379**

(P/N 293 5500 14)

A00B474

APPLICATION

Tie rod bushings.

LUBRICATION AND MAINTENANCE CHART

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (To be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (To be performed by dealer)	PRE-SEASON PREPARATION (To be performed by dealer)	REFER TO
	Rewind Starter Lubrication and Rope Condition						✔	Subsection 04-08
	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	✔			✔			Subsection 04-07
	Coolant Replacement (Except Fan Cooled)						✔	Not applicable
	Condition of Seals						✔	Subsections 04-02 and 04-03
	Injection Oil Filter Condition			✔				Subsection 04-06
	Injection Oil Filter Replacement						✔	Subsection 04-06
	Oil Injection Pump Adjustment	✔			✔			Subsection 04-06
	Fuel Stabilizer					✔		This section no. 2
	Fuel Filter Replacement						✔	This section no. 3
	Fuel Lines and Connections	✔					✔	Subsection 04-10
	Carburetor Adjustment	✔			✔			Subsection 04-09
	Throttle Cable Inspection	✔			✔		✔	Subsection 04-10
	Air Filter Cleaning			✔				This section no. 4
	Drive Belt Condition	✔	✔					This section no. 5
	Condition of Drive and Driven Pulleys	✔		✔		✔		Subsections 05-03 and 05-04
	Cleaning of Drive and Driven Pulleys						✔	Subsections 05-03 and 05-04
	Retorquing of Drive Pulley Screw	✔						Subsection 05-03
	Driven Pulley Preload	✔			✔			Subsection 05-04
	Brake Condition	✔	✔					Subsection 05-06
	Brake Adjustment			✔				Subsection 05-06
	Lubrication of Ratchet Wheel or Fluid Change						✔	Subsection 05-06

SYSTEM	PART/TASK	10-HOUR OR 500 km (300 mi) INSPECTION (To be performed by dealer)	WEEKLY OR EVERY 240 km (150 mi)	MONTHLY OR EVERY 800 km (500 mi)	ONCE A YEAR OR EVERY 3200 km (2000 mi)	STORAGE (To be performed by dealer)	PRE-SEASON PREPARATION (To be performed by dealer)	REFER TO
	Drive Chain Tension	✔		✔				Subsections 05-07 and 05-08
	Countershaft Lubrication (S Series)	✔		✔		✔		Subsection 05-06
	Chaincase/Gearbox Oil Level	✔		✔			✔	Subsections 05-07 and 05-08
	Chaincase/Gearbox Oil Change					✔		Subsections 05-07 and 05-08
	Lubrication of drive axle bearing	✔		✔		✔		Subsection 07-04
	Handlebar Bolts. Retorque to 26 N•m (19 lbf•ft)	✔						Subsection 08-02
	Steering and Front Suspension Mechanism	✔		✔		✔		Subsections 08-02 and 08-03
	Wear and Condition of Skis and Runners	✔	✔					Subsection 08-03
	Steering and Ski Leg Camber Adjustment	✔		✔				Subsection 08-02
	Suspension Adjustments	AS REQUIRED						Section 07: See appropriate Subsection and *Operator's Guide*
	Suspension Lubrication			✔		✔		Section 07: See appropriate Subsection
	Suspension Condition	✔			✔			Section 07: See appropriate Subsection
	Suspension Stopper Strap Condition				✔			Section 07: See appropriate Subsection
	Track Condition	✔		✔				Subsection 07-05
	Track Tension and Alignment	✔	AS REQUIRED					Subsection 07-05
	Spark Plugs*	✔		✔				Subsection 06-04
	Engine Timing	✔					✔	Subsection 06-03
	Battery Condition	✔		✔		✔		Subsection 06-05
	Headlight Beam Aiming				✔			Subsection 09-02
	Wiring Harnesses, Cables and Lines	✔		✔				Subsection 09-02
	Operation of Lighting System (HI/LO Beam, Brake Light, etc.) Test Operation of Emergency Cut-Out Switch and Tether Cut-Out Switch	✔	✔			✔		*Operator's Guide*
	Rags in Air Intake and Exhaust System					✔	✔	This section no. 6
	Engine Compartment	✔		✔				This section no. 7
	Vehicle Cleaning and Protection	✔		✔		✔		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.

NO. 1 ENGINE LUBRICATION

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

Proceed as follows:

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

◆ WARNING

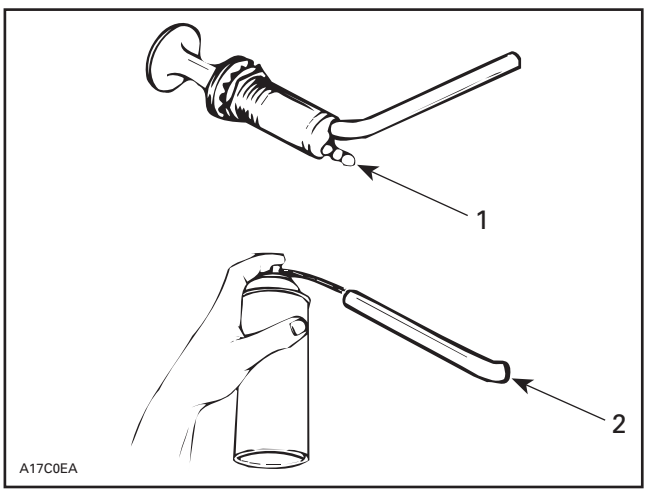
Ensure the track is free of all particles which could be thrown out while it is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle.

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).

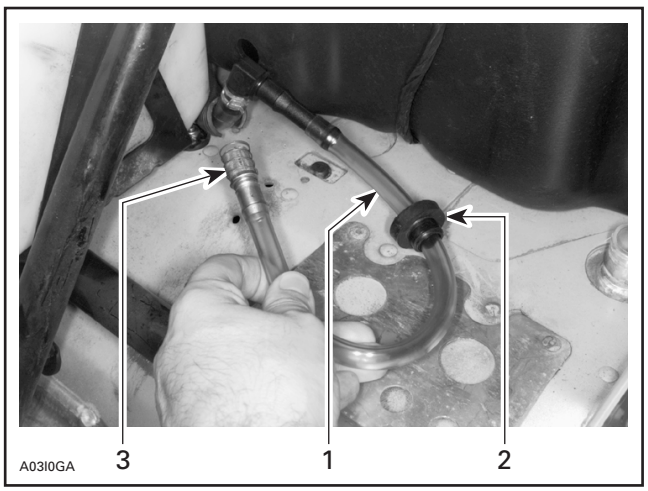
▼ CAUTION

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

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.

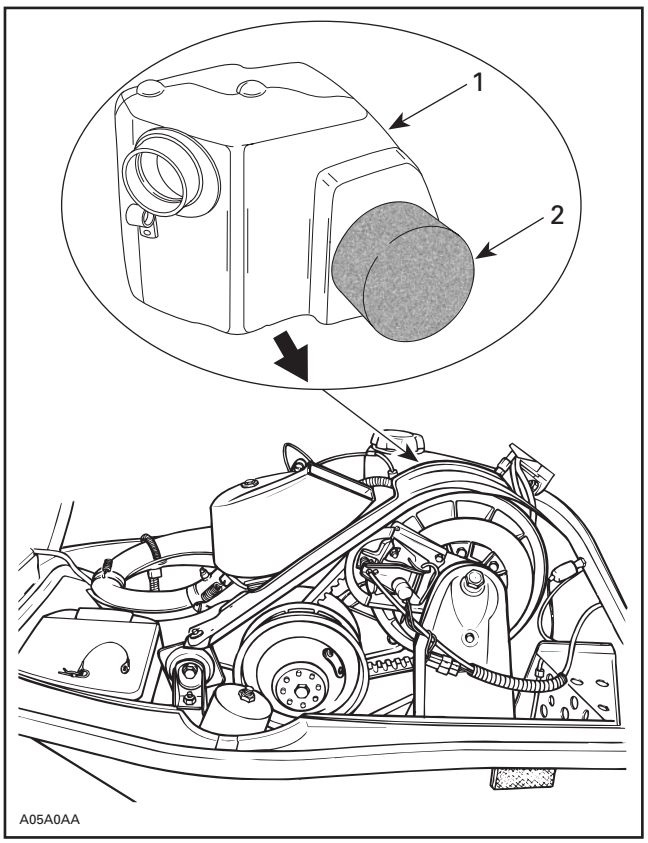
▼ CAUTION

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

Tundra II LT

Air filter is located on lower side portion of air intake silencer. Lift hood and remove belt guard. Gently pull air filter sideward.

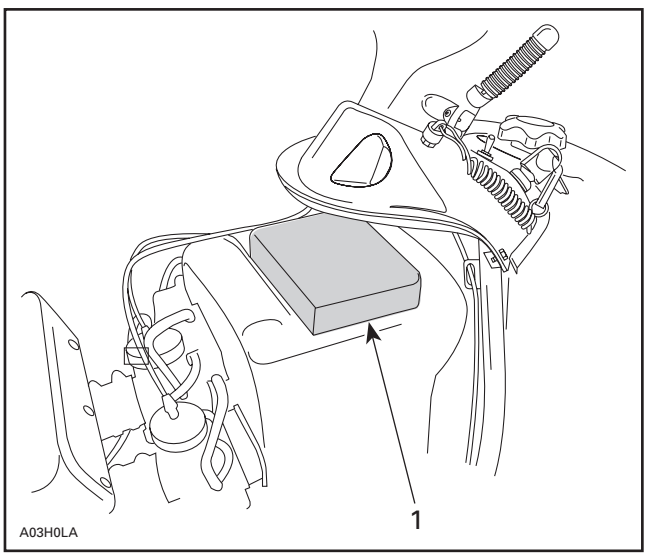
Ensure it is clean and dry. Shake snow out. Clean with a solvent and dry as necessary.



1. *Intake silencer*
2. *Air filter*

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 05-02.

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.

NO. 8 VEHICLE CLEANING AND PROTECTION

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.

For bottom pan cleaning, use Bombardier Cleaner (P/N 293 1100 01 (spray can 400 g) and 293 1100 02 (4 L)).

▼ CAUTION

Do not use Bombardier Cleaner on decals or vinyl.

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.

For vinyl and plastic parts, use Vinyl & Plastic Cleaner (P/N 413 7112 00 (6 x 1L)).

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 16). 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

Lift rear of vehicle until track is clear of the ground. Install on a snowmobile mechanical stand.

NOTE: Do not release track tension.

TABLE OF CONTENTS

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.

SYMPTOM	**ENGINE BACKFIRES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug(s).** a. Carbon accumulation caused by defective spark plug(s). *Clean carbon accumulation and replace spark plug(s).*
	2. Check cooling system. a. Loose fan belt. *Adjust or replace fan belt (refer to TECHNICAL DATA 10).* b. Low antifreeze level. *Adjust antifreeze level. Then check clamps or hoses.* c. Defective tank cap. *Replace cap.* d. Air in system. *Bleed system.*
	3. Check ignition timing. a. Timing is too advanced. *Set timing according to specifications (refer to TECHNICAL DATA 10).*

SYMPTOM	ENGINE SUDDENLY TURNS OFF.
CONDITION	NORMAL USE.
Test/Inspection	**1. Perform engine leak test. Refer to engine leak verification flow chart. Check possible piston seizure.** a. Damaged gasket and/or seal. *Replace defective parts.*
	2. "Four-corner" seizure of piston(s). a. Accelerating too fast when engine is cold. Piston expands faster than cylinder. *Replace piston(s). Ask driver to refer to warm-up procedure in* Operator's Guide.
	3. Piston(s) seizure on exhaust side (color on piston dome is correct). a. Kinked fuel tank vent tube. *Relocate fuel tank vent tube.* b. Leaks at fuel line connections or damaged fuel lines. *Replace defective lines.* c. Fuel does not flow through carburetor(s) (plastic particles in needle area and/or varnish formation in carburetor(s)). *Clean carburetor(s).* d. Spark plug heat range is too warm. *Install spark plug(s) with appropriate heat range (refer to TECHNICAL DATA 10).* e. Improper ignition timing. *Adjust according to specifications (refer to TECHNICAL DATA 10).* f. Restriction in exhaust system. *Replace.* g. Compression ratio is too high. *Install genuine parts.* h. Carburetor calibration is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).* i. Improper rotary valve timing or improper valve. *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or install Bombardier's recommended rotary valve.* j. Poor quality oil. *Use Bombardier Rotax oil.* k. Leaks at air intake silencer. *Replace air intake silencer grommets.*

	4. Melted and/or perforated piston dome; melted section at ring end gap. 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. *Clean residue accumulation in combustion chamber and replace piston(s). Use Bombardier Rotax oil.* b. Spark plug heat range is too high. *Install recommended spark plug(s) (refer to TECHNICAL DATA 10).* c. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).* d. Inadequate fuel quality. *Use appropriate fuel.* e. Carburetion is too lean. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Seized piston all around the circumference (dry surface). a. Lack of oil, damaged oil line or defective injection pump. *Replace defective part(s).*
	6. Grooves on intake side of piston only. a. Oil film eliminated by water (snow infiltration in engine). *Replace piston(s) and check if intake system leaks.*
	7. Piston color is dark due to seizure on intake and exhaust sides. a. Broken or loose fan belt. *Replace fan belt or adjust its tension (refer to TECHNICAL DATA 10).* b. Cooling system leaks and lowers coolant level. *Tighten clamps or replace defective parts. Add antifreeze in cooling system until appropriate level is reached.* c. Accumulation of foreign particles in needle and/or main jet area. *Clean carburetor(s).*
	8. Cracked or broken piston(s). a. Cracked or broken piston(s) due to excessive piston/cylinder clearance or engine overreving. *Replace piston(s). Check piston/cylinder clearance (refer to TECHNICAL DATA 10). Adjust drive pulley according to specifications (refer to TECHNICAL DATA 10) and/or clean pulley sheaves if they are contaminated with greasy particles.*
SYMPTOM	**PISTON RING AND CYLINDER SURFACES ARE GROOVED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil quality.** a. Poor oil quality. *Use Bombardier Rotax oil.*
	2. Check injection pump and its hoses. a. Inadequate injection pump adjustment and/or defective hoses. *Adjust pump according to specifications (refer to ENGINE 04) and/or replace hoses.*

SYMPTOM	ENGINE DOES NOT OFFER MAXIMUM POWER AND/OR DOES NOT REACH MAXIMUM OPERATING RPM.
CONDITION	NORMAL USE.
Test/Inspection	**1. Check spark plug condition.** a. Fouled spark plug(s). *Replace.*
	2. Check if there is water in fuel. a. There is water in fuel. *Drain fuel system, then fill it with appropriate fuel.*
	3. Check items listed in "Engine runs out of fuel" (refer to fuel and oil system sub-section 02).
	4. Check carburetor adjustments and cleanliness. a. Inadequate carburetor adjustments or dirt accumulation. *Adjust according to specifications (refer to TECHNICAL DATA 10) or clean.*
	5. Check drive belt. a. Worn belt. *Replace belt if width is 3 mm (1/8") less than nominal dimension (refer to TECHNICAL DATA 10).*
	6. Check track adjustment. a. Too much tension and/or improper alignment. *Align track and adjust its tension to specifications (refer to TECHNICAL DATA 10).*
	7. Check drive pulley. a. Improper calibration screw adjustments (TRA pulley) and/or worn bushing(s). *Adjust according to specifications (refer to TECHNICAL DATA 10) and/or replace bushing(s).*
	8. Check driven pulley. a. Worn bushing and/or spring tension. *Replace spring and/or adjust its tension according to specifications (refer to TECHNICAL DATA 10).*
	9. Check exhaust system. a. Restriction. *Replace.*
	10. Check ignition timing. a. Decrease in power due to retarded ignition. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	11. Check engine compression. a. Worn piston(s) and ring(s). *Replace (refer to TECHNICAL DATA 10 for specification).*
	12. Check engine cooling system. a. Engine overheats. Improper fan belt tension. *Adjust fan belt (refer to TECHNICAL DATA 10).* b. Antifreeze level is low, cap fails to pressurize system or air circulates through lines. *Adjust level, replace cap or bleed cooling system.*

SYMPTOM	**ENGINE DETONATION AT MAXIMUM RPM.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check which type of fuel is used.** a. Octane number is too low and/or alcohol level is too high. *Use recommended fuel type.*
	2. Check spark plug type. a. Improper spark plug heat range. *Install recommended spark plug(s) (refer to TECHNICAL DATA 10).*
	3. Check exhaust system. a. Too much restriction. *Replace.*
	4. Check ignition timing. a. Timing is too advanced. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	5. Check carburetion. a. Fouled and/or improper carburetor components. *Clean or replace according to specification (refer to TECHNICAL DATA 10).*
	6. Check compression ratio and squish area. a. Compression ratio is too high. *Install genuine parts.*
SYMPTOM	**ENGINE TURNS OVER BUT FAILS TO START.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check switches.** a. Ignition switch, emergency cut-out switch or tether switch is in the OFF position. *Place all switches in the RUN or ON position.*
	2. Check fuel level. a. Mixture not rich enough to start cold engine. *Check fuel tank level and use primer.*
	3. Check spark plug. a. Defective spark plug (no spark). *Replace spark plug(s).*
	4. Check amount of fuel on spark plug. a. Flooded engine (spark plug wet when removed). *Do not overprime or overchoke. 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.*
	5. Check fuel lines. a. No fuel to the engine (spark plug dry when removed). *Check fuel tank level; check fuel filter, replace if clogged; check condition of fuel and impulse lines and their connections.*
	6. Check engine compression. a. Insufficient engine compression. *Replace defective part(s) (ex. : piston(s), ring(s), etc.).*

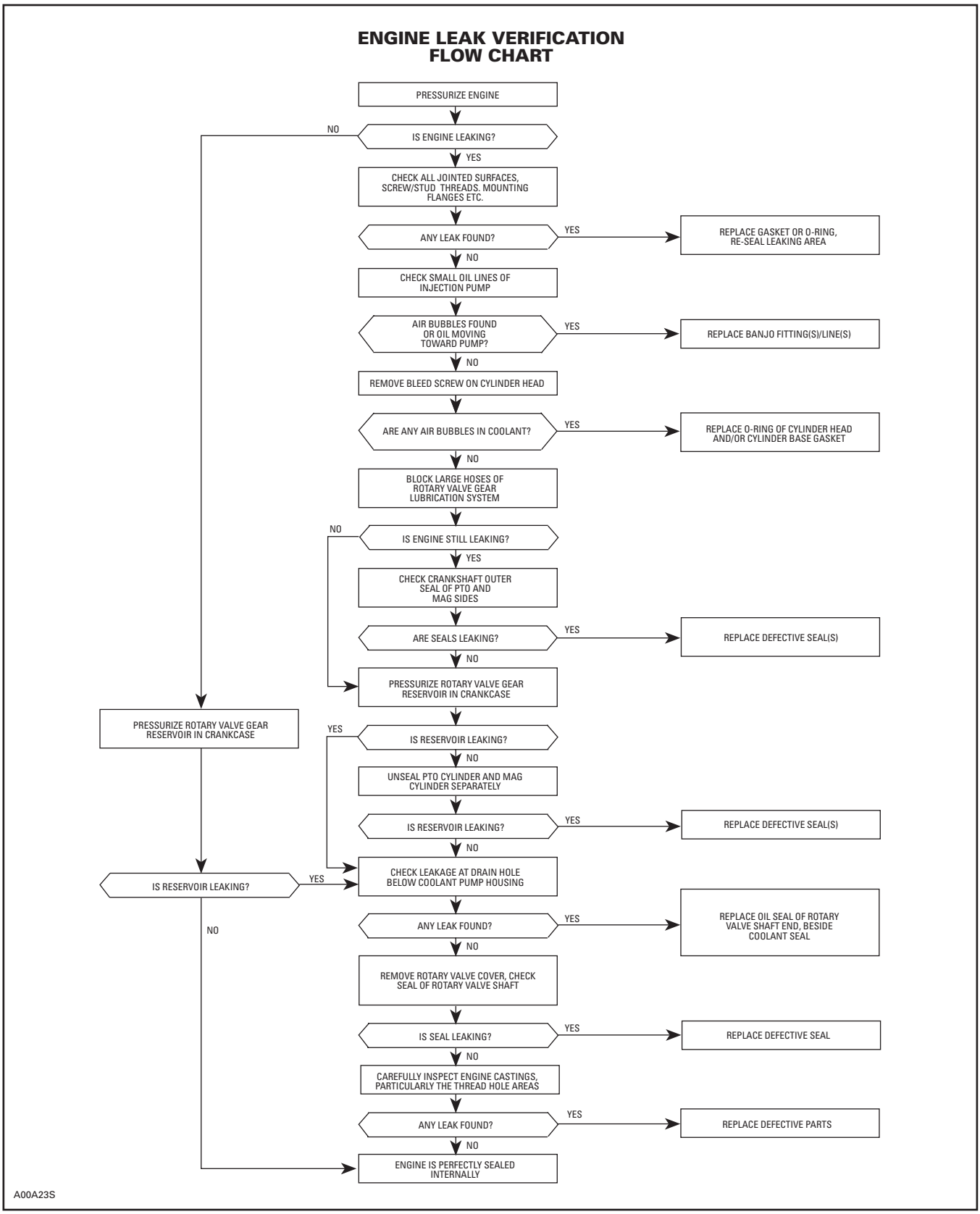
SYMPTOM	**IRREGULAR ENGINE IDLE.**
CONDITION	NORMAL USE AFTER ENGINE WARM UP.
Test/Inspection	**1. Check primer.** a. Fuel leaks at primer nipple which is mounted to carburetor. *Replace.*
	2. Check choke. a. Choke plunger may be partially opened. *Readjust.*
	3. Check carburetor adapter. a. Air enters through a crack. *Replace.*
	4. Check air screw position. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check ignition system trigger coil air gap. a. Air gap is too large. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	6. Check dimension of pilot jet. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	7. Perform engine leak test. a. Leaking gaskets allow air to enter in engine. *Replace defective parts.*
SYMPTOM	**HIGH ENGINE OPERATING TEMPERATURE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check temperature gauge sensor.** a. False reading. *Replace.*
	2. Check fan belt. a. Belt slides because it is too loose. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	3. Verify antifreeze level and check if there is air infiltration in the system or if there are leaks in gasket areas. a. Low antifreeze level or air in system. *Add antifreeze until recommended level is reached, bleed system and/or tighten clamps at fitting.*
	4. Check if antifreeze flows through system properly. a. Foreign particles and/or broken coolant pump impeller. *Clean cooling system and/or replace coolant pump impeller.*
	5. Check thermostat. a. Thermostat reacts slowly or not at all. *Replace.*

	6. Check antifreeze concentration. a. Antifreeze concentration is too high. *Adjust concentration according to Bombardier's recommendations.*
	7. Check tank cap. a. Cap does not hold pressure. *Replace.*
	8. Check carburetion. a. Improperly adjusted or inadequate carburetor components. *Adjust according to specifications (refer to TECHNICAL DATA 10) or replace inadequate component(s).*
	9. Check cylinder head gaskets. a. Worn gaskets. *Replace.*
	10. Check ignition timing. a. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	11. Check if there are leaks at air intake silencer and/or engine crankcase. a. Leak(s). *Repair or replace.*
	12. Check condition and heat range of spark plug(s). a. Melted spark plug tip or inadequate heat range. *Replace.*
SYMPTOM	**ENGINE EQUIPPED WITH "RAVE" VALVE DOES NOT REACH ITS FULL OPERATING RPM (500 TO 1000 RPM SLOWER).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check "RAVE" valve pistons.** a. Valve piston(s) is (are) too far out. *Screw valve piston(s) to bottom.*
	2. Check "RAVE" valve stems. a. Bent "RAVE" valve stem(s). *Replace.*
	3. Check "RAVE" valves. a. Jamed valve(s). *Clean.*
	4. Check tension of "RAVE" springs. a. Inadequate spring tension. *Replace.*
	5. Check "RAVE" pressure holes. a. Clogged holes. *Clean.*
	6. Check clamps or sleeves. a. Damaged clamp(s) or sleeve(s). *Replace.*

SYMPTOM	**ENGINE EQUIPPED WITH "RAVE". ENGINE HESITATES AT MID-SPEED AND REACHES MAXIMUM PERFORMANCE ONLY AFTER A WHILE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check "RAVE" valve spring(s).** a. Spring tension is too weak or spring(s) is (are) broken. *Replace.*
	2. Check "RAVE" valve cover red adjustment screws. a. Adjustment screw(s) is (are) too loose. *Fully tighten.*
	3. Check "RAVE" valve movement ("RAVE" movement indicator P/N 861 7258 00). a. Valve(s) is (are) stuck in open position. *Clean.*
SYMPTOM	**REWIND STARTER ROPE DOES NOT REWIND.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rewind spring.** a. Broken spring. *Replace spring.*
SYMPTOM	**REWIND STARTER PAWL DOES NOT ENGAGE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check stopper spring.** a. Broken stopper spring. *Replace.*
	2. Check pawl and pawl lock. a. Pawl and pawl lock have stuck together because of heat. *Replace.*
	3. Check pawl and rope sheave. a. Pawl and rope sheave have stuck together because of heat. *Replace.*

SYMPTOM	**ENGINE PINGING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel lines.** a. Bent fuel lines (preventing fuel from flowing through). *Relocate or replace fuel lines.*
	2. Check if carburetor(s) is (are) clean. a. Dirt prevents fuel from flowing through. *Clean.*
	3. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	4. Check compression ratio. a. Compression ratio is too high. *Replace inadequate part(s) to obtain manufacturer's recommended compression ratio or use a higher grade fuel.*
SYMPTOM	**ENGINE GENERATES A LOT OF VIBRATIONS.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check engine supports.** a. Loose broken supports or interference between support(s) and chassis. *Retighten to specification (refer to TECHNICAL DATA 10) or replace.*
	2. Check drive pulley (refer to: vibrations coming from drive pulley).
	3. Check carburetor synchronization. a. Throttle slide heights are adjusted differently and/or throttle slide openings are unsynchronized. *Adjust throttle slide heights and throttle cable.*

ENGINE LEAK VERIFICATION FLOW CHART



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	**1. Check fuel tank.** a. Perforated fuel tank. *Replace fuel tank.*
	2. Check fuel pump reservoir and carburetor fittings. a. Leaking fittings. *Replace defective part.*
	3. Check primer. a. Fuel flows through primer while engine runs. *Replace primer.*
	4. Check float height in carburetor(s). a. Fuel level is too high in float bowl(s). *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Check needle valve. a. Foreign particles prevent needle valve(s) from closing and/or worn seating area. *Clean or replace needle valve(s), then clean seating area.*
	6. Check H.A.C. system. a. Connection to atmosphere is plugged. *Clean.* b. Leakage in H.A.C. to carburetor tube. *Replace.* c. Leak in H.A.C. sealed chamber. *Replace.* d. H.A.C. frozen. *Replace.*
SYMPTOM	**FUEL LEAKS IN ENGINE BASE WHEN ENGINE IS STOPPED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 3, 4 and 5 of "High fuel consumption".**
	2. Check fuel pump diaphragm. a. Cracked diaphragm. *Replace.*

SYMPTOM	**ENGINE LACKS POWER OR STALLS AT HIGH RPM.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuel tank vent hose.** a. Kinked or clogged hose. *Relocate or replace.*
	2. Check fuel filter. a. Clogged filter. *Replace.*
	3. Check fuel lines. a. Kinked or clogged lines. *Relocate or replace.*
	4. Check fuel pump flow. a. Dried diaphragm. *Replace.*
	5. Check if carburetor(s) is (are) clean. a. Varnish. *Clean.*
SYMPTOM	**HIGH INJECTION OIL CONSUMPTION.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check oil injection pump adjustment.** a. Oil injection pump adjusted too rich. *Adjust.*
	2. Check injection oil lines and their fitting. a. Leaking lines and/or cover. *Replace defective part(s).*
	3. Check injection pump cover gasket. a. Worn gasket. *Replace.*
	4. Pressurize crankcase rotary valve gear reservoir. a. Leaking gasket(s). *Replace gasket(s).*

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

TRANSMISSION AND BRAKE SYSTEMS

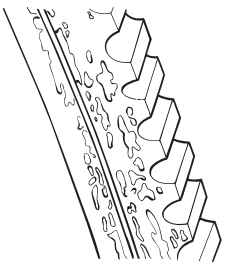
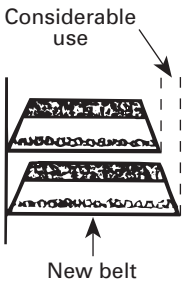
The following charts are provided to help in diagnosing the probable source of troubles. It should be used as a guideline. Some causes or corrections may not apply to a specific model.

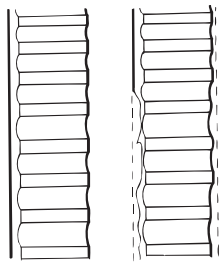
TRANSMISSION

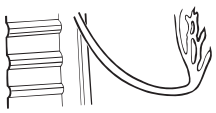
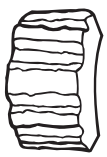
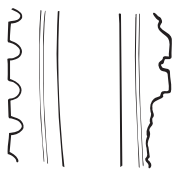
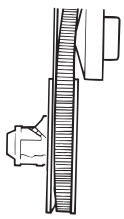
SYMPTOM	**THE SNOWMOBILE ACCELERATES SLOWLY, ESPECIALLY WHEN IT IS STOPPED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt condition.** a. Belt is too narrow (drive belt engagement is higher in drive pulley). *Replace belt if width is 3 mm (1/8") less than a new one (refer to TECHNICAL DATA 10).*
	2. Check distance between pulleys and/or drive belt deflection. a. Distance is too small between pulleys or deflection is too high (drive belt engagement is higher in drive pulley). *Adjust distance between pulleys and/or drive belt deflection according to specifications (refer to TECHNICAL DATA 10).*
	3. Check driven pulley sliding half play. a. Jammed sliding half. *Replace.*
	4. Check spring tension of driven pulley sliding half. a. Sliding half rotation is accelerated when spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	5. Refer to "Vibrations originating from driven pulley" and check items listed.
	6. Check drive pulley spring tension. a. Spring tension is too weak. *Replace.*
SYMPTOM	**ENGINE MAXIMUM RPM IS TOO HIGH AND TOP SPEED IS NOT REACHED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check items 1, 2 and 3 of "The snowmobile accelerates slowly, especially when it is stopped".**
	2. Check driven pulley spring tension. a. Spring tension is to stiff. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	3. Check position of the calibration screws. (TRA drive pulley) a. Selected numbers are too high. *Adjust according to specification (refer to TECHNICAL DATA 10).*
	4. Refer to "Vibrations originating from driven pulley" and check items listed.

SYMPTOM	**LOOSENESS IS FELT IN DRIVE SYSTEM WHEN ACCELERATING/DECELERATING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive chain tension.** a. Drive chain is too loose. *Adjust.*
	2. Check play of driven pulley Woodruff key (aluminum frame models) a. Worn Woodruff key or keyway. *Replace.*
SYMPTOM	**VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check drive belt.** a. Belt width is uneven at many places. *Replace (refer to TECHNICAL DATA 10 for the part number).*
	2. Check tightening torque of drive pulley screw. a. Moving governor cup. *Retighten screw.*
	3. Spring cover screws. a. Spring cover moves and restrains sliding half movement. *Retighten screws.*
	4. Check spring cover (TRA TYPE) and/or outer half bushings. a. Excessive gap between bushings and inner half shaft, thus restraining sliding half movements. *Replace bushing(s).*
	5. Check sliding half slider shoes. a. Worn slider shoes. *Replace.*
SYMPTOM	**VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check sliding half play.** a. Sliding half runout. *Replace sliding half bushing.*
	2. Check sliding half and fixed half straightness. a. Sliding half/fixed half runout. *Replace.*
	3. Check cam slider shoes. a. One or 2 slider shoes out of 3 are broken. *Replace.*

SYMPTOM	**PULLEYS DO NOT DOWN SHIFT PROPERLY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check driven pulley spring tension.** a. Spring tension is too weak. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Refer to "Vibrations coming from driven pulley" and check items listed.
	3. Check drive pulley bushings (cleanliness, wear, etc.). a. Bushings stick to fixed half pulley shaft. *Clean or replace.*
	4. Check driven pulley spring tension. a. Spring tension is too weak. *Replace.*
SYMPTOM	**IT IS DIFFICULT TO ENGAGE TRANSMISSION IN FORWARD OR REVERSE GEAR.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check position of gear shift lever adjustment screw.** a. Improper adjustment. *Adjust according to specifications (refer to TRANSMISSION 05).*
SYMPTOM	**UNEVEN BELT WEAR ON ONE SIDE ONLY.**
CONDITION	NORMAL USE.
Test/Inspection  A00D09Y	**1. Check tightening torque of engine mount bolts.** a. Loose engine mount. *Tighten engine mount nuts/bolts equally.*
	2. Check pulley alignment. a. Pulley misalignment. *Align pulleys.*
	3. Check drive belt contact area on pulleys. a. Rough or scratched pulley surfaces. *Repair or replace pulley half.*
	4. Check driven pulley sliding half play. a. Driven pulley bushing worn. *Replace bushing.*

SYMPTOM	**BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0AY	**1. Check if drive pulley bushings are worn.** a. Insufficient pressure on belt sides. *Replace bushing.* **2. Check condition of drive pulley fixed half shaft.** a. Rusted drive or driven pulley shafts. *Clean shaft with fine steel woof.* **3. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley halves.* **4. Check pulley calibration.** a. Improper pulley calibration. *Calibrate according to specification.*
SYMPTOM	**BELT WORN EXCESSIVELY IN TOP WIDTH.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0BY	**1. Check drive pulley.** a. Excessive slippage due to irregular outward actuation movement of drive pulley. *Carry out drive pulley inspection.* **2. Check drive belt identification number.** a. Improper belt angle. (wrong type of belt). *Replace belt with an appropriate drive belt.* **3. Check drive belt width.** a. Considerable use. *Replace belt if 3 mm (1/8") less than recommended width (see TECHNICAL DATA 10).*

SYMPTOM	**BELT WORN NARROW IN ONE SECTION.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0CY	**1. Check if parking brake is released.** a. Parking brake is engaged. *Release parking brake.* **2. Check track tension/alignment.** a. Frozen or too tight track. *Liberate track from ice or check track tension and alignment.* **3. Check drive pulley.** a. Drive pulley not functioning properly. *Repair or replace drive pulley.* **4. Check idle speed.** a. Engine idle speed too high. *Adjust according to specification.* **5. Check drive belt length.** a. Incorrect belt length. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).* **6. Check distance between pulleys.** a. Incorrect pulley distance. *Readjust according to specification.* **7. Check belt deflection.** a. Deflection is too small. *Adjust according to specification.*
SYMPTOM	**BELT SIDES WORN CONCAVE.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0DY	**1. Check pulley half surfaces.** a. Rough or scratched pulley half surfaces. *Repair or replace.* **2. Check drive belt identification number.** a. Unspecified type of belt. *Replace belt with an appropriate drive belt (refer to TECHNICAL DATA 10).*
SYMPTOM	**BELT DISINTEGRATION.**
CONDITION	NORMAL USE.
Test/Inspection  A00DOEY	**1. Check drive belt identification number.** a. Excessive belt speed. *Using unspecified type of belt. Replace belt with proper type of belt (refer to TECHNICAL DATA 10).* **2. Check if pulley halves are clean.** a. Oil on pulley surfaces. *Clean pulley surfaces with fine emery cloth and wipe clean using Loctite Safety Solvent (P/N 413 7082 00) and a cloth.*

SYMPTOM	**BELT EDGE CORD BREAKAGE.**
CONDITION	NORMAL USE.
Test/Inspection  A00DOFY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).*
SYMPTOM	**FLEX CRACKS BETWEEN COGS.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0GY	**1. Check drive belt condition.** a. Considerable use, belt wearing out. *Replace.*
SYMPTOM	**SHEARED COGS, COMPRESSION SECTION FRACTURED OR TORN.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0HY	**1. Check drive belt rotational direction.** a. Improper belt installation. *Replace.* **2. Check if drive belt rubs against components.** a. Belt rubbing on stationary object. *Relocate components.* **3. Check drive pulley.** a. Violent engagement of drive pulley. *Check drive pulley engagement speed, drive pulley bushings and components.*
SYMPTOM	**BELT "FLIP-OVER" AT HIGH SPEED.**
CONDITION	NORMAL USE.
Test/Inspection  A00D0IY	**1. Check pulley alignment.** a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA 10).* **2. Check drive belt identification number.** a. Using unspecified type of belt. *Replace belt with an appropriate drive belt.*

BRAKE SYSTEM

MECHANICAL BRAKE

SYMPTOM	**BRAKE DOES NOT ADJUST AUTOMATICALLY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ratchet wheel spring.** a. Broken ratchet wheel tag. *Replace.*
	2. Check mobile pad stud. a. Stud rotates in pad. *Replace.*
SYMPTOM	**BRAKE HANDLE DOES NOT RETURN COMPLETELY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check brake return spring.** a. Broken return spring. *Replace.*
	2. Check if brake cable moves freely in its housing. a. Brake cable movement is limited due to oxidation or dirt accumulation. *Replace.*
	3. Check distance between brake lever and caliper. a. Distance is too wide. *Adjust according to specifications (refer to TRANSMISSION 05).*

HYDRAULIC BRAKE

SYMPTOM	**SPONGY BRAKE CONDITION.**
CONDITION	NORMAL USE.
Test/Inspection	*Replace brake fluid and bleed system. If problem still occurs, replace master cylinder.*
SYMPTOM	**BRAKE FLUID LEAKING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check for loosen hose connectors.** *Retighten.*
	2. Check for damaged hose, master cylinder and caliper. *Replace part(s) and check for proper mounting.*

MECHANICAL AND HYDRAULIC BRAKES

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

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	**1. Check fuse.** a. Burnt fuse. *Check wiring condition and replace fuse.*
	2. Check continuity of starter switch contact points. a. Poor contact of starter switch contact points. *Repair or replace switch.*
	3. Check continuity between starter switch and solenoid. a. Open circuit between starter switch and solenoid switch. *Repair.*
SYMPTOM	**STARTER TURNS; BUT DOES NOT CRANK THE ENGINE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery capacity.** a. Shorted battery cell(s). *Replace.*
	2. Check battery charge. a. Weak battery. *Recharge.*
	3. Check wire connection. a. Inadequate connection (too much resistance). *Clean and reconnect.*
	4. Check solenoid switch contact disc. a. Burnt or poor contact of solenoid switch contact disc. *Replace solenoid switch.*
	5. Check continuity of solenoid switch pull-in winding. a. Open circuit of solenoid switch pull-in winding. *Replace solenoid switch.*
	6. Check continuity of solenoid switch hold-in winding. a. Open circuit of solenoid switch hold-in winding. *Replace solenoid switch.*
	7. Check brushes. a. Poor contact of brushes. *Replace brushes.*
	8. Check commutator. a. Burnt commutator. *Turn commutator in lathe.*

	9. Check height of commutator mica. a. Commutator mica too high. *Undercut mica.*
	10. Check field coil resistance. a. Shorted field coil. *Repair or replace yoke.*
	11. Check armature resistance. a. Shorted armature. *Repair or replace armature.*
	12. Check tension of brush springs. a. Weak brush spring tension. *Replace springs.*
	13. Check yoke assembly magnets. a. Weak magnets. *Replace yoke assembly.*
	14. Check if bushings are worn. a. Worn bushings. *Replace bushings.*
SYMPTOM	**STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch pinion gear.** a. Worn clutch pinion gear. *Replace clutch.*
	2. Check clutch. a. Defective clutch. *Replace clutch.*
	3. Check movement of clutch on splines. a. Poor movement of clutch on splines. *Clean and correct.*
	4. Check clutch bushing. a. Worn clutch bushing. *Replace clutch.*
	5. Check starter bushings. a. Worn starter bushing(s). *Replace bushing(s).*
	6. Check ring gear. a. Worn ring gear. *Replace ring gear.*

SYMPTOM	**ELECTRIC STARTER KEEPS TURNING WHEN ENGINE IS STARTED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check clutch.** a. Jammed clutch pinion gear. *Replace or clean.*
	2. Check movement of clutch on splines. a. Clutch is stuck on splines. *Clean.*
	3. Check ignition switch. a. Ignition switch does not return to its ON position or is short-circuited. *Adjust retaining screw or replace switch.*
	4. Check solenoid. a. Shorted solenoid switch winding(s). *Replace solenoid switch.*
	5. Check solenoid switch contacts. a. Melted solenoid switch contacts. *Replace solenoid switch.*
	6. Check starter switch. a. Starter switch returns poorly. *Replace ignition switch.*
SYMPTOM	**NOISE OCCURENCE WHEN STARTING ENGINE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if ring gear is well mounted to drive pulley inner half.** a. Loose and/or broken bolts. *Retighten bolts using thread locker or replace ring gear and drive pulley inner half.*
SYMPTOM	**ELECTRIC STARTER SOMETIMES DOES NOT WORK WHEN TURNING IGNITION SWITCH.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check battery cables and starter wires.** a. Corroded and/or loose connection(s). *Clean and/or retighten.*
	2. Check fuse. a. Oxidized fuse. *Clean.*
	3. Check wiring harness connections. a. Oxidized connections. *Clean or replace defective terminals.*

	4. Check ignition switch. a. Defective contacts in ignition switch. *Replace.*
	5. Check solenoid of electric starter. a. Shorted solenoid wiring harness or eroded contact washer. *Replace.*
SYMPTOM	**HEADLAMP NOT LIGHTING.**
CONDITION	WHITE BULB.
Test/Inspection	**1. Check bulb.** a. Gas leak. *Replace bulb.*
CONDITION	BROKEN ELEMENT.
Test/Inspection	**1. Check for loose headlamp housing and bulb socket.** a. Vibration problem. *Tighten headlamp mounting screws. Lock bulb in socket. Replace bulb.*
CONDITION	MELTED FILAMENT (ENDS OF ELEMENT HOLDER) AND BLACK BULB.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be above 15 Vac.** NOTE: If quartz halogen bulb is involved, ensure that proper voltage regulator is installed. a. Excessive voltage in lighting circuit. *Replace voltage regulator and ensure proper grounding. Retest.*
SYMPTOM	**HEADLAMP DIMING.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check voltage at headlamp at different speeds. It must not be below 11 Vac.** a. Insufficient voltage in lighting circuit. *Replace voltage regulator and retest.*
	2. Visually inspect wiring harness for damaged and/or melted wires and/or bad wire terminal crimping and/or connections. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Repair/replace damaged wires and/or terminals. Reroute harness where necessary.*
	3. On manual start models: Verify regulator ground. a. Rusted or loose retaining screws. *Clean, apply lithium grease (LMZ1) and firmly tighten screws.*
	4. Verify if there is an interconnection between AC and DC current. a. Faulty installation of optional equipment. *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).*

	5. Verify of optional electric accessories are overloading the magneto/generator. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing excess accessories. Reconnect as recommended by manufacturer.*
	6. Hot Grips brand : Verify if they were connected in parallel by mistake. a. Excessive electrical load to magneto/generator. *Reconnect as recommended by manufacturer.*
	7. Bombardier heating grips : Verify if the return wires of the elements were grounded to the chassis by mistake. a. Faulty installation of optional equipment. *Reconnect as recommended by manufacturer.*
	8. Verify if heating grips installation overloads the magneto/generator capacity. a. Excessive electrical load to magneto/generator. *Reduce the electrical load by removing accessories.*
SYMPTOM	**FALSE FUEL AND/OR TEMPERATURE GAUGE READINGS.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Verify if gauge was connected on DC current by mistake (in case of optional installation).** a. Faulty installation of optional equipment. *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).*
	2. Verify sender unit for free movement and/or correct arm position. a. Defective or damaged part. *Correct or replace sender unit.*
	3. Verify sender unit/gauge wiring harness condition. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. *Replace or repair damaged wires. Reroute where necessary.*

SYMPTOM	**ENGINES DOES NOT START – NO SPARK AT SPARK PLUG.**
CONDITION	AT ENGINE CRANKING.
Test/Inspection	**1. Verify spark plug condition.** a. Defective, improperly set, worn-out, fouled. *Identify source of problem and correct. Replace spark plug.*
	2. Verify spark plug cap resistance with an ohmmeter. a. Defective part. *Replace cap.*
	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. a. Heating, rotating or sharp part in contact with harness. Improper harness routing. Defective switch(es). Corroded connector terminals. *Replace or repair damaged wires. Reroute where necessary. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
	4. Verify trigger coil resistance with an ohmmeter and connector condition. a. Defective coil. Corroded connector terminals. *Replace defective coil. Clean terminals and apply silicone dielectric grease.*
	5. Verify condition of ignition coil. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace ignition coil.*
	6. Verify condition of ignition generator coils. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace coils.*
	7. Verify CDI (Capacitor Discharge Ignition) module. a. Mechanically damaged part. Vibration problem. Electrically damaged part. *Tighten mounting screws. Replace CDI module, retest and verify ignition timing.*
SYMPTOM	**ENGINE STALLS.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**
SYMPTOM	**IRREGULAR ENGINE SPEED.**
CONDITION	AT HIGH SPEED.
Test/Inspection	**1. Verify items 4, 5 and 6 above.**
CONDITION	AT LOW SPEED.
Test/Inspection	**1. Verify items 4 and 5 above and trigger coil/flywheel protrusion air-gap.** a. Air-gap too large. *Readjust air-gap.*

SYMPTOM	**ENGINE IS MISFIRING – ERRATIC SPARK AT SPARK PLUG.**
CONDITION	RIDING ON WET SNOW.
Test/Inspection	**1. Verify if spark plug wires and/or spark plug cap seals are sealing-out moisture.** a. Defective wires and/or seals. *Replace defective part.*
	2. Verify if ignition system wiring harness connectors are in good condition and/or are sealing-out moisture. a. Loose connectors, corroded terminals or defective parts. *Clean terminals and apply silicone dielectric grease. Replace defective parts.*
CONDITION	NORMAL USE.
Test/Inspection	**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.** 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. *Replace defective parts and/or repair damaged wires. Replace defective switch(es). Clean terminals and apply silicone dielectric grease.*
CONDITION	RIDING IN DEEP AND THICK SNOW.
Test/Inspection	**1. Perform all verifications outlined under "Engine does not start — no spark at spark plug".**
	2. Verify spark plug(s). Proceed with spark plug analysis in order to identify source of problem. a. Defective and/or worn spark plug(s) and/or cable(s) and/or cap(s). *Replace defective part(s). Proceed with ignition system testing procedures. Perform engine analysis.*

SYMPTOM	**FOULED (BLACK) SPARK PLUG TIP.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check carburetor(s).** a. Carburetion is too rich. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check injection oil consumption. a. Injection pump flow is too high. *Adjust according to specification or replace.*
	3. Check oil quality. a. Poor oil quality that creates deposits. *Use Bombardier oil.*
	4. Check engine compression. a. Leaking piston ring(s). *Replace.*
SYMPTOM	**SPARK PLUG TIP(S) IS (ARE) LIGHT GREY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Refer to "Engine slows down or stops at high RPM" and check items listed.**
	2. Check spark plug heat range. a. Spark plug heat range is too high. *Replace by Bombardier's recommended spark plug (refer to TECHNICAL DATA 10).*
	3. Check if air intake silencer leaks. a. Air surplus coming from opening(s) located between halves. *Seal.*
	4. Check carburetor adapter collars. a. Loose collar(s). *Tighten.*
	5. Check carburetor adapter(s). a. Cracked or deformed adapter(s). *Replace.*
SYMPTOM	**BRAKE LIGHT REMAINS ON.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check if bulb is properly installed.** a. Bulb is not installed correctly (contact elements are reversed). *Install bulb correctly.*
	2. Check brake switch. a. Switch contact remains closed. *Adjust brake cable or brake switch.*

SYMPTOM	**REAR LIGHT BULB FLASHES.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check bulb tightness in housing.** a. Looseness at bulb contact elements. *Install bulb correctly.*
	2. Check if rear light is properly connected. a. Connector housing is partially connected. *Install connector housing properly.*
	3. Check continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*
SYMPTOM	**TACHOMETER DOES NOT WORK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check fuse.** a. Burnt fuse. *Replace.*
	2. Check continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*
SYMPTOM	**HIGH BEAM PILOT LAMP LIGHTS UP WHEN LOW BEAM IS SELECTED.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check proper connections.** a. Yellow wire connected to pilot lamp. Mixed-up connections with heating element pilot lamps. *Reconnect a YELLOW/BLACK wire to pilot lamp. YELLOW wires are connected to heating element pilot lamps.*

SUSPENSION 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.

SYMPTOM	**REAR SUSPENSION BOTTOMS OUT.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check rear spring preload or rear arm spring preload.** a. Spring tension is too low. *Increase rear arm spring preload.*
SYMPTOM	**SLIDER SHOES WEAR OUT PREMATURELY.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on slider shoes. *Adjust according to specifications (refer to TECHNICAL DATA 10). Replace defective parts.*
SYMPTOM	**TRACK CLEATS BECOME BLUE.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Pressure is too great on cleats. *Adjust according to specifications (refer to TECHNICAL DATA 10).*
	2. Check slider shoes and/or suspension retaining screws. a. Worn slider shoes or lost retaining screws. *Replace defective parts and/or tighten loose screws.*
SYMPTOM	**NOISE OR VIBRATIONS ORIGINATING FROM THE TRACK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check slide suspension retaining bolts.** a. Missing bolt(s) allowing movement of certain components which in turn interfere with track rotation. *Replace missing bolt(s).*
	2. Check condition of idler wheel(s). a. Idle wheel rubber is damaged. *Replace.*
	3. Check guide cleats. a. Top portion of guide cleat(s) is bent. *Replace.*
	4. Check sprockets. a. One or various teeth of drive shaft sprockets are broken. *Replace sprocket(s).*
	5. Check track rods and/or internal traction teeth. a. One or various track rods and/or teeth are broken. *Replace track.*

SYMPTOM	**DERAILING TRACK.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too loose. *Adjust.*
	2. Check if track and slider shoes are properly aligned. a. Improper alignment. *Adjust.*
SYMPTOM	**REAR SUSPENSION IS LOW OR TOO STIFF.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check track tension.** a. Track is too tight. *Adjust.*
	2. Check if axles are properly lubricated. a. Improper lubrication and/or contaminated grease (sticky oil sludge). *Clean and/or lubricate.*
	3. Check rear spring preload. a. Insufficient preload. *Increase preload using shock adjustment cams.*
SYMPTOM	**WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn ski runners. *Replace.*
	2. Check tension of front spring adjustment cams. a. Insufficient ski pressure on the ground. *Increase spring preload.*
	3. Check if front arm stopper strap is too long. a. Insufficient ski pressure on the ground. *Shorten stopper strap.*
	4. Check front arm spring tension. a. Insufficient ski pressure on the ground. *Slacken spring tension.*

SYMPTOM	**HANDLE BAR IS DIFFICULT TO TURN.**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check position of front spring adjustment cams.** a. More pressure on the ground when cam increases spring preload. *Reduce front spring preload.*
	2. Check position of stopper strap. a. More weight when stopper strap is short. *Lengthen front arm stopper strap.*
	3. Check position of front arm shock adjustment cam(s). a. When spring tension is weak, more weight is transferred to the skis. *Increase spring preload.*
	4. Check condition of ball joints. a. Corrosion restrains movement. *Lubricate or replace.*
	5. Check swing arm camber (liquid cooled models). a. Too much ski leg inclination. *Adjust camber to 0° ± .5°.*
SYMPTOM	**THE SNOWMOBILE IS UNSTABLE (IT MOVES FROM LEFT TO RIGHT AND VICE VERSA).**
CONDITION	NORMAL USE.
Test/Inspection	**1. Check ski runner condition.** a. Worn or bent ski runners. *Replace ski runners.*
	2. Check ski alignment. a. Improper ski alignment. *Align skis in order to obtain proper toe-out (opening) (to adjust, refer to STEERING SYSTEM 08).*
	3. Check if bushings are too loose in steering system. a. Bushings are too loose. *Replace.*

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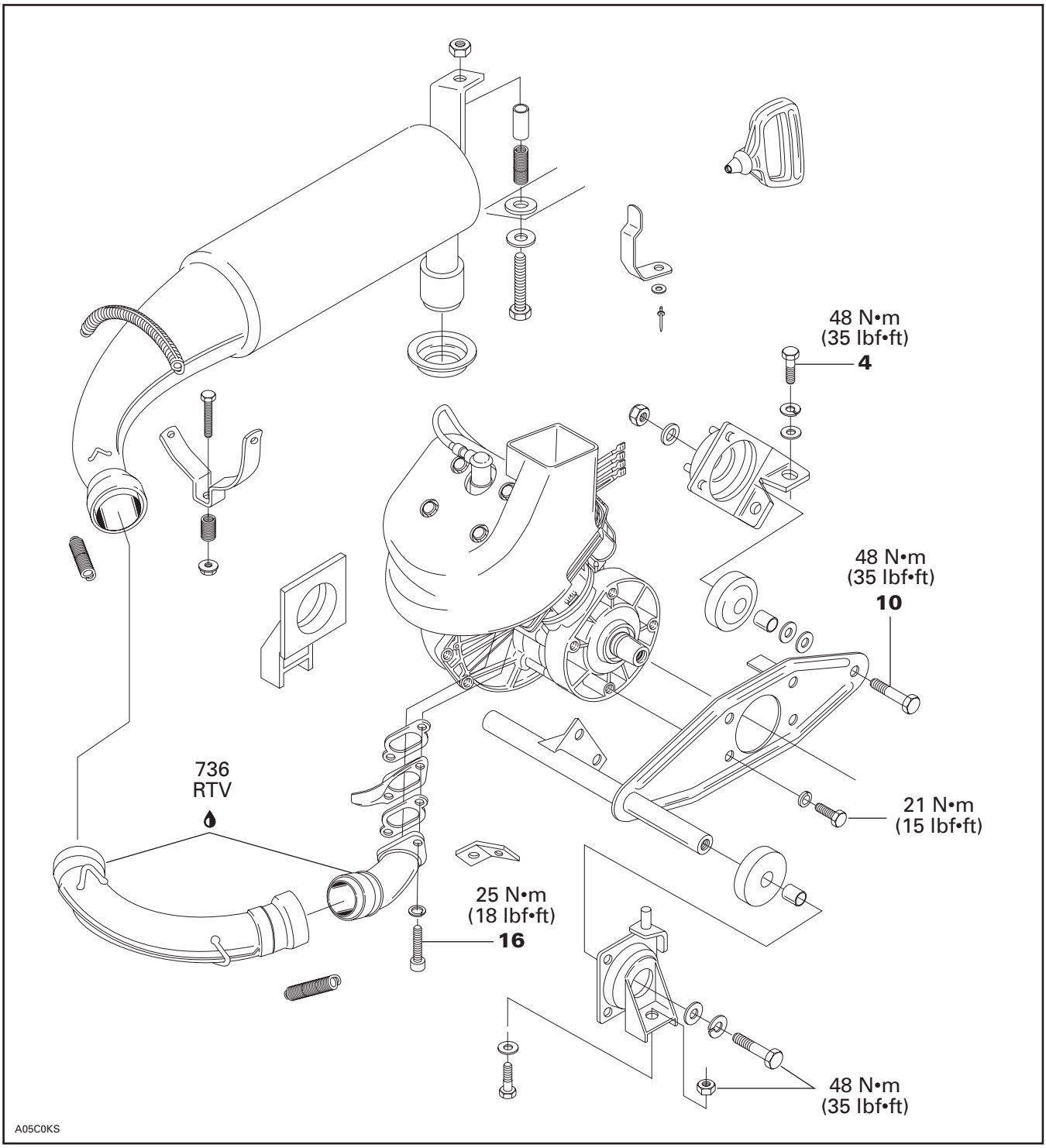
277 ENGINE TYPE

ENGINE REMOVAL AND INSTALLATION



REMOVAL FROM VEHICLE

Remove or disconnect the following then lift engine from vehicle:

- belt guard
- drive belt
- muffler
- carburetor
- oil injection pump cable
- oil injection inlet fitting
- impulse line
- electrical connectors
- hood retaining cable
- engine mount nuts

ENGINE SUPPORT AND MUFFLER DISASSEMBLY AND ASSEMBLY

Torque the manifold screws **no. 16** to 25 N•m (18 lbf•ft).

Torque the engine support screws **nos. 4** and **10** to 48 N•m (35 lbf•ft).

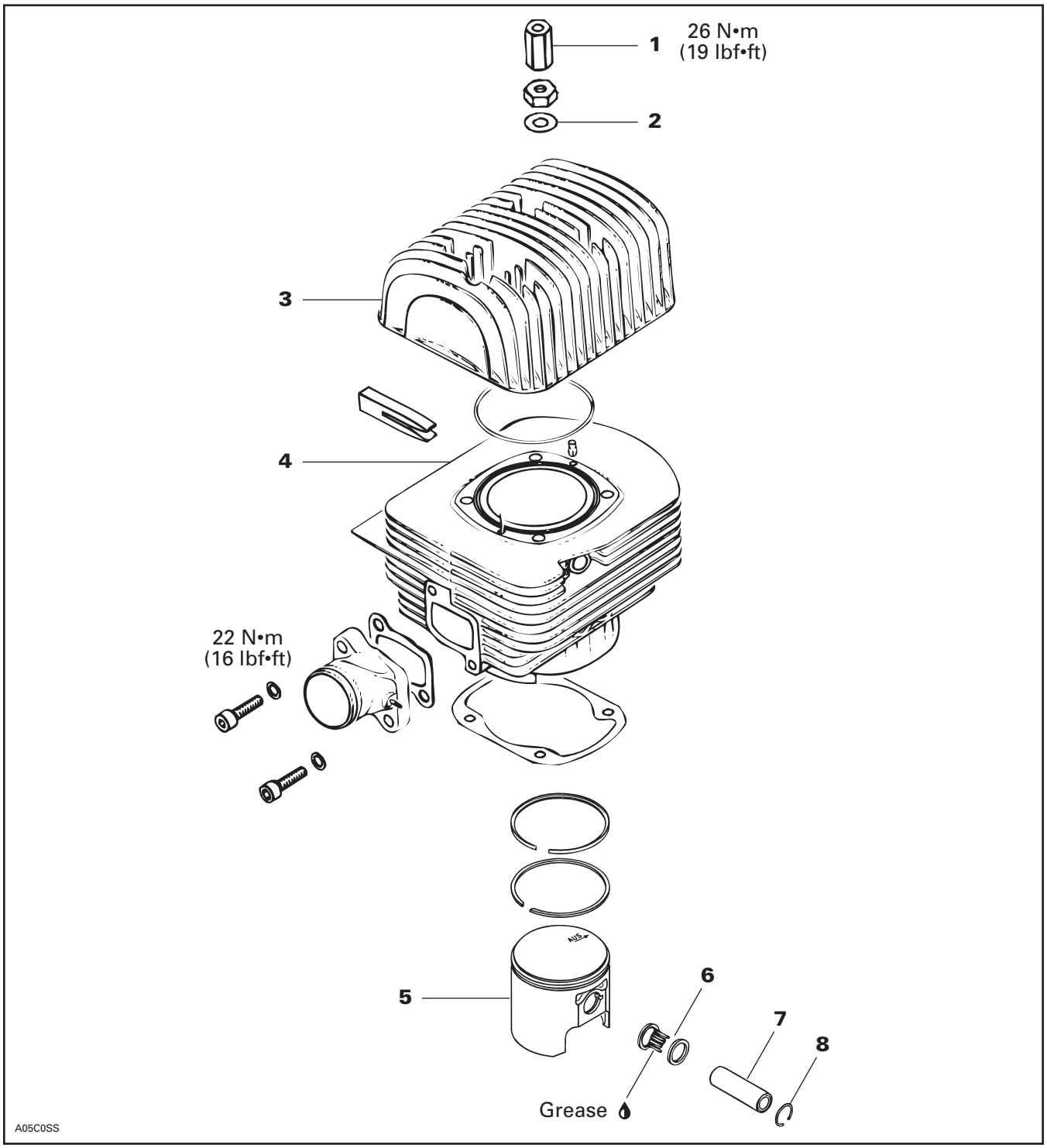
Torque the engine mount screws to 21 N•m (15 lbf•ft).

INSTALLATION ON VEHICLE

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

- Check tightness of engine mount nuts, and drive pulley screw.
- After throttle cable installation, check maximum throttle slide opening.
- Check pulley alignment and drive belt tension.
- Should a light exhaust leak is experienced at muffler ball joint, Dow Corning sealer no. 736 RTV (P/N 413 7092 00) can be used.

TOP END



TROUBLESHOOTING

Before completely disassemble engine, check airtightness. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT 04-04.

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

TOP END REMOVAL (without removing engine from chassis)

Remove the following then lift cylinder head **no. 3** and cylinder **no. 4**:

- belt guard
- carburetor
- exhaust system
- spark plug
- oil injection inlet
- fan cowl and hood cable
- cylinder head nuts **no. 1** and washers **no. 2**

CLEANING

Discard all gaskets.

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

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

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

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

DISASSEMBLY

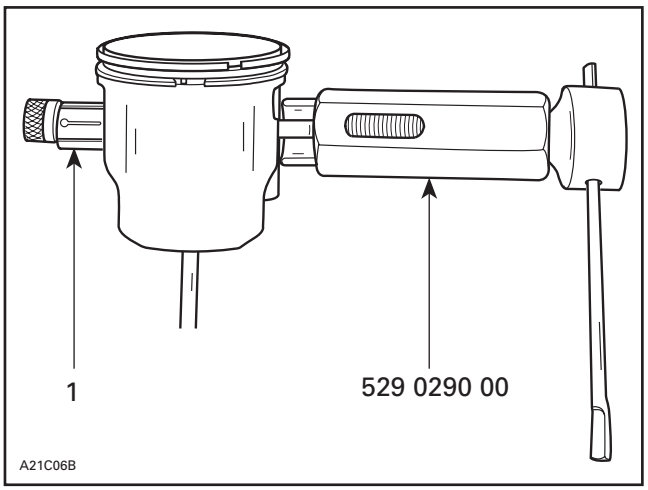
5, Piston

On this engine, piston pin needle bearing **no. 6** is mounted without a cage.

Use piston pin puller (P/N 529 0290 00) along with expansion sleeve and locating sleeve.

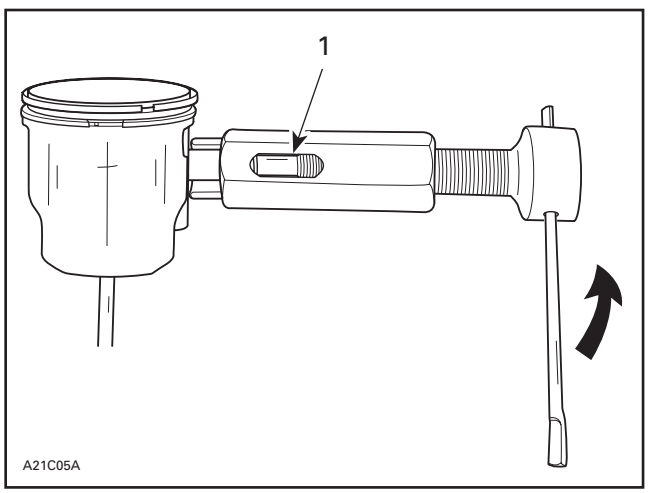
Place a clean cloth or rubber pad (P/N 529 0234 00) over crankcase to prevent circlips **no. 8** from falling into crankcase. Then with a pointed tool inserted in piston notch, remove circlips from piston **no. 5**.

Insert piston pin puller (P/N 529 0290 00) then install expansion sleeve over puller rod.



1. Expansion sleeve

Pull out piston pin **no. 7** by unscrewing puller until first thread of puller rod aligns with 277 mark.

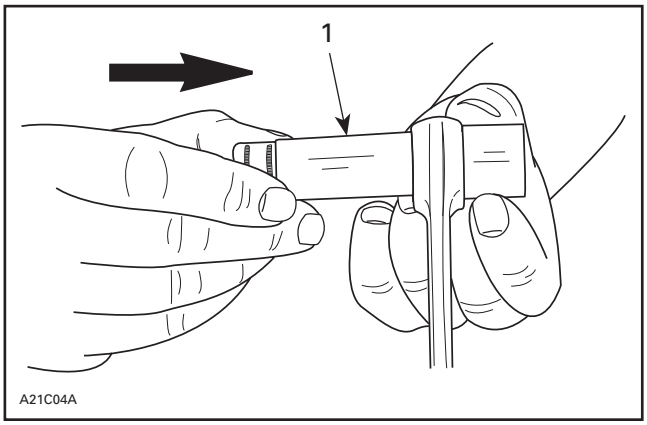


1. 277 mark on puller

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 21mm (.826 in)

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

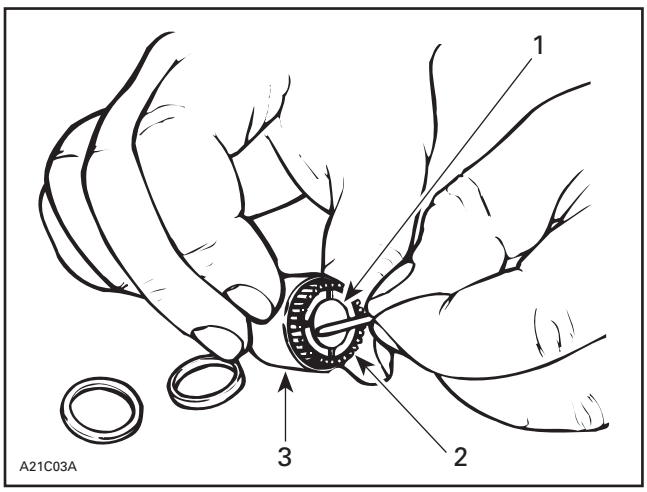
Use a locking tie to fasten all needles and thrust washers along with sleeves.

INSPECTION

Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT 04-04.

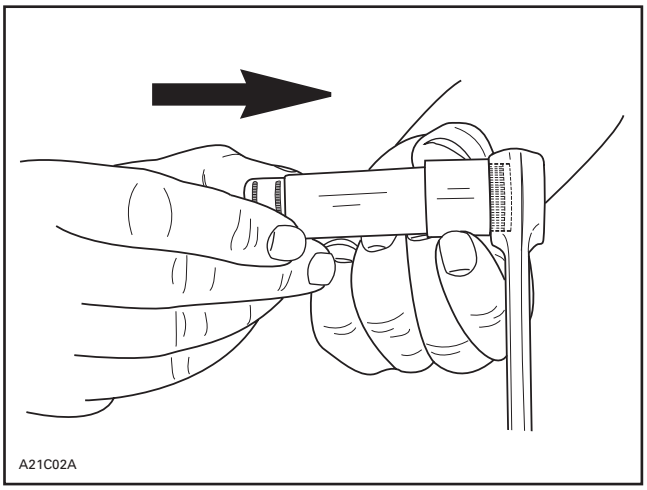
ASSEMBLY

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

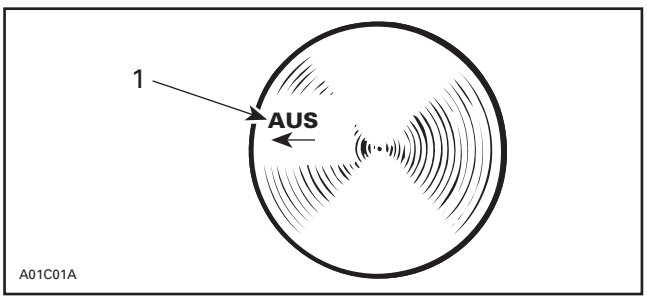


1. Expansion sleeve
2. 31 needles
3. Locating sleeves

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

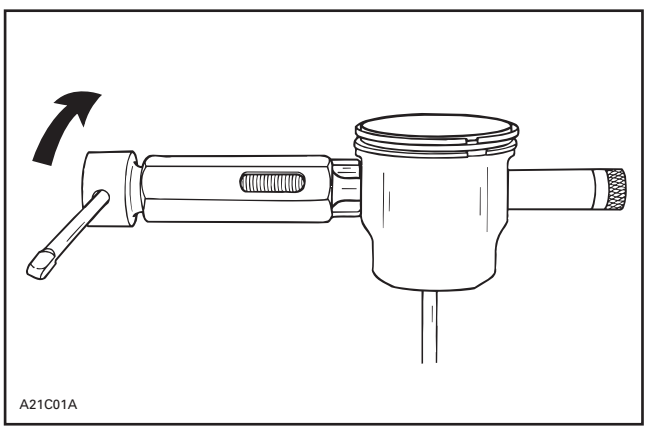


Mount piston over connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in the direction of exhaust port.



1. Exhaust

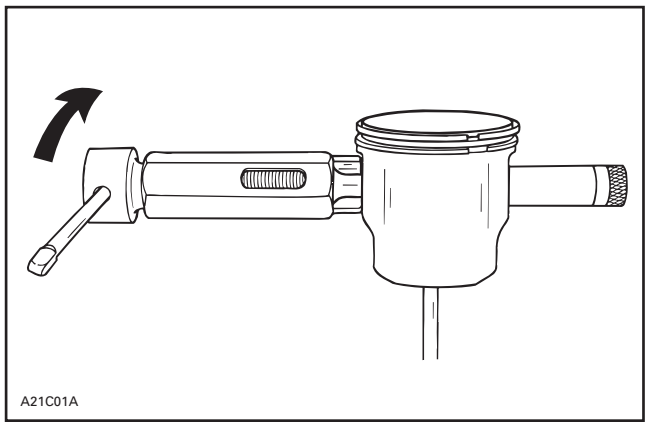
Install piston pin puller (P/N 529 0290 00) and turn handle until piston pin is correctly positioned in piston.



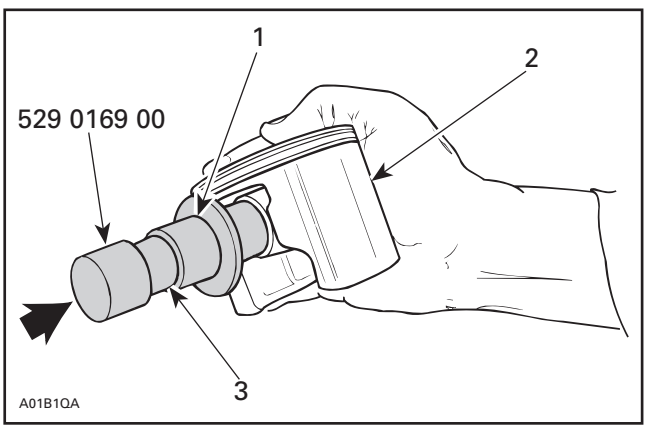
Remove piston pin puller and expansion sleeve.

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.

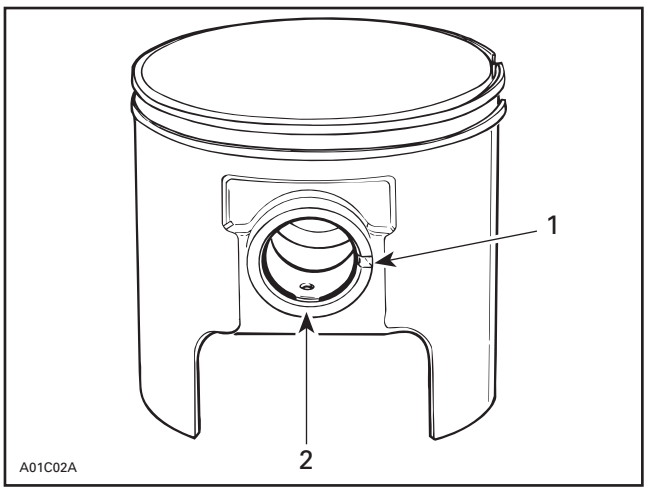
Use piston pin puller (P/N 529 0290 00) to insert piston pin. Plastic halves should come off piston. If not, pull them using a long nose pliers.



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).



1. Place circlip in
2. Restrain
3. Oil



1. Piston notch
2. Circlip break

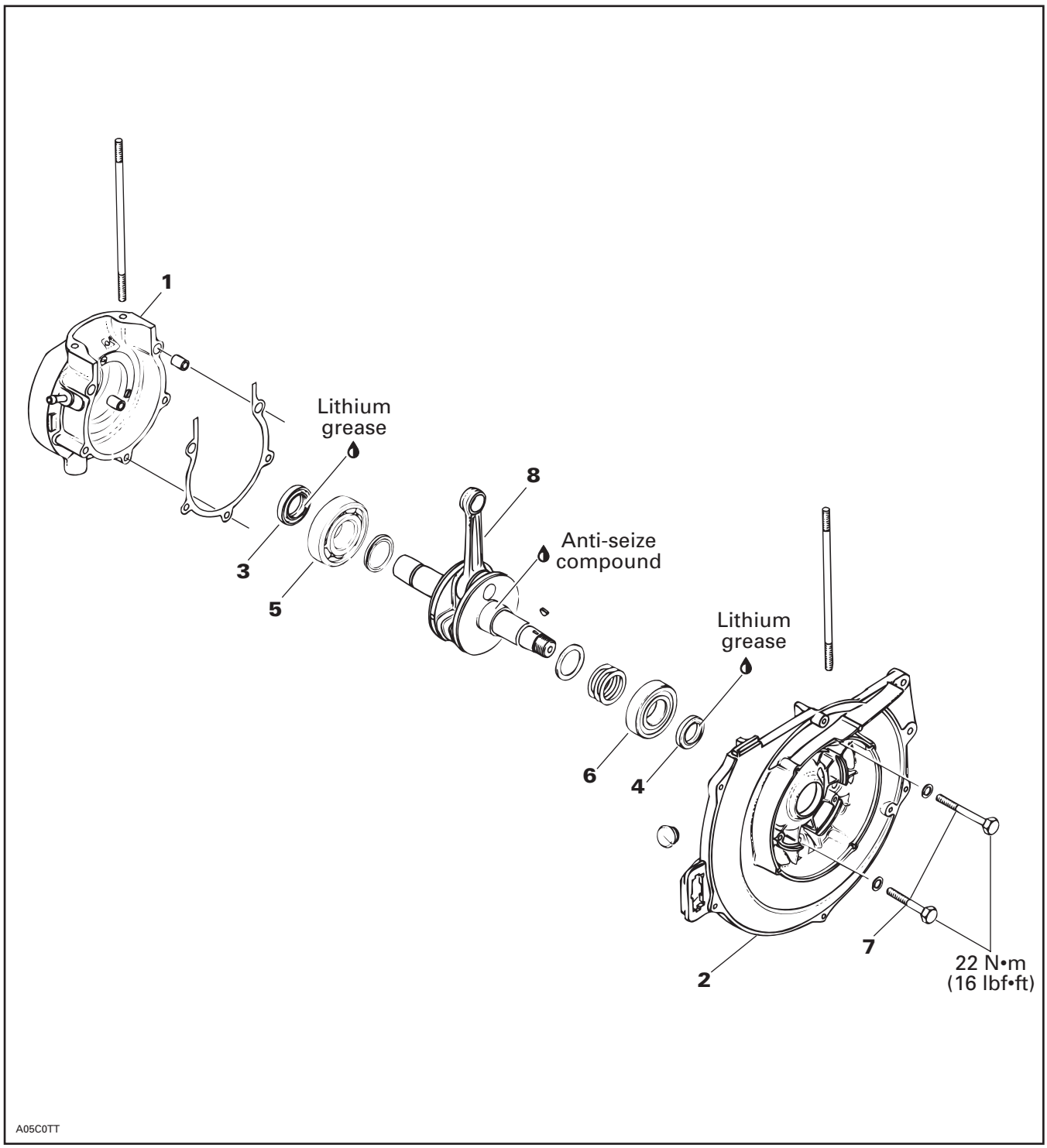
▼ CAUTION

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

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

Position cylinder head on cylinder with fins in line with crankshaft center line. Cross torque retaining nuts to 26 N•m (19 lbf•ft).

BOTTOM END


1
Lithium grease
3
5
8
Anti-seize compound
Lithium grease
6
4
7
2
22 N•m (16 lbf•ft)
A05C0TT

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

CLEANING

Discard all oil seals and gaskets.

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

DISASSEMBLY

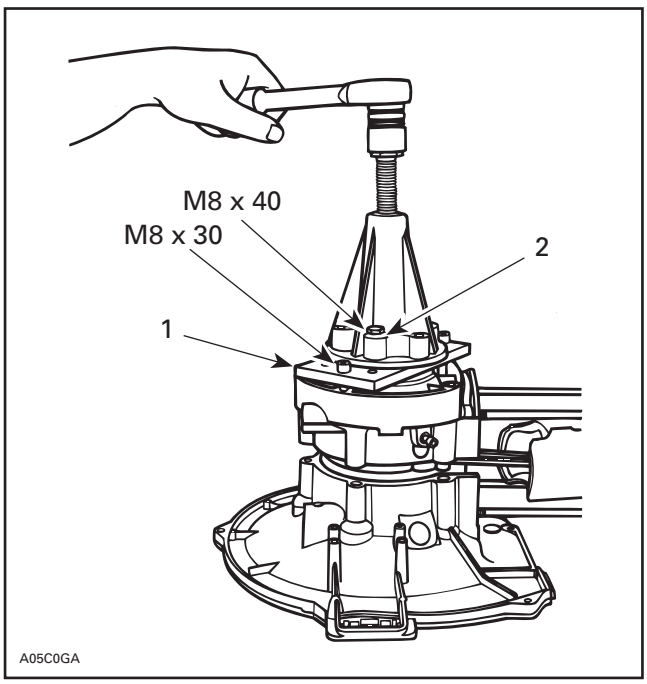
General

To remove drive pulley, refer to DRIVE PULLEY 05-03.

To remove magneto, refer to MAGNETO 04-05.

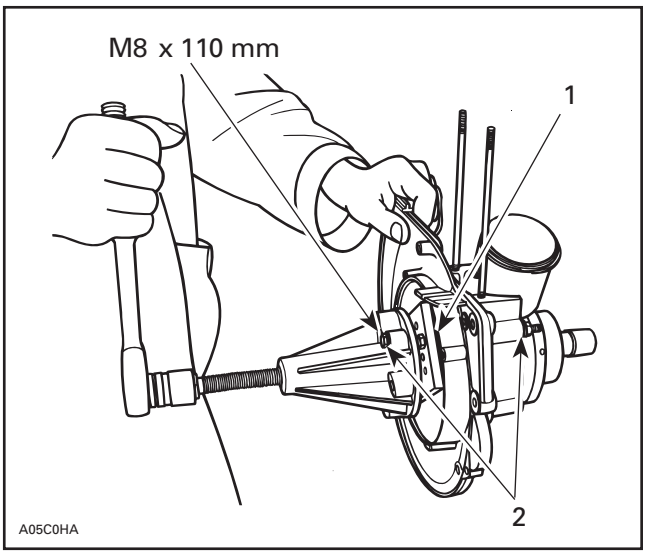
2,6, Crankcase Half

Heat to 110-120°C (230-248°F) all around bearing seat on PTO side. Install puller (P/N 420 8762 98) to plate (P/N 529 0249 00) with washer under screw heads and extract PTO side crankcase half **no. 1**.



1. Plate
2. Flat washer

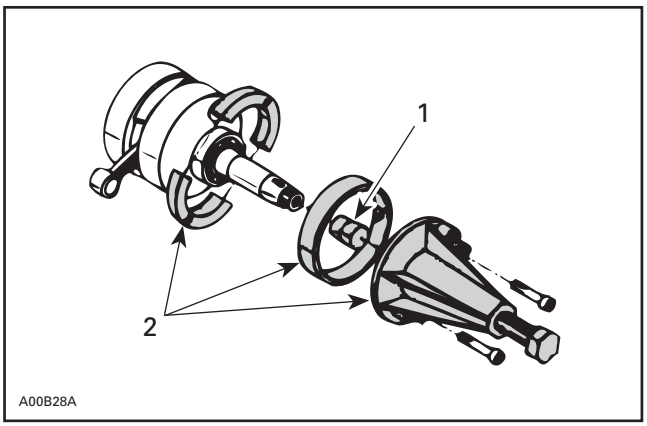
Heat to 110-120°C (230-248°F) all around bearing seat on MAG side. Install puller with plate, long bolts M8 x 110 mm and flat washers. Extract MAG side crankcase half **no. 2**.



1. Plate
2. Flat washers

To remove seals **nos. 3** and **4**, push from outside the crankcase towards the inside.

To remove bearings **nos. 5** and **6** from crankshaft use a protective cap and special puller as illustrated.



1. Protective cap
2. Special puller

INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

Install connecting rod with its lubrication slot on big end facing exhaust side.

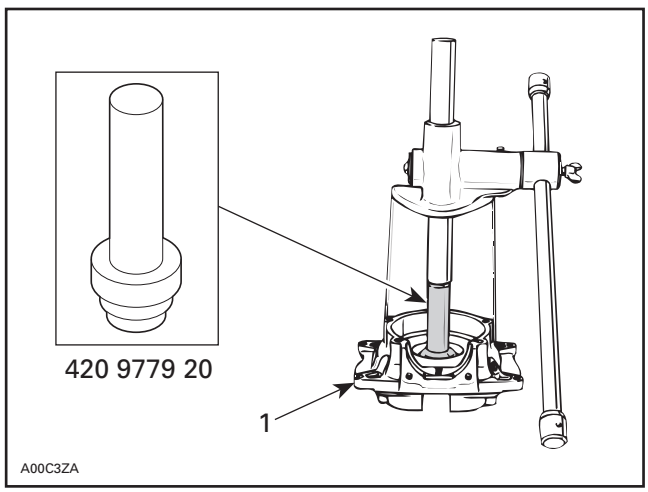
Smear anti-seize lubricant (P/N 413 7010 00) on part of crankshaft where bearing fits.

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

Install bearings with groove outward.

NOTE: Crankshaft end play requires adjustment only when crankshaft and/or crankcase is replaced. Prior to magneto side bearing installation, determine crankshaft end play and install required shim(s) on crankshaft extension. For the crankshaft end play adjustment procedure, refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT 04-04.

To install new seal **nos. 3** and **4** into crankcase use oil seal pusher (P/N 420 9779 20).



1. Crankcase half

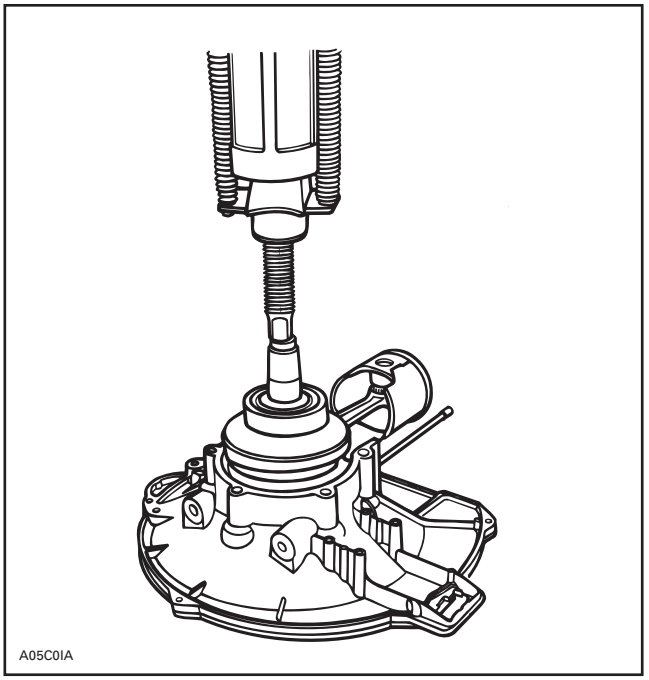
Prior to crankcase adjoining, install a protector sleeve on each crankshaft extension to prevent oil seal damage. Apply a light coat of lithium grease on seal lip. Spray some new injection oil on all moving parts of the crankshaft.

Install crankshaft seals with pusher (P/N 420 2778 75) for MAG side seal **no. 4** and (P/N 420 8766 60) for PTO side seal **no. 3**.

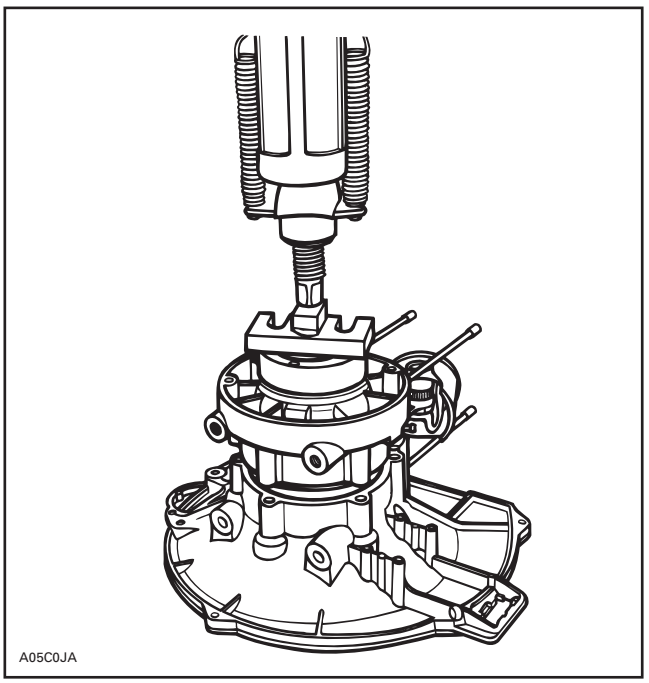
▼ CAUTION

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

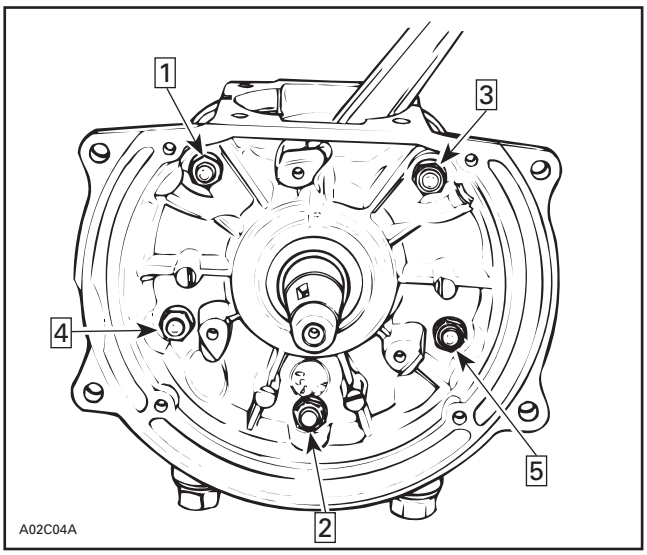
Using a press, install crankshaft into MAG side crankcase half.



Press down PTO side crankcase half onto crankshaft using appropriate spacer(s).



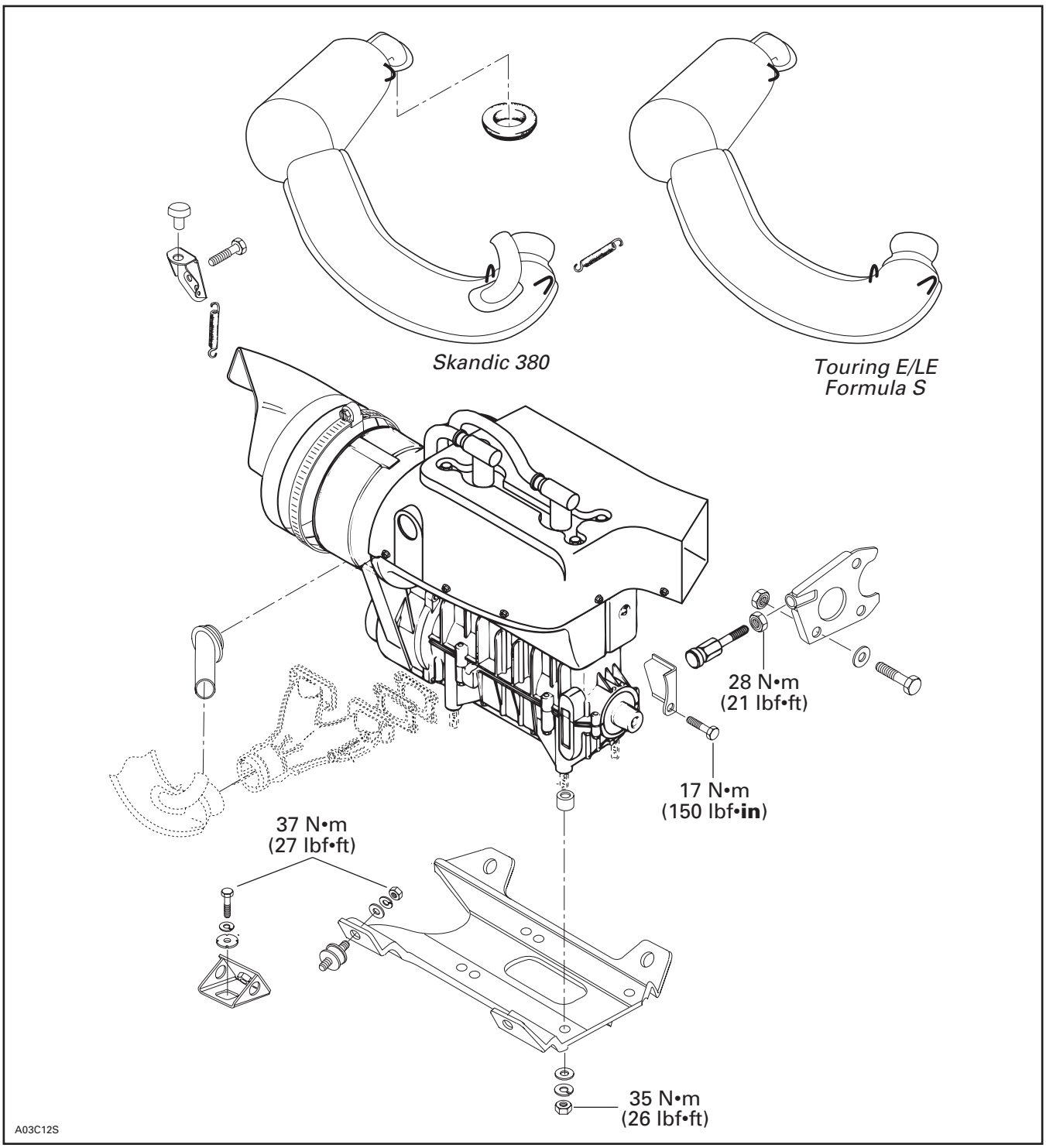
Torque the screws no. 7 to 22 N•m (16 lbf•ft) following illustrated sequence.



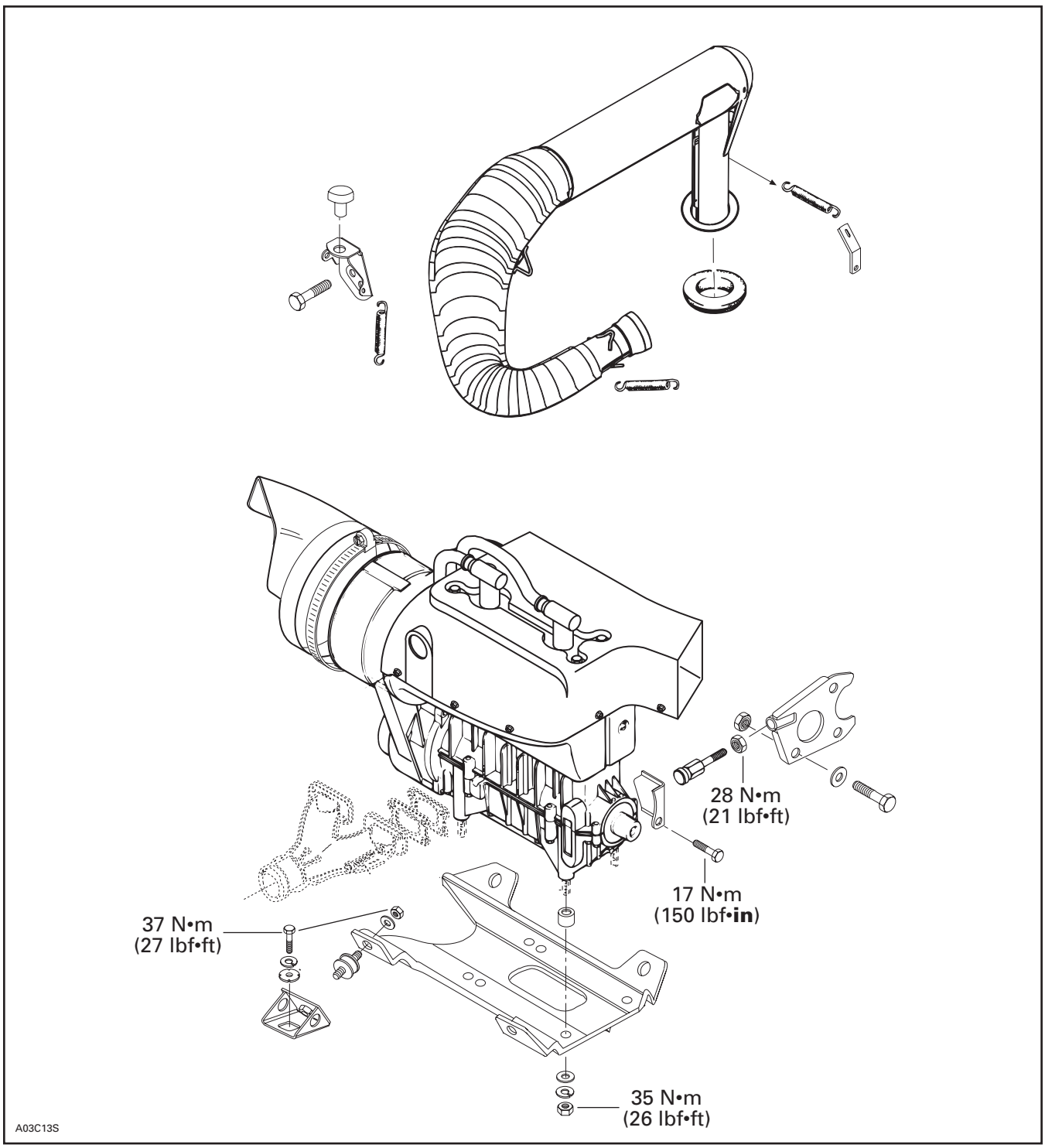
377, 443 AND 503 ENGINE TYPES

ENGINE REMOVAL AND INSTALLATION

377 and 443 Engine Types



503 Engine Type



ENGINE REMOVAL AND INSTALLATION

Disconnect or remove the following:

◆ WARNING

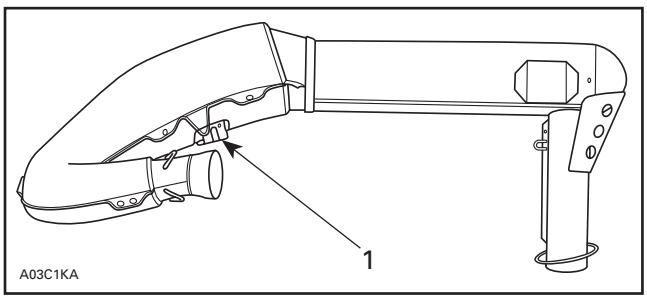
Before disconnecting any electrical wire in starter system always first disconnect the BLACK negative battery cable (on electric starting models).

- negative cable from battery (on electric starting models)
- belt guard
- drive belt
- drive pulley using appropriate puller, refer to 05-03 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

TUNED PIPE IDENTIFICATION

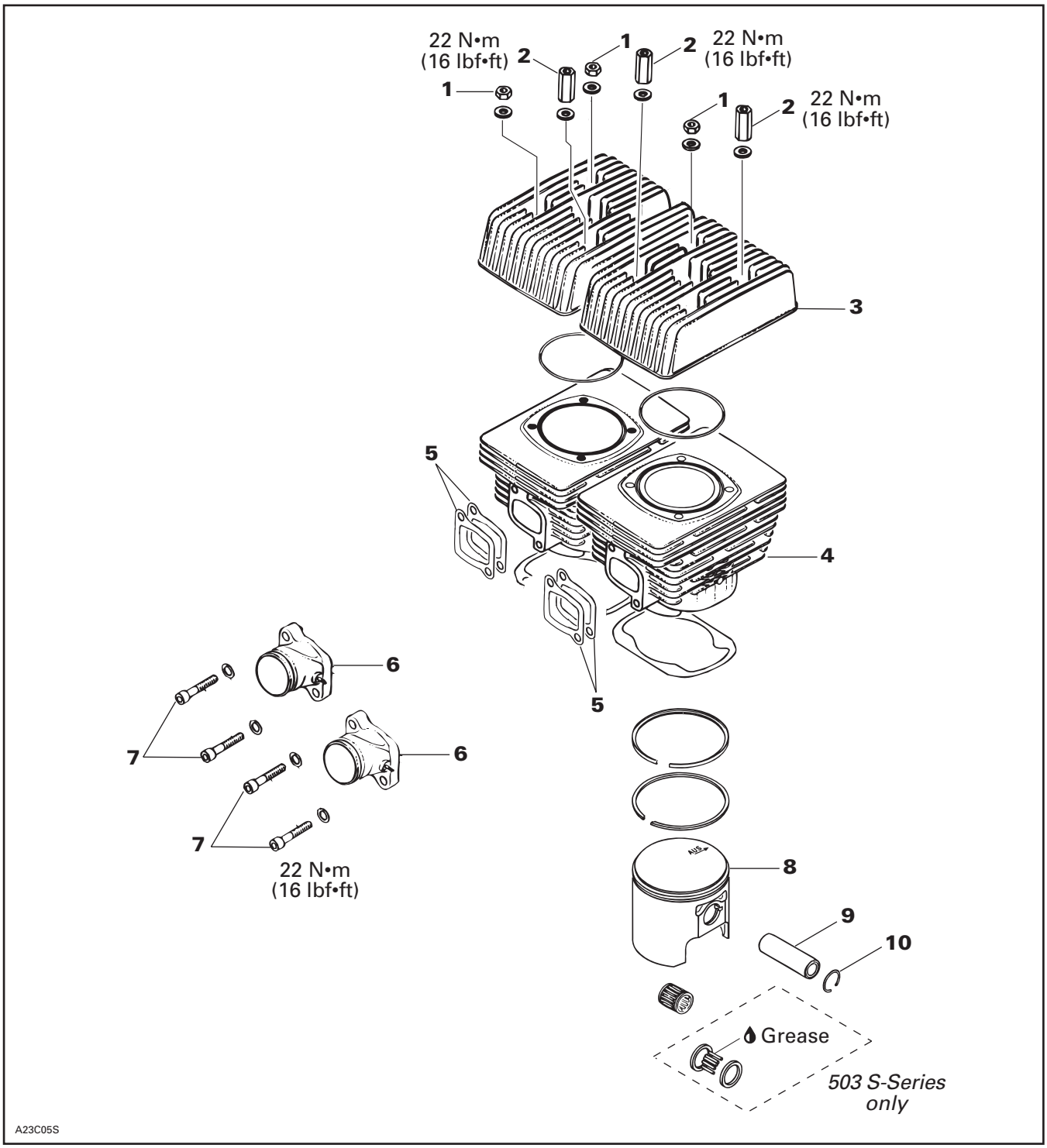
This part is identified on welded support.

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



1. Identification: 0467 for 514 0467 00

TOP END


22 N•m
(16 lbf•ft)
1
2
22 N•m
(16 lbf•ft)
1
2
22 N•m
(16 lbf•ft)
3
5
4
5
6
7
6
7
22 N•m
(16 lbf•ft)
8
9
10
Grease
503 S-Series
only
A23C05S

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.

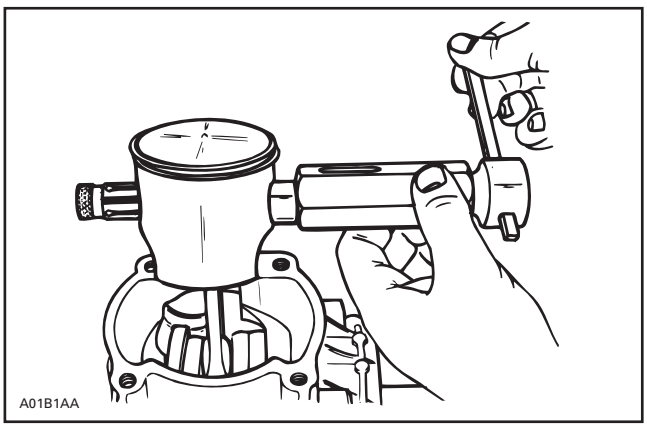
Remove cylinder heads.

All Engines Except 503

Place a clean cloth over crankcase to prevent circlips no. 10 from falling into crankcase. Then with a pointed tool inserted in piston notch, remove circlip from piston no. 8.

To remove piston pin no. 9, use piston pin puller (P/N 529 0290 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.



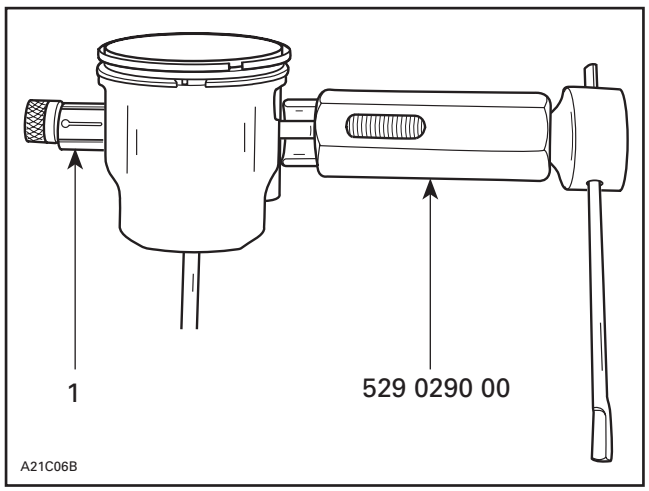
NOTE: The PTO cylinder or fan housing have to be removed to give access to MAG piston pin with the puller.

503 Engine

On these 503 engines, piston pin needle bearing is mounted without a cage.

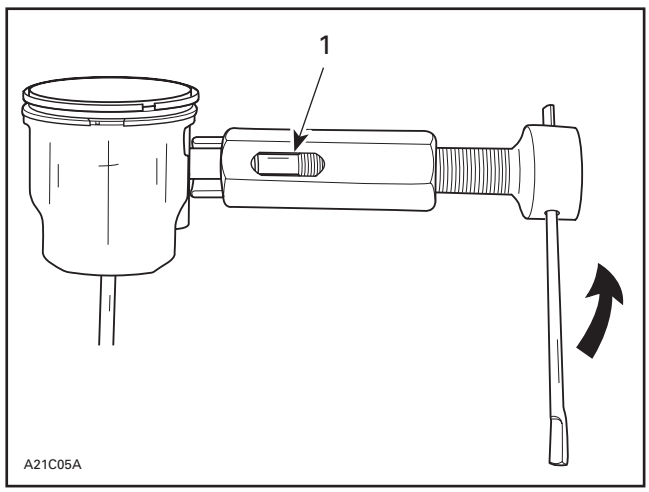
Use piston pin puller (P/N 529 0290 00) along with expansion sleeve and locating sleeve.

– Place a clean cloth or rubber pad (P/N 529 0234 00) over crankcase to prevent circlips from falling into crankcase. Then with a pointed tool inserted in piston notch, remove piston circlip on side where piston pin puller will be inserted.
– Insert piston pin puller (P/N 529 0290 00) then install expansion sleeve over puller rod.



