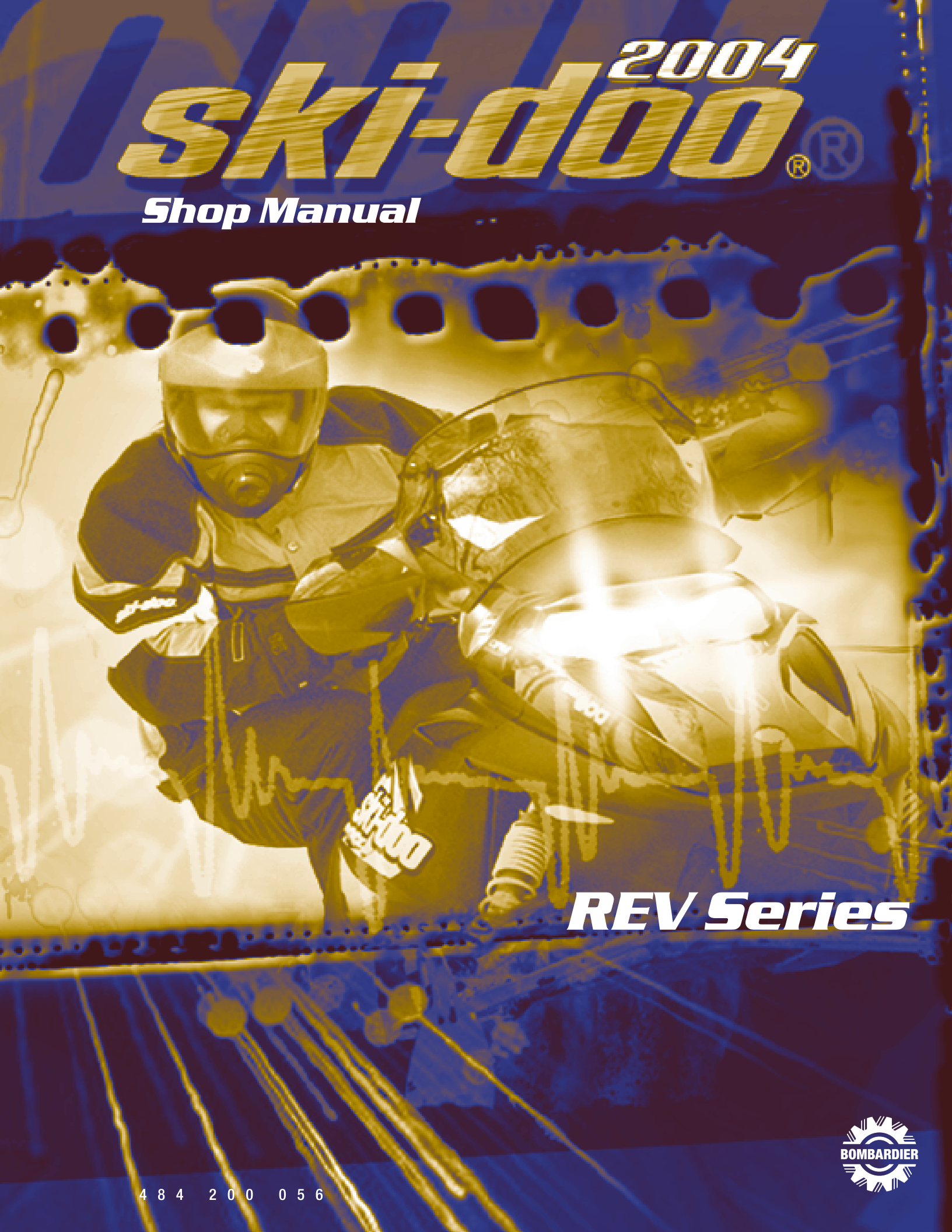
2004
ski-doo®
Shop Manual
REV Series
BOMBARDIER
484 200 056

2004
Shop Manual

REV SERIES

BOMBARDIER
RECREATIONAL PRODUCTS

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SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair some 2004 Ski-Doo snowmobiles. See model list below.

This edition was primarily published to be used by snowmobile mechanic technicians who are already familiar with all service procedures relating to Bombardier made snowmobiles. Mechanic technicians should attend continuous training courses given by Bombardier Training Dept.

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 the 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 time of writing. Service and Warranty Bulletins may be published to update the content of this manual. Make sure to read and understand them.

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.

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.

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.

⚠ WARNING

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

⚠ WARNING

Unless otherwise specified, engine should be turned OFF and cold for all maintenance and repair procedures.

INTRODUCTION

This shop manual covers the following Bombardier made 2004 REV Series models:

TYPICAL — REV SERIES

MODEL	ENGINE TYPE	COUNTRY	MODEL NUMBER
GSX (E) LTD 1 + 1 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2803
GSX (E) LTD 1 + 1 800 HO (R) BLACK	793 HO	CAN/U.S.	2805
GSX (E) LTD 1 + 1 800 HO (R) SILVER	793 HO	CAN/U.S.	2804
GSX (E) LTD 600 HO SDI (R) SILVER	593 HO SDI	CAN/U.S.	2800
GSX (E) LTD 800 HO (R) BLACK	793 HO	CAN/U.S.	2802
GSX (E) LTD 800 HO (R) SILVER	793 HO	CAN/U.S.	2801
GSX (E) SPORT 1 + 1 500 SS (R) BLACK	593	CAN/U.S.	2808
GSX (E) SPORT 1 + 1 500 SS (R) BLACK	593	CAN/U.S.	2809
GSX (E) SPORT 1 + 1 500 SS (R) SILVER	593	CAN/U.S.	2806
GSX (E) SPORT 1 + 1 500 SS (R) SILVER	593	CAN/U.S.	2807
GSX (E) SPORT 1 + 1 600 HO (R) BLACK	593 HO	CAN/U.S.	2812
GSX (E) SPORT 1 + 1 600 HO (R) BLACK	593 HO	CAN/U.S.	2813
GSX (E) SPORT 1 + 1 600 HO (R) SILVER	593 HO	CAN/U.S.	2810