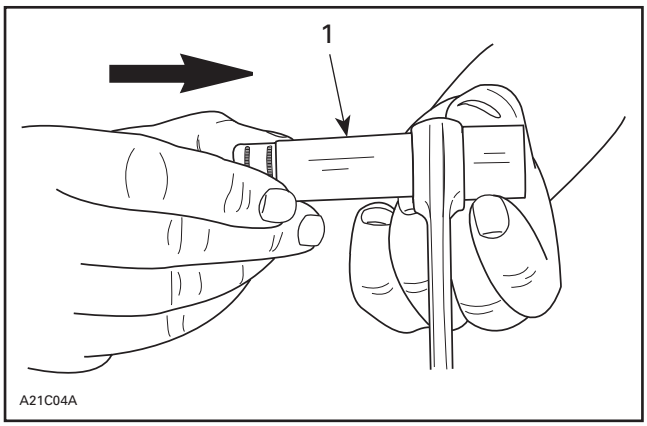
1. Expansion sleeve

– 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)

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

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

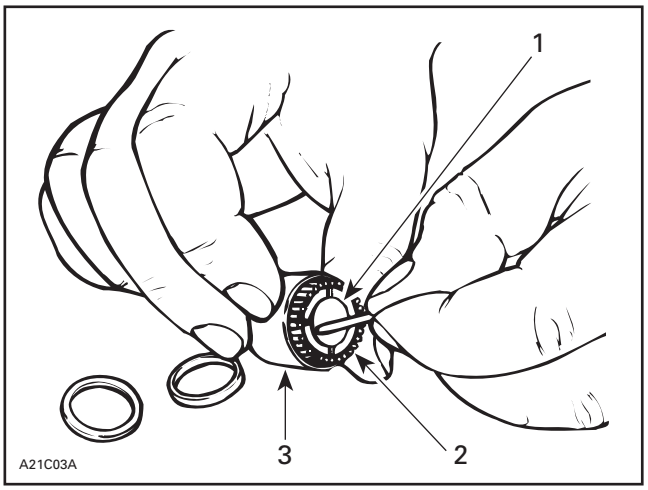
INSPECTION

Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

ASSEMBLY

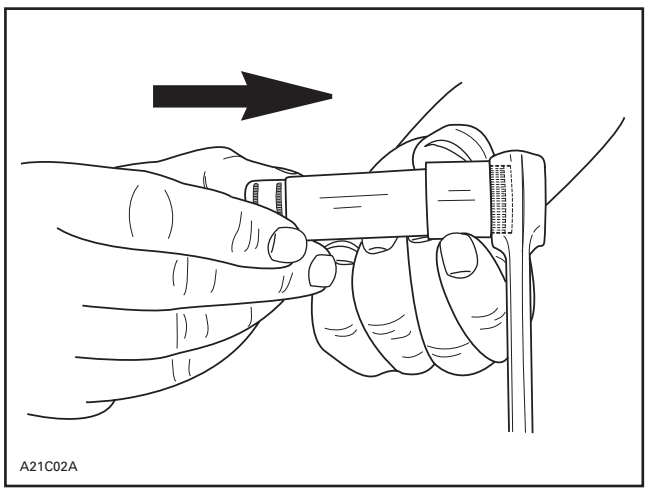
503 Engine

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

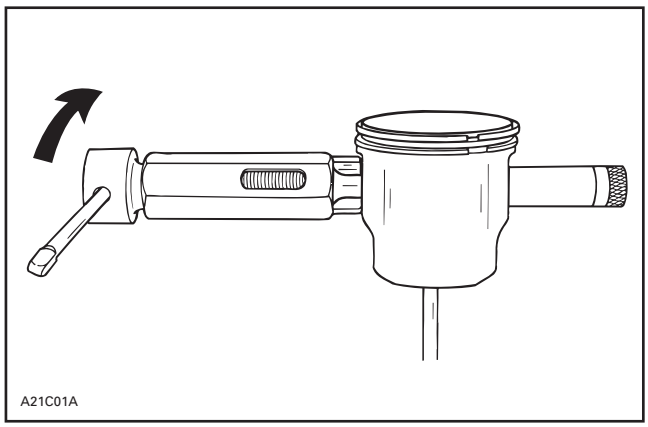


1. Expansion sleeve
2. 31 needles
3. Locating sleeve

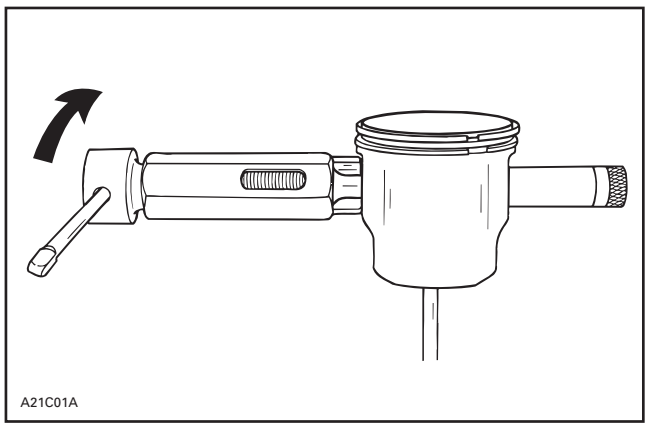
– Grease thrust washers and install them on each end of needles.
– Using a 21 mm (.826 in) diameter pusher, insert needles into connecting rod.



– Mount piston over connecting rod with the letters "AUS" (over an arrow on the piston dome) facing in the direction of exhaust port (see illustration below).
– Install piston pin puller (P/N 529 0290 00) and turn handle until piston pin is correctly positionned in piston.

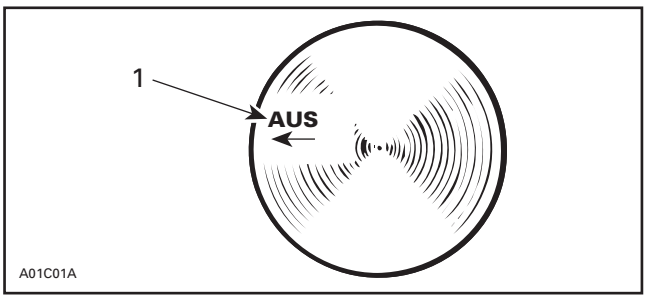


– Remove piston pin puller and expansion sleeve.
– Install circlips as described below.
– When installing new needle bearing, insert needles with thrust washers. Instead of expansion sleeve, needles are held in place by 2 inner plastic cage halves.
– Use piston pin puller (P/N 529 0290 00) to insert piston pin. Plastic halves should come off piston. If not, pull them out using long nose pliers.



– Install circlips as described below.

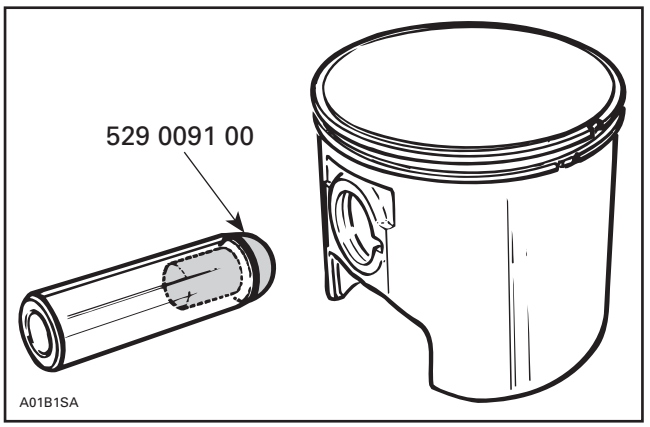
At assembly, place the pistons over the connecting rods with the letters "AUS" (over an arrow on the piston dome) facing in the direction of the exhaust port.



1. Exhaust

All Engines Except 503

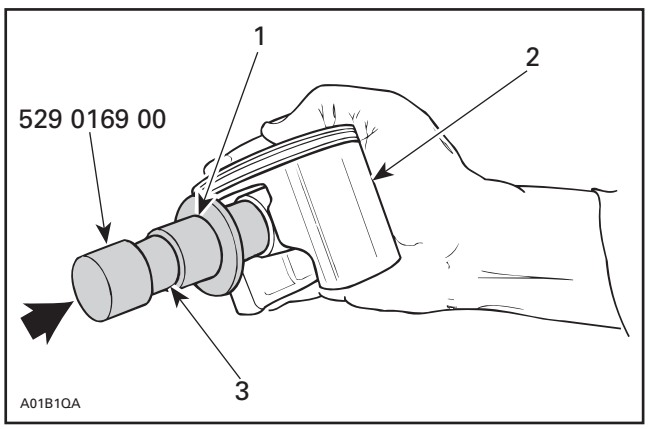
To center the piston pin with the connecting rod bearing, use centering tool (P/N 529 0091 00).



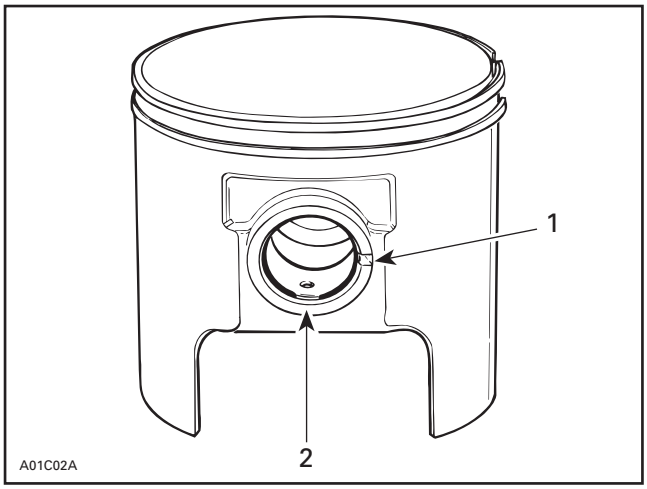
NOTE: The circlip on the opposite side can be installed before pin installation, the tool will easily go out.

All Models

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).



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. 4**, lubricate the cylinder with new injection oil or equivalent.

Install proper ring compressor on piston assembly.

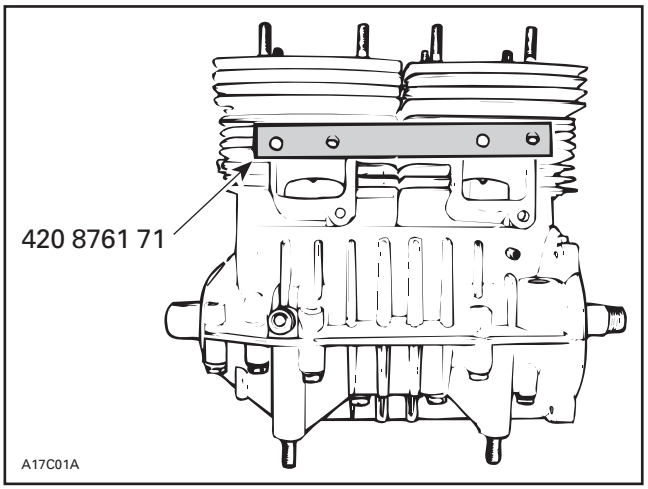
ENGINE TYPE	RING COMPRESSOR P/N
377 and 443	420 8760 90
503	420 8769 70

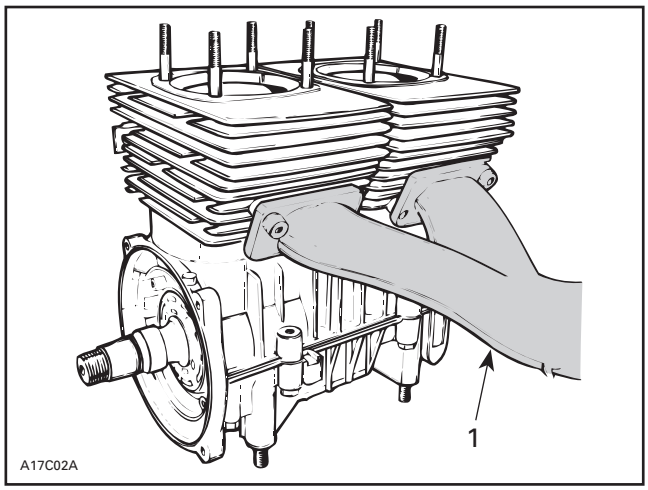
NOTE: The ring compressor will not fit on over size pistons.

Check flatness of intake sockets **no. 6**. Refer to ENGINE DIMENSION MEASUREMENT 04-04 and look for **checking surface flatness**.

At cylinder **no. 4** and/or cylinder head **no. 3** installation, use aligning tool or exhaust manifold itself to ensure sealing of intake manifold and exhaust before tightening cylinder head nuts.

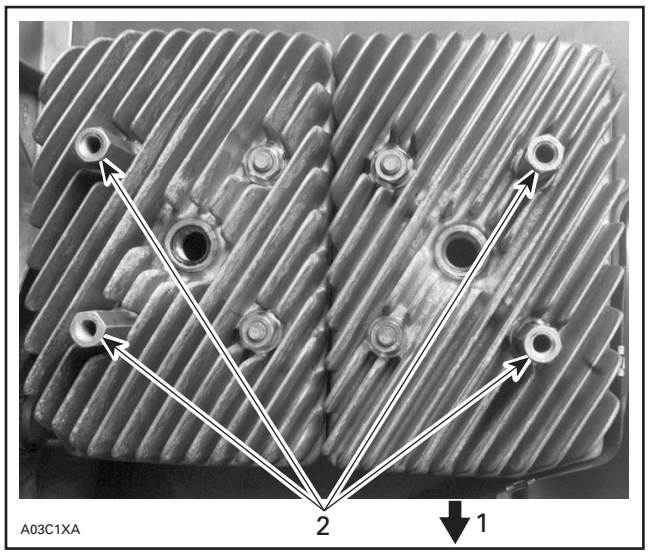
ENGINE TYPE	ALIGNING TOOL P/N
377, 443 and 503	420 8761 71





1. Or use exhaust manifold to align cylinders

Position distance nuts **no. 2** as illustrated.



1. Exhaust
2. Distance nuts

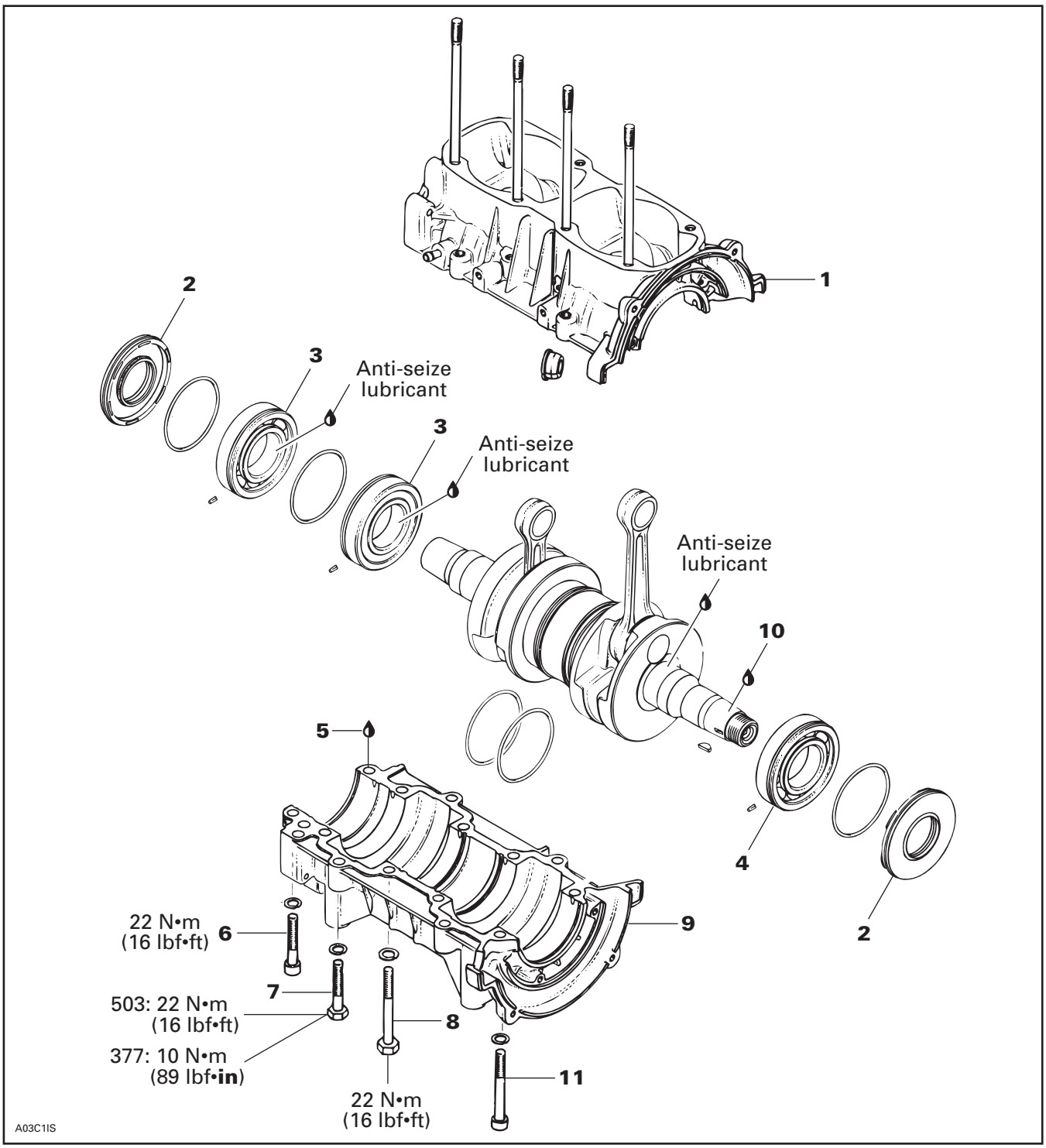
Cross torque cylinder head nuts **nos. 1** and **2** to 22 N•m (16 lbf•ft); torque each cylinder head individually.

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


1
2
3
Anti-seize lubricant
3
Anti-seize lubricant
Anti-seize lubricant
10
5
4
2
9
22 N•m (16 lbf•ft)
6
7
503: 22 N•m (16 lbf•ft)
377: 10 N•m (89 lbf•in)
8
22 N•m (16 lbf•ft)
11
A03C1IS

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.

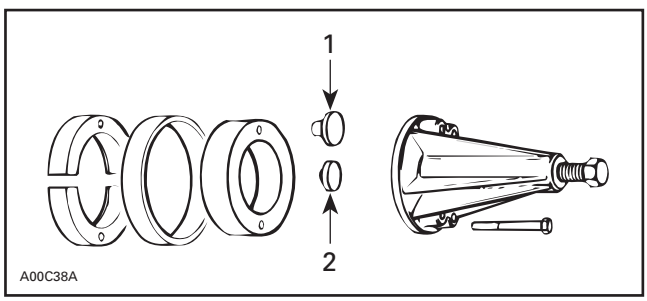
Remove old sealant from crankcase mating surfaces with Bombardier gasket remover (P/N 413 7085 00).

▼ 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

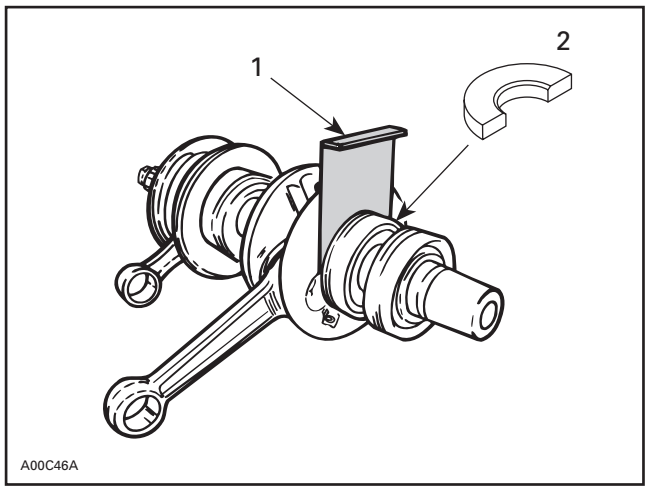
Refer to ENGINE DIMENSIONS MEASUREMENT 04-04.

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 377 and 443 and (P/N 420 8768 24) for 503 for proper positioning.



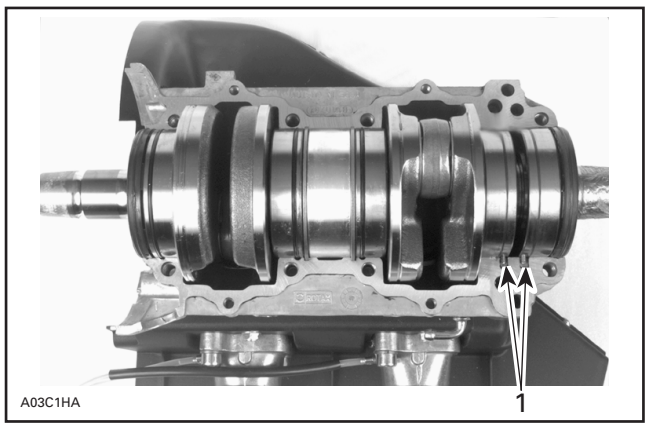
1. Feeler gauge
2. Distance gauge

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.

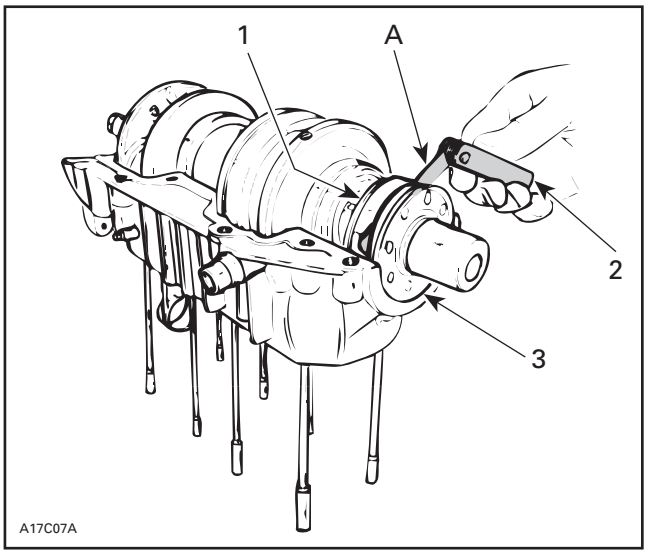


TYPICAL
1. Drive pins

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.

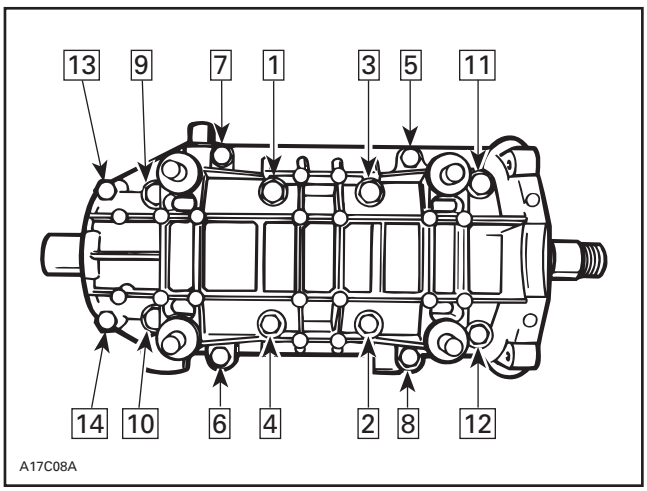
Apply paste gasket (P/N 413 7027 00) **no. 5** on the other mating surface.

NOTE: Primer N allows Loctite 515 to fully cure on aluminum surfaces. It increases filling capacity and reduce 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.

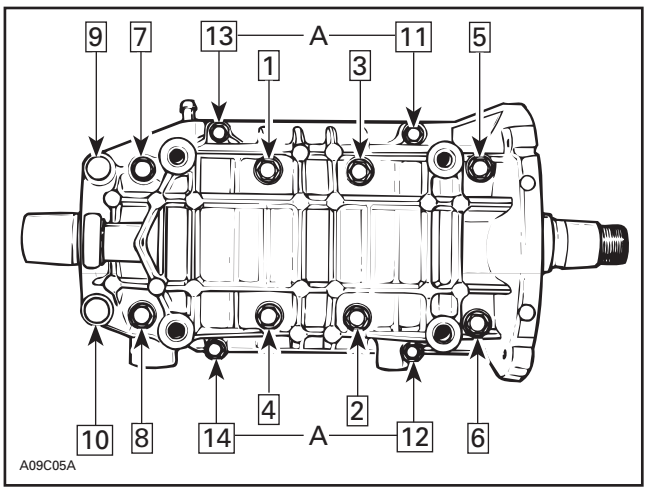
503 Engine Type

Torque screws **nos. 6, 7, 8** and **11** to 10 N•m (89 lbf•**in**) then to 22 N•m (16 lbf•ft) following illustrated sequence.



377 and 443 Engines

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 04-05.

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 BDC (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 last page of this chapter.

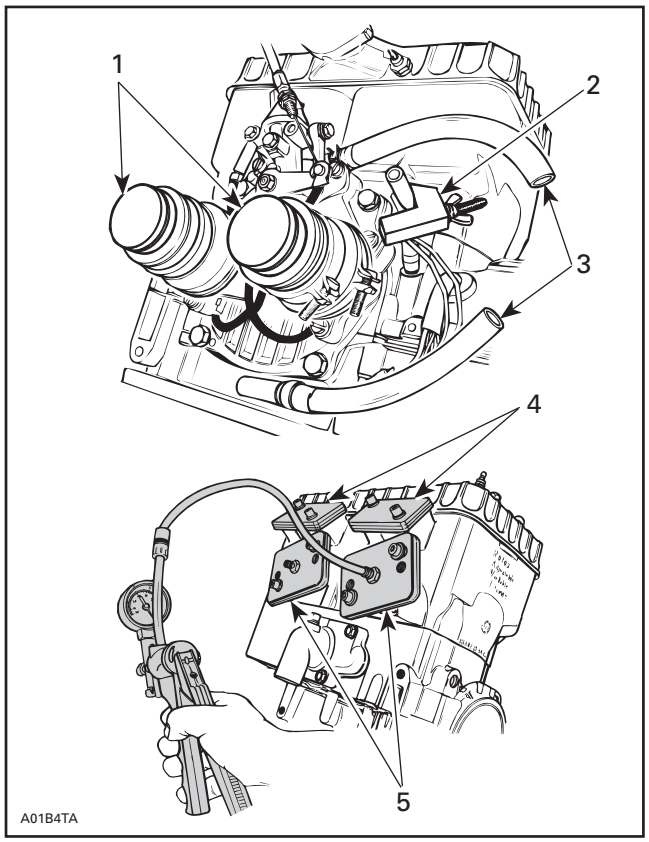
Using flow chart and following text, pressurize area to be tested and spray soapy solution at the indicated location.

TEST PRESSURE: 34 kPa (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.

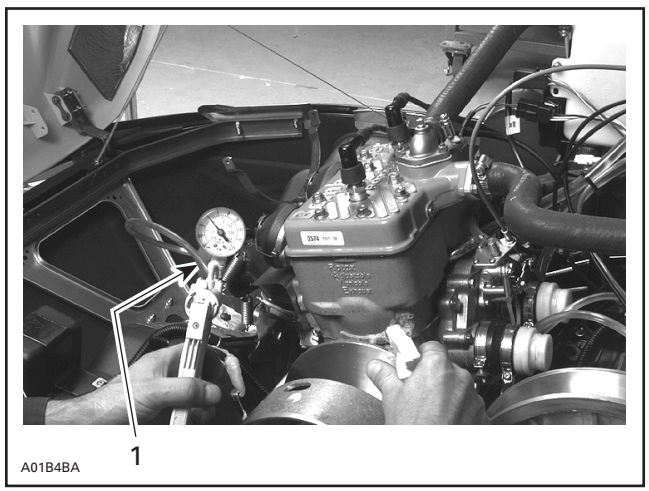
Engine



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 BDC).

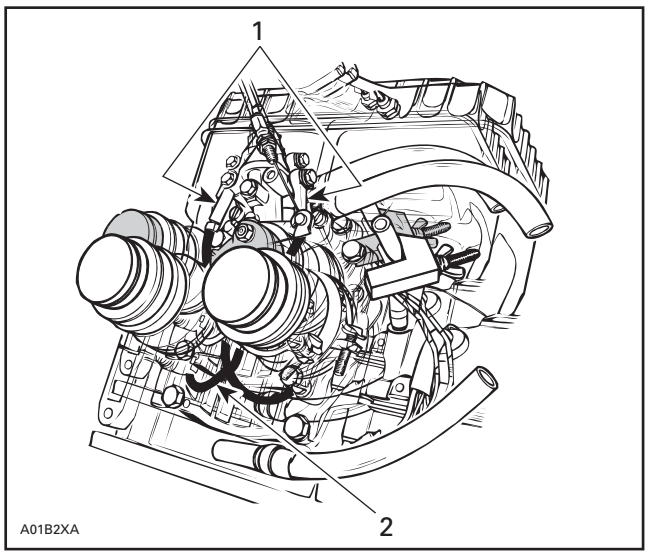


TYPICAL

1. *Rubber Plug*

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.



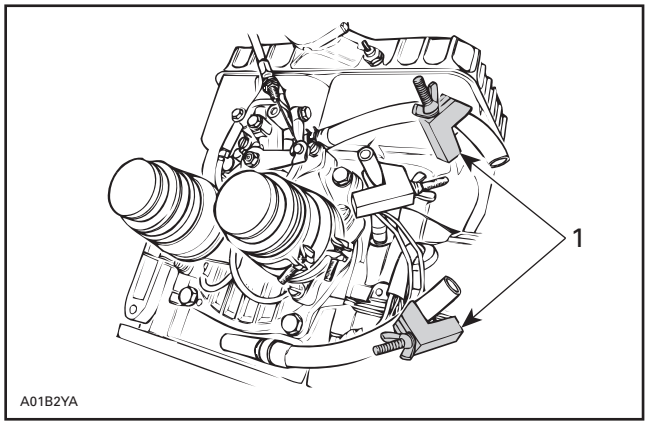
1. *Banjo fittings*
2. *Small injection oil lines*

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.

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



1. Block both hoses

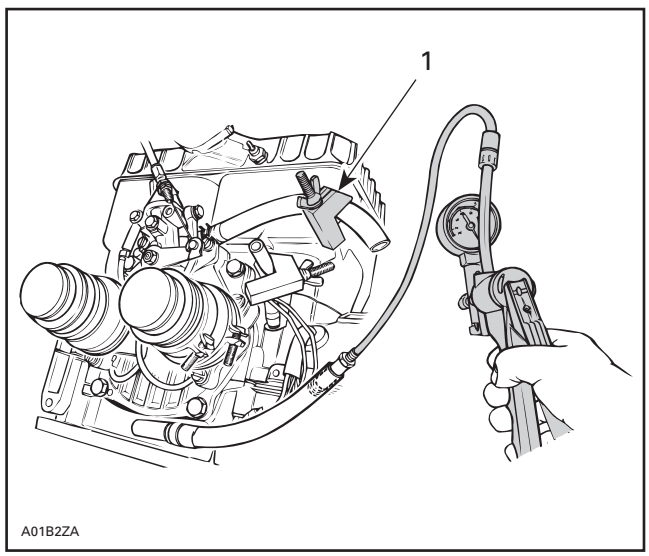
If leakage stops, ignore remaining items and check crankcase rotary valve gear reservoir as per **Crankcase Rotary Valve Gear Reservoir** of this section.

5. Remove clutch then check crankshaft outer seal.
6. Remove rewind starter and magneto system then check crankshaft outer seal.
7. 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.

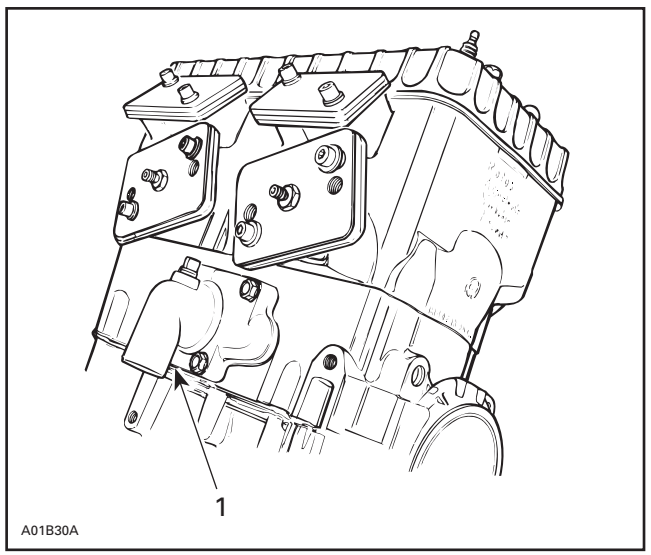


1. Blocked hose

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

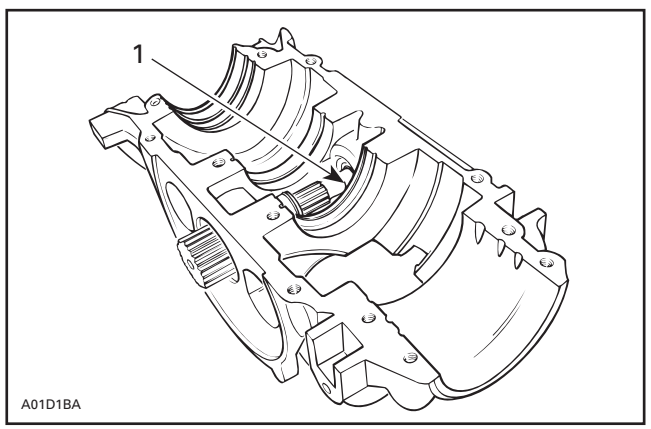
   If pressure drops, it indicates defective crankshaft inner seal on PTO side.
2. Remove a spark plug or any plug of leak tester kit on MAG side.

   If pressure drops, it indicates defective crankshaft inner seal on MAG side.
3. Check drain hole below coolant pump housing with soapy water.



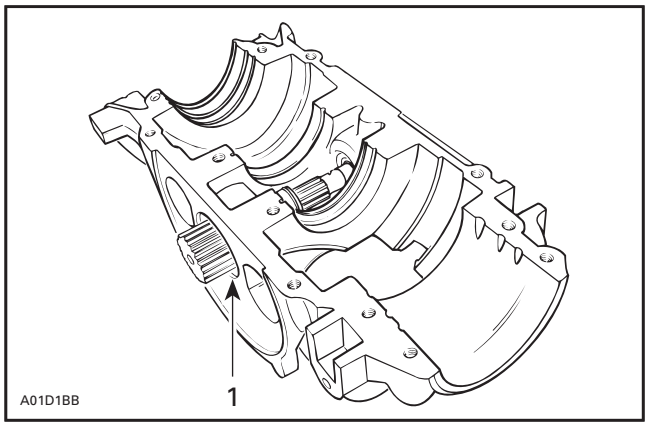
1. Drain hole

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



1. Oil seal

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.

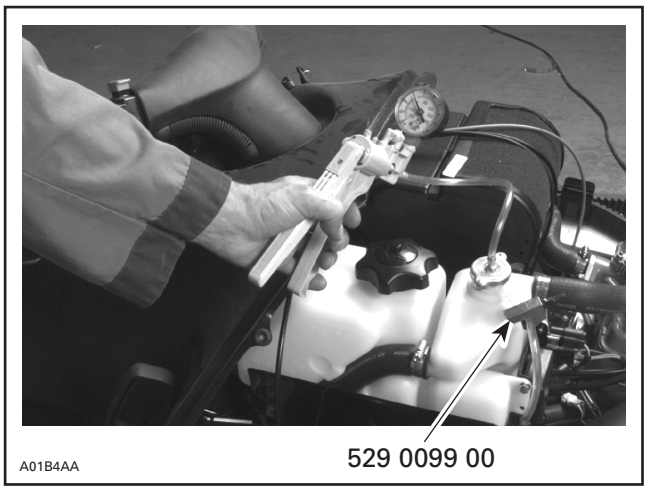
FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

COOLING SYSTEM LEAK TEST

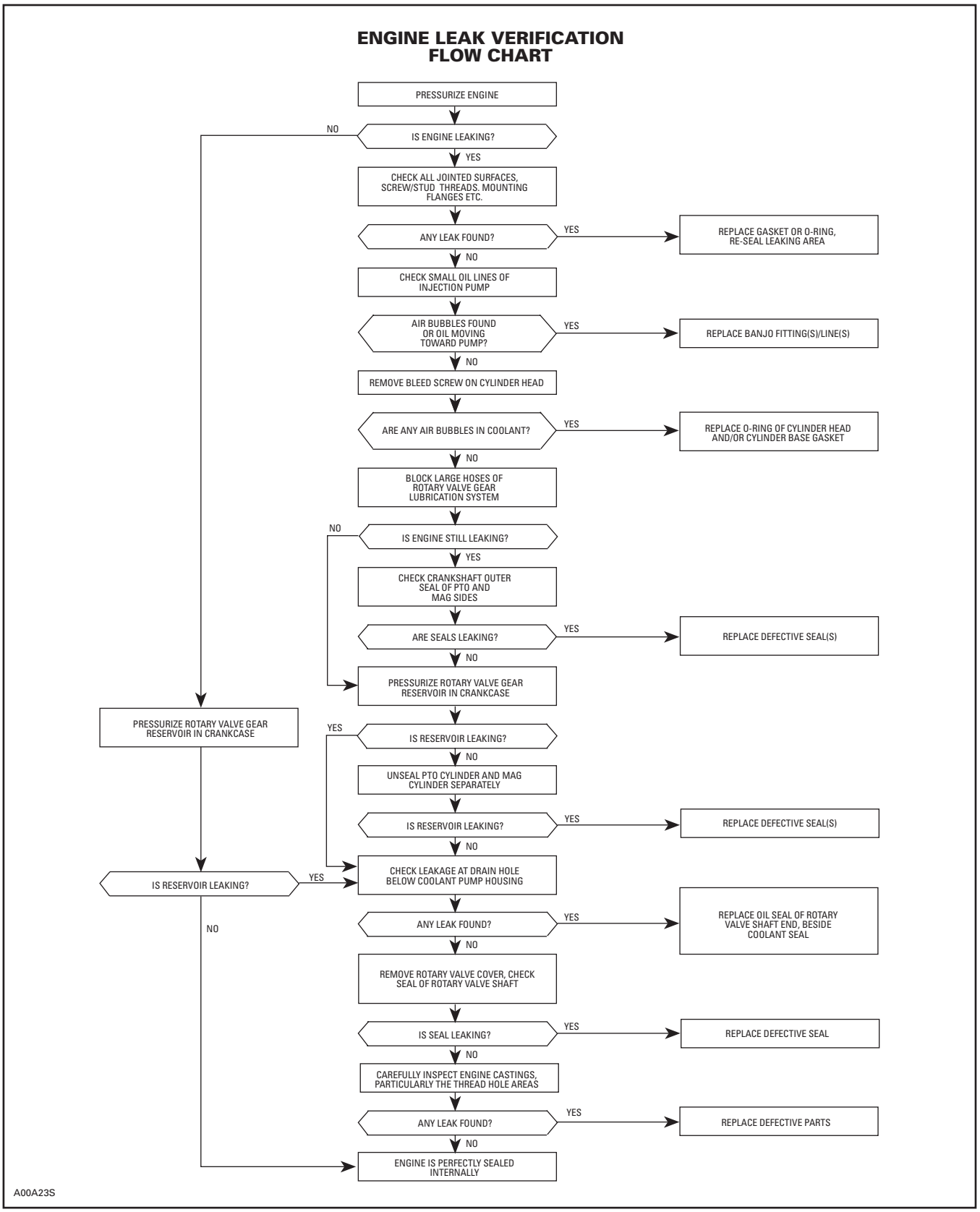
Install special plug (radiator cap) (P/N 529 0214 00) and hose pincher (P/N 529 0099 00) on overflow hose. Pressurize all system through coolant reservoir to 15 PSI.

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



ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

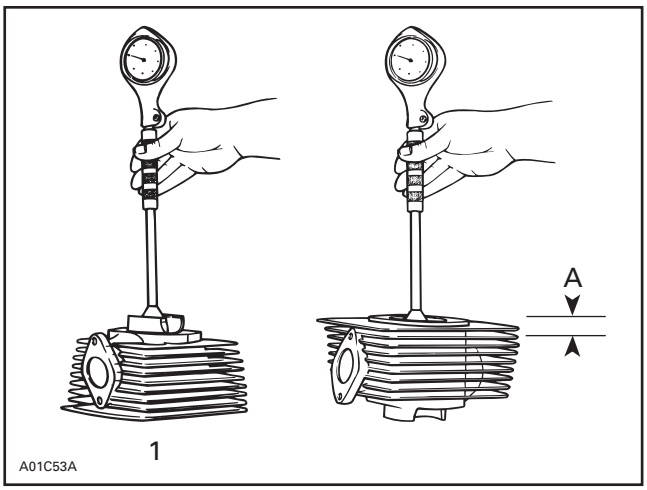
CYLINDER TAPER

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.



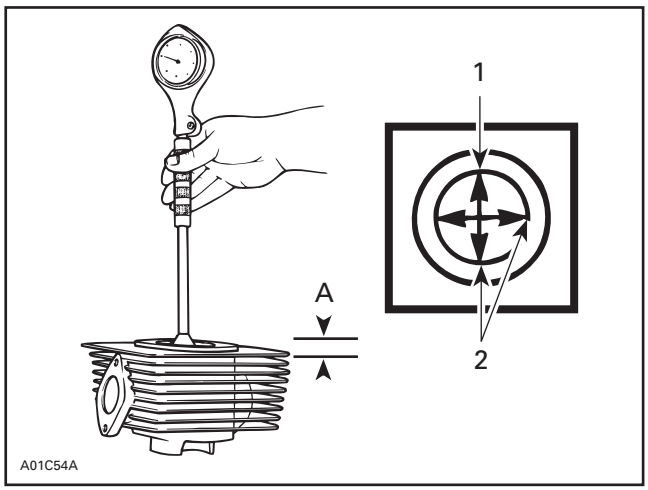
1. Below the intake port
A. 16 mm (5/8 in) from top

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.

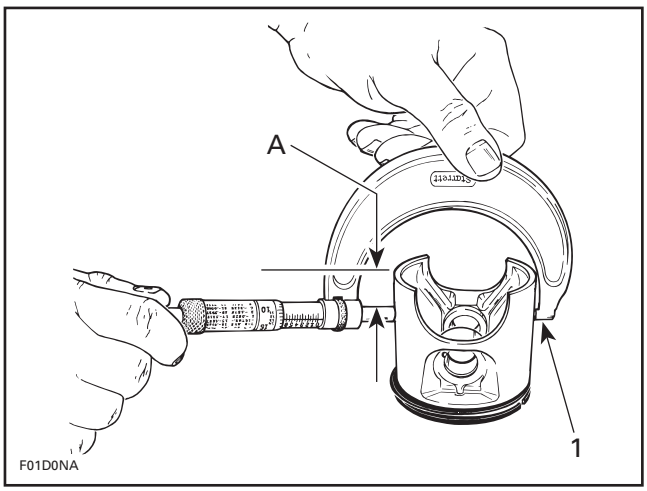
NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



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

USED PISTON MEASUREMENT

Using a micrometer, measure piston at A perpendicularly (90°) to piston pin.



1. Measuring perpendicularly (90°) to piston pin axis
A. See table below

ENGINE TYPE	DIMENSION A mm (in)
277 and 503	18 (.71)
337 and 503	20.8 (.82)

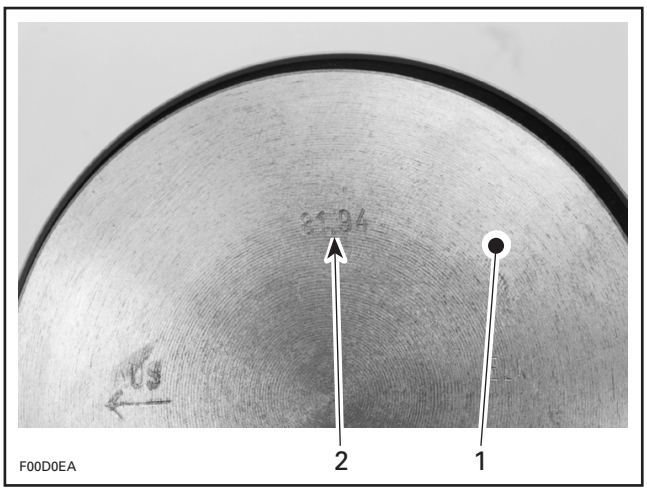
The measured dimension should be the same as the one scribed on piston dome. If not, install a new piston.

CYLINDER/PISTON CLEARANCE

Used and New Pistons

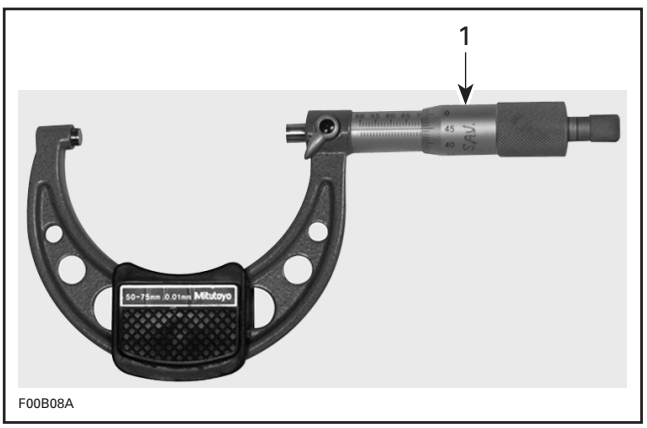
NOTE: Make sure used piston is not worn. See USED PISTON MEASUREMENT above.

Take the measurement on the piston dome.



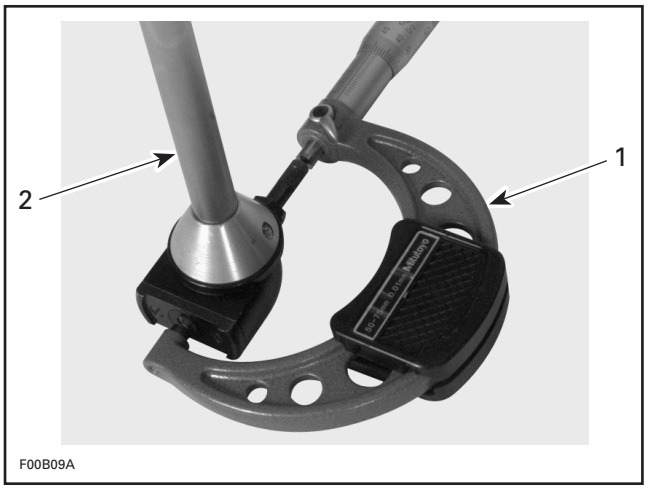
1. Piston dome
2. Piston measurement

Adjust and lock a micrometer to the specified value on the piston dome.

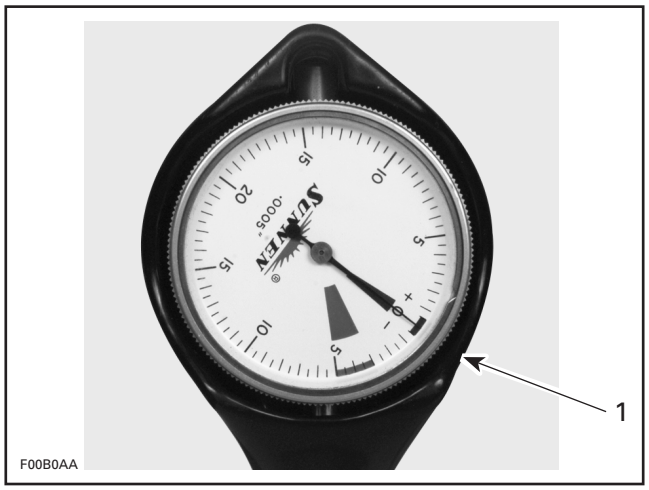


1. Micrometer set to the piston dimension

With the micrometer set to the piston dimension, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0.

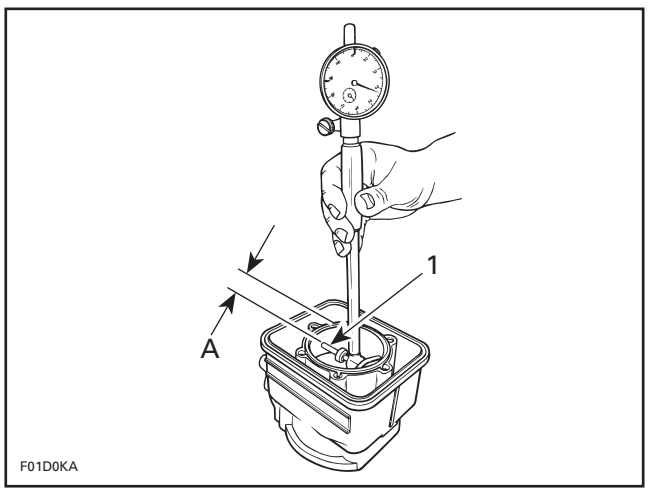


1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0

Position the dial bore gauge at 16 mm (5/8 in) below cylinder top edge.



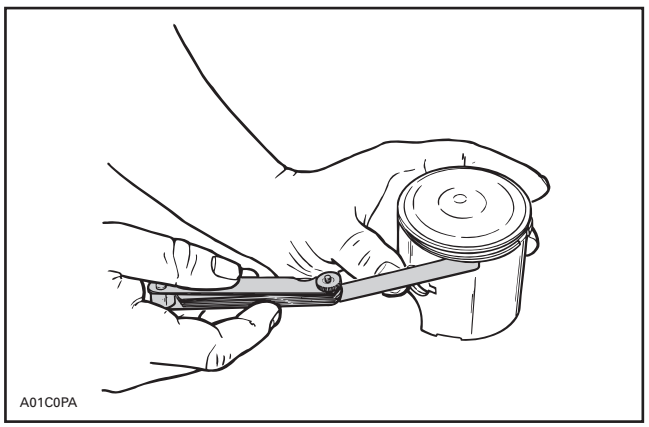
1. Measuring perpendicularly (90°) to piston pin axis
A. 16 mm (5/8 in)

Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder or rebore. Refer to TECHNICAL DATA 10.

NOTE: Make sure the cylinder bore gauge indicator is set exactly at the same position as with the micrometer, otherwise the reading will be false.

RING/PISTON GROOVE CLEARANCE

Using a feeler gauge check clearance between ring and groove. Replace piston if clearance exceeds specified tolerance. Refer to TECHNICAL DATA 10.

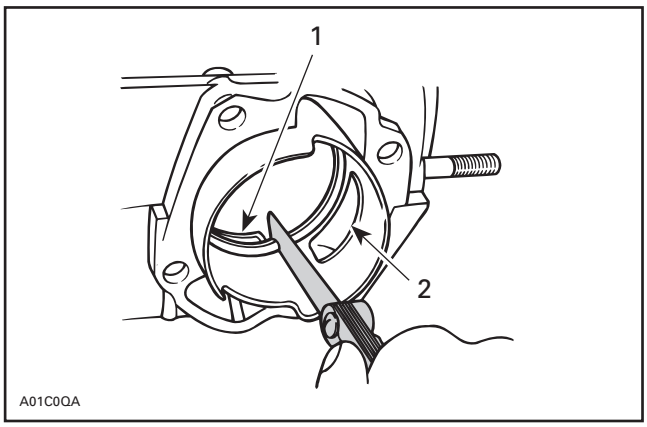


RING END GAP

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 10.



1. Transfer port
2. Intake port

CRANKSHAFT DEFLECTION

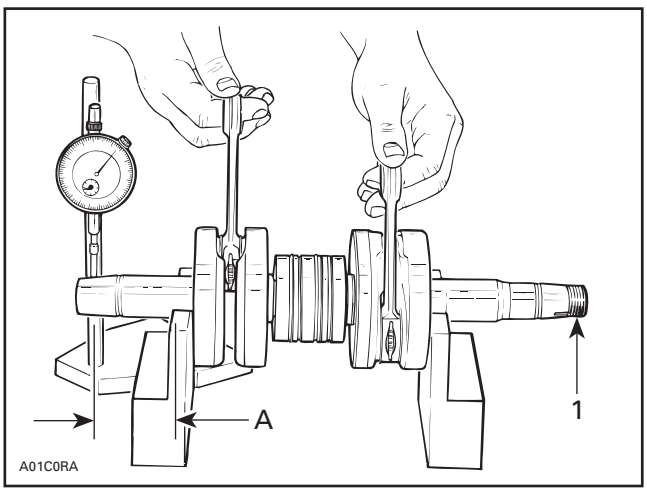
Crankshaft deflection is measured with a dial indicator.

Measuring (in engine)

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

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)
377, 443	75.5 (2.972)	0.05 (.002)
503	82.5 (3.248)	0.06 (.002)

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)

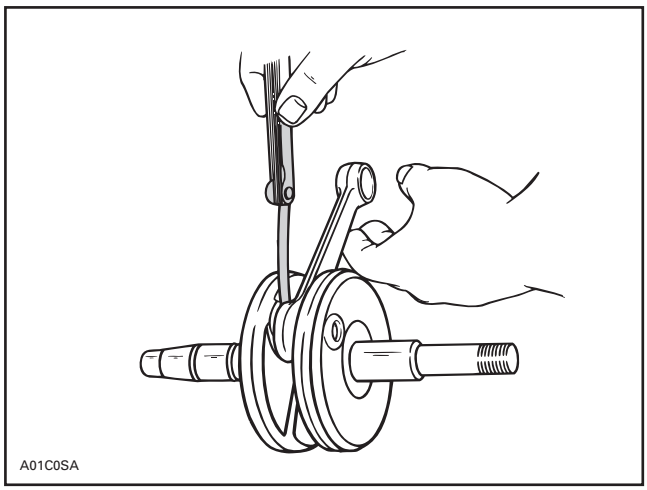
NOTE: Crankshaft deflection can not be correctly measured between centers of a lathe.

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
277, 377 443 and 503	0.20 - 0.53 mm (.008 - .021 in)	1.00 mm (.039 in)

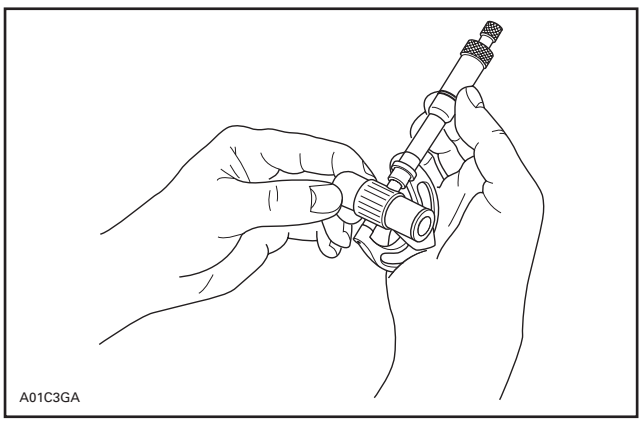
Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight. If the distance exceeds specified tolerance, repair or replace the crankshaft.

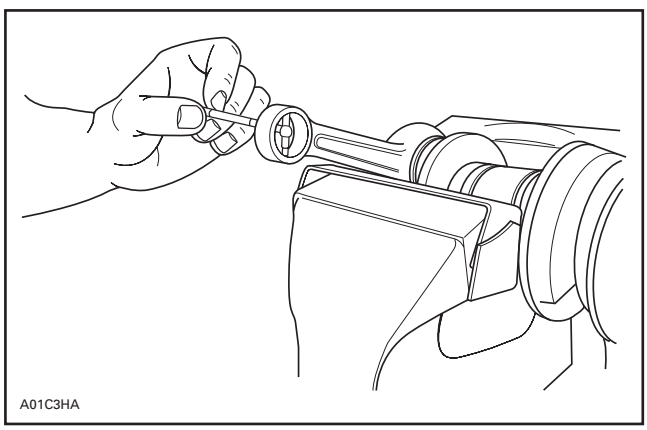


TYPICAL

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
277	0.020 - 0.030 mm (.0008 - .0012 in)	0.05 mm (.0020 in)
377, 443 and 503	0.020 - 0.033 mm (.0008 - .0013 in)	

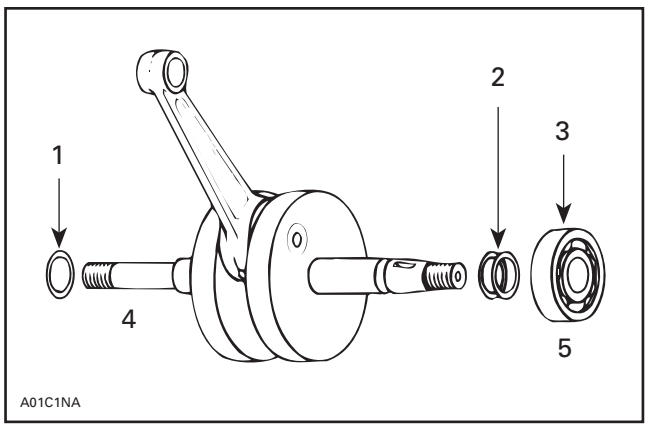
CRANKSHAFT END-PLAY

277 Engine Type

ENGINE TYPE	MINIMUM	MAXIMUM
277	0.10 mm (.004 in)	.030 mm (.012 in)

Adjustment

Crankshaft end-play is adjusted with shims located between crankshaft and magneto side bearing.



1. Distance ring
2. Shim location
3. Bearing
4. PTO
5. MAG

▼ CAUTION

Always install end-play adjustment shims on the magneto side between bearing and crankshaft counterweight.

The following is required for the adjustment procedure:

– adjustment shims (refer to parts catalog)

thicknesses available: 0.10 mm (.004 in)
0.20 mm (.008 in)
0.30 mm (.012 in)
0.50 mm (.020 in)
1.00 mm (.040 in)

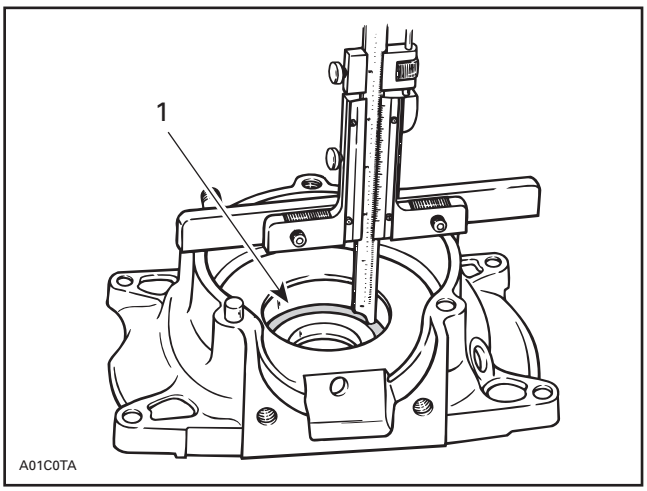
– micrometer

– caliper

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

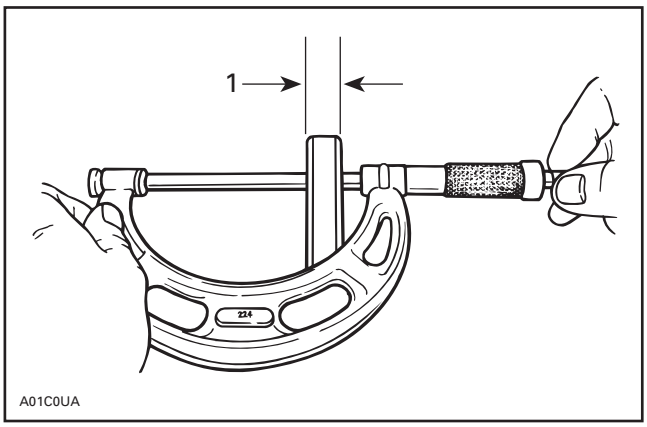
a. Measure crankcase halves as illustrated (M_1 and M_2).

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



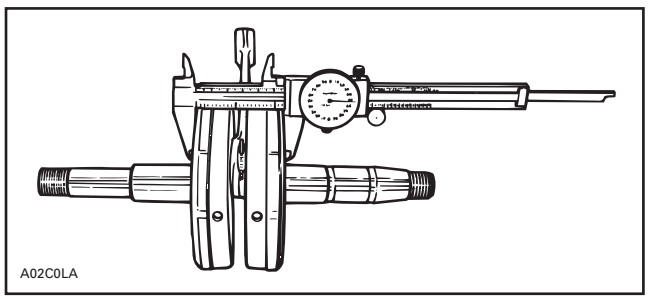
MEASURING M_1 AND M_2
1. Bearing seat

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



MEASURING M_4 AND M_5
1. Bearing thickness

c. Measure distance between bearing shoulders on crankshaft (M_6).



MEASURING M_6

d. Measure the distance ring (M_7) and adjustment shims thickness (M_8). Add these measurements to obtain dimension B.

e. From dimension A, subtract dimension B.

The result is the actual crankshaft end-play that must be within specification.

If the result is over specification, add adjustment shim(s) to reach this specification.

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

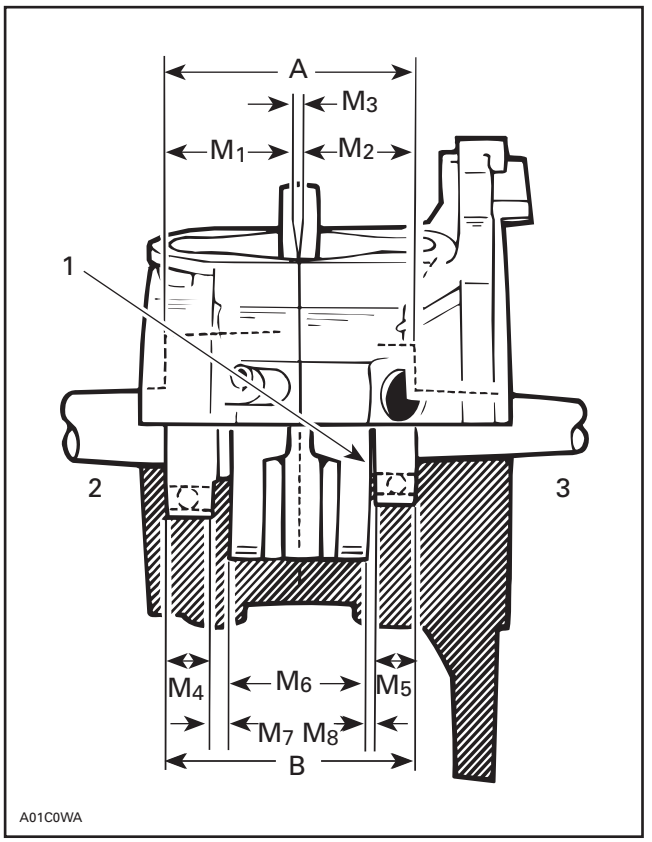
To Summarize

A = $M_1 + M_2 + M_3$

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

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

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



1. End-play is adjusted with shims
2. PTO
3. MAG

377, 443, 503 Engine Types

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

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.

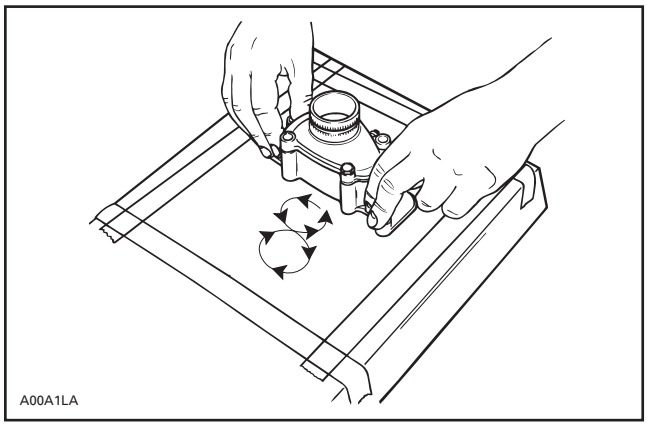
If any play is felt, part must be rectified.

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.

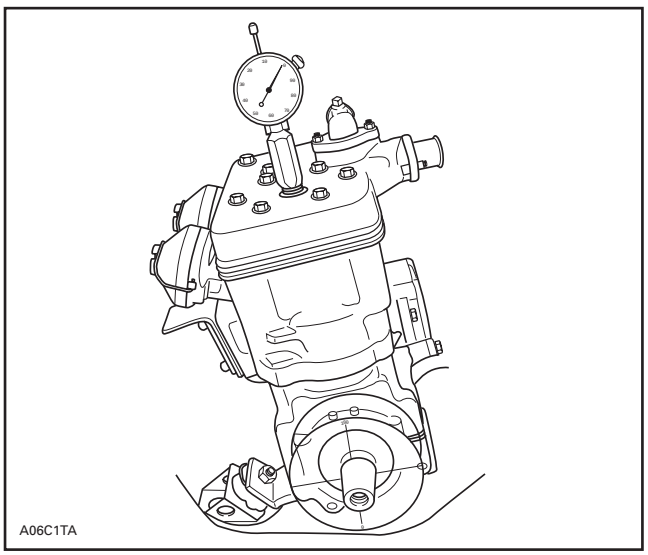
Install a TDC gauge (P/N 414 1047 00) in spark plug hole on MAG side.

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.



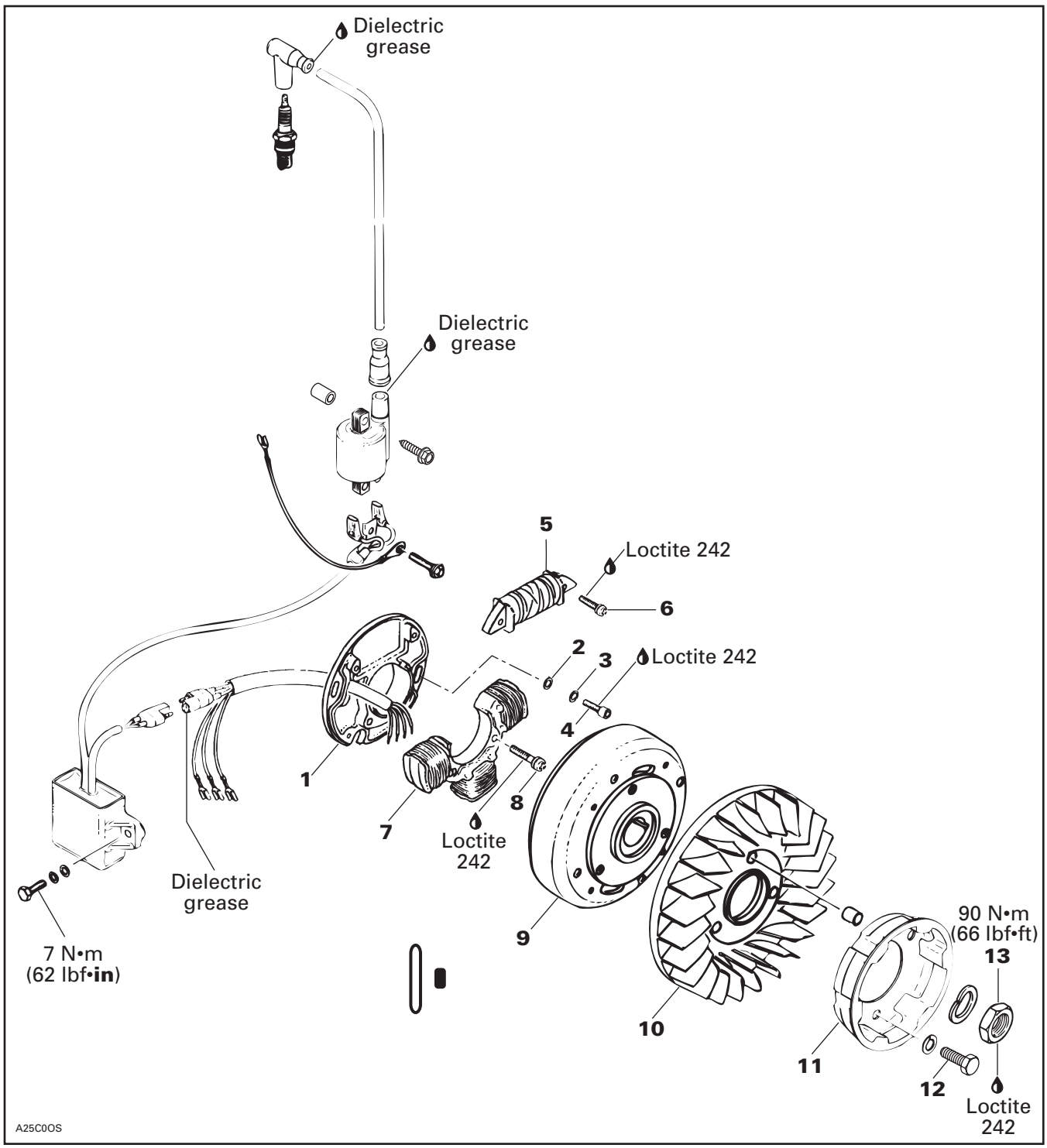
Interval between cylinders must be exactly 180°.

Any other reading indicates a misaligned (twisted) crankshaft.

CDI SYSTEM

NIPPONDENSO IGNITION SYSTEM WITH SINGLE GENERATING COIL

277 Engine



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

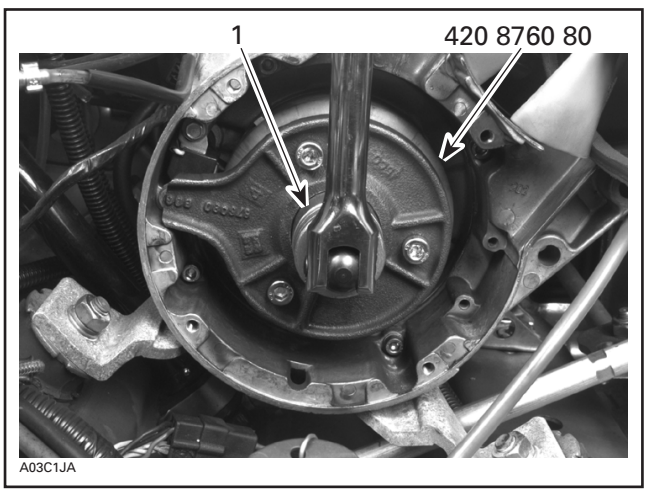
To gain access to magneto assembly, remove the following parts as needed on different engines:

– tuned pipe and muffler
– oil injection pump mounting plate from rewind starter
– rewind starter
– starting pulley no. 10 and fan no. 11

To remove magneto flywheel retaining nut no. 13, install puller ring (P/N 420 8760 80) and M8 x 20 screws.

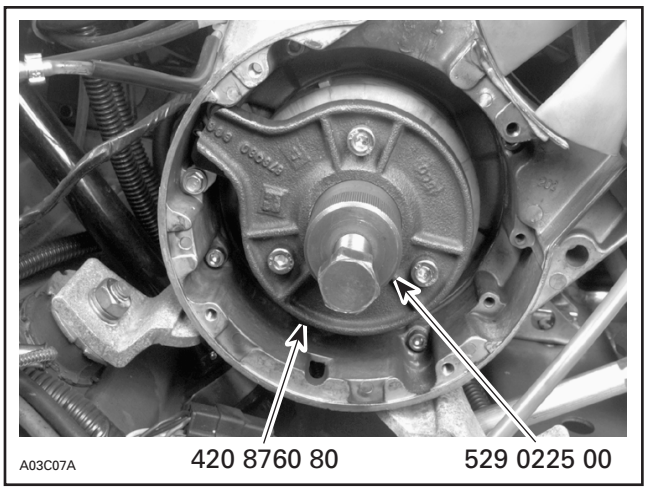
– Remove magneto flywheel nut, using a 30 mm socket machined to 40 mm (1.580 in) outside diameter by 16 mm (5/8 in) long.

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.



TYPICAL
1. 30 mm socket

To remove magneto flywheel no. 9, install the magneto puller (P/N 529 0225 00).



TYPICAL

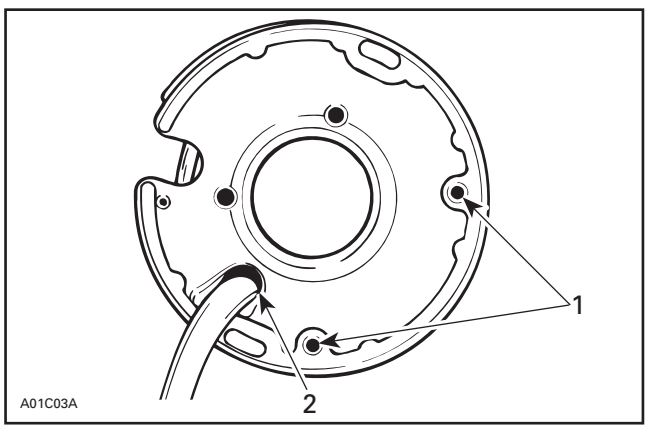
– Tighten puller bolt and at same time, tap on bolt head using a hammer to release magneto flywheel from its taper.

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

REPAIR

To replace generator coil no. 2:

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

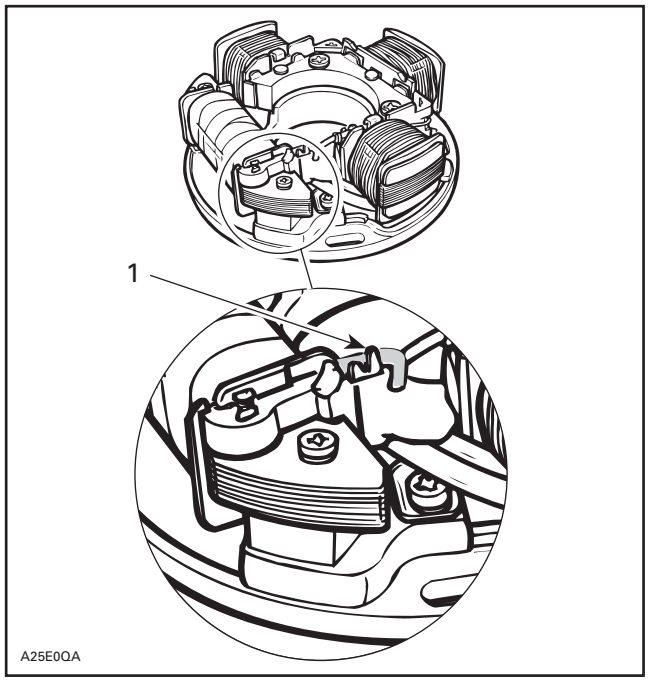


1. Heat
2. Protect harness from flame

▼ CAUTION

Protect harness from flame.

– Remove screws.
– Uncrimp and unsolder BLACK/RED wire from coil terminal.

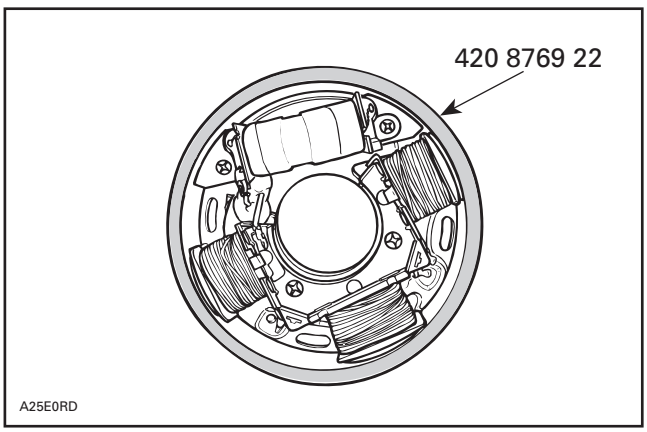


1. Uncrimp and unsolder wire here

– Strip end of old wire then crimp and solder on new coil.

Apply Loctite 242 (blue) to screws **nos. 6** and **8** then install the new coil on armature plate.

Use magneto coil centering tool (P/N 420 8769 22) and install it so that it fits around armature plate before tightening screws.

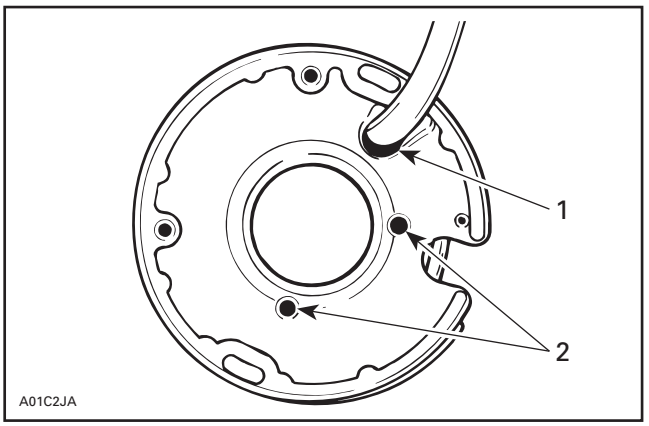


▼ CAUTION

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

To replace lighting generator coil **no. 7**:

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

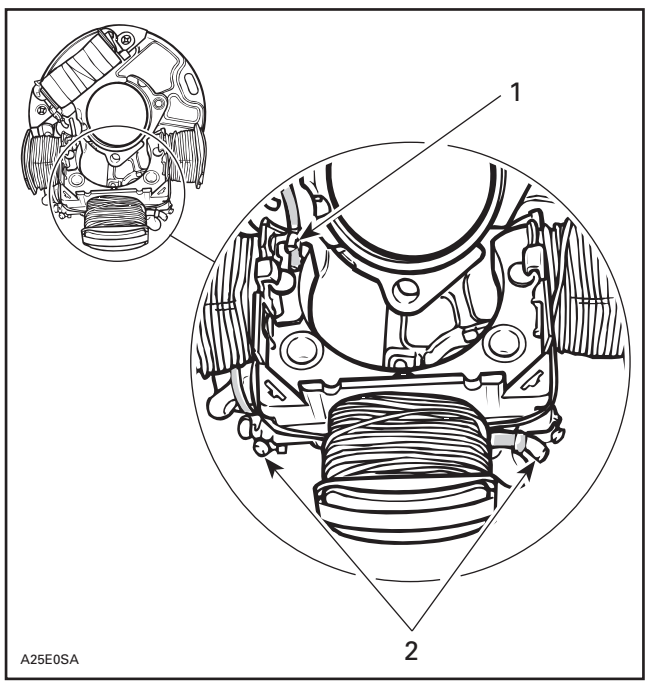


1. Protect harness from flame
2. Heat

▼ CAUTION

Protect harness from flame.

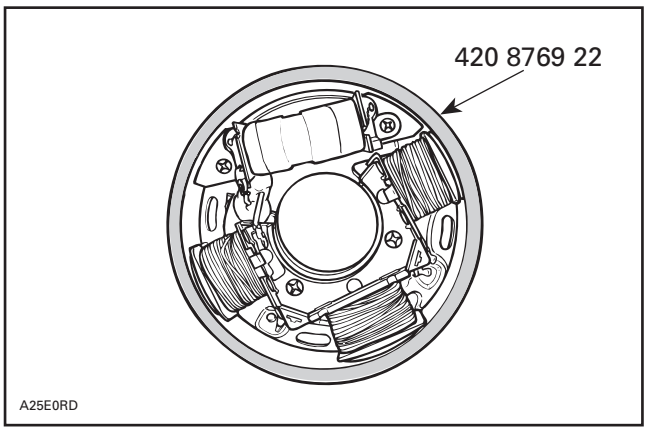
– Remove screws.
– Uncrimp and unsolder YELLOW and YELLOW/BLACK wires from coil terminals.
– Uncrimp and unsolder ground wire (BLACK) from coil core.



1. Uncrimp and unsolder ground wire (BLACK) here
2. Uncrimp and unsolder YELLOW and YELLOW/BLACK wires here

– Position new coil, crimp and solder all wires.
– Prior to assembly, apply Loctite 242 (blue).

Use magneto coil centering tool (P/N 420 8769 22) and install it so that it fits around armature plate before tightening screws.



▼ CAUTION

Before reinstalling magneto, remove the loose epoxy from harness.

ASSEMBLY

Position the armature plate **no. 1** on the crankcase, aligning the marks on both parts.

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

Clean crankshaft extension (taper).

Apply Loctite 242 (blue) on taper.

Position Woodruff key, magneto flywheel **no. 9** and lock washer **no. 12** on crankshaft.

Clean nut threads and apply Loctite 242 (blue) before tightening nut **no. 13**.

Torque nut to 90 N•m (66 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.

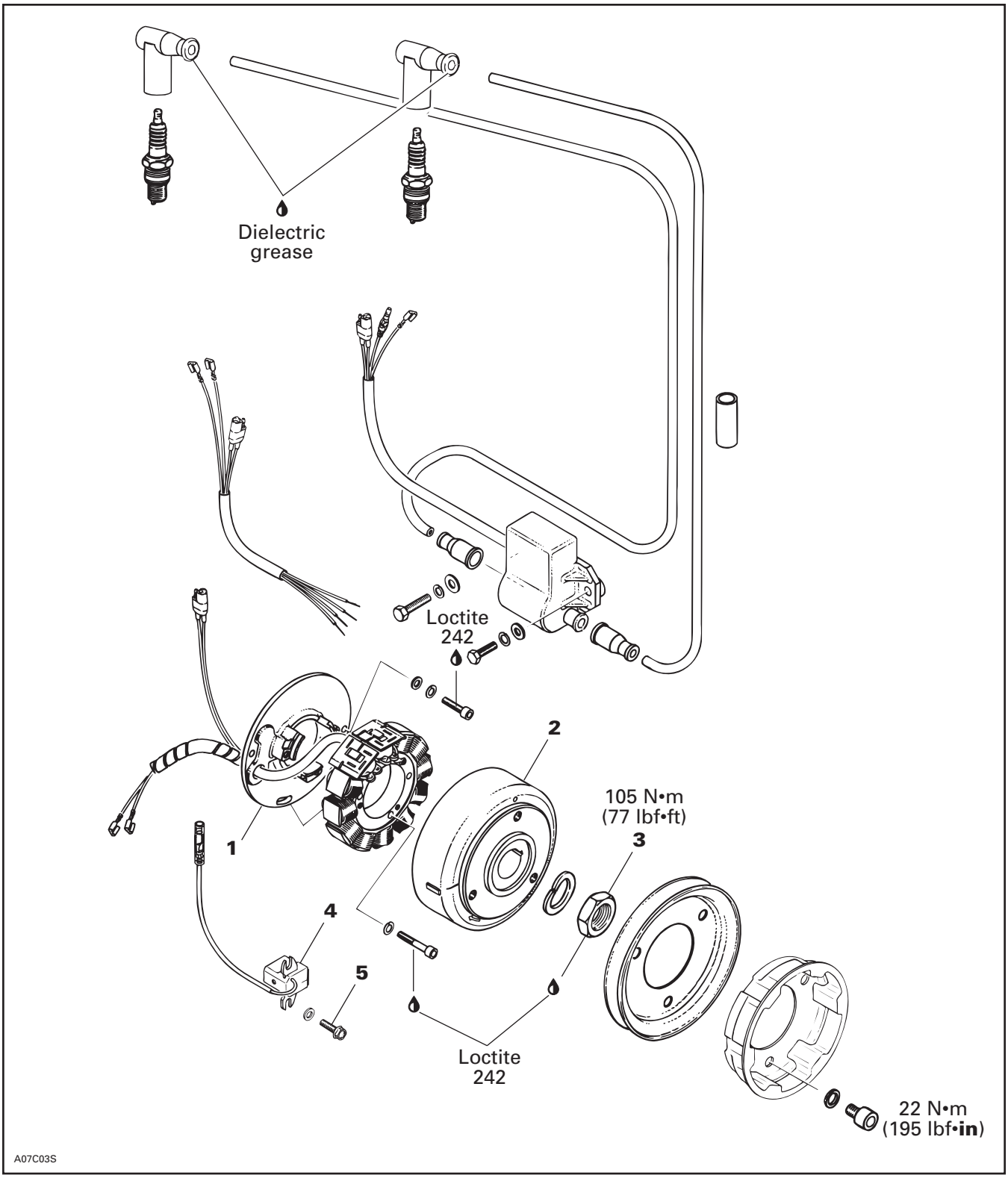
Reinstall fan and starting pulley. Make sure yellow fin of fan is aligned with timing hole when piston is at TDC.

Ignition Timing

Check ignition timing as described in IGNITION TIMING 06-03.

DUCATI IGNITION SYSTEM

377, 443 and 503 Engines



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

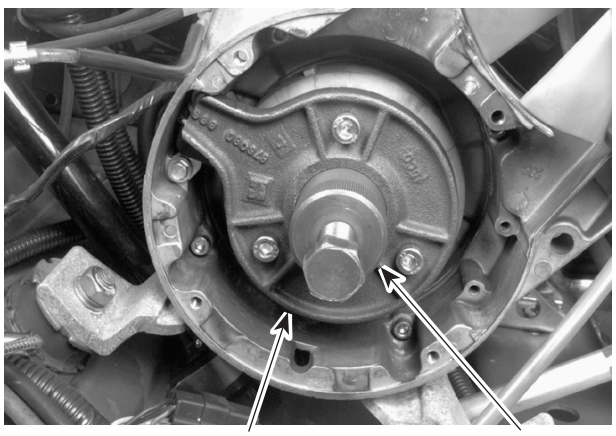
Clean armature and magneto using only a clean cloth.

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:

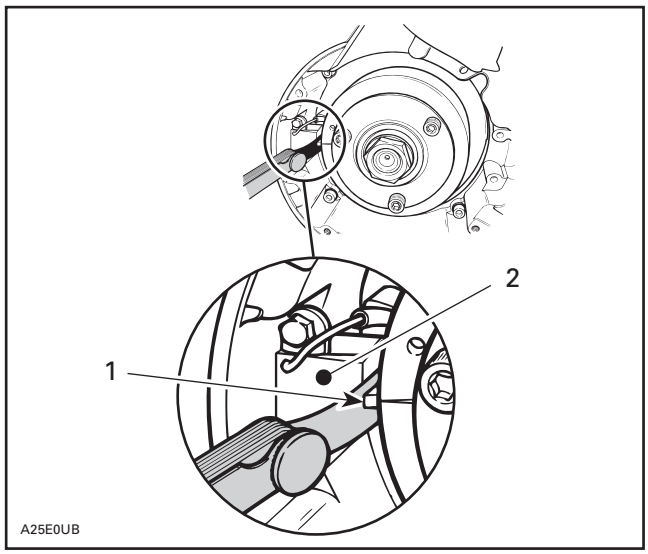
– Disconnect trigger coil wire (RED).
– Remove grommet from crankcase where trigger coil wire exits magneto housing.
– Remove retaining screws no. 9.
– Remove trigger coil and carefully pull wire.
– Install new trigger coil and other parts removed.

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.

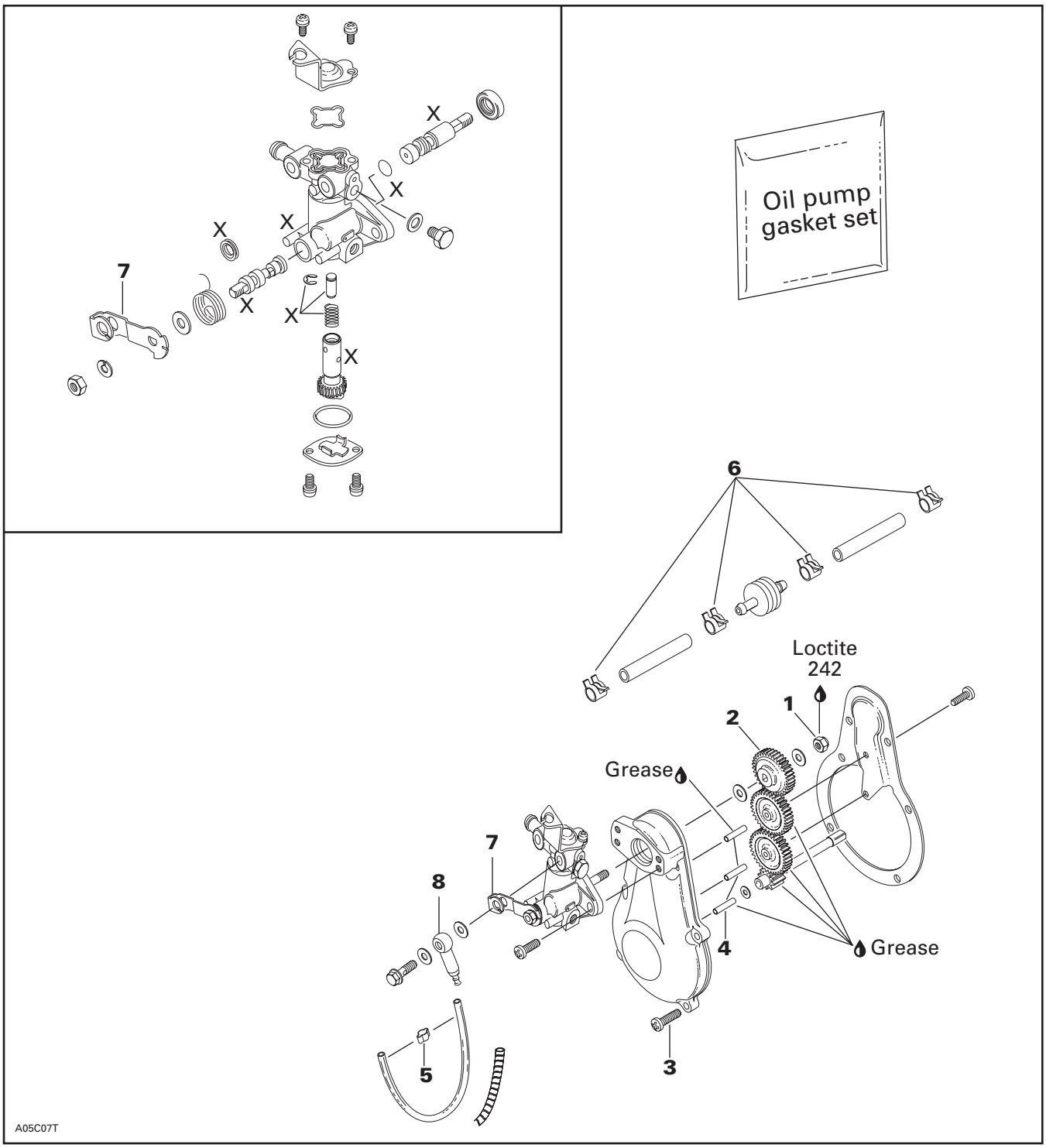
Ignition Timing

Check as described in IGNITION TIMING 06-03.

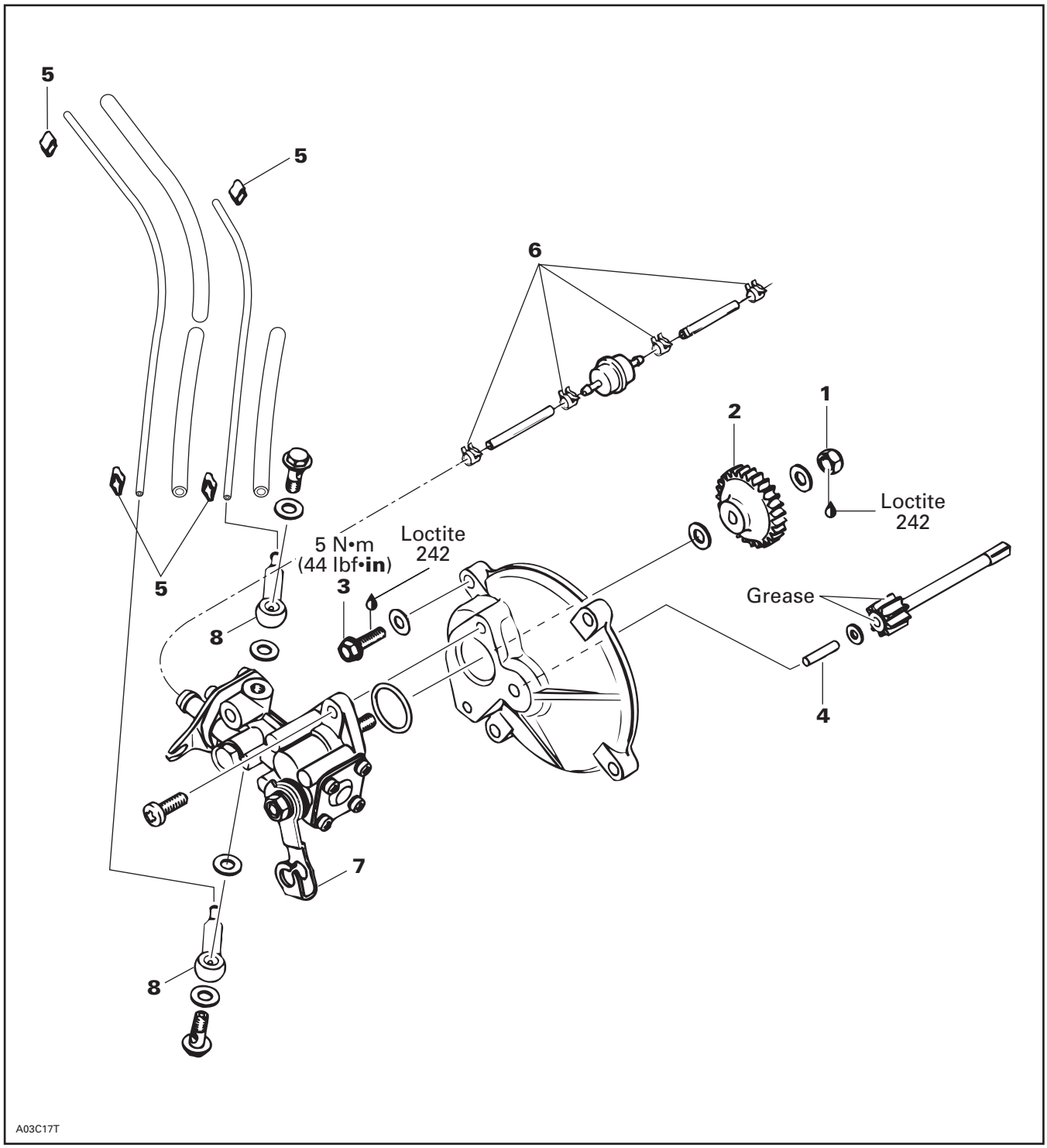
OIL INJECTION SYSTEM

OIL INJECTION PUMP

277 Engine



377, 443 and 503 Engines



OIL PUMP IDENTIFICATION

Different engines need different pumps. See identification on pump lever **no. 7**.

▼ CAUTION
Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
277	135 T
377 (Formula S)	L4
377 (Formula S Elec., Touring E and Skandic 380)	L5*
443	E6*
503	E6*

* L5 and E6 oil pumps do not supply any oil at idle. They are called zero oil delivery at idle.

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

CLEANING

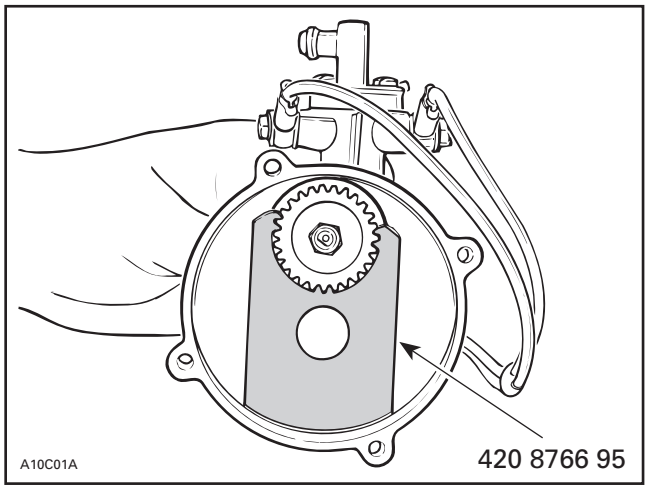
Clean all metal components in a non-ferrous metal cleaner.

DISASSEMBLY

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

To remove gear retaining nut **no. 1**, first extract the needle roller **no. 4** with pliers then lock gear **no. 2** in place using the following gear holder:

ENGINE TYPE	TOOL P/N
377/443/503	420 8766 95



ASSEMBLY

At gear **no. 2** assembly, apply a light coat of synthetic grease (P/N 413 7115 00) on gear teeth.

The needle roller **no. 4** must be engaged as deep as possible in the pump mounting flange.

Always check for spring clips **no. 5** and clamps **no. 6** tightness.

Torque screws **no. 3** to 5 N•m (44 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.

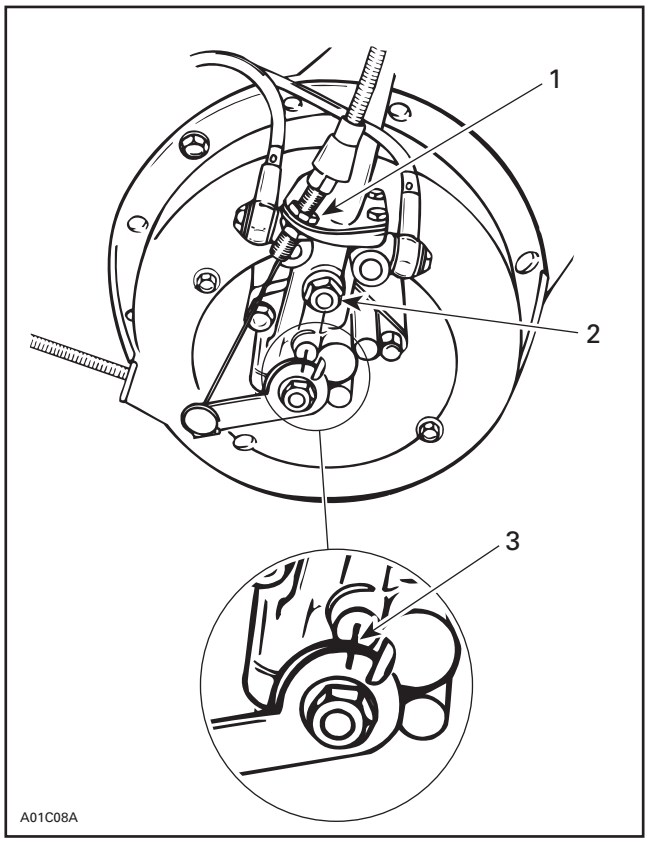
ADJUSTMENT

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.



TYPICAL

1. *Adjuster nuts*
2. *Bleeder screw*
3. *Marks must align*

▼ CAUTION

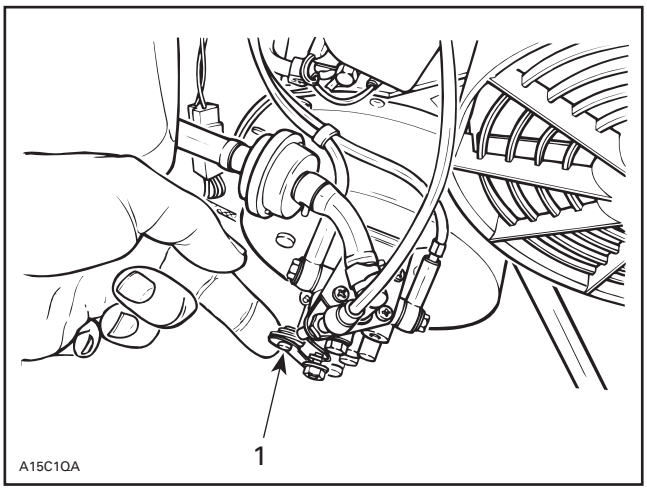
Proper oil injection pump adjustment is very important. Any delay in the opening of the pump can result in serious engine damage.

To Bleed Oil Lines

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

Make sure the tank is sufficiently filled.

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



TYPICAL — ENGINE AT IDLE

1. *Fully open position*

◆ WARNING

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

CHECKING OPERATION

Oil Pump

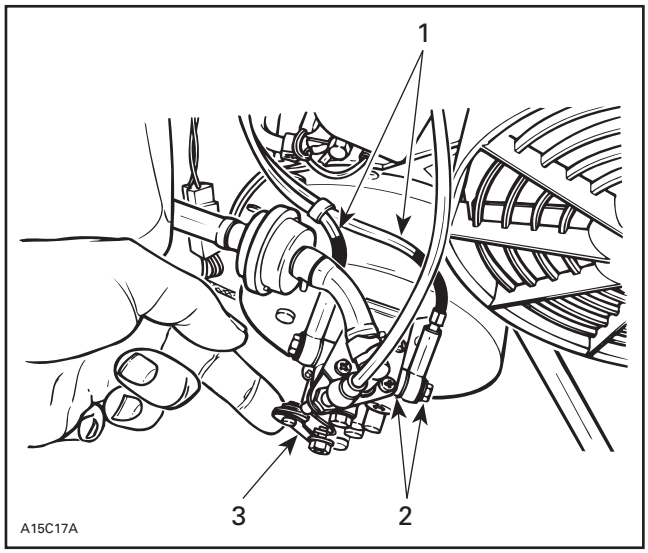
On Vehicle

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

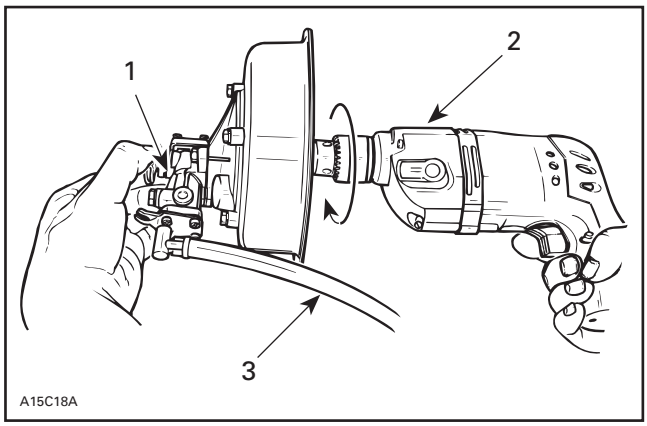
1. *Oil columns advancing*
2. *Washer on each side*
3. *Fully open position*

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. Replace as necessary.

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*

Banjo Fitting

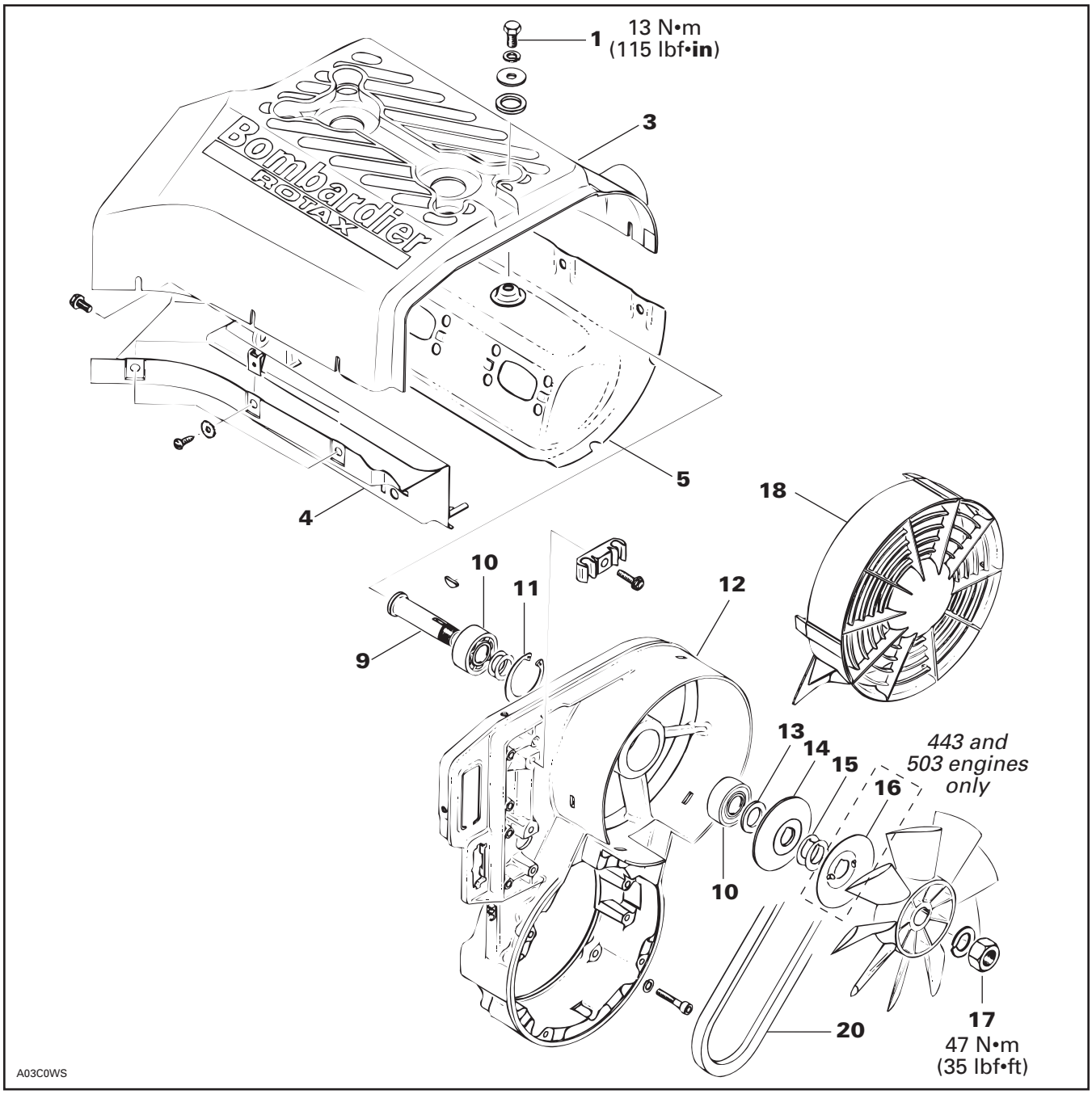
Inside the banjo fitting, there is a ball that acts as a check valve. To verify this check valve, proceed the same as for checking pump operation on vehicle. First unbolt banjo fitting from pump. After restarting the engine, check that a clear section in small oil line is present. Reconnect banjo fitting.

Run engine at idle. Oil column must advance. If the check valve is faulty, oil column will go back and forth. Replace if so.

AXIAL FAN COOLING SYSTEM

NOTE: For 277 engine radial fan cooling system, refer to CDI SYSTEM 04-05.

377, 443 and 503 Engines



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.

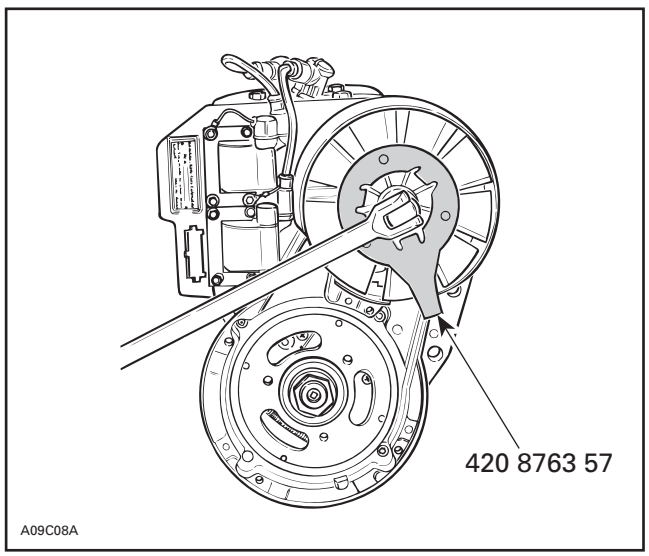
CLEANING

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

DISASSEMBLY AND ASSEMBLY

Remove fan protector.

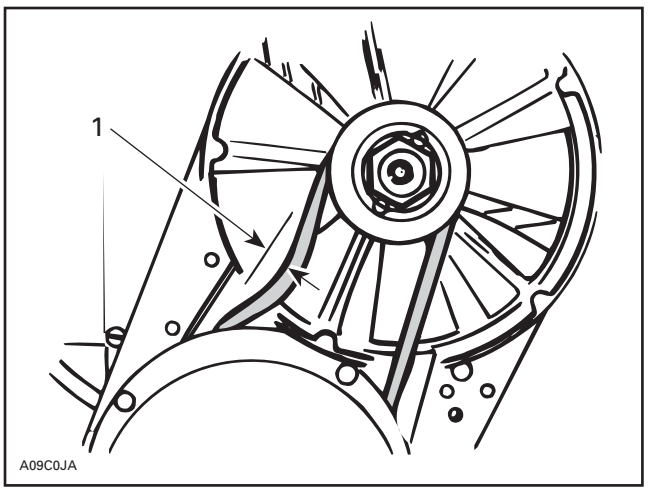
To remove or install fan pulley retaining nut **no. 17**, lock fan pulley with special holder wrench (P/N 420 8763 57). At assembly, torque nut to 65 N•m (48 lbf•ft).



TYPICAL

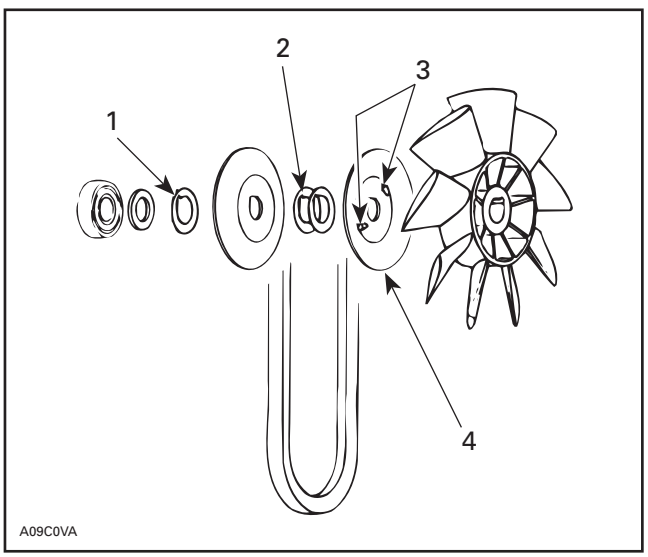
Fan belt deflection must be as specified when applying the proper force midway between pulleys.

ENGINE TYPE	BELT DEFLECTION	FORCE APPLIED
377, 443	8.5 mm (11/32 in)	5 kg (11 lb)
503	9.5 mm (3/8 in)	



1. Deflection

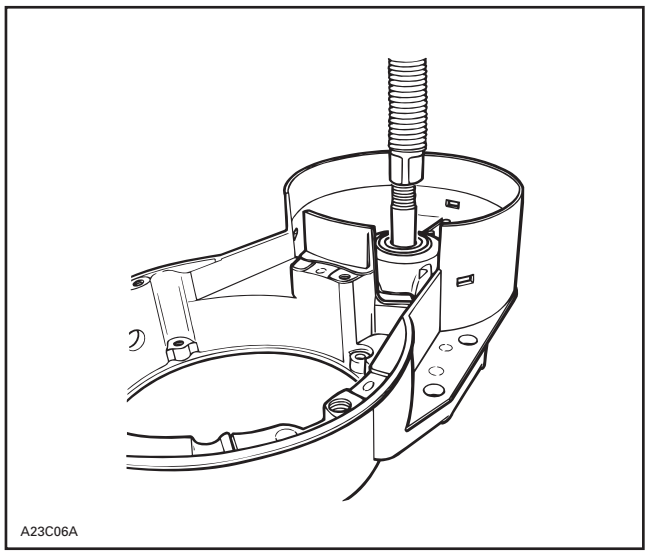
To adjust tension, add or remove shim(s) **no. 15** between pulley halves **nos. 14** and **16**. Install excess shim(s) between distance sleeve **no. 13** and half pulley **no. 14** (housing side).



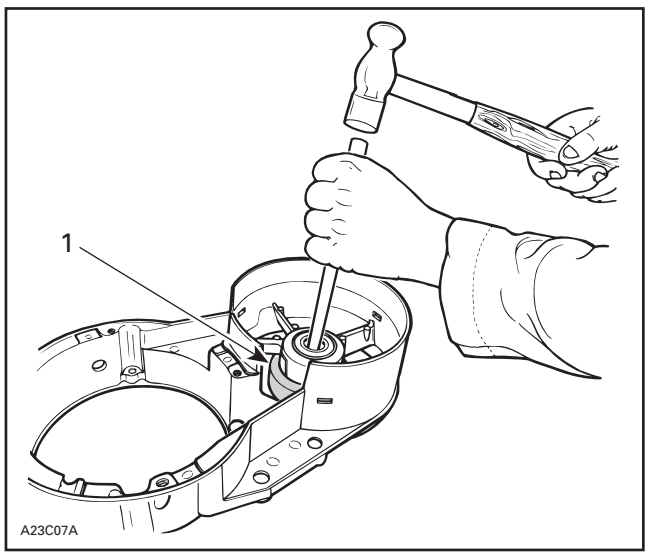
1. Unused shim(s) here
2. Adjust here
3. Positioning noses
4. Some engines only

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.

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



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

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**.

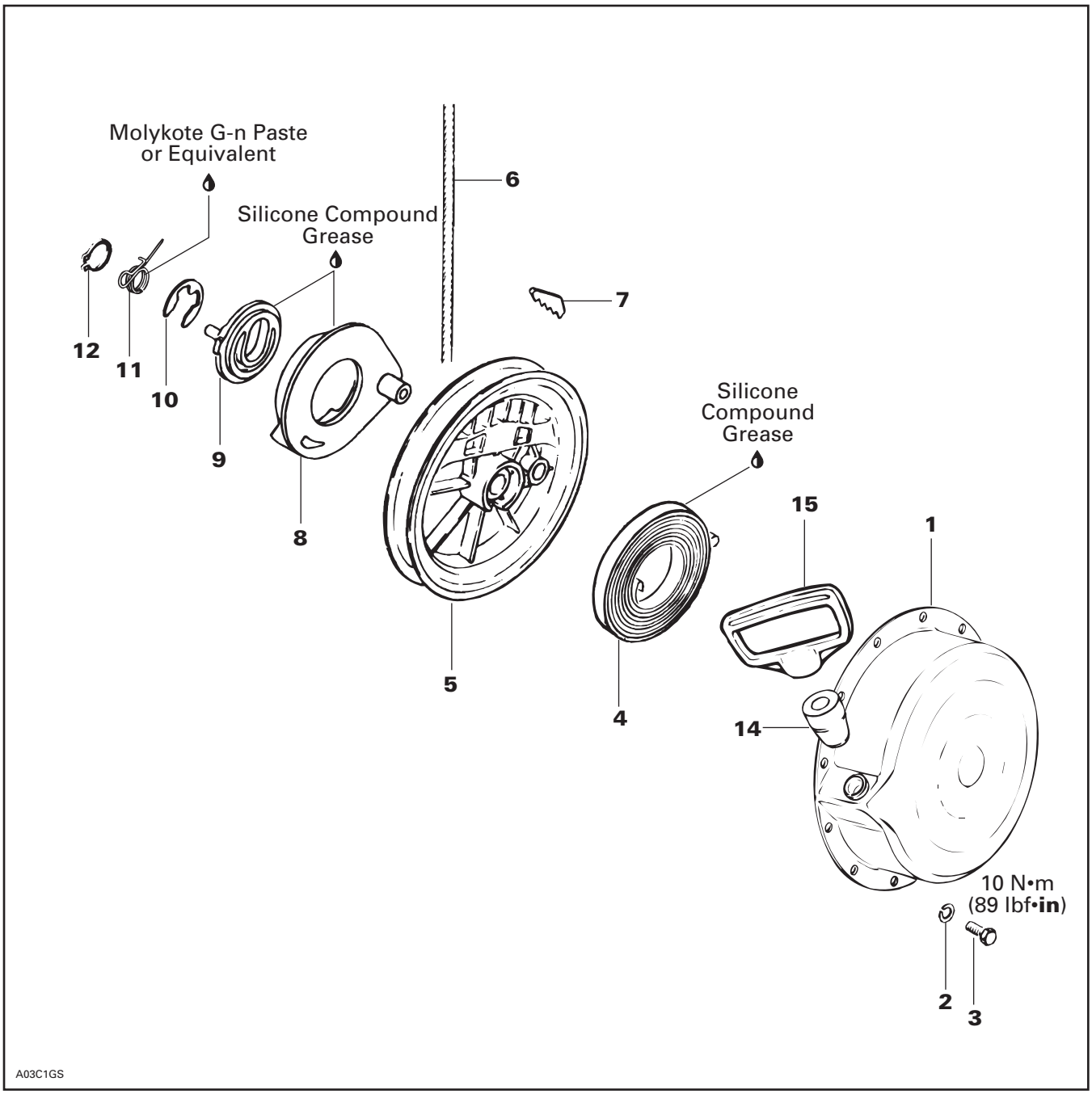
Reinstall fan protector **no. 18** properly.

◆ WARNING

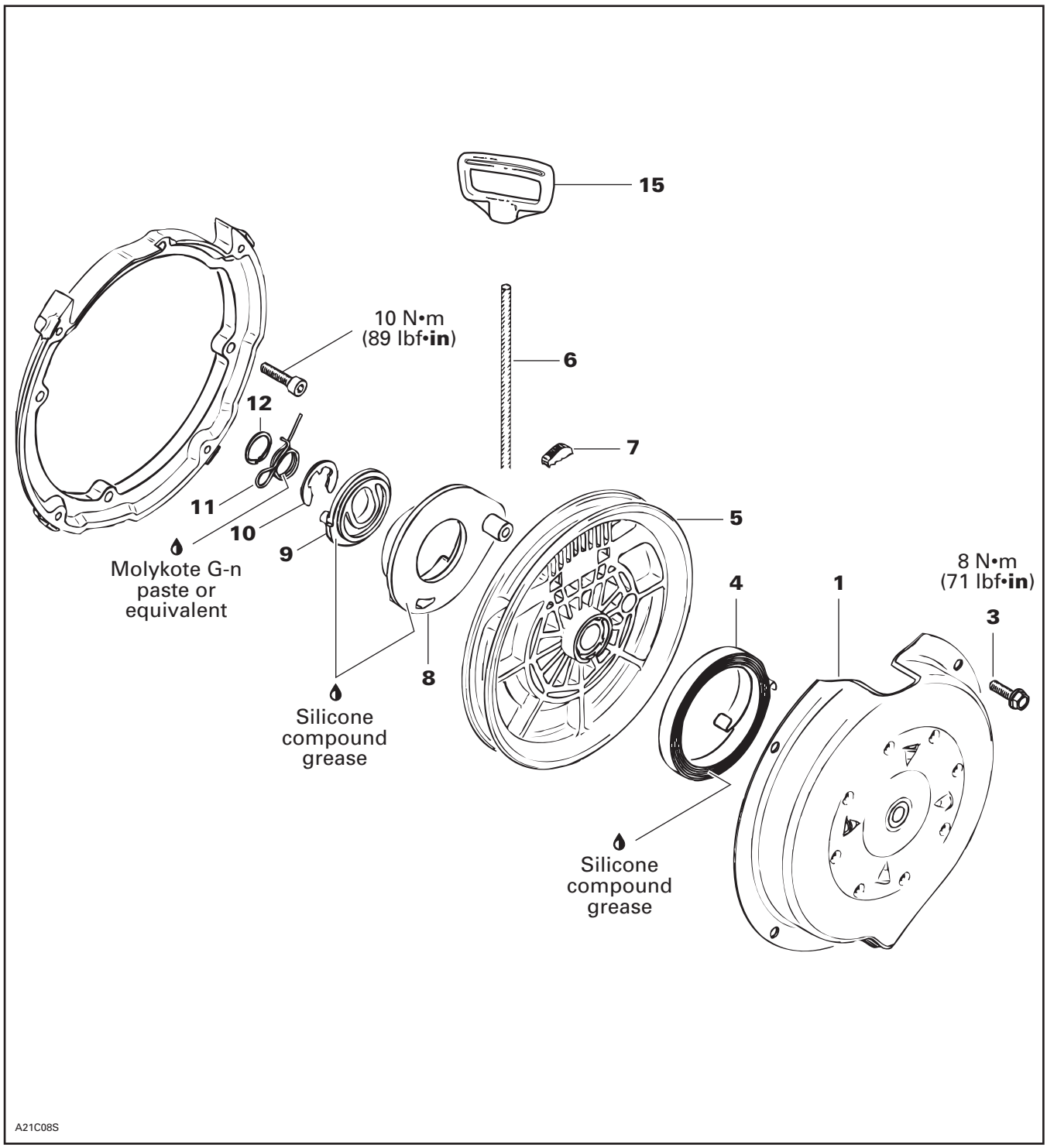
Always reinstall fan protector after servicing.

REWIND STARTER

277, 377 and 443



503 Skandic 500 and Formula SL



REMOVAL

Using a small screwdriver, extract rope knot from starter grip **no. 15**. 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.

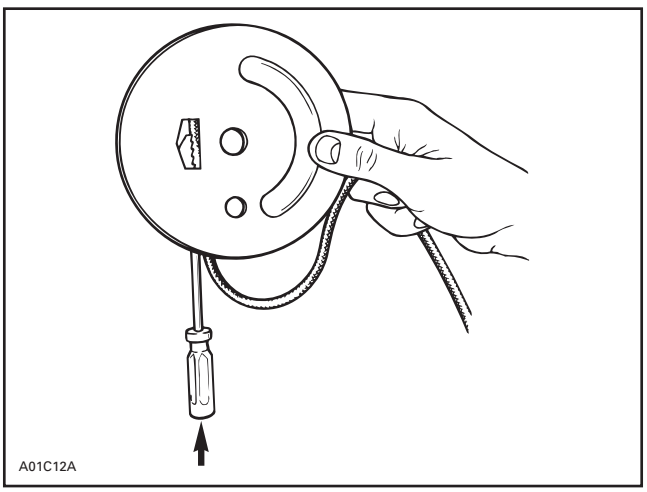
DISASSEMBLY

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

INSPECTION

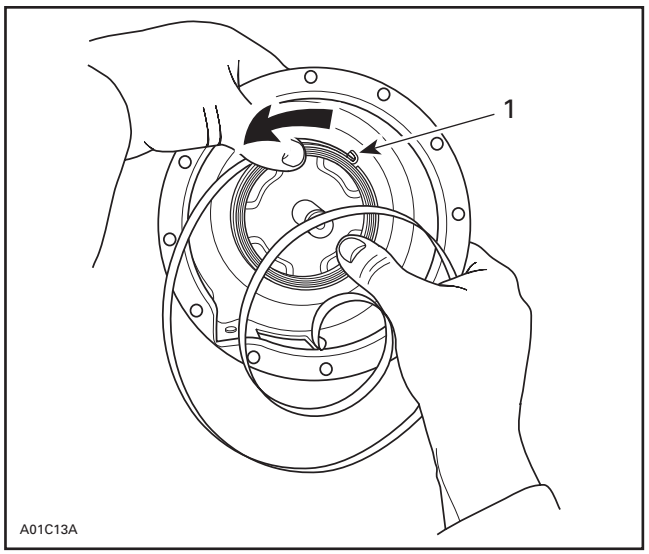
Check rope **no. 6** for fraying. Replace if so.

ASSEMBLY

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

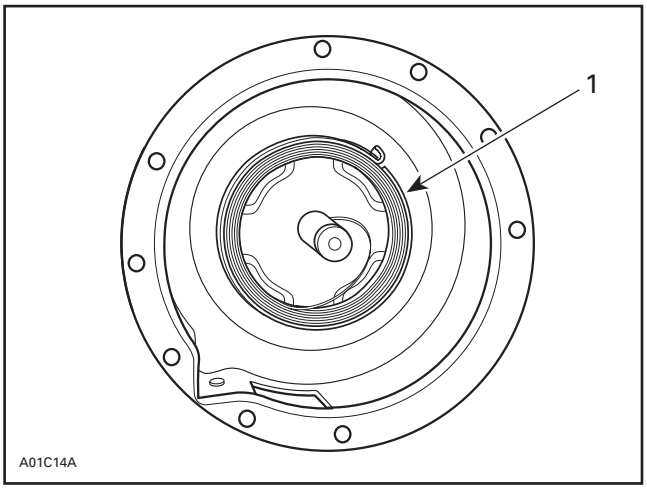
▼ CAUTION

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.

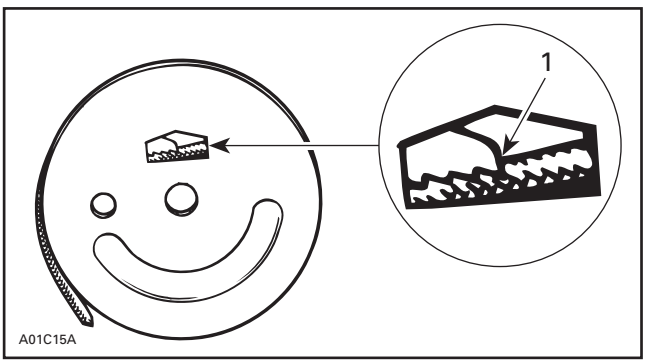


1. Grease inside spring guide

▼ 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.



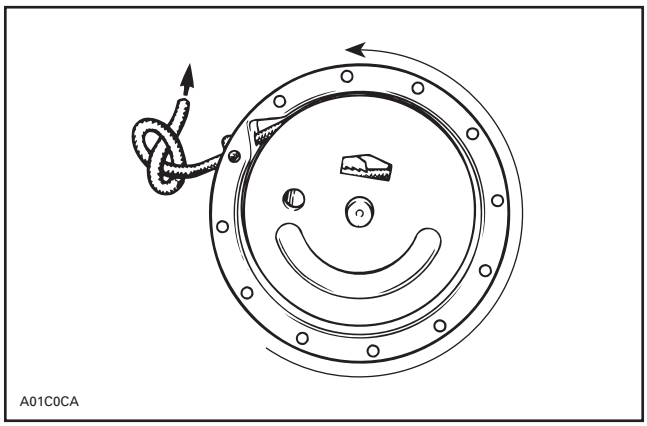
1. Push to lock

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.

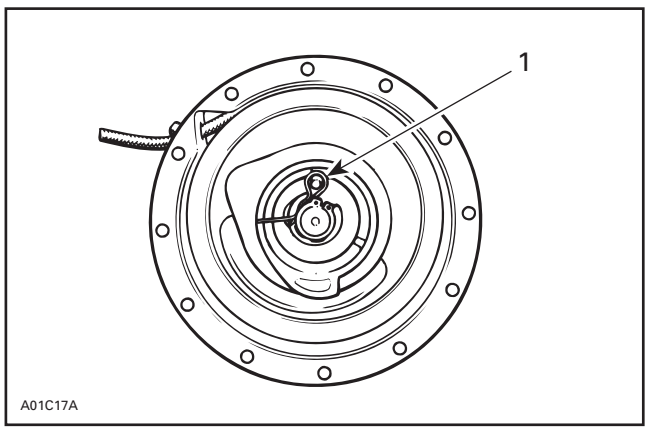
Rotate the sheave counterclockwise until rope end is accessible through starter housing orifice.

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

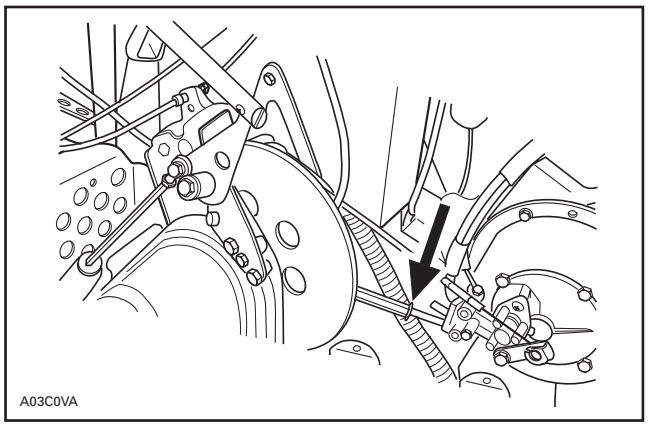
This lubricant must NOT be used on rewind springs as it does not stay on when dry.

INSTALLATION

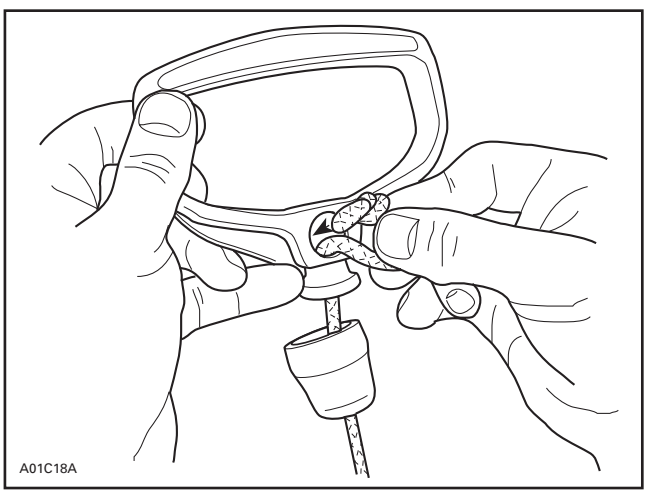
On fan cooled models with oil injection pump, re-install oil pump on rewind starter assembly.

Reinstall rewind starter assembly on engine.

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

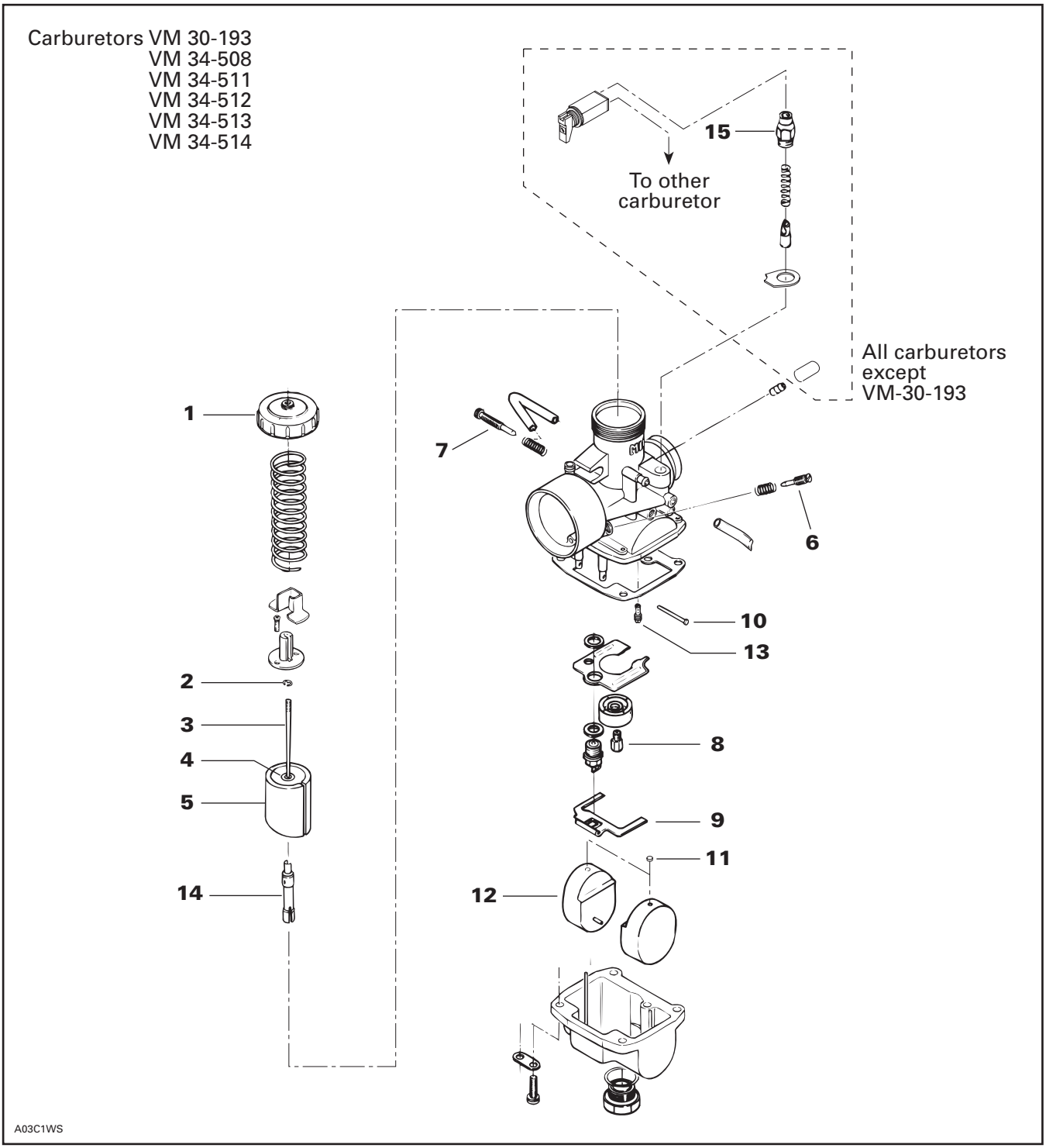


Prior to installing starter grip **no. 15** on new rope, it is first necessary to fuse the rope end with a lit match. pass rope through rubber buffer **no. 14** and starter grip and tie a knot in the rope end. Fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.



TYPICAL

CARBURETOR AND FUEL PUMP



REMOVAL

Remove air silencer(s). For S-Series, see BATTERY 06-05.

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.

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

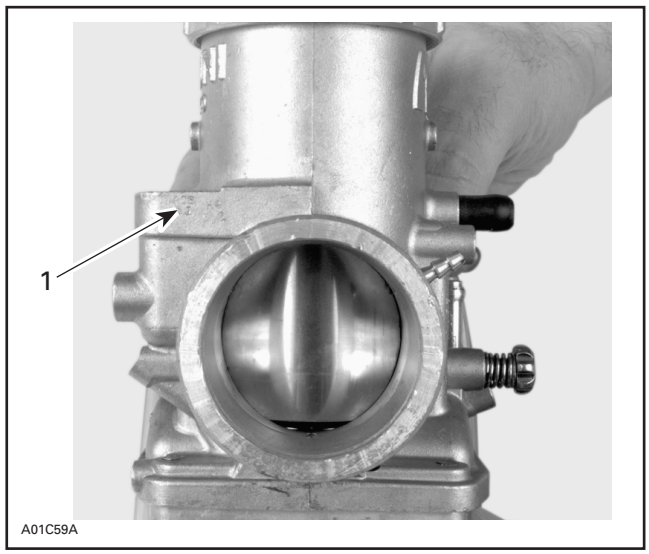
NOTE: Install needle valve for snowmobile carburetor only. It is designed to operate with a fuel pump system.

Check throttle slide for wear. Replace as necessary.

Check idle speed screw straightness. Replace as necessary.

IDENTIFICATION

All carburetors are identified on their body.



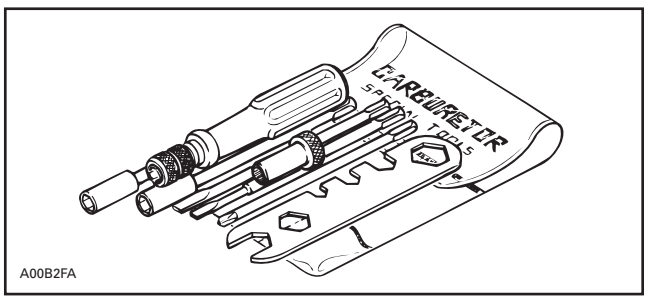
1. Identification: 34-482

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

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

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.

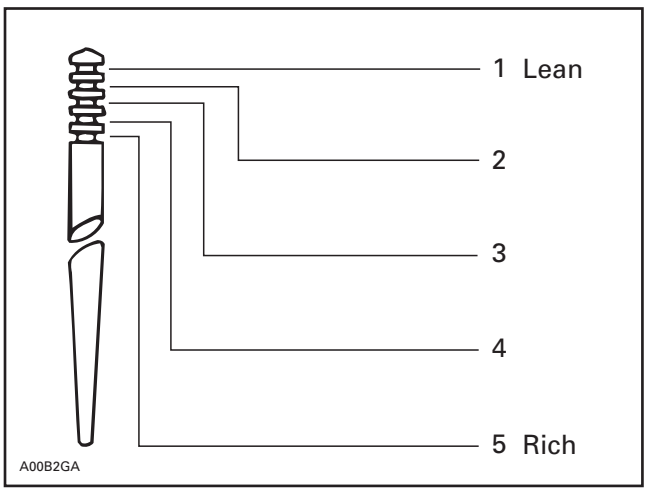
The position of the needle in the throttle slide is adjustable by means of an E-clip inserted into 1 of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

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

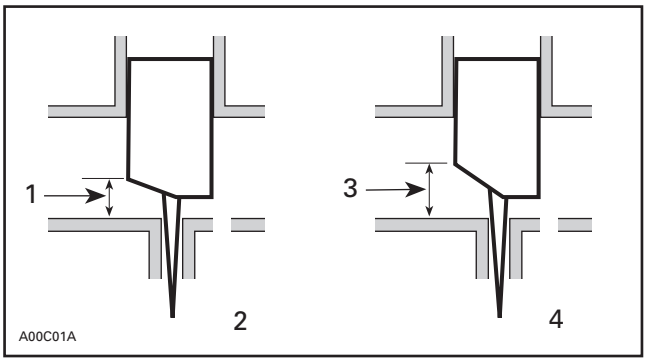
Needle identification

Recommended position of the E-clip **from top**



CLIP POSITIONS

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



1. *Low cutaway (high air speed)*
2. *Rich mixture*
3. *High cutaway (low air speed)*
4. *Lean mixture*

8, Main Jet

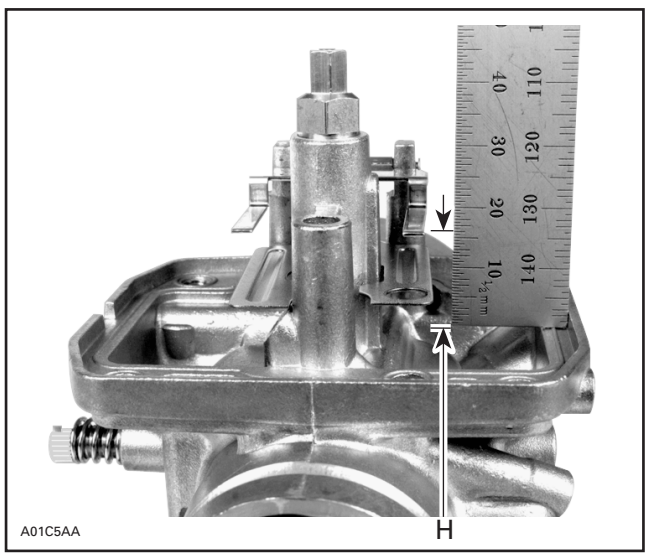
The main jet installed in the carburetor has been selected for a temperature of -20°C (0°F) at sea level. Different jetting can be installed to suit temperature and/or altitude changes. Always check spark plug tip and/or piston dome color to find out correct jetting.

CARBURETOR FLOAT LEVEL ADJUSTMENT

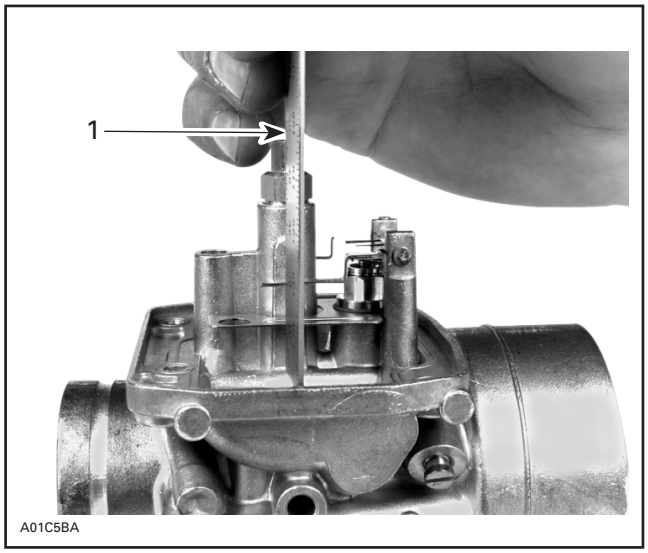
9,10, Float Arm and Float Arm Pin

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

– Remove float bowl and gasket from carburetor.
– Make sure that float arm is symetric — not distored.
– 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.



TYPICAL
H: Float height

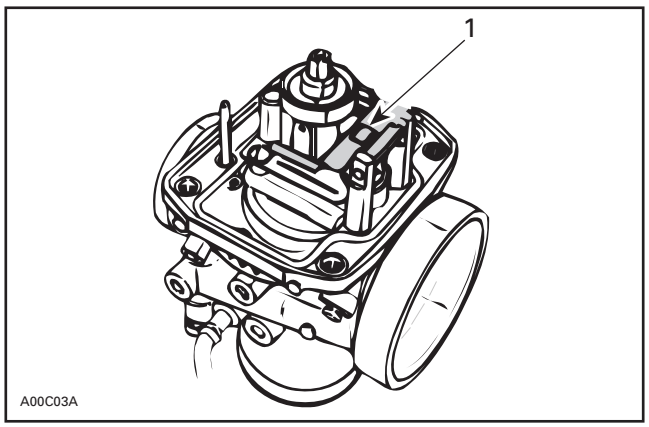


1. Ruler vertical and in line with main jet

CARBURETOR MODEL	FLOAT HEIGHT H	
	± 1 mm	(± .040 in)
VM 30 VM 34	23.9	(.941)

To Adjust Height H:

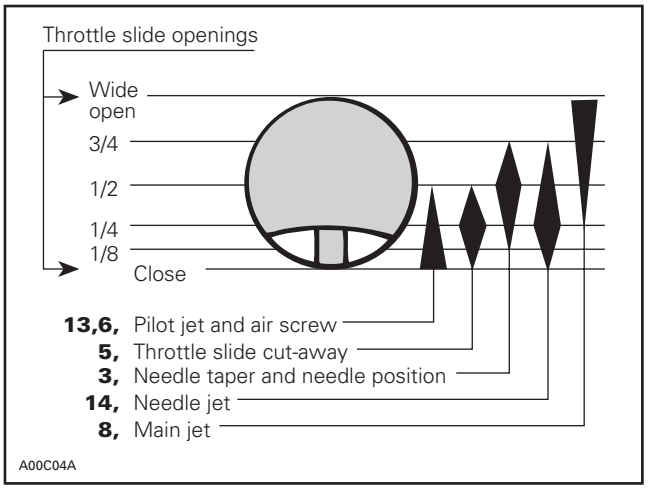
– Bend the contact tab of float arm until the specified height is reached.



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 cutaway 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 10 and to SPARK PLUG 06-03.

NOTE: For high altitude regions, the *High Altitude Technical Data Booklet* (P/N 484 0686 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.

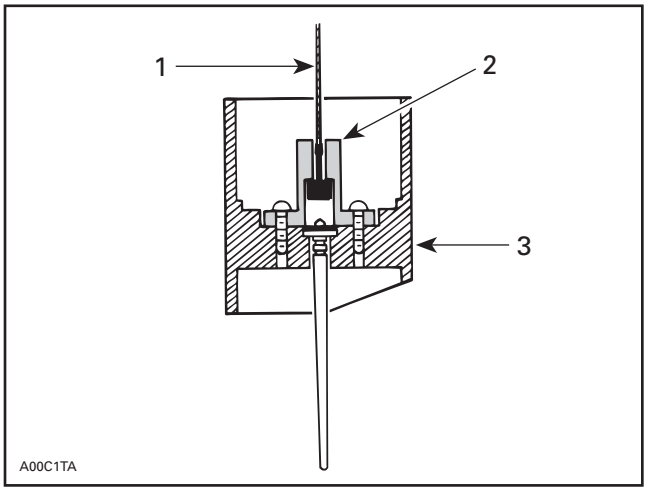
▼ CAUTION

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.



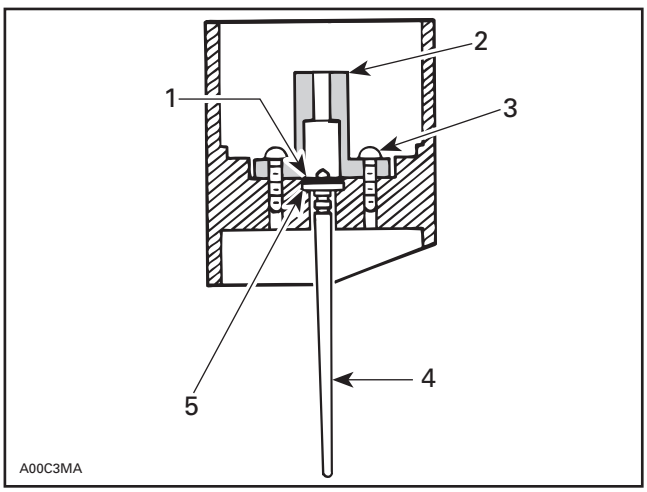
CENTER POST TYPE

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

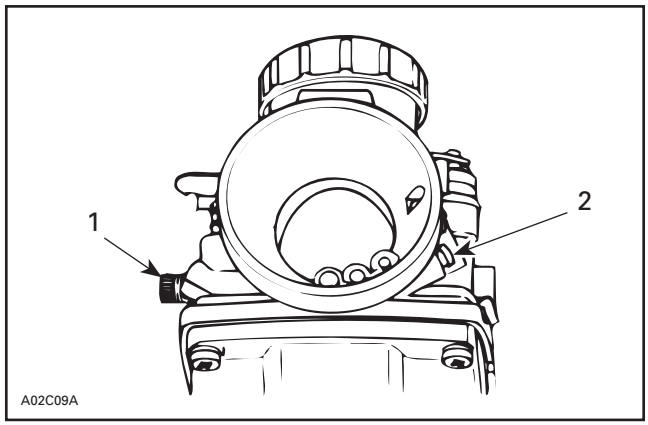
Serious engine damage can occur if this notice is disregarded.



CENTER POST TYPE

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

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 enrichners mixture and conversely, turning it out counterclockwise leans mixture.

Refer to TECHNICAL DATA 10 for the specifications.

Carburetor Synchronization

Twin Carburetor Models Only

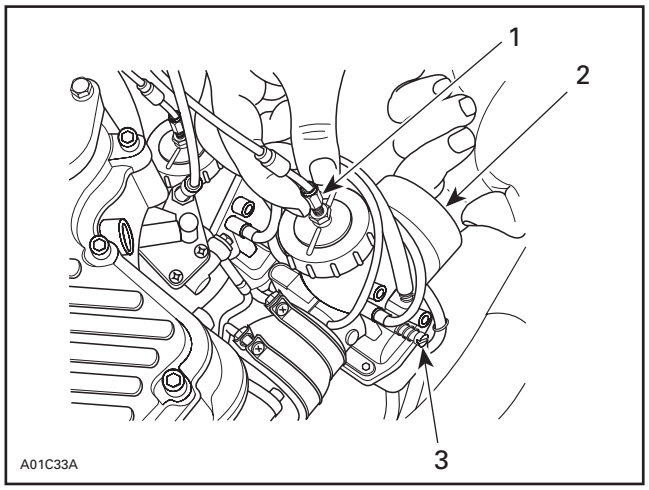
Both carburetor slides must start to open at the same time.

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 slides 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 slide 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

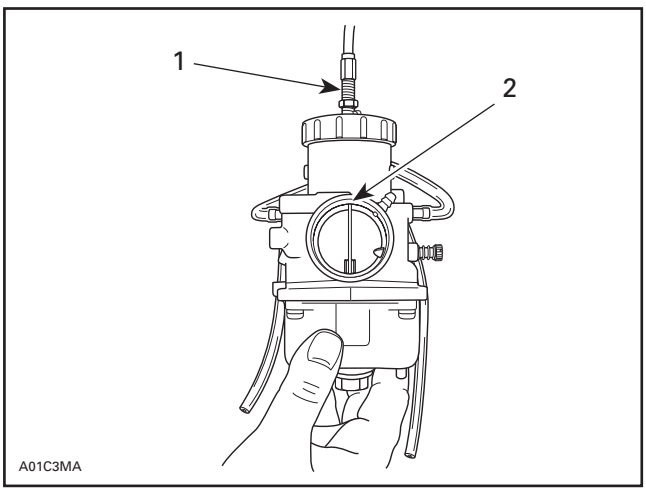
On twin carburetor models, make sure both carburetors start to operate simultaneously. Beside do not interchange carburetors, the jetting may be different on each side. A red dot is printed on one carburetor and on the engine. Match the carburetor and the engine dots when applicable.

▼ CAUTION

On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 04-06.

All Models

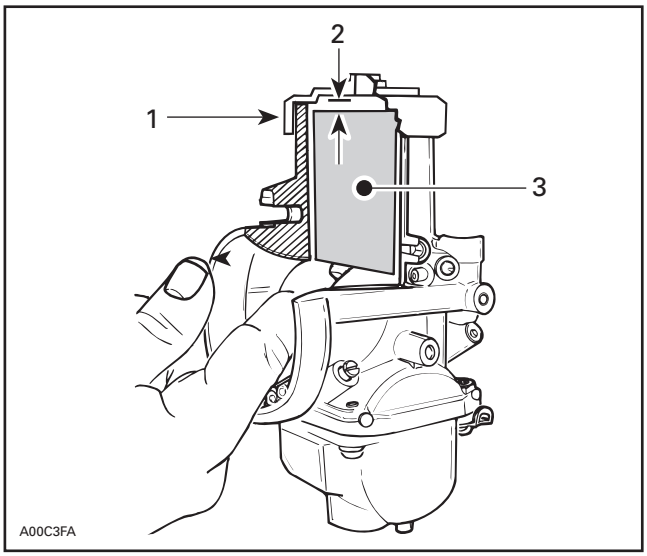
Throttle slide must be flush or 1.0 mm (.040 in) lower than the top of carburetor oulet bore (engine side).



THROTTLE LEVER AGAINST HANDLE GRIP

1. *Throttle cable adjuster*
2. *Throttle slide flush or 1.0 mm (.040 in) lower than carburetor oulet 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

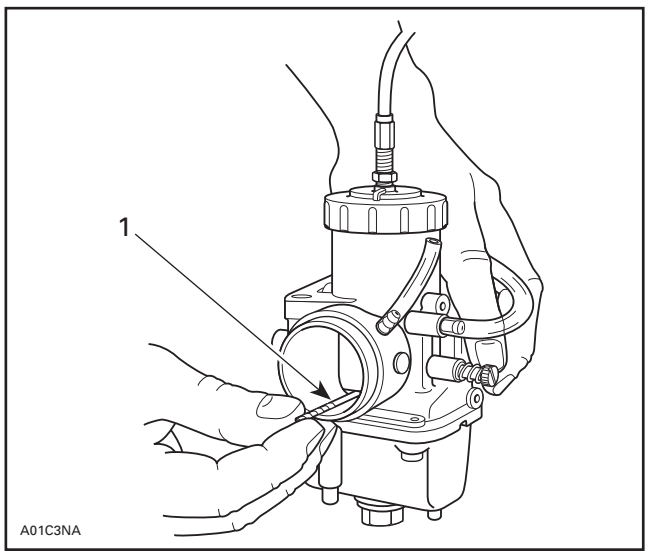
On oil injection models, the oil injection pump adjustment must be checked each time carburetor is adjusted. Refer to OIL INJECTION SYSTEM 04-06.

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.

Models	Throttle Slide Height mm (in)
Tundra II LT, Skandic 380, Touring E/LE, Formula S/S Electric	1.3 (.051)
Skandic 500, Formula SL, Touring LE	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 10 for the specifications.

▼ CAUTION

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

CHOKE

Touring E/LE, Skandic 380/500 and Formula S/S Elec./SL

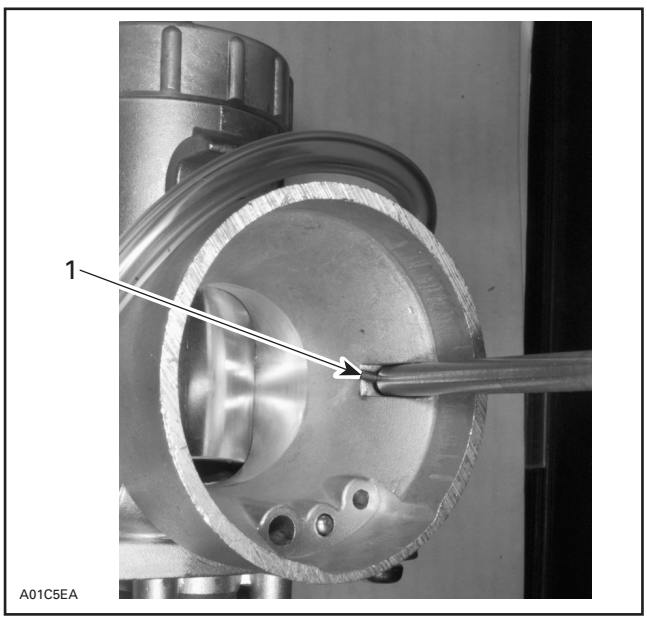
Choke Plunger Adjustment

Set choke lever to fully open position.

CHOKE LEVER — FULLY OPEN POSITION

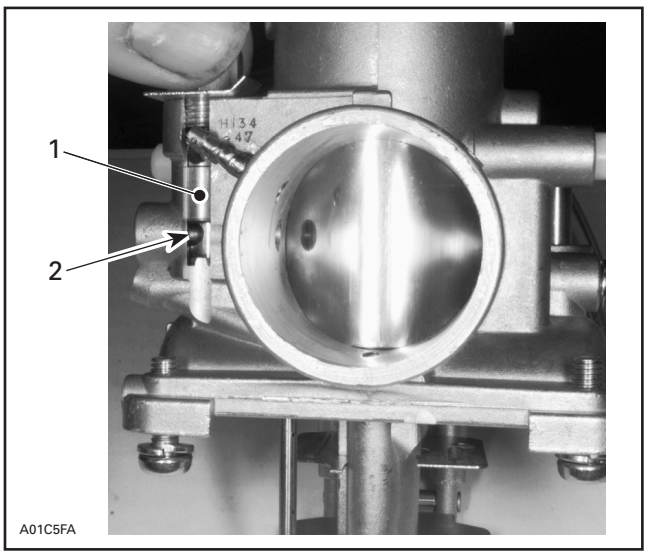
Use small diameter of tool for VM 34 carburetors.

Insert choke plunger tool into choke air inlet of each carburetor. Tool stopper may not lean against recess wall. Though it must be within 1 mm (.040 in) of recess wall.



AIR SILENCER SIDE SHOWN

1. *Tool stopper within 1 mm (.040 in) of recess wall*



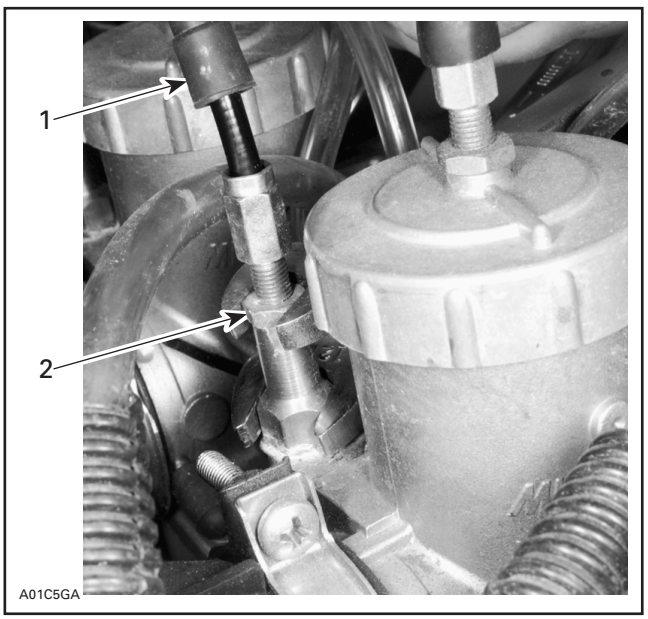
CUTAWAY (ENGINE SIDE SHOWN)

1. *Choke plunger*
2. *Tool properly seated under choke plunger*

If tool tip does not seat under choke plunger **no. 15**, adjust as follows:

Make sure choke lever is at fully open position.

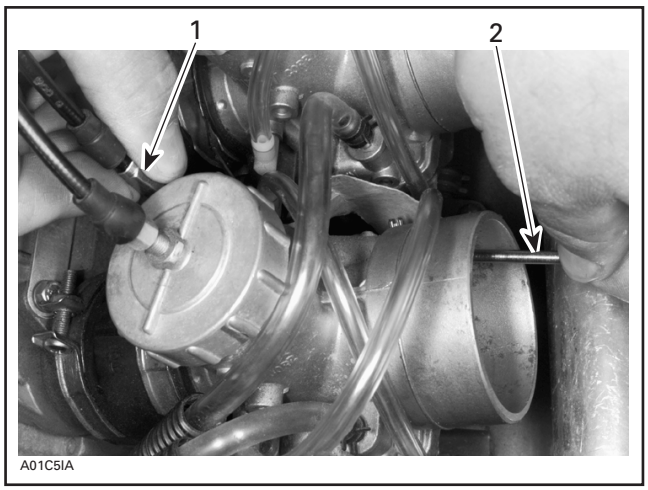
Lift up protector cap and loosen choke cable lock nut, as shown in the next photo.



1. *Lift up protector cap*
2. *Loosen lock nut*

Turn choke cable adjustment nut by hand until tool properly seats under choke plunger.

NOTE: A light pressure should be needed to position tool under plunger.



1. Choke cable adjustment nut
2. Choke plunger tool

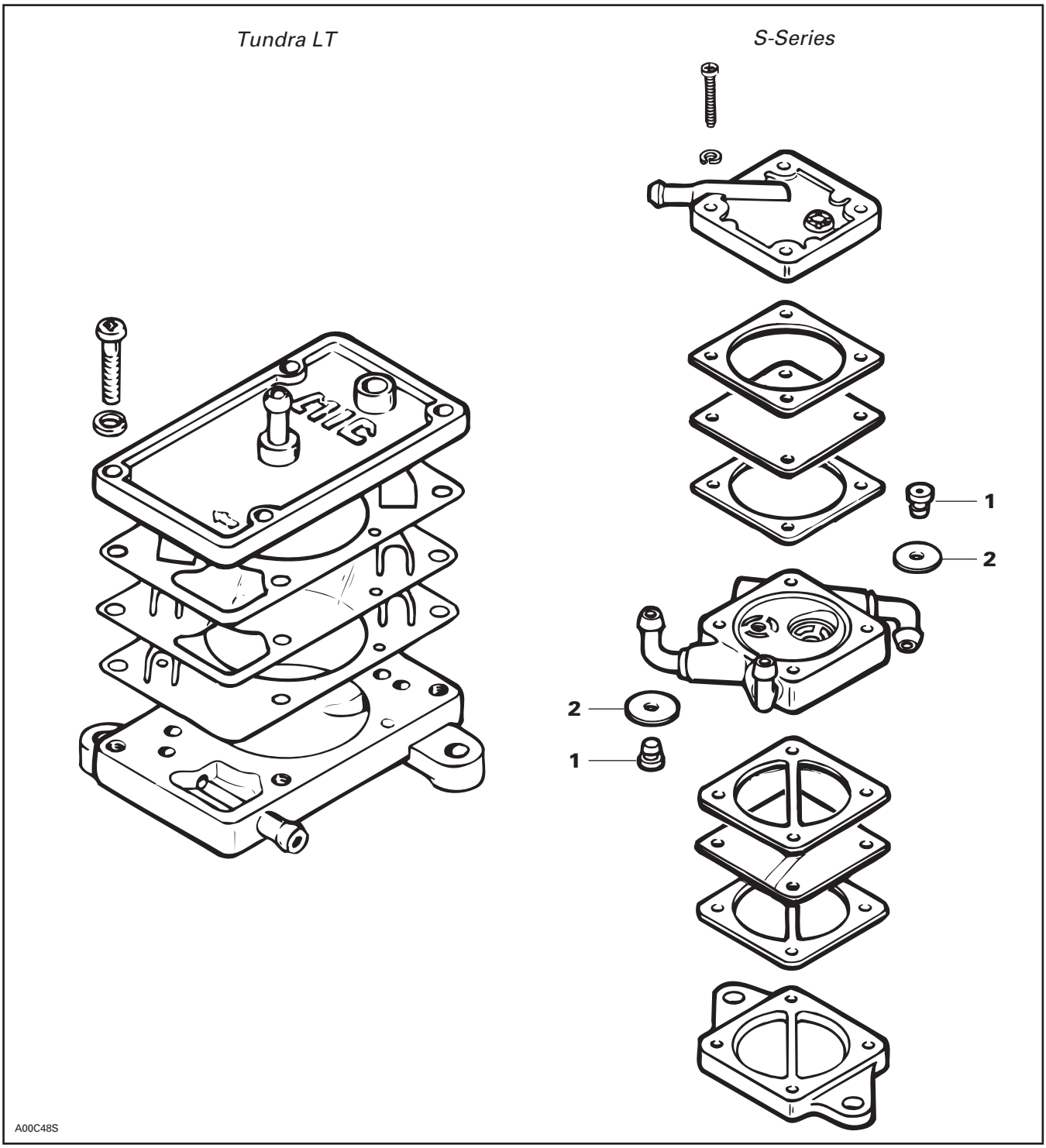
Tighten choke cable lock nut and reinstall protector cap.

Set choke lever to close and open positions and ensure that tool properly seats under plunger **only** when lever is set to fully open position.

Set choke lever to close position and, by pulling and pushing choke lever, make sure there is no tension on cable (free play).

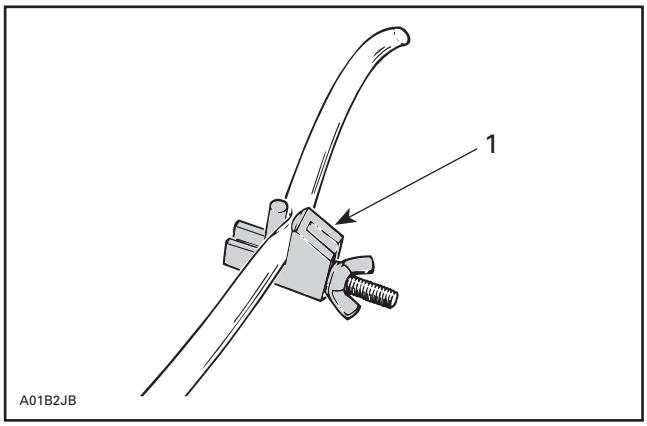
CHOKE LEVER — CLOSED POSITION

FUEL PUMP



REMOVAL

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

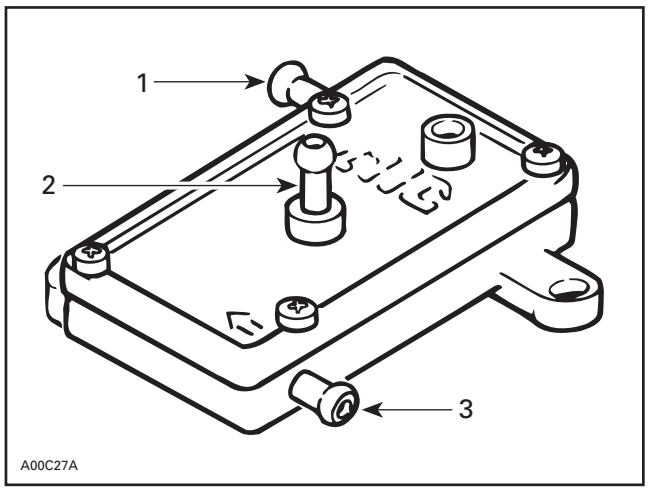


1. Hose pincher (P/N 529 0099 00)

Disconnect fuel outlet line(s).

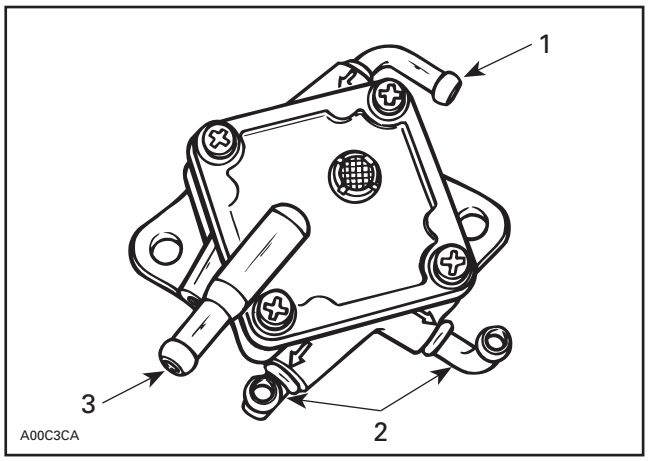
Disconnect impulse line.

Remove screws (or nuts if applicable) securing fuel pump.



LOW-SUPPLY FUEL PUMP WITH SINGLE OUTLET

1. Fuel outlet line
2. Impulse line
3. Fuel inlet line



HIGH-SUPPLY FUEL PUMP WITH TWIN OUTLETS

1. Inlet
2. Outlets
3. Impulse

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.

DISASSEMBLY

1,2, Grommet and Valve (high-supply pump with twin outlets only)

Do not disassemble valves unless replacement is necessary.

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.

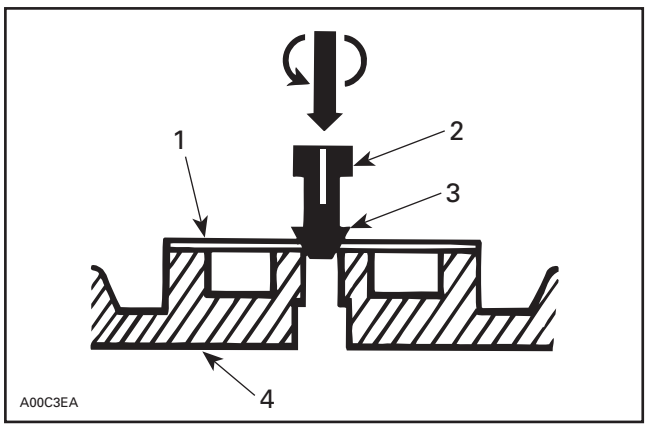
Inspect diaphragm. The pumping area should be free of holes, tears or imperfections. Replace as needed.

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

ASSEMBLY

To install a new valve, proceed as follows:

– Place new valve flat on its seat.
– Slightly oil taper tip of grommet.
– Push grommet with a rotational movement until it crosses its housing.



1. Valve
2. Grommet
3. Lubricate tip
4. Pump body

When assembling pump, ensure to properly position stages together. Refer to previous illustrations if necessary.

INSTALLATION

To install, inverse removal procedure.

◆ WARNING

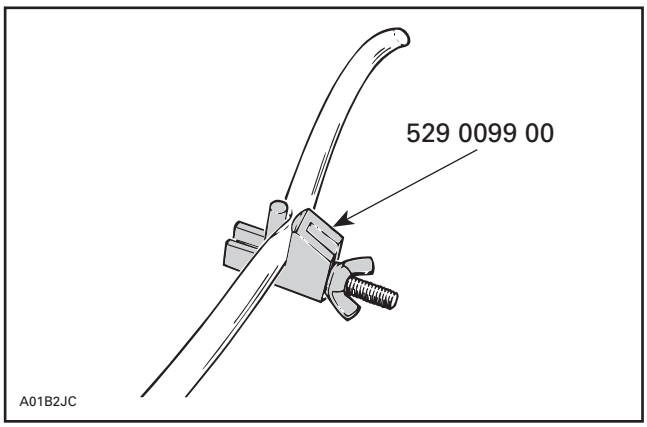
Pressure test to ensure there is no leak in fuel system.

FUEL TANK AND THROTTLE CABLE

Fuel Tank Lines

◆ WARNING

When draining a fuel tank or when-ever 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

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

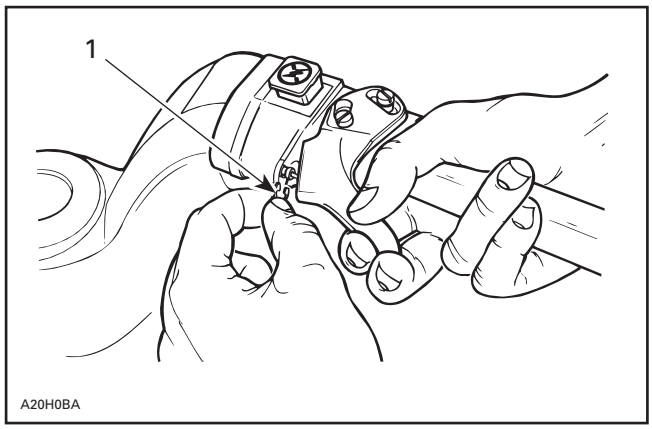
Throttle Cable Circlip at Handlebar

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

◆ WARNING

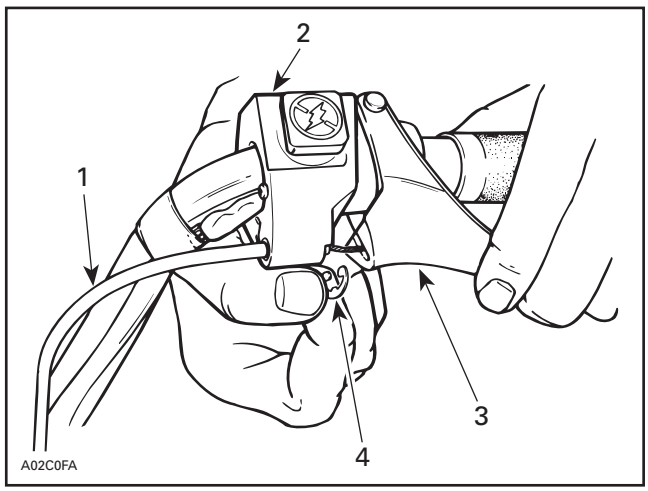
If this procedure is disregarded, throttle might be half-open at normally closed position and the engine will speed up when starting.

Models with Easy Action Throttle Lever



TYPICAL
1. Circlip

Other Models

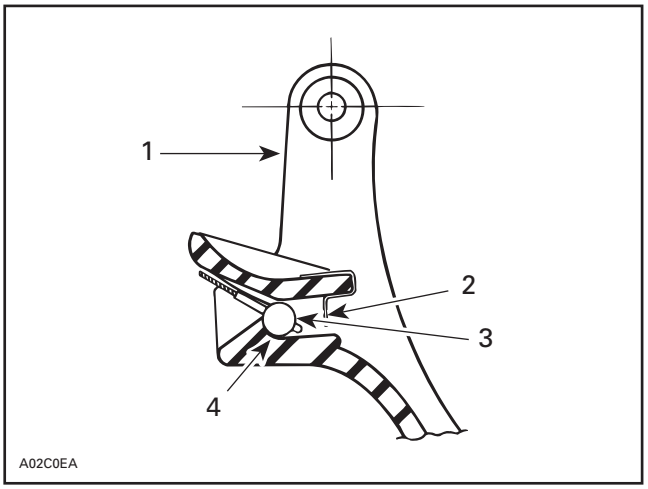


1. Throttle cable housing
2. Throttle handle housing
3. Throttle handle
4. Circlip

Throttle Cable Retainer

Tundra II LT Models

The retainer must be pushed on the throttle handle tab until it sits properly.



1. Throttle handle
2. Retainer
3. Cable barrel
4. Silicone grease

Adjust throttle cable as specified in CARBURETOR AND FUEL PUMP 04-09.

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.

TABLE OF CONTENTS

DRIVE BELT

1998 APPLICATION CHART

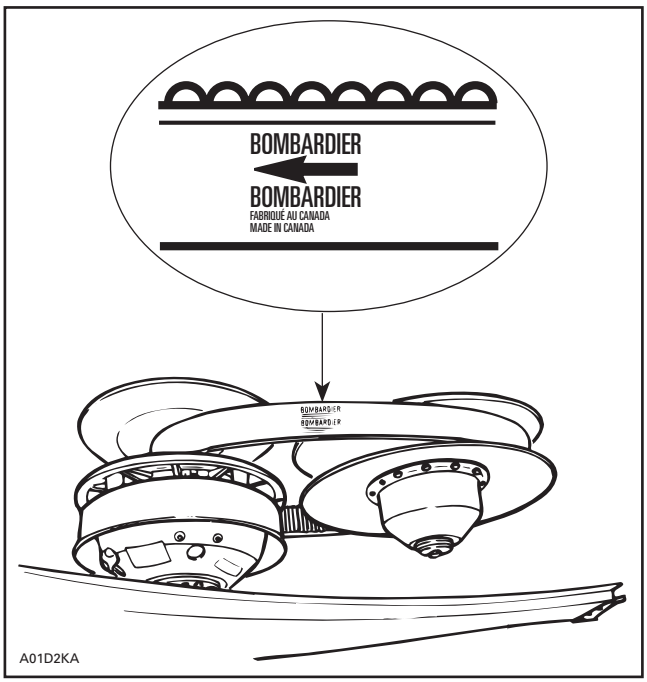
MODEL	PART NUMBER	WIDTH (NEW) ± 0.25 mm (.010 in)	MINIMUM WIDTH (WEAR LIMIT)
TUNDRA II LT	414 8276 00	33.3 mm (1-5/16 in)	30 mm (1-3/16 in)
S-SERIES	415 0606 00	34.3 mm (1-27/64 in)	32 mm (1-1/4 in)

CLEANING

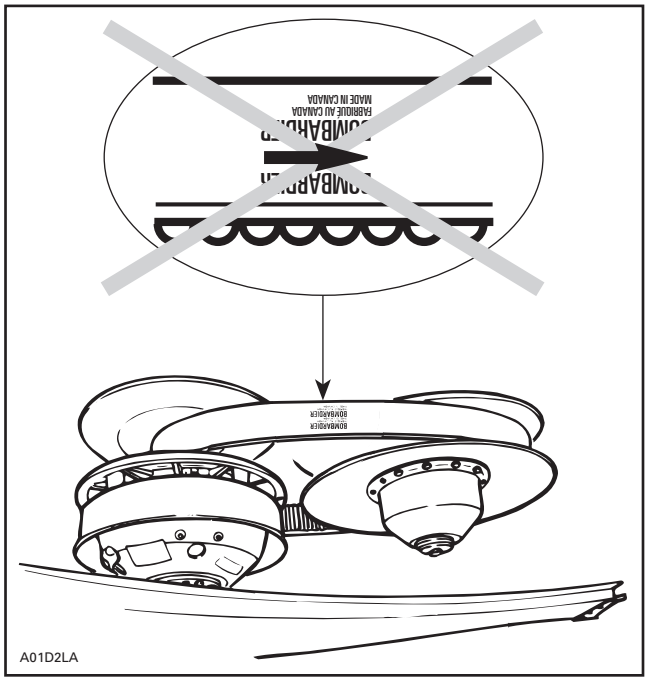
Use Bombardier Cleaner (P/N 293 1100 01) to remove rubber residue from drive belt.

ROTATION DIRECTION

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



CORRECT



INCORRECT

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

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 PULLEY DISTANCE AND ALIGNMENT 05-05.

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

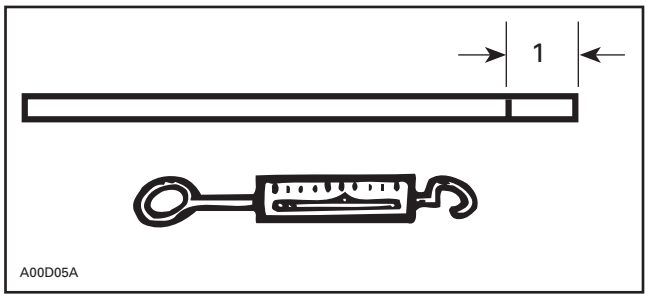
MODEL	DEFLECTION mm (in)	FORCE kg (lb)	HEIGHT† OVER DRIVEN PULLEY
Tundra II LT	32 ± 5 (1-1/4 ± 13/64)	6.8 (15)	0 - 1.5 mm (0 - 1/16 in)
S-Series	32 ± 5 (1-1/4 ± 13/64)	11.3 (25)	0 - 1.5 mm (0 - 1/16 in)

†For reference only

To Check Tension

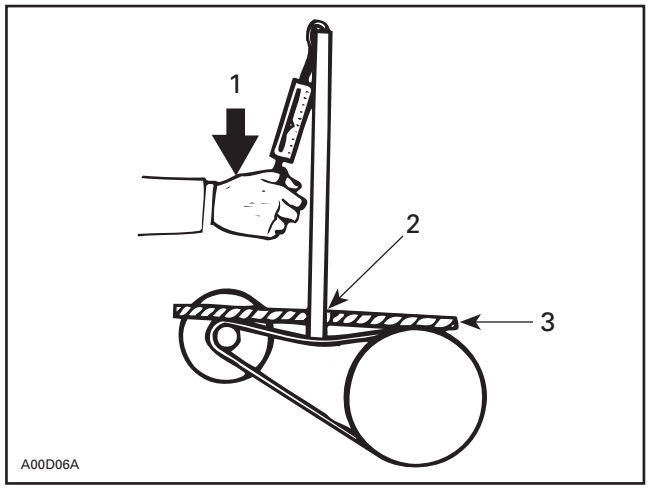
Position a reference rule on drive belt.

Wooden Stick and Spring Scale Method:



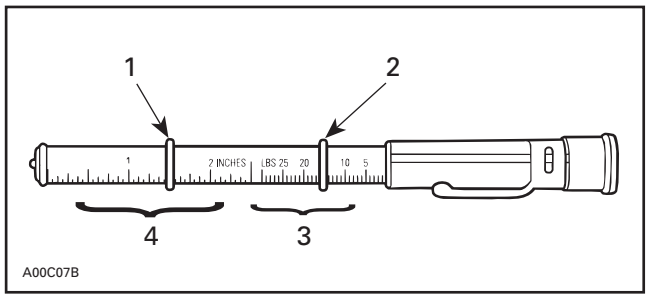
1. Mark specified deflection

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



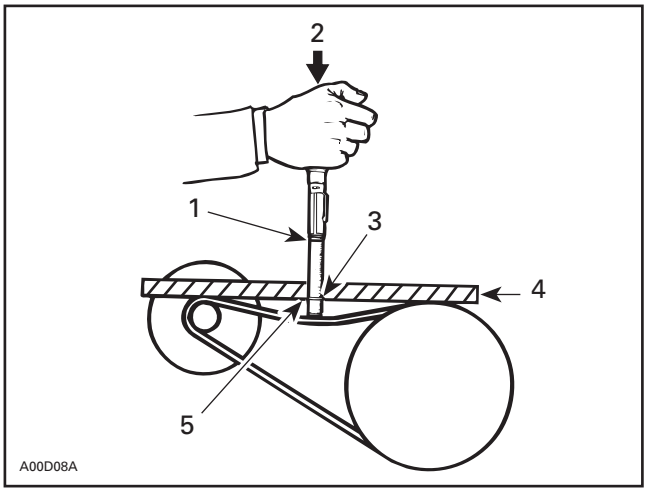
1. Read deflection here
2. Reference rule
3. Force

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.

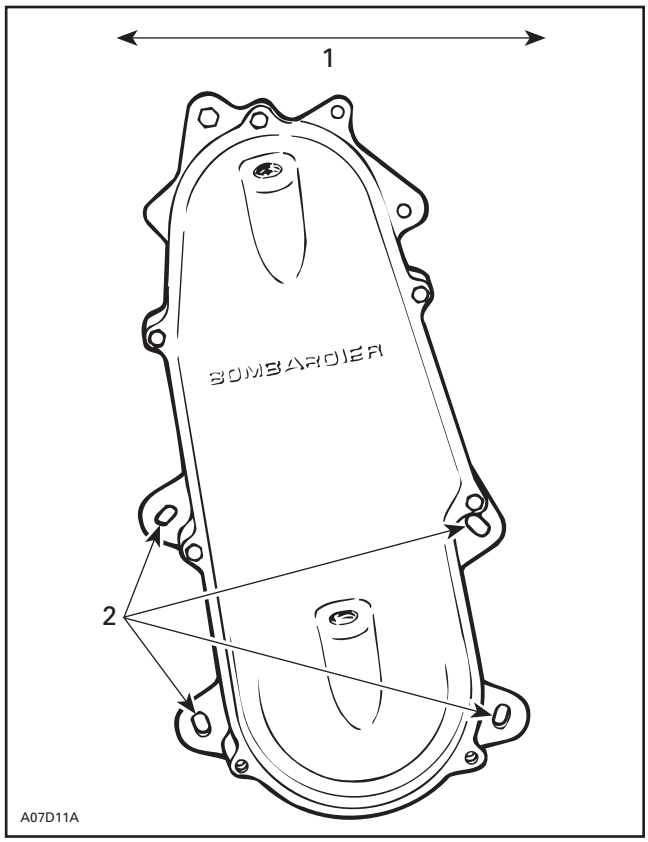


1. *Upper O-ring*
2. *Force*
3. *Lower O-ring*
4. *Reference rule*
5. *Deflection*

DEFLECTION ADJUSTMENT

Tundra II LT

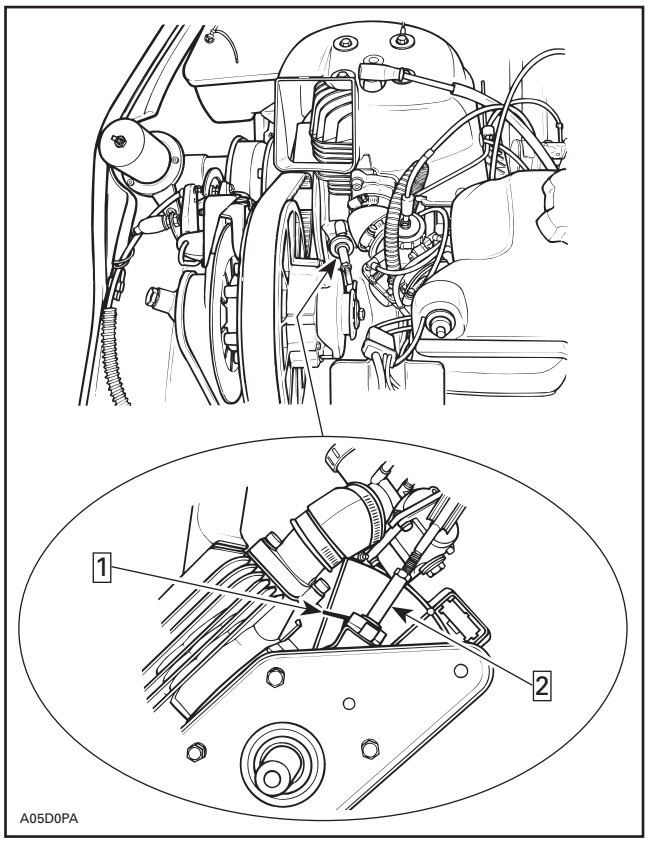
Drive belt deflection is adjusted by moving chaincase.



TYPICAL

1. *Movement*
2. *Retaining nuts*

To do so, loosen the 4 chaincase retaining nuts, unlock and raise driven pulley support.



TUNDRA II LT

Step 1 : Push and hold
Step 2 : Raise support

Adjust pulley distance according to specifications, refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and measure drive belt deflection. Readjust pulley distance if required, then tighten the 4 nuts. Adjust driven pulley support and lock it to engine.

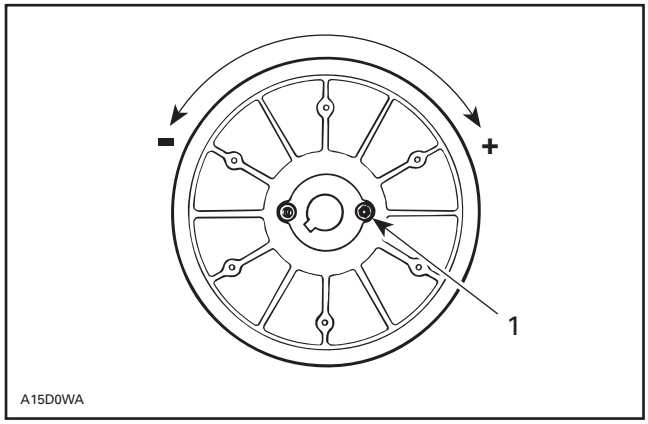
S-Series

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

To increase deflection: turn Allen screws clockwise.

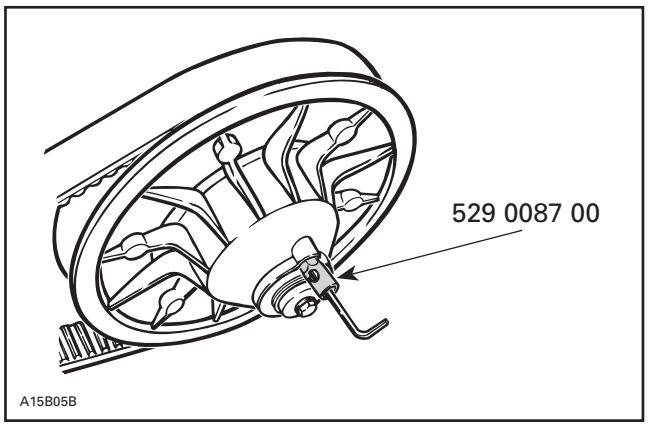
To decrease deflection: turn Allen screws counterclockwise.

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).



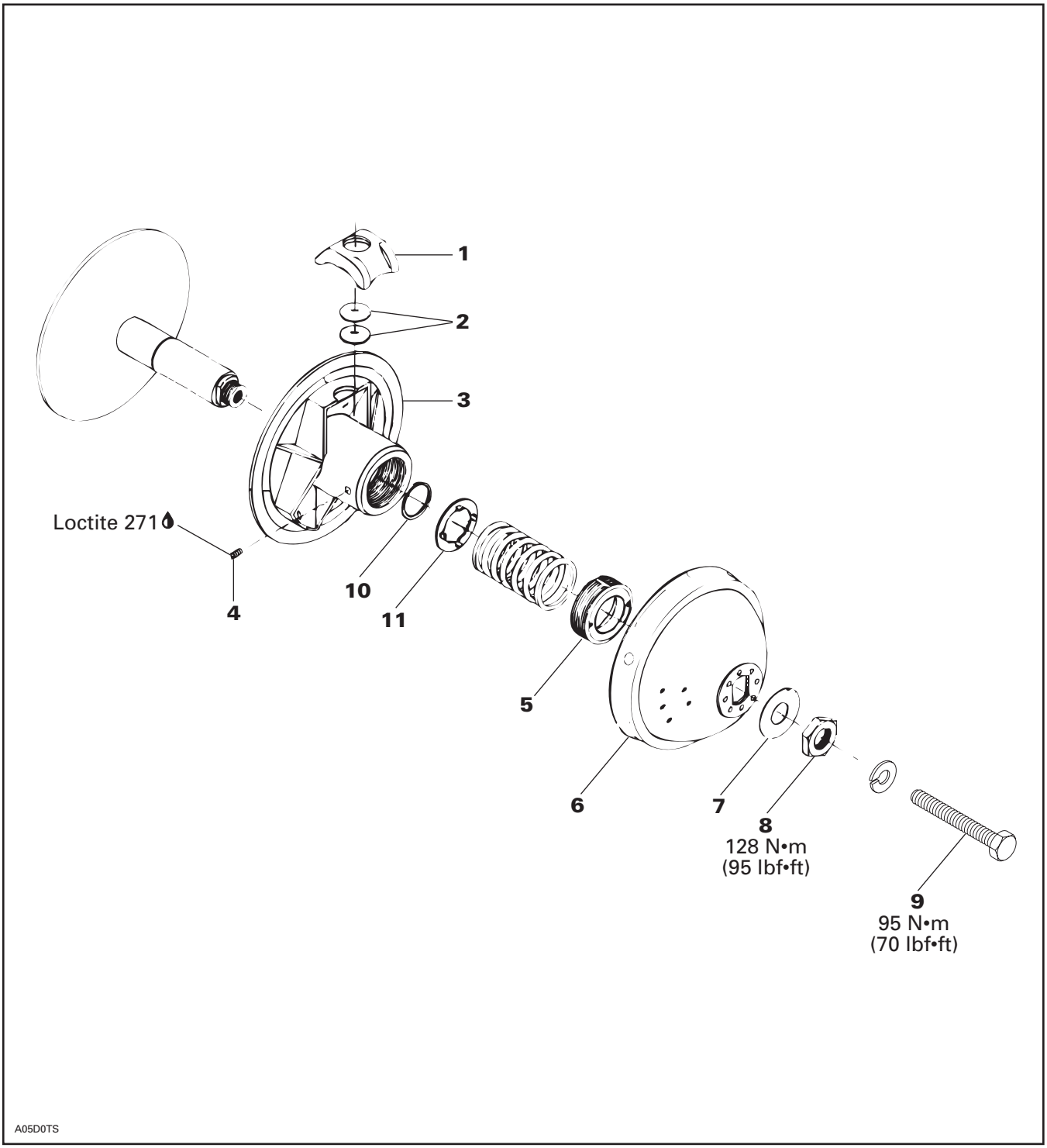
Restrain Allen screws with the wrench and tighten nut with the socket using socket handle provided in tool box.

DRIVE PULLEY

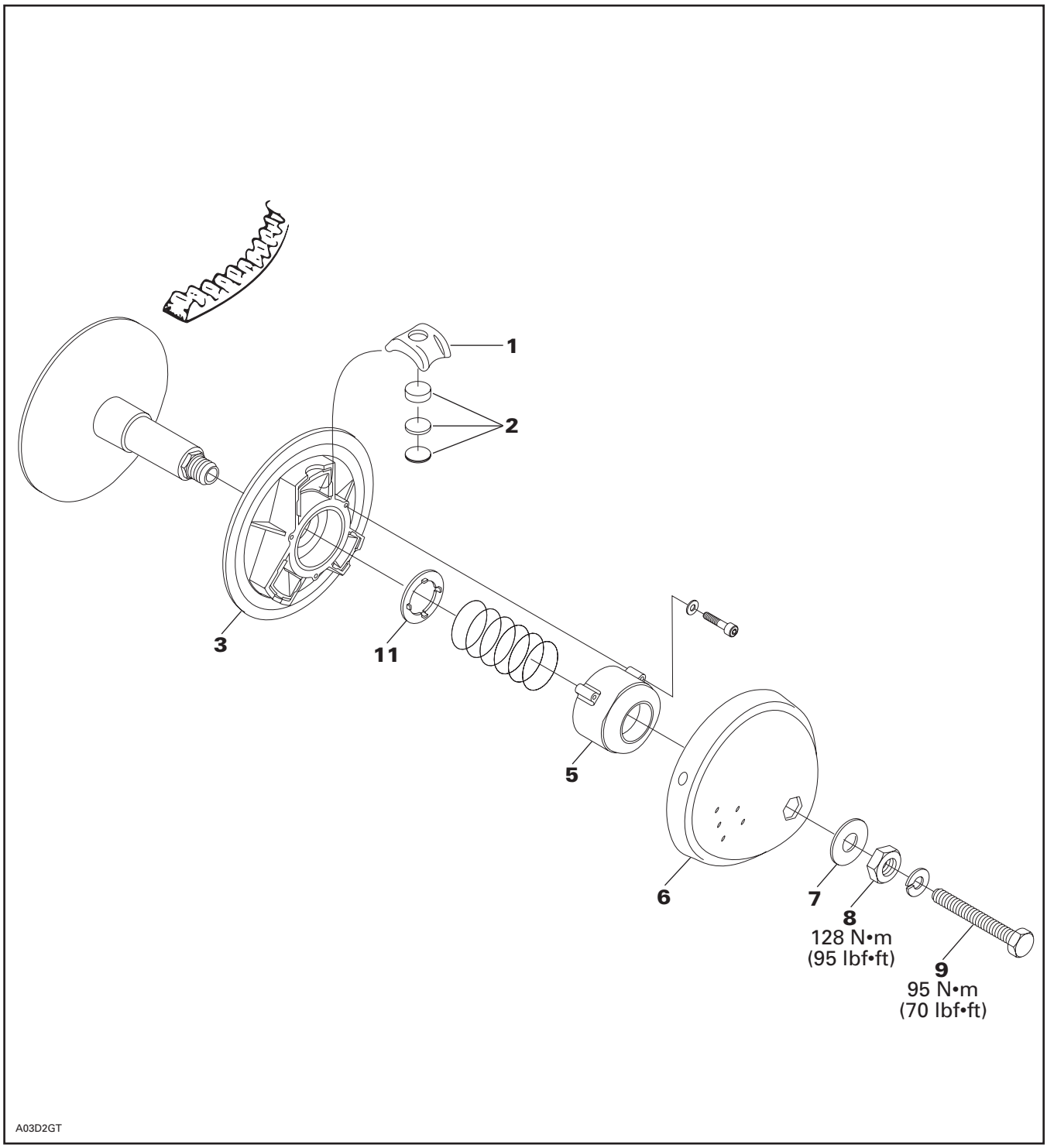
BOMBARDIER LITE

NOTE: This is a lubrication free drive pulley.

Tundra II LT



377 Engine S-Series



GENERAL

Some drive pulley components (return spring, calibration disk) can be changed to improve vehicle performance in high altitude regions. The *High Altitude Technical Data booklet* (P/N 484 0686 00 and 484 0545 00 for binder) gives information about calibration according to altitude.

▼ CAUTION

Such modifications should only be performed by experience mechanics since they can greatly affect vehicle performance.

◆ WARNING

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

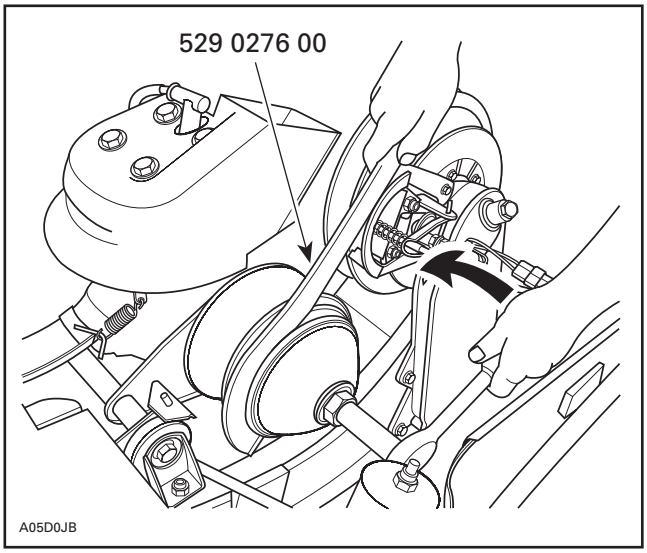
NOTE: If disassembling drive pulley, first straighten tab washer **no. 7** then untighten nut **no. 8**.

◆ WARNING

Never use an impact wrench to remove or install the drive pulley.

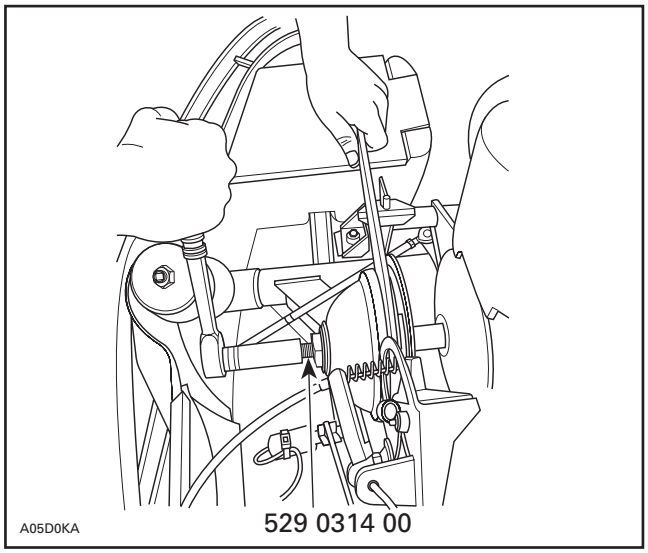
Use clutch holder (P/N 529 0276 00).

Remove retaining screw **no. 9**.



TYPICAL

Insert drive pulley puller (P/N 529 0314 00) then remove drive pulley.

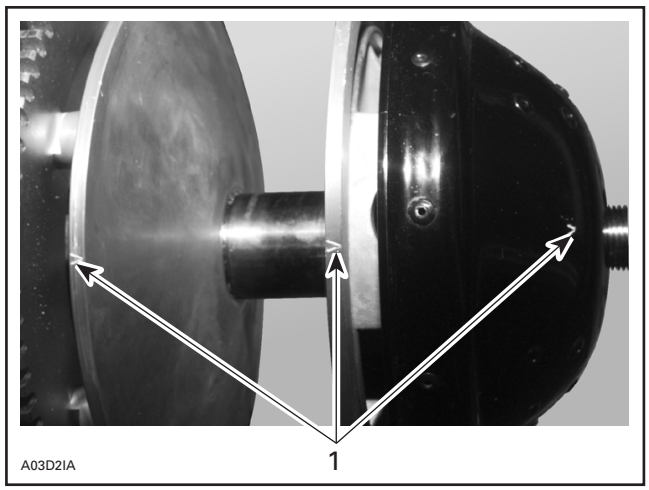


TYPICAL

DISASSEMBLY

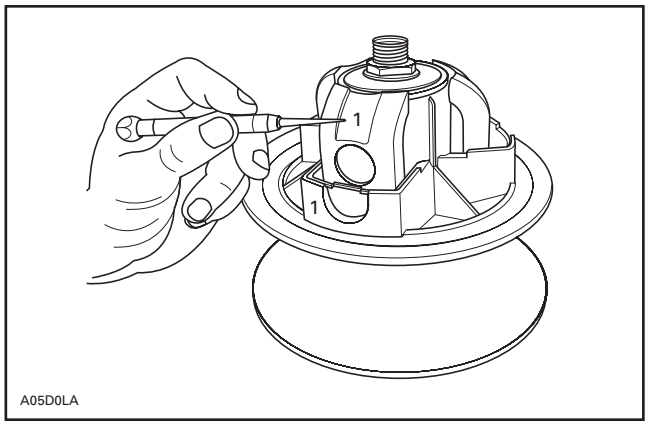
Unscrew nut. Remove tab washer.

Check for alignment marks for proper indexing at reassembly.



1. Alignment marks

Identify blocks **no. 1** and their respective positive positions for reassembly.



1. Identify

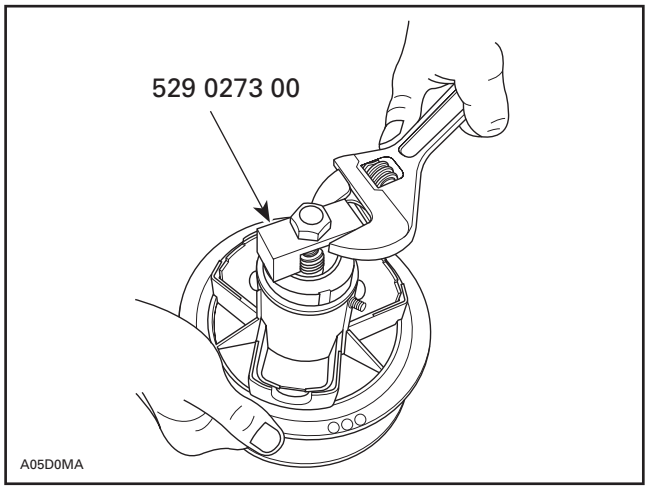
2, Cap, Washer and Disk

These are calibration parts. Refer to TECHNICAL DATA 10.

Tundra II LT

Unscrew set screw **no. 4** then use spring cover tool (P/N 529 0273 00) to unscrew spring cover **no. 5**.

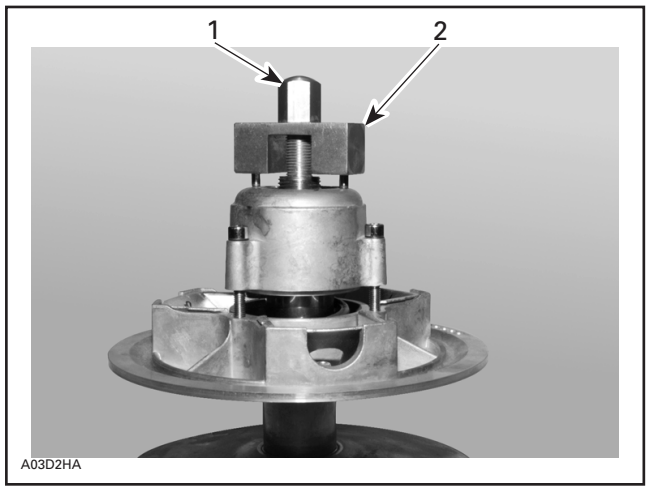
Mount tool in a vise for cover hand-unscrewing.



Remove washer **no. 10** then circlip **no. 11**.

377 Engine S-Series

Install spring cover tool (P/N 529 0273 00) with clutch puller (P/N 529 0314 00) on spring cover.



1. Puller tool
2. Spring cover tool

Screw puller (hand tight) to hold spring cover and remove screws holding spring cover.

Slowly unscrew clutch puller to release spring pressure.

Remove spring cover **no. 5**, spring and washer **no. 11**.

CLEANING

All Models

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

INSPECTION

Check sliding half for excessive lateral play and fixed half shaft for scratches. Replace as required.

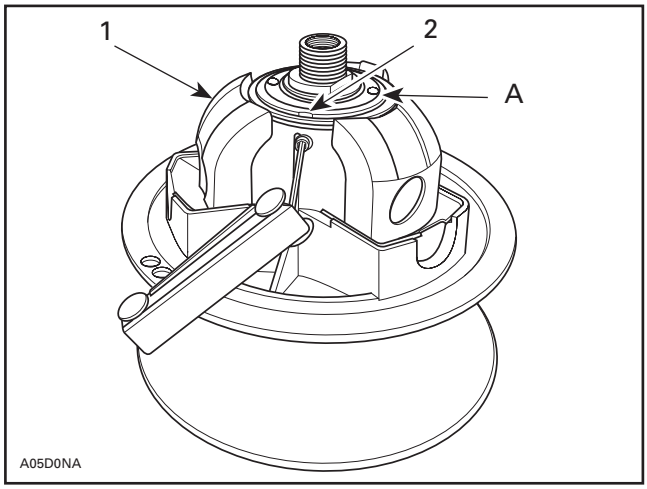
ASSEMBLY

Install circlip **no. 11** then washer **no. 10**.

Make sure to install blocks at their original position and with their curved end toward governor cup. See following illustration.

Tundra II LT

Screw spring cover to 2 to 3 mm (1/16 to 1/8 in) down below sliding half end. Apply Loctite 271 on screw threads. Install set screw aligned with spring cover slot.



1. Curved end
2. Spring cover slot
A. 2 to 3 mm (1/16 to 1/8 in)

All Models

Tighten nut no. 8 to 128 N•m (95 lbf•ft).

INSTALLATION

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).

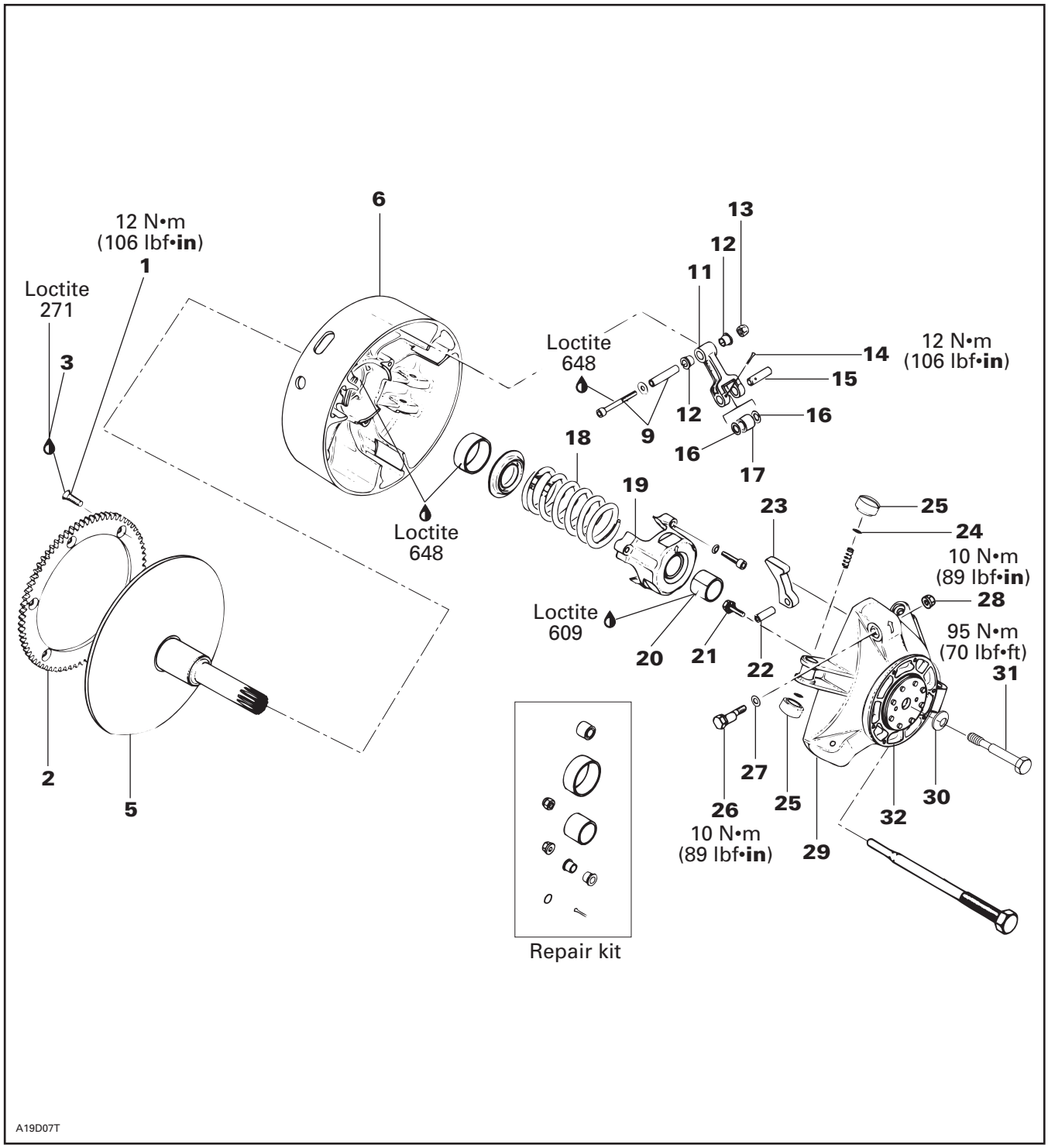
◆ WARNING

After 10 hours of operation the transmission system of the vehicle must be inspected to ensure the retaining screw is properly torqued.

TRA

All Models

NOTE: This is a lubrication free 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 0686 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.

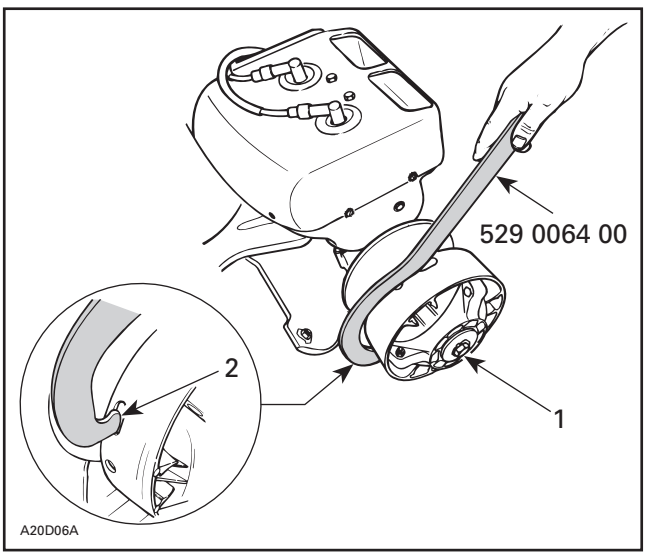
◆ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer, or other such qualified person. Subcomponent 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).

▼ 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

▼ CAUTION

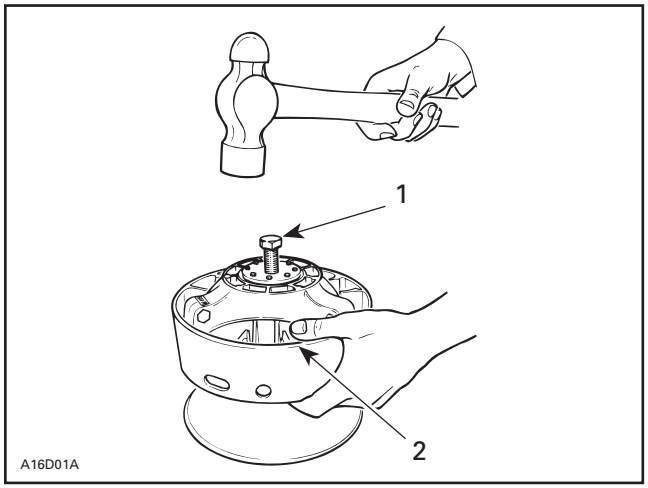
Retaining screws must be heated before disassembly.

5,6, Fixed and Sliding Half

▼ CAUTION

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

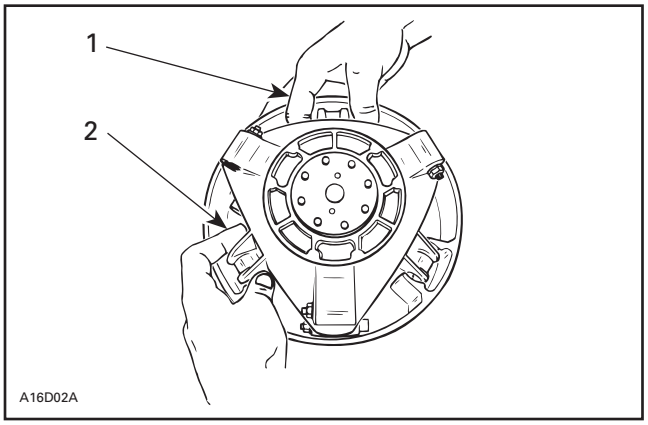
Carefully lift governor cup until slider shoes come at their highest position into guides.

Hold a slider shoe set then carefully lift its housing and remove them. Proceed the same way for other housings lifting 1 at a time.

32, Cushion Drive

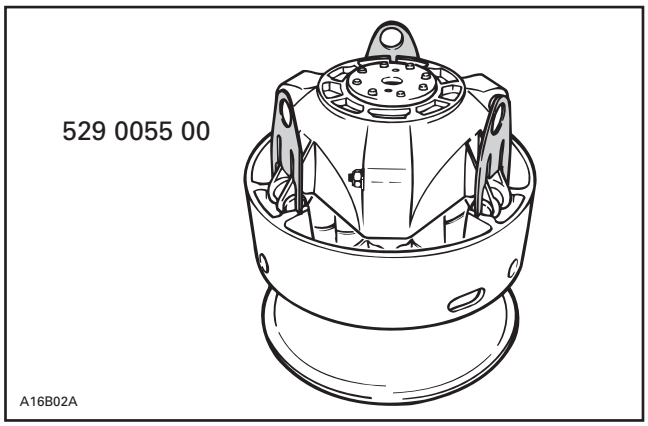
▼ CAUTION

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.



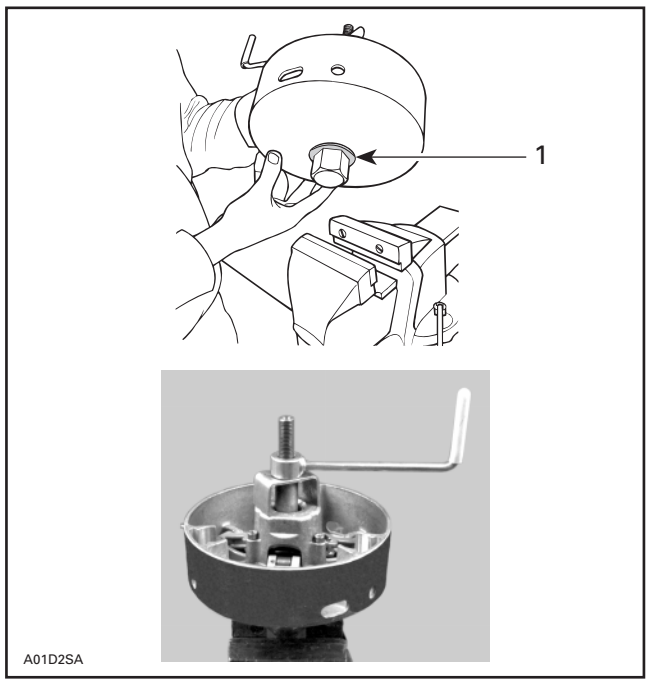
19, Spring Cover Ass'y

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 harden 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

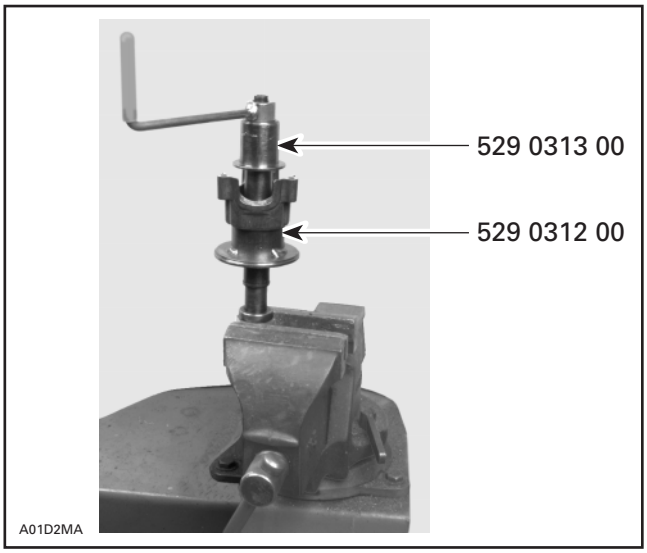
Inspect splines and free play between both parts. Maximum free-play is 0.5 mm (.020 in) measured at calibration screw radius. Replace if required.

20, Spring Cover Bushing

Visually inspect coating. Replace if worn.

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

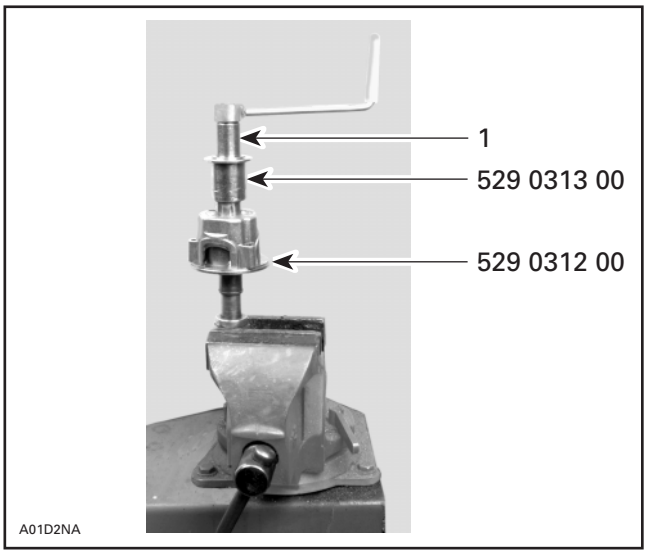
Bushing must be bonded with retaining compound.

Apply retaining compound outside of bushing then press it down to counterbore from sliding half side. Use spring compressor (P/N 529 0151 00) and appropriate flare tools.

▼ CAUTION

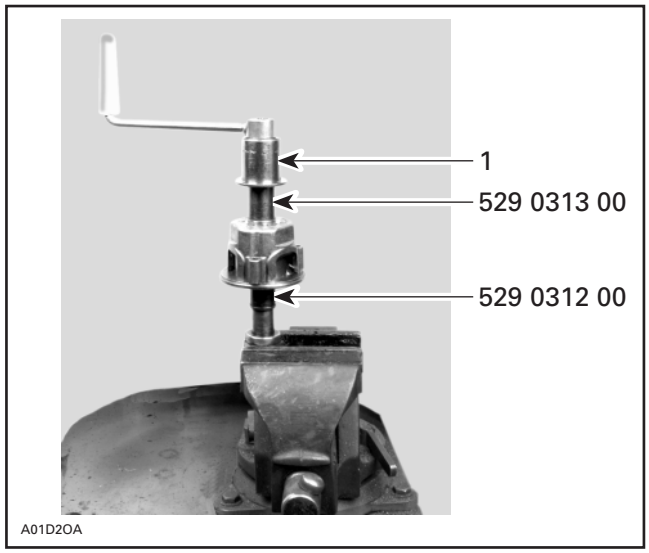
Insert bushing from sliding half side (inner) of spring cover.

Start driving bushing into spring cover.



1. Note upper tool side

Press bushing.



1. Note upper tool side

ASSEMBLY

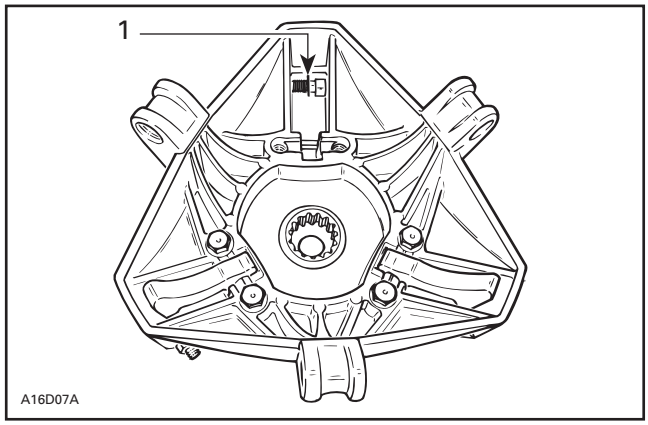
NOTE: This drive pulley is lubrication free. **Do not lubricate** any component.

1,2,3, Screw, Ring Gear and Loctite 271

Apply Loctite 271 (P/N 413 7029 00) on threads and under head then torque to 15 N•m (133 lbf•in).

26,27,28, Calibration Screw, Washer and Locking Nut

When installing calibration screw, make sure to install washer as shown.



1. Washer

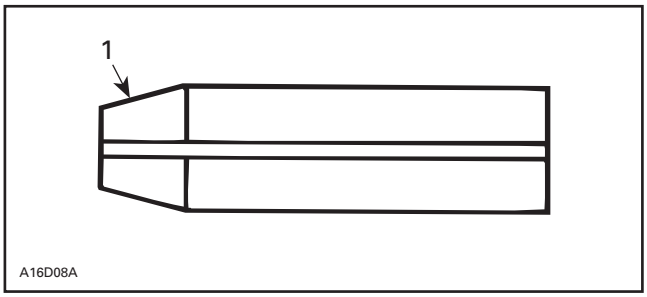
Torque locking nut to 10 N•m (89 lbf•**in**).

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 10.

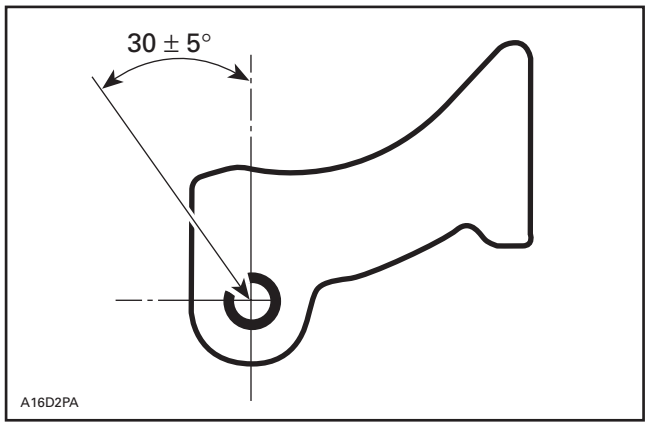
21,22,23, Ramp, Dowel Tube and Screw

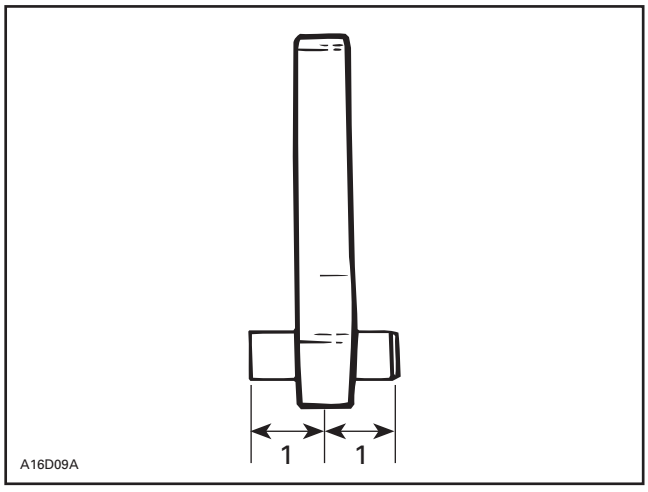
Insert dowel tube from chamfered side. Make sure ramp is centered on dowel tube.



1. Chamfered side

Position dowel tube split at the illustrated angle.





1. Equal distance

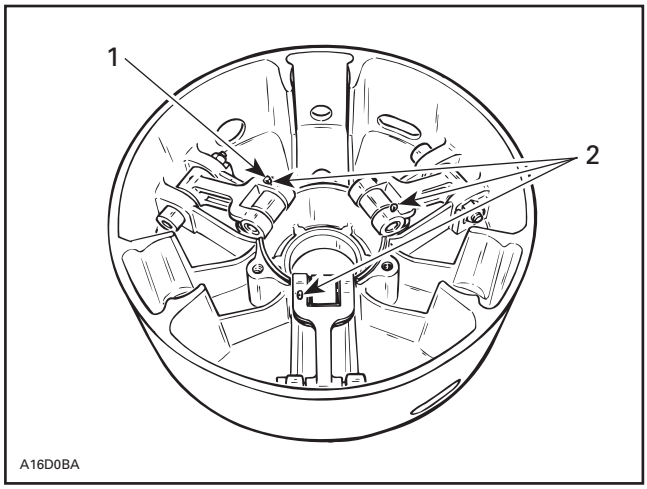
Torque screws to 10 N•m (89 lbf•**in**).

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

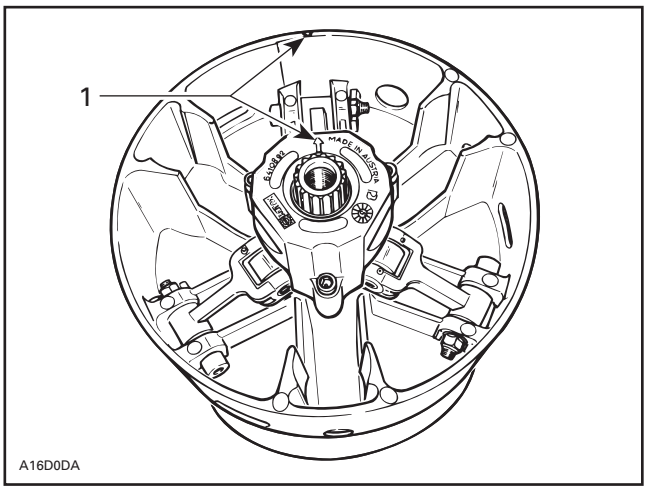
Lever ass'y and rollers must move easily after installation.

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.

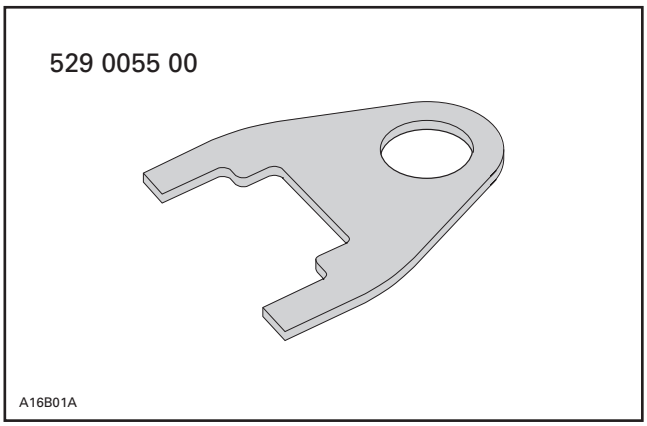


1. Align

Install and torque screws to 10 N•m (89 lbf•**in**).

6,25,29, Sliding Half, Slider Shoe and Governor Cup

To install governor cup, use following tool:

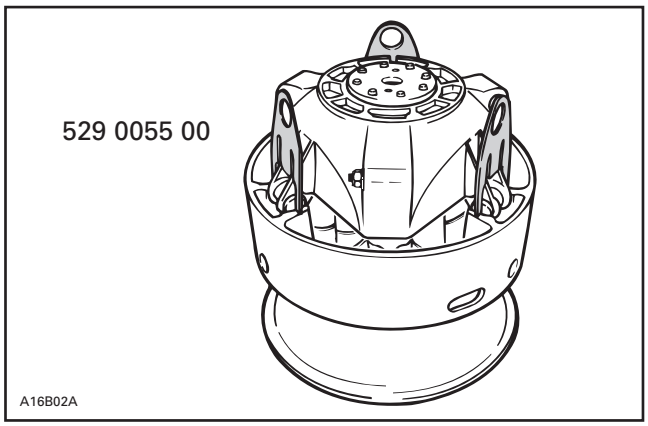


Insert spring and slider shoes into governor cup so that groove in each slider shoe is vertical to properly slide in guides.

▼ CAUTION

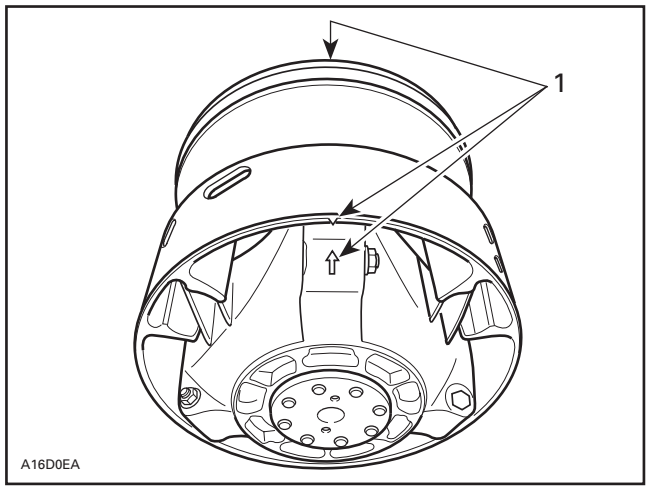
Make sure O-rings are installed on slider shoes and their grooves are positioned vertically.

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.



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.

Lock crankshaft in position as explained in removal procedure.

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.

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 10.

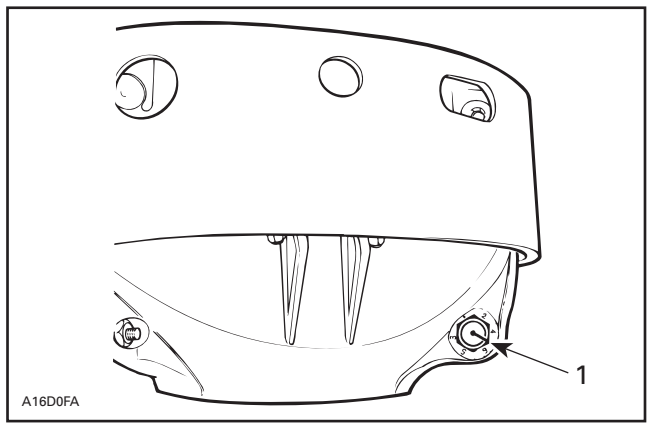
NOTE: Use precision digital tachometer for engine RPM adjustment.

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

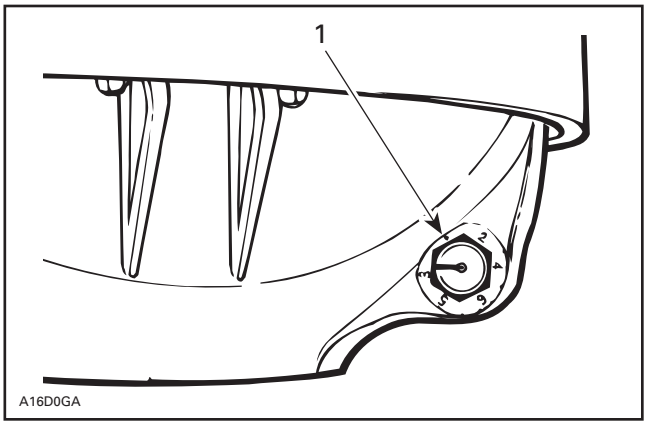
Calibration screw has a notch on top of its head.



1. Notch

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 the number is substituted by a dot (due to its location on casting).

See TECHNICAL DATA 10 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 4 and is changed to position 6. So maximum engine RPM is increased of 400 RPM.

To Adjust:

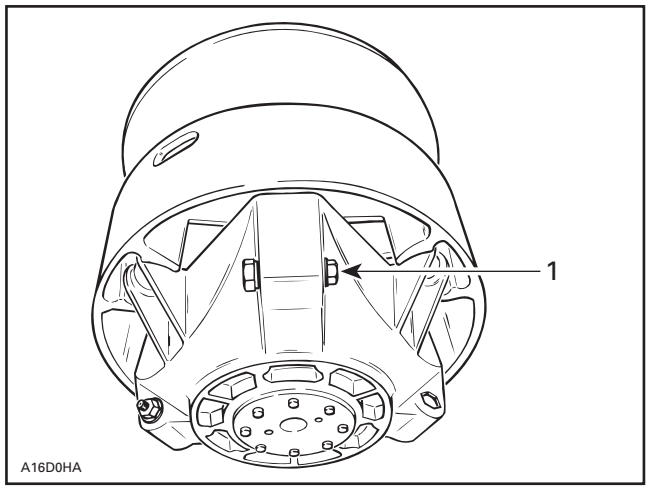
Just loosen locking nut enough to pull calibration screw **partially** out and adjust to desired position. Do not completely remove the locking nut. Torque locking nuts to 10 N•m (89 lbf•**in**).

▼ CAUTION

Do not completely remove calibration screw or its inside washer will fall off.

▼ CAUTION

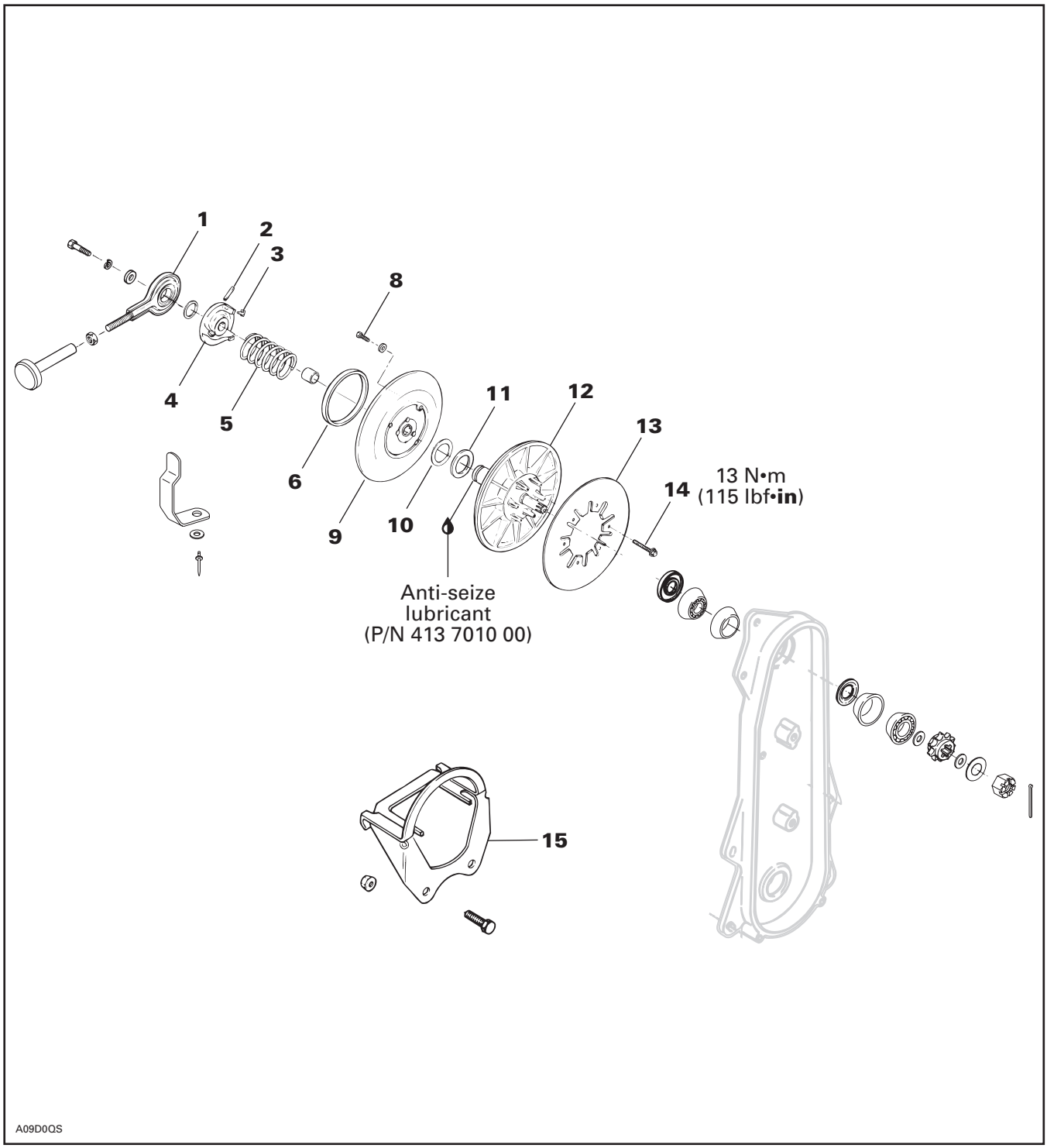
Always adjust all 3 calibration screws and make sure they are all set at the same number.



1. Loosen just enough to permit rotating of calibration screw

DRIVEN PULLEY

Tundra II LT



NOTE: Driven pulley components (support, cam, shoes, etc.) can be serviced without removing the whole driven pulley from chaincase. Refer to the following procedures but neither remove brake caliper nor open chaincase for those cases.

REMOVAL

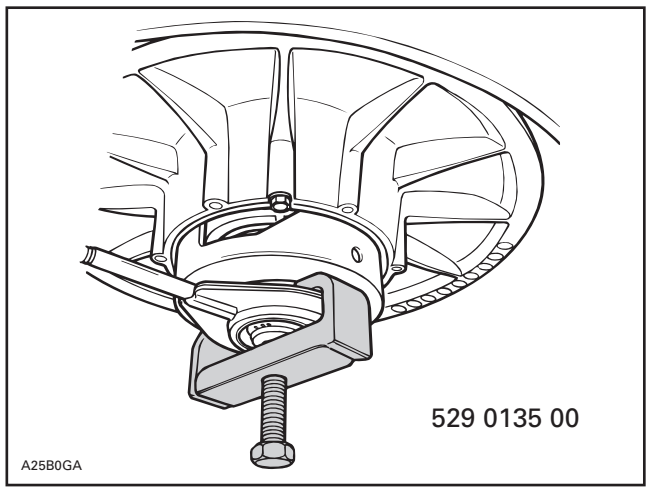
To remove driven pulley from chaincase, follow this procedure.

Remove belt guard and drive belt from vehicle.

Remove brake support **no. 13** from chaincase with brake ass'y.

Free countershaft support **no. 1** from support clamp.

To remove driven pulley support use support puller (P/N 529 0135 00).



Chaincase

Open chaincase and drain oil. Unlock and remove upper sprocket.

The following is required to have enough space to remove driven pulley from chaincase:

Slacken upper retaining screws of steering column.

Disconnect carburetor boots from intake manifold and air intake silencer.

Disconnect impulse hose from engine.

Disconnect oil injection supply line at injection pump and plug line to prevent draining.

Remove screws retaining rear engine support to chassis.

Tip engine forward just enough to allow driven pulley removal from chaincase. Block in this position.

NOTE: In some cases, chaincase retaining screws might have to be slackened to allow pivoting of chaincase. In this case, note position of alignment shims. Besides, air intake silencer and oil injection reservoir might have to be slightly moved to get enough space to pull driven pulley.

DISASSEMBLY

Chaincase and Driven Pulley

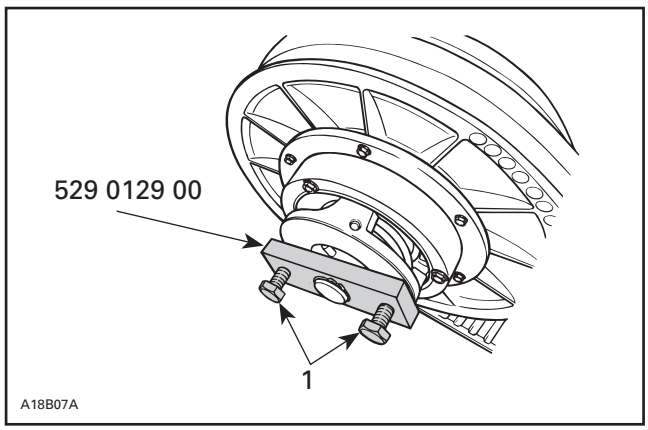
Remove bearing cone.

Knock driven pulley shaft with a plastic hammer and pull driven pulley out.

Remove support **no. 1** using a suitable puller.

Remove roll pin **no. 2** and slide outer cam **no. 4** out of pulley shaft.

Install tool (P/N 529 0129 00), reinstall washer, lock washer and screw. Tighten tool screws alternately then remove roll pin.

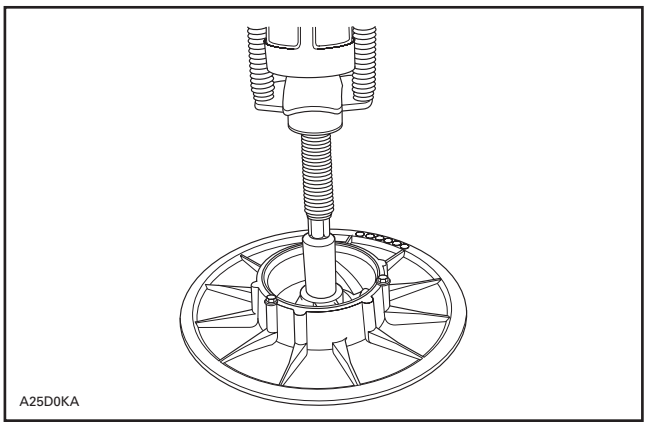


1. Tighten alternately

Note spring original setting (adjusting hole in sliding half).

6,9, Sliding Half Bushing and Bushing

To disassemble a worn bushing (small), use a press and a suitable pusher.



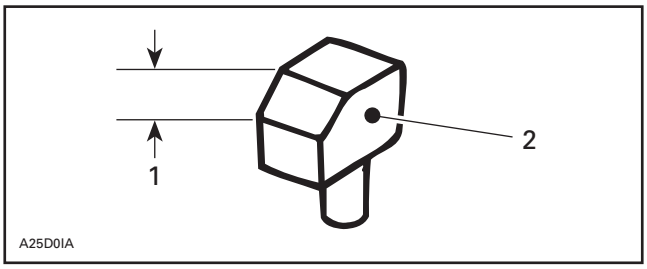
TYPICAL

Remove 3 screws and washers and pry large bushing out.

INSPECTION

3, Slider Shoe

Check cam slider shoes for wear. Replace when inside edge of cam slider shoe slope is worn to 1 mm (.039 in) or less.

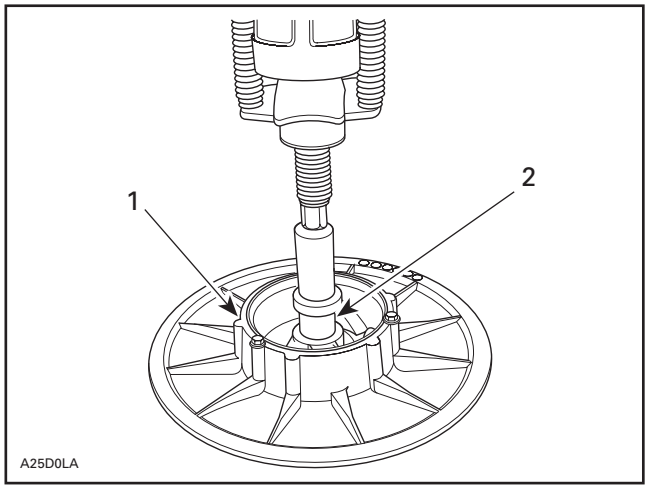


1. *Measure length of slider shoe slope*
2. *Sliding pulley side*

ASSEMBLY

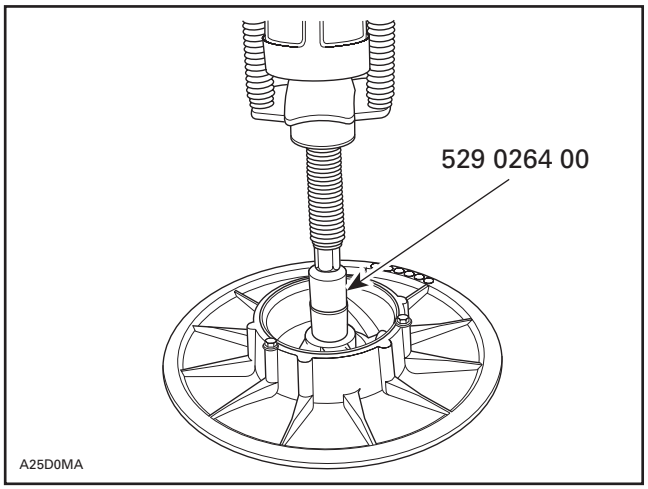
6, Sliding Half Bushing

Clean mounting surfaces with Loctite Safety Solvent. Using a press and a suitable pusher, install bushing as illustrated.



1. *Install bushing from this side of sliding half*
2. *Bushing*

After bushing installation, try fixed half shaft inside bushing. If it is too tight, use burnishing bar (P/N 529 0264 00) then retry. If it is still too tight, use burnishing bar with oil on it.



8,9, Screw and Bushing

Align notches with screw positions and press down. Torque screws to 5 N•m (44 lbf•**in**).

3, Slider Shoe

When replacing slider shoes, always install a new set (3 shoes) to maintain equal pressure on cam.

12, Fixed Half Shaft

Thoroughly clean the fixed half shaft. Remove rust with no. 320 grit sand paper.

Apply a light film of anti-seize lubricant (P/N 413 7010 00) on the shaft. Always wipe off surplus.

NOTE: Activate the sliding half several times to distribute lubricant over full length of shaft. Be careful that lubricant does not get on inner halves of pulley.

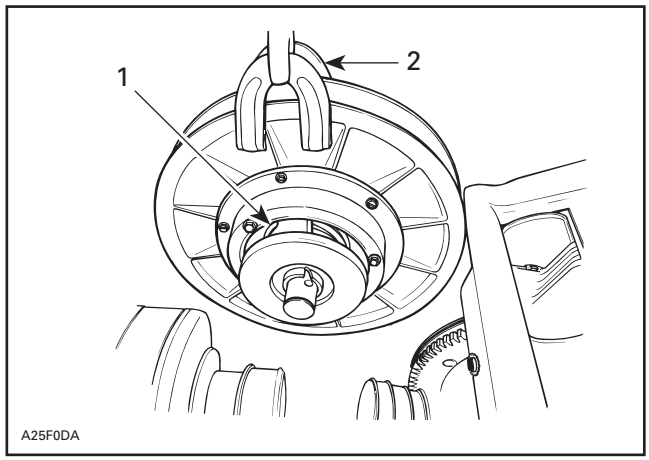
13,14, Brake Disc and Screw

Install brake disc on fixed half and torque screws to 13 N•m (115 lbf•**in**).

Assemble driven pulley components by reversing the disassembly procedure.

2,4,5, Roll Pin, Outer Cam and Spring

One of its ramps facing upwards, hold sliding half with welding clamps. Install spring into sliding half at its original setting (previously noted adjusting hole). Insert other spring end in outer cam and turn clockwise until a slider shoe corresponds with the ramp facing upwards. Push cam all the way in then install roll pin coated with anti-seize lubricant (P/N 413 7010 00).



TYPICAL

1. *A ramp facing upwards*
2. *Welding clamp*

INSTALLATION

Driven Pulley and Chaincase

Install a new upper chaincase oil seal and a new chaincase cover seal.

Reinstall the driven pulley on vehicle by reversing the removal procedure.

NOTE: If chaincase screws have been slackened, chaincase can be reinstalled to its initial position by securing driven pulley support before tightening chaincase retaining screws. Make sure to install alignment shims as noted at removal.

▼ CAUTION

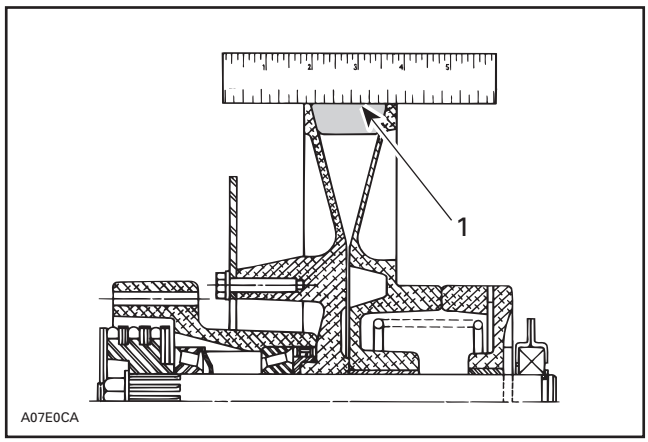
Bleed oil injection pump on models that have had their injection oil supply line removed. Refer to INJECTION OIL SYSTEM 04-06.

ADJUSTMENT

10,11, Shim

NOTE: The following adjustment must be performed with a new drive belt.

For best performance, particularly at starting, top of drive belt should be flush with top of driven pulley halves.



TYPICAL

1. *Belt flush with the top of the pulley halves*

Shim(s) **no. 10** and **no. 11** provide belt height adjustment between pulley halves. Adding shims will lower the belt in driven pulley, while removing shims will raise the belt. Adjust properly.

5, Spring

General

It is usual to experience spring setting during breaking period of a new spring. The factory spring preload is slightly higher (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA 10 are applicable after break-in period (about 10 hours of use).

Spring Torsional Pre-Load

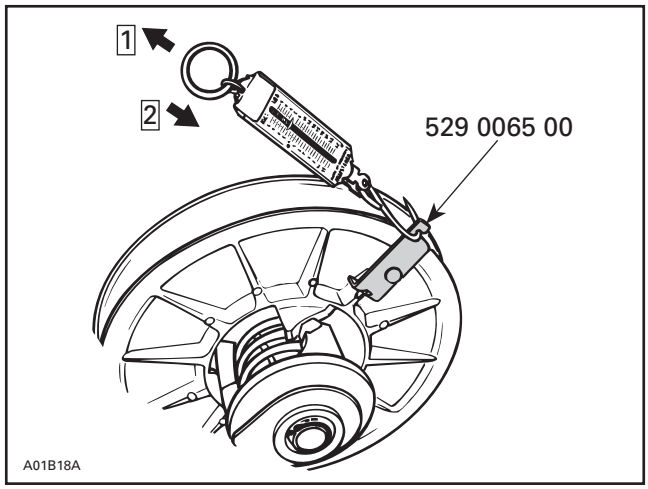
To check spring pre-load adjustment, use spring scale hook (P/N 529 0065 00) and a spring scale.

Install the hook on the sliding half, making sure the spring scale is perpendicular to the pulley axle.

Take a measurement when opening driven pulley and another one when driven pulley begins to close after a rotation of 10 mm (3/8 in). Spring pre-load is the average measurement between these 2.

$$\frac{1^{st}\text{ measurement (when opening)} + 2^{nd}\text{ measurement (when closing)}}{2} = \text{Spring pre-load}$$

Example: $\frac{3.8\text{ kg (8.4 lb) (when opening)} + 3.4\text{ kg (7.9 lb) (when closing)}}{2} = 3.6\text{ kg (8 lb) Actual spring pre-load}$

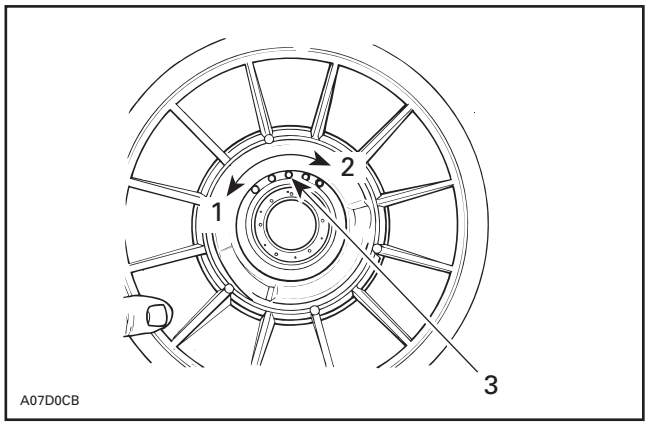


TYPICAL

Step 1 : 1st measurement
Step 2 : 2nd measurement

Spring pre-load should be as TECHNICAL DATA section 10.

To adjust spring pre-load relocate spring end in sliding pulley, moving it clockwise to decrease the pre-load and counterclockwise to increase it.



1. Decrease
2. Adjusting holes
3. Increase

NOTE: Always recheck torsional pre-load after adjusting.

Chaincase

Check oil level and refill as required. Refer to CHAINCASE 05-07.

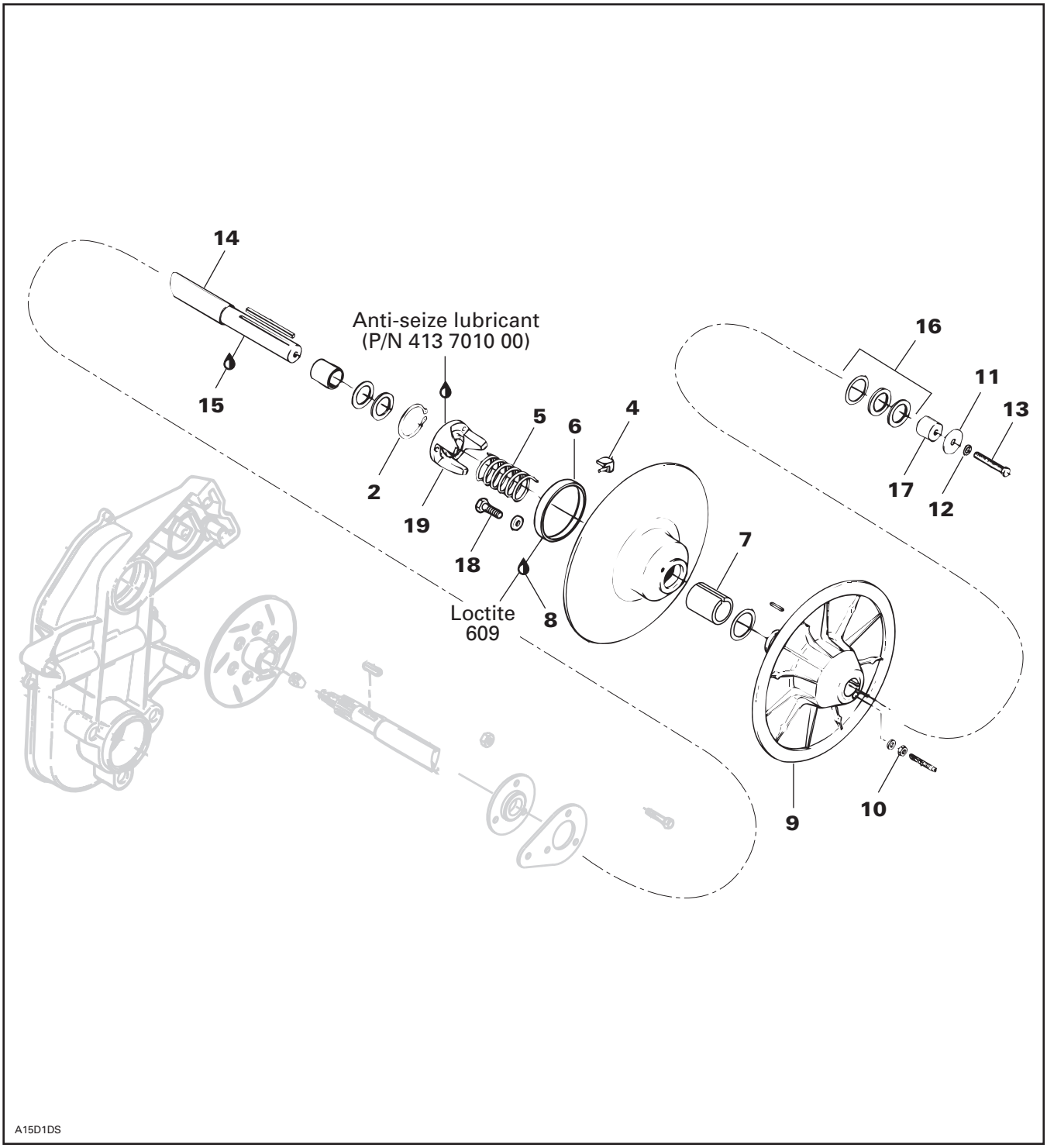
Pulley Alignment and Drive Belt Deflection

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 and DRIVE BELT 05-02 to perform adjustments.

▼ CAUTION

Drive belt and pulley adjustments must always be checked whenever pulleys have been removed, replaced or disassembled.

S-Series


14
15
Anti-seize lubricant
(P/N 413 7010 00)
2
19
5
6
4
18
Loctite
609
8
7
9
10
16
11
13
17
12
A15D1DS

REMOVAL

Remove belt guard and drive belt from vehicle.

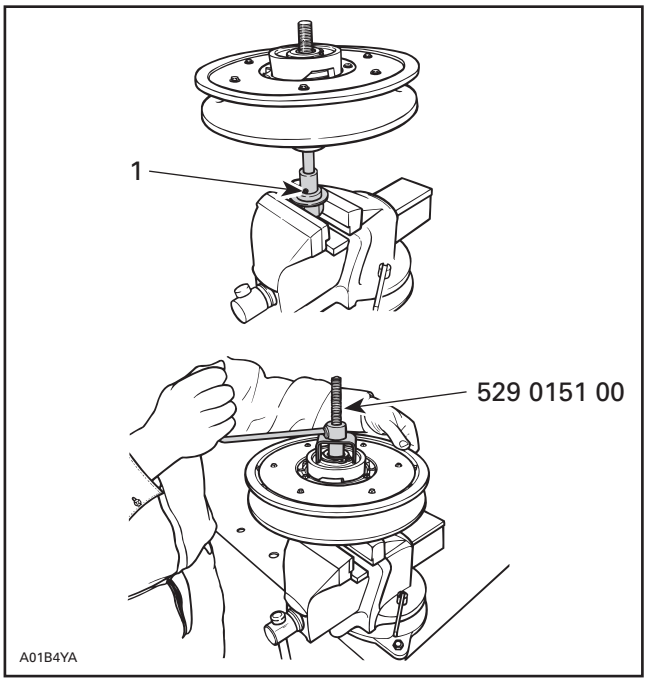
Remove the cap screw **no. 13**, lock washer **no. 12**, washer **no. 11**, extension **no. 17** and shims **no. 16** then pull the driven pulley from the countershaft.

14, Countershaft

Should countershaft **no. 14** removal be required, refer to BRAKE 05-06 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** 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.

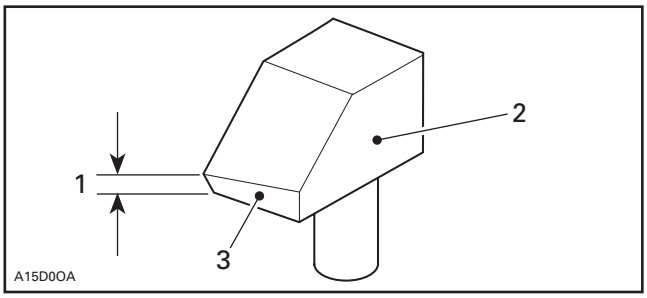
Using a dial bore gauge measure bushing diameter. Measuring point must be at least 5 mm (1/4 in) from bushing edge.

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

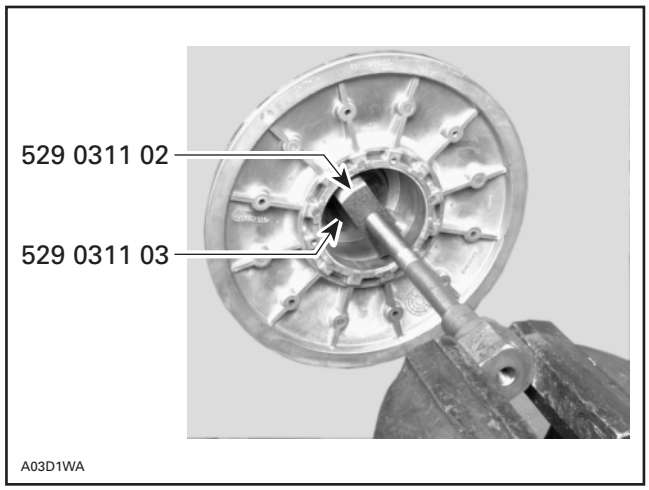
Large Bushing

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.

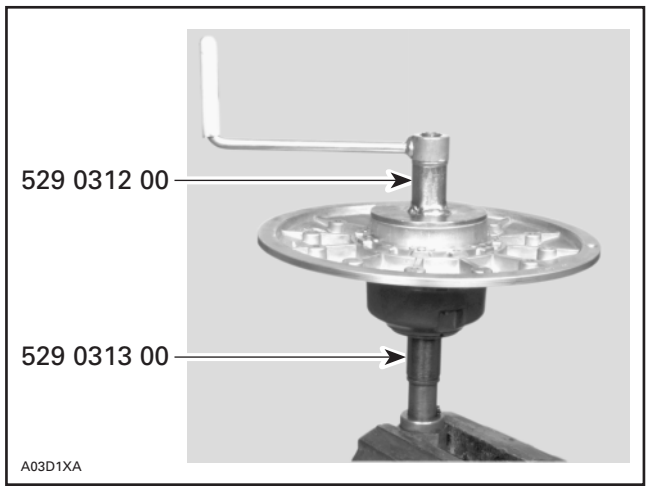


Mount puller screw head in a vise.

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.



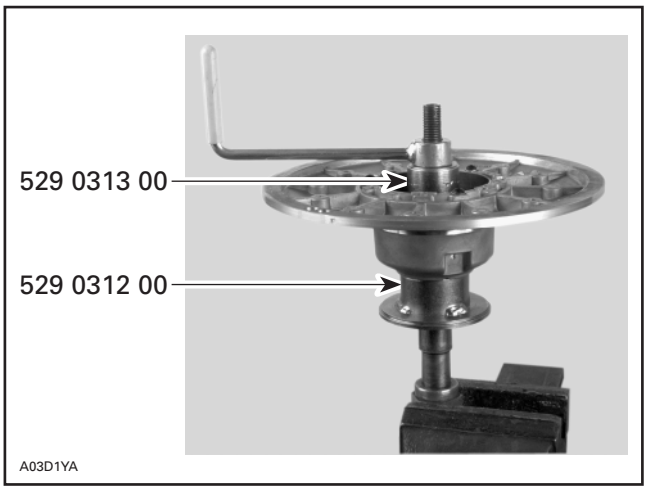
Small Bushing

NOTE: Following procedure can be done with a press using the same tools.

Install puller in a vise.

Heat bushing area.

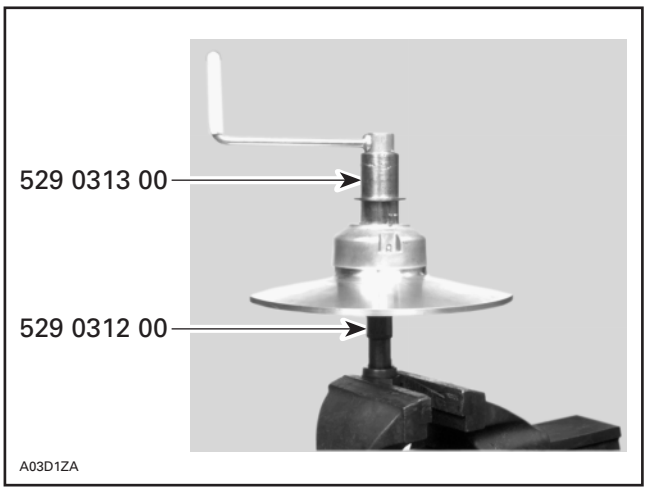
Turn puller handle and sliding half at once to extract the bushing.



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

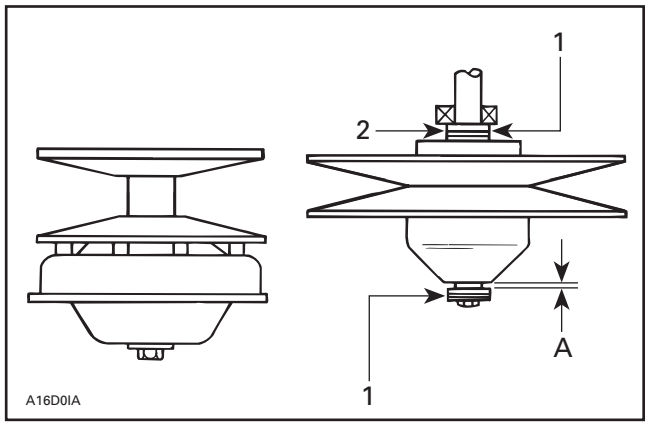
▼ CAUTION

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

Should installation procedure be required, refer to BRAKE 05-06 then look for **Brake Disc** and **Countershaft Bearing Adjustment**.

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

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).

ADJUSTMENT

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05 to adjust pulley distance. Adjust drive belt height between pulley halves 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 (about 1 kg (2 lb)) to compensate for spring setting. Specifications in TECHNICAL DATA 10 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.

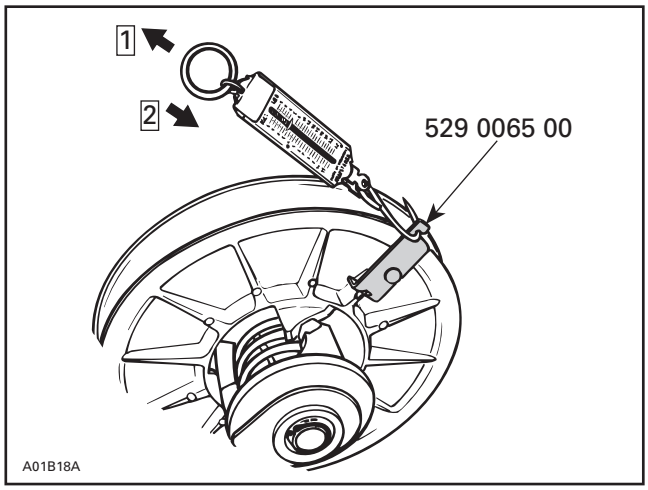
Remove drive belt.

Install the hook on the sliding half. Preventing fixed half from turning, pull sliding half with the spring scale perpendicularly with pulley axle.

Take 1st 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 2nd measurement when sliding half begins to return. Spring pre-load is the average measurement between these 2.

$$\frac{\text{1st measurement (when opening)} + \text{2nd measurement (when closing)}}{2} = \text{Spring pre-load}$$

$$\text{Example: } \frac{\text{3.8 kg (8.4 lb) (when opening)} + \text{3.4 kg (7.5 lb) (when closing)}}{2} = \text{3.6 kg (8 lb) Actual spring pre-load}$$

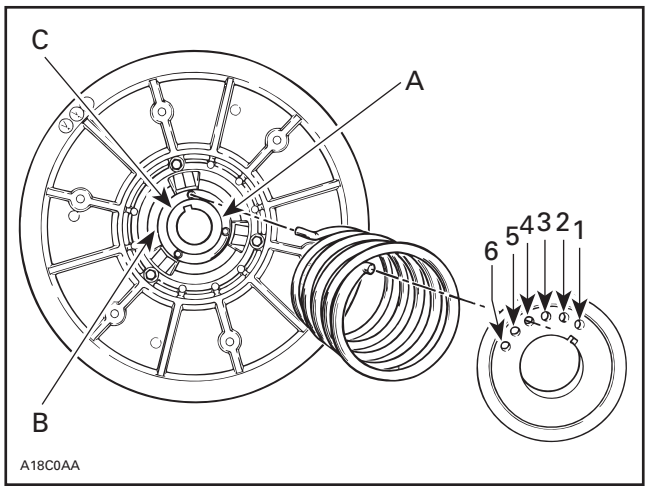


TYPICAL

Step 1 : 1st measurement
Step 2 : 2nd 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 10.

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 05-05 and DRIVE BELT 05-02 to perform adjustments.

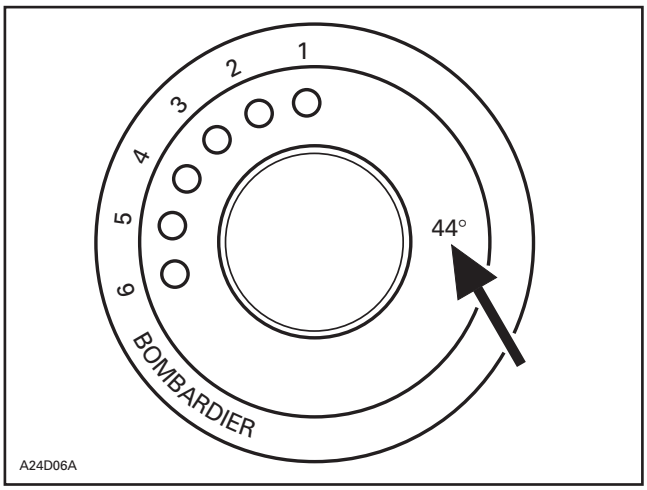
▼ CAUTION

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 10.

Cam angle is identified on cam.



NOTE: For high altitude regions, the *High Altitude Technical Data Booklet* (P/N 484 0686 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.

◆ 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

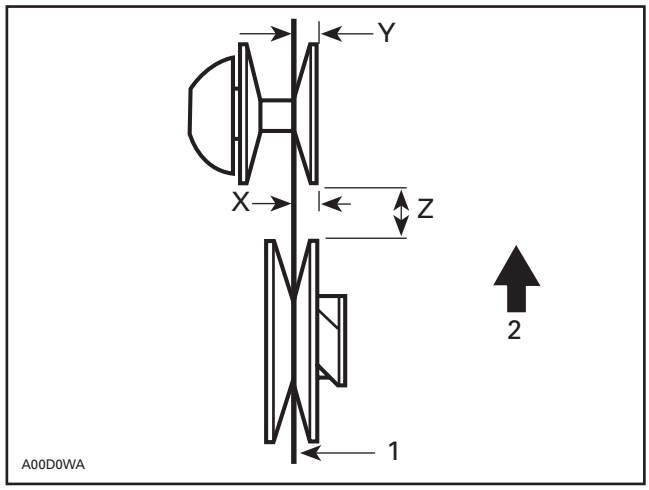
Remove belt guard and drive belt.

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

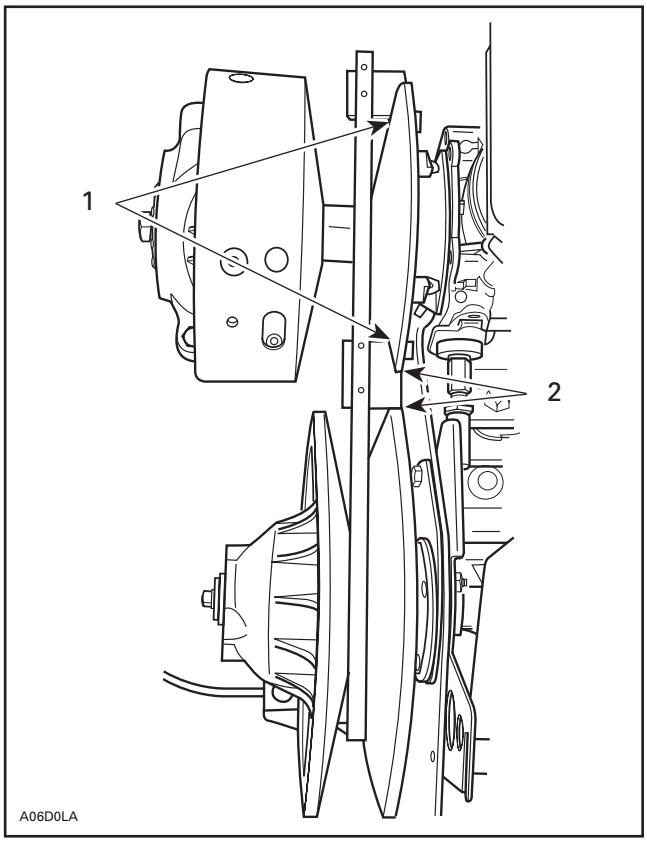
The distance Y **must** exceed distance X to compensate for the twist due to the engine torque.

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.

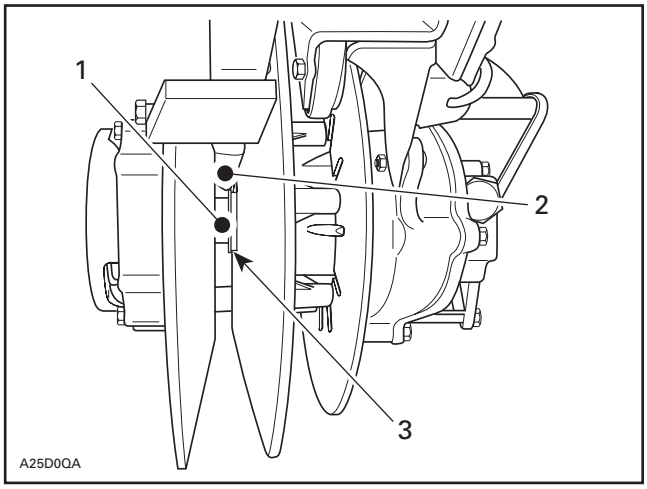


TYPICAL

1. *Contact (alignment)*
2. *Contact (distance)*

Tundra II LT Only

Bottom of alignment template must not seat on shaft nor fixed half shoulder and shim(s).



TYPICAL

1. *Shaft*
2. *Alignment template*
3. *Fixed half shoulder and shim(s)*

Drive Belt Deflection

NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT 05-02 to adjust drive belt deflection.

▼ CAUTION

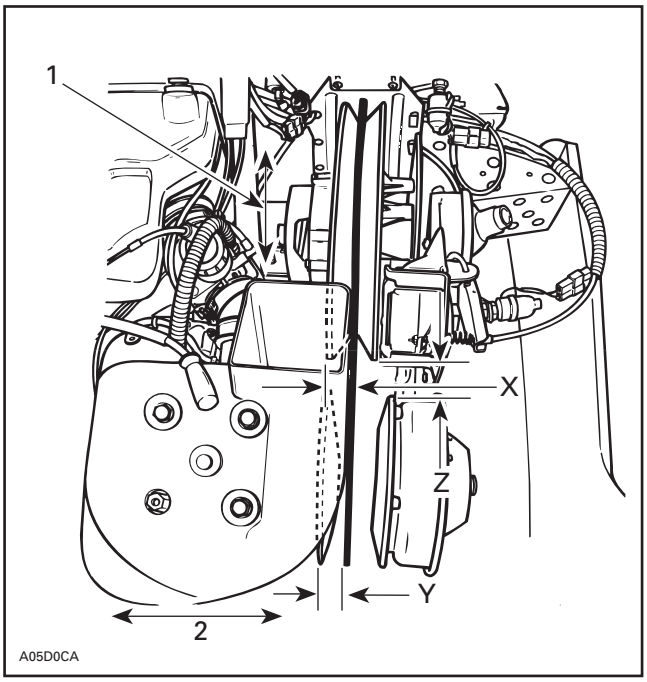
This section deals mainly with adjustment procedures. For complete assembly requirements, refer to the proper ENGINE or TRANSMISSION installation section.

PULLEY ALIGNMENT AND DISTANCE SPECIFICATIONS CHART

MODEL	PULLEY DISTANCE	OFFSET		ALIGNMENT TEMPLATE ①
	Z	X	Y-X	
	+ 0, – 1 mm (+ 0, – .040 in)	± 0.50 mm (.020 in)		P/N
Tundra II LT	37.0 (1.460)	36.0 (1.420)	0 to 1.5 mm (0 to .060 in)	529 0269 00
Bombardier Lite Equipped S-Series	25.0 (.984)	33.4 (1.315)	0.5 to 1.5 mm (.020 to .060 in)	529 0300 00
TRA Equipped S-Series	16.5 (.650)	35.0 (1.380)	1.0 to 2.0 mm (.040 to .080 in)	529 0267 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.

Tundra II LT



1. Driven pulley movement
2. Engine movement

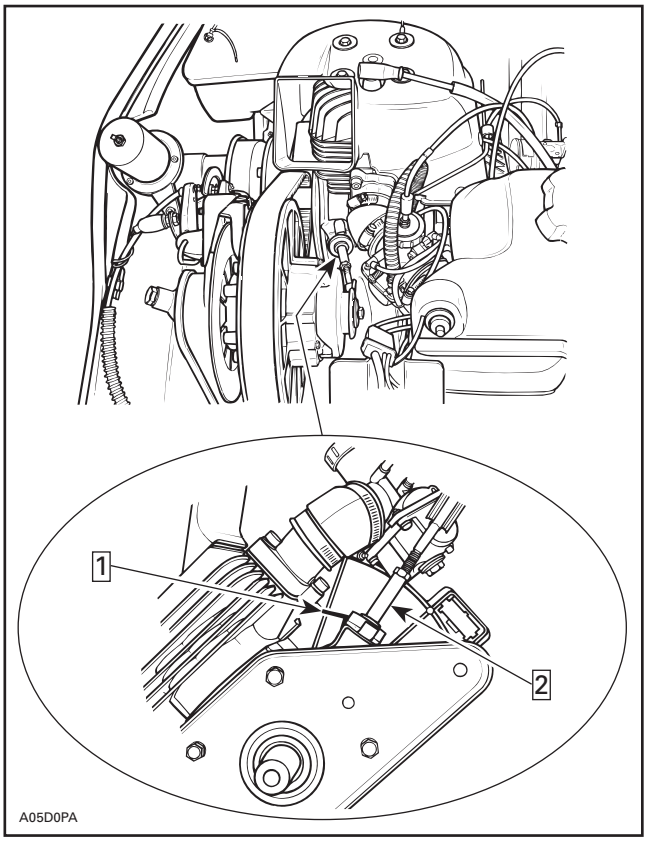
▼ CAUTION

The rear suspension must be mounted on the vehicle and track tension and alignment must be done to provide the right frame width.

Pulley Distance Adjustment Method

Slacken the 4 chaincase retaining bolts, unlock and raise pulley support.

Move chaincase to obtain specific adjustment and adjust driven pulley support length accordingly (light contact).

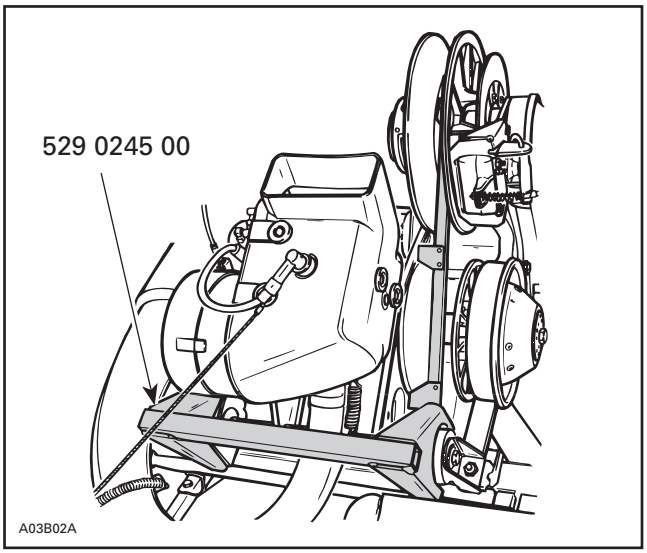


Step 1 : Push and hold
Step 2 : Raise support

Pulley Alignment Method

Engine Movement

Loosen the support retaining bolts and install engine support positioner (P/N 529 0245 00) to keep from altering distance between both supports.



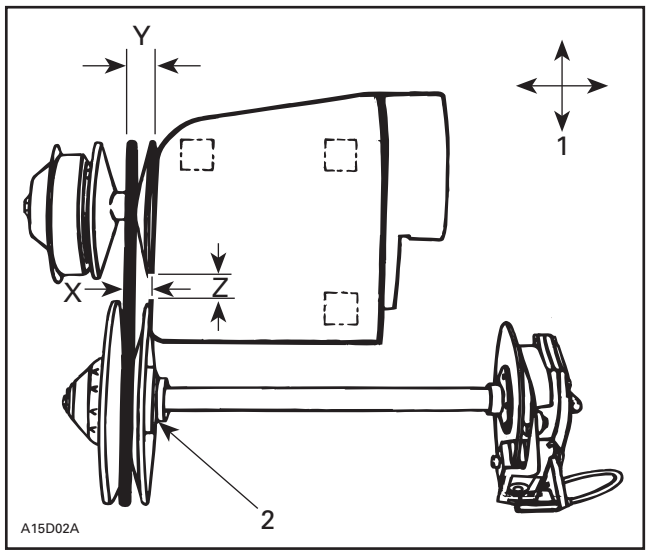
TYPICAL

Move the engine to obtain specified pulley alignment, torque engine support bolts to 55 N•m (41 lbf•ft) and remove engine support positioner.

Driven Pulley Movement

Shims can be mounted between chaincase and frame. Use shim (P/N 504 0398 00), 0.53 mm (.021 in) thick.

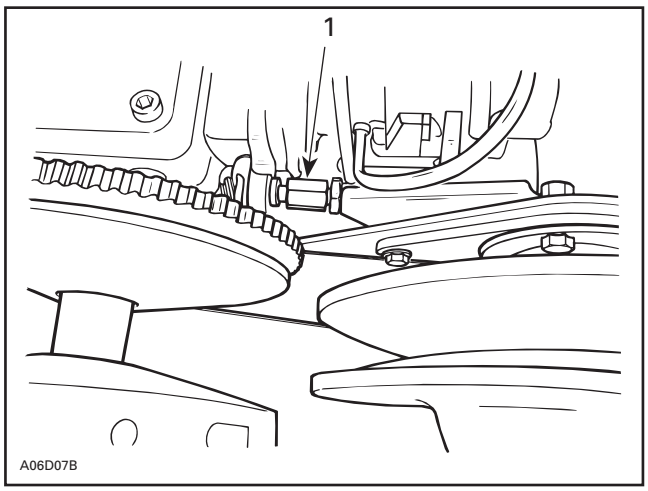
S-Series



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

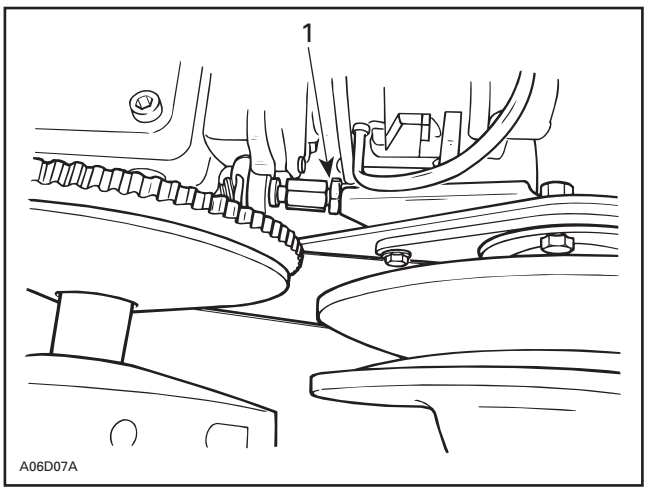
Driven Pulley Movement

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 countershaft 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.

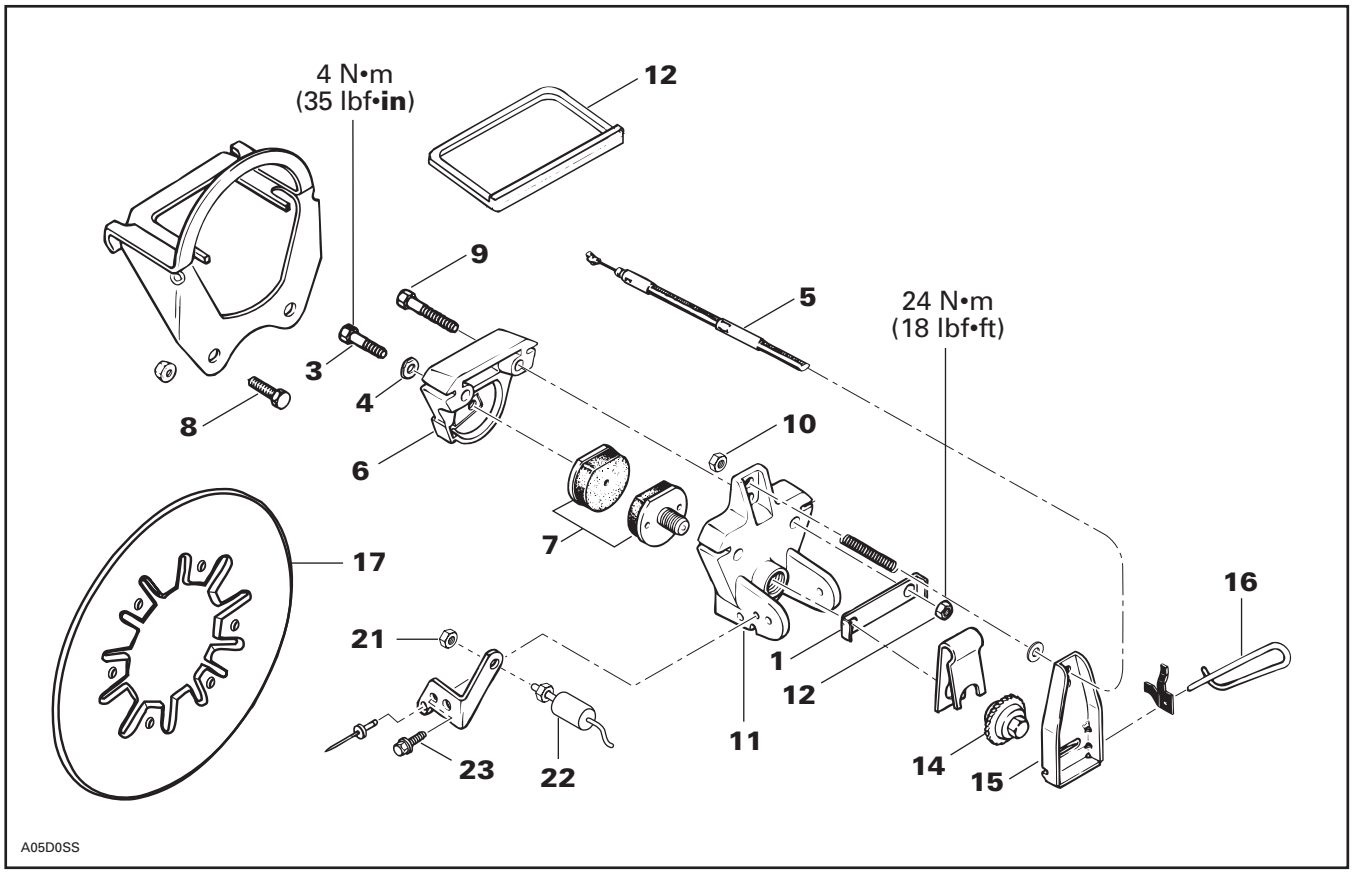


1. Retighten

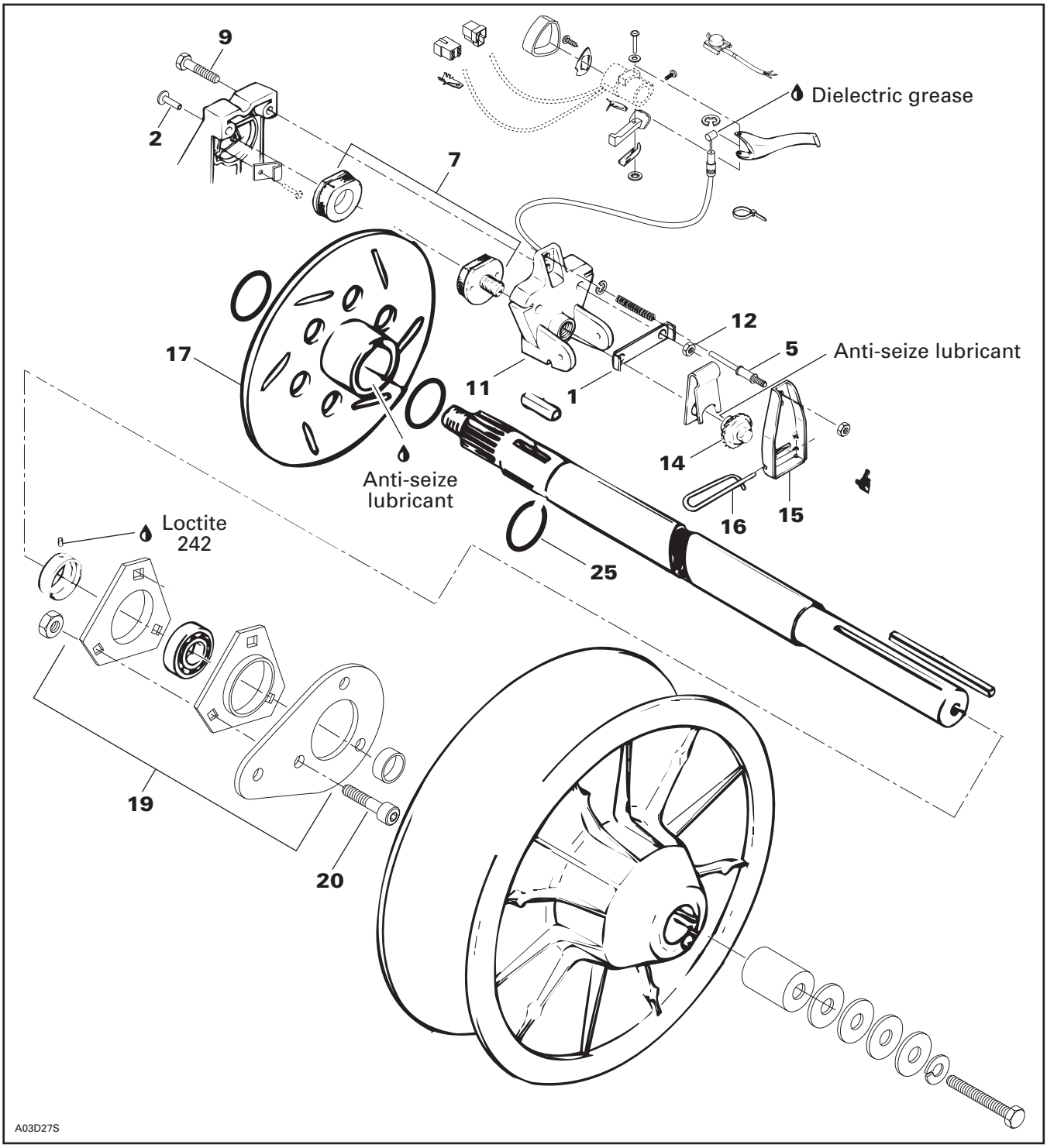
BRAKE

MECHANICAL BRAKE

Tundra II LT

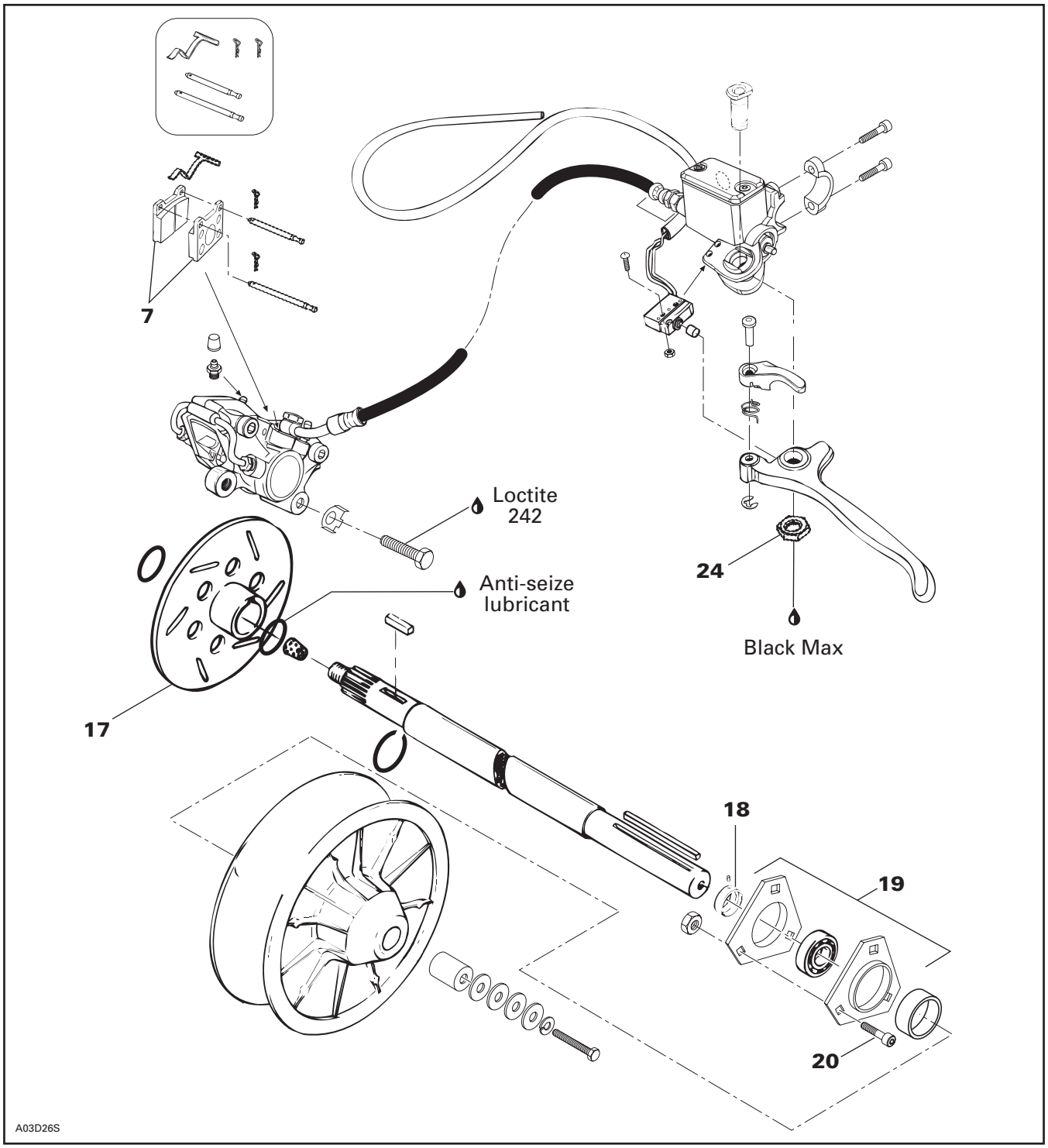


Formula S/S Elec., Touring E and Skandic 380/500



HYDRAULIC BRAKE

Touring LE and Formula SL



REMOVAL

Tundra II LT

The split caliper type brake should be removed from chaincase as an assembly. Proceed as follows:

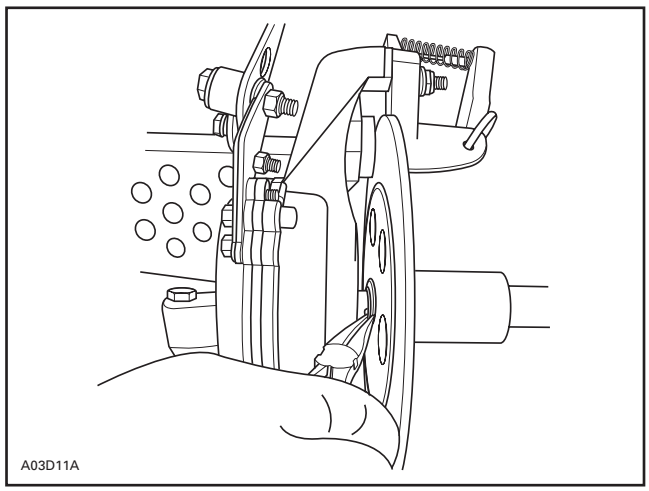
– Remove belt guard.
– Disconnect brake cable.
– Remove bolts **no. 8** securing brake support to chaincase.
– Slide brake caliper ass'y out of brake support.
– To remove brake disc, refer to DRIVEN PULLEY 05-04.

Brake Disc Removal

S-Series with Mechanical Brake

Brake disc can be withdraw without removing caliper. Proceed as follows:

– Remove belt guard, belt and driven pulley.
– Remove air silencer.
– Unbolt bearing support from chassis.
– Open chaincase and remove upper sprocket.
– Pull countershaft toward driven pulley side to gain access to clip **no. 25**.
– Remove clip **no. 25** on countershaft.

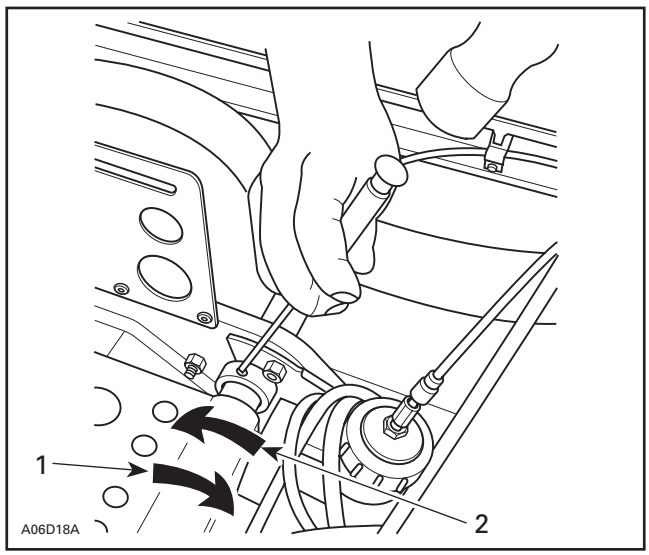


– Pull countershaft toward driven pulley side tofree from chaincase and disc.
– Remove disc.

Countershaft Removal

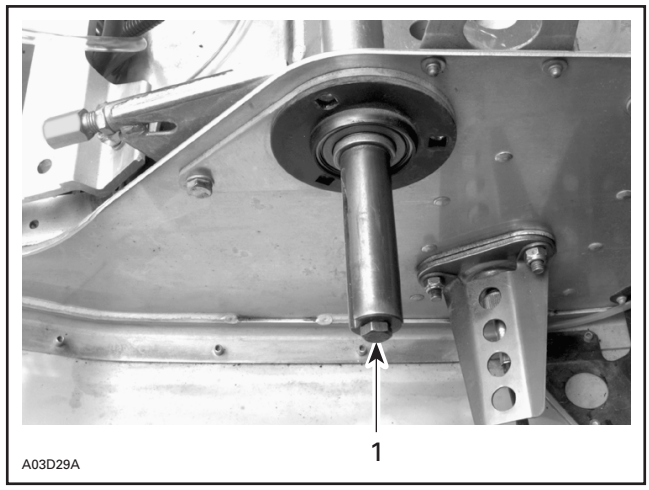
S-Series with Mechanical Brake

Proceed the same as for brake disc removal but unlock bearing collar on driven pulley side.



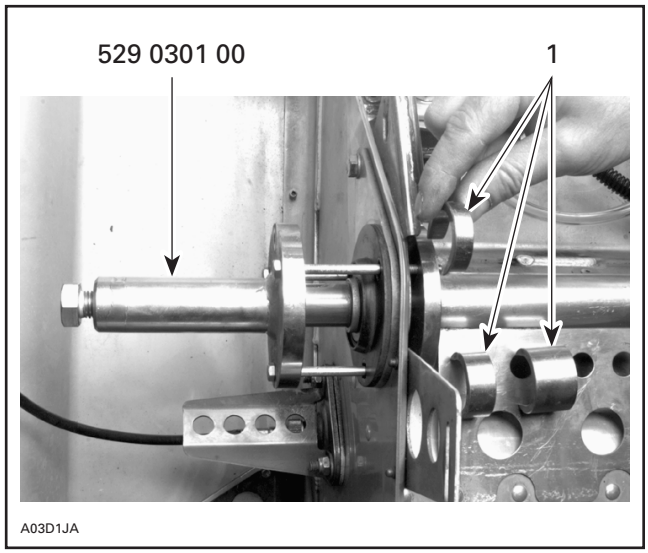
1. Lock
2. Unlock

Unbolt bearing support then install screw on countershaft.



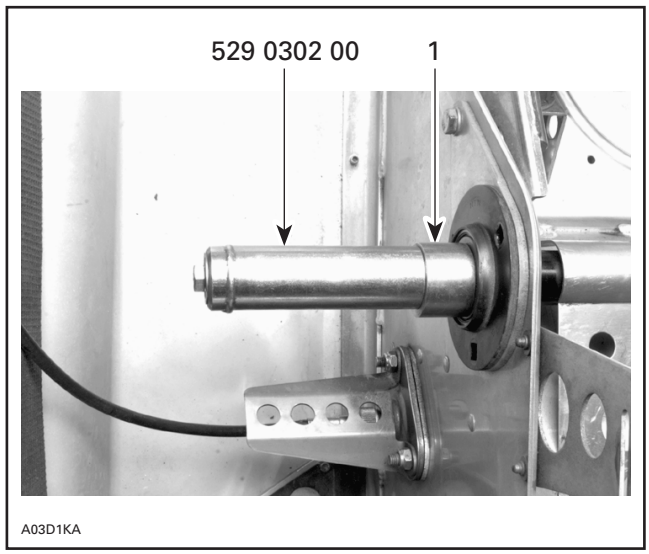
1. Screw

Push 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

Countershaft and Brake Disc Removal

S-Series with Hydraulic Brake

– Remove muffler.
– Refer to CHAINCASE 05-07 in order to remove chaincase cover.
– Remove upper sprocket castellated nut.
– Remove belt guard, drive belt and driven pulley referring to DRIVEN PULLEY 05-04.
– Loosen set screw and unlock collar **no. 18** if bearing is needed to be disassembled. See above S-Series illustration and procedure.
– Remove 3 retaining screws **no. 20** from countershaft bearing housing.
– Unbolt oil reservoir support to make room for countershaft or brake disc removal.
– Pull countershaft toward driven pulley side to gain access to clip **no. 25**.
– Remove clip **no. 25** on countershaft.
– Pull countershaft toward driven pulley side to free from chaincase. Withdraw countershaft toward chaincase.
– Remove connecting pipe between tuned pipe and after muffler.
– Disconnect brake line from caliper and plug it.
– Unbolt caliper from chaincase.
– Remove brake disc from countershaft.

DISASSEMBLY

7,15,16,23, Brake Pad, Brake Lever, Pin and Screw

All Models with Mechanical Brake

Pull pin out off caliper and remove lever.

On Tundra II LT, remove self-tapping screw. Unscrew ratchet wheel in order to remove moving pad.

Remove fixed pad.

S-Series with Mechanical Brake

Fixed pad is riveted to chaincase on these models. Caliper must be split to remove moving pad. To removed fixed pad, drill out its rivet then pry disc in order to free fixed pad.

All Models with Hydraulic Brake

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 sol-vent. Soiled brake pads must be replaced by new ones.

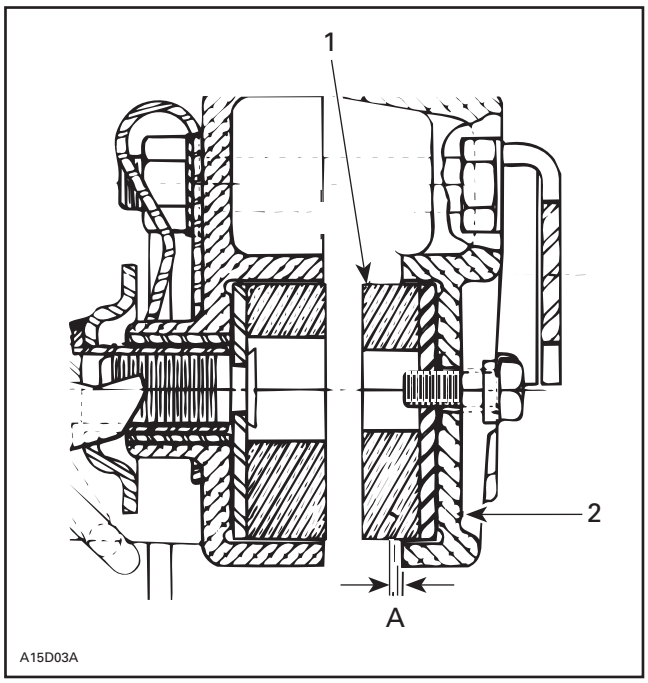
INSPECTION

7, Brake Pad

Brake pads must be replaced when **fixed** pad projects only 1 mm (1/32 in) from caliper.

▼ CAUTION

Brake pads must always be replaced in pairs.



TYPICAL

1. *Fixed pad*
2. *Inner caliper*

A. 1 mm (1/32 in) minimum

Brake Disc

Check for scoring, cracking or heat discoloration, replace as required. Refer to DRIVEN PULLEY 05-04 for replacement procedures on Tundra II LT.

▼ CAUTION

Brake disc should never be machined.

ASSEMBLY

14, Ratchet Wheel

Apply synthetic grease (P/N 413 7115 00) on threads and spring seat prior to installing. Fully tighten then back off one turn.

16, Pin

Install so that it can only be removed upward. Lock it in the caliper casting notch.

7, Fixed Brake Pad

Tundra II LT

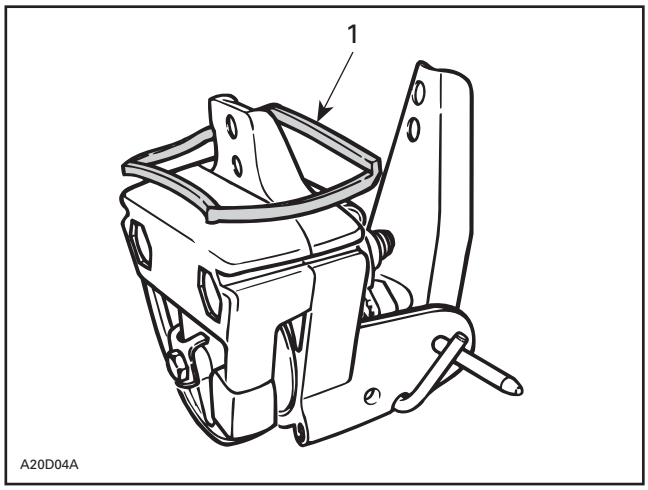
Torque screw **no. 3** to 4 N•m (35 lbf•**in**). Bend locking tab **no. 4** over a flat of screw head.

1,6,11,12, Locking Tab, Inner, Outer Caliper and Nut

Tundra II LT

Assemble both caliper halves. Insert bolts **no. 9**, locking tab **no. 20**, then nuts. Torque nuts to 24 N•m (18 lbf•ft). Caliper half side slots must align to allow proper sliding in brake support. Bend locking tab over a flat of each nut.

Install rubber slider **no. 12** lubricated with shortening (cooking fat) into side slots of caliper. It must be installed so that the raised edge is upward and on the same side of nuts as shown.



1. Raised edge upward and same side of nuts

▼ CAUTION

Positioning of rubber slider is important to avoid the possibility of damage against locking tab edges.

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.

17, Brake Disc

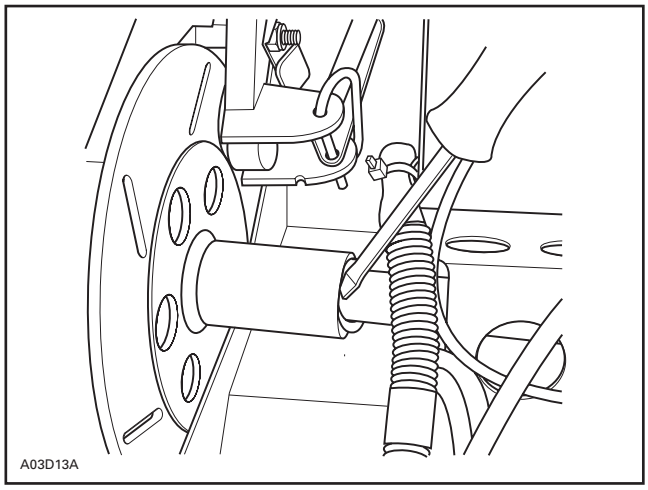
S-Series

The brake disc must be floating on countershaft for efficient operation of brake.

Apply anti-seize lubricant (P/N 413 7010 00) on shaft and check that disc slides freely.

The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

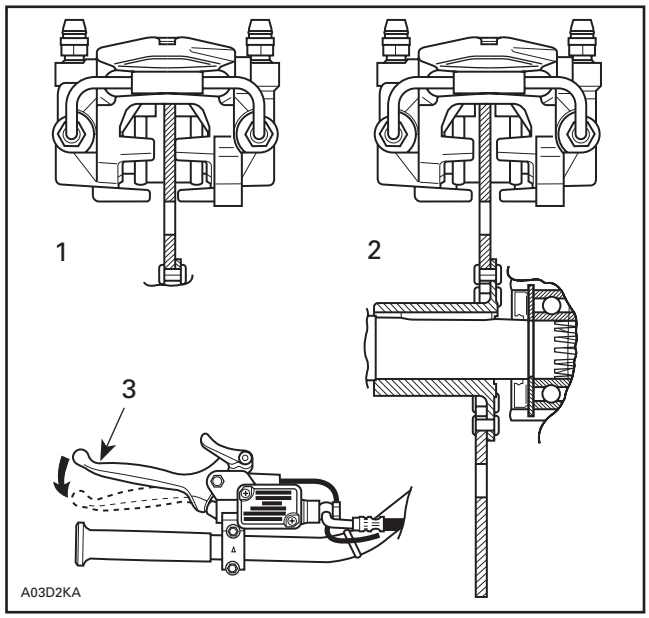
Push O-rings inside disc hub.



7, Brake Pad

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.

Countershaft Bearing Adjustment

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 07-04 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 05-07.

1,11,12, Locking Tab, Outer Caliper and Nut

S-Series

Install caliper retaining bolts.

Assemble outer caliper. Install locking tab then nuts. Torque nuts to 24 N•m (18 lbf•ft). Bend locking tab over a flat of each nut.

5,10, Brake Cable and Nut

Insert brake cable into upper hole in brake lever and caliper. Install nut and tighten until a few threads exceed.

◆ WARNING

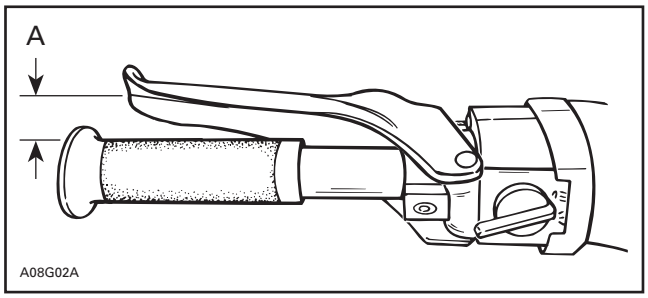
At least 3 threads must exceed the elastic stop nut.

ADJUSTMENT

Brake

Models with Mechanical Brake

Fully depress brake handle several times to obtain 13 mm (1/2 in) between brake handle and handlebar grip when brake is fully applied.



A. 13 mm (1/2 in)

Should this adjustment be unattainable, retighten nut no. 10 as needed.

Models with Hydraulic Brake

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

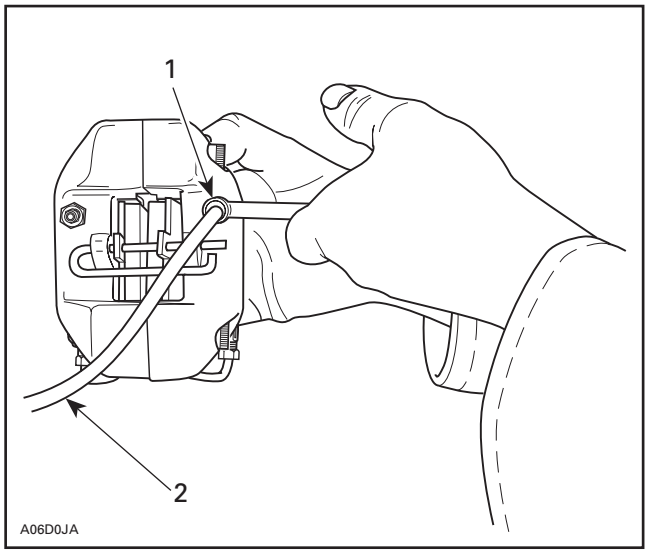
Use only DOT 4 brake fluid for heavy duty or racing applications.

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.



TYPICAL

1. *Open bleeder*
2. *Clear hose to catch used brake fluid*

Brake Light

Models with Mechanical Brake Except Tundra II LT

Brake light should light up before brake pads touch brake disc. To adjust, unscrew nut no. 10 until brake light goes on.

◆ WARNING

At least one full thread must exceed the elastic stop nut.

Check brake adjustment as described above.

NOTE: If brake light adjustment is unattainable while respecting brake adjustment, ratchet wheel may be too far out. If so, tighten ratchet wheel.

Tundra II LT

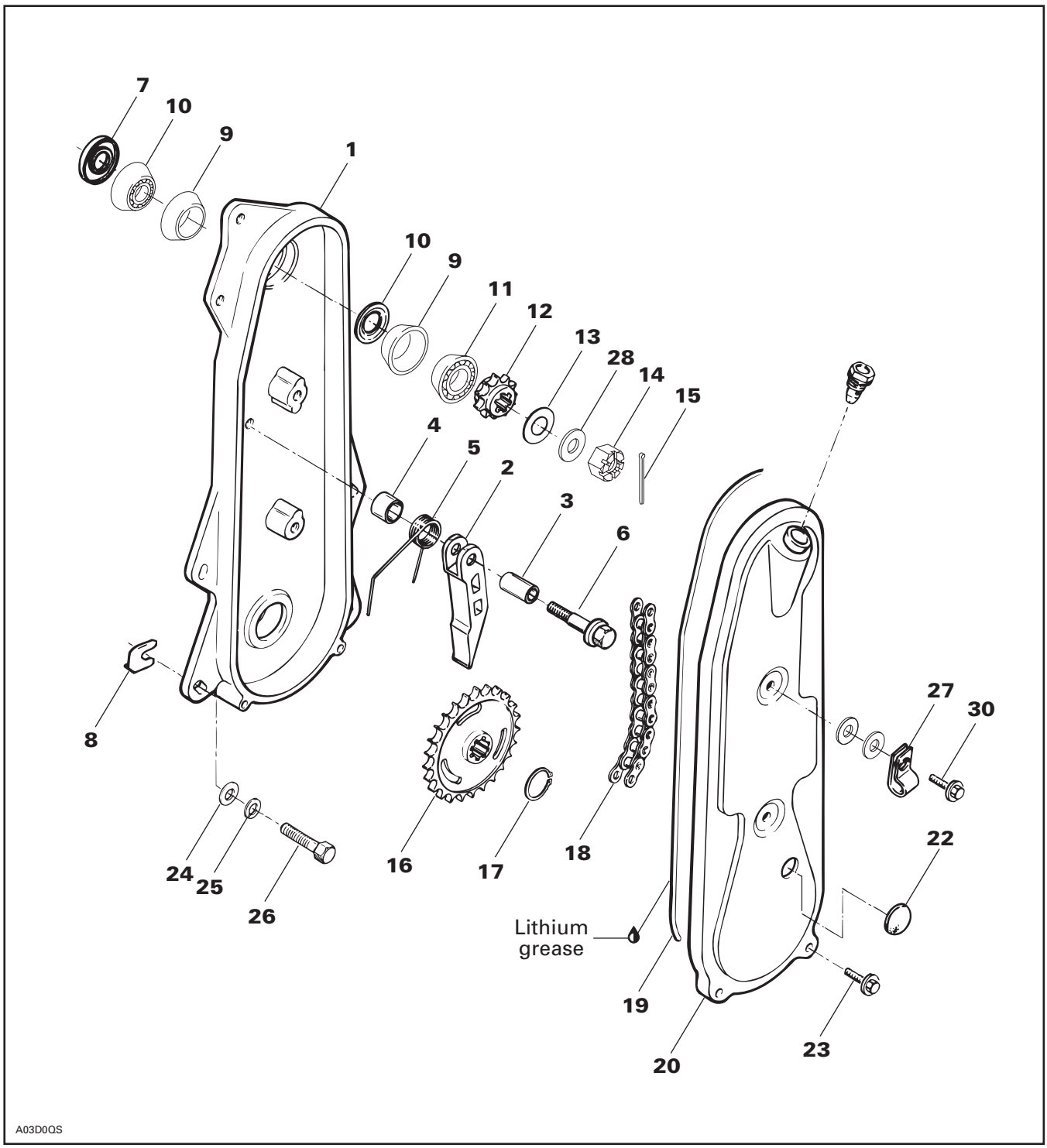
Brake light should light up before brake pads touch brake disc. To adjust, unlock nut no. 21 and turn brake switch no. 22 accordingly. Lock in position by tightening nut no. 21.

Models with Hydraulic Brake

There is no adjustment on these models. Check that switch is securely installed.

CHAINCASE

Tundra II LT

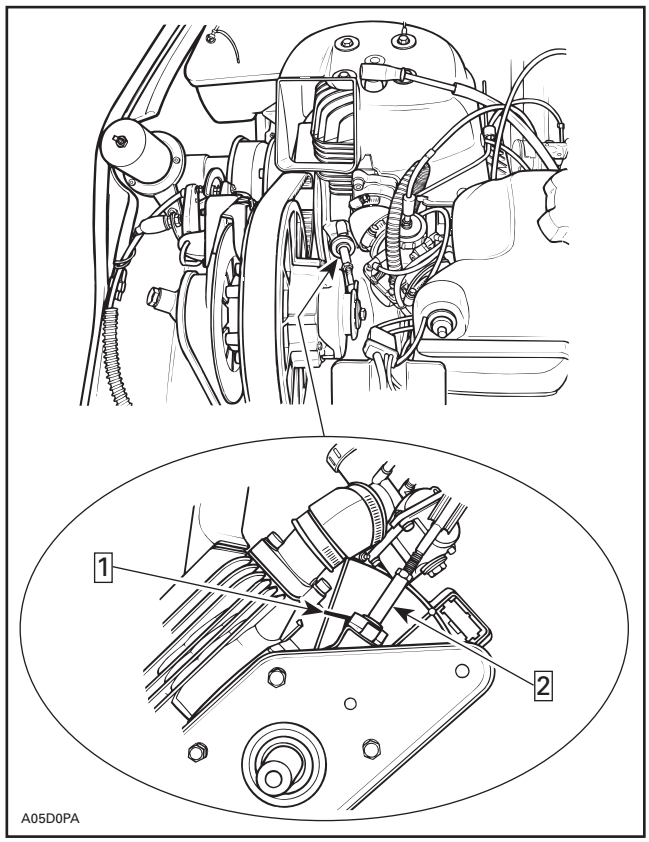


REMOVAL

Chaincase and driven pulley can be removed from the vehicle as an assembly.

Remove belt guard and drive belt.

Unlock and raise driven pulley support.



Step 1 : Push and hold
Step 2 : Raise support

NOTE: On electric starting model, disconnect and remove battery from its rack.

▼ CAUTION

Be careful not to ground positive terminal with the chassis. Always disconnect BLACK negative cable first.

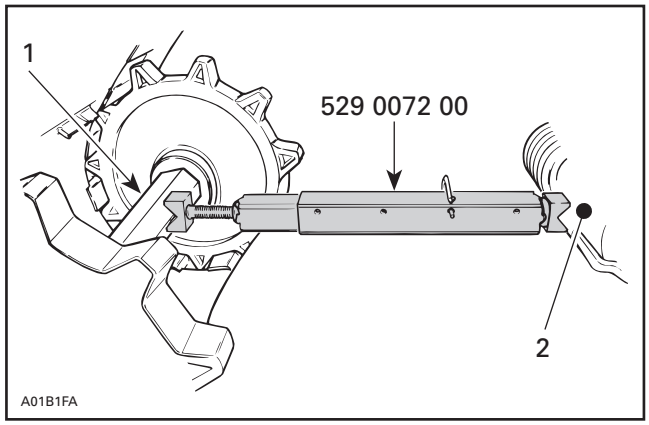
Remove chaincase cover **no. 21** and drain oil.

Pry out drive axle from chaincase.

Unscrew the nut **no. 14** on the upper sprocket **no. 12** and remove circlip **no. 17** on the bottom one **no. 16**. Remove chain tensioner assembly **nos. 2** to **6**, then simultaneously remove chain **no. 18** and both sprockets.

Remove the 4 cap screws **no. 26** securing chaincase to frame. Save alignment shims **no. 8** for installation.

Release track tension, use drive axle holder (P/N 529 0072 00).



1. Drive axle
2. Suspension cross shaft

Chaincase and Driven Pulley Assembly

Using 2 large screwdrivers inserted between chaincase and frame, pry complete assembly from vehicle.

DISASSEMBLY

Disassemble driven pulley from chaincase. Refer to DRIVEN PULLEY 05-04.

INSPECTION

Visually inspect the chain for cracked, damaged or missing link rollers. Check for defective bearings, sprockets and worn chain tensioner components.

◆ WARNING

If chain deflection is greater than 38 mm (1.5 in) (without chain tensioner), replace chain and check condition of sprockets.

GEAR RATIO MODIFICATION

For particular applications, the number of teeth of the sprockets can be increased or decreased on lower and upper sprockets.

Available lower sprocket: 27 teeth.

Available upper sprockets: 11, 12, 15 teeth.

Available chains: 62, 64 links.

The chain length may be affected depending the combination of lower/upper sprockets as follows:

GEAR RATIO/ CHAIN LENGTH CHART		
GEAR RATIO	CHAIN LENGTH (LINKS)	STANDARD ON
11/27*	62	Optional
14/25	62	Tundra II LT

* Chaincase protector **no. 8** is mandatory with this sprocket.

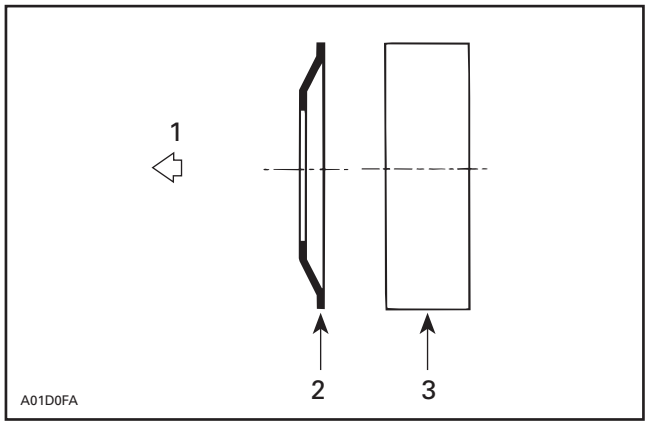
▼ CAUTION

Such modifications should only be performed by experienced mechanics since they can greatly affect vehicle performance.

NOTE: For high altitude regions, the *High Altitude Technical Booklet* (P/N 484 0686 00 and P/N 484 0545 00 for binder) gives information about calibration according to altitude.

ASSEMBLY

Position oil deflector ring **no. 10** then sit bearing in chaincase aperture. Install spacer then the other bearing.



1. Toward chaincase
2. Oil deflector
3. Bearing

1, Oil Seal

Using an appropriate pusher, press new oil seal **no. 7** into chaincase hub. Oil seal must sit flush with case hub edge.

INSTALLATION

Reverse removal procedure. Pay particular attention to the following:

Torque castellated nut **no. 7** to 14 N•m (124 lbf•**in**), slacken then retorque to 0.5 - 2.5 N•m (5 - 22 lbf•**in**).

In case of a vehicle equipped with an 11 teeth sprocket, check the wear of protectors **no. 8**. Replace if required.

Grease new gasket **no. 20** with petroleum jelly, or other suitable product, and install gasket making sure gasket it does not shift from its correct position. Tighten bolts evenly.

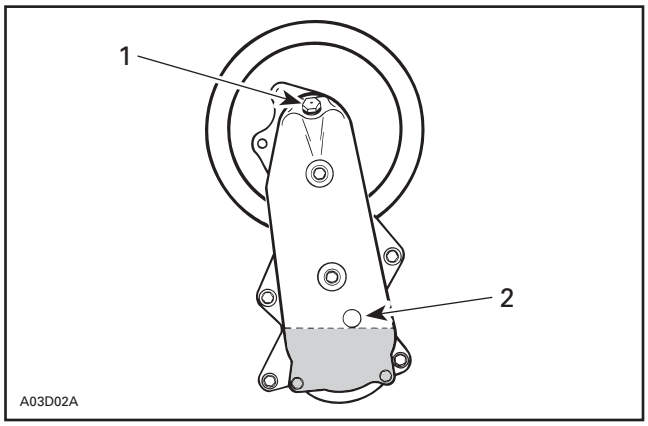
NOTE: Bottom pan has an emboss below chaincase housing to ease installation.

23, Chaincase Oil

Remove filler cap and pour 200 mL (7 fl. oz) of chaincase oil (P/N 413 8019 00) into chaincase.

NOTE: Chaincase oil capacity is 200 mL (7 fl. oz).

Check the oil level by removing the chaincase oil level plug.



1. Filler cap
2. Oil level plug

The oil should be leveled with the bottom of the oil level orifice.

Reinstall battery and connect cables on electric starting model.

▼ CAUTION

Always connect positive RED cable first to prevent sparks.

ADJUSTMENT

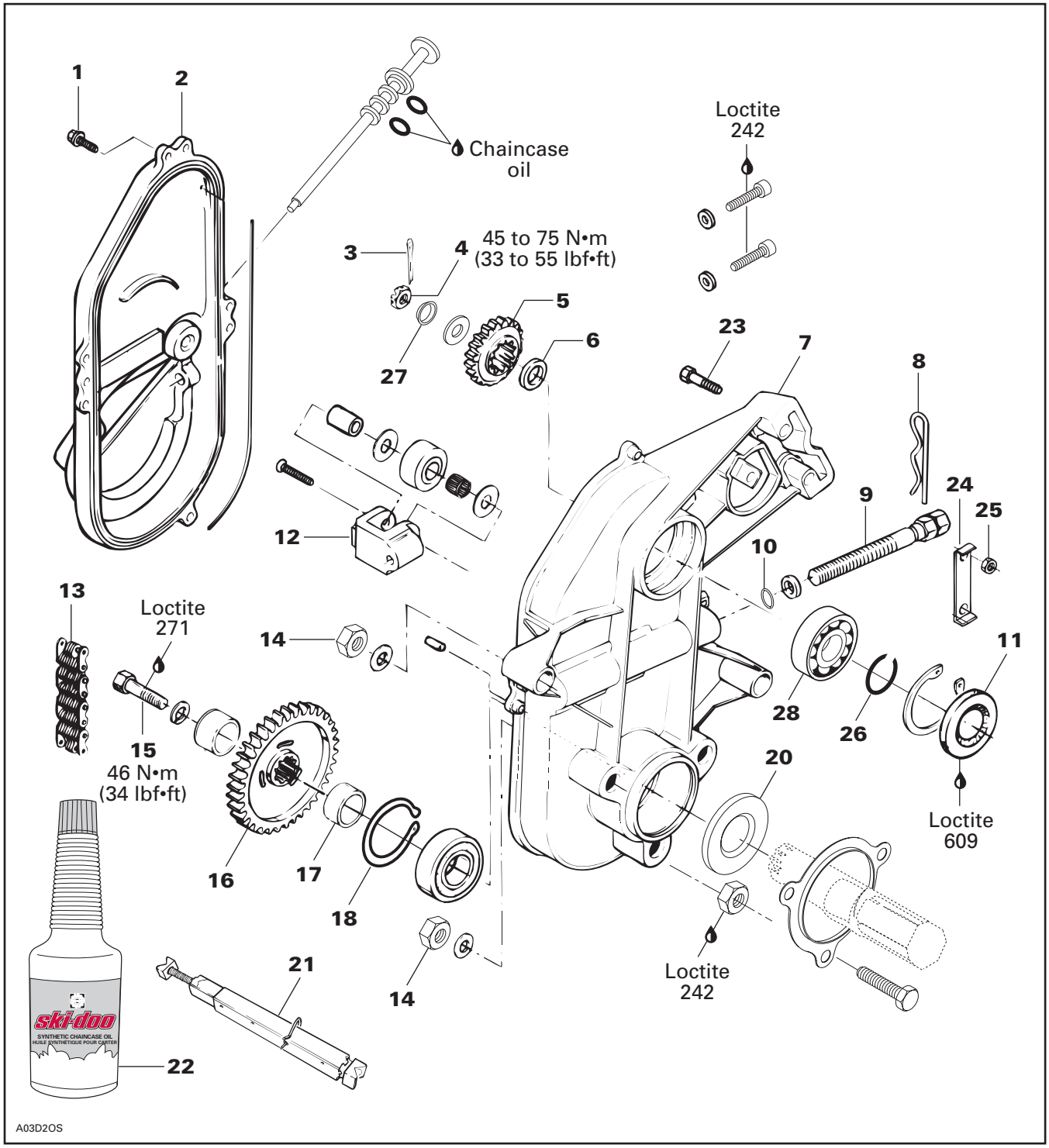
Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT 05-05.

Track Tension and Alignment

Refer to TRACK 07-05.

S-Series Without Reverse Gear



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

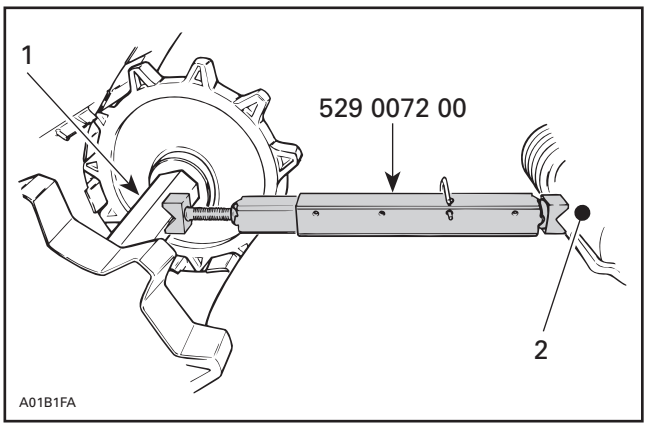
Remove cotter pin **no. 3**, nut **no. 4**, washer **no. 27** retaining upper sprocket **no. 5** and screw **no. 15** retaining lower sprocket **no. 16**. Pull sprockets and drive chain simultaneously. Remove shims **nos. 6** and **17**.

NOTE: Should countershaft removal be required, refer to BRAKE 05-06 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 10 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 0686 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 07-04 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.

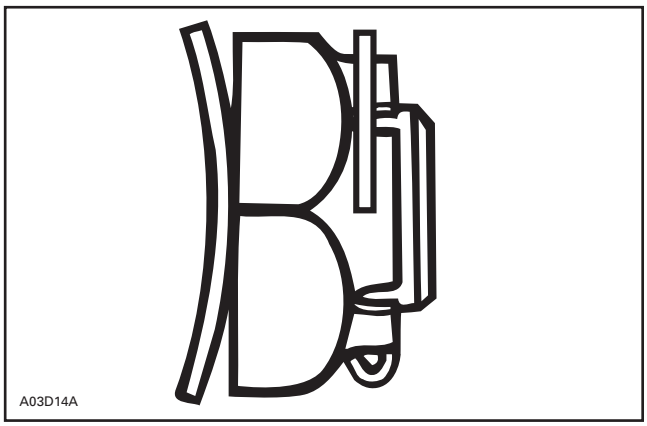
NOTE: Should installation procedure for countershaft be required, refer to BRAKE 05-06 then look for **Brake disc and Countershaft bearing adjustment**.

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).

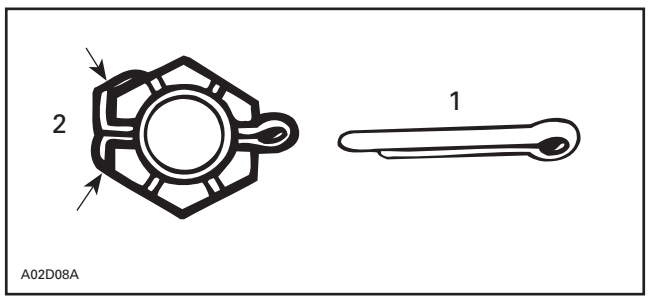
Install new cotter pin in the position shown.

▼ CAUTION

When removing a cotter pin always replace with a new one.

▼ CAUTION

Cotter pin will rub on chaincase cover if installed otherwise.



1. New
2. Fold cotter pin over castellated nut flats only

18, Circlip

▼ CAUTION

It is of the utmost importance to install the circlip otherwise damage to the chaincase components may occur.

DRIVE CHAIN ADJUSTMENT

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.

▼ CAUTION

Free-play must not exceed 5 mm (13/64 in), readjust if necessary.

◆ WARNING

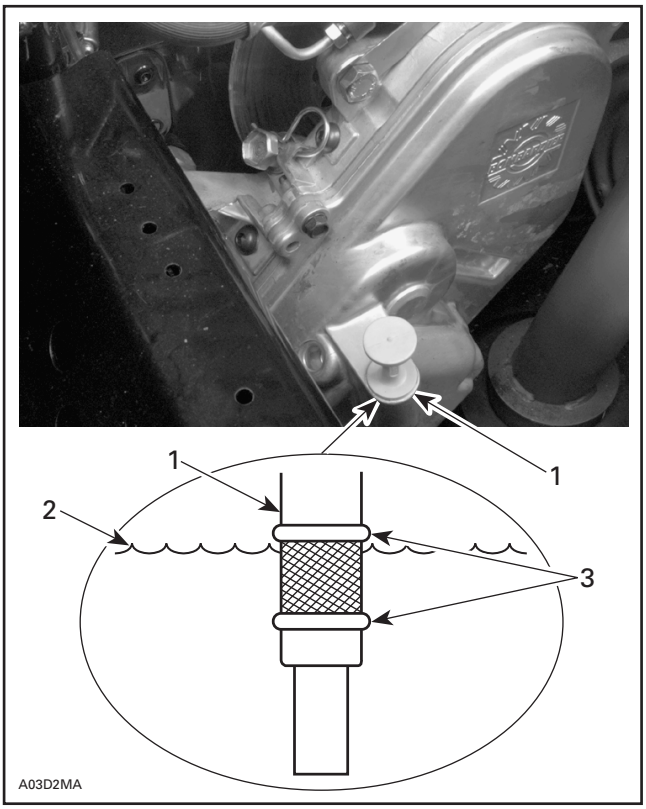
If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

22, Chaincase Oil

Pour 250 mL (8.5 fl. oz) of chaincase oil (P/N 413 8019 00) into chaincase.

NOTE: Chaincase oil capacity is 250 mL (8.5 fl. oz).

Check oil level with the dipstick then add if required.



TYPICAL

1. *Dipstick*
2. *Oil level*
3. *Level between marks*

NOTE: Chaincase must be in its proper position when checking oil level.

ADJUSTMENT

Pulley Alignment

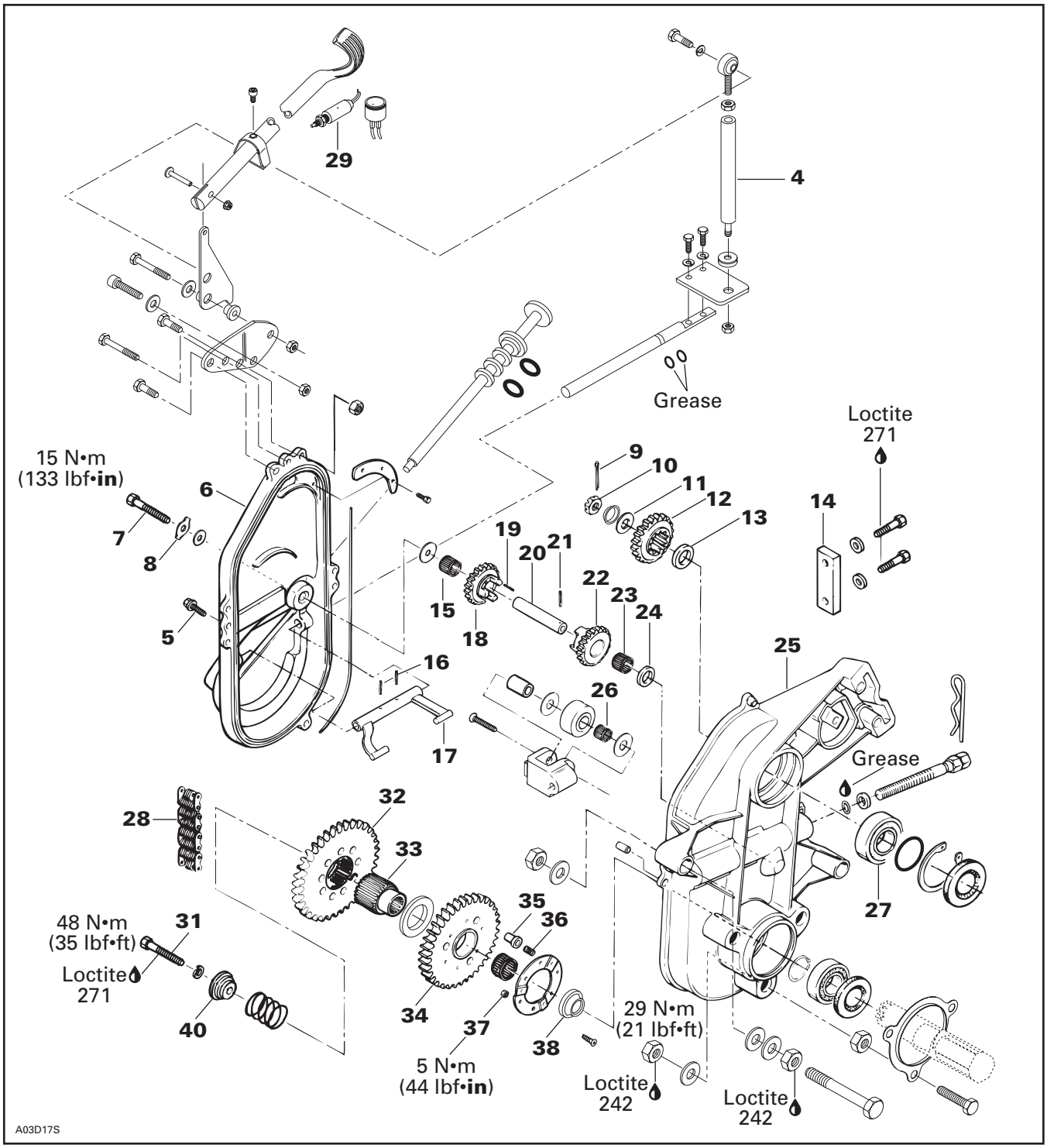
Refer to PULLEY DISTANCE AND ALIGNMENT 05-04.

Track Tension and Alignment

Refer to TRACK 07-05.

GEARBOX

Skandic 380/500

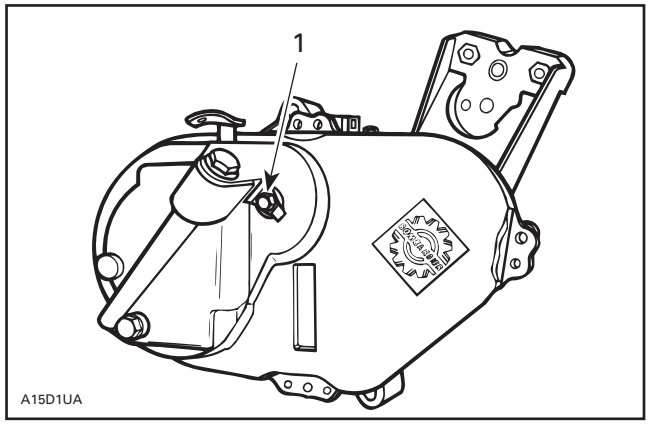


DISASSEMBLY

NOTE: It is possible to see the sliding gear in motion through oil gauge hole.

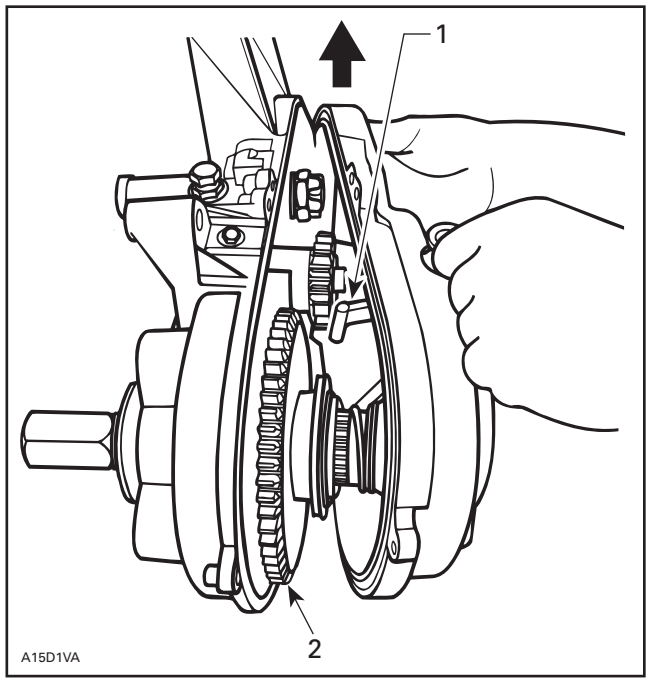
Unbolt gear shift linkage from shifter.

Unscrew cover screws **no. 5** as well as reverse axle screw **no. 7**.



1. Reverse axle screw

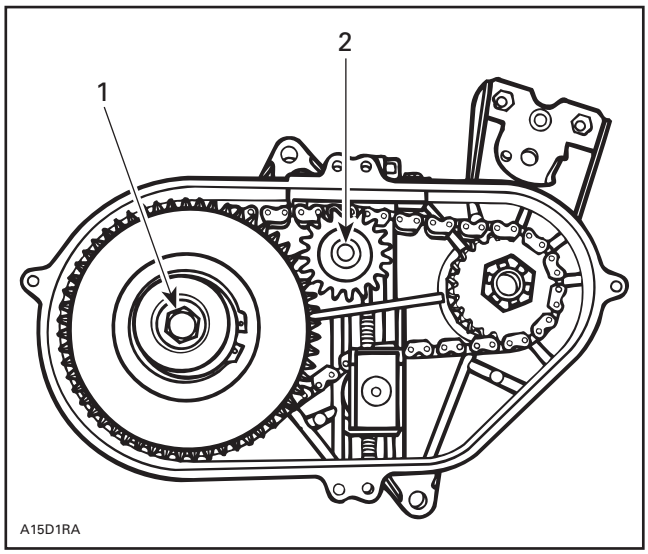
Separate cover **no. 6** from housing and move it toward the front in order to disengage fork from sliding gear.



1. Fork
2. Sliding gear

Loosen 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.

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).

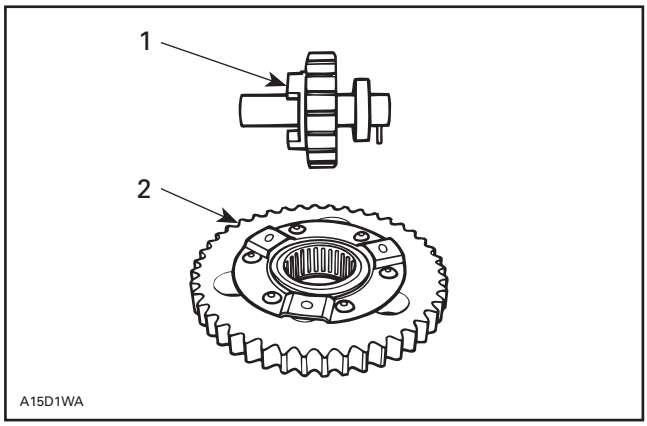
a. If upper sprocket is too far in, possible causes are:
   1. Countershaft bearing on driven pulley side may be too far in. To check, pull out bearing using countershaft bearing remover (P/N 529 0301 00) then recheck sprocket alignment. Use bearing installer (P/N 529 0302 00) to reposition bearing. 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.

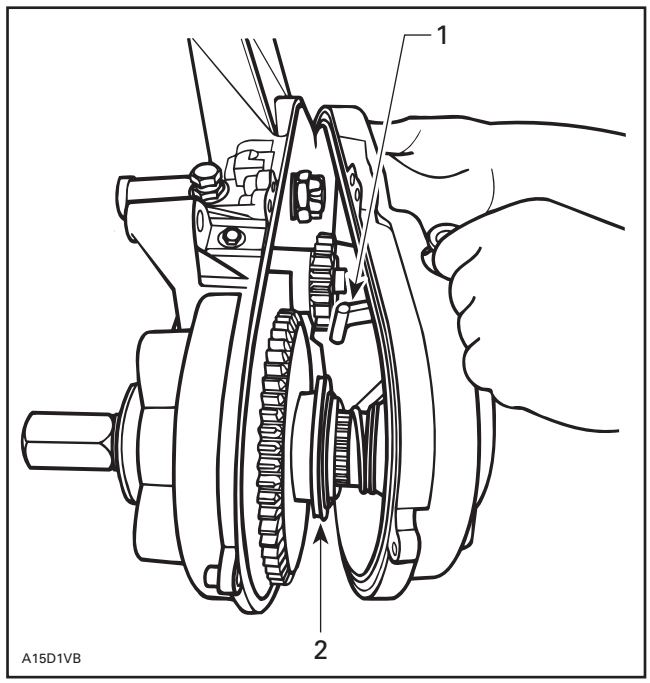
Install needle bearing **no. 15** (wider one) in reverse gear **no. 18**.

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

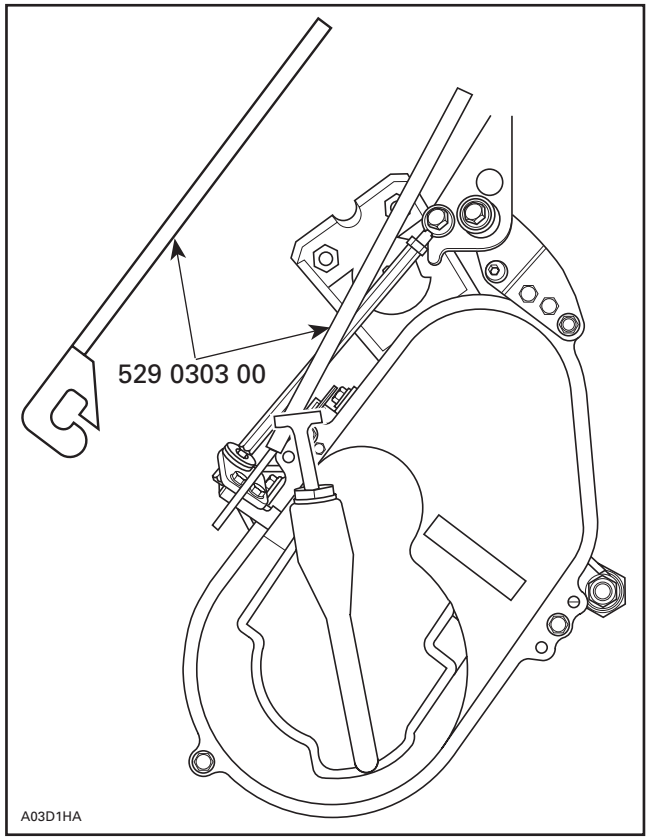
Fully tighten adjustment screw by hand, then back off only far enough for hair pin to engage in locking hole.

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.

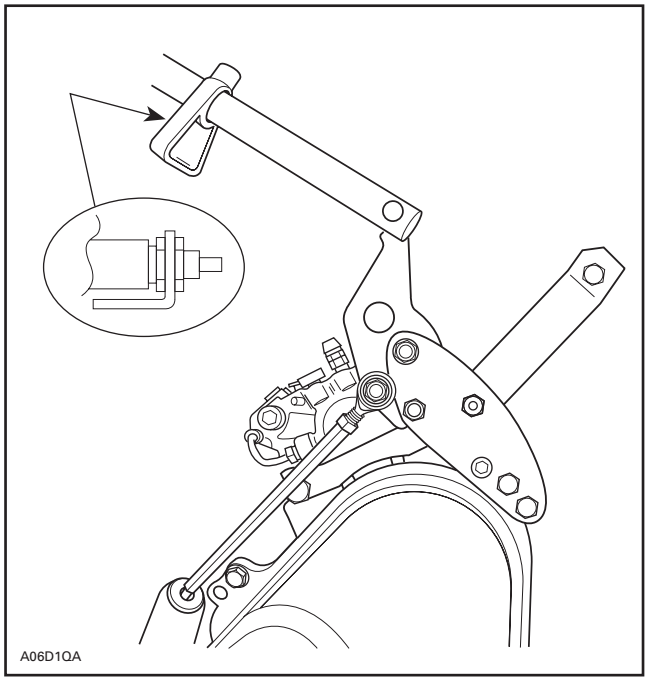


NOTE: It is normal to feel a light friction when shifting into gear.

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.



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.

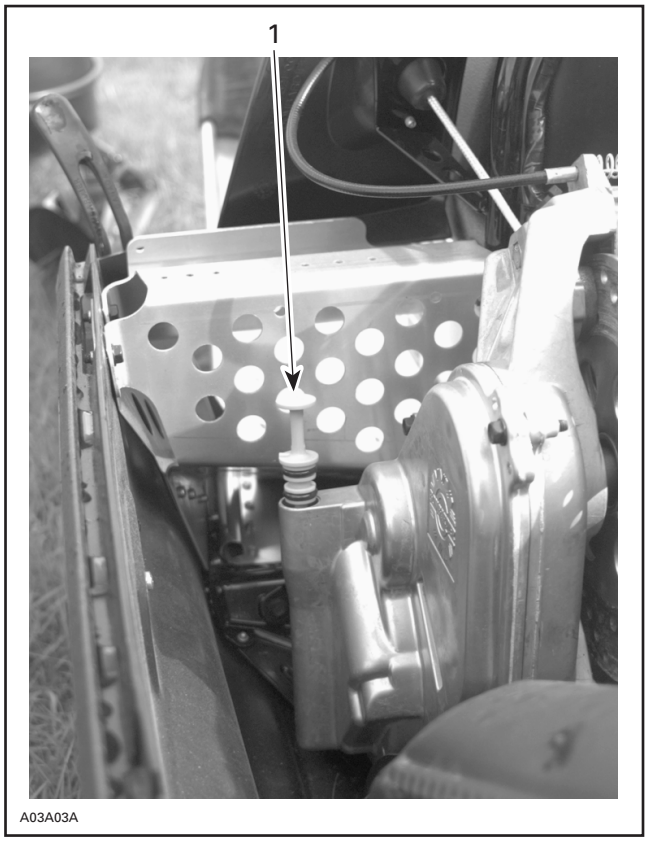
Clean cover interior.

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. Oil level must be between MIN. and MAX. marks.



TYPICAL

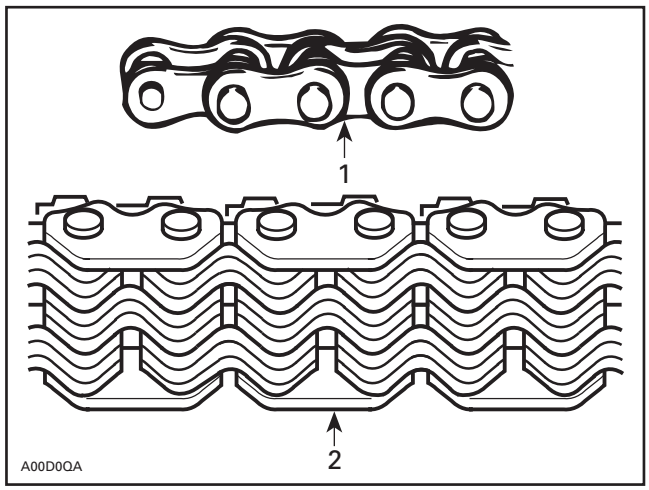
1. Dipstick

Shifter can be put in reverse position to ease removal of dipstick.

DRIVE CHAIN

GENERAL

Bombardier drive chains exist in 2 types, for proper use refer to TECHNICAL DATA 10.



1. 1/2 in single
2. 3/8 in silent chain

SILENT CHAIN

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 10.

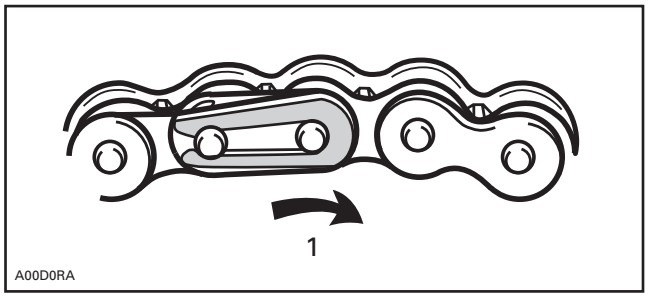
NOTE: No work (separation, lengthening) can be done on the silent chain type.

CHAIN ATTACHMENT

When joining chain ends, the open end of the circlip must be on opposite side of chain rotation. The circlip should also be facing the outer side of chaincase.

◆ WARNING

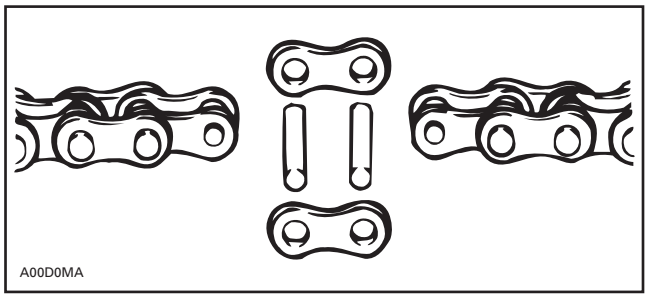
Always ensure that the connecting link circlip is in good condition and is properly secured.



TYPICAL
1. Rotation

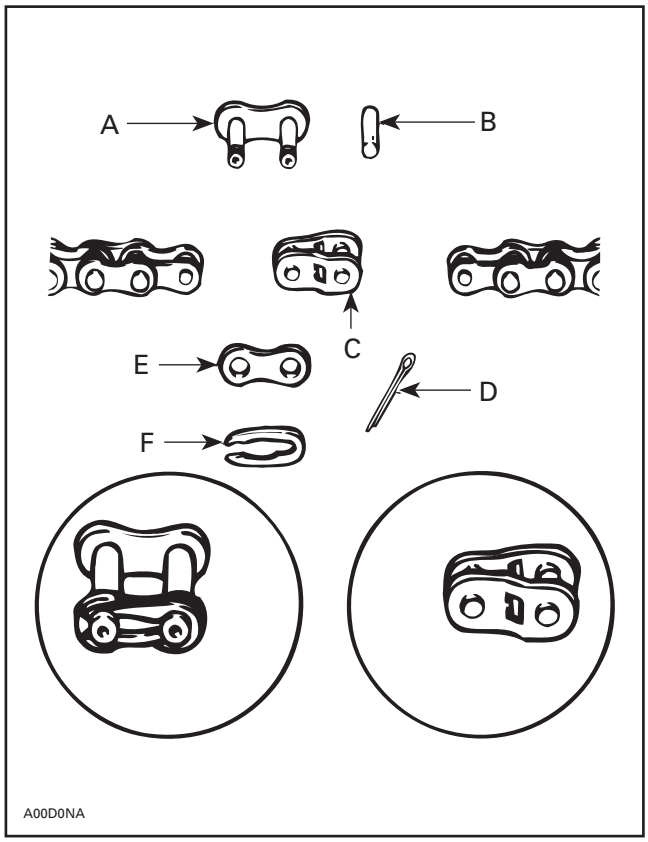
CHAIN SEPARATION

When separating an endless chain, always use a chain bearing pin extractor. Also, make sure to remove one complete link.



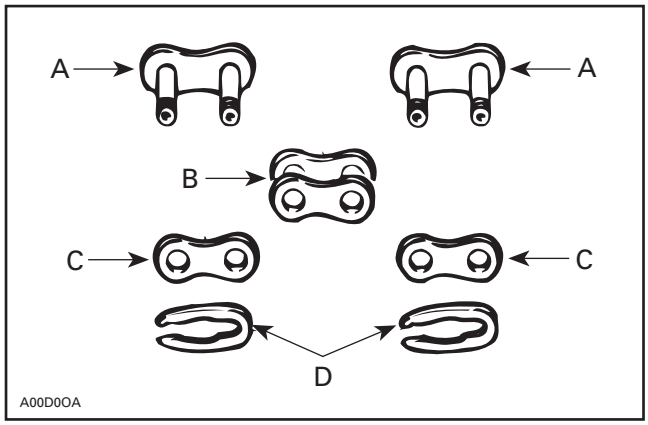
NOTE: Chain connecting link should only be used to lengthen or shorten a chain when changing the number of teeth of sprocket(s). A stretched chain must never be shortened because the chain pitch has changed (increased) and will not properly match the sprocket pitch, causing premature wear.

NOTE: Refer to TECHNICAL DATA 10, for chain length according to gear ratio of each specific vehicle.



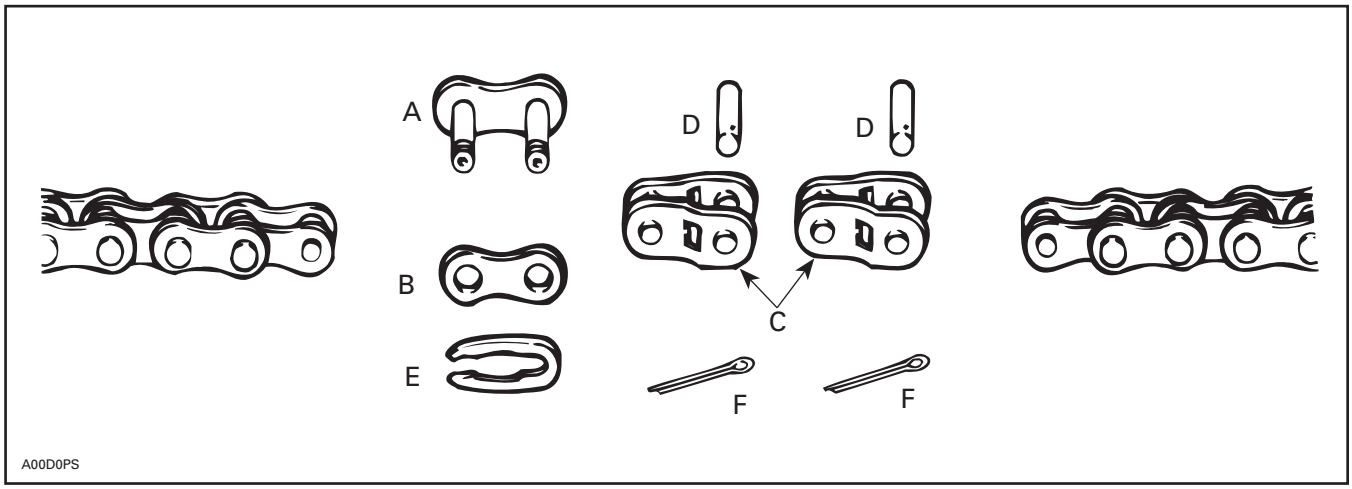
LENGTHENING 1/2 LINK

A. Connecting link
B. Link pin
C. Cranked link
D. Cotter pin
E. Outer link
F. Circlip



LENGTHENING 1 LINK

A. Connecting link
B. Inner link
C. Outer link
D. Circlip



LENGTHENING 1-1/2 LINKS

A. Connecting link
B. Outer link
C. Cranked link
D. Link pin
E. Circlip
F. Cotter pin

TABLE OF CONTENTS

WIRING DIAGRAMS

MODEL	WIRING DIAGRAM PAGE	HEADLIGHT (watt)	TAILLIGHT (watt)	ELECTRICAL SYSTEM OUTPUT (watt)
Tundra II LT	Annex 1	60/55 hal.	8/27	160
Skandic 380/500	Annex 2	60/55 hal.	8/27	240
Formula S	Annex 3	60/55 hal.	8/27	240
Formula SL	Annex 4	60/55 hal.	8/27	240
Touring E/LE Formula S Electric	Annex 5	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 WH – WHITE RD – RED BL – BLUE YL – YELLOW	GN – GREEN GY – GREY VI – VIOLET OR – ORANGE BR – BROWN

Following table shows wire colors related to electrical circuits.

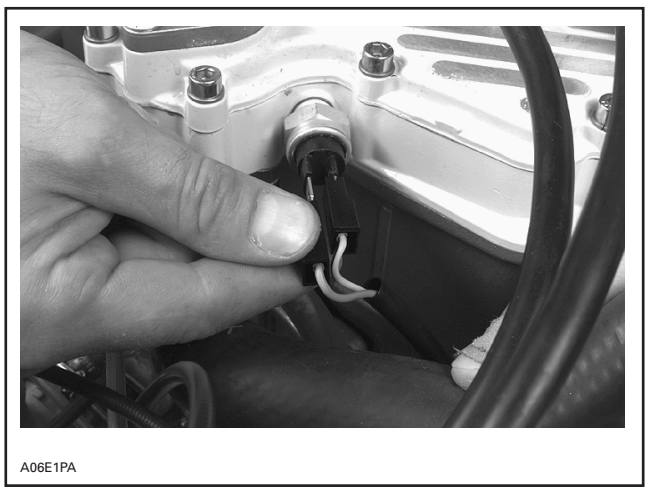
WIRE COLORS	ELECTRICAL CIRCUIT	ADDITIONAL INFORMATION
BLACK/YELLOW	ENGINE SHUT OFF – Key switch – Tether cord switch – Emergency switch	Must be grounded to stop engine.
BLACK (small)	Ground for shut off	
BLACK (big)	Ground for starter (–)	
YELLOW YELLOW/BLACK	12 volts (AC)	If shorted, magneto stops producing electricity.
RED	12 volts (DC) (+) For starter motor	
RED/GREEN	12 volts (DC) (+) For starter solenoid	
RED/BLUE	12 volts (DC) (+) Rectifier output	
GREY	12 volts (AC) High beam	Current returns by YELLOW/BLACK wire connected to headlamp.
VIOLET/GREY	12 volts (AC) Low beam	
WHITE	12 volts (AC) Brake light	Current returns by YELLOW/BLACK wire connected to taillight.
WHITE/RED	12 volts (AC) Low oil level	Current returns by YELLOW/BLACK wire connected to oil level sensor.
BLUE	12 volts (AC) Fuel level indicator	Current returns by YELLOW wire connected to fuel level sensor.
ORANGE	12 volts (AC) Heated grips (max.)	Current returns by YELLOW/BLACK wire connected to heating elements.
ORANGE/VIOLET	12 volts (AC) Heated grips (min.)	
BROWN	12 volts (AC) Heated throttle lever (max.)	
BROWN/YELLOW	12 volts (AC) Heated throttle lever (min.)	
GREEN	12 volts (AC) Temperature gauge	Current returns by YELLOW wire connected to sensor.
VIOLET	12 volts (AC) 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.

UNPLUGING CONNECTORS

Always unplug connectors by pulling on housing not on wire.



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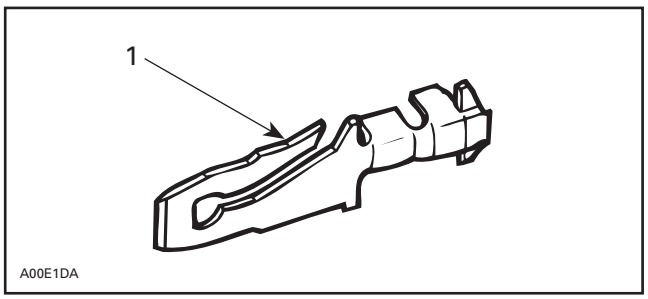
TYPICAL

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.



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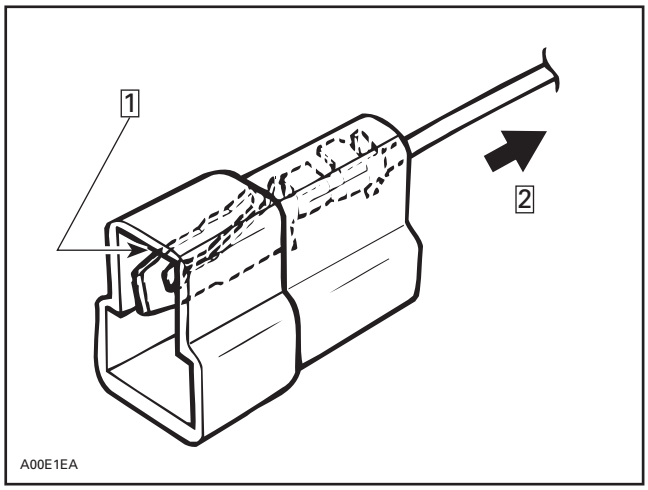
TAB CONNECTOR
1. Locking tab

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.



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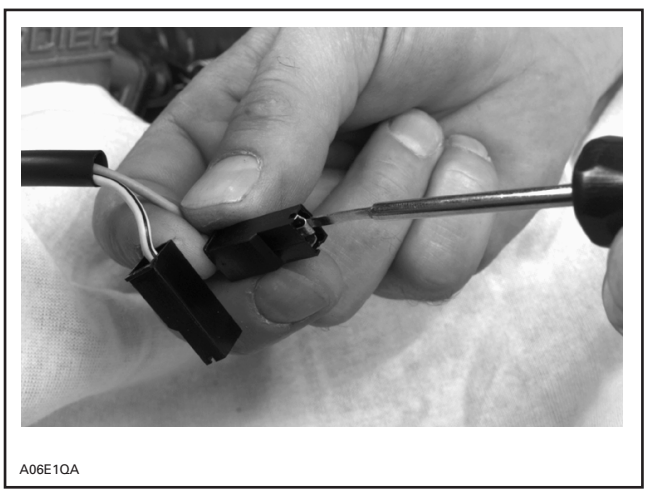
Step 1 : Pull this side
Step 2 : Insert screwdriver here

Locking Receptacle Connector

To remove:

– Insert tool Snap-on TT 600-5 in access opening then pull housing toward wire side.



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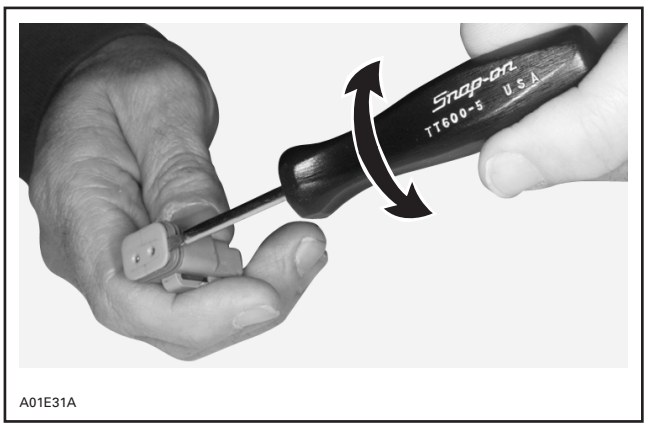
Waterproof Connector Housing

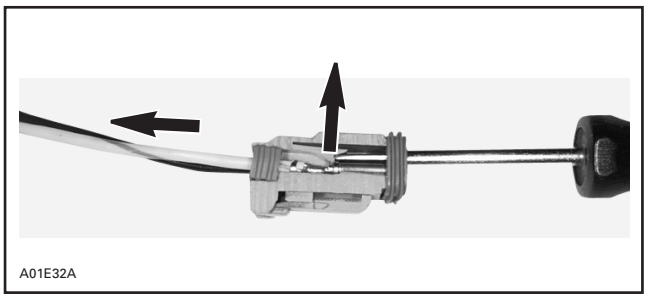
Female Connector Housing

To remove:

– Insert tool Snap-on TT 600-5 under lock and twist to lift it.



– Pry tab to free connector then pull wire out of housing.

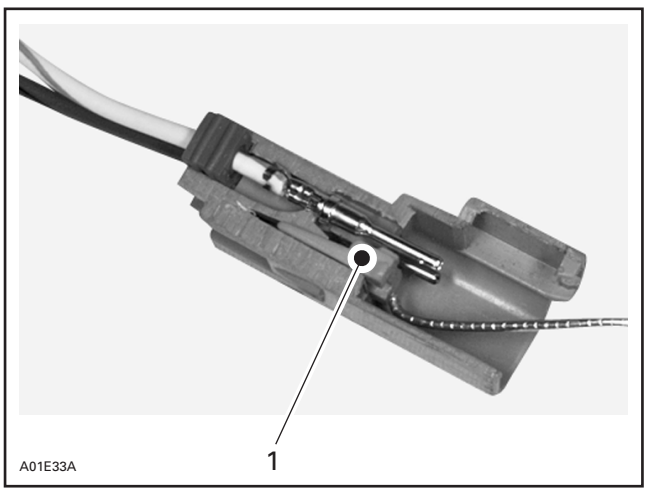


FEMALE CONNECTOR HOUSING — CUTAWAY

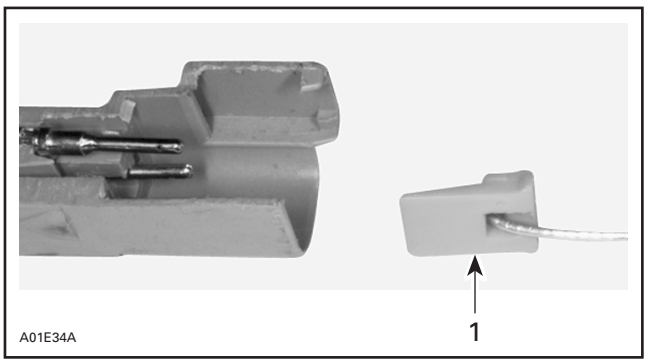
Male Connector Housing

To remove:

– Using a small hook, pull out the lock.

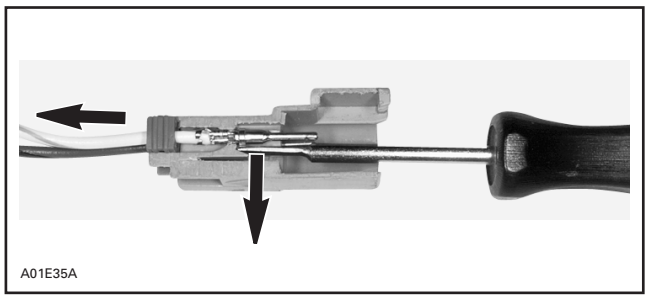


1. Lock



1. Lock

– Pry tab to free connector then pull wire out of housing.

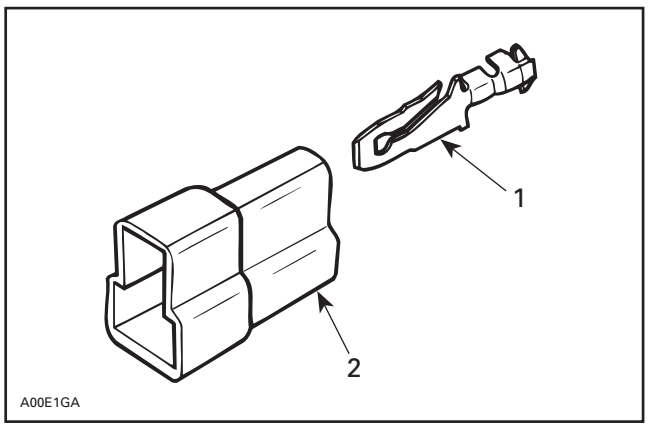


MALE CONNECTOR HOUSING — CUTAWAY

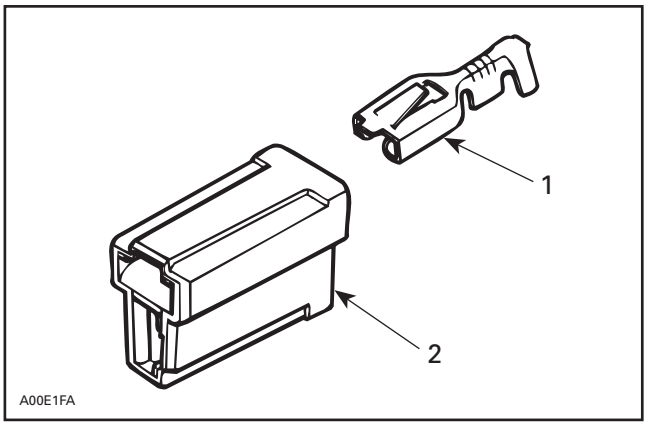
TAB AND RECEPTACLE CONNECTORS INSTALLATION

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.



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

NIPPONDENSO CDI SYSTEM (WITHOUT TRIGGER COIL)

277 Engine Type

The 277 engine type uses a single coil ignition system. Refer to CDI SYSTEM 04-05 for more informations.

This section is mainly divided in 2 parts, the first one using a Top Dead Center gauge to verify the magneto flywheel timing mark position. The second one using a stroboscopic timing light to check ignition timing.

Flywheel timing mark position verification is required to:

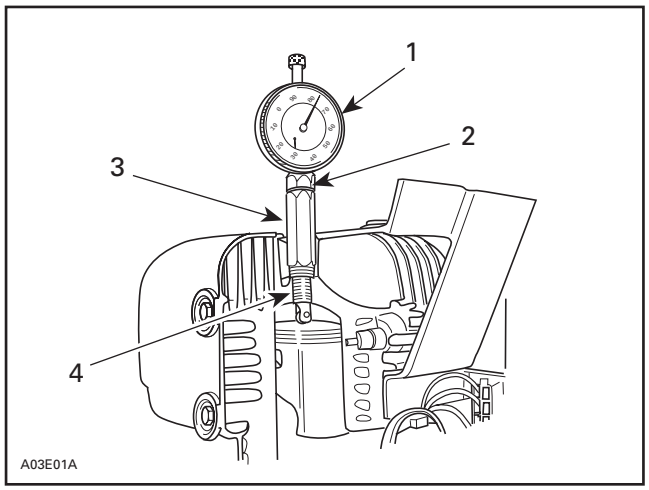
1. Troubleshoot a missing or broken magneto flywheel Woodruff key.
2. Troubleshoot a magneto flywheel corresponding to a different engine type.
3. Scribe the timing mark on a new service magneto flywheel.

Always verify magneto flywheel timing mark position before checking ignition timing.

Verifying Magneto Flywheel Timing Mark Position

1. Disconnect spark plug wire and remove spark plug.
2. Install and adjust TDC gauge on engine as follows:

– Rotate magneto flywheel clockwise until piston is just Before Top Dead Center.



1. Outer ring
2. Adaptor lock nut
3. Roller lock nut
4. Adaptor

– Loosen adaptor lock nut then holding gauge with dial face toward magneto, screw adaptor in spark plug hole.

– Slide gauge far enough into adaptor to obtain a reading then finger tighten adaptor lock nut.

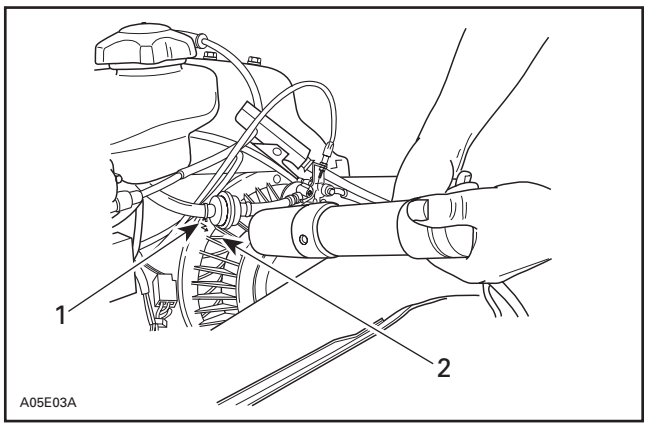
– Rotate magneto flywheel clockwise until piston is at Top Dead Center.

– Unlock outer ring of dial and turn it until “0” (zero) on dial aligns with pointer.

– Lock outer ring in position.

3. From this point, rotate magneto flywheel back 1/4 turn then rotate it clockwise to reach the specified position. Refer to TECHNICAL DATA 10.

Check if yellow fin aligns with mark on fan cowl.



1. Fan cowl timing mark
2. Yellow fin

If marks do not align, there is something wrong with fan mounting. Check Woodruff key and fan.

▼ CAUTION

Always check the timing with a stroboscopic timing light at 6000 RPM after the marks have been checked.

Checking Ignition Timing

NOTE: To perform this procedure we strongly recommend a stroboscopic timing light which is able to exceed 6000 RPM.

To check ignition timing, use a timing light (P/N 529 0319 00).

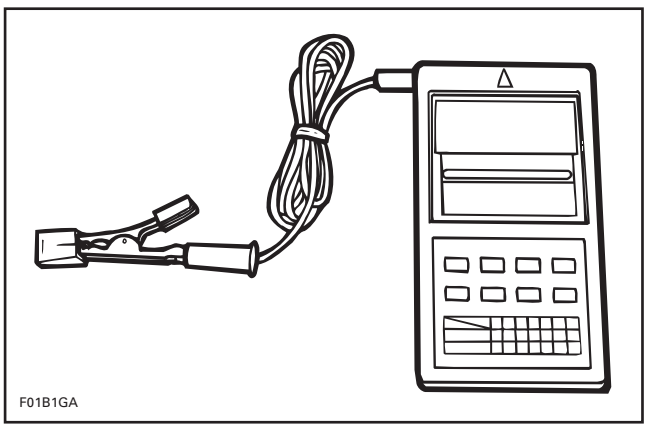
NOTE: This timing light is battery powered (2 alkaline batteries, type C) and therefore needs no auxiliary power supply. If a different timing light requiring auxiliary power supply is used on manual start models, use a separate battery to power timing light.

TIMING LIGHT (P/N 529 0319 00)

The ignition components are affected by temperature variation, therefore, timing must be checked when engine is cold, after idling for a MAXIMUM of 20 seconds.

NOTE: On applicable models, turn heating grips off prior to checking ignition timing.

1. Connect timing light pick-up to the spark plug lead. Use a digital induction type tachometer (P/N 529 0145 00).



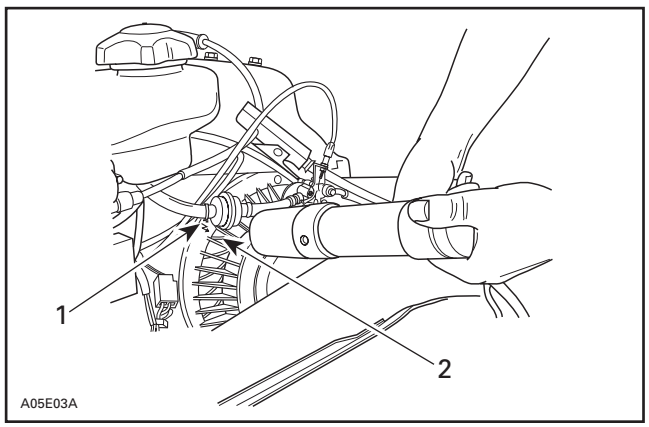
TACHOMETER (P/N 529 0145 00)

Connect tachometer wire to spark plug wire or aim tachometer toward spark plug wire without using any connection wire.

◆ 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 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.

2. Start the engine and point timing light straight in line with the fan cowl timing mark. Bring engine to 6000 RPM for a brief instant.



TUNDRA II LT

1. *Fan cowl timing mark*
2. *Yellow fin*

3. Check if the yellow fin aligns with the fan cowl timing mark. Tolerance is 1°.

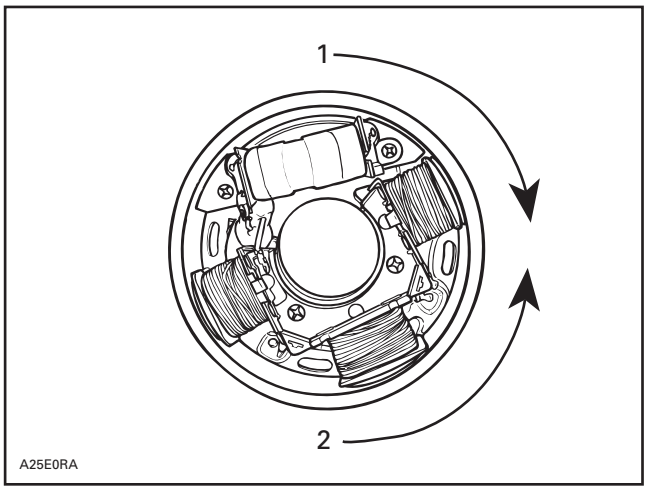
NOTE: On the NIPPONDENSO ignition system, timing advance decreases as engine speed increases. When marks are aligned at 6000 RPM, spark occurrence is still Before Top Dead Center.

If the yellow fin aligns with the fan cowl timing mark, timing is correct.

If timing adjustment is required, rewind starter and starter pulley have to be removed. For removal procedure, refer to CDI SYSTEM 04-05.

IGNITION TIMING ADJUSTMENT

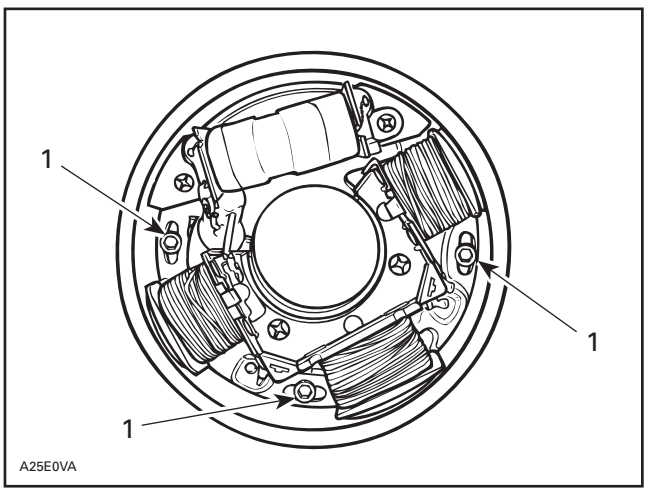
Timing is performed by moving armature plate, clockwise to retard spark occurrence, counterclockwise to advance.



TYPICAL

1. *To retard*
2. *To advance*

To adjust, loosen 3 armature plate retaining screws and lightly rotate armature plate in proper direction.

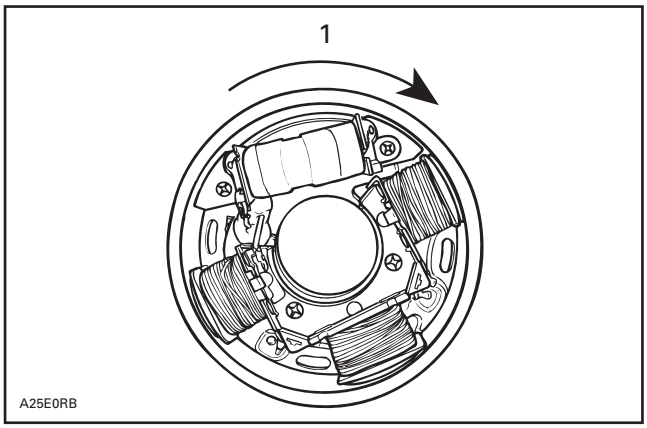


1. *Retaining screws*

Refer to the difference between the fan cowl timing mark and the yellow fin to determine the amount of rotation.

When the yellow fin is on **left** side of fan cowl timing mark, it indicates too **advanced** timing.

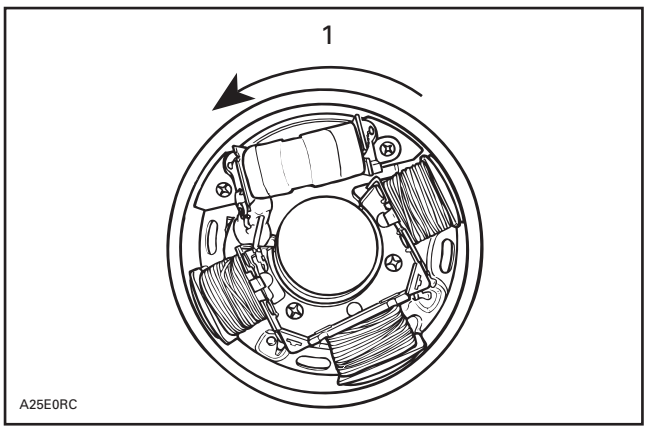
In this case, turn armature plate clockwise.



1. Turn clockwise to retard

When the yellow fin is on **right** side of fan cowl timing mark, it indicates **retarded timing**.

In this case, turn armature plate counterclockwise.



1. Turn counterclockwise to advance

After adjustment, tighten armature plate retaining screws.

▼ CAUTION

Make sure armature plate screws are well secured. Armature plate screws must have medium strength threadlocker (P/N 413 7030 00) applied before tightening.

Reinstall removed parts.

Recheck ignition timing (make sure engine is cold).

DUCATI CDI SYSTEM

377, 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 verified as follows.

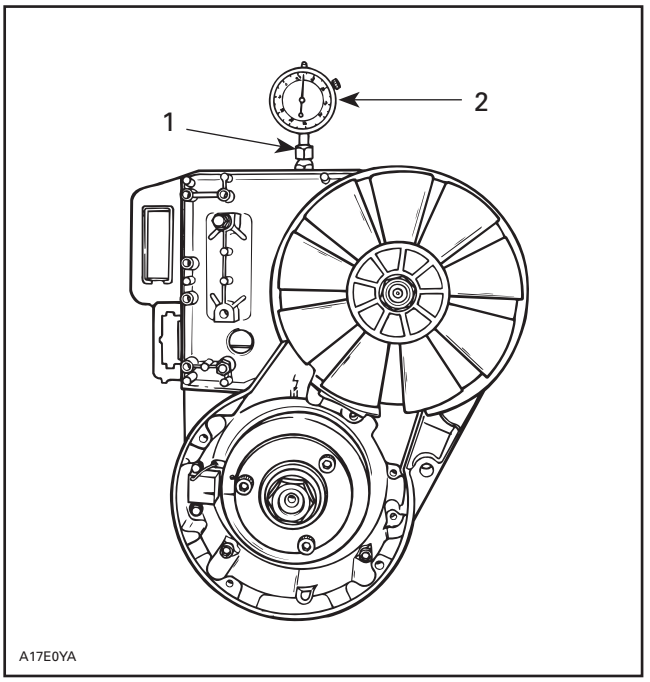
Verifying Magneto Flywheel Timing Mark Position

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

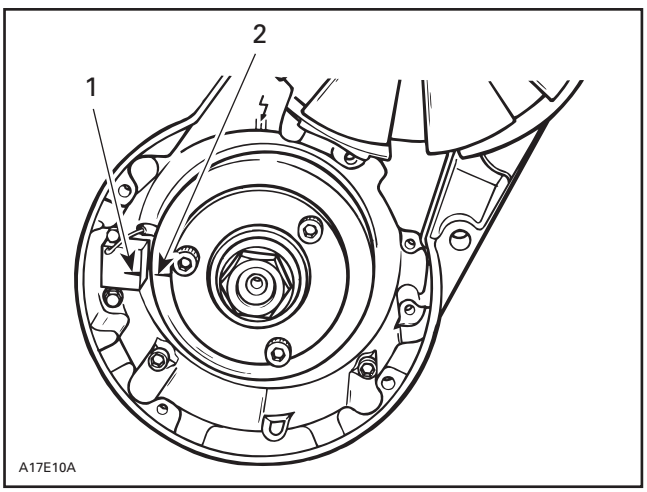
1. Gauge on MAG side cylinder
2. Adaptor lock nut

   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.
   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.

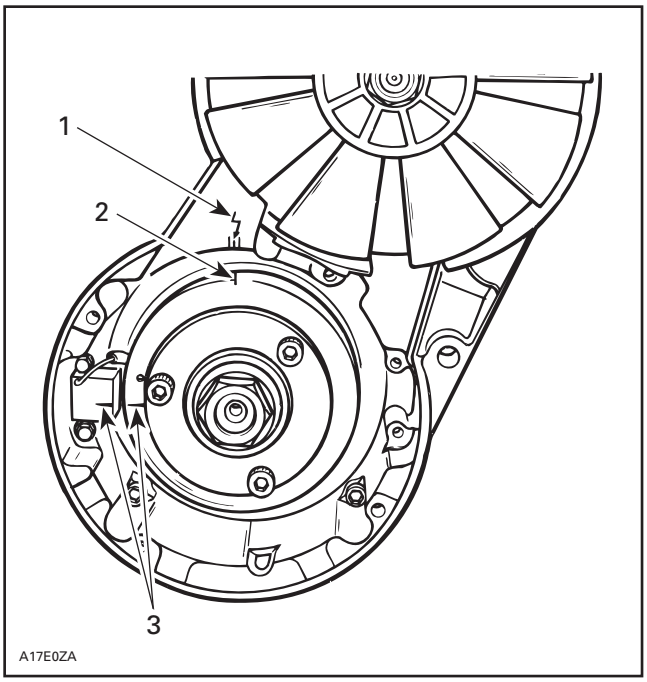
   a. Rotate the magneto flywheel counterclockwise, one-quarter turn then carefully rotate it clockwise until the needle indicates the specified measurement. Refer to TECHNICAL DATA 10.
   b. Verify that the magneto flywheel mark perfectly aligns with the mark on the trigger coil, refer to illustration.
   c. 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.
   a. Remove the fan cover from the engine.
   b. Maintain magneto flywheel so that previous marks remain aligned.
   c. 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).
   d. Reinstall rewind starter.
   e. 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).

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

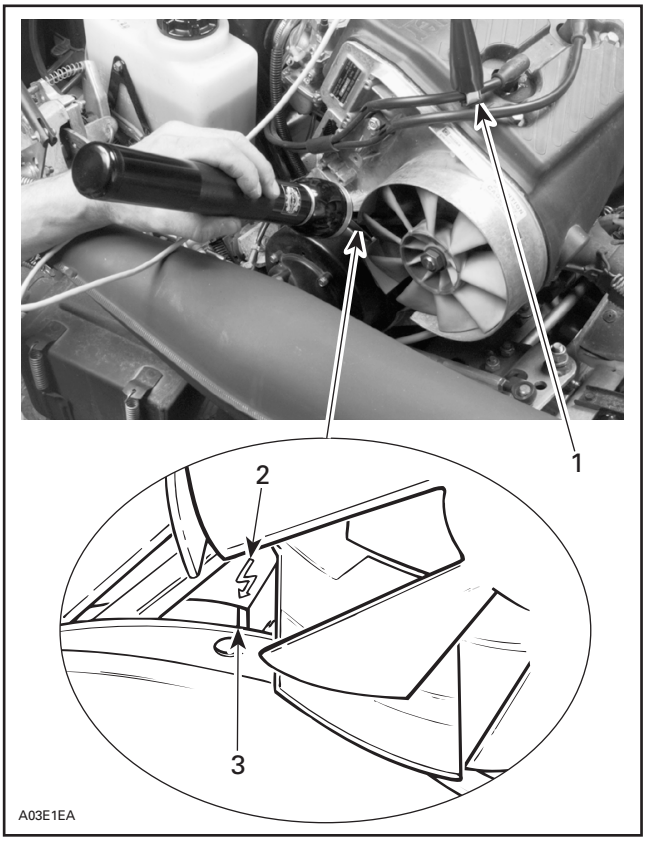
Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground. Do not allow anyone in front of or behind the vehicle while engine is running. Keep clear of track and do not wear loose clothing which can get caught in moving parts.

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.



S-SERIES

1. *Timing light pick-up on MAG side*
2. *Crankcase arrow*
3. *Magneto flywheel mark*

3. Install parts which were removed.

SPARK PLUGS

NGK SPARK PLUG

All Models

NGK SPARK PLUG NUMBERING SYSTEM

Bombardier is using the NGK spark plug type on all its snowmobile models.

The heat range identification system is:

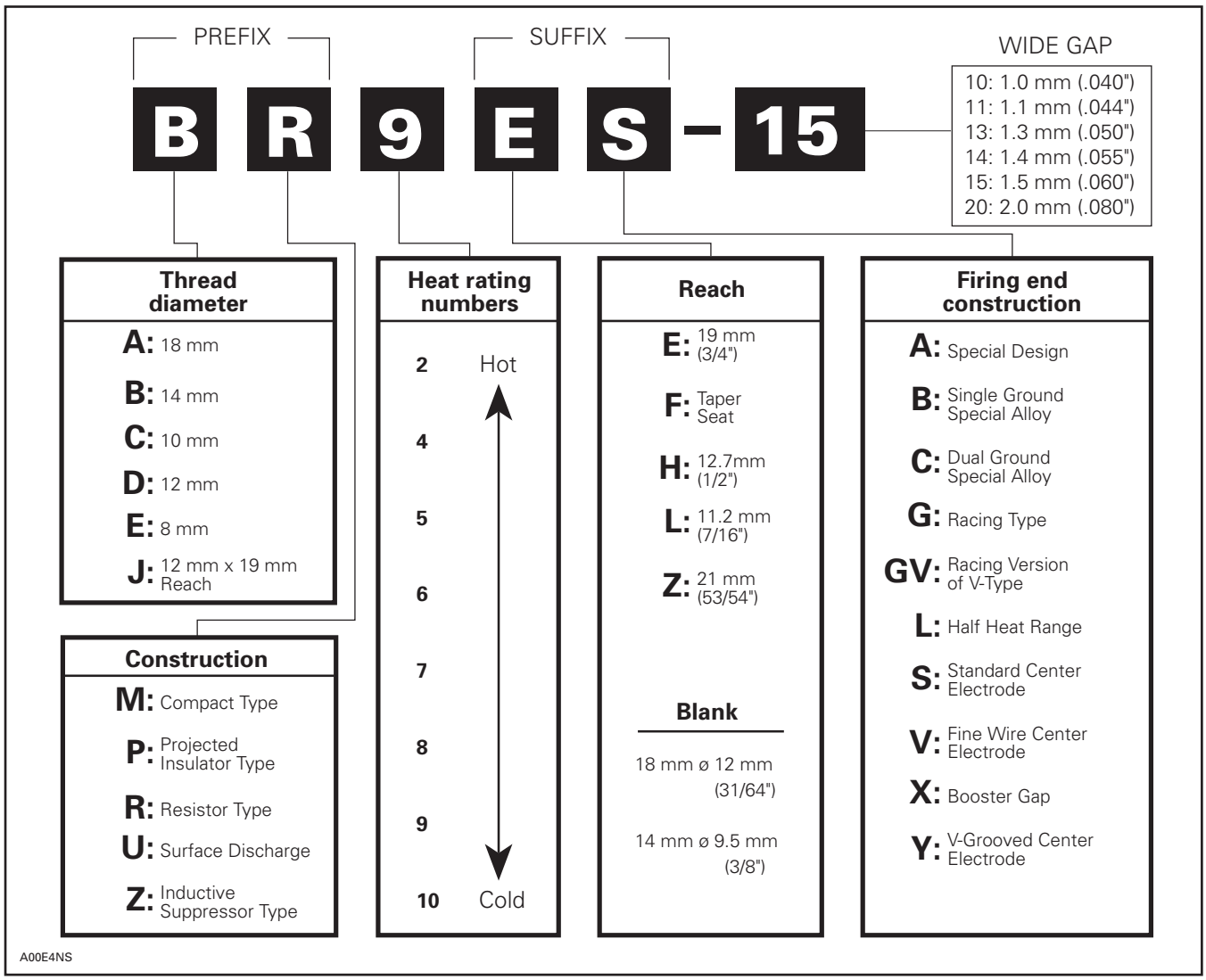
Low number → hot plug
High number → cold plug

REFERENCE CHART

NGK spark plugs used on Bombardier snowmobiles are covered in this manual:

– BR9ES

DESIGN SYMBOLS USED IN NGK SPARK PLUGS



CROSSCUTS AND GAP STYLES OF SPARK PLUGS

DISASSEMBLY

First unscrew the spark plug 1 turn.

Clean the spark plug and cylinder head with pressurized air, then completely unscrew.

◆ WARNING

Whenever using compressed air, always wear protective eye wear.

HEAT RANGE

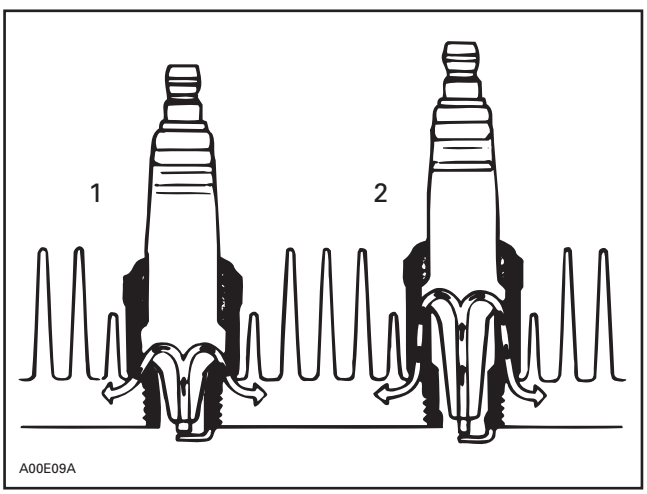
The proper operating temperature or heat range of the spark plugs is determined by the spark plug ability to dissipate the heat generated by combustion.

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.

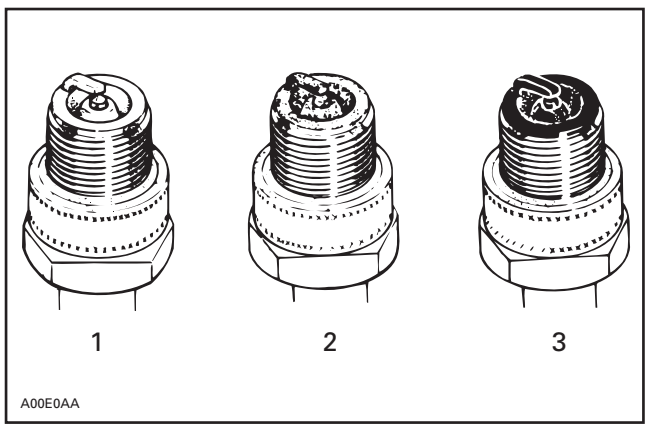
A too "hot" plug will result in overheating and pre-ignition, etc.

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



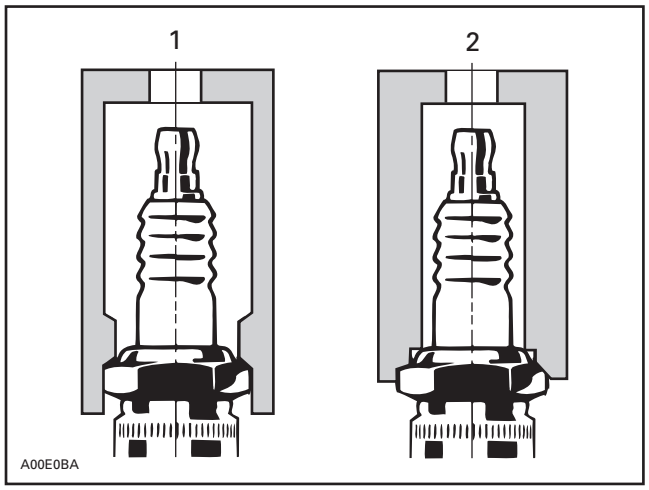
1. Overheated (light grey)
2. Normal (brownish)
3. Fouled (black)

The plug electrode and piston dome reveal 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.

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 10.
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.

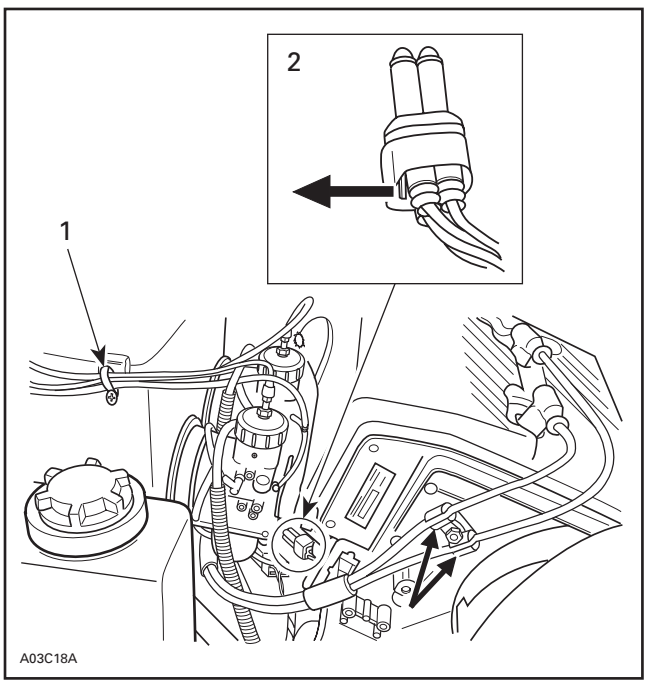
Remove belt guard.

Unfasten spark plug cables from fan housing. Unplug spark plug caps.

Remove throttle cable attachment from air silencer.

Unplug CDI box harness connector.

Loosen collar on carburetor adaptors. Remove air silencer. CDI box will come along with.

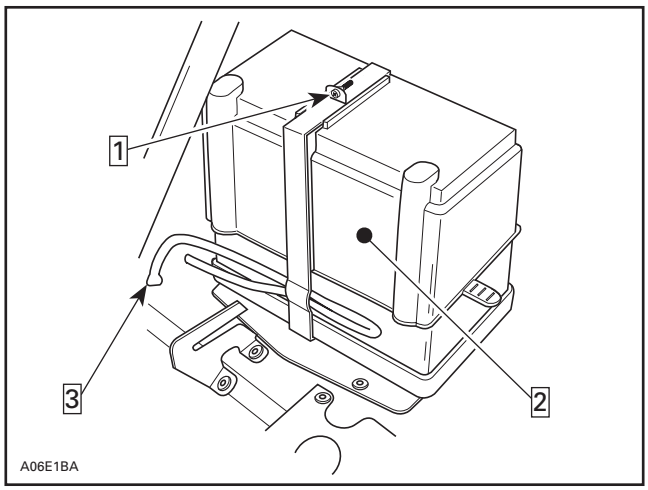


1. Attachment
2. CDI box harness connector

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

All Models

Withdraw battery from vehicle being careful not lean it so that electrolyte flows out of vent tube.

▼ CAUTION

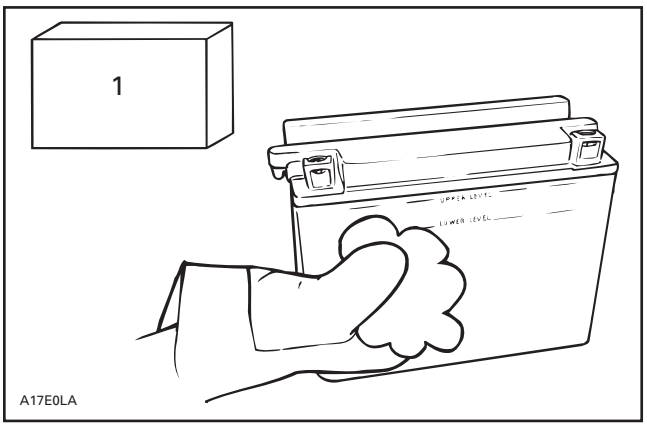
Should any electrolyte spillage occur, immediately wash off with a solution of baking soda and water to prevent damage to vehicle components.

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 casting is damaged, replace battery and thoroughly clean battery tray and close area with water and baking soda.

◆ WARNING

Should the battery casing be damaged, wear a suitable pair of non-absorbent gloves when removing the battery by hand.

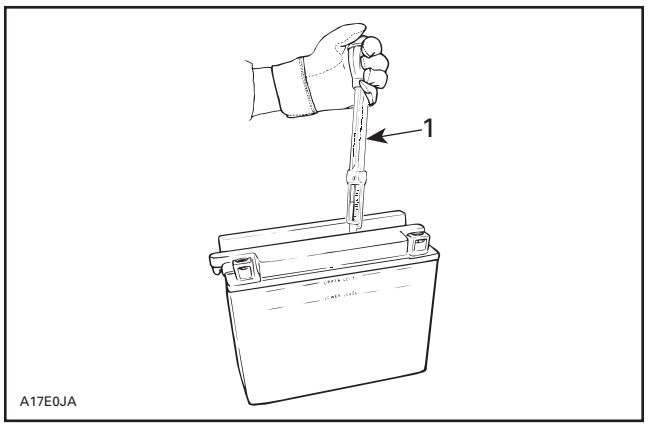
Inspect battery posts for security of mounting.

Inspect for cracked or damaged battery caps, replace defective caps.

◆ WARNING

Battery caps do not have vent holes. Make sure that vent tube is not obstructed.

HYDROMETER TEST



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 32	100 90	add	.008 .004	to the reading
27	**80**	**correct reading**		
21 16 10 4 –1 –7 –12 –18 –23 –29 –34 –40	70 60 50 40 30 20 10 0 –10 –20 –30 –40	subtract	.004 .008 .012 .016 .020 .024 .028 .032 .036 .040 .044 .048	from the reading

EXAMPLE NO. 1
Temperature below 27°C (80°F):
Hydrometer Reading: 1.250
Electrolyte temperature: –7°C (20°F)
Subtract .024 Sp. Gr.
Corrected Sp. Gr. is 1.226

EXAMPLE NO. 2
Temperature above 27°C (80°F):
Hydrometer Reading: 1.235
Electrolyte temperature: 38°C (100°F)
Add .008 Sp. Gr.
Corrected Sp. Gr. is 1.243

▼ CAUTION

Do not install a partially charged battery on a snowmobile since the casing might crack at freezing temperature. The following chart shows the freezing point of the electrolyte in relation to the charge of the battery.

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	(+19F)

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.

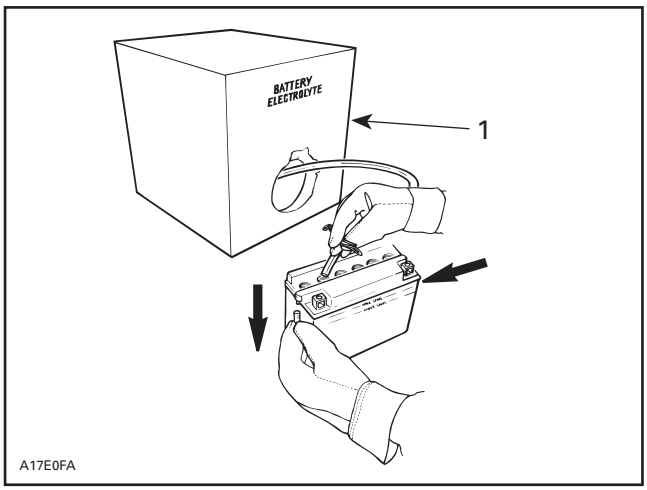
In case of accidental premature removal of caps or sealing tube, battery should be given a full charge.

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.

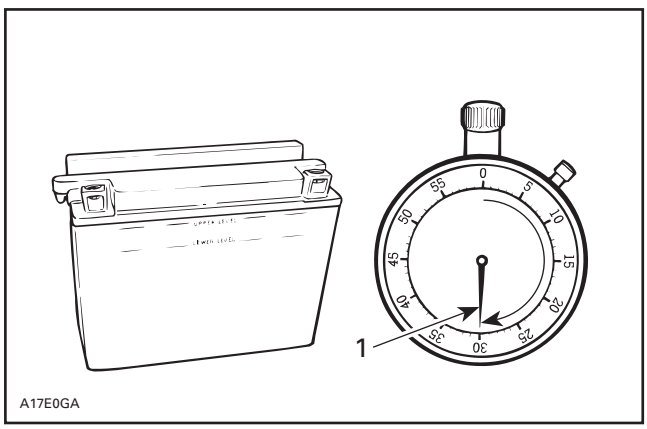
◆ WARNING

Failure to remove the sealing tube could result in an explosion.



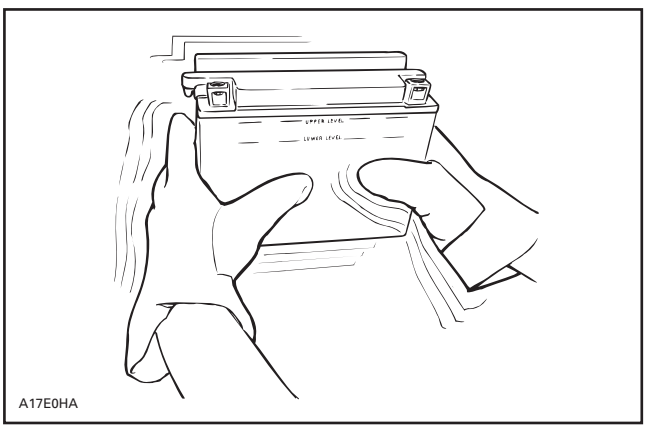
1. Battery electrolyte

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.

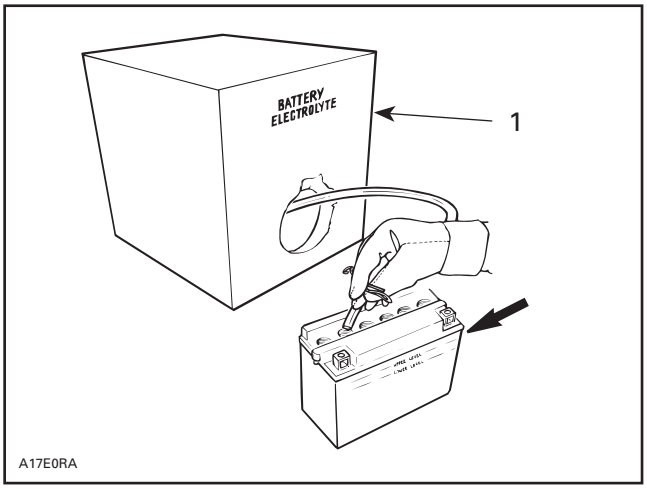


1. 30 minutes

4. Allow gas bubbles to escape by lightly shaking battery by hand.

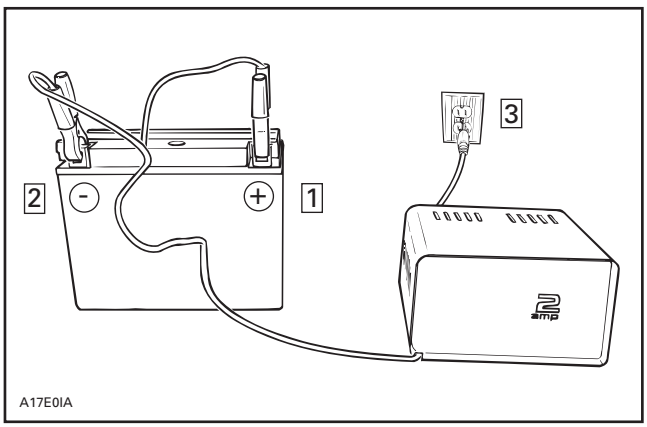


5. Readjust the electrolyte level to the UPPER LEVEL line.



1. Battery electrolyte

6. Connect a 2 A battery charger for 10 to 20 hours.



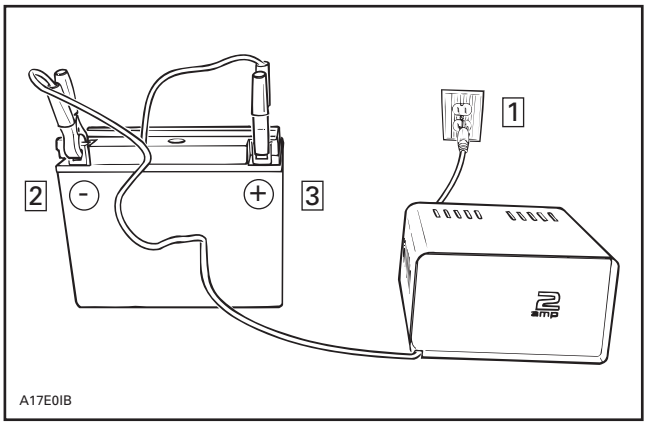
▼ CAUTION

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.

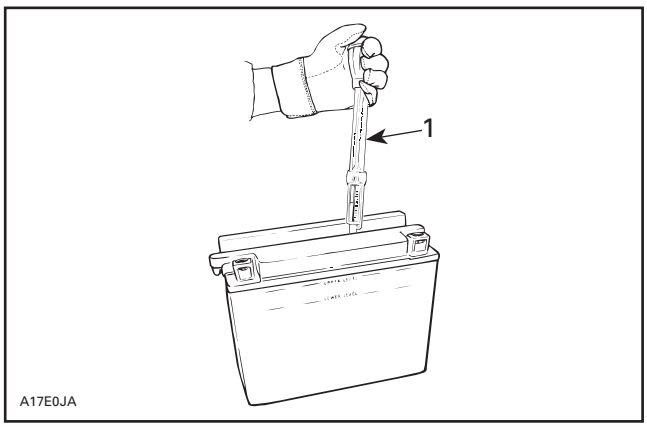
◆ WARNING

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.

7. Disconnect battery charger.

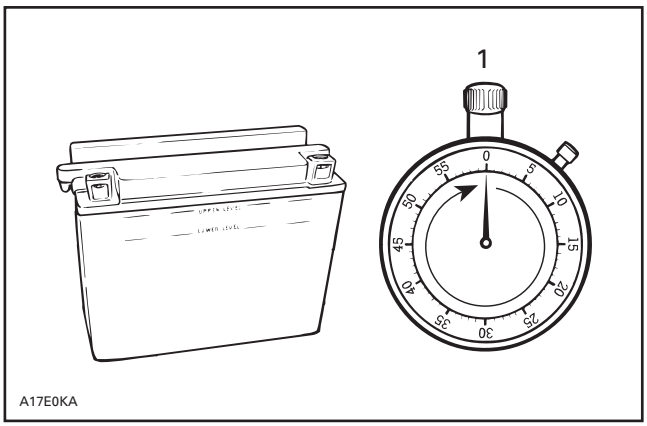


8. Test battery state of charge. Use a hydrometer.



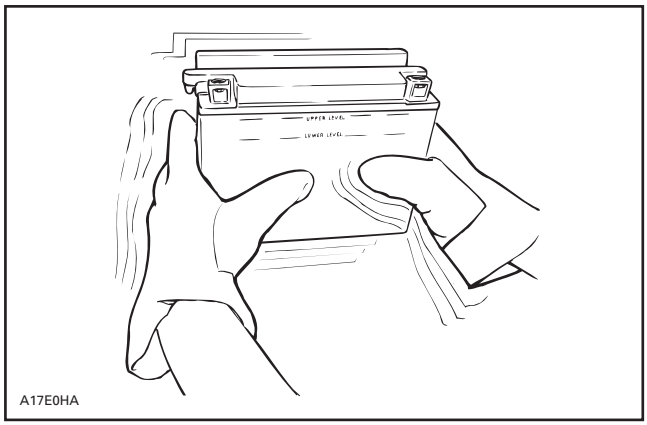
1. Specific gravity 1.260

9. Let battery settle for 1 hour.

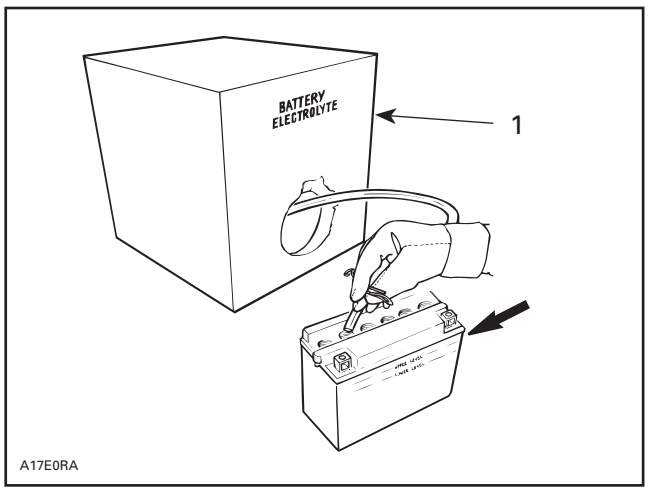


1. 60 minutes

10. Allow gas bubbles to escape by lightly shake battery.

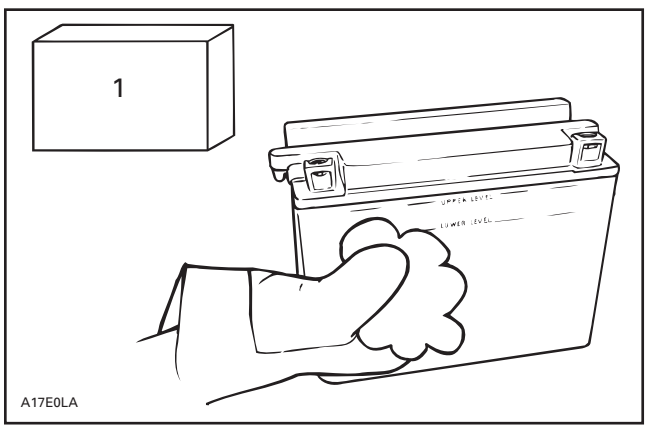


11. Readjust electrolyte level.



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 2 hours before charging.

◆ WARNING

Do not place battery near open flame.

Time required to charge a battery will vary depending some factors such as:

– Battery temperature: 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, 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.
– 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.

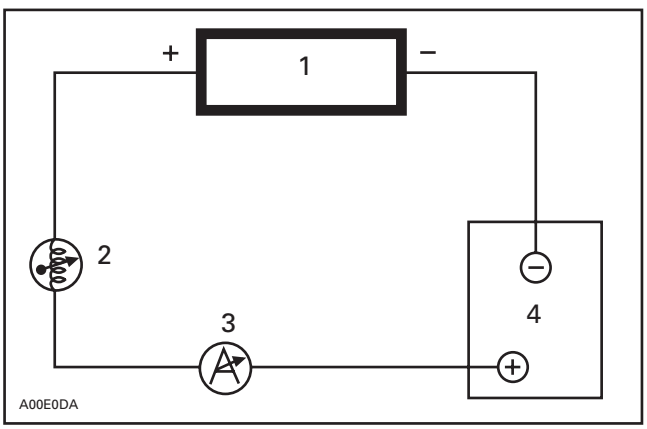
BATTERY CHARGING EQUIPMENT

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 12 Ω 50 W
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.

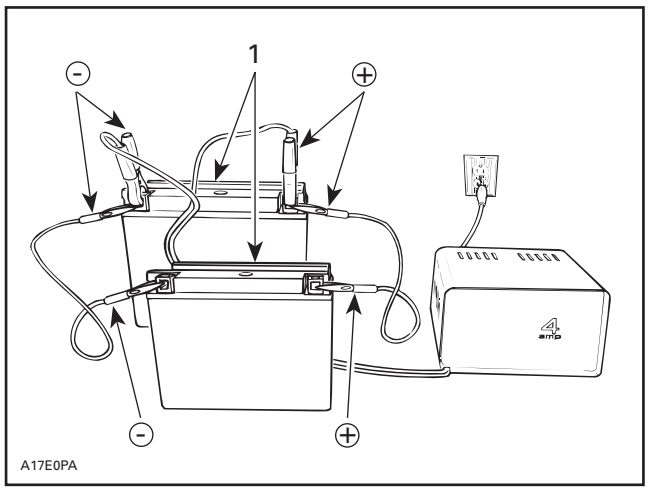
▼ CAUTION

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 5 batteries at a time requires a 10 A rated charger (5 × 2 A = 10 A).



TYPICAL
1. Two batteries = 4 A

INSTALLATION OF BATTERY

Ensure vent tube is properly installed on battery elbow.

Connect vent tube to vehicle fitting on front frame.

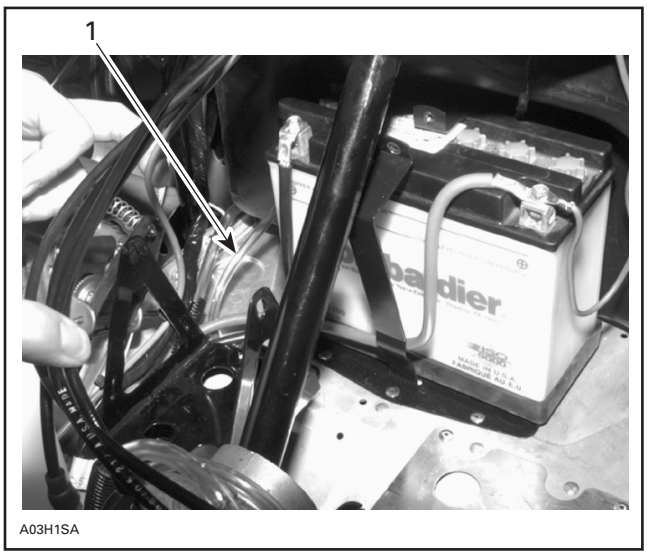
Route RED positive cable behind retaining strip and connect it to positive battery terminal. Connect RED wire (coming from ignition switch).

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.



BATTERY CONNECTION
1. Vent tube on fitting

Ensure that vent tube is not kinked or blocked then install protective boot over battery.

Close and fasten retaining strips.

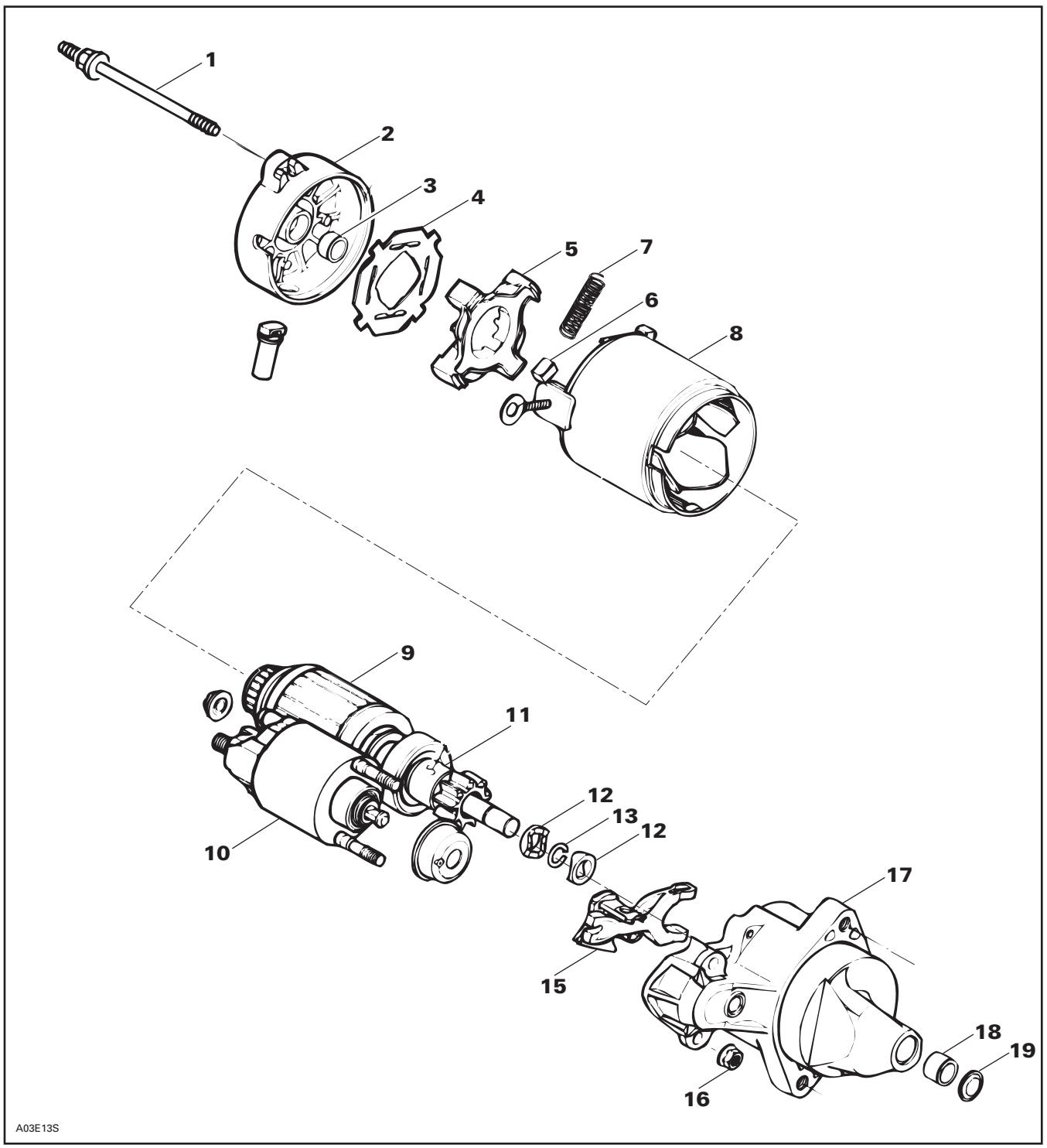
Reinstall air silencer.

Fasten spark plug cables to fan housing.

Reinstall throttle cable to air silencer. See removal illustration.

ELECTRIC STARTER

S-Series with Electric Starting



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**.

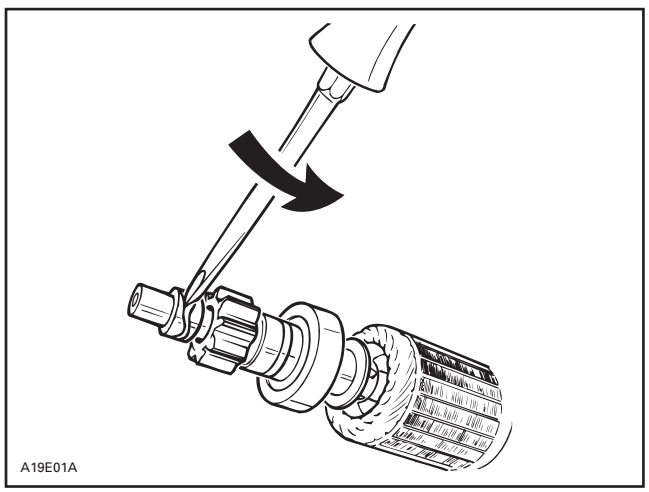
Unscrew starter longer screws **no. 1** then pull yoke **no. 8** with end frame **no. 2** to separate from drive housing **no. 17**.

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.

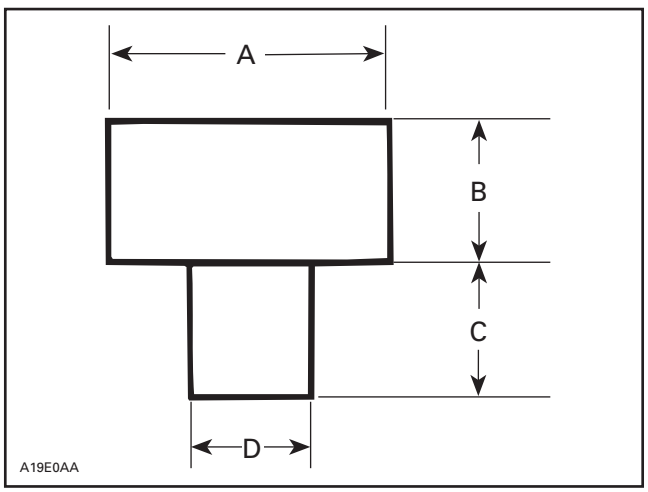
Remove overrunning clutch **no. 11**.

Check the wear on bushing **no. 18** by measuring the amount of radial play between the armature shaft and the bushing.

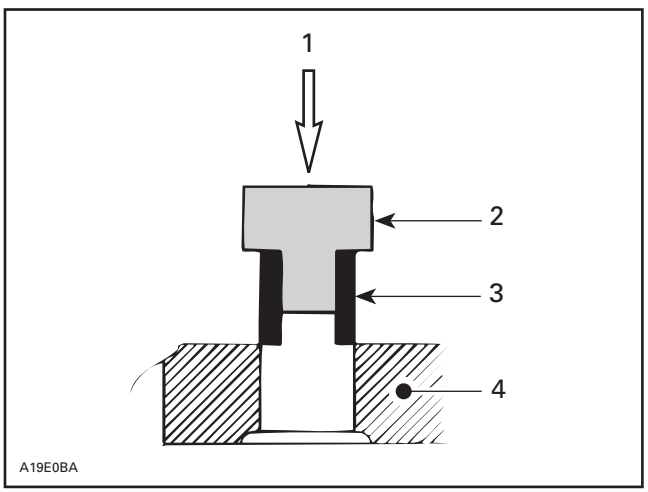
The radial play should not exceed 0.20 mm (0.008 in). If greater, replace the bushing. To replace, press out the old one toward bushing cover and press in a new one with a bushing pusher. The correct size of the bushing pusher to use is given on next illustration.

▼ CAUTION

Support drive housing adequately to prevent damage when pressing bushing.

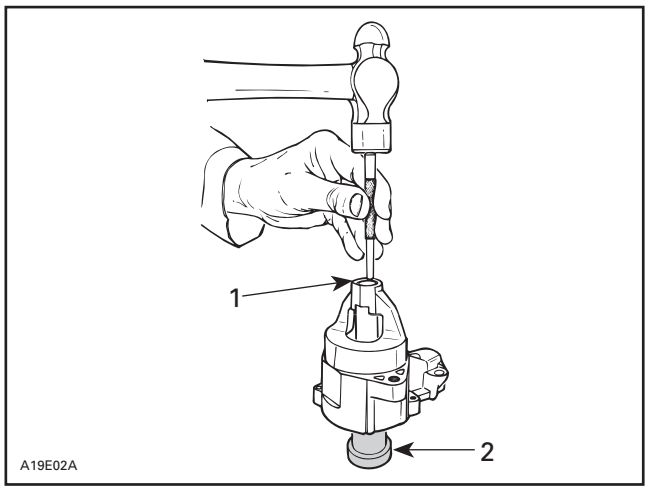


BUSHING PUSHER
A. 16 mm (5/8 in) dia.
B. 13 mm (1/2 in)
C. 11 mm (7/16 in)
D. 11 mm (.433 in)



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.



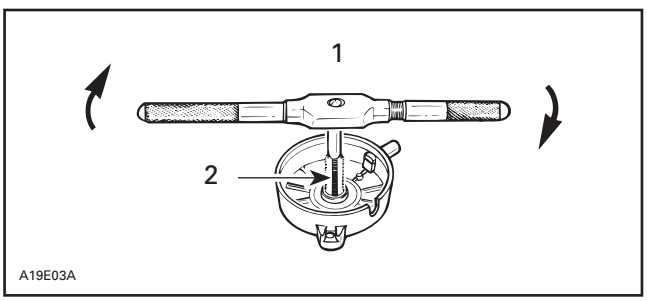
1. Stake bushing cover
2. Support

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.



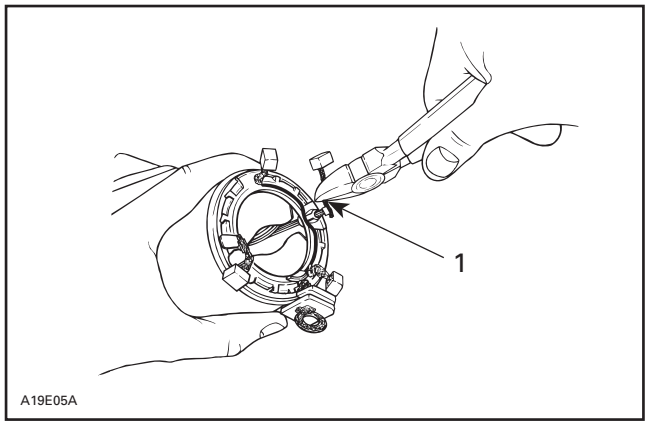
1. Turn until bushing goes out
2. 12 mm tap

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

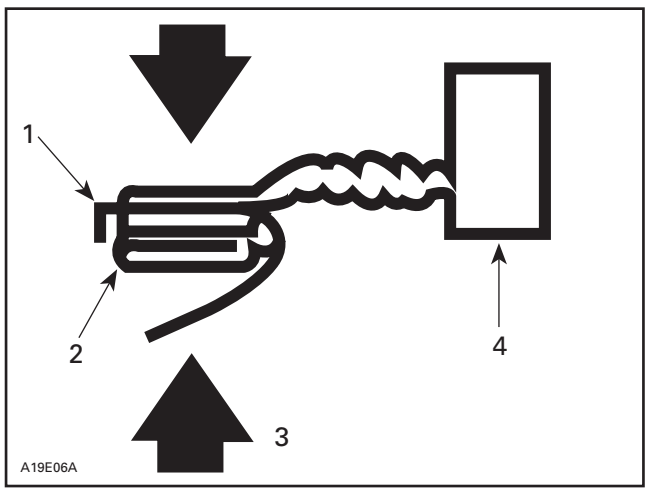
Remove burrs with a file on the remaining welded portion.

▼ 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.

▼ 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 subsection.

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.

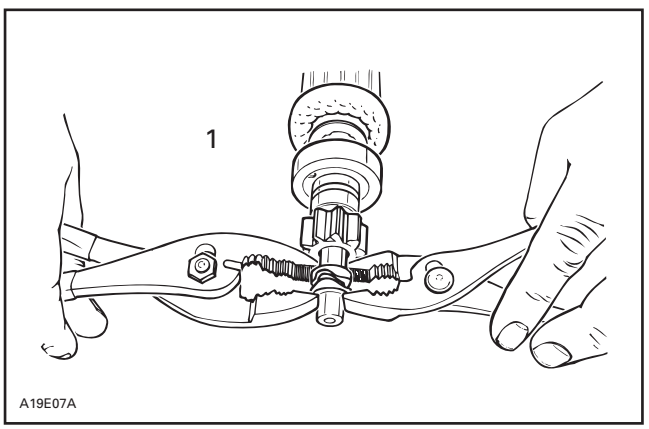
Install overrunning clutch onto armature shaft. Insert **inner** collar onto shaft. Install a new circlip.

▼ CAUTION

Always install a new circlip when servicing.

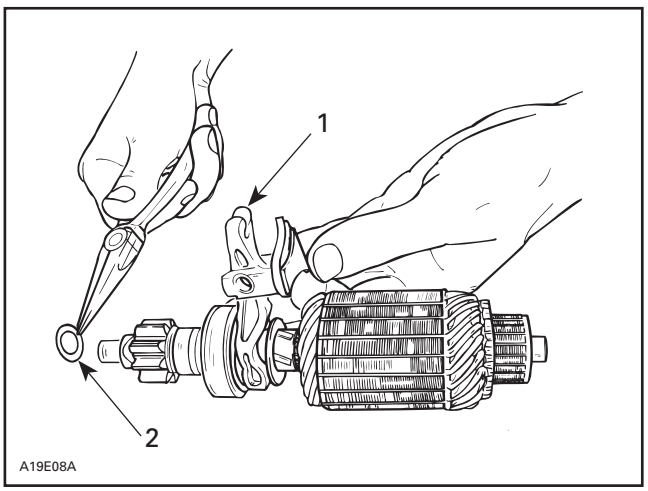
Insert **outer** collar being careful to match protrusions with notches of collars.

Using a pair of pliers on each side of stop collars, squeeze evenly until collars sit over circlip.



1. Squeeze evenly

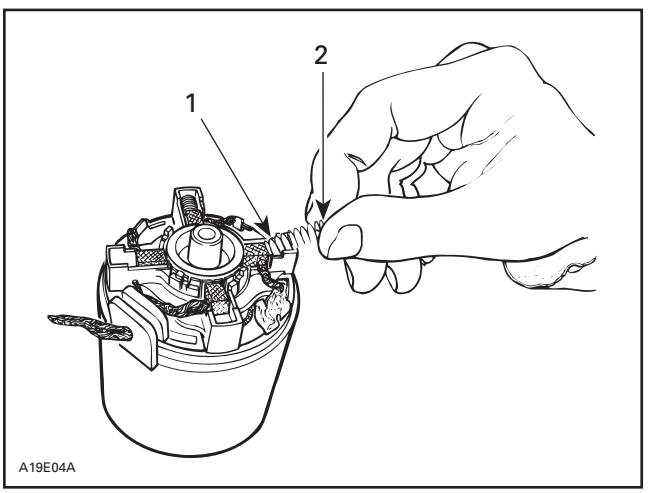
Install thrust washer against outer stop collar. Place drive lever onto overrunning clutch then insert into drive housing.



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.



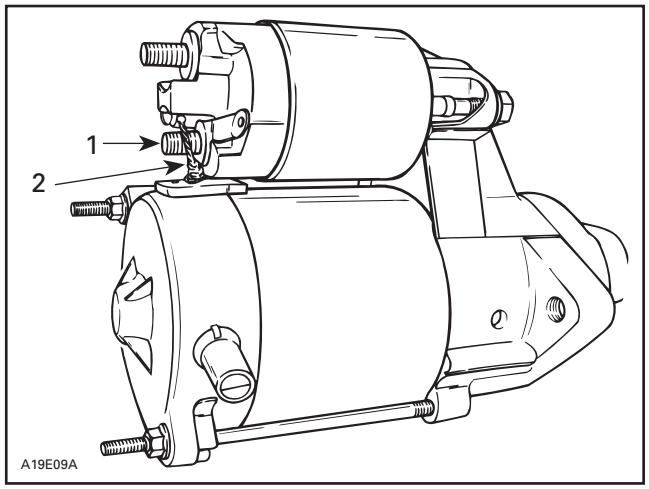
1. This end first
2. Push this end to complete

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

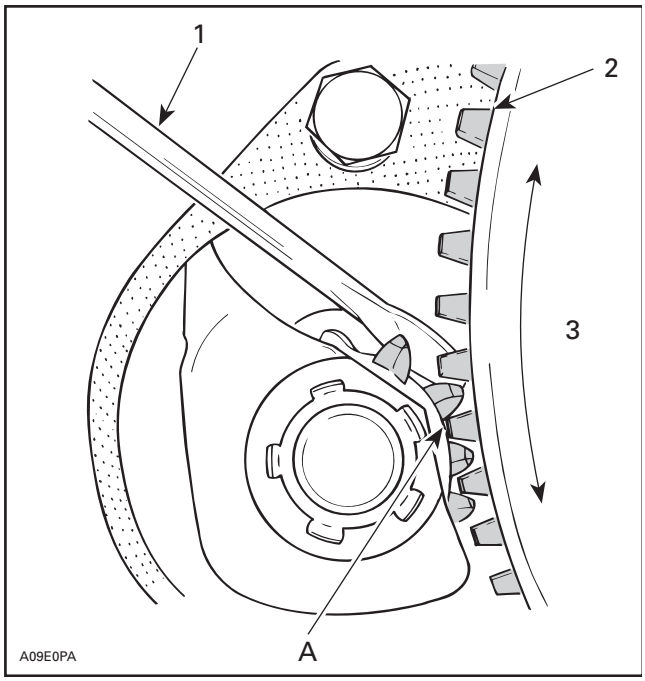
Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

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.

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.

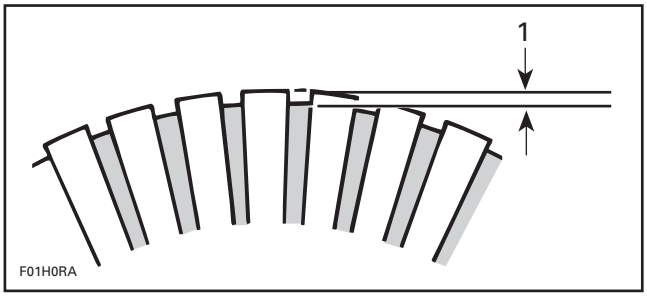
INSPECTION

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.

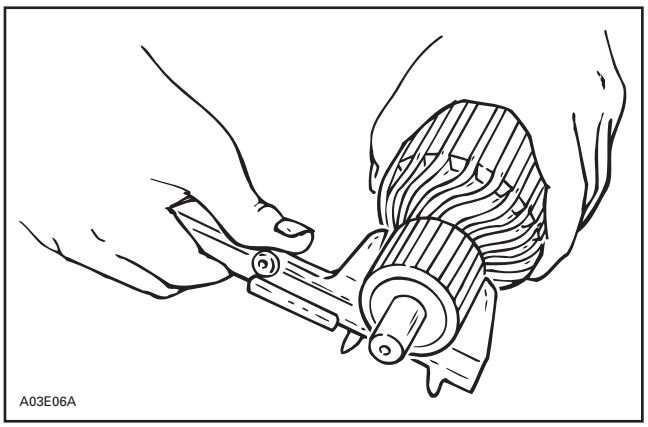
Check the commutator for mica depth. If the depth is less than 0.20 mm (0.008 in), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.



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.

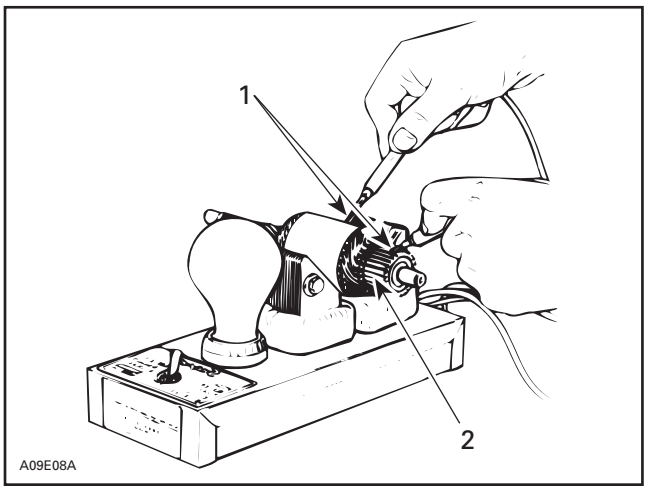
Check commutator outer diameter. If less than specified value, replace.



MODEL	WEAR LIMIT
S-Series	27 mm (1.063 in)

Test for Ground Circuit in the Armature:

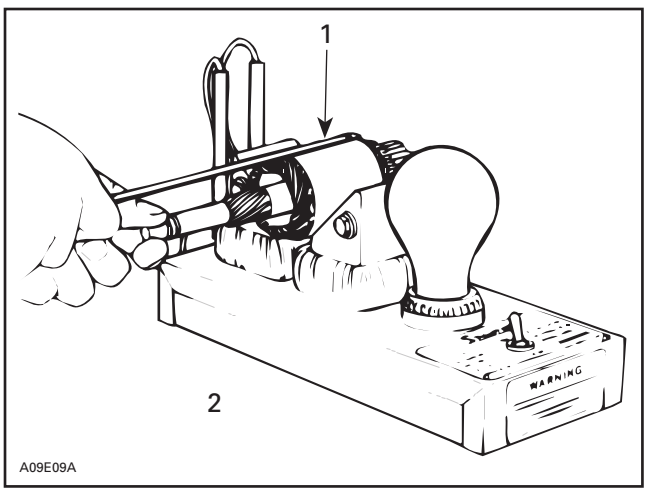
Use growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded. Replace armature if so.



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

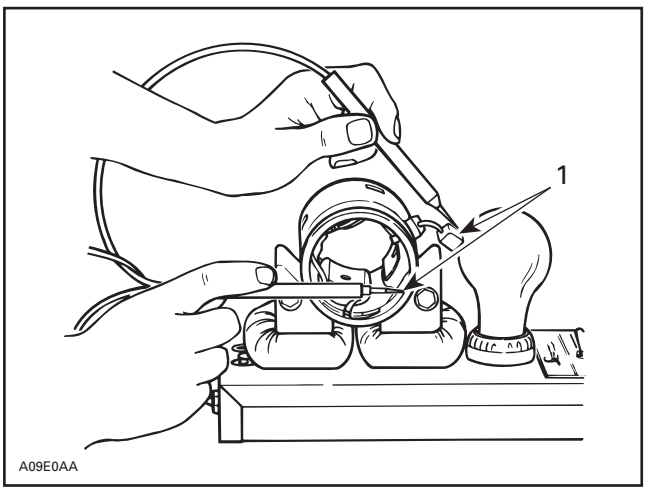
Test the Armature for Open Circuit

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 2 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.

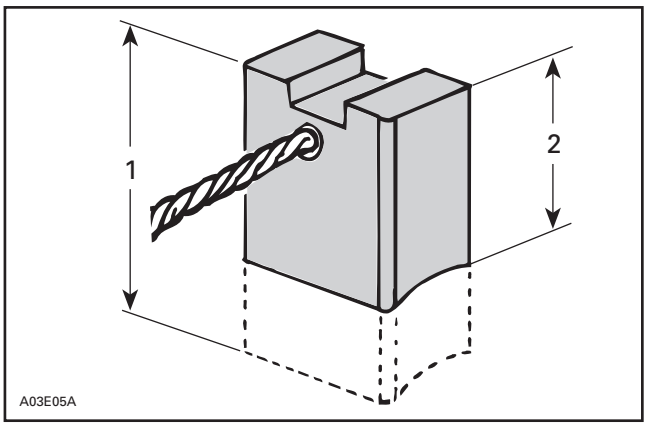
Brush Holder

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	10 mm (.400 in)	6 mm (.236 in)



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.

TESTING PROCEDURE

GENERAL

Two types of ignition systems are found on ROTAX engines covered by this manual; both are Capacitor Discharge Ignition (CDI) systems. The following chart gives the engine types with their implemented system.

ENGINE TYPE	IGNITION SYSTEM	CHARGING SYSTEM OUTPUT
277	① NIPPONDENSO (CDI) SINGLE COIL	160
377, 443 and 503	② DUCATI (ADC)	240

CDI System Identification

Nippondenso

The NIPPONDENSO CDI system has a separate ignition coil which is mounted on fan housing.

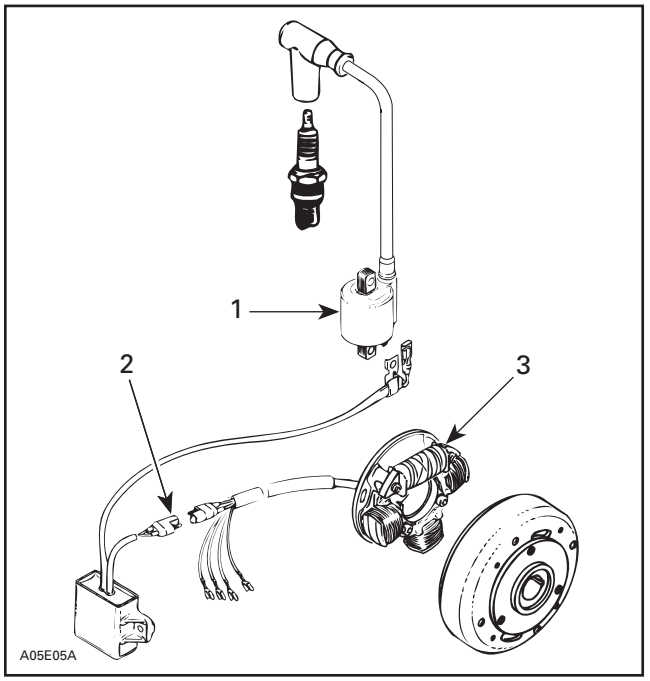
Ignition module is connected to a single ignition generator coil via a 2-wire connector (BLACK and BLACK/RED wires).

277 Engine

Ignition module stamped P/N: 070000-1960

Ignition coil stamped P/N: 129700-2480

Flywheel stamped P/N: 032700-4380



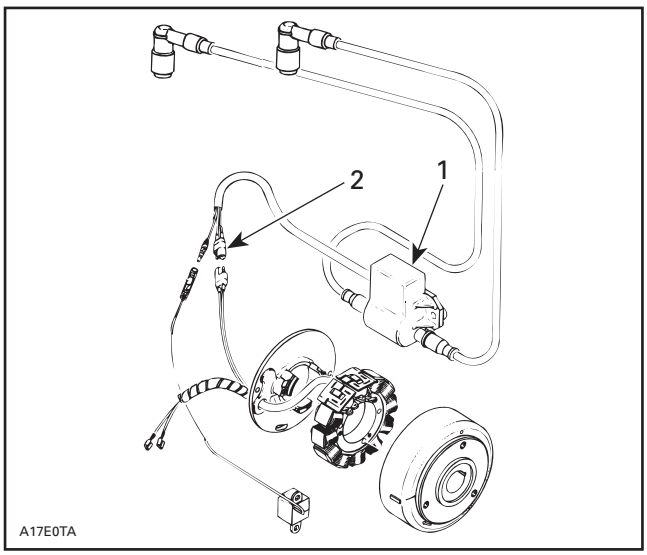
① NIPPONDENSO CDI SINGLE COIL SYSTEM

1. Separate ignition coil mounted on fan housing
2. Two-wire connector (BLACK and BLACK/RED wires)
3. Single ignition generator coil

Ducati

The DUCATI CDI system has a combined ignition module/ignition coil which are mounted on air silencer, below carburetor(s).

Ignition module is connected to the ignition generator coils via a 4-wire connector (GREEN and WHITE wires).



② *DUCATI CDI SYSTEM*

1. *Combined ignition module/ignition coil mounted on air silencer below carburetors*
2. *4-wire connector*

NIPPONDENSO CDI SYSTEM TESTING

Tundra II LT

IGNITION SYSTEM TESTING SEQUENCE

In the case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition;
2. Electrical connectors;
3. Ignition switches, tether cord cap switch and emergency switch;
4. Ignition coil output;
5. Ignition module output;
6. High voltage coil output.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors;
2. Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon vehicle starting. Readings when the engine is running will be higher than indicated range. Part temperature must be approximately 20°C (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

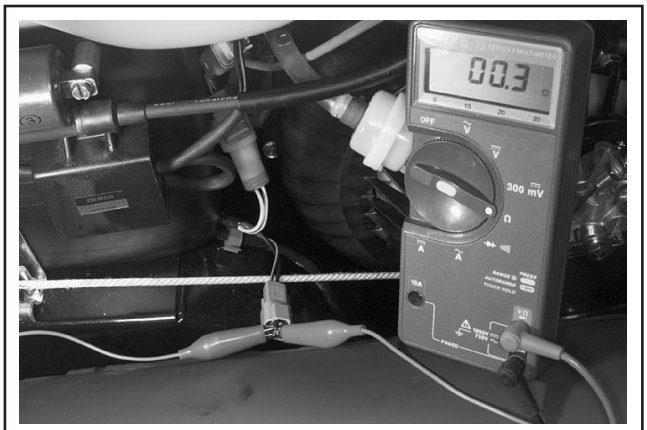
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

Make sure that none of the connectors are disconnected.

3. IGNITION SWITCH, TETHER CORD SWITCH AND EMERGENCY SWITCH TESTING

Disconnect connector housing 1-04 from engine and check resistance as indicated in IGNITION table.



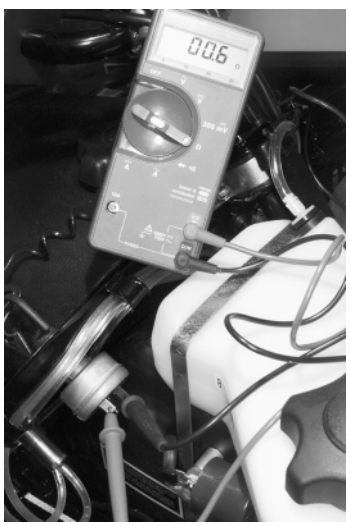
A05E06A

If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

Ignition Switch (key)

Disconnect switch housing. Using a multimeter, check between "MAG" and "GRD" terminals if the circuit is open (0.L $_{M\Omega}$) in operating position and if the circuit is closed (0 $_{\Omega}$) in off position.



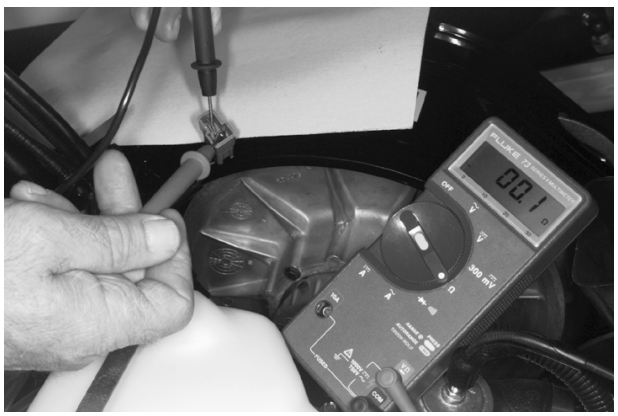
A05E07A

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Emergency Switch

Unplug switch block connected to main wiring harness. Check using a multimeter. Connect probes to BLACK/YELLOW and BLACK wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 Ω) in off position.



A05E08A

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Tether Cord Switch

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to BLACK/YELLOW and BLACK wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 Ω) in off position.

A05E09A

If readings do not correspond to the above mentioned indications, replace switch.

If readings are acceptable, check other switches.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

NOTE: For the next step, no switch must be connected to the main wiring harness.

Disconnect all switches from the main wiring harness and check the continuity of each wire by connecting probes to the end of wires of the same color. Repeat with all other wires. It is important to mention that all wires of the same color within a given harness are connected together. These wires should therefore have a closed circuit. On the other hand, BLACK and BLACK/YELLOW wires must have an open circuit (0.L $_{M\Omega}$).

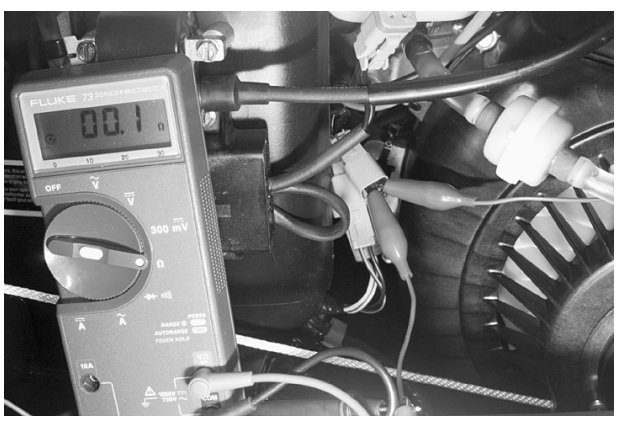
Repair or replace if necessary.

General

When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

4. IGNITION GENERATOR COIL VOLTAGE TESTING

1. Disconnect the 2-wire housing between the ignition module and the magneto wiring harness.
2. Connect multimeter probes and bring the selector switch to $\tilde{V}$ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



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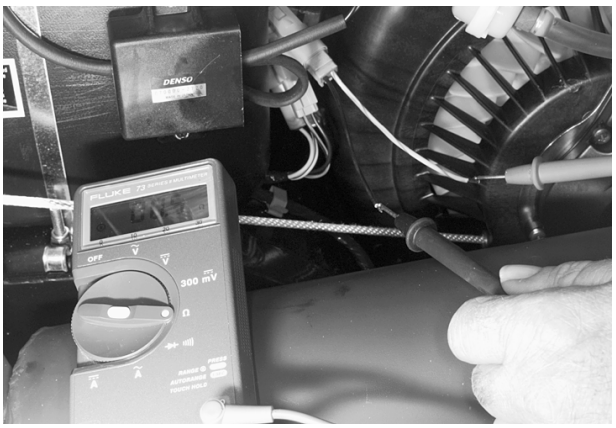

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5. Compare readings with those appearing in the IGNITION table.

5. IGNITION MODULE VOLTAGE TESTING

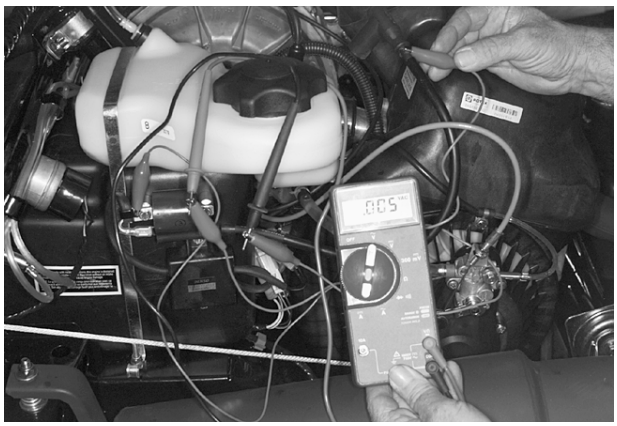
1. Disconnect WHITE/BLUE wire from high voltage coil.
2. Connect one multimeter probe to the screw, and the other one to the WHITE/BLUE wire. Place the selector switch to $\tilde{V}$ and the scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.

A05E0CA

5. Compare readings with those appearing in the IGNITION table.

6. HIGH VOLTAGE COIL VOLTAGE TESTING

1. Disconnect spark plug cap from spark plug.
2. Fasten alligator clip to spark plug cable, near the spark plug.
3. Connect other multimeter wire to high voltage coil screw, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
4. Activate the manual starter and check values indicated by the multimeter.
5. Repeat operation 3 times.



A05E0DA

6. Compare readings with those appearing in the IGNITION table.

CONCLUSION

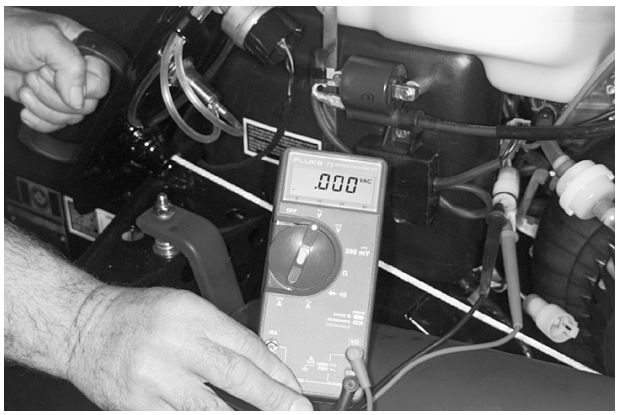
If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the IGNITION table.

Set the multimeter as indicated.

LIGHTING GENERATOR COIL VOLTAGE TESTING

NOTE: The lighting generator coil is not part of the ignition system. It is a self-contained system used to supply current to the lighting system and to other devices working on alternating current. However, this system can be tested using a multimeter.

1. Disconnect housing from engine (YELLOW and YELLOW/BLACK wires).
2. Connect multimeter wires, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.



A05E0EA

5. Compare readings with those appearing in the LIGHTING table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the LIGHTING table.

Set the multimeter as indicated.

IGNITION SYSTEM TESTING (Tundra II LT)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Stop switch	Running insulation	BK and BK/YL	1-04-1-F and 1-04-2-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	1-04-1-F and 1-04-2-M	00.0 - 00.5	00.0 Ω	—	—	At least one stop switch must be operational.
Ignition generator coil	Output	BK and BK/RE	4-20-1-M and 4-20-2-M	40.0 - 76.0	00.0 Ω	18.0 - 30.0	00.0VAC	No stop switch must be operational.
	Stop wire continuity	BK/RE BK/YL	4-20-2-M and 1-04-1-M	00.0 - 00.5	00.0 Ω	—	—	—
	Ground continuity	BK and BK	1-04-1-M and 4-20-1-M	00.0 - 00.5	00.0 Ω	—	—	—
	Ground continuity	BK and BK	1-04-1-M and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
Ignition module	Output voltage	BK and WH/BL	3-01-2 and 3-01-2-F	—	—	10.0 - 20.0	00.0VAC	Disconnect WH/BL wire from coil in order to take measurements.
High voltage coil	Primary winding resistance	BK	3-01-2 and 3-01-2-M	0.6	00.0 Ω	—	—	Disconnect WH/BL wire from coil in order to take measurements.
	Secondary winding resistance (spark plug cap included)	—	Spark plug cap and 3-01-2	8.9K - 13.5K	00.0 KΩ	▼ CAUTION Do not measure high voltage coil output voltage.		
	Secondary winding resistance	—	Spark plug wire and 3-01-2	4.9K - 7.5K	00.0 KΩ	▼ CAUTION Do not measure high voltage coil output voltage.		
	Secondary winding voltage	—	In spark plug cap and 3-01-2	—	—	0.3 - 1.2	0.00VAC	The measurement must be taken on the spark plug wire (without the spark plug).
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0K - 6.0K	00.0 KΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (Tundra II LT)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Lighting generator coil	Power	YL and YL/BK	1-03-A-M and 1-03-B-M	0.05 - 0.6	00.0 Ω	3.0 - 7.0	00.0 VAC	—
	Insulation	YL and engine	1-03-A-M and engine	0.L	00.0 MΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

M: Male connector

F: Female connector

DUCATI CDI SYSTEM TESTING

Série S

IGNITION SYSTEM TESTING SEQUENCE

In case of ignition problems, check the following in the prescribed order until the problem can be solved.

1. Sparking/spark plug condition;
2. Electrical connectors;
3. Ignition switches, tether cord cap and emergency switch;
4. Ignition coil output;
5. Trigger coil output;
6. High voltage coil output.

LIGHTING SYSTEM TESTING SEQUENCE

1. Electrical connectors;
2. Magneto output (lighting generator coil).

Testing Conditions

Voltage measurements are always taken upon starting the vehicle. Readings taken when the engine is running will be higher than indicated range. Part temperature must be approximately 20°C (room temperature), otherwise readings could be distorted.

Analysis of Readings

Voltage Readings

When testing the different magneto components, it is important to take into consideration that readings vary according to the force applied onto the manual starter. It is therefore important to employ enough force upon each trial.

The reading must be 3 times within or above the range indicated in the corresponding table. If the reading is too low, the part is considered to be defective and it must be replaced.

Resistance Readings

Place multimeter selector switch to Ω in order to measure resistance. Readings must be within the indicated range. Otherwise, the part is considered to be defective and must be replaced.

▼ CAUTION

When taking measurements, it is useless to try to start the vehicle since readings would then be distorted.

Intermittent Ignition Problems

It is difficult to make a diagnostic in the case of intermittent ignition problems. Thus, problems occurring only when the engine operating temperature is normal must be checked in similar conditions.

In most cases when problems are caused by temperature or vibrations, these can only be solved by replacing parts. Most problems cannot be detected when the engine is stopped.

Multiple Problems

As a matter of fact, more that one component can be defective. As a result, if the problem remains although a part was replaced, start over the whole verification from the beginning in order to identify the other defective component.

1. SPARKING

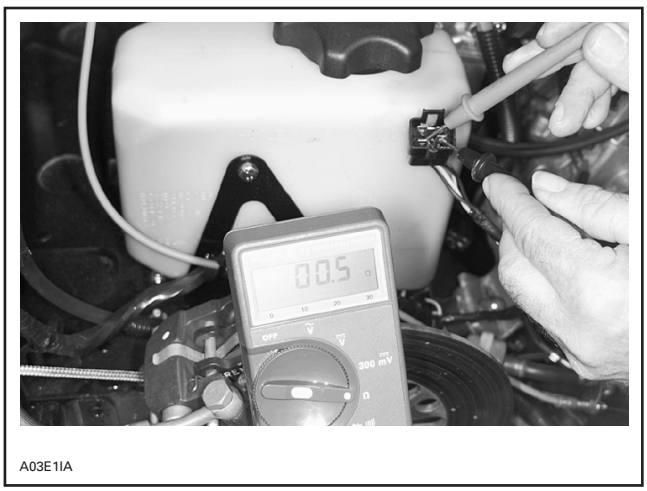
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. If no spark is produced, replace the spark plug with a new one and do the test again.

2. ELECTRICAL CONNECTOR TESTING

Make sure that none of the connectors are disconnected.

3. IGNITION SWITCH, TETHER CORD SWITCH AND EMERGENCY SWITCH TESTING

Disconnect connector housing 2-01 from engine, and using a multimeter, check resistance as indicated in IGNITION table.



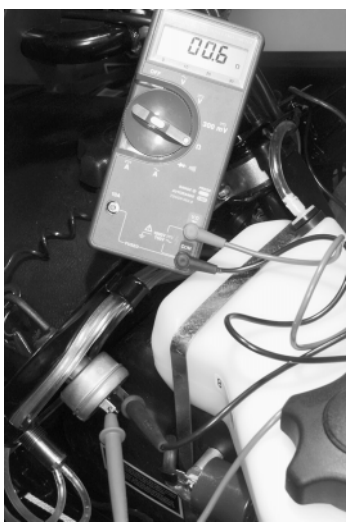
A03E1IA

If readings are acceptable, go on to next step.

If readings are inadequate, individually check each switch as follows.

Ignition Switch (key)

Disconnect switch housing. Using a multimeter, check between "MAG" and "GRD" terminals if the circuit is open (0.L $_{M\Omega}$) in operating position and if the circuit is closed (0 $_{\Omega}$) in off position.



A05E07A

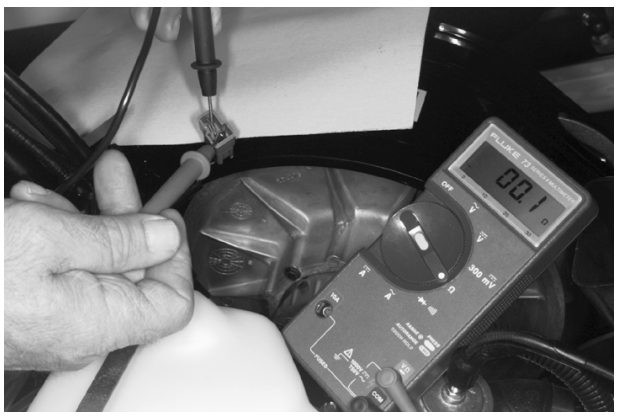
TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Emergency Switch

Unplug switch block connected to main wiring harness. Check using a multimeter. Connect probes to 6-02-C-M and 6-02-D-M terminals. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 Ω) in off position.



A05E08A

TYPICAL

If readings do not correspond to the above-mentioned indications, replace switch.

If readings are acceptable, check other switches.

Tether Cord Switch

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to 6-03-B-M and 6-03-A-M wires. The multimeter should indicate an open circuit (0.L $_{M\Omega}$) in operating position and a closed circuit (0 $_{\Omega}$) in off position.


A05E09A

TYPICAL

If readings do not correspond to the above mentioned indications, replace switch.

If readings are acceptable, check other switches.

If none of these verifications are conclusive, the problem finds its source in the main wiring harness. Proceed as follows:

NOTE: For this next step, no stop switch must be connected to the main wiring harness.

Disconnect all stop switches from the main wiring harness and check the continuity of each wire by connecting probes to the end of wires of the same color. Repeat with all other wires. It is important to mention that all wires of the same color within a given harness are connected together. These wires should therefore have a closed circuit. On the other hand, BLACK and BLACK/YELLOW wires must have an open circuit (0.L $_{M\Omega}$).

Repair or replace if necessary.

GENERAL

When manually starting the engine while the spark plug is installed, the engine will tend to accelerate beyond the compression point. This will result in higher magneto output power.

4. IGNITION GENERATOR COIL VOLTAGE TESTING

1. Disconnect the 4-wire housing between the ignition module and the magneto wiring harness (4-20).
2. Connect multimeter probes to GREEN and WHITE wires (female end), then bring selector to $\tilde{V}$ and scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.

A03E1JA

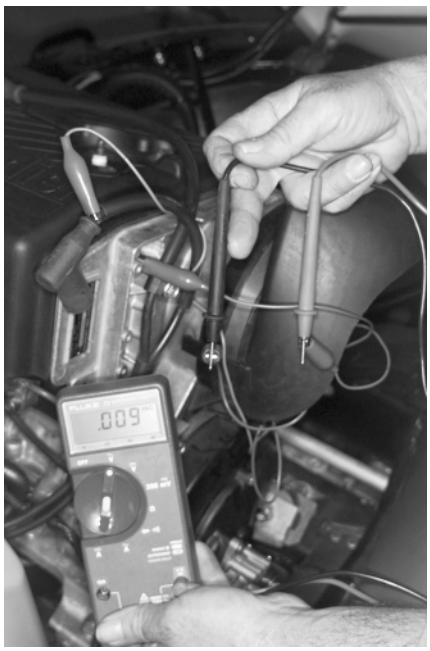
5. Compare readings with those appearing in the IGNITION table.

5. TRIGGER COIL VOLTAGE TESTING

1. Disconnect 4-wire housing between the ignition module and the engine (4-20).
2. Connect multimeter probes to RED/WHITE wire (female side) and to the engine, then bring selector switch to $\tilde{V}$ and scale to 00.0^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.
5. Compare readings with those appearing in the IGNITION table.

6. HIGH VOLTAGE COIL VOLTAGE TESTING

1. Disconnect spark plug cap from right spark plug (magneto side).
2. Fasten alligator clip to spark plug cable, near the spark plug.
3. Connect other multimeter wire to high voltage coil screw, then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
4. Activate the manual starter and check values indicated by the multimeter.
5. Repeat operation 3 times.



6. Compare readings with those appearing in the IGNITION table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the IGNITION table.

Set the multimeter as indicated.

LIGHTING GENERATOR COIL VOLTAGE TESTING

NOTE: The lighting generator coil is not part of the ignition system. It is a self-contained system used to supply current to the lighting system and to other devices working on alternating current. However, this system can be tested using a multimeter.

1. Disconnect housing from engine (2-01).
2. Connect multimeter wires to YELLOW and YELLOW/BLACK wires (female side), then place selector switch to $\tilde{V}$ and scale to 0.00^{VAC}.
3. Activate the manual starter and check values indicated by the multimeter.
4. Repeat operation 3 times.
5. Compare readings with those appearing in the LIGHTING table.

CONCLUSION

If none of the above testing operations produced valid results, it is strongly recommended to keep on testing according to the list appearing in the Resistance column of the LIGHTING table.

Set the multimeter as indicated.

IGNITION SYSTEM TESTING (fan-equipped S-Series)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Stop switch	Running insulation	BK and BK/YL	2-01-D-M and 2-01-C-M	0.L	00.0 MΩ	—	—	No stop switch must be operational.
	Continuity in stop position	BK and BK/YL	2-01-D-M and 2-01-C-M	00.0 - 00.5	00.0 Ω	—	—	At least one stop switch must be operational.
Ignition generator coil	Output	BL and GR	4-20-B-F and 4-20-A-FA	230.0 - 330.0	00.0 Ω	30.0 - 60.0	00.0VAC	No stop switch must be operational.
	Ground continuity	WH and engine	4-20-B-F and engine	00.0 - 00.5	00.0 Ω	—	—	The term "engine" refers to the engine metal parts connected to the magneto housing.
	Ground continuity	BR and engine	4-01-C-F and engine	00.0 - 00.5	00.0 Ω	—	—	
Trigger coil	Continuity	RE/WH and engine	4-20-D-F and engine	140.0 - 180.0	00.0 Ω	2.0 - 9.0	00.0VAC	
Ignition module and high voltage coil	Secondary winding resistance with caps	—	Spark plug cap and on the engine	13.1K - 18.3K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
High voltage coil	Secondary winding resistance without caps	—	Inside spark plug wires and on the engine	5.1K - 6.3K	00.0 KΩ	**▼ CAUTION** Do not measure high voltage coil output voltage.		
	Secondary winding voltage	—	On spark plug wire and on the engine	—	—	0.1 - 0.4	00.0VAC	The measurement must be taken on the spark plug wire (without the spark plug).
	Module insulation	BK	In the cap and on 4-20-A-F	0.L	00.0 MΩ	—	—	—
	Module insulation	—	In the cap and on 4-20-A-F	0.L	00.0 MΩ	—	—	—
Spark plug cap	Cap resistance	—	Spark plug side and wire side	4.0K - 6.0K	00.0 KΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

LIGHTING SYSTEM TESTING (fan-equipped S-Series)								
Part	Test to be performed	Wire color	Multimeter probe connection	Resistance Ω		Voltage V		Note
				Value (Ohms)	Multimeter scale	Value (Volts)	Multimeter scale	
Lighting generator coil	Power	YL and YL/BK	2-01-B-F and 2-01-A-F	0.05 - 0.6	00.0 Ω	2.5 - 7.0	00.0 VAC	—
	Insulation	YL and engine	1-03-A-M and engine	0.L	00.0 MΩ	—	—	—
	Insulation	YL/BK engine	2-01-A-F and engine	0.L	00.0 MΩ	—	—	—

NOTE: Stop switches include the ignition switch, the tether cord switch and the emergency cut-out switch.

It is important to take note that voltage measurements must be taken while starting the vehicle using the manual starter.

Voltages obtained upon starting are proportional to the force applied onto the manual starter. A low voltage is therefore normal under a low cranking force.

Perform testing in the prescribed order and replace any parts not performing according to specifications.

It is important to resume all tests when replacing a component.

If not specified, the probe connecting sequence is not important.

M: Male connector

F: Female connector

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 YELLOW/BLACK wire.

Connect the other wire of the voltmeter to 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 YELLOW or YELLOW/BLACK 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.

INSPECTION OF HEATING ELEMENTS

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

HIGH INTENSITY	YELLOW/BLACK wire ORANGE wire	8.73 to 10.67 ohms
LOW INTENSITY	YELLOW/BLACK wire ORANGE/VIOLET wire	17.7 to 20.7 ohms

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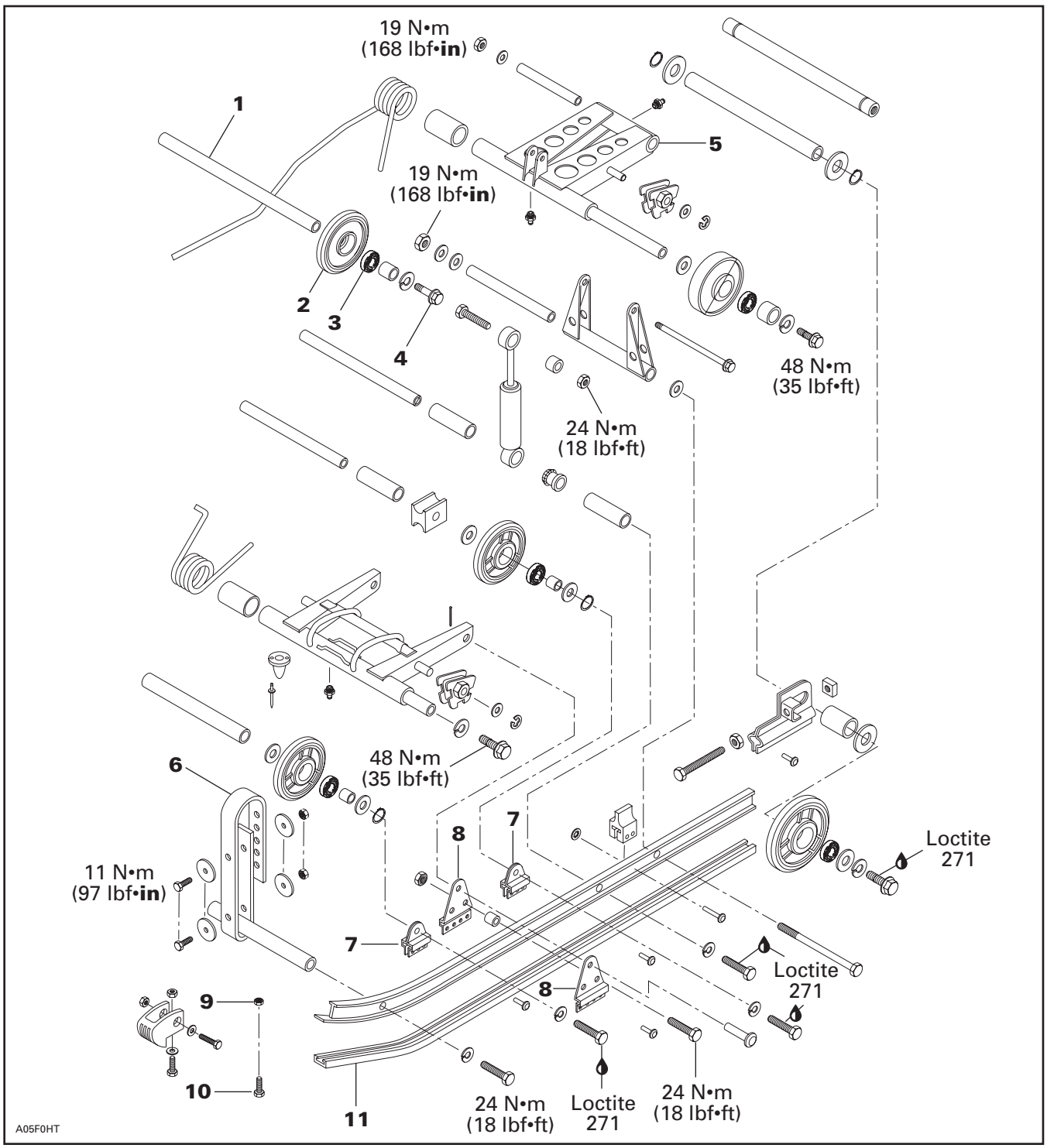
TORQUE REACTION SUSPENSION

Tundra II LT



COMPONENT REMOVAL

Lift rear of vehicle and support it off the ground.

5, Rear Arm

Release spring tension. Unfasten shock from rear arm. Remove 3 screws retaining rear arm.

REMOVAL

NOTE: To prevent cross shaft from turning when unscrewing screws assembled with threadlocker, proceed as follows:

– Loosen one screw then retighten.
– Remove the other screw.
– Remove the first one.

1,2,3,4, Cross Shaft, Idler Wheel, Spacer and Screw

Remove idler wheel ass'y.

Lift rear of vehicle and support it off the ground.

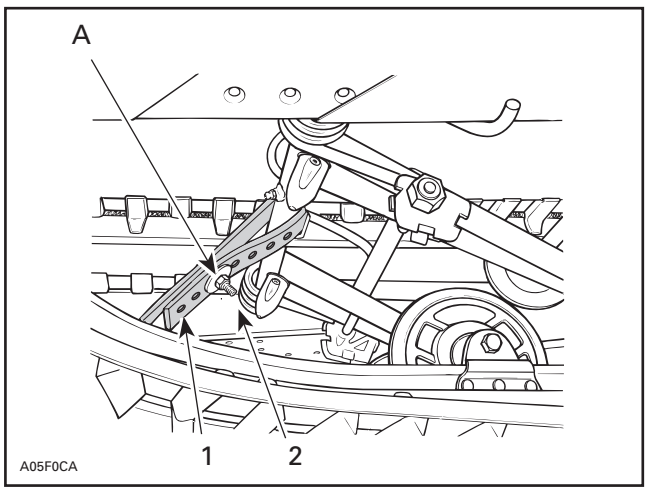
Unscrew 4 screws retaining front arm and rear arm to frame.

Remove suspension.

DISASSEMBLY AND ASSEMBLY

6, Stopper Strap

Inspect strap for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through the 3rd hole from the end. Torque nut to 11 N•m (97 lbf•**in**).

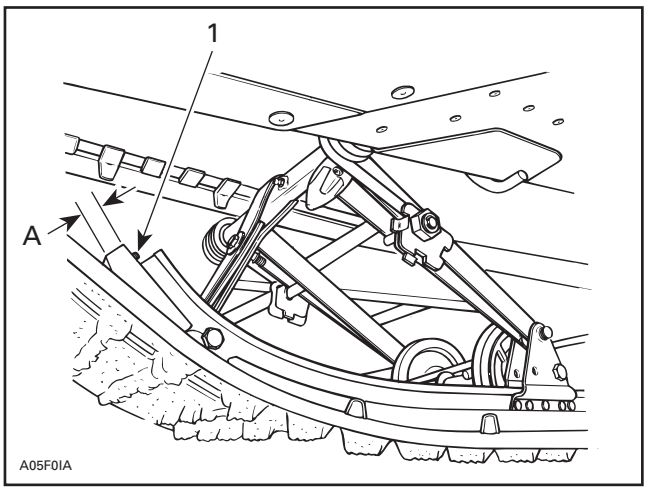


1. 1st hole
2. 3rd hole
*A. 11 N•m (97 lbf•**in**)*

9,10,12, Nut, Slotted Screw and Slider Shoe

To replace a worn shoe, remove the front screw and stop nut, then slide the shoe rearward out of the runner.

NOTE: Slider shoe minimum thickness: 10 mm (25/64 in).



1. Front screw and nut
A. 10 mm (25/64 in)

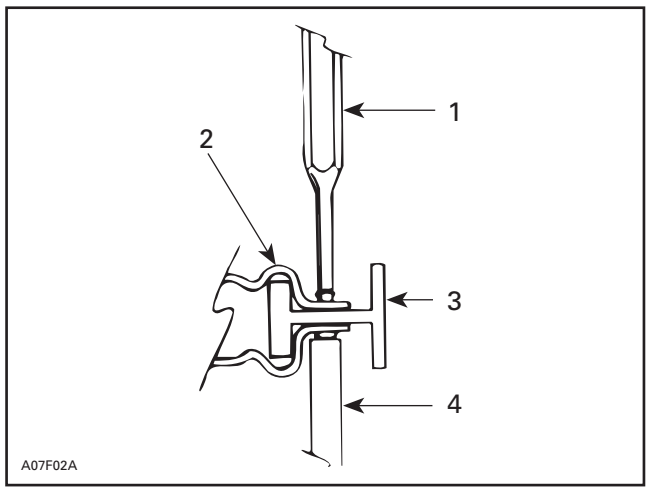
▼ CAUTION

Slider shoes must always be replaced in pairs.

7,8, Support and Front Arm Support

To remove rivets securing the supports, cut rivet heads off using a cold chisel.

At assembly, position the rivet head toward the outside of the assembly. Support the rivet head against a metal block, as shown, and use a flat head punch to secure the rivet in place.



1. Flat head punch
2. Support
3. Runner
4. Metal block

NOTE: Rivets can be substituted with 3/16 in x 3/4 in long screws and flanged elastic stop nuts. Always position screw head outside the assembly.

INSPECTION

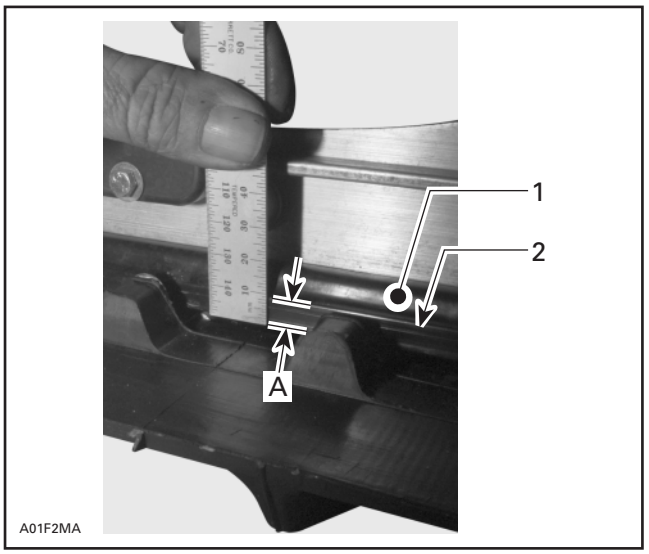
Shock Absorber

Refer to SUSPENSION AND SKI SYSTEM 08-03 for shock inspection.

11, Slider Shoe

Measure slider shoes from the bottom to the 0.5 mm (.020 in) radius as shown on the next photo.

Minimum thickness must be 2 mm (.080 in).



TYPICAL
1. Slider shoe
2. Molding line (this line is not the wear limit)
A. Wear measurement (must be at least 2 mm (.080 in))

Replace slider shoes when wear limit is reached.

▼ CAUTION

Slider shoes must always be replaced in pairs.

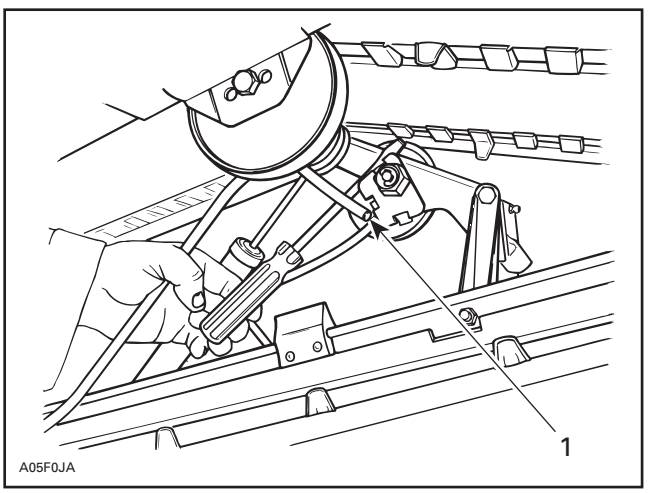
INSTALLATION

Release rear spring tension then install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

Bolt suspension to tunnel.

Pry rear spring end onto cam.



1. Spring end

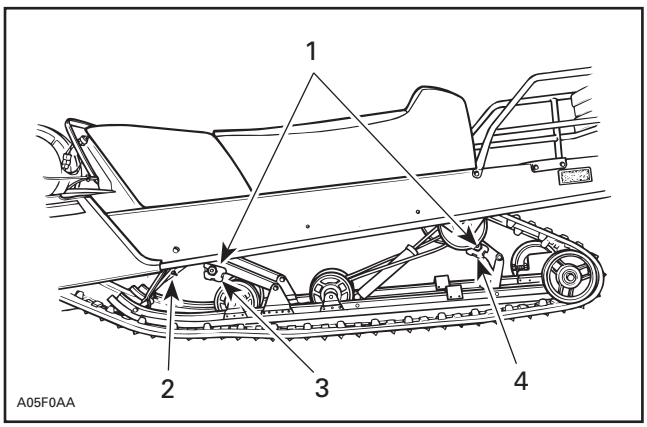
Adjust track tension/alignment. Refer to TRACK 07-05.

RIDE ADJUSTMENT

The front portion of rear suspension is adjustable for surface condition and steering effects.

The stopper strap is adjustable for vehicle weight transfer control.

The rear portion of rear suspension is adjustable for driver's weight.



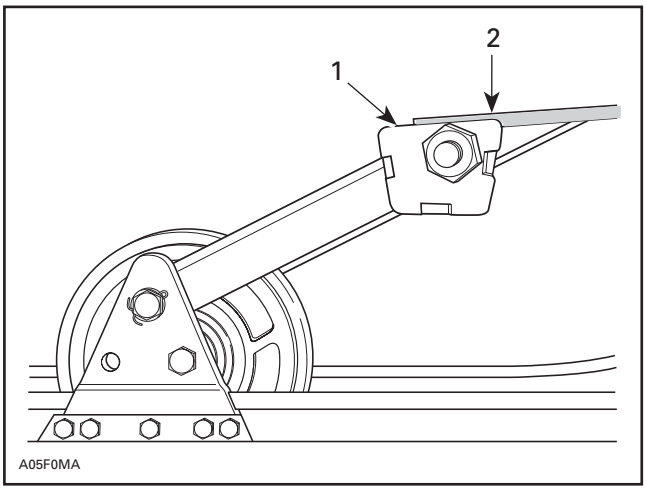
1. Driver's weight
2. Stopper strap for weight transfer
3. Steering effect/surface condition
4. Adjustment cams

Choice of suspension adjustments depends on carrying load, driver's weight, personal preference, riding speed and field condition.

Slight suspension bottoming occurring under the worst riding conditions indicates a good choice of spring preload.

To adjust rear suspension adjustment cams, use special key supplied in vehicle tool box.

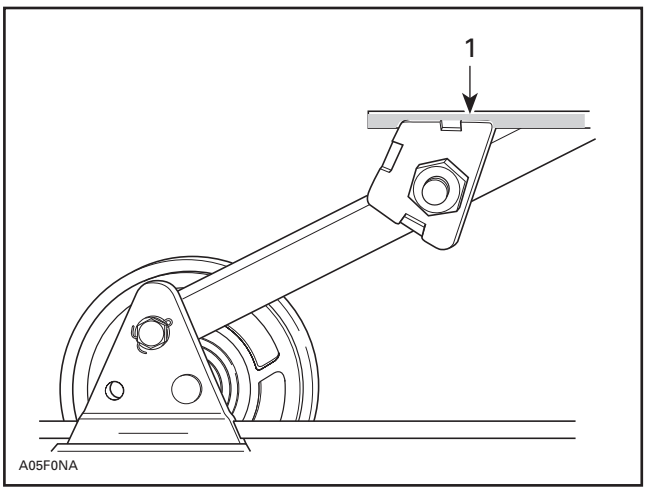
Turning adjustment cam moves edges of cam supporting spring rod. The softest adjustment is reached when the supporting edge of cam is the closest to hexagonal portion of cam.



SOFTEST ADJUSTMENT

1. Supporting edge closest to hexagonal
2. Spring

The stiffest adjustment is reached when the supporting edge of cam is the farthest to hexagonal portion of cam.

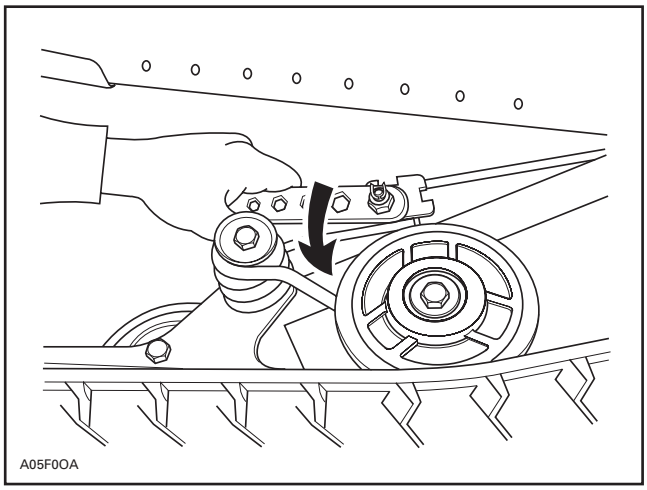


STIFFEST ADJUSTMENT

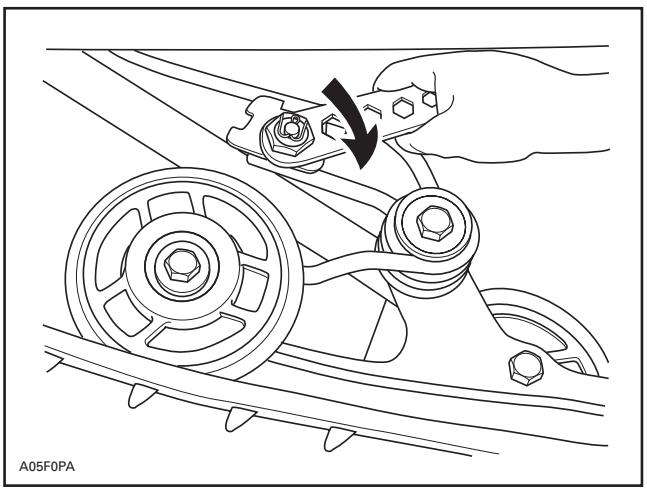
1. Supporting edge farthest to hexagonal

▼ CAUTION

Always turn the left side adjustment cams in a clockwise direction and the right side cams in a counterclockwise direction. Left and right adjustment cams must always be set at the same position.



RH SIDE

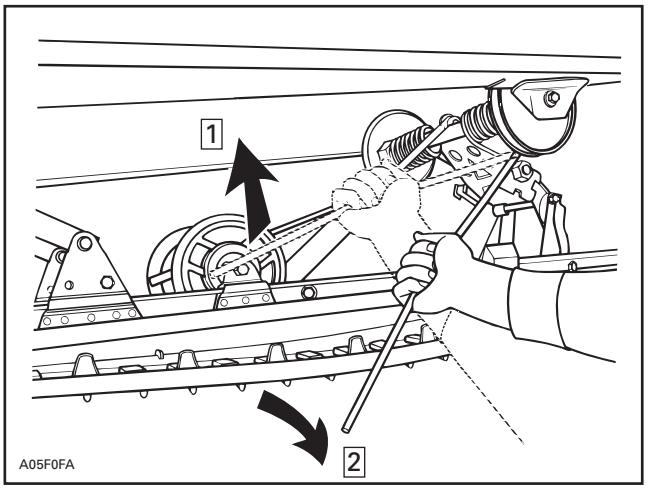


LH SIDE

NOTE: To quickly change rear cam position without using any tool:

– Lay vehicle on its side.

– Unhook rear spring by hand from lower idler wheel.



– Turn adjustment cam by hand to the desired position.

– Reinstall spring on its support making sure that it sits in the groove of support.

Stopper Strap

The function of the stopper strap is to control the transfer of vehicle weight during acceleration and to control track lead angle.

The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive steering.

The longer the belt, the greater will be the track lead angle. A shorter belt will reduce track lead angle which may help when negotiating a particular snow condition.

Adjusting holes on the stopper strap allow to adjust it according to driver's requirements, field and/or snow conditions.

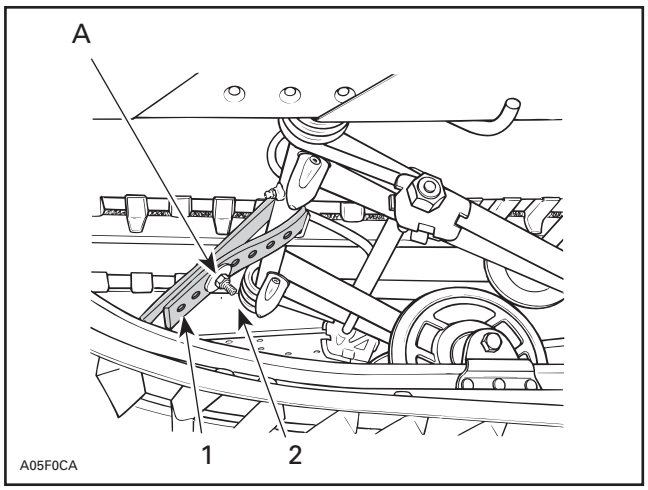
▼ CAUTION

Whenever stopper strap length is changed, track tension must be readjusted to prevent any possibility of operating vehicle with a too loose or too tight track tension.

For normal use, locate bolt through 3rd hole from strap end.

◆ WARNING

Always torque the nut to 11 N•m (97 lbf•**in**). Replace strap if worn or torn.



1. 1st hole
2. 3rd hole
*A. 11 N•m (97 lbf•**in**)*

NOTE: When towing a load, it is suggested to adjust stopper strap to its shortest length, soften front springs of rear suspension and stiffen rear springs. These adjustment will improve steering ability.

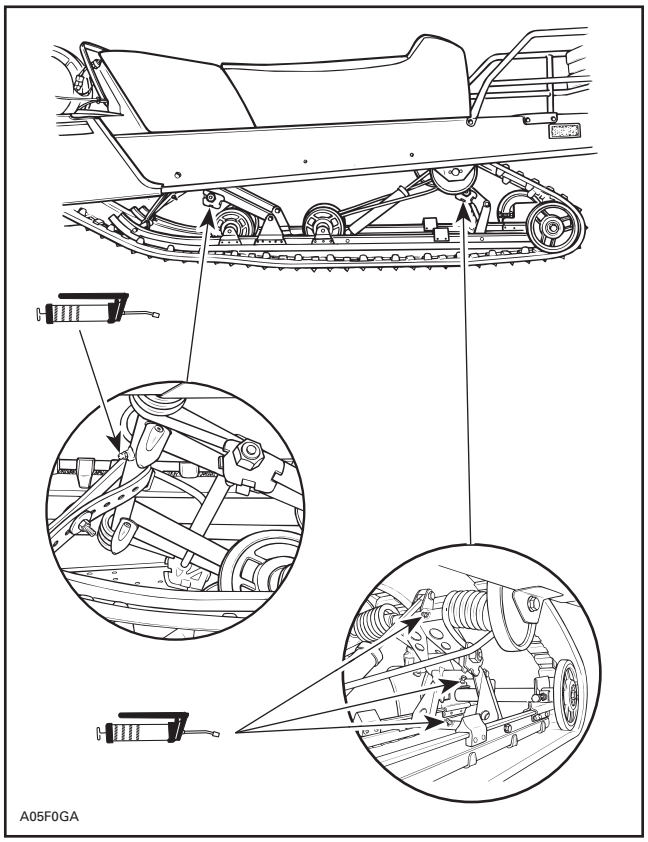
Deep Snow Operation

When operating the vehicle in deep snow, it may be necessary to change position of adjustment cams, stopper strap and/or driver's riding position, to change the angle at which the track rides on the snow. Operator's familiarly with the various adjustments as well as snow conditions will dictate the most efficient combination.

LUBRICATION

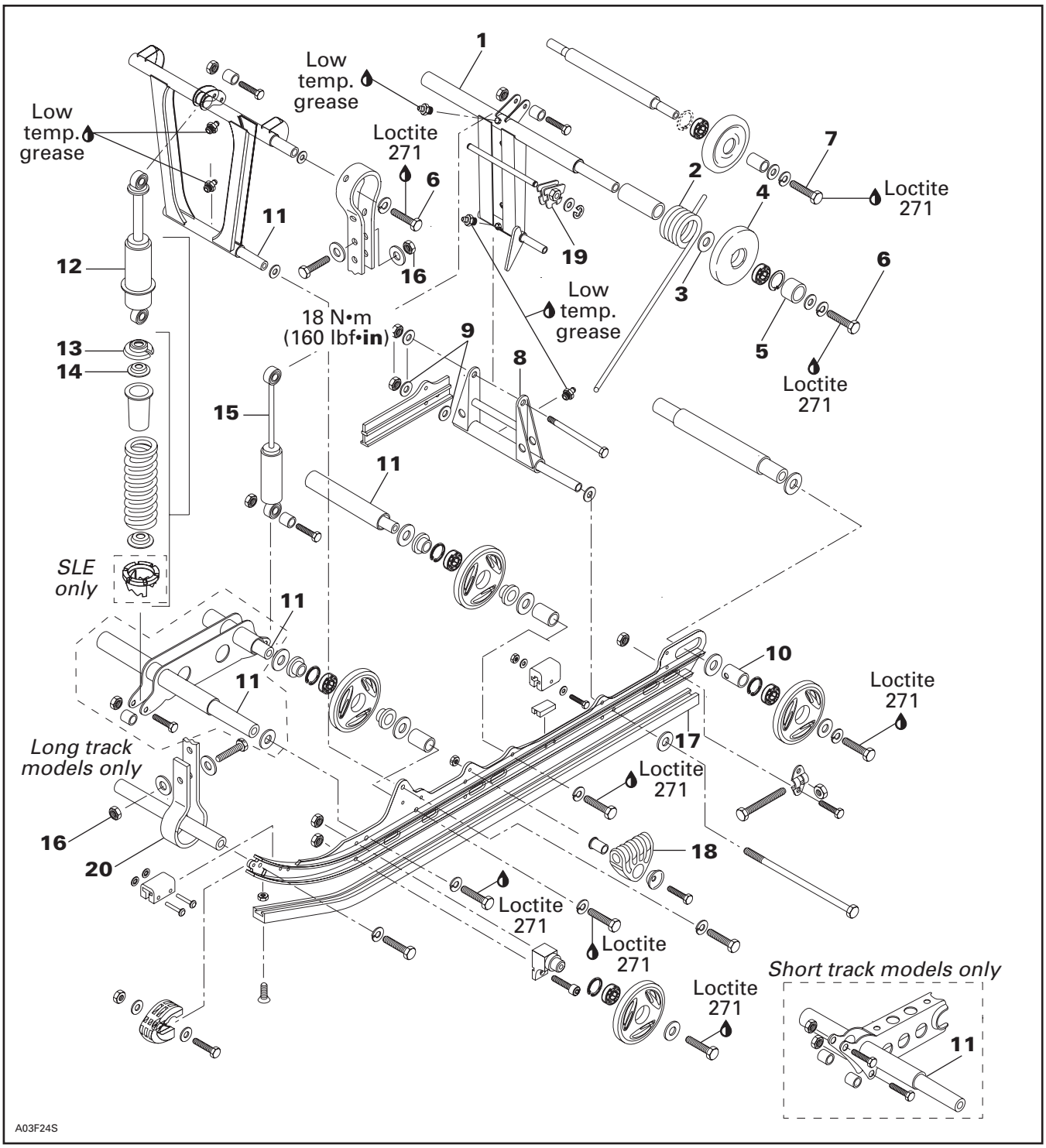
Lubricate front and rear arms at grease fittings using synthetic grease (P/N 413 7115 00).

NOTE: There are 4 grease fittings.



SC-10 SPORT AND TOURING SUSPENSION

S-Series



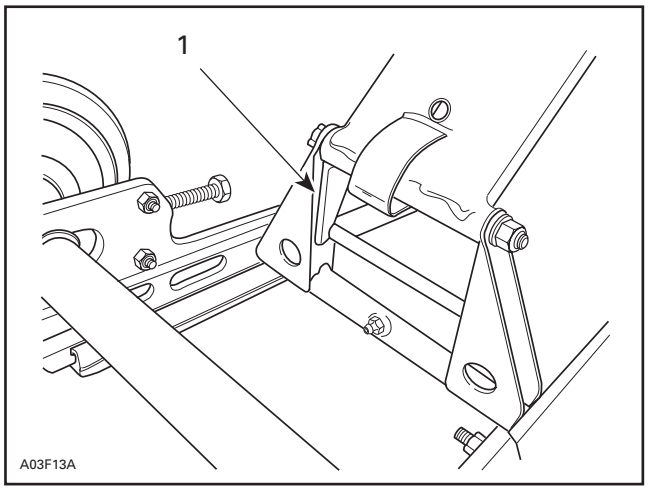
COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

1, Rear Arm

Release spring tension by unfastening spring support. Unfasten shock from rear arm. Remove 3 screws retaining rear arm.

At installation, rear arm stroke limiter must be behind shackle.

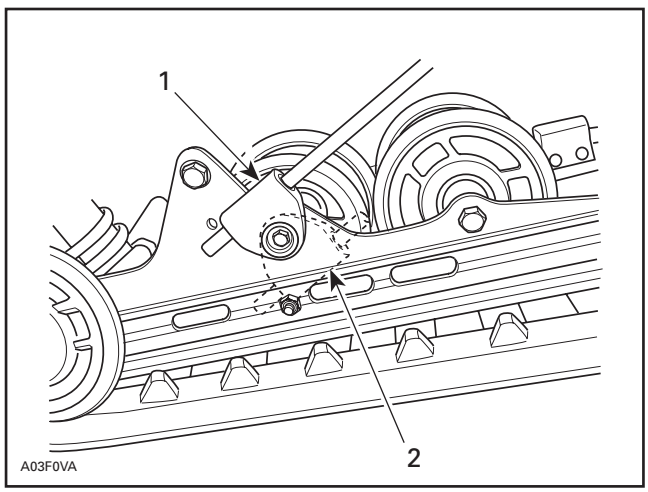


1. Stroke limiter on rear side

18, Spring Support

▼ CAUTION

To avoid track damage, spring supports must be mounted upward.



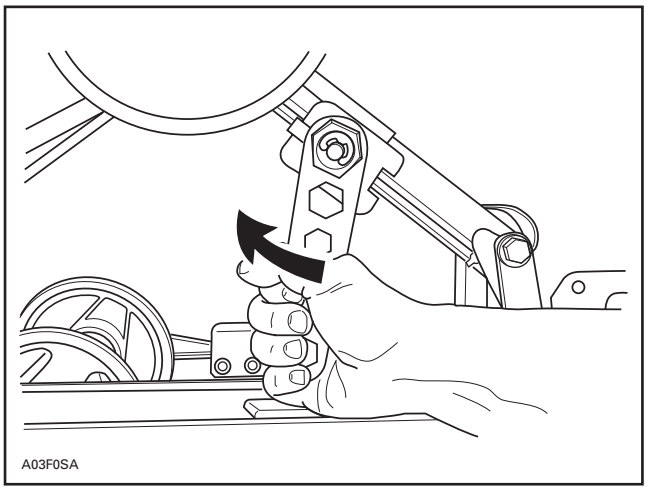
RIGHT SIDE SHOWN

1. Right position: upward
2. Wrong position

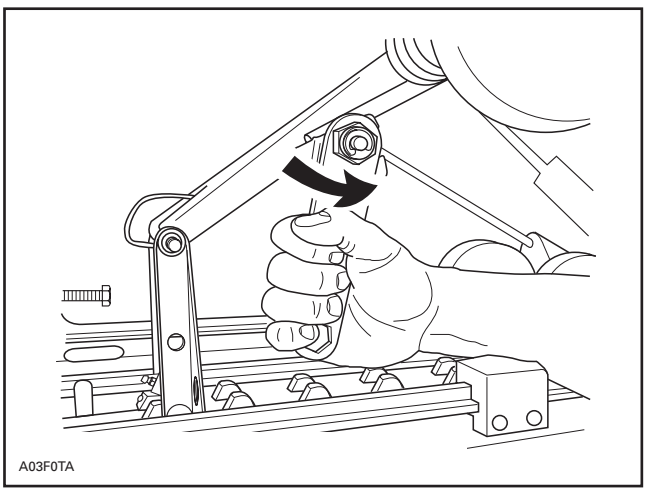
REMOVAL

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. Block suspension in place.

2,3,4,5,6,18, Spring, Washer, Idler Wheel, Spacer, Screw and Spring Support

Unbolt spring support from runner while retaining spring end. Move spring end rearward to completely release spring preload. Proceed with the other side.

Unscrew both rear arm screws.

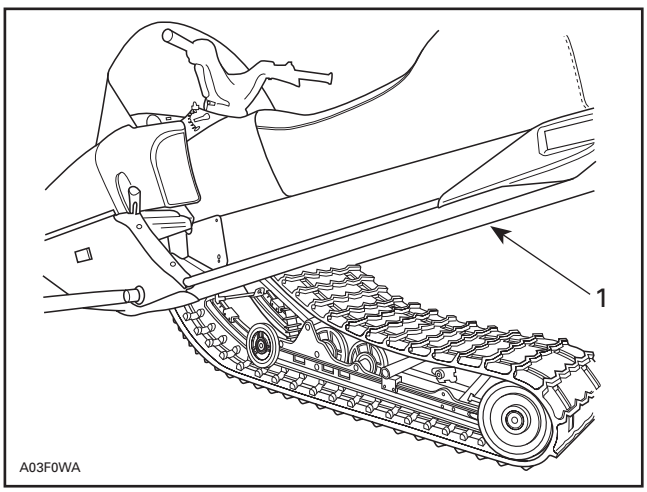
NOTE: To prevent cross shaft from turning when unscrewing screws assembled with threadlocker, proceed as follows:

– Knock on screw head and/or heat to break threadlocker bond.
– Loosen 1 screw then retighten.
– Remove the opposite screw.
– Remove the first one.

7, Screw

Unscrew center idler wheel axle from tunnel then remove.

Lift rear of vehicle until spacers, idler wheels, washers and springs can be removed.



1. Lift rear of vehicle

6, Screw

Remove both screws retaining front arm to tunnel.

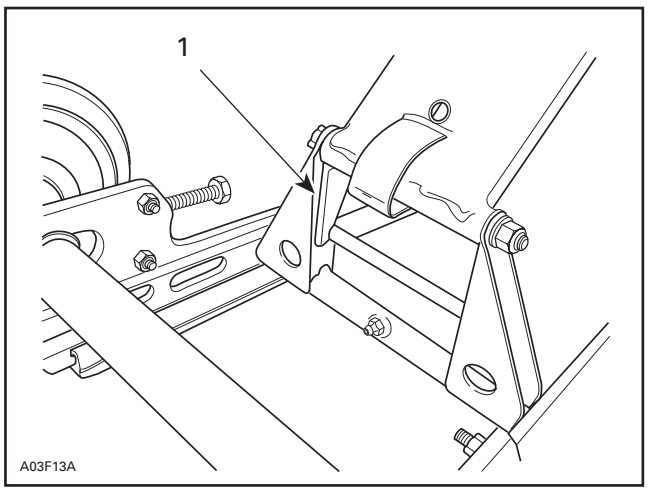
Remove suspension.

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to 07-05 TRACK.

1, Rear Arm

At installation, rear arm stroke limiter must be on rear side.



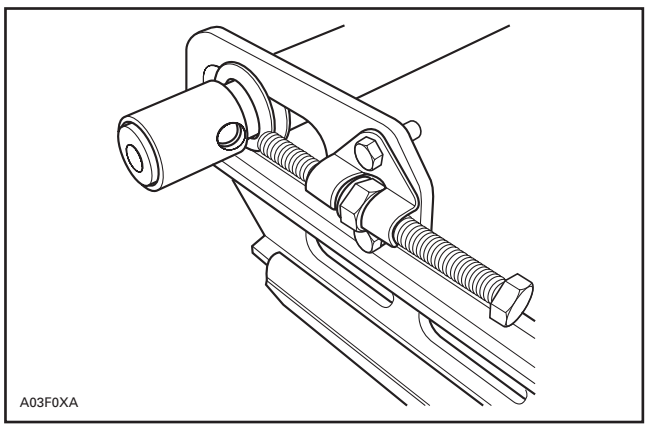
1. Stroke limiter on rear side

8,9, Pivot Arm and Flat Washer

At installation pivot arm grease fitting must face rearward. Small washer must be against nut. Large washers must be inside rails on both side.

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.

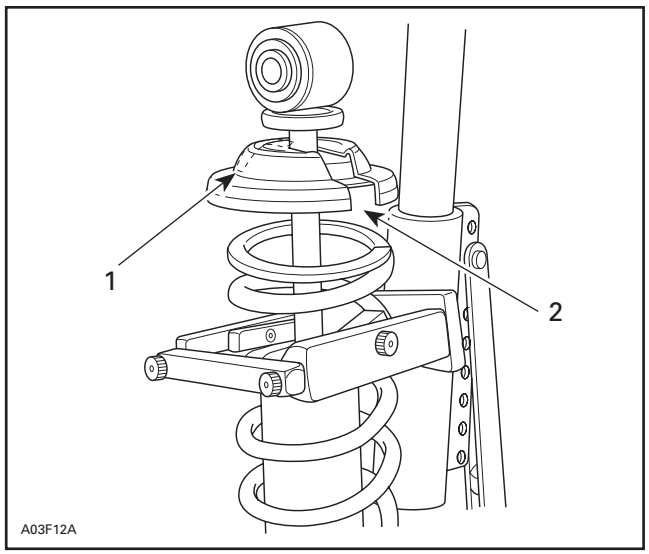
12,13,14, Front Shock, Spring Stopper and Cap

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 il locks. Remove spring stopper and cap then release handle.

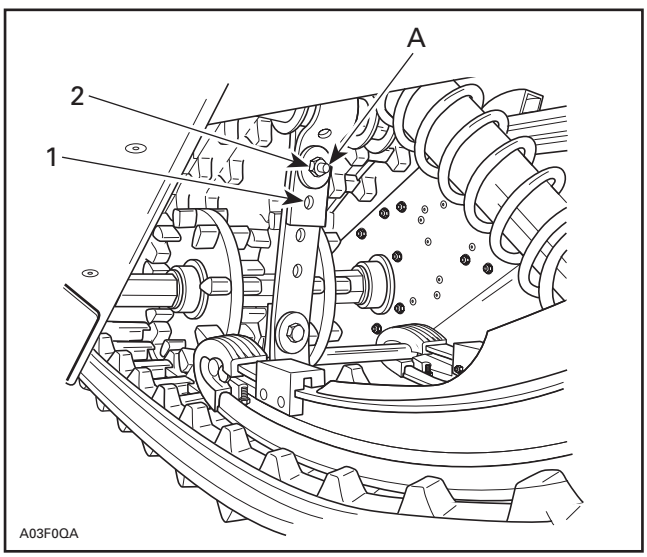
At installation, cap opening must be 180° from spring stopper opening.



1. Spring stopper opening
2. Cap 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 the 2nd hole from the end. Torque nut to 11 N•m (97 lbf•**in**).



1. 1st hole
2. 2nd hole
*A. 11 N•m (97 lbf•**in**)*

INSPECTION

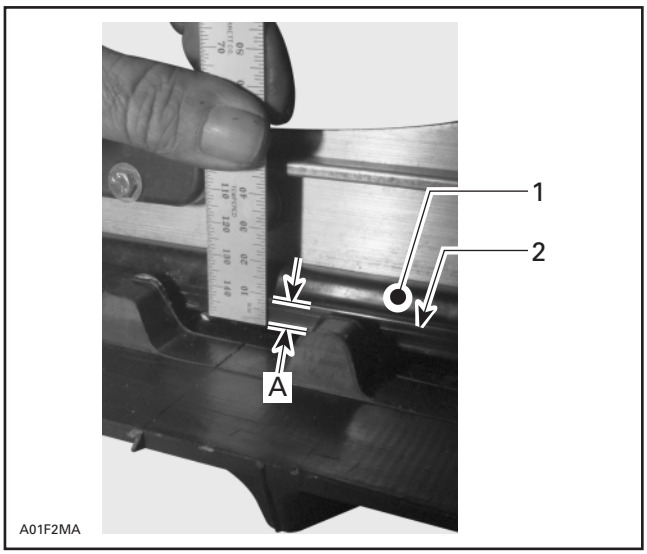
Shock Absorber

Refer to SUSPENSION AND SKI SYSTEM 08-03 then look for **Shock Inspection**.

17, Slider Shoe

Measure slider shoes from the bottom to the 0.5 mm (.020 in) radius as shown on the next photo.

Minimum thickness must be 2 mm (.080 in).



TYPICAL

1. Slider shoe
2. Molding line (this line is not the wear limit)
A. Wear limit measurement (must be at least 2 mm (.080 in))

Replace slider shoes when wear limit is reached.

▼ CAUTION

Slider shoes must always be replaced in pairs.

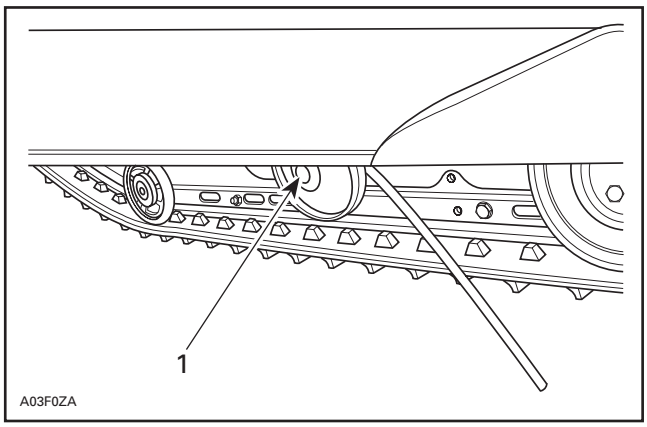
INSTALLATION

Do not install rear spring yet. Install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

2,3,4,5,6, Spring, Washer, Idler Wheel, Spacer and Screw

On each side, install rear spring, washer, idler wheel, spacer then bolt that axle to tunnel.



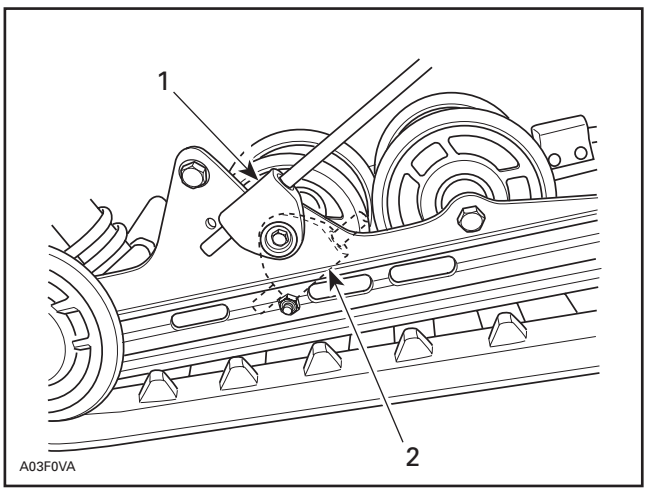
1. Spacer

18, Spring Support

Install spring supports to rails.

▼ CAUTION

To avoid track damage, spring supports must be mounted upward.



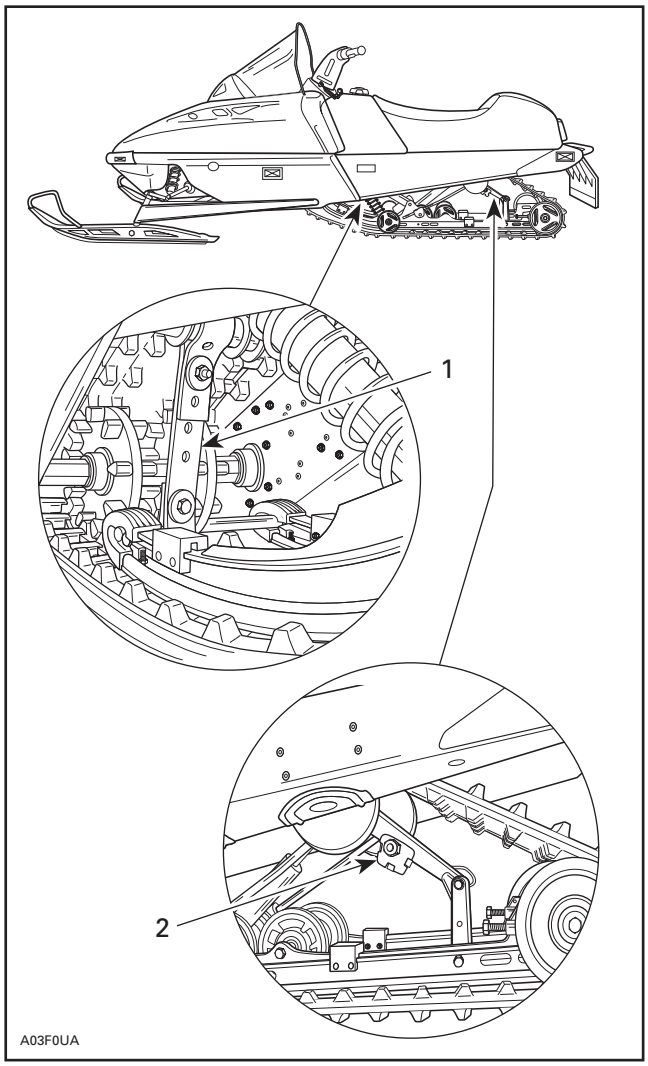
RIGHT SIDE SHOWN

1. Right position: upward
2. Wrong position

RIDE ADJUSTMENT

The stopper strap is adjustable for vehicle weight transfer control.

The rear portion of rear suspension is adjustable for driver's weight.



1. Stopper strap for weight transfer
2. Driver's weight

Choice of suspension adjustments depends on carrying load, driver's weight, personal preference, riding speed and field condition.

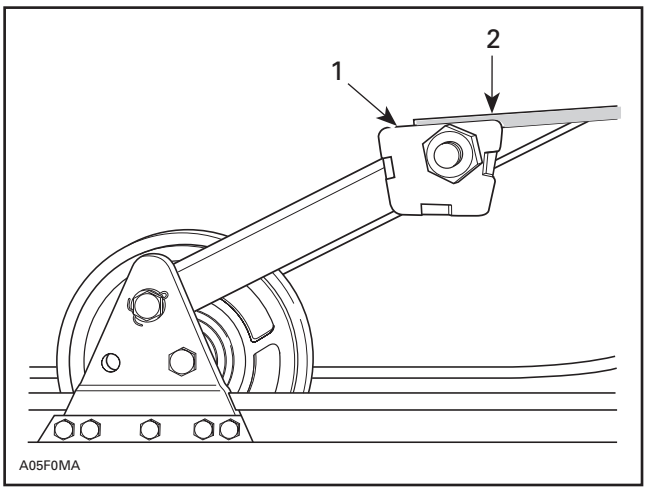
Rear Suspension Setting Table

Cam Position	Soft → Heavy
Operator's Weight	Light → High
Riding Speed	Low → High
Field Condition	Flat → Bumpy

Slight suspension bottoming occurring under the worst riding conditions indicates a good choice of springs preload.

To adjust rear suspension adjustment cams, use multi wrench supplied in vehicle tool box.

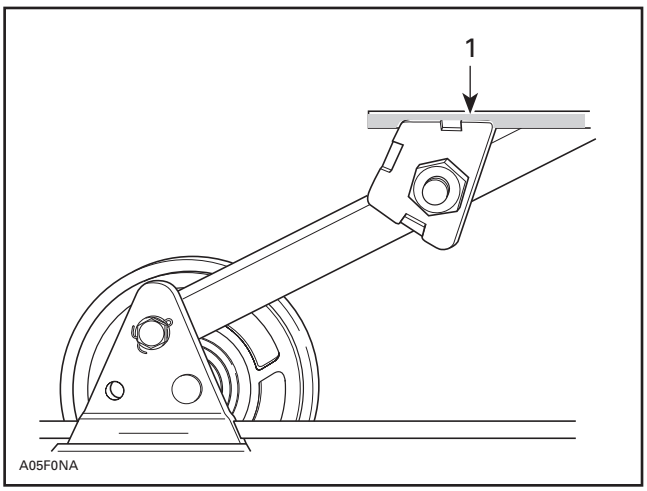
Turning adjustment cam moves edges of cam supporting spring rod. The softest adjustment is reached when the supporting edge of cam is the closest to hexagonal portion of cam.



SOFTEST ADJUSTMENT

1. *Supporting edge **closest** to hexagonal*
2. *Spring*

The stiffest adjustment is reached when the supporting edge of cam is the farthest to hexagonal portion of cam.

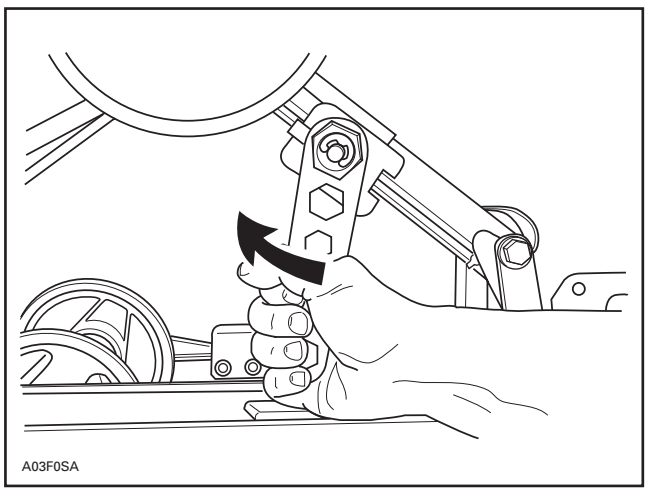


STIFFEST ADJUSTMENT

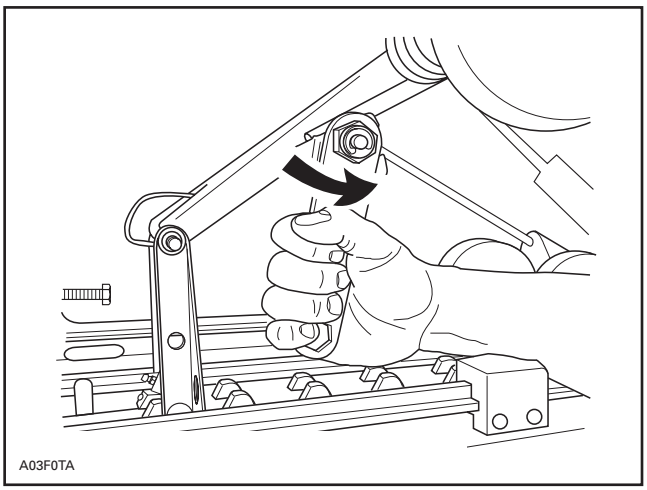
1. *Supporting edge **farthest** to hexagonal*

▼ CAUTION

Always turn the left side adjustment cams in a clockwise direction and the right side cams in a counterclockwise direction. Left and right adjustment cams must always be set at the same position.



LH SIDE SHOWN



RH SIDE SHOWN

Stopper Strap

The function of the stopper strap is to control the transfer of vehicle weight during acceleration and to control track lead angle.

The longer the belt, the more the weight will be transferred to the track to provide a better traction. The shorter the belt, the lesser the weight transferred to the track, thus maintaining a more positive steering.

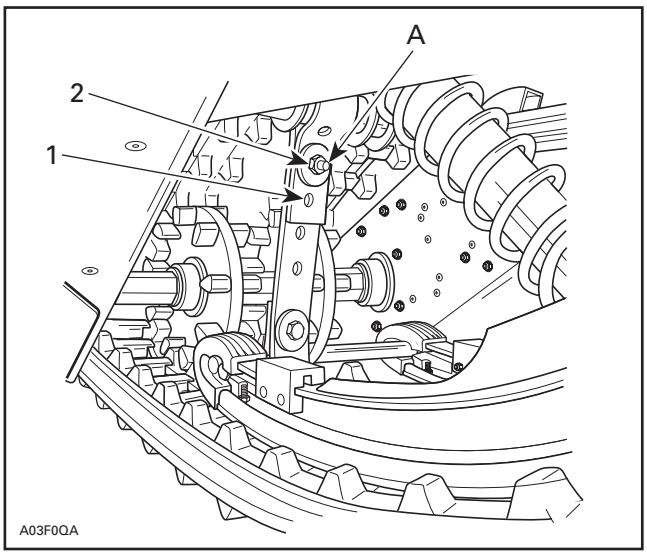
The longer the belt, the greater will be the track lead angle. A shorter belt will reduce track lead angle which may help when negotiating a particular snow condition.

Adjusting holes on the stopper strap allow to adjust it according to driver's requirements, field and/or snow conditions.

▼ CAUTION

Whenever stopper strap length is changed, track tension must be readjusted to prevent any possibility of operating vehicle with a too loose or too tight track tension.

For normal use, locate bolt through 2nd hole from strap end.



1. 1st hole
2. 2nd hole
*A. 11 N•m (97 lbf•**in**)*

◆ WARNING

Always torque the nut to 11 N•m (97 lbf•**in**). Replace strap if worn or torn.

NOTE: When towing a load, it is suggested to adjust stopper strap to a shorter length and stiffen rear springs. These adjustment will improve steering ability.

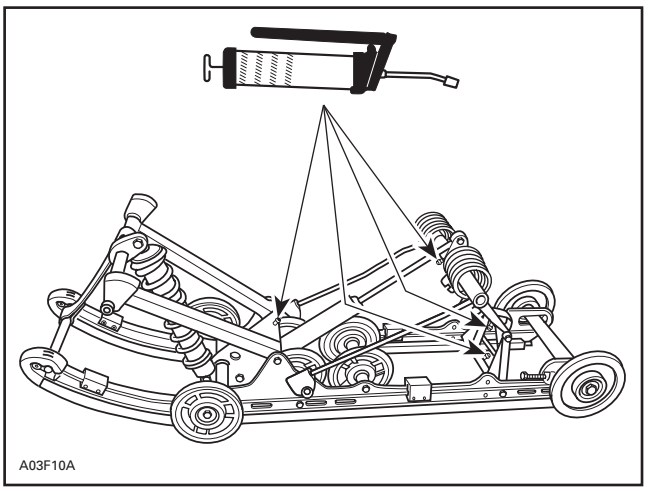
Deep Snow Operation

When operating the vehicle in deep snow, it may be necessary to change position of adjustment cams, stopper strap and/or driver's riding position, to change the angle at which the track rides on the snow. Operator's familiarly with the various adjustments as well as snow conditions will dictate the most efficient combination.

LUBRICATION

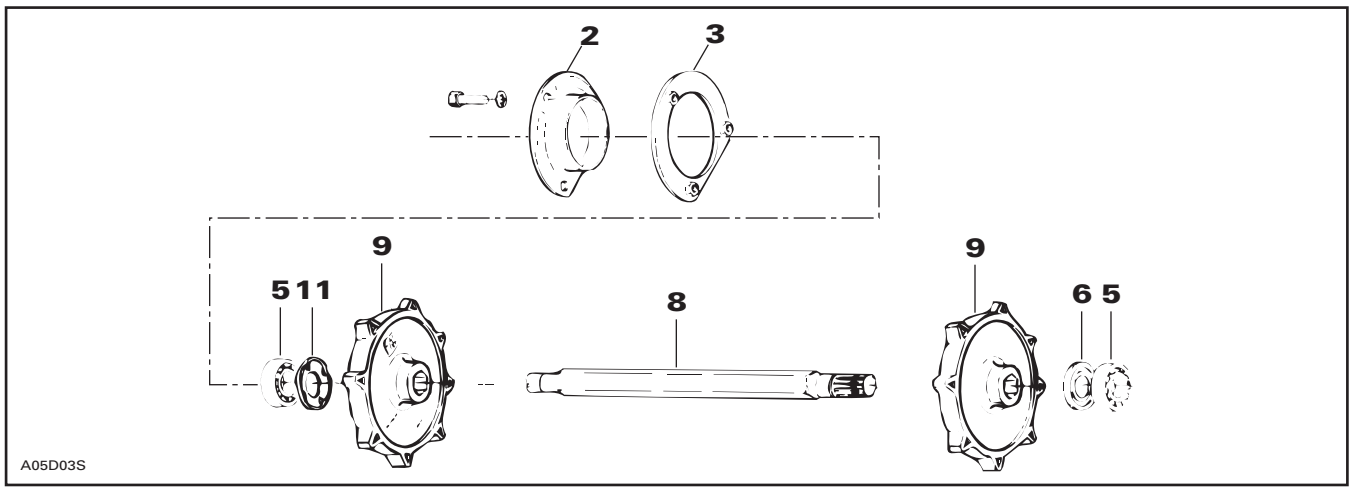
Lubricate front and rear arms at grease fittings using synthetic grease (P/N 413 7115 00).

NOTE: There are 4 grease fittings.

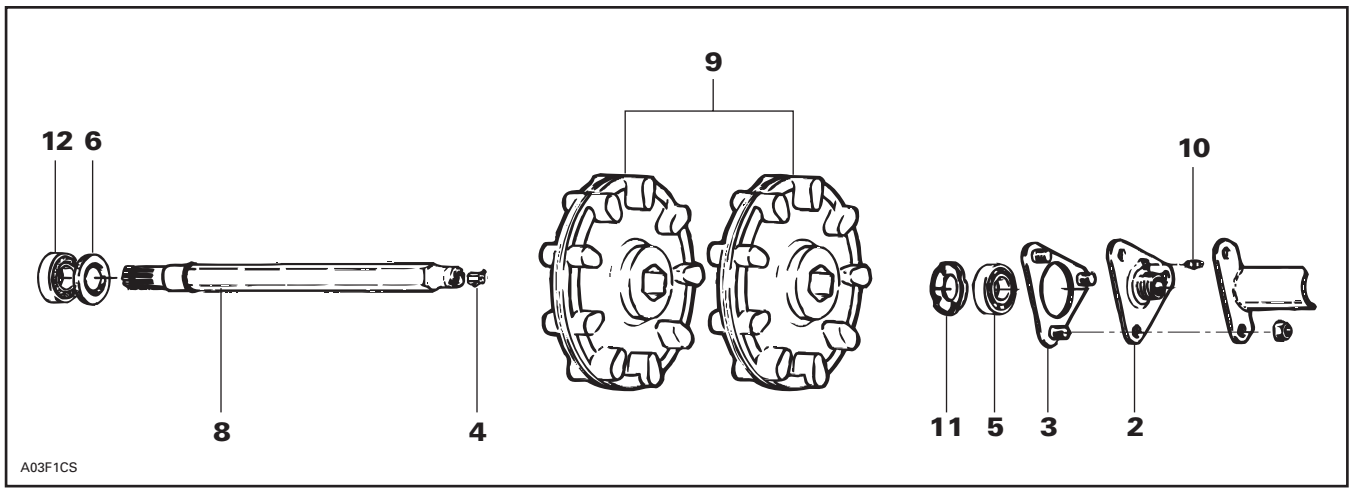


DRIVE AXLE

Tundra II LT



S-Series



REMOVAL

All Models

Drain oil from chaincase or gearbox. Remove chaincase cover and release drive chain tension (if applicable).

Raise and block rear of vehicle off the ground.

Remove suspension. (Refer to REAR SUSPENSION 07).

2,6, End Bearing Housing and Seal

NOTE: If applicable, remove muffler, battery and its support. If vehicle is equipped with a speedometer, remove angle drive unit and coupling cable if necessary.

On all S-Series, remove chaincase cover, chain and sprocket then circlip and bearing on drive axle.

Pry oil seals from chaincase and end bearing housing (if applicable).

Unlock sprocket from drive axle and remove with its spacer (if applicable).

8,9, 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.

DISASSEMBLY

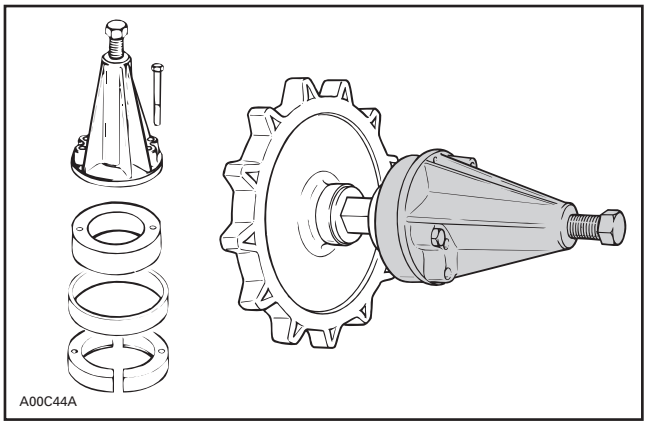
4, Speedometer Drive Insert

All Models

Remove speedometer drive insert (if applicable).

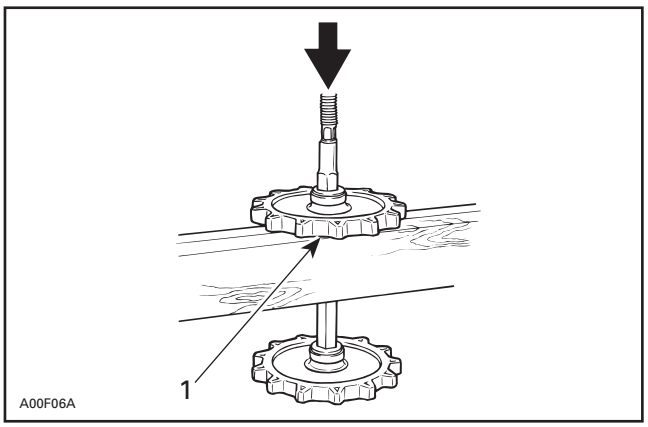
5,12, Bearing

To remove bearings, use puller assembly, ring and half rings as illustrated.



9,13, Sprocket and Half-Sprocket

To remove press fit sprockets, use a press and a suitable support as illustrated.



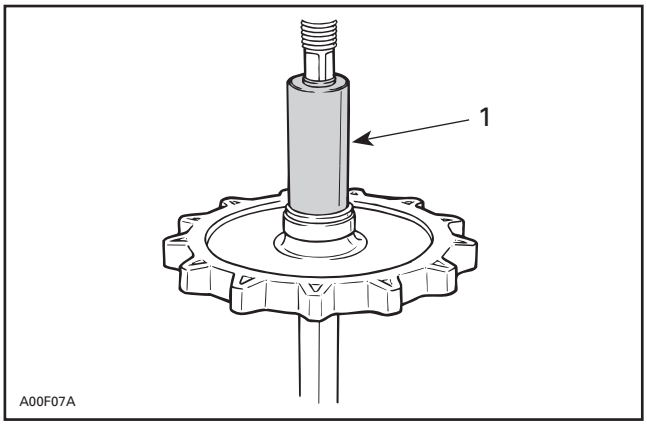
1. Support sprocket near hub

NOTE: 2 different types of sprocket press fit can be found. Ensure to replace ring reinforced sprockets with the same type.

ASSEMBLY

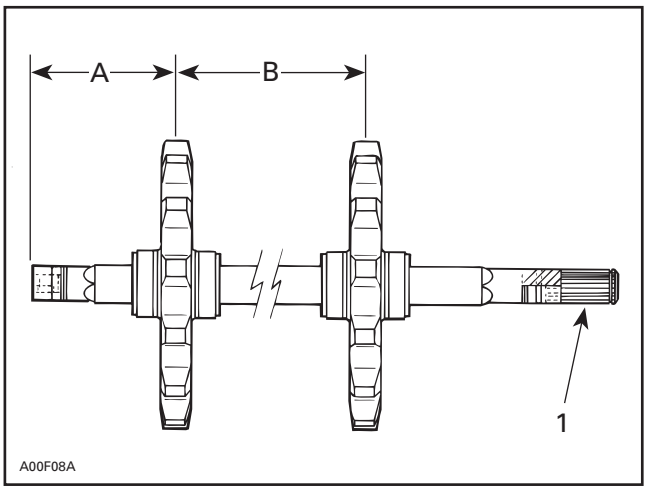
8,9,13, Drive Axle and Sprocket

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

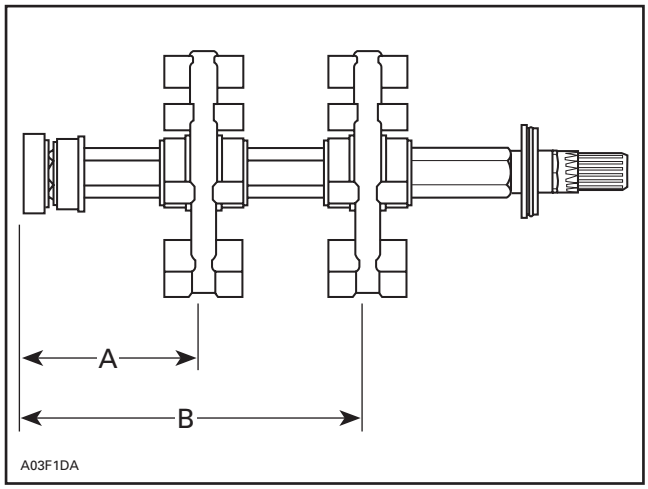
Tundra II LT



TYPICAL
1. Chaincase side

APPLICABLE MODEL	A mm (in)	B mm (in)
Tundra II LT	83 (3-17/64)	242 (9-17/32)

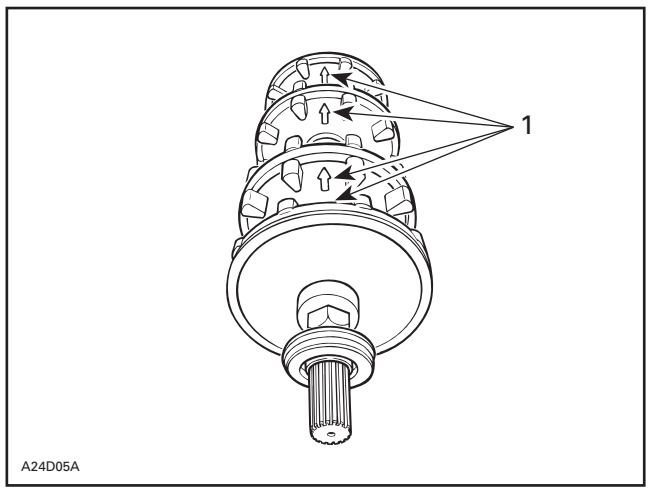
S-Series



A. 159.3 mm (6-17/64 in)
B. 282.3 mm (11-7/64 in)

All Models

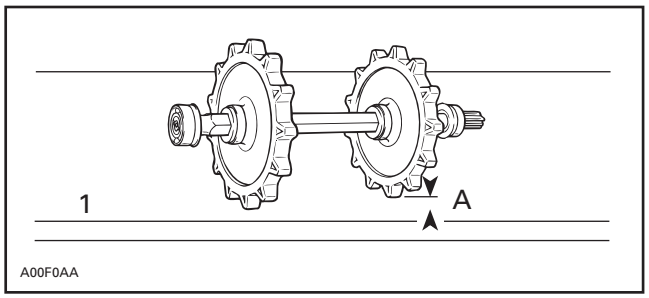
Ensure to align indexing marks of each sprocket when assembling.



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.



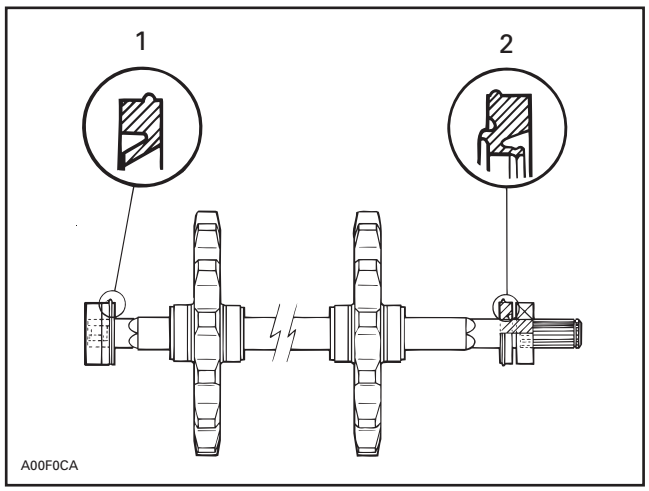
1. Plane surface
A. 1.5 mm (1/16 in) MAXIMUM

▼ 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 (chaincase side only on Tundra II LT). Locate seal lip as illustrated.



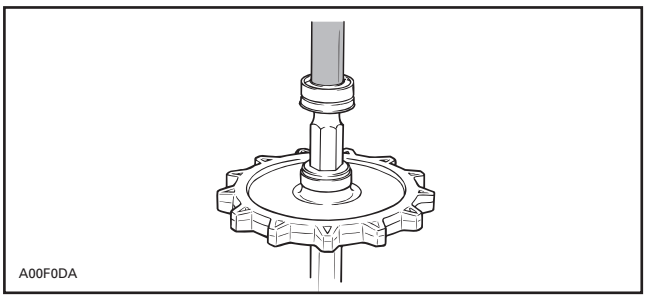
1. Grease seal type
2. Oil seal type

11, Bearing Protector

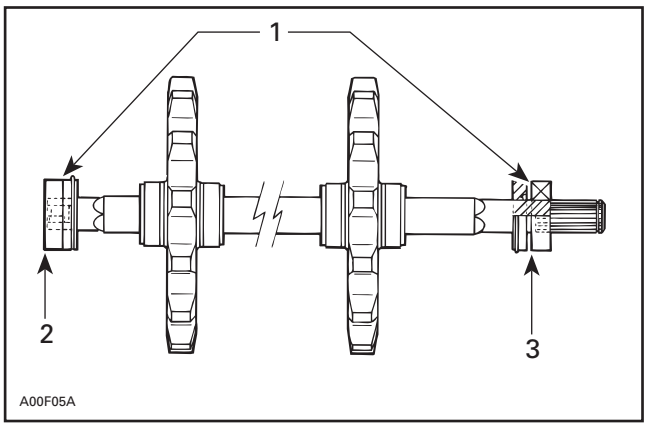
At assembly, flat side of bearing protector must be against bearing.

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.



1. Bearing shield on this side
2. Flush with drive axle
3. Seated on shaft shoulder

AXIAL PLAY

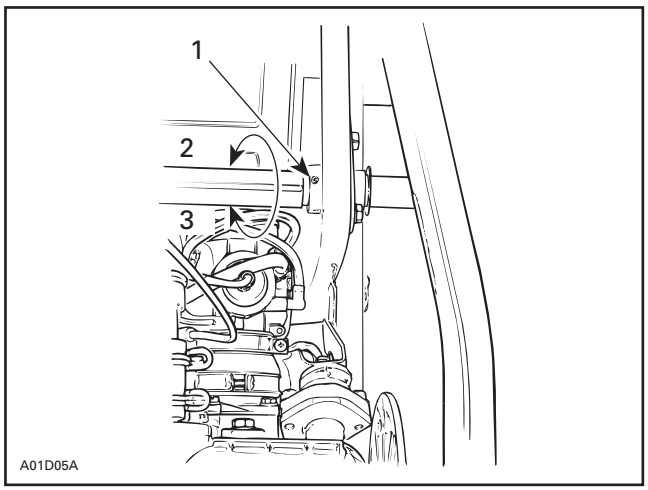
S-Series

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.

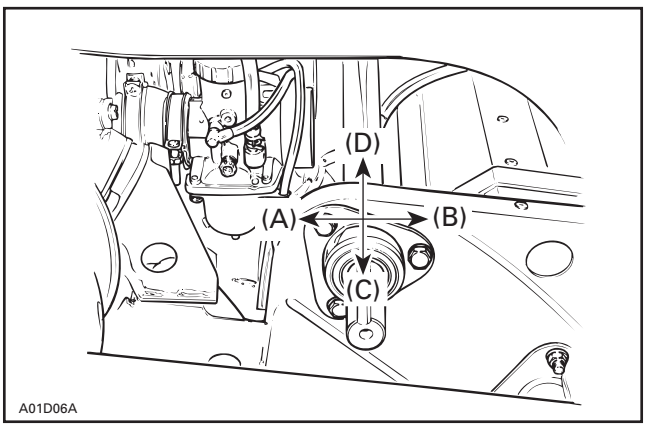


TYPICAL

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

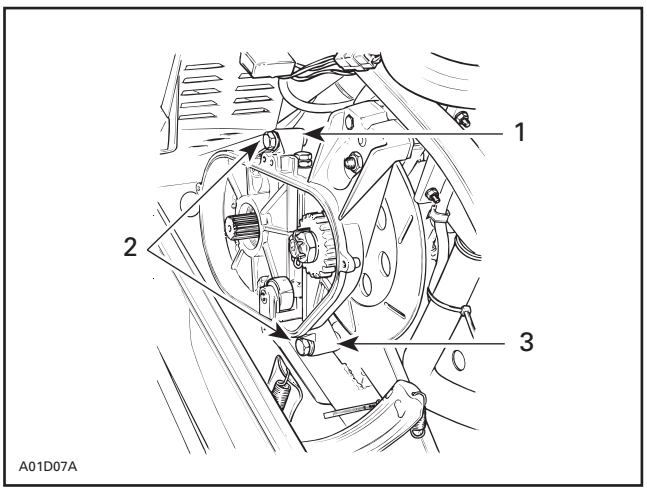
– Add shim(s) (P/N 504 0398 00) between chaincase and frame to obtain easy bearing installation.

▼ 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.

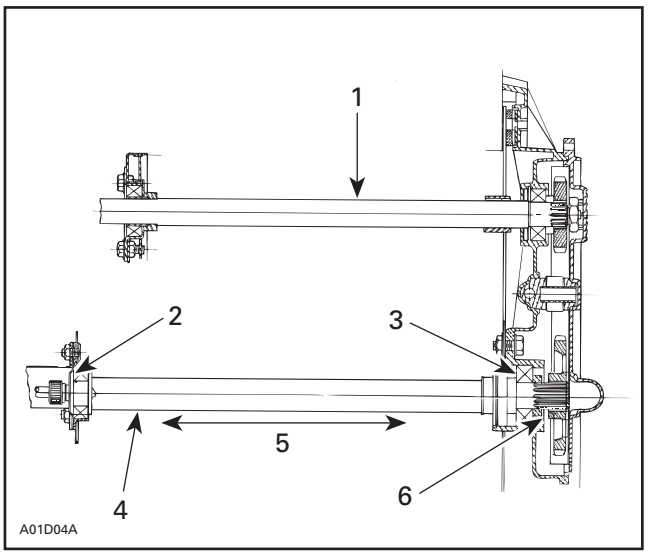


TYPICAL

1. *Upper shim location*
2. *Lower shim location*
3. *50 mm long screws when installing one shim or more*

– Do not reinstall the driven pulley at this time.

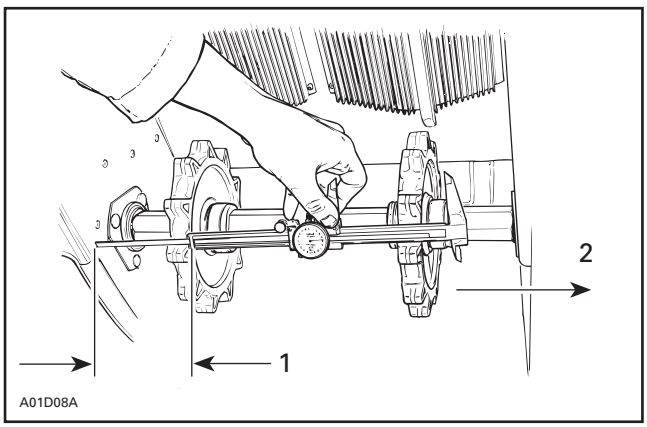
AXIAL PLAY ADJUSTMENT



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.

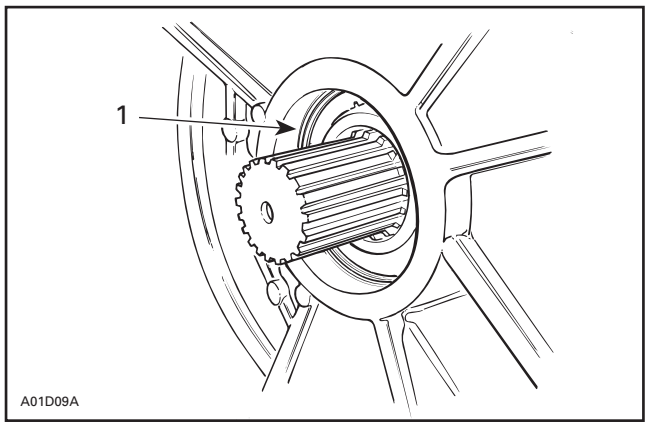


TYPICAL

1. *Distance between sprocket and tunnel*
2. *Drive axle pushed toward chaincase*

▼ CAUTION

Be sure drive axle bearing makes full contact all around the shoulder of the bearing bore.



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

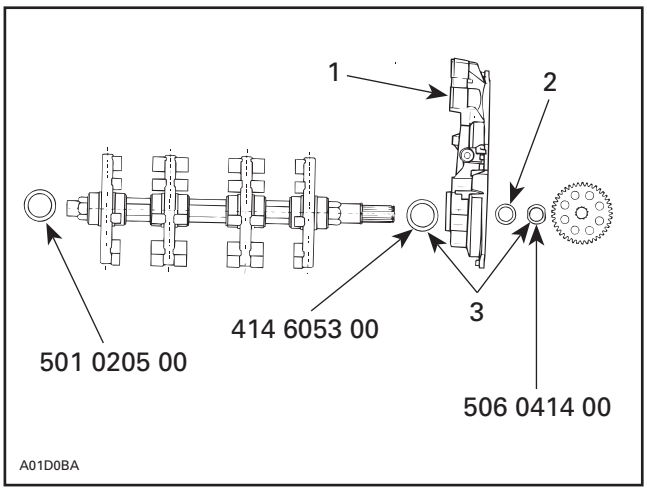
Shim position is important to maintain proper sprocket alignment.

▼ CAUTION

Install shim(s) following the pattern shown in the chart.

	SHIM POSITION AND QUANTITY	
SHIM(S) REQUIRED	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.

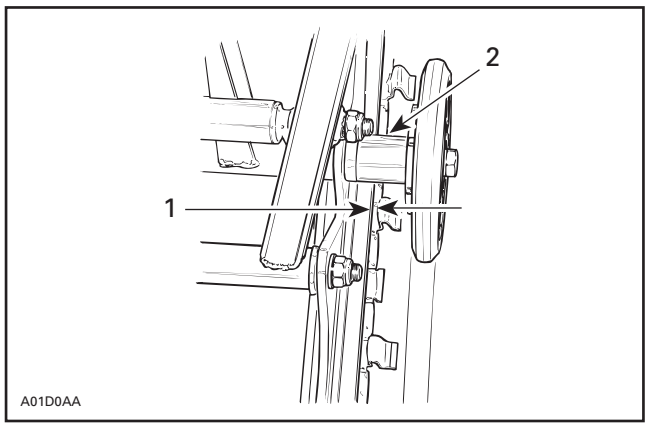


1. Chaincase
2. Spacer
3. Same quantity

– Double-check 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.

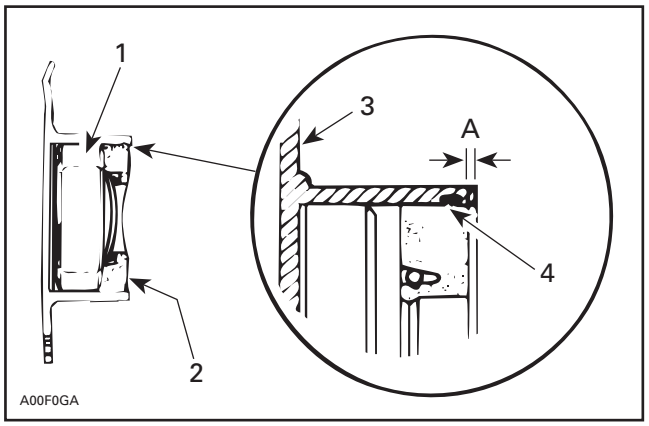
INSTALLATION

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 (if applicable).

Refill with chaincase oil.

Install the suspension. Refer to TRACK 07-05 and adjust track tension and carry out track alignment procedure.

LUBRICATION

15, Grease Fitting

Lubricate end housing bearing with synthetic grease (P/N 413 7115 00).

ADJUSTMENT

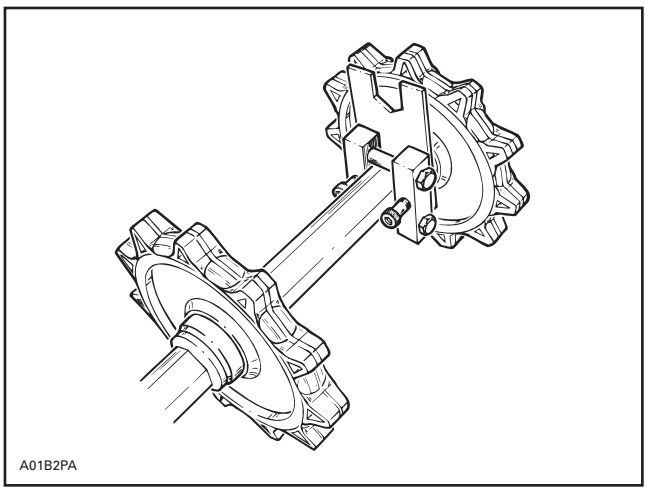
Sprocket/Track Alignment

▼ CAUTION

Do not temper with sprocket/track alignment if frame or suspension is damaged.

Sprockets might be repositioned to fit track holes (lugs on S-Series) without removing drive axle.

Use drive axle sprocket adjuster kit (P/N 861 7257 00).



TYPICAL

TRACK

TRACK TYPE APPLICATION

Refer to TECHNICAL DATA 10.

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, see procedure below.

◆ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

REMOVAL

Tundra II LT

Remove the following items:

– chaincase cover, sprockets, chain
– muffler
– upper center idler ass'y
– suspension
– end bearing housing
– drive axle seal
– drive axle (outwards from end bearing housing)
– track

S-Series

Remove the following items:

– speedometer cable
– muffler
– chaincase cover
– suspension
– drive axle seal
– end bearing housing
– sprockets and chain
– drive axle (toward end bearing housing)
– 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 07-04.

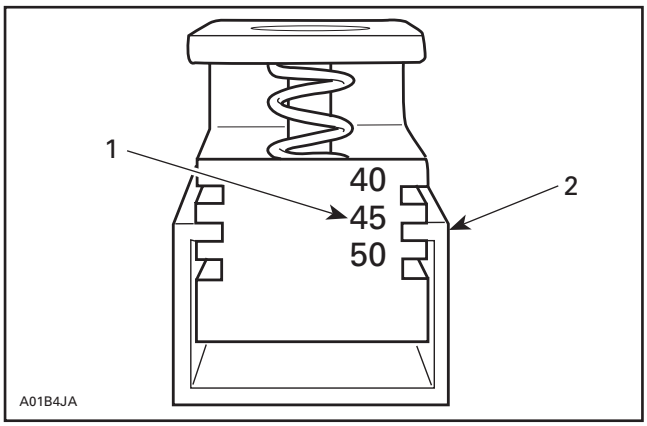
Track Tension and Alignment

Track tension and alignment are interrelated. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Tension

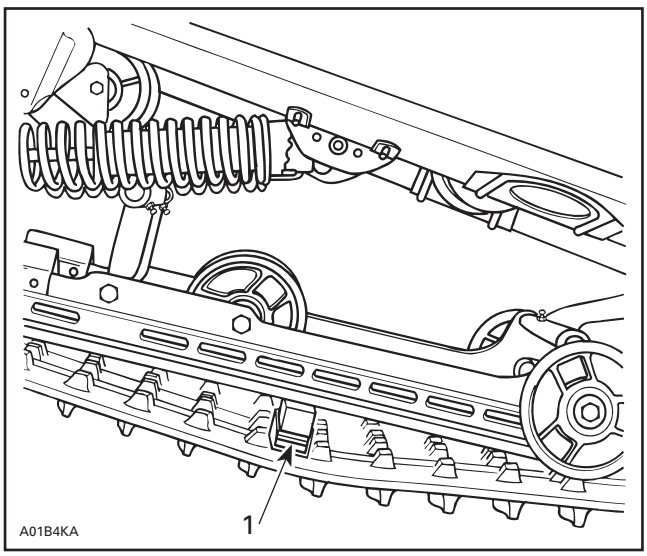
Lift the rear of vehicle and support with a mechanical stand. Allow the slide to extend normally. Check the gap half-way between front and rear idler wheels. Measure between slider shoe and bottom inside of track.

When using the track tension gauge (P/N 529 0215 00), slide U shape extrusion to proper deflection.



1. Example 45 mm
2. Extrusion

Insert pre-setted 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 line.

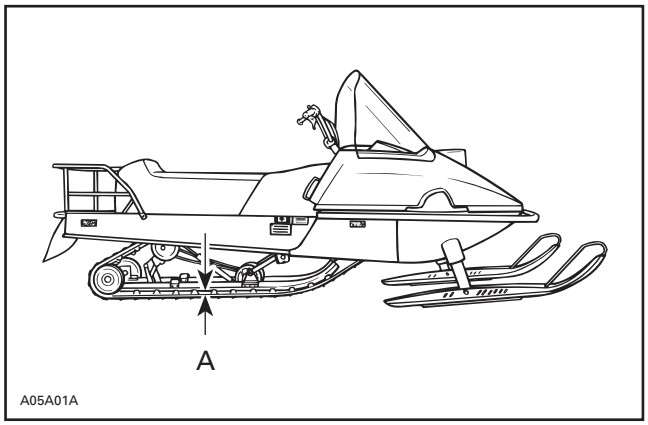


TYPICAL
1. Line

NOTE: Lightly oil track tension gauge center pin to avoid sticking.

Tundra II LT

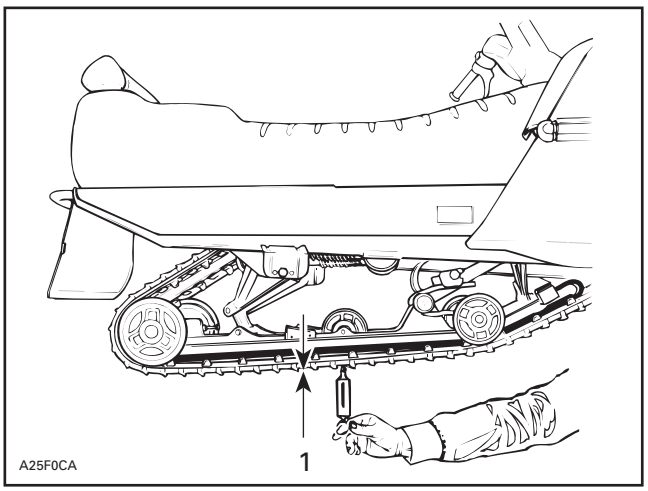
35 to 40 mm (1-3/8 to 1-9/16 in) when exerting a downward pull of 7.3 kg (16 lb).



A. 35 to 40 mm (1-3/8 to 1-9/16 in)

S-Series

35 to 40 mm (1-3/8 to 1-9/16 in) when exerting a downward pull of 7.3 kg (16 lb).



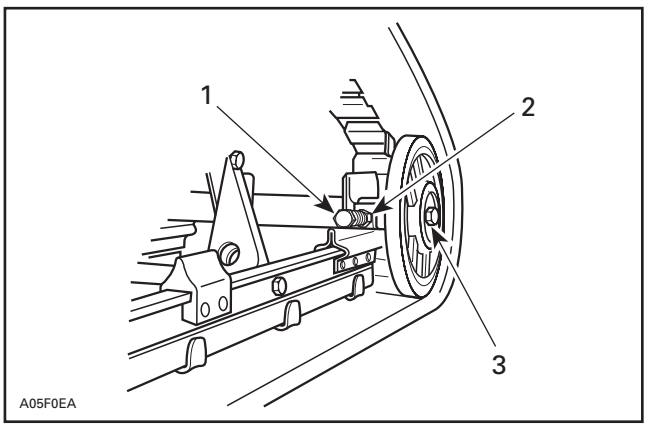
TYPICAL
1. 35 to 40 mm (1-3/8 to 1-9/16 in) with 7.3 kg (16 lb)

All Models

▼ 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 (1 side only on Tundra II LT and S-Series) and the adjuster bolt lock nut; then loosen or tighten the adjuster bolts located on the inner side of the rear idler wheels.



TYPICAL

1. *Adjuster bolt*
2. *Lock nut (except S-Series)*
3. *Retaining screw*

Alignment

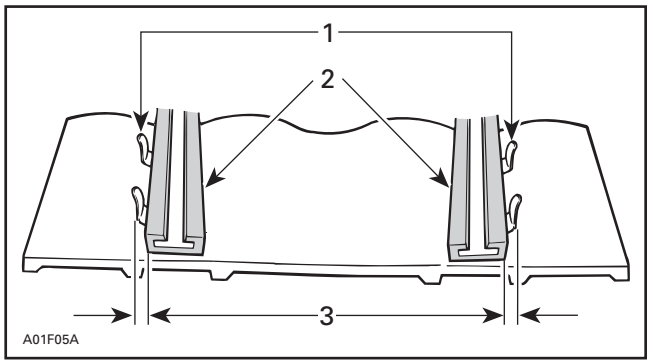
◆ WARNING

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.

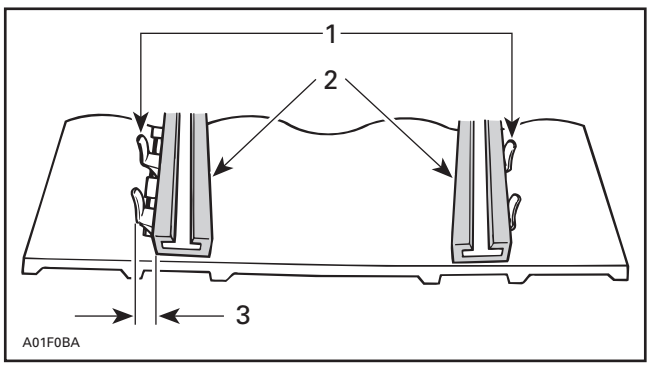


1. *Guides*
2. *Slider shoes*
3. *Equal distance*

◆ WARNING

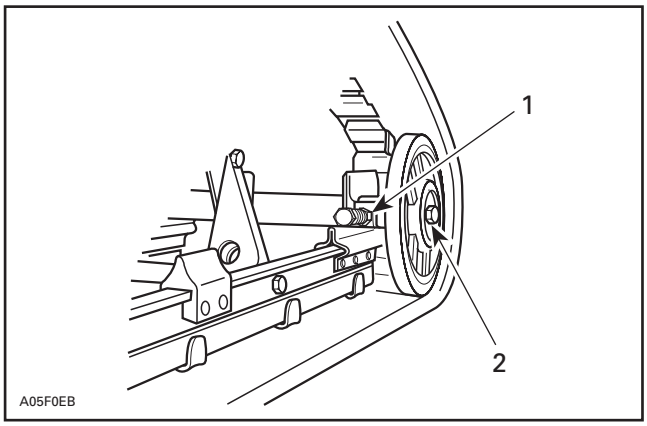
Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track.

To correct, stop engine then loosen the lock nuts and tighten the adjuster bolt on side where guides are farthest to slide. Tighten lock nuts and recheck alignment.



1. *Guides*
2. *Slider shoes*
3. *Tighten on this side*

Tighten lock nuts and the idler wheel retaining screws.



TYPICAL

1. *Retighten (except S-Series)*
2. *Retighten*

Restart engine, rotate track **slowly** and recheck alignment.

TRACK CLEAT

Removal

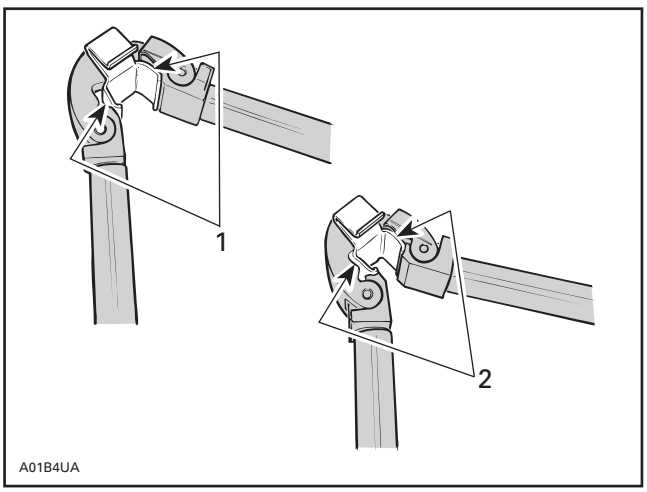
– Raise rear of vehicle off the ground and lift snow guard then rotate track to expose a cleat to be replaced.

– Using track cleat remover (P/N 529 0082 00) for Tundra II LT. Use (P/N 529 0087 00) for all other 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) for Tundra II LT or cleat installer (P/N 529 0288 00) for S-Series, bend cleat then push tabs into rubber.



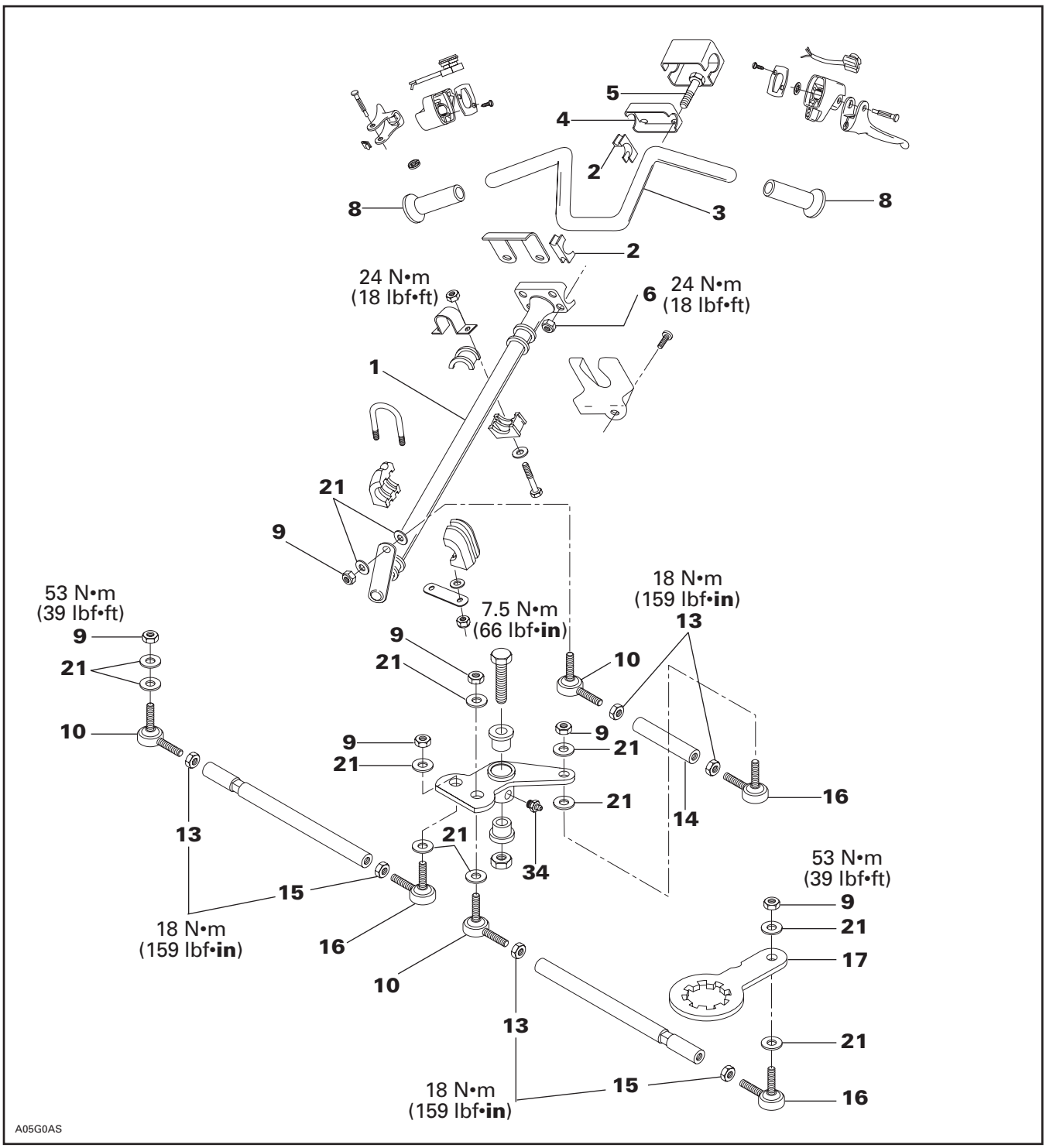
TYPICAL

1. *First step*
2. *Second step (to push tabs into rubber)*

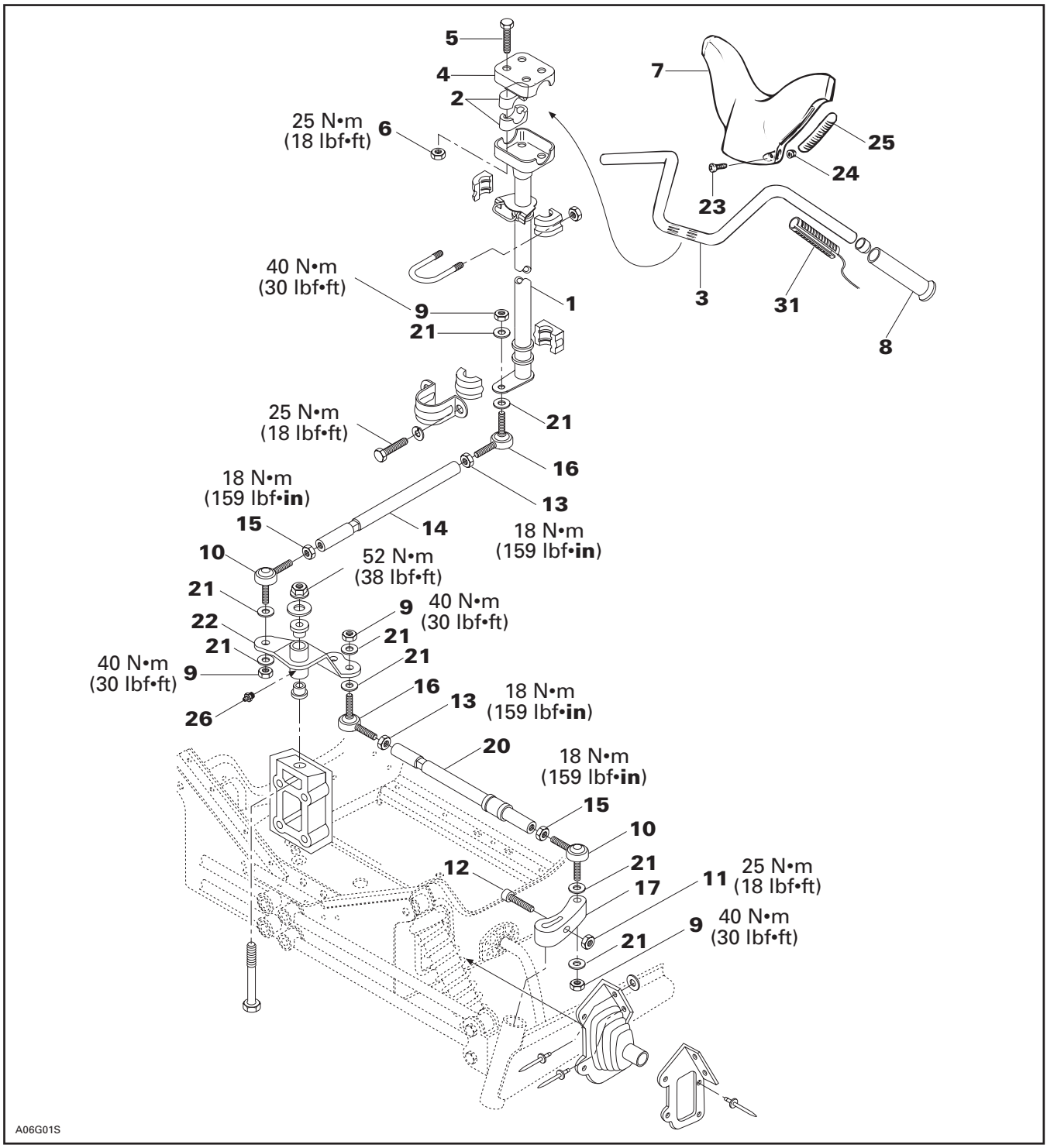
TABLE OF CONTENTS

STEERING SYSTEM

Tundra II LT



S-Series


5
4
2
25 N•m
(18 lbf•ft)
6
7
25
24
23
3
31
8
40 N•m
(30 lbf•ft)
9
21
1
25 N•m
(18 lbf•ft)
21
16
18 N•m
(159 lbf•in)
13
15
14
18 N•m
(159 lbf•in)
10
52 N•m
(38 lbf•ft)
21
9
40 N•m
(30 lbf•ft)
22
21
21
40 N•m
(30 lbf•ft)
9
21
16
13
18 N•m
(159 lbf•in)
26
20
18 N•m
(159 lbf•in)
15
10
12
21
11
25 N•m
(18 lbf•ft)
17
9
40 N•m
(30 lbf•ft)
21
A06G01S

INSPECTION

Check skis and runner shoes for wear, replace as necessary. Refer to SUSPENSION AND SKI SYSTEM 08-03.

17,36, Steering Arm and Ski Leg

Make sure steering arm and ski leg splines interlock (if applicable).

◆ WARNING

All parts having worn splines have to be changed by new ones.

Check general condition of steering system.

Check general condition of steering system components for wear and replace if necessary.

DISASSEMBLY 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.

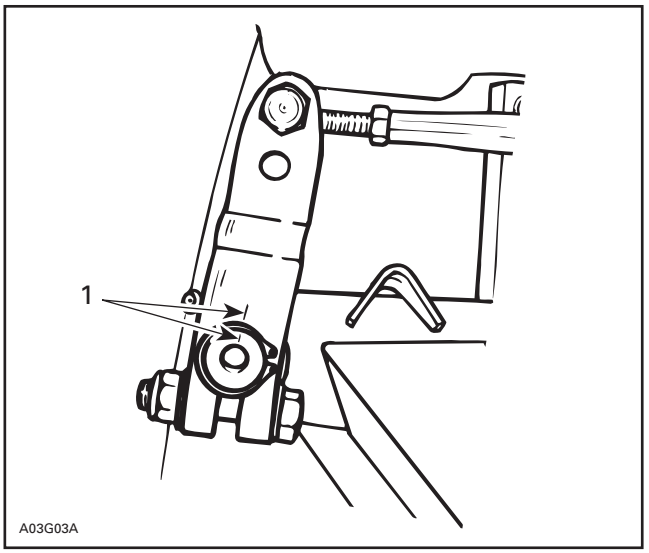
1, Steering Column

Remove steering pad then handlebar ass'y.

Detach short tie rod from steering column working under engine. On S-Series remove air intake silencer and carburetor(s) to gain access.

17, Steering Arm

To maintain correct steering geometry when reassembling, punch mark the steering arm and ski leg before removal.



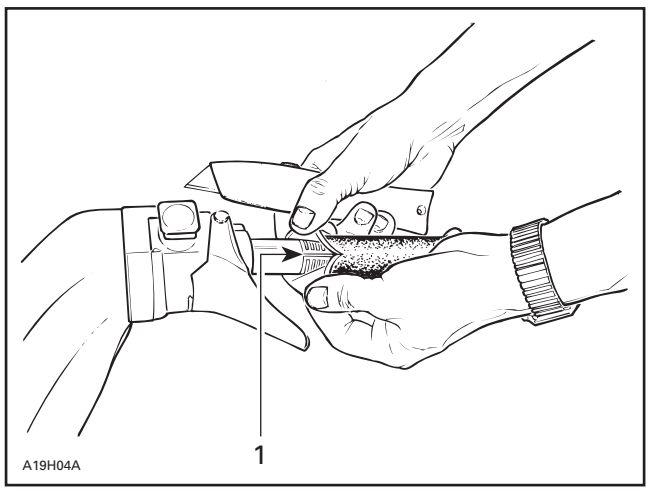
TYPICAL

1. Punch marks

31, Heating Grip Element

On vehicle equipped with heating grips, grips might be unremovable as explained earlier, in this case, carefully proceed as follows to prevent damaging heating elements.

Locate the grip heater wires inside handlebar; look through end of grip. Start cutting grip exactly opposite heater wires and immediately peel open to locate gap in heating element, as shown.



1. Gap in heating element opposite wires

Continue cutting along gap and remove grip. If required, slowly peel heating element from handlebar and remove.

To install, stick heating element to handlebar making sure wires do not interfere with operation of accelerator or brake handle.

◆ WARNING

Never use lubricants (e.g. soap, grease, etc.) to install handlebar grip, use instead a mix of soap and water. Mix 40 parts of water with one part of dish washing soap (recommended: Ultra Joy, Sunlight or Palmolive).

Insert new grip with a rubber mallet. Heat grip with a heater gun or a spot light to facilitate installation.

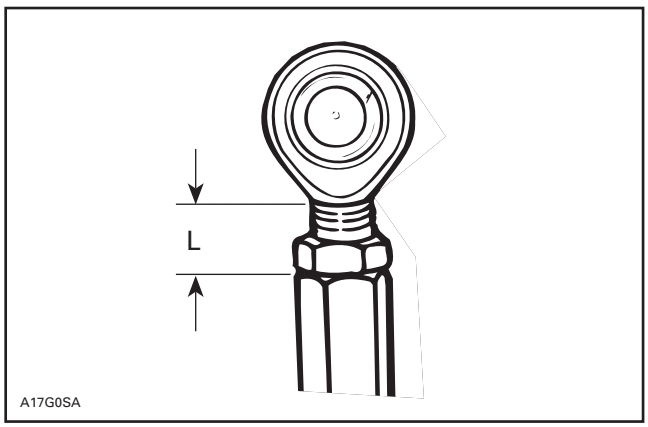
INSPECTION

To verify heating elements refer to TESTING PROCEDURE 06-07.

10,16, Ball Joint (left hand and right hand threads)

Inspect ball joint ends for wear or looseness, if excessive, replace.

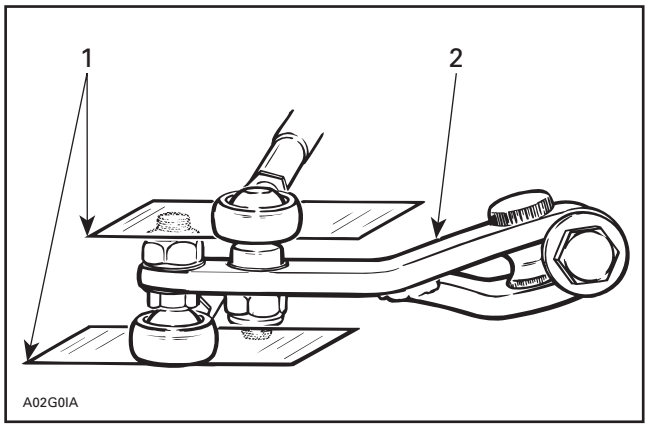
Screw threaded end of ball joint into tie rod. The maximum external threaded length not engaged in tie rod must not exceed the value L in the following chart:



TYPICAL

MODEL	L	
	mm	(in)
All models	20	(25/32)

The cut-off section of the tie rod end must run parallel with the horizontal line of the steering arm when assembled on vehicle. The ball joint should be restrained when tightening tie rod end lock nut. For torque specifications see specific exploded view.



TYPICAL

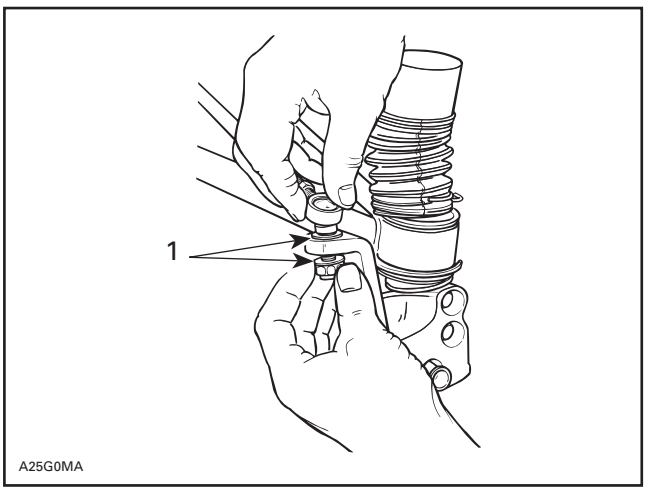
1. *Steering arm*
2. *Parallel with steering arm*

◆ 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

Install a hardened washer on each side.



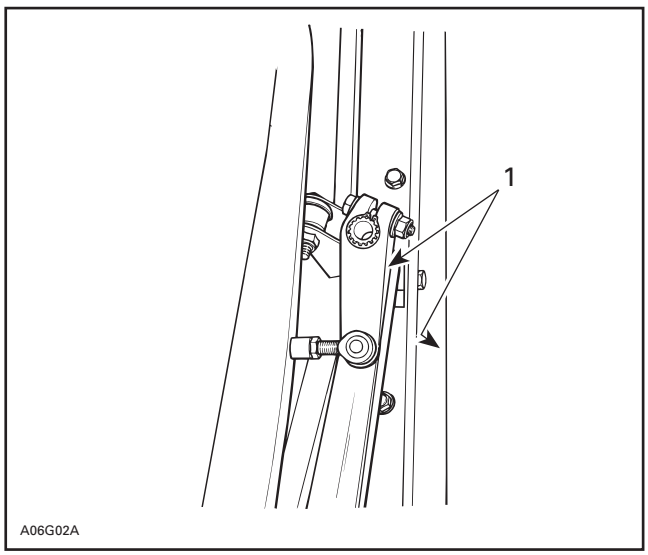
TYPICAL

1. *Hardened washers*

17,36, 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.



1. Parallel

9,13,15, Ball Joint Nut and Jam Nut

Tighten ball joint jam nuts to specified torque (see illustration).

11,12, Steering Arm Nut and Bolt

Tighten steering arm nuts to specified torque (see illustration).

ADJUSTABLE HANDLEBAR

1,3, Steering Column and Handlebar

If applicable, remove the steering clamp and nuts holding the handlebar to the steering column. Tighten nuts to the specified torque (see illustration).

2,4,5,6, Handlebar Support, Steering Clamp, Bolt and Nut

Install the 4 handlebar support, steering clamp, the 4 screws and nuts to the column, as illustrated.

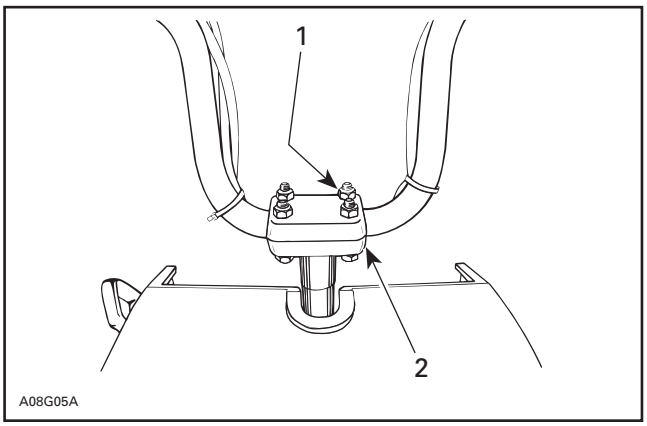
See applicable exploded view for each model.

Adjust the steering handle to the desired position.

Lock the handle in place by tightening the 4 nuts to 26 N•m (19 lbf•ft).

▼ CAUTION

Tighten the nuts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps.



TYPICAL

1. Torque 26 N•m (19 lbf•ft)
2. 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.

▼ CAUTION

Plastic alloy components such as fuel tank, windshield, controls, etc. can be cleaned using mild detergents or isopropyl alcohol and a soft clean cloth. Never clean plastic parts with strong detergent, degreasing agent, paint thinner, acetone, etc. Do not apply isopropyl alcohol directly on decals.

7,23,24,25, Steering Pad, Bolt, Nut and Rubber Attachment

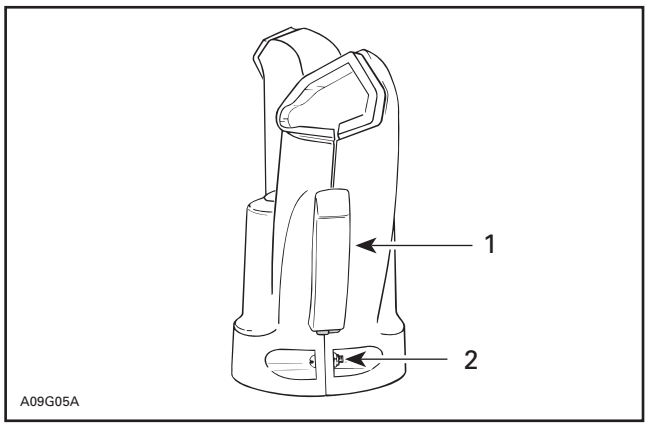
▼ CAUTION

Prior to installation, perform handlebar adjustment

Properly fit the steering pad to the handlebar. Assemble using the 2 rubber attachments, nuts and bolts.

◆ WARNING

Make sure that the steering pad and all controls are properly fixed to their normal location on the handlebar.



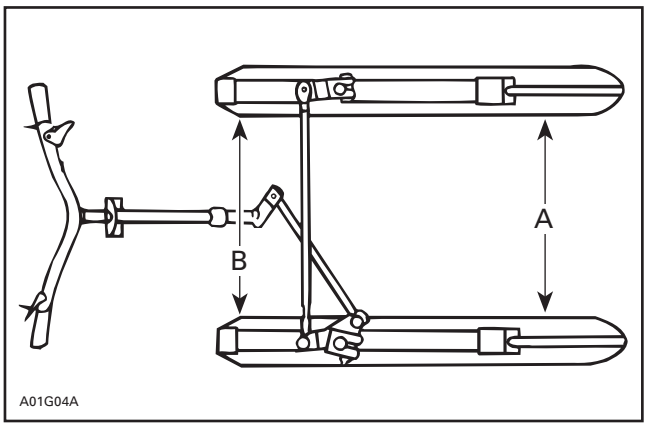
1. Rubber attachment
2. Nut and bolt

STEERING ADJUSTMENT (SKIS)

Definitions

TOE-OUT:

A difference in measurement between front edge A and rear edge B of skis as viewed from top side of suspension system. It is adjustable.



CAMBER:

A specific inward or outward tilt angle of ski leg compared to a vertical line when viewing vehicle from front. **This angle is not adjustable on these models.**

Adjustments

Tundra II LT

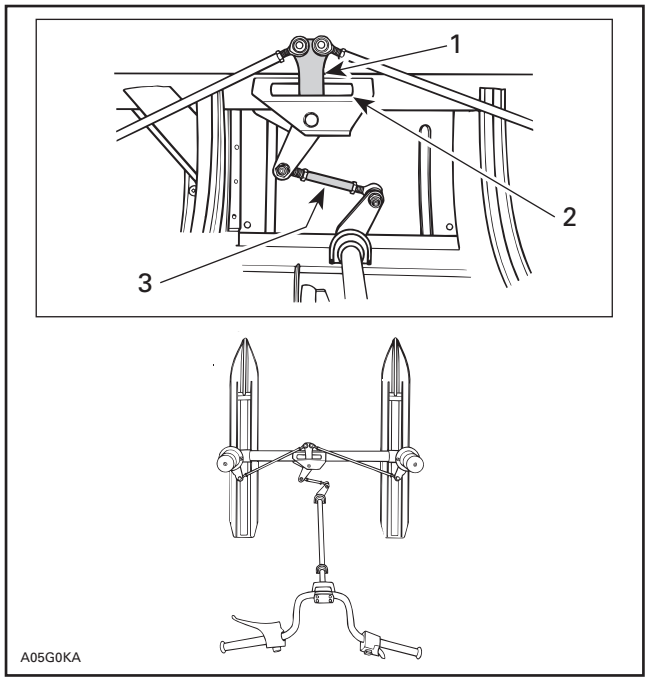
Adjustments should be performed following this sequence:

– Pivot arm centering/horizontal handlebar.
– Set toe-out.

PIVOT ARM CENTERING/HORIZONTAL HANDLEBAR

Turn handlebar until pivot arm is well centered in slot of its bracket.

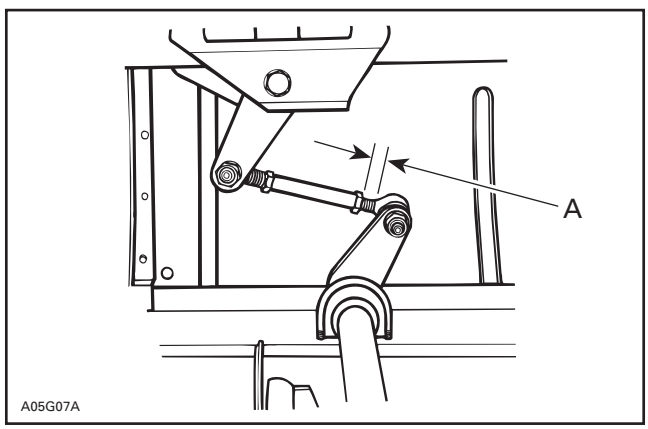
Check if handlebar is horizontal. To adjust, loosen lock nuts of short tie rod and turn it accordingly.



1. *Pivot arm centered in slot*
2. *Slot*
3. *Turn to adjust*

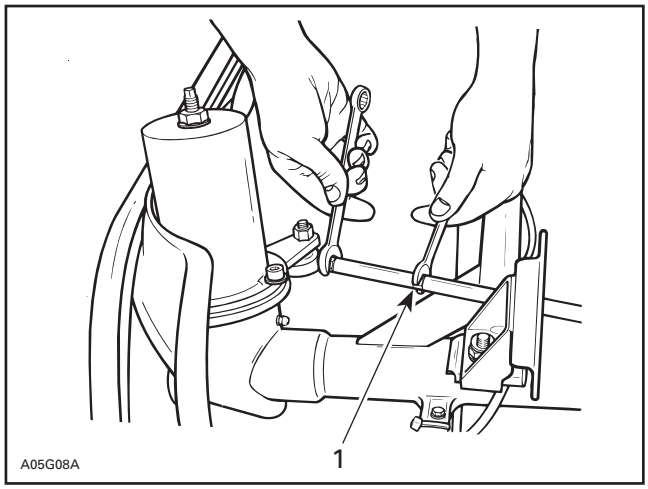
◆ WARNING

Maximum ball joint external threaded length not engaged in the tie rod end must not exceed 15 mm (19/32 in). Torque lock nut to 20 N•m (15 lbf•ft).



A. 15 mm (19/32 in) max.

Restrain tie rod while firmly retighten nuts so that ball joint sockets run parallel with steering arm and pivot arm.

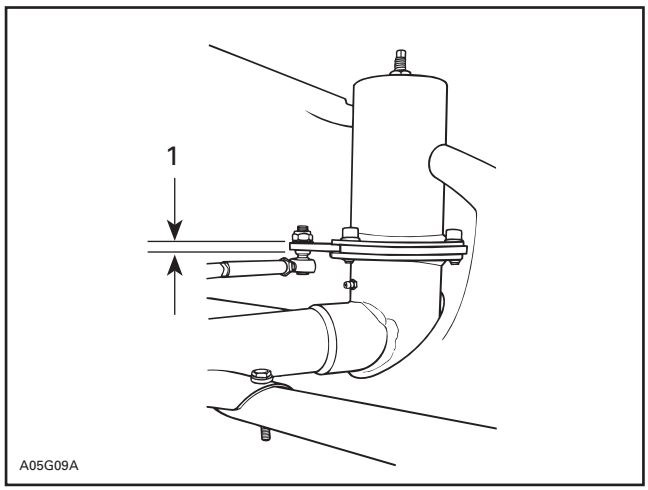


LONG TIE ROD SHOWN

1. *Restrain tie rod to tighten lock nuts*

◆ WARNING

Ball joint sockets must run parallel with steering arm and pivot arm. Tie rod must be restrained when tightening lock nuts.



LONG TIE ROD SHOWN

1. *Ball joint parallel with arm*

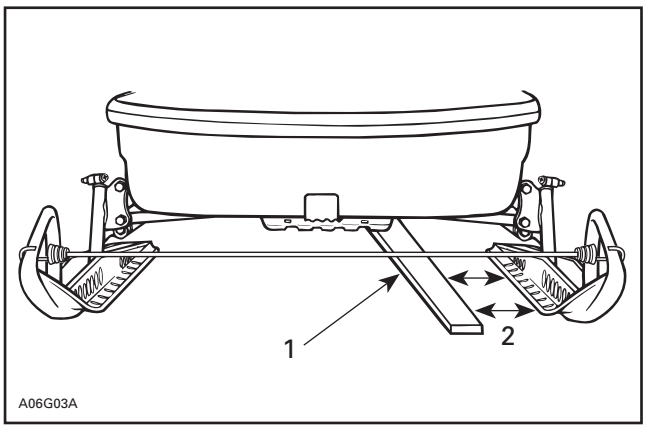
Ensure that pivot arm is still centered and check ski toe-out.

TOE-OUT

Loosen lock nuts of long tie rods and turn each tie rod so that skis are in a straight ahead position. To adjust toe-out, slightly turn both tie rods exactly the same amount.

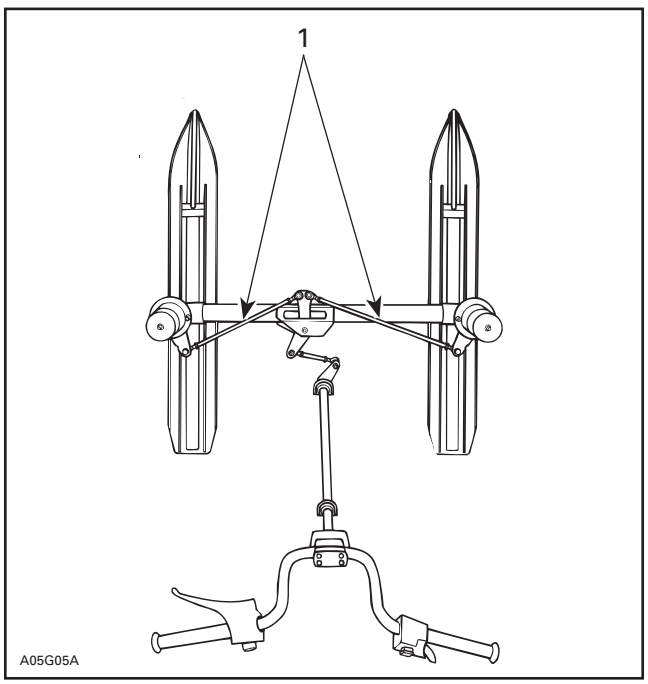
Check external threaded length not engaged and firmly retighten nuts as specified above.

NOTE: To make sure skis are in straight-ahead position, place a straight edge against pre-adjusted track and measure distance between front and rear of skis and straight edge. Distances should be equal. After ski toe-out adjustment, distance at front of ski must be 3.0 mm (1/8 in) more than at rear on both sides for a total toe-out of 6 mm (1/4 in).



TYPICAL

1. *3.0 mm (1/8 in) more at front than at rear*
2. *Straight edge*



1. *Turn to adjust*

S-Series

Adjustments should be performed following this sequence:

– Pivot arm centering.
– Check for horizontal handlebar.
– Set toe-out.

PIVOT ARM CENTERING

◆ WARNING

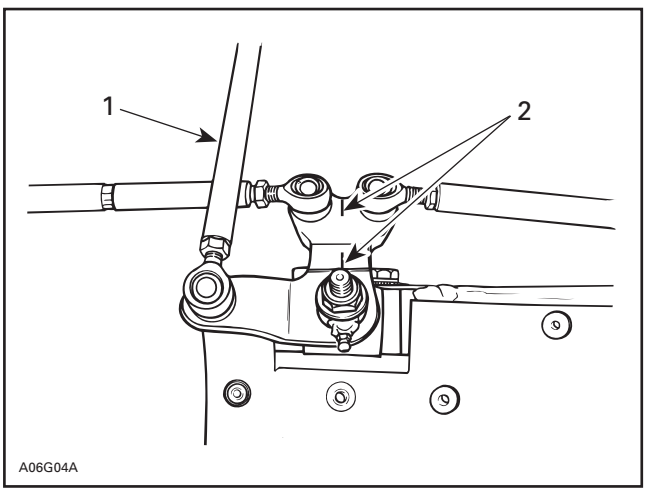
Do not attempt to adjust skis straight ahead position by turning ball joint on tie rod no. 14.

13,14,22, Jam Nut, Tie Rod and Pivot Arm

With handlebar in straight position, center of pivot arm must be in line with end of bolt. Loosen jam nuts on tie rod **no. 14** (LH threads on steering column end) and turn tie rod accordingly. Tighten jam nuts to 18 N•m (159 lbf•**in**).

◆ WARNING

Never lengthen tie rod so that threated portion of ball joint exceeds 20 mm (25/32 in).



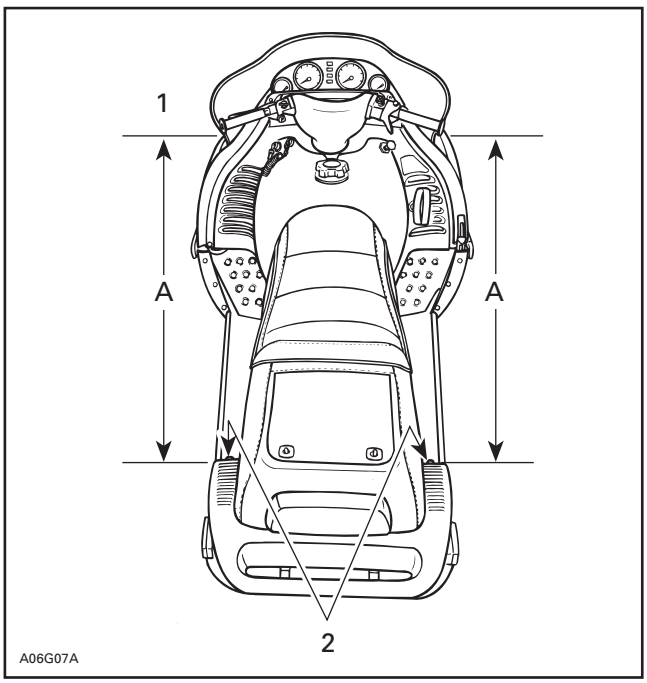
S-SERIES

1. *Tie rod **no. 14***
2. *Center of pivot arm in line with bolt end*

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 rear most 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 threated portion of ball joint exceeds 20 mm (25/32 in).

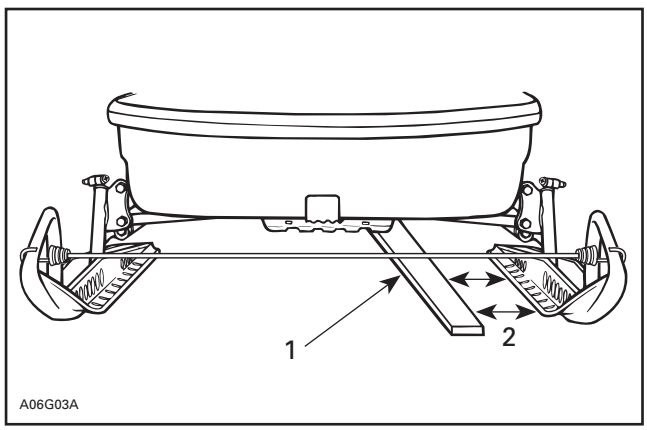
– Close front of skis manually to take all slack from steering mechanism.

NOTE: A rubber cord must be hooked in front of skis to keep them closed.

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.

To reduce tolerance when measuring, set one ski to proper toe-out then measure from that ski to the opposite ski.



TYPICAL

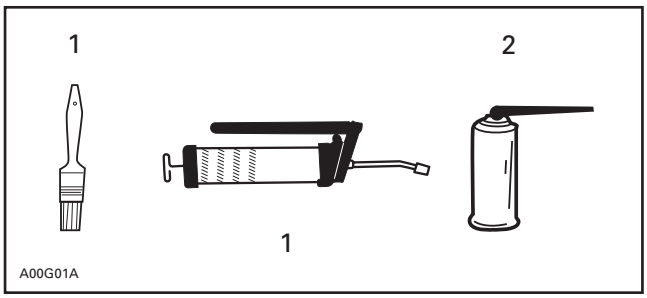
1. *Straight edge*
2. *Measure here*

LUBRICATION

◆ WARNING

Do not lubricate throttle and/or brake cable, housing and spring coupler bolts.

The following symbols will be used to show what type of lubricant should be used at the suitable locations.



1. Synthetic grease (P/N 413 7115 00)
2. BOMBARDIER LUBE (P/N 293 6000 16)

Grease Fitting and Ski Leg

Use synthetic grease only (P/N 413 7115 00).

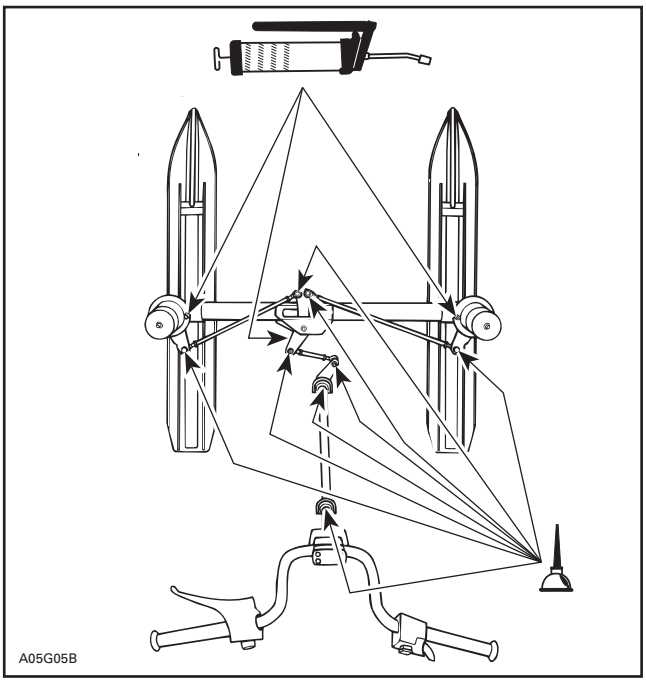
Tundra II LT

Lubricate front suspension posts and pivot arm at grease fittings. Pump five strokes of grease gun on each post.

NOTE: There are 3 grease fittings.

Oil ball joints and steering column bushings.

NOTE: There are 8 lubrication points.

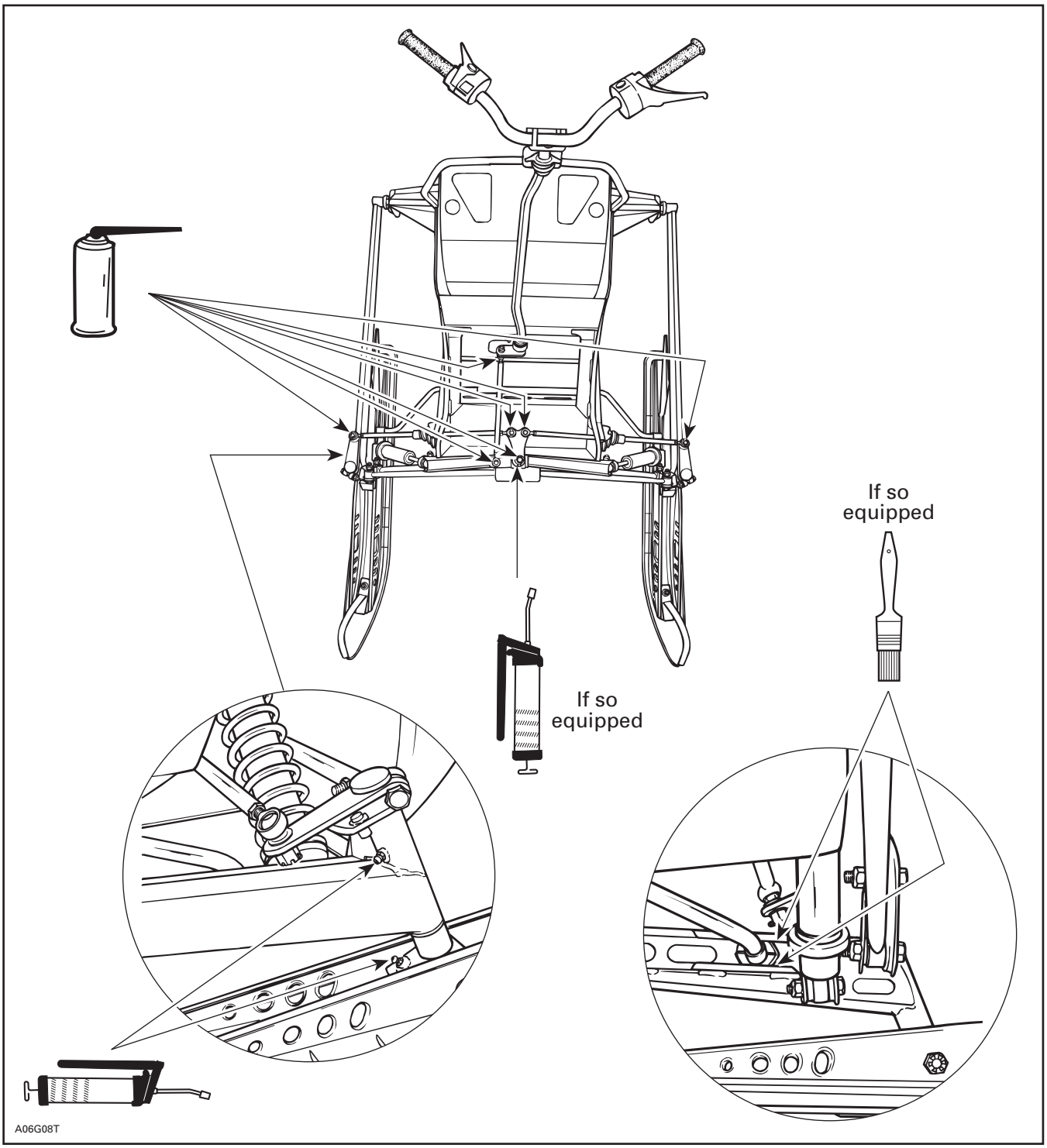


S-Series

Lubricate:

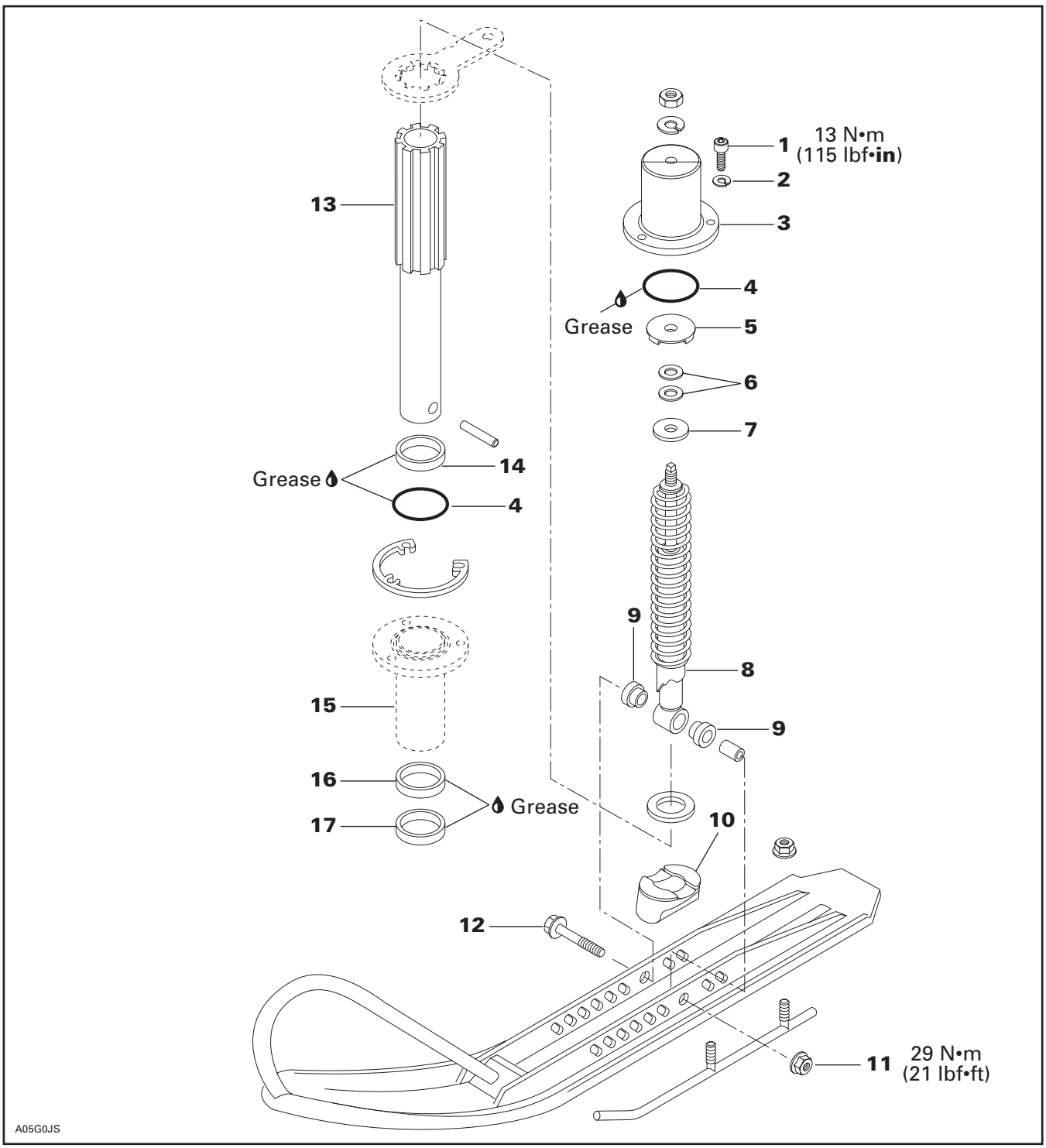
- Steering column.
- Ski legs, ski pivots and idler arm.
- Stabilizer sliders with grease, and oil their ball joints if so equipped.
- Pivot arm at grease fitting no. 26 (some models only).

S-Series



SUSPENSION AND SKI SYSTEM

Tundra II LT

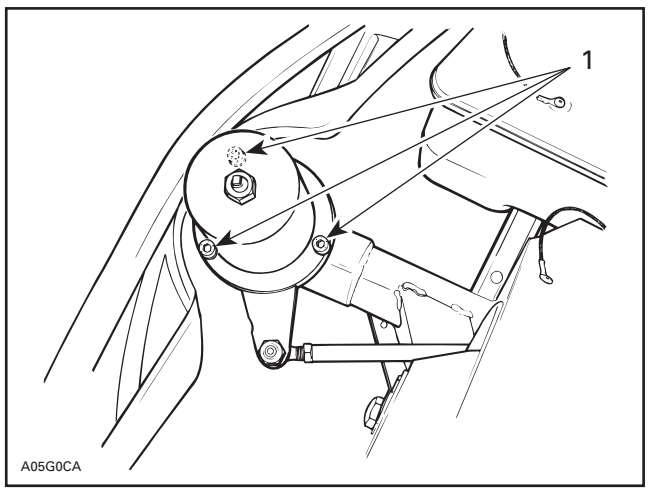


ON-VEHICLE COMPONENT REMOVAL

8, Shock

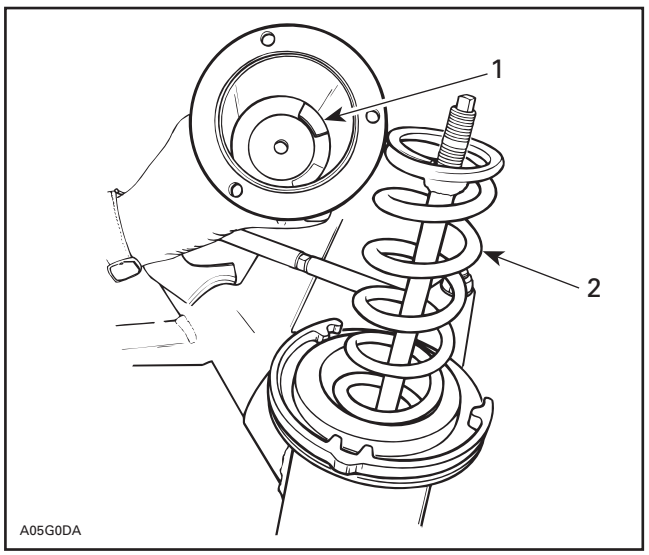
Lift front of vehicle and support off the ground.

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. 7**.



1. Allen screws

NOTE: These washers and stopper can be wedged in cover.



1. Washers and stopper wedged in cover
2. Spring

Pull out spring then check shock as described below in **inspection**.

Suspension Free Operation

Remove cover and check for free movement of ski leg by lifting end of ski.

DISASSEMBLY

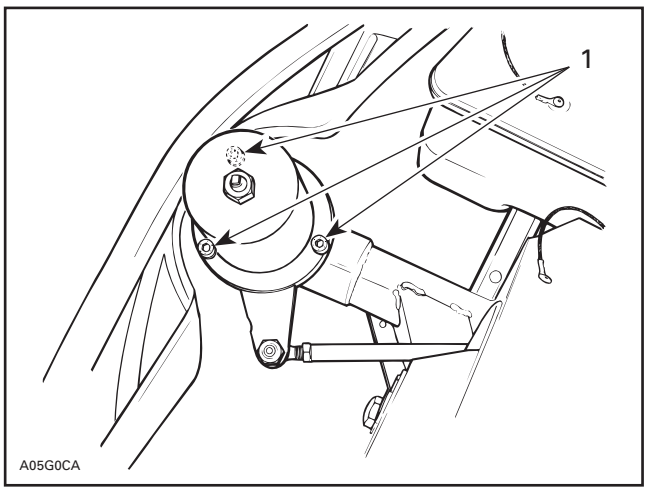
Lift front of vehicle and support off the ground.

1,2,3,5,6,7,9,11,12, Bolt, Lock Washer, Cover, Stopper, Bushing and Nut

Remove ski bolt, nut, bushings and ski.

Unscrew shock piston pin nut then remove washer. Shock with spring will fall off the ski leg.

Unscrew 3 Allen screws retaining cover, then remove stopper and washers.

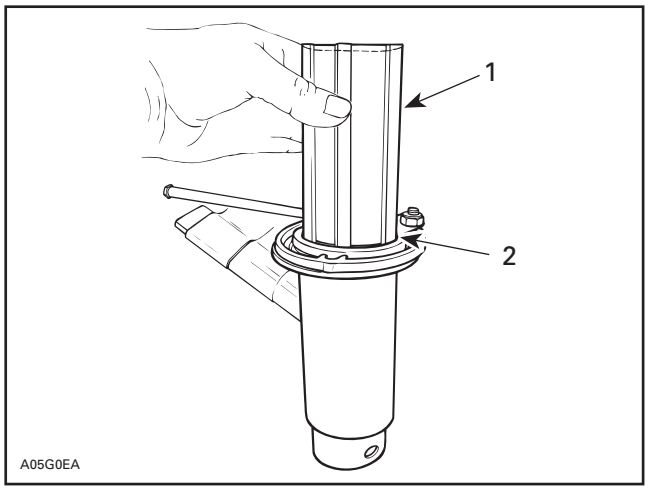


1. Allen screws

NOTE: These washers and stopper can be wedged in cover.

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.

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

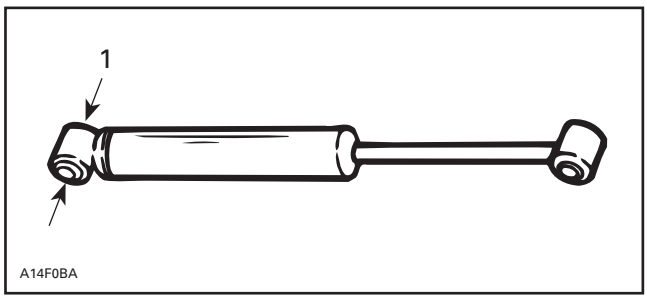
Check stopper for crack or deterioration. Replace as required.

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.



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 checking that it moves smoothly and with uniform resistance.

Pay attention to the following conditions that will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme end of either stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

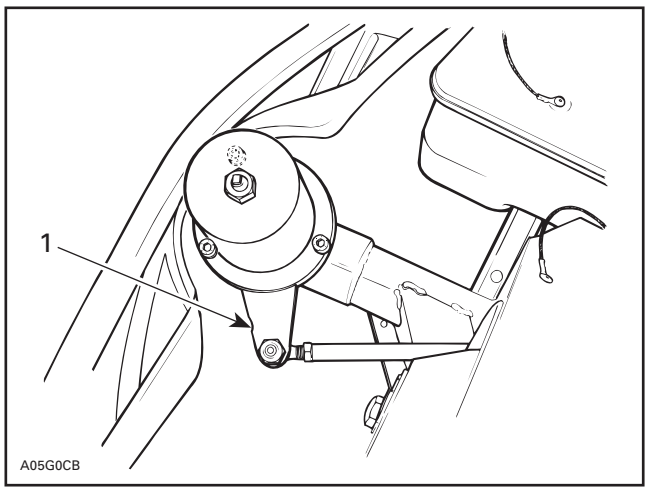
INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply synthetic grease (P/N 413 7115 00) as illustrated in exploded view above.

Tighten nuts and screws to proper torque as mentioned in exploded view.

Steering arm notch must face outside of vehicle.

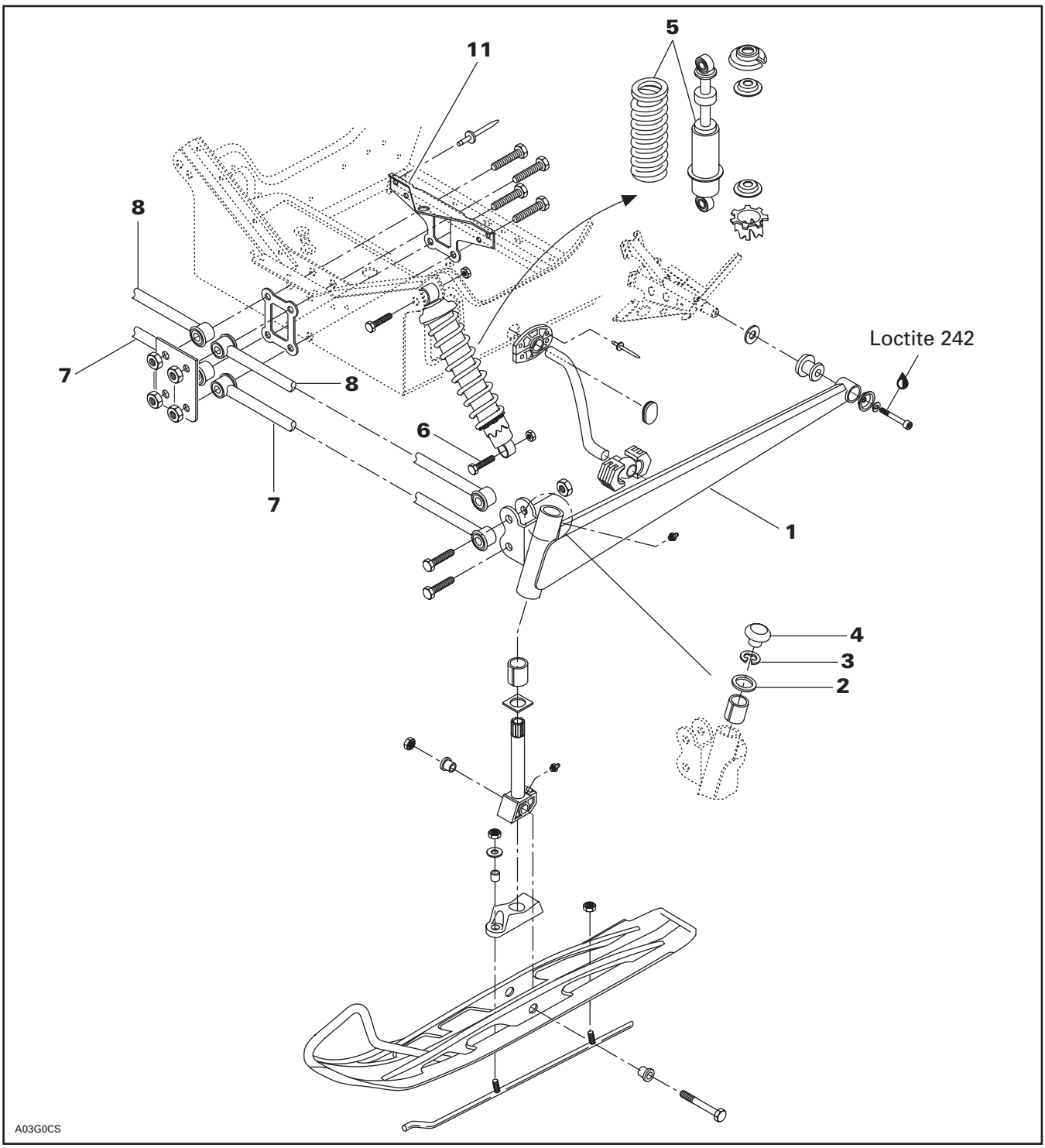


1. Recess facing outside

16,17, Seal

Install seal before reinstalling ski leg.

S-Series

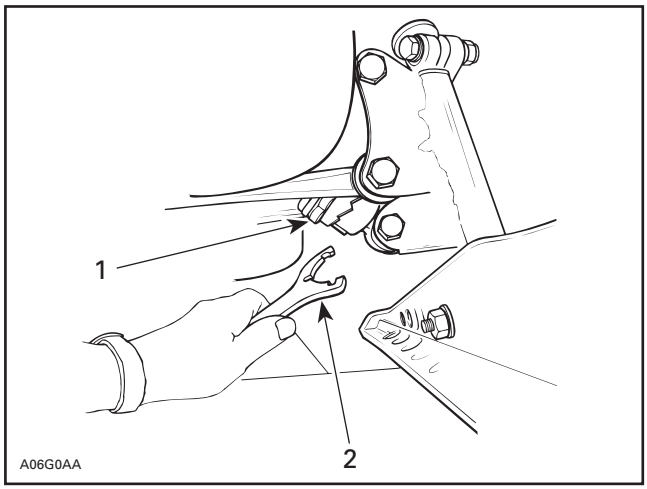


DISASSEMBLY

5, Shock

Lift front of vehicle and support it off the ground.

On models so equipped reduce spring preload by turning adjusting ring accordingly with special key in vehicle tool box.



1. Shock cam
2. Special key

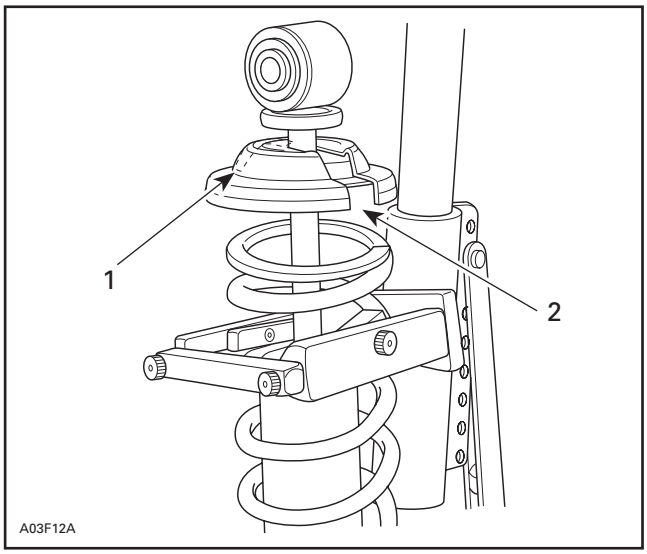
Remove lower bolt then upper bolt of shock.

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 bar. Adjust handle horizontal by changing position of clevis pin.

Push down on handle until il locks. Remove spring stopper and cap then release handle.

At installation, cap opening must be 180° from spring stopper opening.



1. Spring stopper opening
2. Cap opening

1, Swing Arm

Lift front of vehicle and support it off the ground.

Unbolt ski.

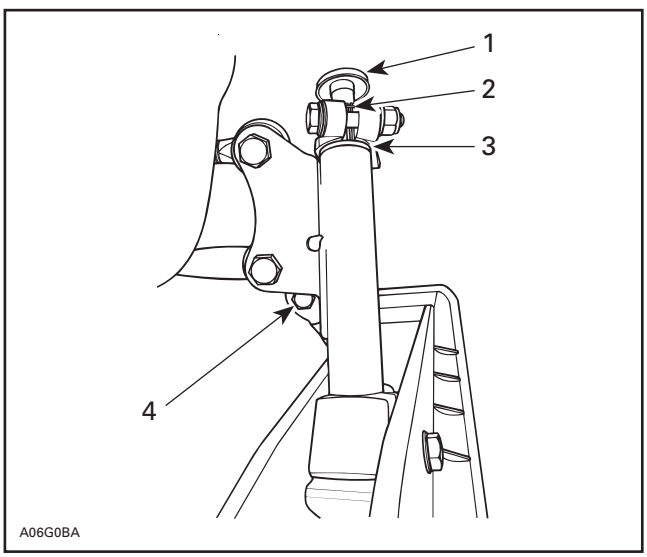
Remove cap, circlip then slacken steering arm bolt and pull up steering arm. Note shim positions. Ski leg may fall off from swing arm.

Unbolt lower end of shock from swing arm.

Unbolt half arms and tie rods.

Unbolt rear of swing arm from frame.

Pull swing arm off the vehicle. Stabilizer bar will disengage ball joint at swing arm inside rails.



*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 if grease fittings are not clogged.

Check 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 on all S-Series models, refer to Tundra shock inspection.

INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Apply synthetic grease (P/N 413 7115 00) to ski leg components.

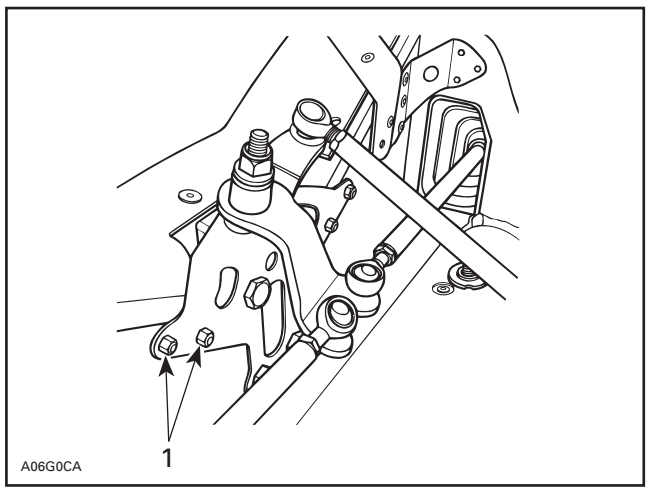
Tighten nuts and screws to proper torque as mentioned in exploded view.

7,8, Upper Half Arm and Tie Rod

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.



TYPICAL — SOME MODELS

1. Nuts and bolts

TABLE OF CONTENTS

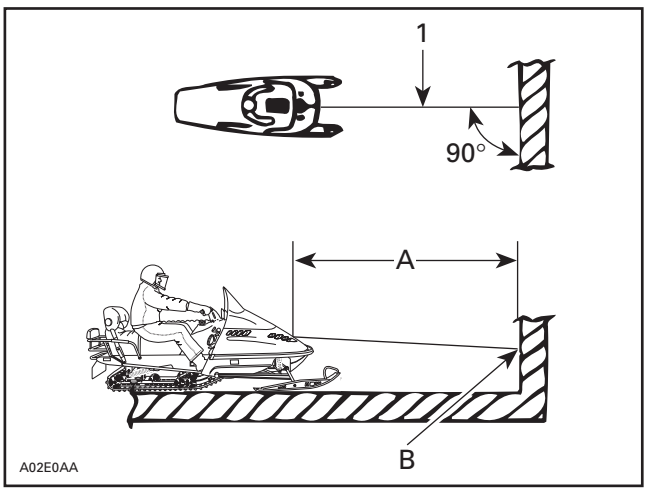
BODY

INSTALLATION AND ADJUSTMENT

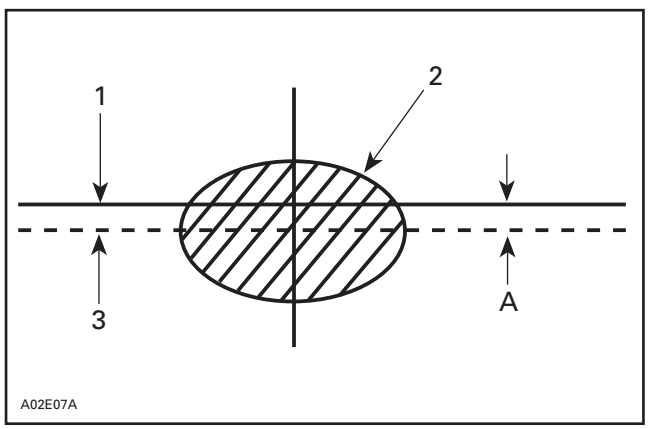
HEADLAMP BEAM AIMING

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 headlamp center



1. Headlamp horizontal center line
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.

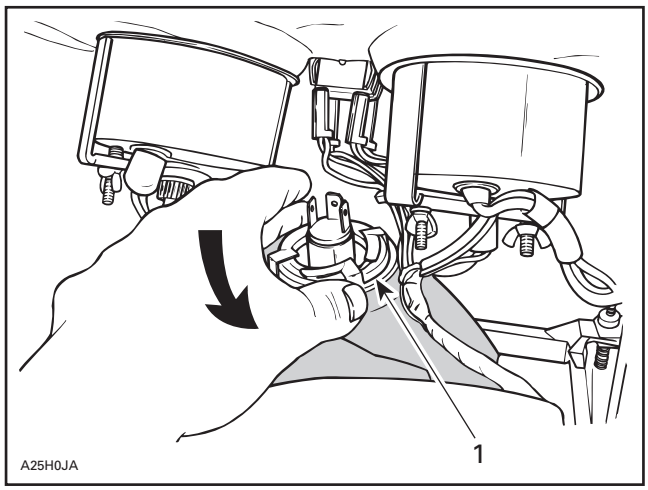
Select **high** beam.

Adjustment

Remove headlamp molding. Turn screws accordingly at upper headlamp attachment.

BULB REPLACEMENT

If headlamp bulb is burnt, tilt hood and unplug the connector from the headlamp. Remove the rubber boot and unfasten the bulb retainer clips or locking ring.



TYPICAL
1. Locking ring

Detach the bulb and replace. 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.

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 solvant directly on decals.

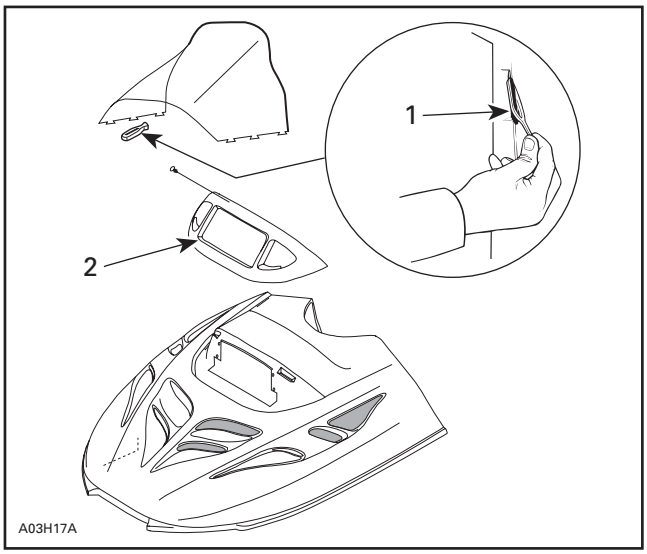
WINDSHIELD INSTALLATION

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*

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

Check belt guard mounting bosses, clips and retainers for wear.

NOTE: Belt guards are purposely made slightly oversize to maintain tension on their clips and retainers preventing undue noise and vibration. It is important that this tension be maintained when reassembling.

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.

PLASTIC REPAIR

REPAIR

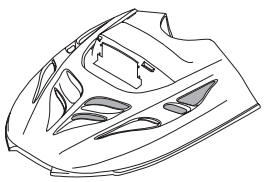
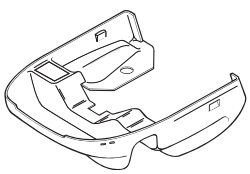
The very first step before repairing plastic materials is to find out exactly which type of material is involved. Refer to following chart.

▼ 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	IRREPARABLE	
		R.I.M. POLYURETHANE	HIGH DENSITY POLYETHYLENE	IMPACT COPOLYMER
HOOD  A03H0ZJ	Tundra II LT			
	S-Series			
BOTTOM PAN  A06H1AJ	Tundra II LT			
	S-Series			

MATERIAL REPAIR PROCEDURE

R.I.M. polyurethane 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. polyurethane

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.
– Apply aluminum tape RA-T from Crest to the damaged area **outside** surface. This will act as a back support during repair.
– Repair inside surface first.
– Apply Crest 50 mm (2 in) wide fiberglass tape to the damaged area **inside** surface.
– Apply Crest TP-E epoxy over the fiberglass tape.
– When epoxy is hardened, remove aluminum tape from outside surface.
– Cover outside surface with Crest TP-E epoxy filling the damaged area. Damaged area should be slightly higher.
– Heat surface with a heater lamp placed at 40 cm (15 in) for a period of 15 minutes.
– Sand outside repair area using a dry sand paper.
– Use Crest TP-E epoxy if a final finish is required.
– Sand repair area as needed.
– Clean surface to be painted 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).

NOTE: R.I.M. material is high static plastics, painting must be done in a dust free area such as a paint booth.

Crest products used in R.I.M. repair procedure are available from following locations:

CREST MAIN OFFICE AND MANUFACTURING PLANT	
CREST INDUSTRIES, INC. 3841 13th Street Wyandotte, Michigan 48192	Phone: 313-283-4100 Toll Free: 1-800-822-4100 Fax: 1-800-344-4461 Fax: 313-283-4461

DISTRIBUTOR WAREHOUSE LOCATIONS		
UNITED STATES		CANADA
CREST EAST COAST, INC. P.O. Box 550 1109 Industrial Parkway Brick, New Jersey 08723 Phone: 908-458-9000 Fax: 908-458-5753 CREST PRODUCTS, INC. *Shipping Address:* 125 Production Drive Yorktown, Virginia 23693 Phone: 757-599-6572 Virginia: 1-800-572-5025 Outstate: 1-800-368-5033 Fax: 757-599-6630 *Mailing Address:* P.O. Box 2018 Grafton, Virginia 23692 CREST INDUSTRIES SOUTHEAST, INC. *Shipping Address:* 4300 Glen Haven Drive Decatur, Georgia 30035 Phone: 404-288-4658 Toll Free: 1-800-552-0876 Fax: 404-288-4658 *Mailing Address:* P.O. Box 254 Decatur, Georgia 30031	CREST INDUSTRIES, INC. (CREST MID-WEST) 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 **CREST MID WEST** **Regional Branch Warehouses** CREST INDUSTRIES, INC. P.O. Box 635 Mountain Home, Arkansas 72653 Phone: 501-491-5583 Toll Free: 1-800-733-2737 CREST INDUSTRIES, INC. 4200 Jackson Street, Unit 9 Denver, Colorado 80216 Phone: 303-320-3900 Toll Free: 1-800-733-2737 Fax: 303-320-6509 REM-CO DISTRIBUTING, INC. 5625 S. Adams Tacoma, Washington 98409 Phone: 206-474-5414 Toll Free: 1-800-735-7224 Fax: 206-474-7339	J2 PRODUCTS A Division of Sawill Ltd. 54 Audia Court, Unit 2A Concord, Ontario, L4K 3N4 *Phone:* Toronto: 416-665-1404 Concord: 905-669-9410 Montréal: 514-962-3932 *Fax:* Concord: 905-669-9419 Montréal: 514-962-3932 WHEEL-IN AUTOMOTIVE SUPPLY *Shipping Address:* No. 1, 3911A Brandon St. S.E. Calgary, Alberta, T2G 4A7 Office: 403-287-0775 *Mailing Address:* P.O. Box 40036 929-42nd Avenue S.E. Calgary, Alberta, T2G 5G5

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:

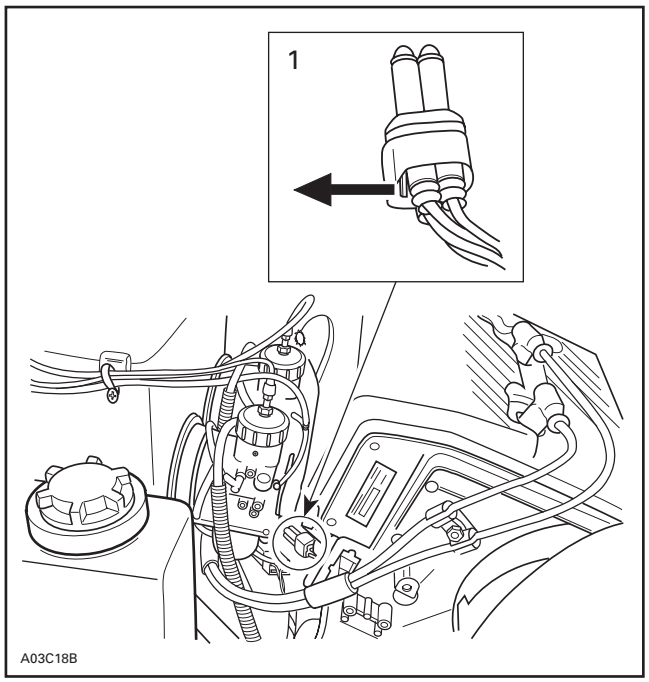
– electric welding
– amperage: 70-110 A
– voltage: 20-24 V
– rod: E-7014 (3/32 in)

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.

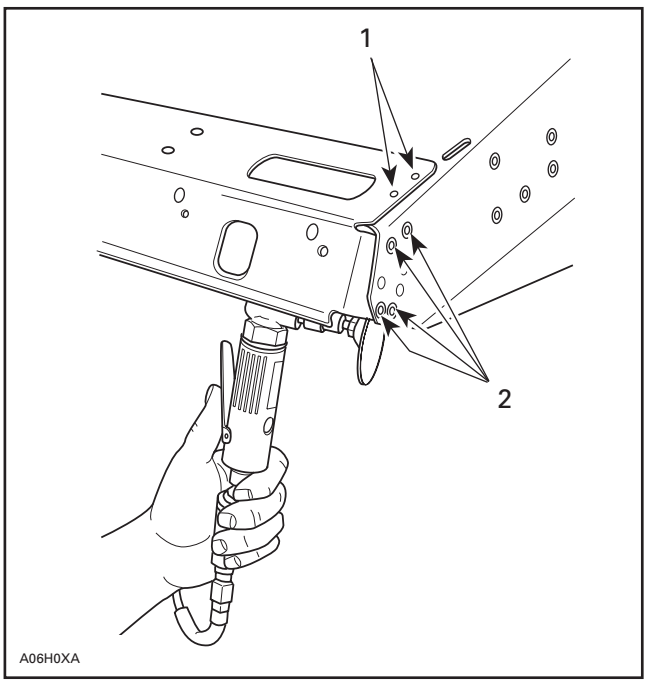
▼ CAUTION

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^2	cm^2	6.45
in^3	cm^3	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^2)	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.

VEHICLE MODEL				TUNDRA II LT	TOURING E, SKANDIC 380, FORMULA S, FORMULA S ELEC.	TOURING LE	SKANDIC 500, FORMULA SL
ENGINE TYPE				**277**	**377**	**443**	**503**
Number of Cylinders				1	2	2	2
Bore			mm (in)	72.00 (2.835)	62.00 (2.441)	67.5 (2.66)	72.00 (2.835)
Stroke			mm (in)	66.00 (2.598)	61.00 (2.402)	61.00 (2.402)	61.00 (2.402)
Displacement			cm^3 (in^3)	268.70 (16.40)	368.30 (22.48)	436.6 (26.64)	496.70 (30.31)
Compression Ratio (corrected)				6.70	6.80	6.4	6.20
Maximum Power Engine Speed ①			± 100 RPM	6900	6900	7000	7000
Piston Ring Type			$1^{st}/2^{nd}$	ST/R	ST/R	ST/R	ST/R
Ring End Gap	(new) (wear limit)		mm (in) mm (in)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)	0.2 (.008) 1.0 (.039)
Ring/Piston Groove Clearance	(new) (wear limit)		mm (in) mm (in)	0.04 (.0016) 0.2 (.008)	0.04 (.0016) 0.2 (.008)	0.04 (.0016) 0.2 (.008)	0.04 (.0016) 0.2 (.008)
Piston/Cylinder Wall Clearance	(new) (wear limit)		mm (in) mm (in)	0.090 (.0031) 0.2 (.008)	0.060 (.0024) 0.2 (.008)	0.080 (.0031) 0.2 (.008)	0.090 (.0035) 0.2 (.008)
Connecting Rod Big End Axial Play	(new) (wear limit)		mm (in) mm (in)	0.20 (.0079) 1.0 (.0394)	0.20 (.0079) 1.0 (.0394)	0.20 (.0079) 1.0 (.0394)	0.2 (.0079) 1.0 (.0394)
Maximum Crankshaft End-play ②			mm (in)	0.3 (.0118)	0.3 (.0118)	0.3 (.0118)	0.3 (.0118)
Maximum Crankshaft Deflection Measured at Center			mm (in)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)	0.08 (.0031)
Rotary Valve Timing ③			Opening Closing	N.A.	N.A.	N.A.	N.A.
Magneto Generator Output			W	160	240	240	240
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)	2.52 (.099)	1.68 (.066)	1.38 (.054)	1.66 (.065)
Trigger Coil ⑤				N.A.	140 – 180	140 – 180	140 – 180
Generating Coil ⑤	Low Speed		Ω	40 – 76	N.A.	N.A.	N.A.
	High Speed		Ω	N.A.	230 – 330	230 – 330	230 – 330
Lighting Coil ⑤			Ω	0.05 – 0.6	0.23 – 0.28	0.23 – 0.28	0.23 – 0.28
High Tension Coil ⑤	Primary		Ω	0.11 – 0.21	N.A.	N.A.	N.A.
	Secondary		kΩ	4.9 – 7.5	5.1 – 6.3	5.1 – 6.3	5.1 – 6.3
Carburetor Type			PTO/MAG	VM 34-508	2 x VM 30-193	VM 34-511/512	VM 34-513/514
Main Jet			PTO/MAG	190	140/140	200/190	180/170
Needle Jet				159 O-8	159 P-0	159 P-0	159 P-0
Pilot Jet				40	40	35	40
Needle Identification – Clip Position				6DH4-2	6DP9-3	6DH2-3	6DH2-3
Slide Cut-away				2.5	2.5	2.5	2.5
Float Adjustment			± 1 mm (± .040in)	23.9 (.94)	23.9 (.94)	23.9 (.94)	23.9 (.94)
Air Screw Adjustment			± 1/16 turn	1	1-1/4	1-1/2	1-7/8
Idle Speed RPM			± 200 RPM	1200	1650	1650	1650
Gas Type/Pump Octane Number				Unleaded/87	Unleaded/87	Unleaded/87	Unleaded/87
Gas/Oil Ratio				Injection	Injection	Injection	Injection
Type				Radial Fan	Axial Fan	Axial Fan	Axial Fan
Axial Fan Belt Adjustment	Deflection		mm (in)	N.A.	8 – 9 (.31 – .35)	8 – 9 (.31 – .35)	9 – 10 (.35 – .39)
	Force ⑥		kg (lbf)	N.A.	5 (11)	5 (11)	5 (11)
Thermostat Opening Temperature			°C (°F)	N.A.	N.A.	N.A.	N.A.
Radiator Cap Opening Pressure			kPa (PSI)	N.A.	N.A.	N.A.	N.A.
ENGINE COLD N•m (lb•ft)	Drive Pulley Retaining Screw ⑦			95 (70)	95 (70)	95 (70)	95 (70)
	Exhaust Manifold Nuts or Bolts			25 (18)	22 (16)	22 (16)	22 (16)
	Magneto Ring Nut			90 (66)	105 (77)	105 (77)	105 (77)
	Crankcase Nuts or Screws		M6 M8	— 22 (16)	10 (7) 22 (16)	10 (7) 22 (16)	— 22 (16)
	Crankcase/Engine Support Nuts or Screws			21 (15)	38 (28)	38 (28)	38 (28)
	Cylinder Head Nuts			26 (19)	22 (16)	22 (16)	22 (16)
	Crankcase/Cylinder Nuts or Screws			N.A.	N.A.	N.A.	N.A.
	Axial Fan Shaft Nut			N.A.	50 (37)	50 (37)	50 (37)

VEHICLE MODEL				TUNDRA II LT	TOURING E	FORMULA S, FORMULA S ELEC.
ENGINE TYPE				**277**	**377**	**377**
	Chain Drive Ratio			14/25	18/44	21/44
	Chain	Pitch	in	1/2	3/8	3/8
		Type/Links Qty/Plates Qty		Single/62	Silent/70/11	Silent/72/11
	Drive Pulley	Type of Drive Pulley		Bombardier Lite	Bombardier Lite	Bombardier Lite
		Ramp Identification		N.A.	N.A.	N.A.
		Calibration Screw Position or Calibration Part ②		1143 2 x C	1181 1 x C	1181 1 x C
		Spring Color		Turquoise	Green/Green	Red/Blue
		Spring Length	± 1.5 mm (± .060 in)	85.3 (3.36)	72.0 (2.83)	96 (3.78)
		Clutch Engagement	± 200 RPM	3100	2500	3500
	Driven Pulley Spring Preload Cam Angle		± 0.7 kg (± 1.5 lb) degree	3.6 (7.9) 37.8°	4.8 (10.6) 44°	4.8 (10.6) 44°
	Pulley Distance Z		(+0, –1) mm ((+0, –1/32) in)	37 (1-29/64)	25.5 (1)	25.5 (1)
	Offset	X	± 0.4 mm (± 1/64 in)	36 (1-27/64)	33.4 (1-5/16)	33.4 (1-5/16)
		Y – X	MIN. MAX.	– 0 (– 0) + 1.5 (+ .059)	+ 0.5 (+ .020) + 1.5 (+ .059)	+ 0.5 (+ .020) + 1.5 (+ .059)
	Drive Belt Part Number (P/N)			414 8276 00	415 0606 00	415 0606 00
	Drive Belt Width (new) ③		mm (in)	33.3 (1-5/16)	34.7 (1-3/8)	34.7 (1-3/8)
	Drive Belt Adjustment	Deflection	± 5 mm (± 13/64 in)	32 (1-1/4)	32 (1-1/4)	32 (1-1/4)
		Force ④	kg (lbf)	6.8 (15)	11.3 (25)	11.3 (25)
	Track	Width	cm (in)	38.1 (15)	38.1 (15)	38.1 (15)
		Length	cm (in)	354 (139)	345 (136)	307 (121)
		Profile Height	mm (in)	—	18.4 (.724)	18.4 (.724)
		Adjustment Deflection	mm (in)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)
		Force ⑤	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)
	Suspension Type	Track		Torque Reaction Slide	SC-10 Touring	SC-10 Sport
		Ski		Telescopic Strut	DSA	DSA
	Length		cm (in)	284.5 (112)	292 (115)	272.5 (107.3)
	Width		cm (in)	95.3 (37.5)	115.6 (45.5)	115.6 (45.5)
	Height		cm (in)	114 (44.9)	122 (48.0)	112 (44.1)
	Ski Stance		cm (in)	81.3 (32.0)	101.6 (40)	101.6 (40)
	Mass (dry)		kg (lb)	171 (377)	205 (452)	Formula S: 195 (430) Formula S Elec.: 204 (449)
	Ground Contact Area		cm^2 (in^2)	7864 (1219)	7227 (1120)	6503 (1008)
	Ground Contact Pressure		kPa (PSI)	2.13 (.309)	2.78 (.403)	Formula S: 2.94 (.426) Formula S Elec.: 3.08 (.447)
	Frame Material			Steel	Aluminum	Aluminum
	Bottom Pan Material			Polyethylene High Density	Impact Copolymer	Impact Copolymer
	Hood Material			Polyethylene High Density	RRIM Polyurethane	RRIM Polyurethane
	Battery		V (A•h)	N.A.	12 (22)	Formula S Elec.: 12 (22) Formula S: N.A.
	Headlight		W	H4 60/55	H4 60/55	H4 60/55
	Taillight and Stoplight		W	8/27	8/27	8/27
	Tachometer and Speedometer Bulb		W	N.A.	5	5
	Fuel and Temperature Gauge Bulb		W	N.A.	N.A.	N.A.
	Fuse	Starter Solenoid	A	N.A.	30	Formula S Elec.: 30 Formula S: N.A.
		Tachometer	A	N.A.	N.A.	N.A.
	Fuel Tank		L (U.S. gal)	26 (6.9)	40 (10.6)	40 (10.6)
	Chaincase Gearbox		mL (U.S.oz)	250 (8.5)	250 (8.5)	250 (8.5)
	Cooling System		L (U.S. oz)	N.A.	N.A.	N.A.
	Injection Oil Reservoir		L (U.S. oz)	1.9 (64)	2.55 (86)	2.55 (86)

VEHICLE MODEL				TOURING LE	SKANDIC 380	SKANDIC 500	FORMULA SL
ENGINE TYPE				**443**	**377**	**503**	**503**
Chain Drive Ratio				21/44	21/44	21/44	22/44
Chain	Pitch		in	3/8	3/8	3/8	3/8
	Type/Links Qty/Plates Qty			Silent/72/11	Silent/72/11	Silent/72/11	Silent/72/11
Drive Pulley	Type of Drive Pulley			TRA	Bombardier Lite	TRAC	TRAC
	Ramp Identification			291 ①	N.A.	291 ①	291 ①
	Calibration Screw Position or Calibration Part ②			2	1181 1 x C, 1 x S21	3	3
	Spring Color			Red/Blue	Green/Green	Red/Yellow	Yellow/Red
	Spring Length		± 1.5 mm (± .060 in)	89.0 (3.50)		87.9 (3.46)	121.1 (4.77)
	Clutch Engagement		± 200 RPM	2900	2500	2900	3300
Driven Pulley Spring Preload Cam Angle			± 0.7 kg (± 1.5 lb) degree	4.8 (10.6) 44°	4.8 (10.6) 44°	4.8 (10.6) 44°	4.8 (10.6) 44°
Pulley Distance Z			(+0, –1) mm ((+0, –1/32) in)	16.5 (21/32)	25.5 (1)	16.5 (21/32)	16.5 (21/32)
Offset	X		± 0.4 mm (± 1/64 in)	35.0 (1-3/8)	33.4 (1-5/16)	35.0 (1-3/8)	35.0 (1-3/8)
	Y – X		MIN. MAX.	+ 1 (+ .039) + 2 (+ .079)	+ 0.5 (+ .020) + 1.5 (+ .059)	+ 1 (+ .039) + 2 (+ .079)	+ 1 (+ .039) + 2 (+ .079)
Drive Belt Part Number (P/N)				415 0606 00	415 0606 00	415 0606 00	415 0606 00
Drive Belt Width (new) ③			mm(in)	34.7 (1-3/8)	34.7 (1-3/8)	34.7 (1-3/8)	34.7 (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 ④	kg (lbf)	11.3 (25)	11.3 (25)	11.3 (25)	11.3 (25)
Track	Width		cm (in)	38.1 (15)	38.1 (15)	38.1 (15)	38.1 (15)
	Length		cm (in)	345 (136)	345 (136)	345 (136)	307 (121)
	Profile Height		mm (in)	18.4 (.724)	23.2 (.913)	23.2 (.913)	18.4 (.724)
	Adjustment	Deflection	mm (in)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)	35 – 40 (1-3/8 – 1-9/16)
		Force ⑤	kg (lbf)	7.3 (16)	7.3 (16)	7.3 (16)	7.3 (16)
Suspension Type		Track		SC-10 Touring	SC-10 Touring	SC-10 Touring	SC-10 Sport
		Ski		DSA	DSA	DSA	DSA
Length			cm (in)	294 (115.7)	294 (115.7)	294 (115.7)	272.5 (107.3)
Width			cm (in)	120.7 (47.5)	108 (42.5)	108 (42.5)	120.7 (47.5)
Height			cm (in)	122 (48.0)	122 (48.0)	122 (48.0)	112 (44.1)
Ski Stance			cm (in)	106.7 (42)	94 (37)	94 (37)	106.7 (42)
Mass (dry)			kg (lb)	208 (457)	214 (471)	221 (486)	202 (445)
Ground Contact Area			cm^2 (in^2)	7227 (1120)	7227 (1120)	7227 (1120)	6503 (1008)
Ground Contact Pressure			kPa (PSI)	2.82 (.409)	2.90 (.421)	3.06 (.435)	3.05 (.442)
Frame Material				Aluminum	Aluminum	Aluminum	Aluminum
Bottom Pan Material				Impact Copolymer	Impact Copolymer	Impact Copolymer	Impact Copolymer
Hood Material				RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane	RRIM Polyurethane
Battery			V (A•h)	12 (22)	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	30	N.A.	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)	N.A.	N.A.	N.A.	N.A.
Injection Oil Reservoir			L (U.S. oz)	2.55 (86)	2.55 (86)	2.55 (86)	2.55 (86)

ENGINE TECHNICAL DATA LEGEND

BTDC: Before Top Dead Center
CDI: Capacitor Discharge Ignition
K: Kilo (x 1000)
MAG: Magneto Side
N.A.: Not Applicable
PT: 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 except Tundra II LT. 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 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 TECHNICAL DATA LEGEND

DSA: Direct Shock Action
RRIM: Reinforced Reaction Injection Molding
TRA: Total Range Adjustable drive pulley
N.A.: Not Applicable

① Lever with roller pin (P/N 417 0043 09) (Hollow).

② For Bombardier Lite drive pulleys:
1157 = Block, red push type 38 g (P/N 417 1157 00)
1181 = Block, black screw type 39.6 g (P/N 417 1181 00)
1143 = Block, red screw type 41.8 g (P/N 417 1143 00)

W = Washer 1.8 g (P/N 417 1158 00)
C = Cap 1.65 g (P/N 417 1145 00)
S3.4 = Weight, screw type 3.4 g (P/N 417 1144 00)
S21 = Weight, screw type 21 g (P/N 417 1204 00)

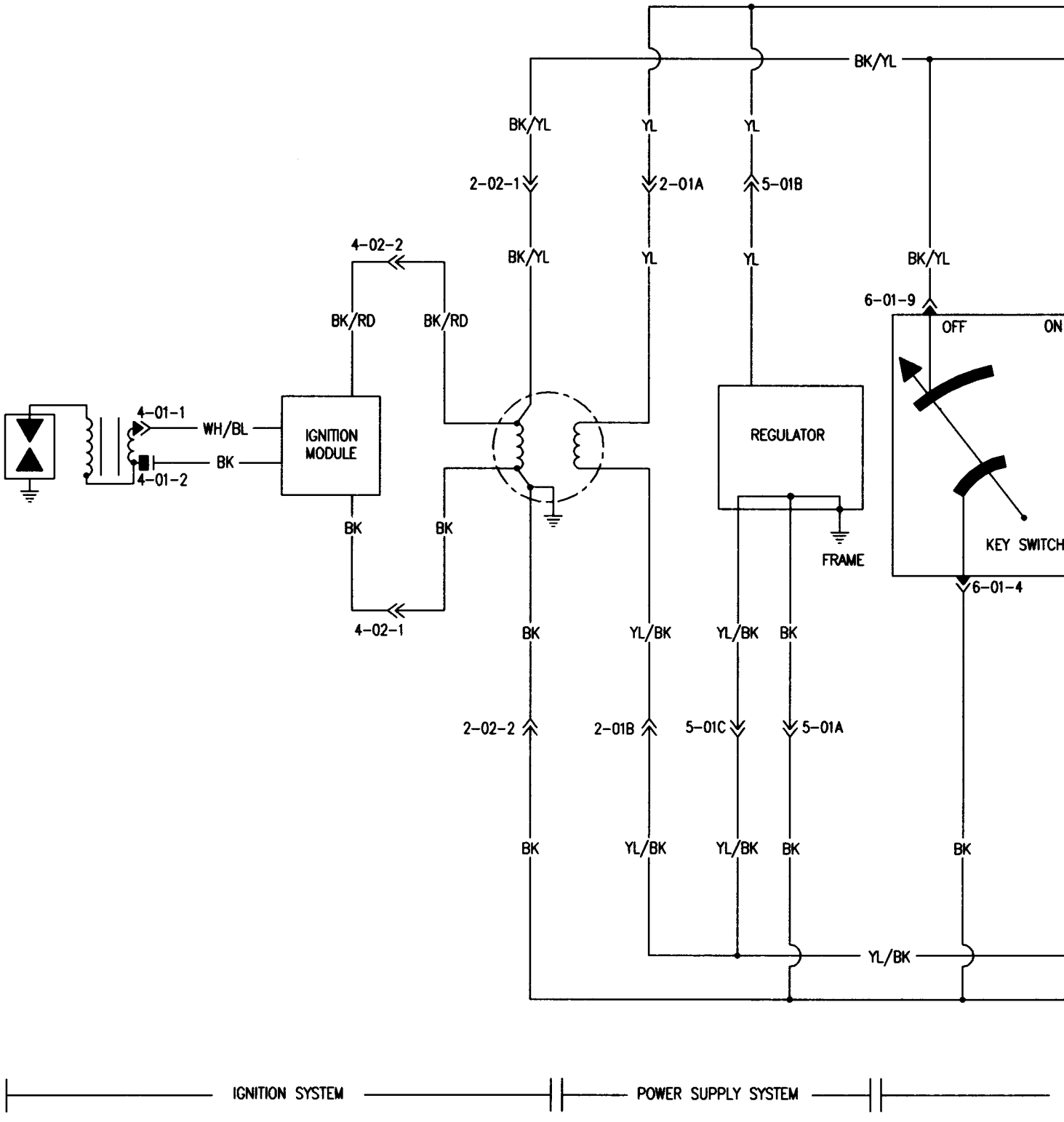
③ Minimum allowable width may not be less than 3.0 mm (1/8 in) of new drive belt.

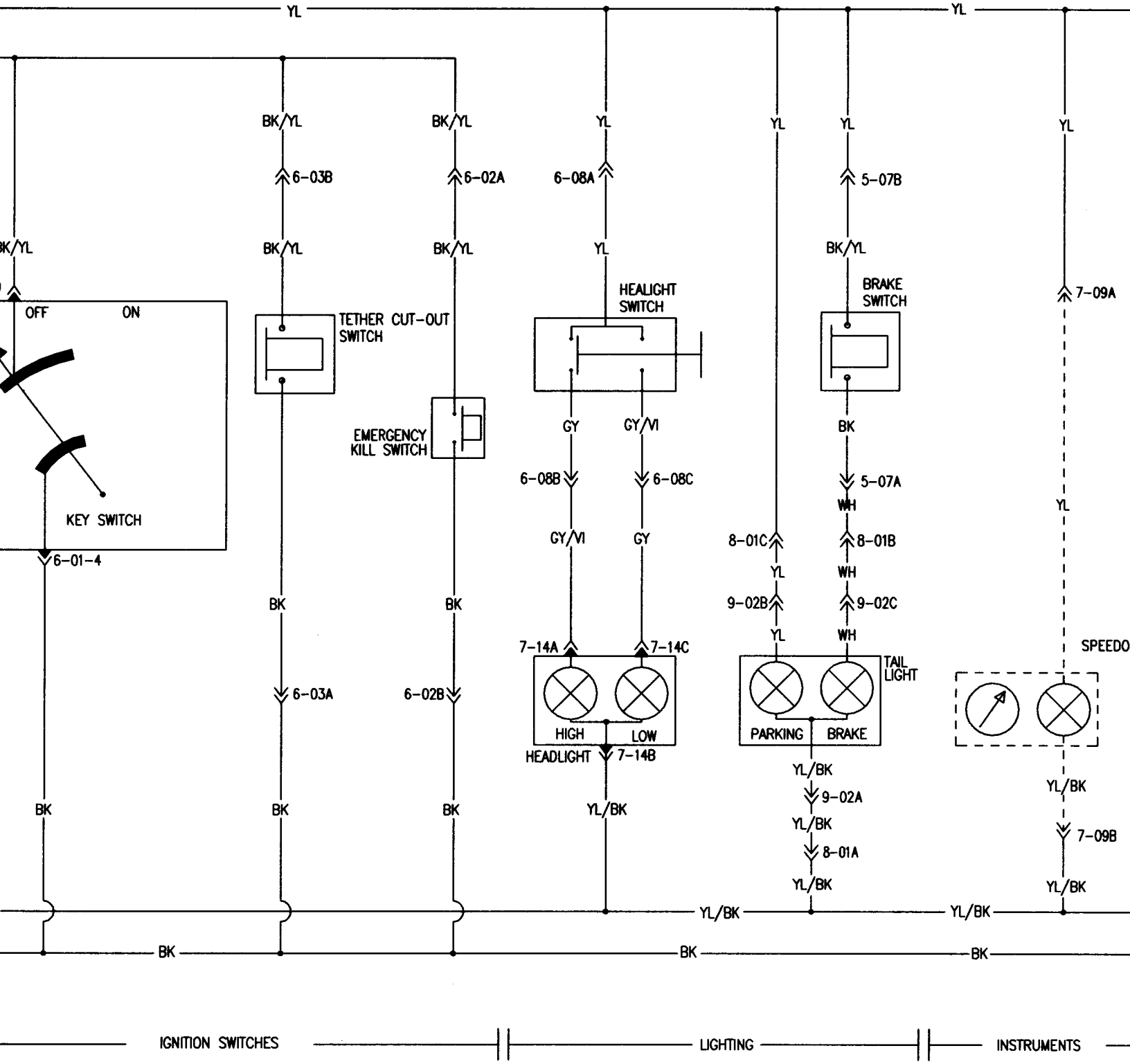
④ Force applied midway between pulleys to obtain specified deflection.

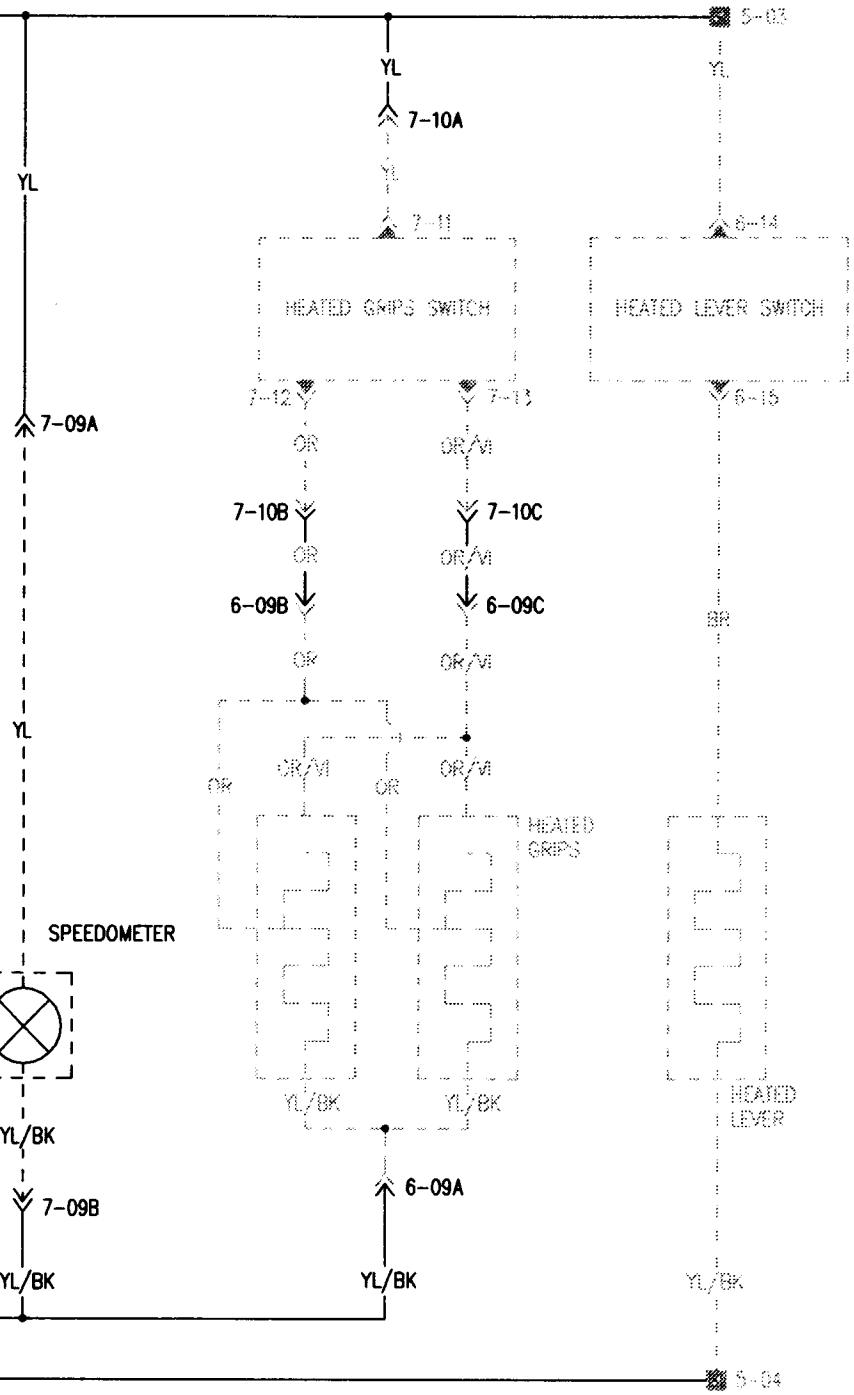
⑤ Force or downward pull applied to track to obtain specified tension deflection.

ANNEX 1 TUNDRA II LT

'98 TUNDRA II LT



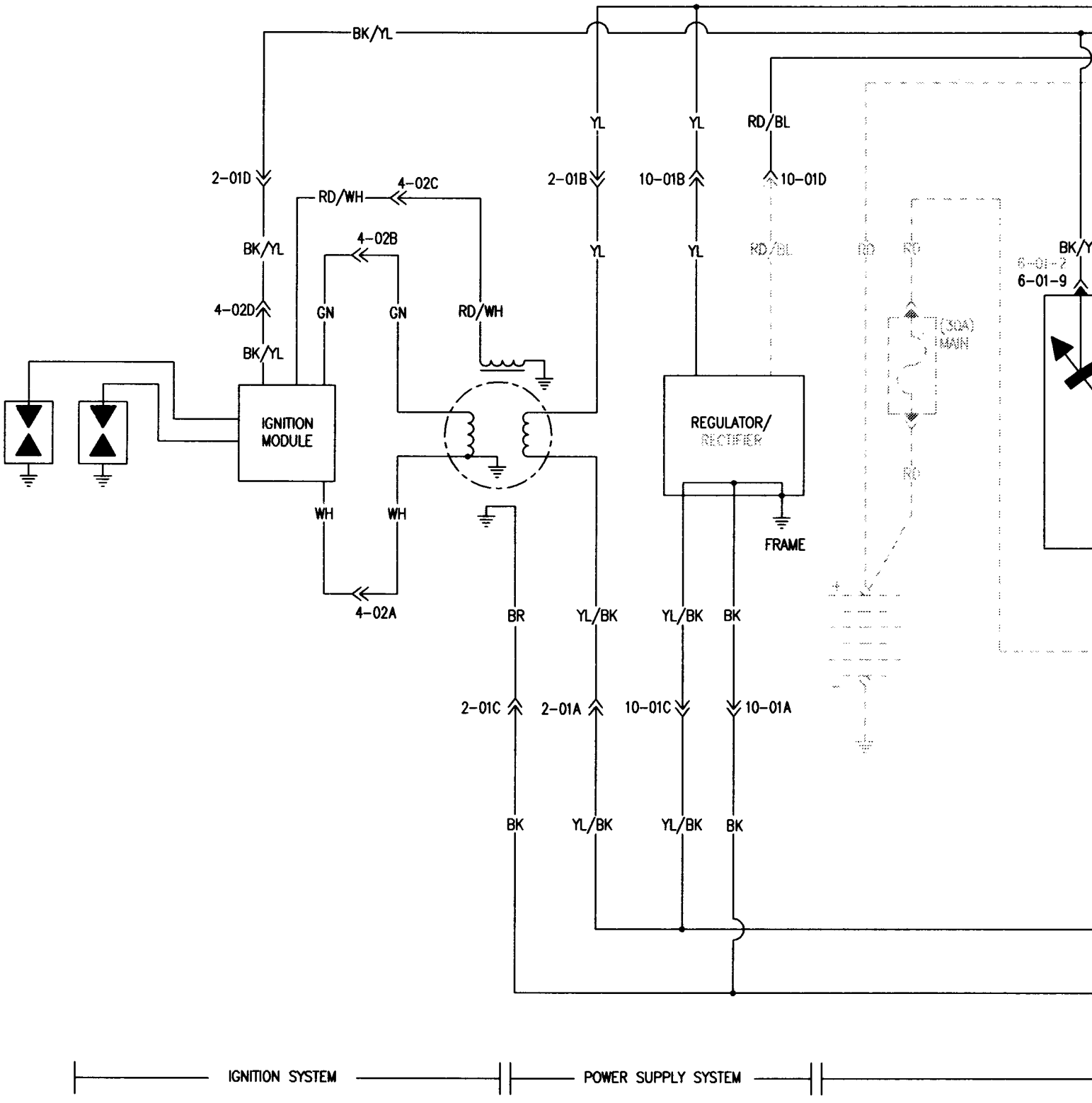

YL
YL
BK/YL
6-03B
BK/YL
TETHER CUT-OUT SWITCH
6-03A
BK
BK/YL
6-02A
BK/YL
EMERGENCY KILL SWITCH
6-02B
BK
YL
6-08A
YL
HEALIGHT SWITCH
GY
GY/VI
6-08B
6-08C
GY/VI
GY
7-14A
7-14C
HIGH
LOW
HEADLIGHT
7-14B
YL/BK
YL
YL
5-07B
BK/YL
BRAKE SWITCH
BK
5-07A
WH
8-01C
8-01B
YL
WH
9-02B
9-02C
YL
WH
TAIL LIGHT
PARKING
BRAKE
YL/BK
9-02A
YL/BK
8-01A
YL/BK
YL
7-09A
YL
SPEEDO
YL/BK
7-09B
YL/BK
OFF
ON
KEY SWITCH
6-01-4
BK
BK
BK
YL/BK
YL/BK
BK
BK
BK
IGNITION SWITCHES
LIGHTING
INSTRUMENTS

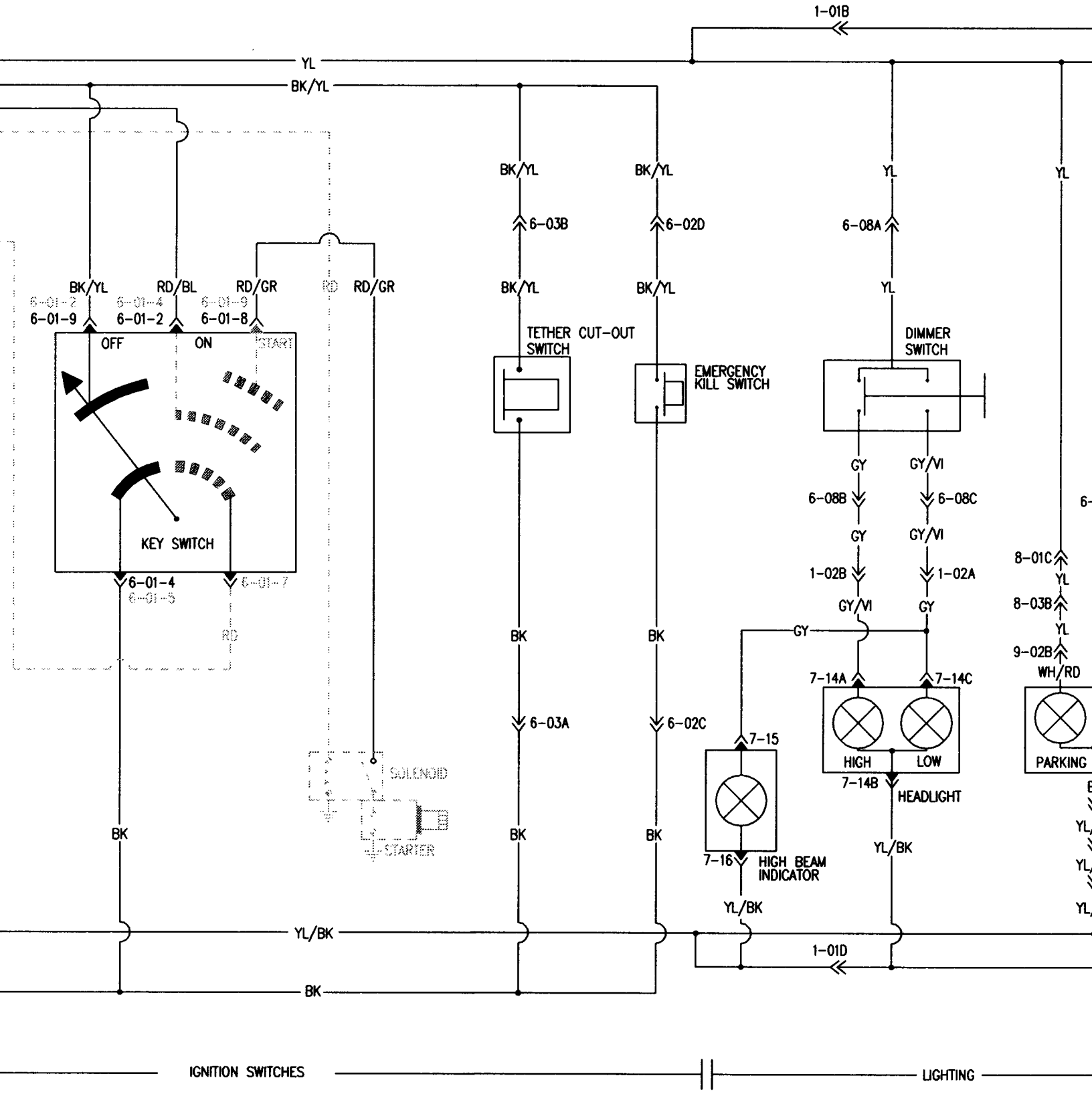


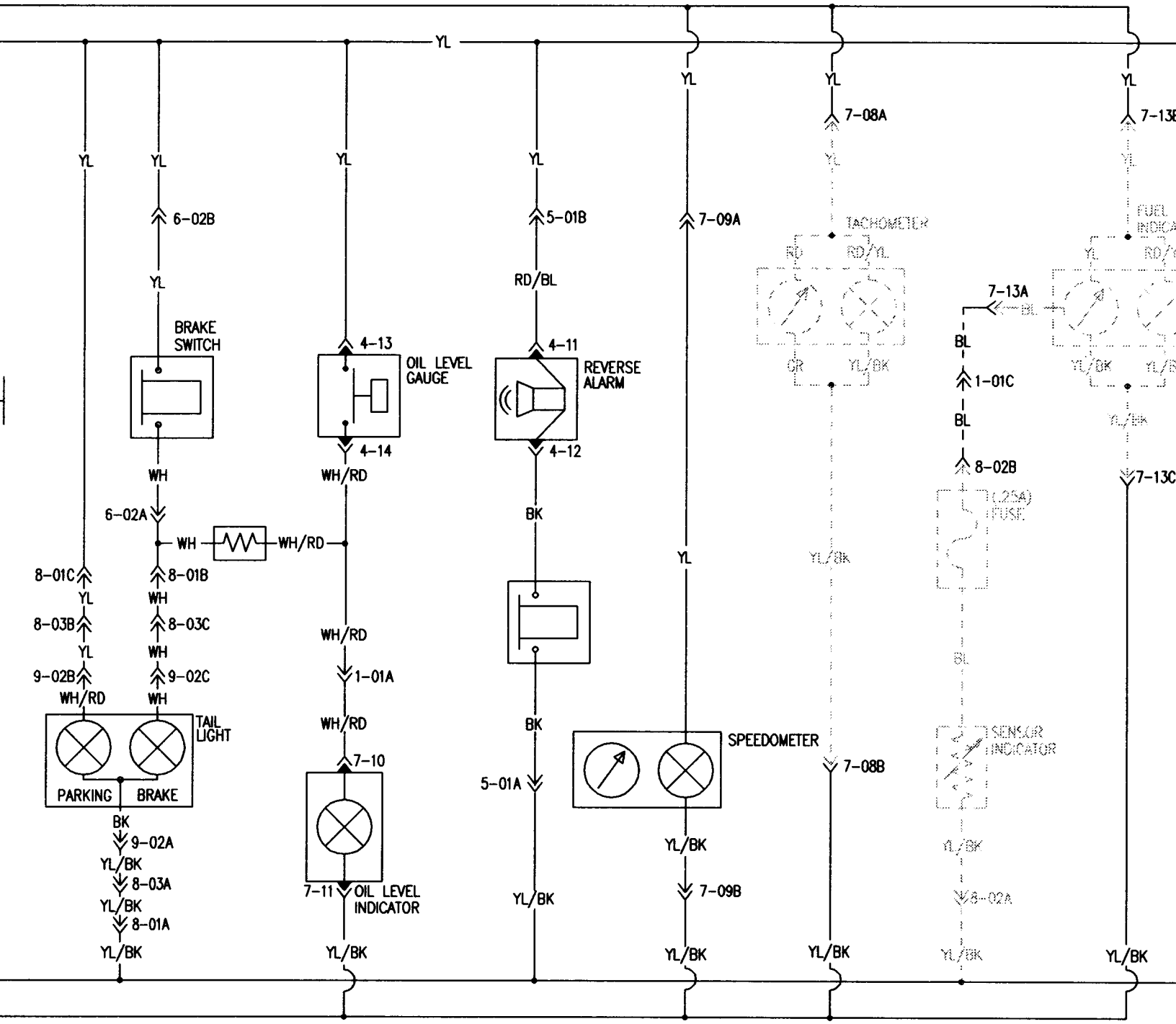
HEATING ELEMENTS

ANNEX 2 SKANDIC 380/500

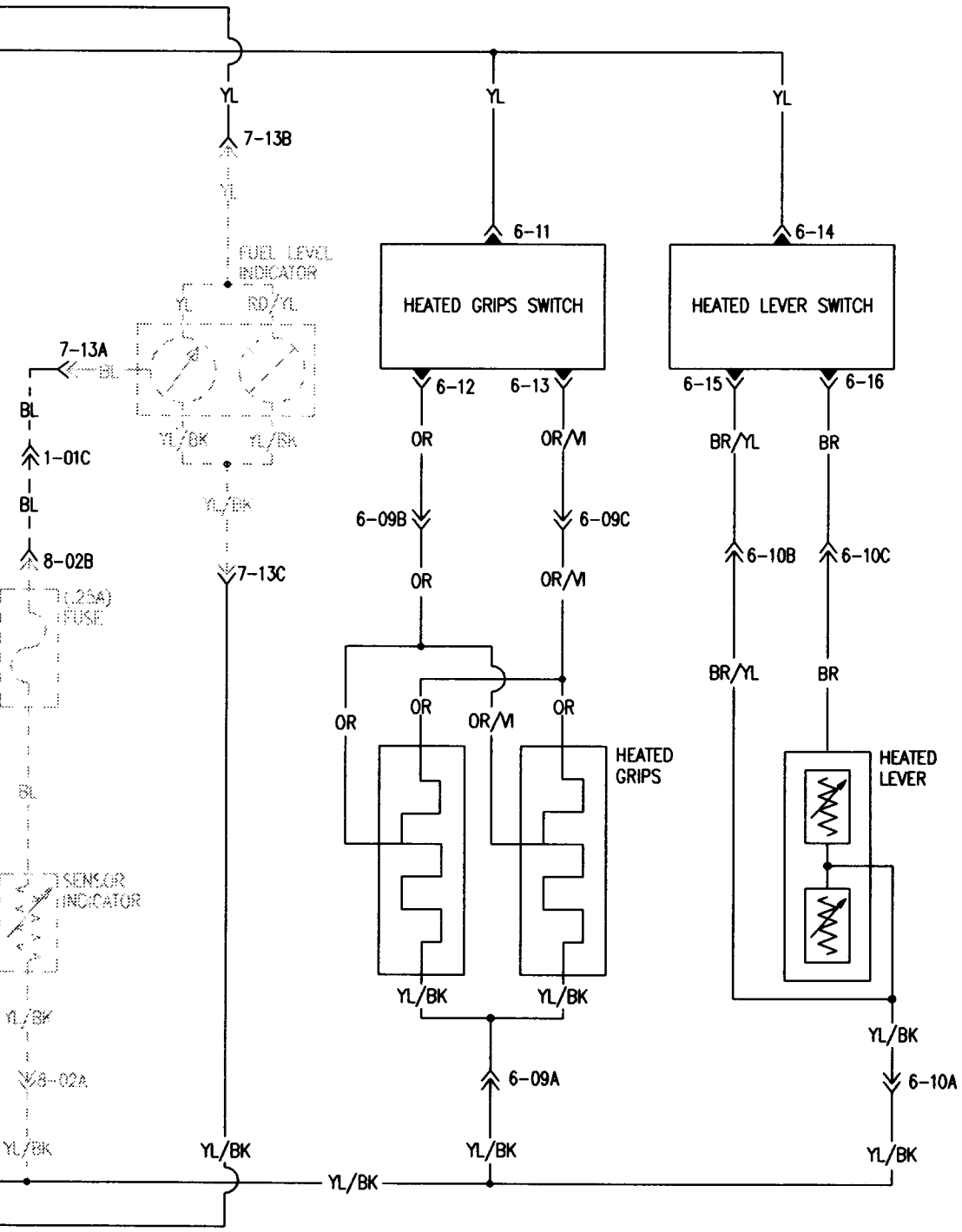
'98 SKANDIC 380
'98 SKANDIC 500




1-01B
YL
BK/YL
BK/YL
BK/YL
6-03B
BK/YL
TETHER CUT-OUT SWITCH
6-03A
BK
BK/YL
6-02D
BK/YL
EMERGENCY KILL SWITCH
6-02C
BK
YL
6-08A
YL
DIMMER SWITCH
GY
6-08B
GY
1-02B
GY/VI
GY/VI
6-08C
GY/VI
1-02A
GY
GY
7-14A
7-14C
HIGH
LOW
7-14B
HEADLIGHT
YL/BK
YL
8-01C
YL
8-03B
YL
9-02B
WH/RD
PARKING
BK/YL
RD/BL
RD/GR
RD
RD/GR
6-01-2
6-01-9
6-01-4
6-01-2
6-01-9
6-01-8
OFF
ON
START
KEY SWITCH
6-01-4
6-01-5
6-01-7
RD
SOLENOID
STARTER
BK
BK
GY
7-15
7-16
HIGH BEAM INDICATOR
YL/BK
YL/BK
1-01D
BK
IGNITION SWITCHES
LIGHTING

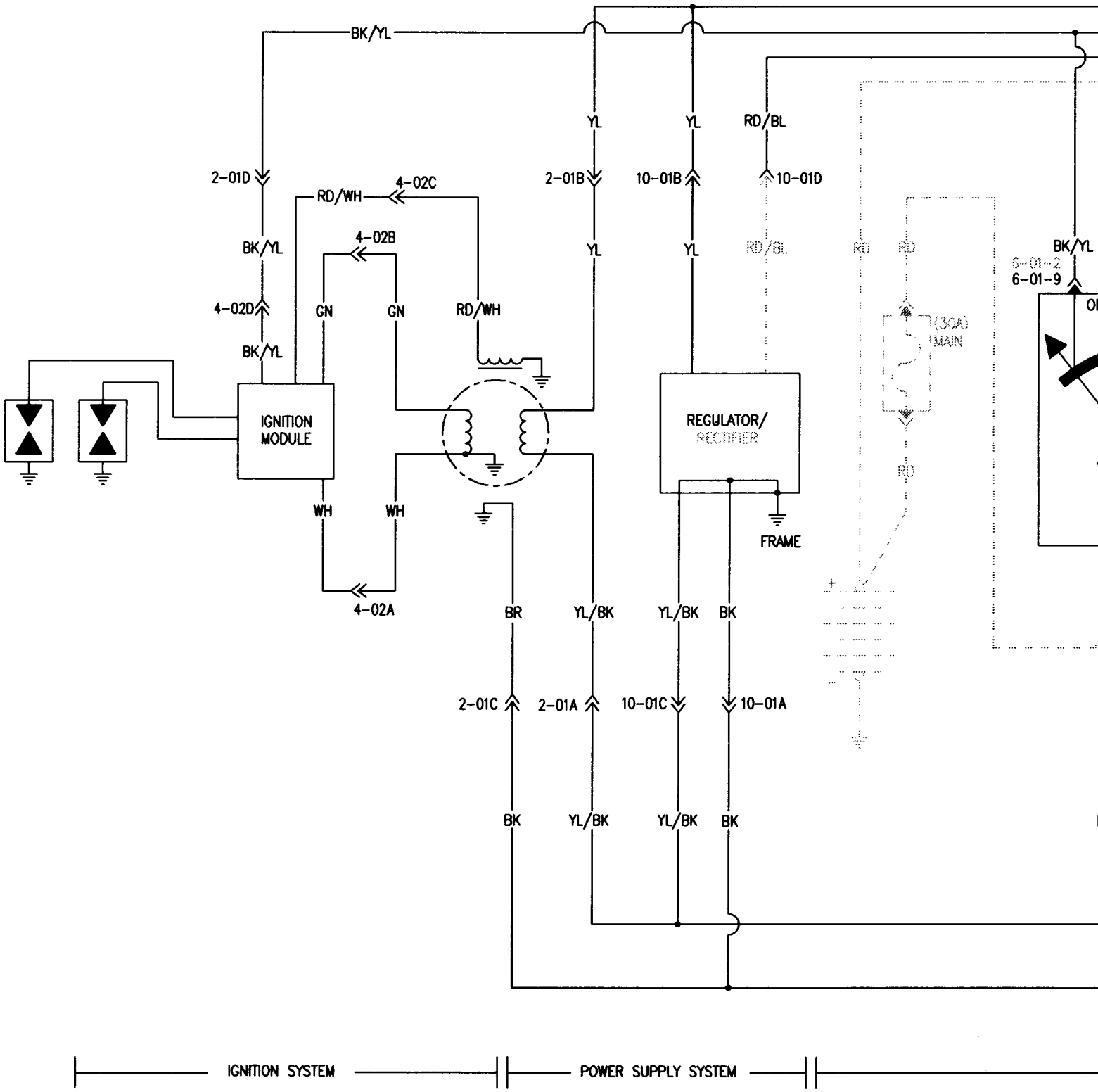


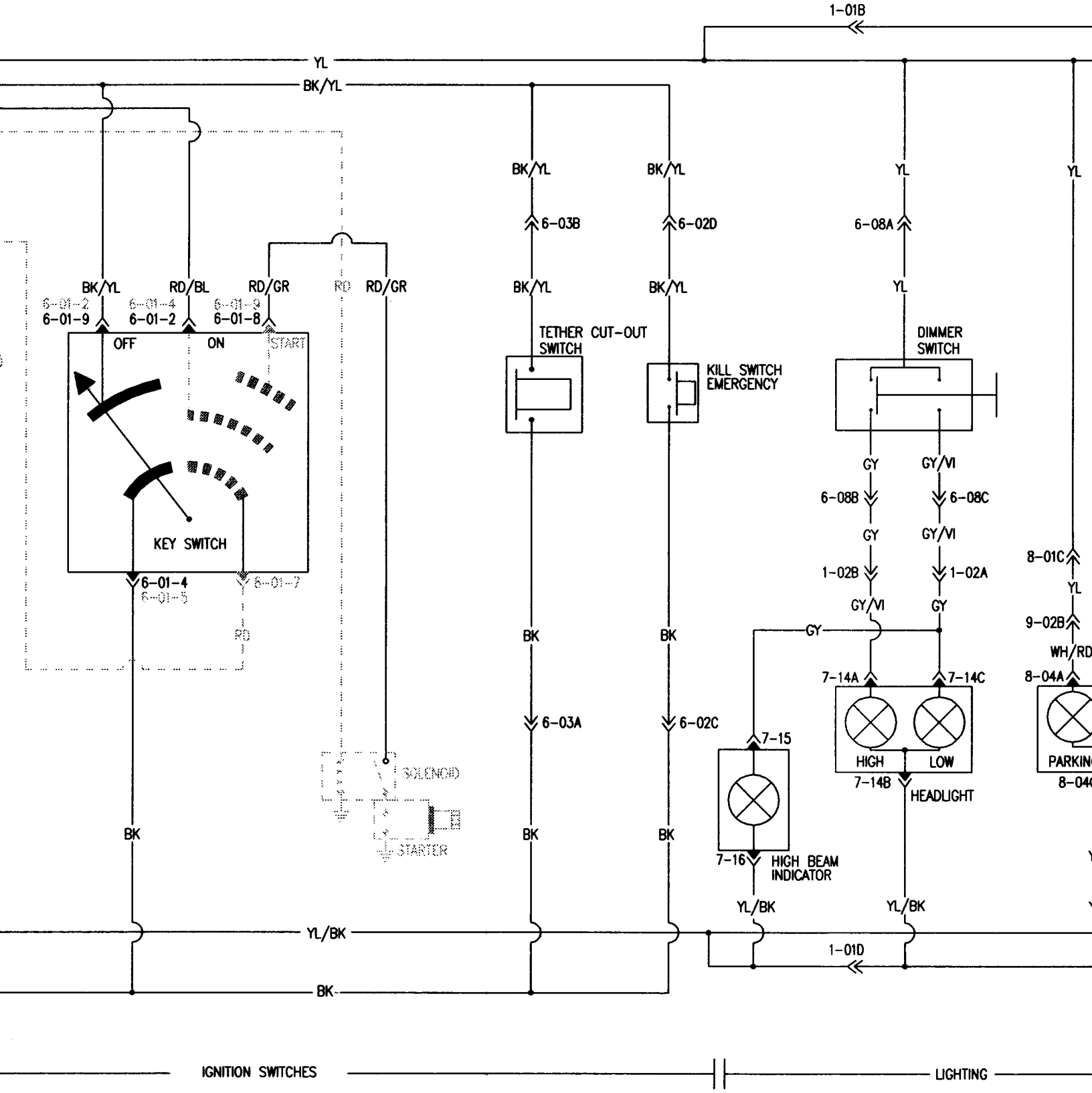
INSTRUMENTS

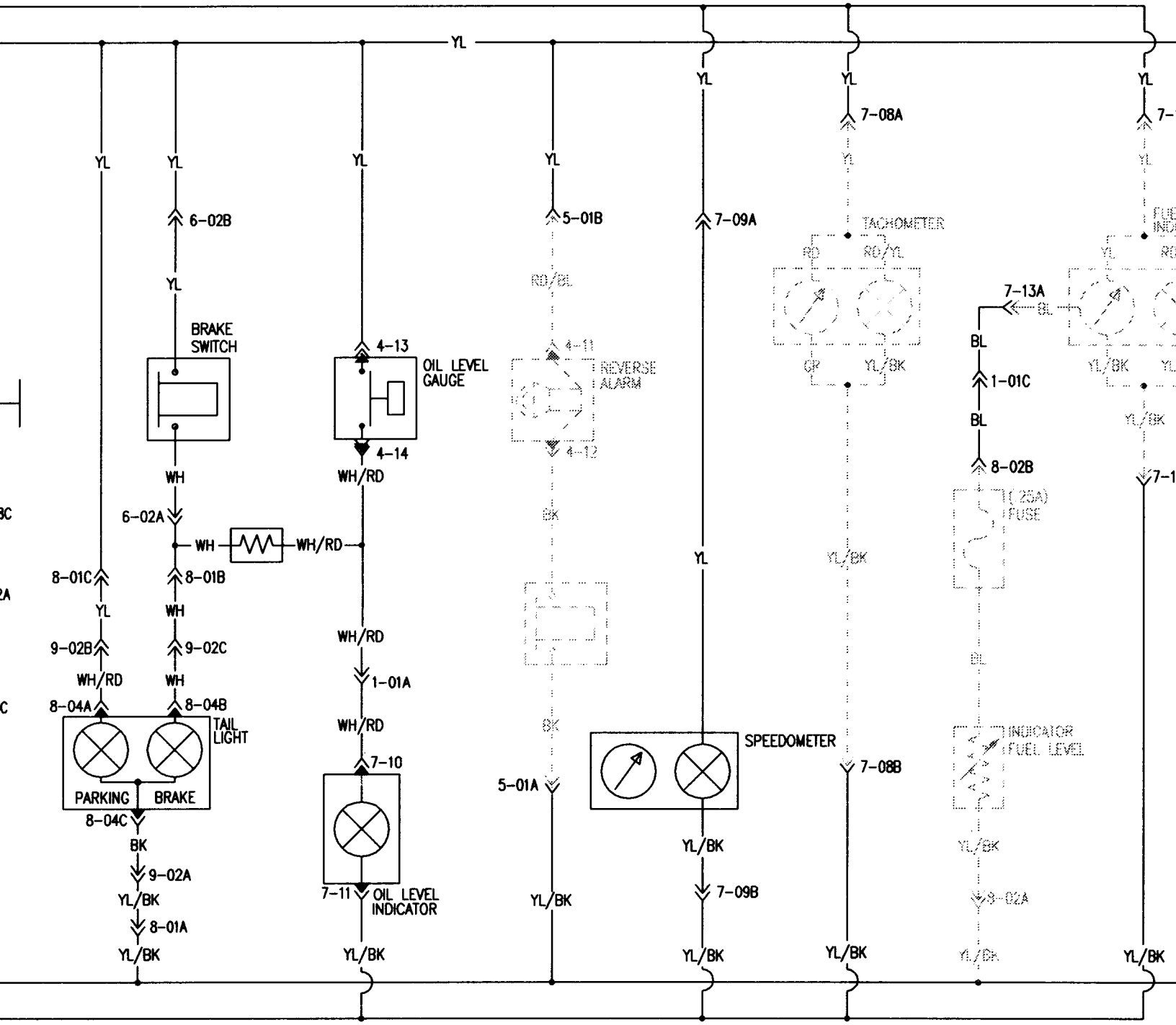

YL
7-13B
YL
FUEL LEVEL INDICATOR
YL
RD/YL
7-13A
BL
BL
1-01C
BL
8-02B
(25A) FUSE
BL
SENSOR INDICATOR
YL/BK
8-02A
YL/BK
YL/BK
YL/BK
7-13C
YL
6-11
HEATED GRIPS SWITCH
6-12
6-13
OR
OR/WH
6-09B
6-09C
OR
OR/WH
OR
OR
OR/WH
OR
HEATED GRIPS
YL/BK
YL/BK
6-09A
YL/BK
YL
6-14
HEATED LEVER SWITCH
6-15
6-16
BR/YL
BR
6-10B
6-10C
BR/YL
BR
HEATED LEVER
YL/BK
6-10A
YL/BK
YL/BK
HEATING ELEMENTS

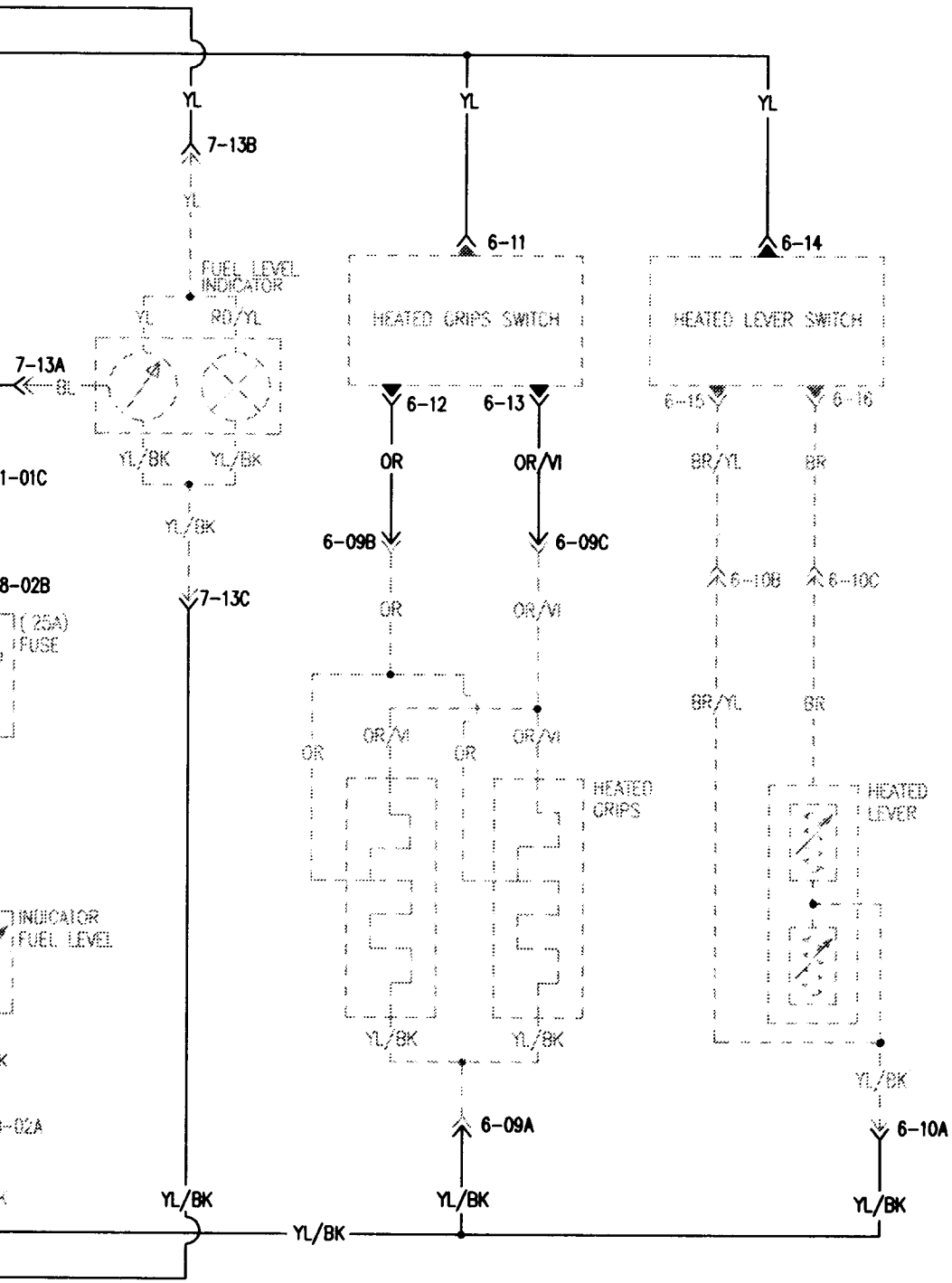
ANNEX 3 FORMULA S

'98 FORMULA S


BK/YL
YL
YL
RD/BL
2-01D
4-02C
RD/WH
2-01B
10-01B
10-01D
BK/YL
4-02B
YL
YL
RD/BL
RD
RD
BK/YL
6-01-2
6-01-9
4-02D
GN
GN
RD/WH
BK/YL
(30A)
MAIN
IGNITION
MODULE
REGULATOR/
RECTIFIER
RD
WH
WH
FRAME
4-02A
BR
YL/BK
YL/BK
BK
2-01C
2-01A
10-01C
10-01A
BK
YL/BK
YL/BK
BK
IGNITION SYSTEM
POWER SUPPLY SYSTEM

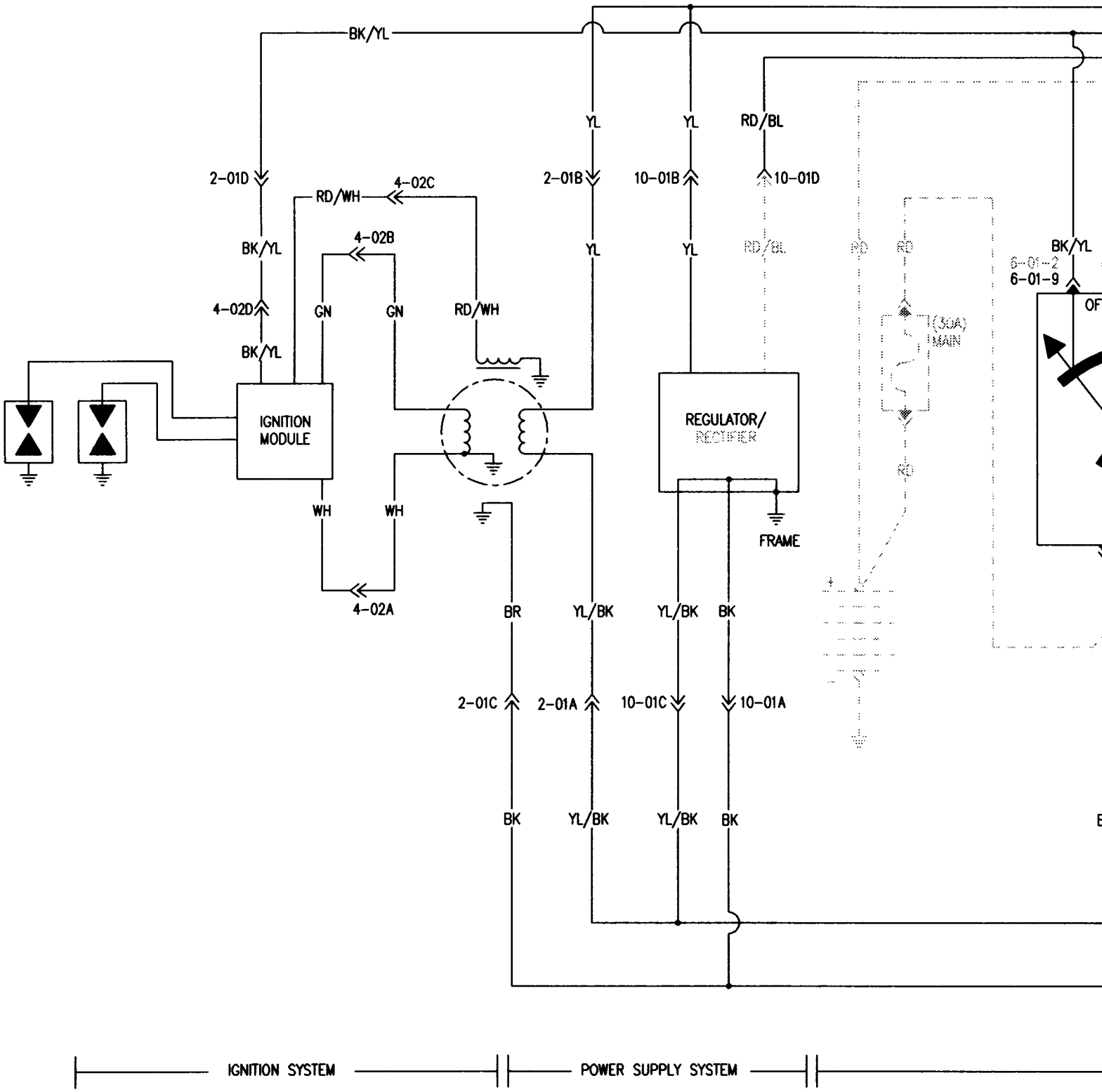

1-01B
YL
BK/YL
BK/YL
BK/YL
6-03B
BK/YL
TETHER CUT-OUT SWITCH
BK
6-03A
BK
BK/YL
6-02D
BK/YL
KILL SWITCH EMERGENCY
BK
6-02C
BK
YL
6-08A
YL
DIMMER SWITCH
GY
6-08B
GY
1-02B
GY/VI
GY/VI
6-08C
GY/VI
1-02A
GY
GY
7-15
7-16
HIGH BEAM INDICATOR
YL/BK
7-14A
7-14C
HIGH
LOW
7-14B
HEADLIGHT
YL/BK
YL
8-01C
YL
9-02B
WH/RD
8-04A
PARKIN
8-04
BK/YL
6-01-2
6-01-9
RD/BL
6-01-4
6-01-2
RD/GR
6-01-3
6-01-8
OFF
ON
START
KEY SWITCH
6-01-4
6-01-5
6-01-7
RD
RD
RD/GR
SOLENOID
STARTER
BK
YL/BK
1-01D
BK
IGNITION SWITCHES
LIGHTING

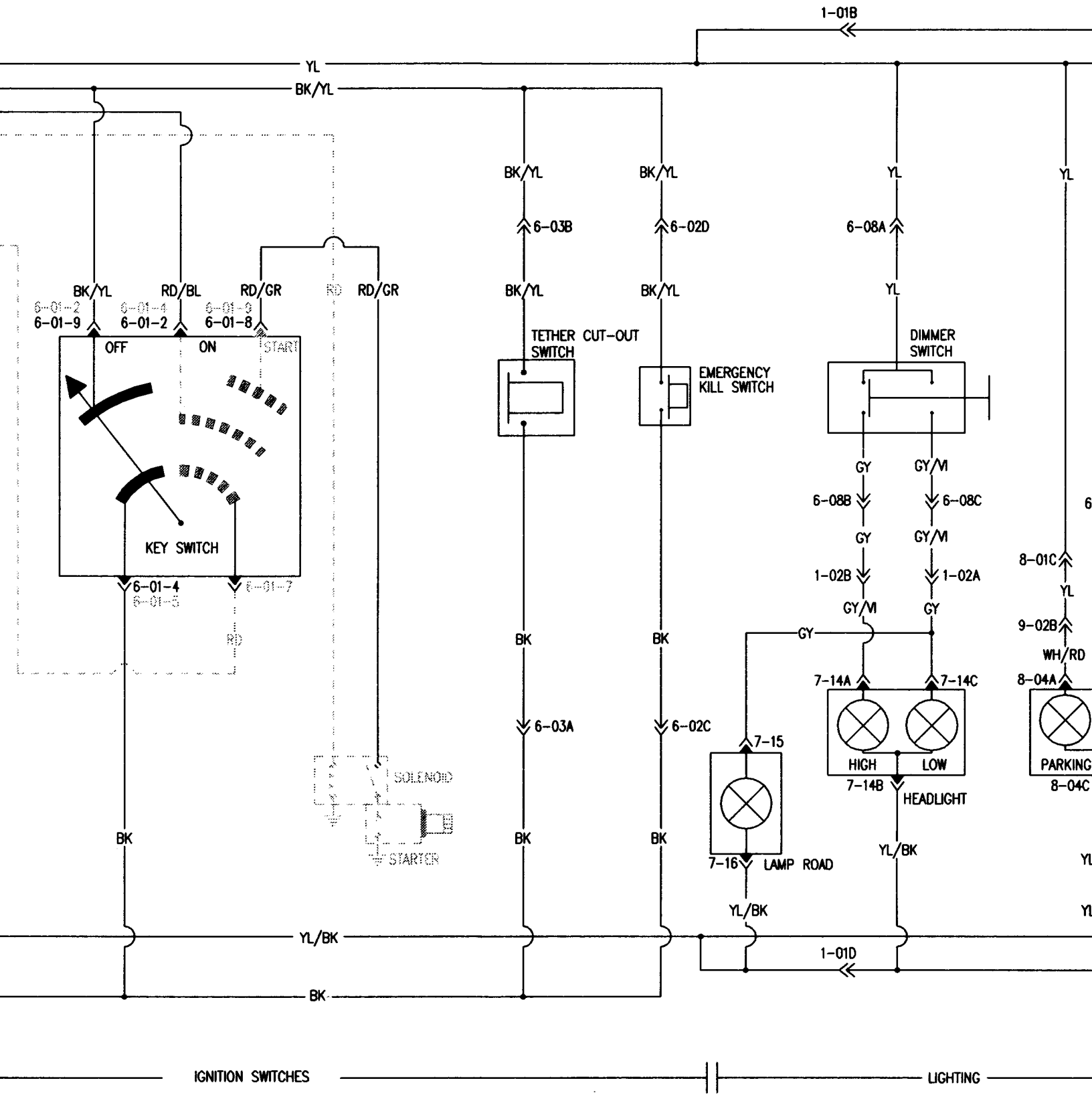

YL
YL
YL
YL
YL
YL
YL
7-08A
7-
6-02B
5-01B
7-09A
TACHOMETER
RD
RD/YL
RD/BL
7-13A
GR
YL/BK
BL
1-01C
BL
8-02B
BRAKE SWITCH
4-13
OIL LEVEL GAUGE
4-14
4-11
REVERSE ALARM
4-12
WH
WH/RD
6-02A
WH
WH/RD
8-01C
8-01B
YL
WH
9-02B
9-02C
WH/RD
WH
8-04A
8-04B
TAIL LIGHT
PARKING
BRAKE
8-04C
BK
9-02A
YL/BK
8-01A
YL/BK
WH/RD
1-01A
WH/RD
7-10
7-11
OIL LEVEL INDICATOR
YL/BK
BK
5-01A
YL/BK
YL
SPEEDOMETER
YL/BK
7-09B
YL/BK
YL/BK
7-08B
YL/BK
(25A) FUSE
BL
INDICATOR FUEL LEVEL
YL/BK
9-02A
YL/BK
YL/BK
INSTRUMENTATION


YL
YL
YL
7-13B
YL
6-11
6-14
FUEL LEVEL INDICATOR
YL
RD/YL
HEATED GRIPS SWITCH
HEATED LEVER SWITCH
7-13A
BL
6-12
6-13
6-15
6-16
YL/BK
YL/BK
OR
OR/VI
BR/YL
BR
1-01C
YL/BK
6-09B
6-09C
6-10B
6-10C
8-02B
7-13C
OR
OR/VI
(25A)
FUSE
OR/VI
OR/VI
OR
OR
BR/YL
BR
HEATED GRIPS
HEATED LEVER
INDICATOR
FUEL LEVEL
YL/BK
YL/BK
YL/BK
6-09A
6-10A
YL/BK
YL/BK
YL/BK
HEATING ELEMENTS

ANNEX 4 FORMULA SL

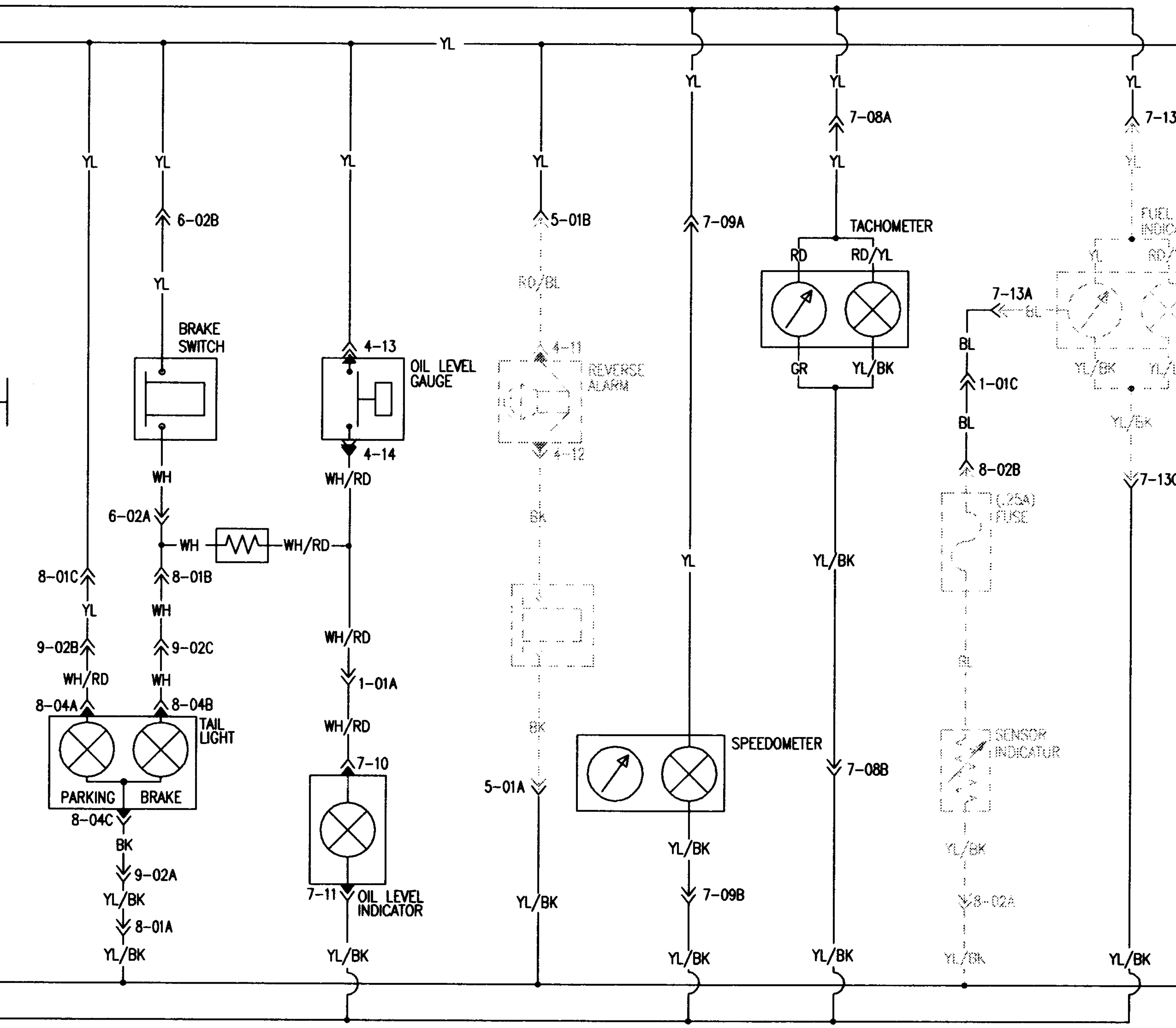
'98 FORMULA SL



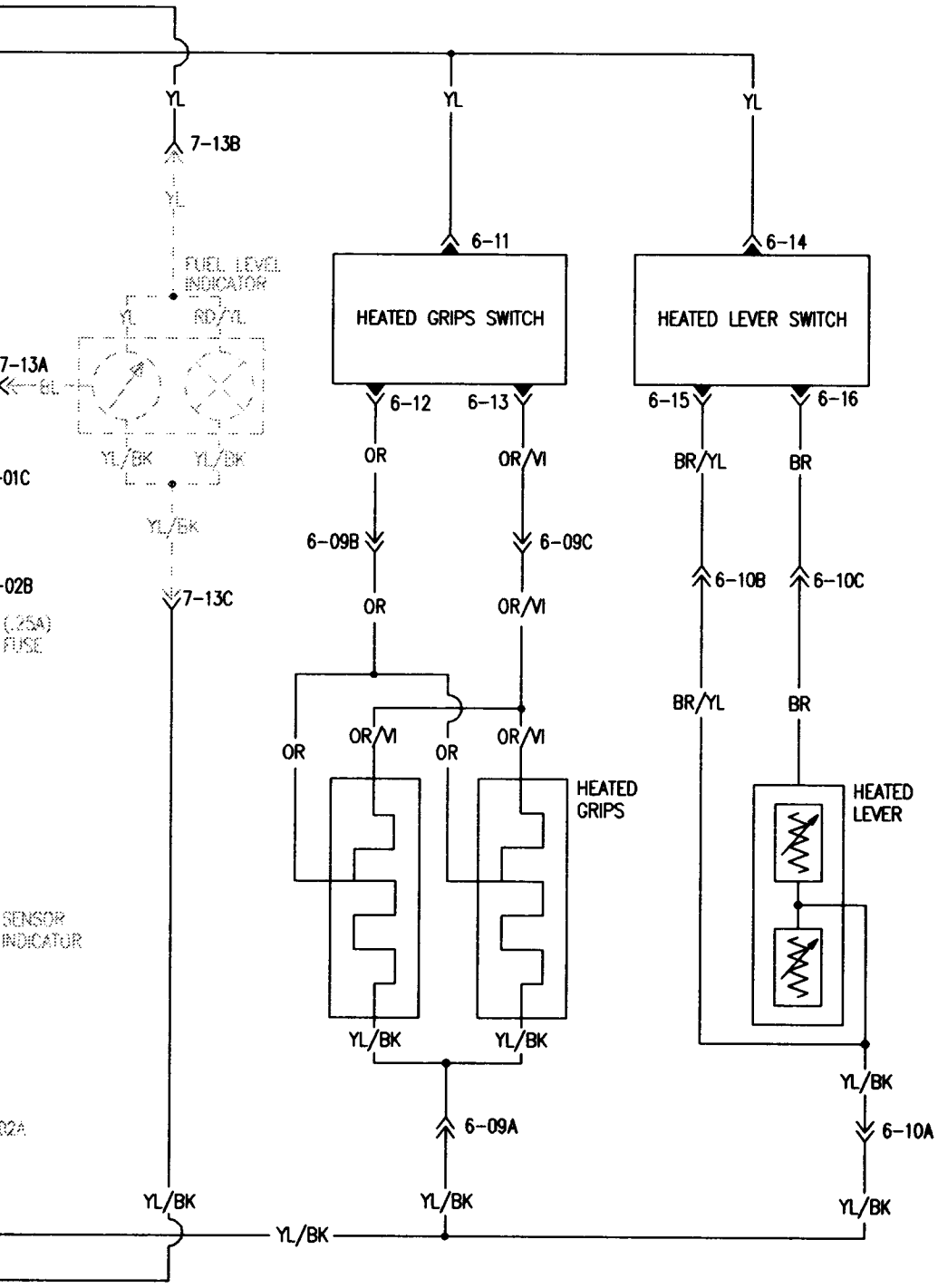


IGNITION SWITCHES

LIGHTING



INSTRUMENTS

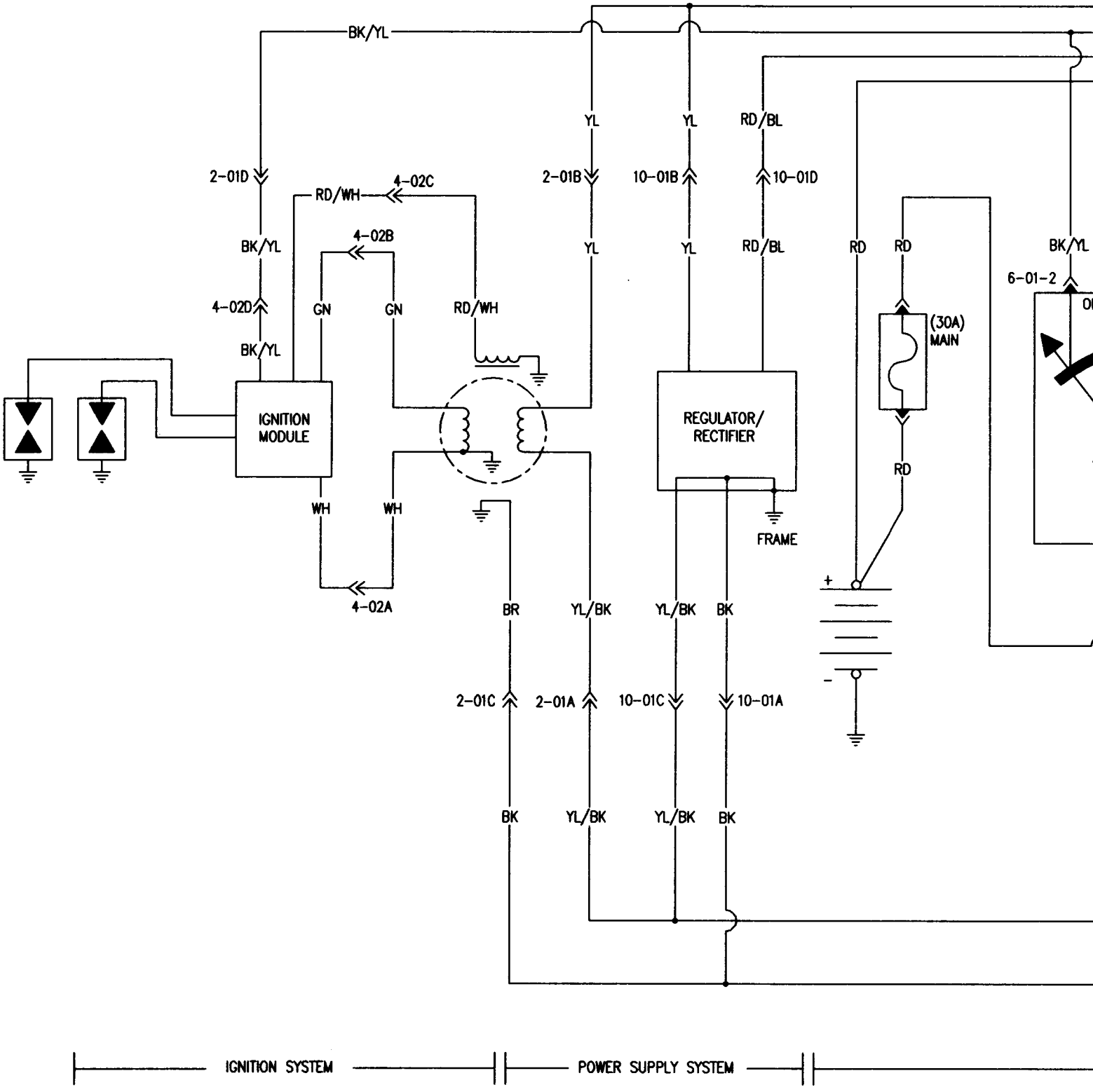


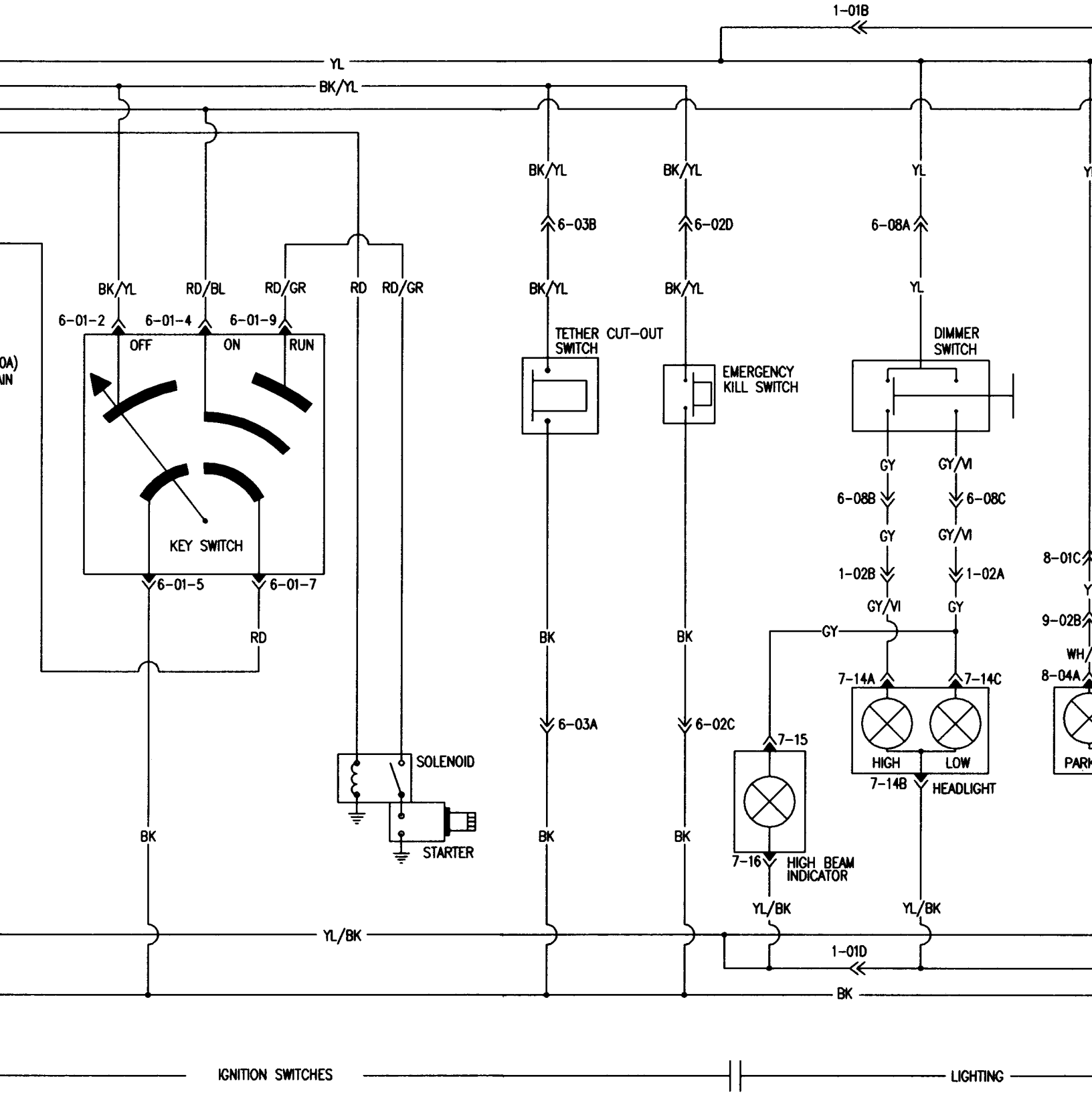
HEATING ELEMENTS

ANNEX 5

TOURING E/LE
FORMULA S ELECTRIC

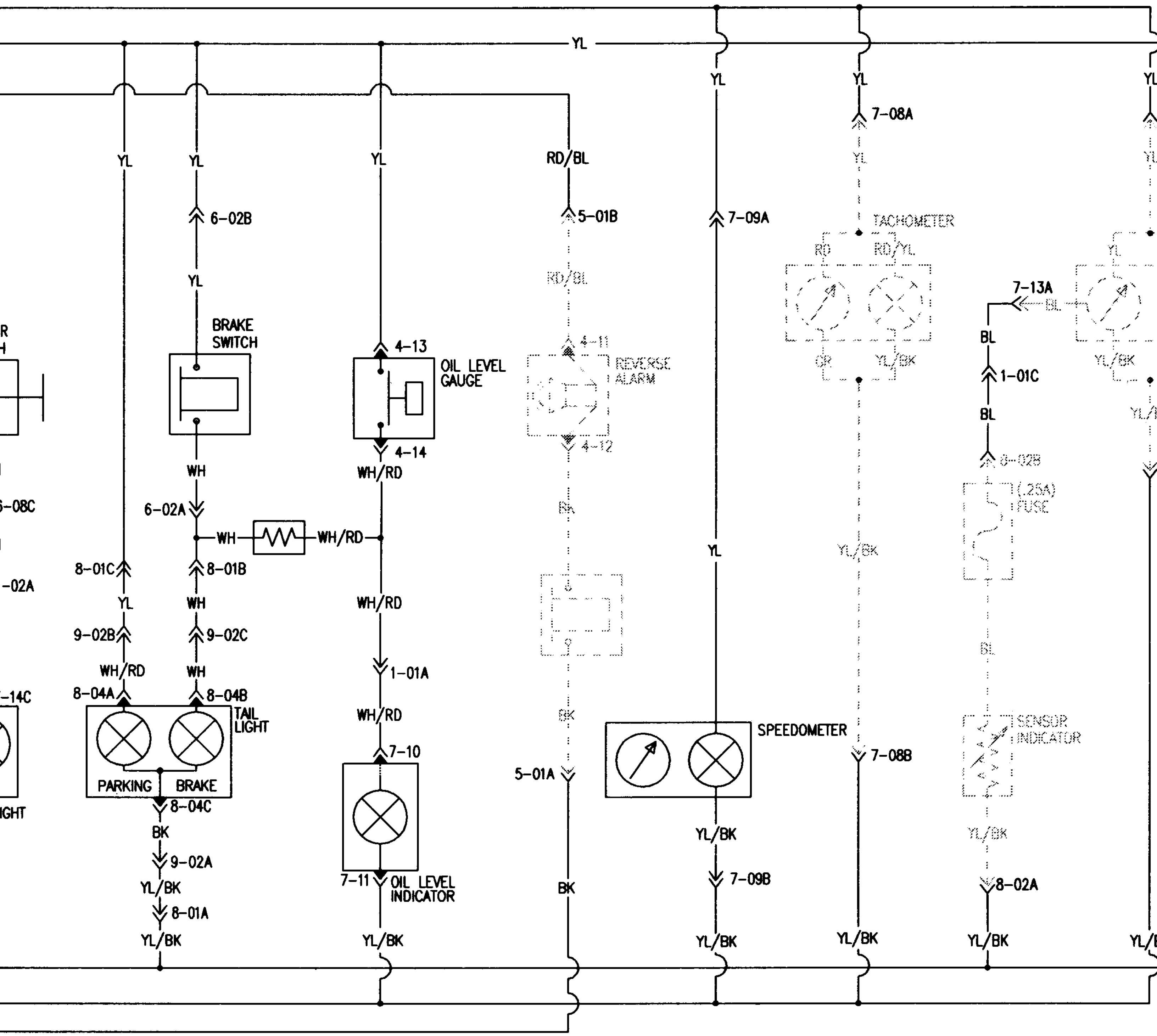
'98 TOURING E
'98 TOURING LE
'98 FORMULA S ELECTRIC



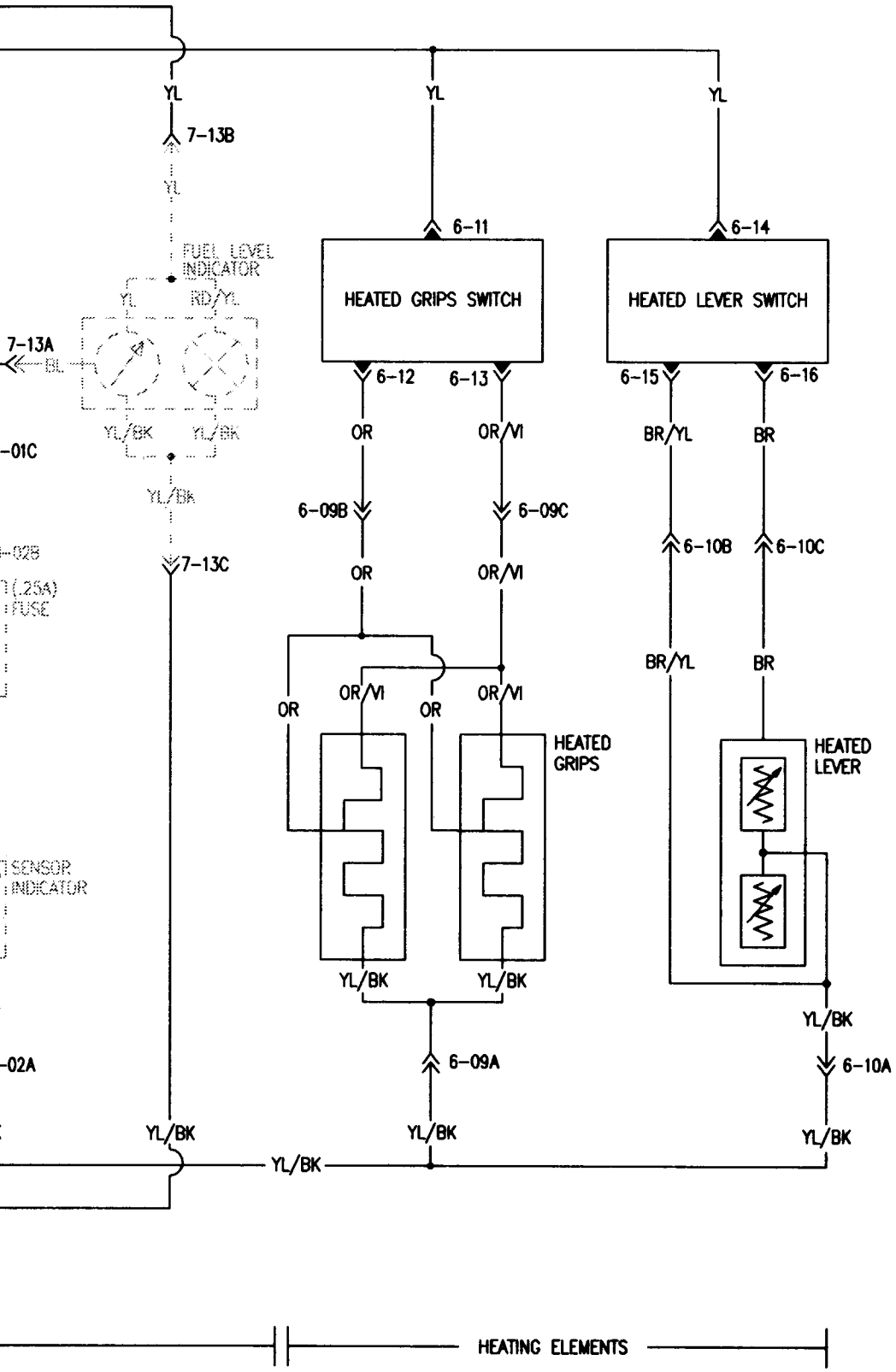


IGNITION SWITCHES

LIGHTING



HTING — INSTRUMENTS


YL
YL
YL
7-13B
YL
6-11
6-14
FUEL LEVEL INDICATOR
HEATED GRIPS SWITCH
HEATED LEVER SWITCH
YL
RD/YL
7-13A
BL
6-12
6-13
6-15
6-16
OR
OR/VI
BR/YL
BR
YL/BK
YL/BK
6-09B
6-09C
6-10B
6-10C
7-13C
OR
OR/VI
BR/YL
BR
OR
OR/VI
OR
OR/VI
HEATED GRIPS
HEATED LEVER
YL/BK
YL/BK
YL/BK
6-09A
6-10A
YL/BK
YL/BK
YL/BK
HEATING ELEMENTS

VERSION FRANÇAISE ÉGALEMENT DISPONIBLE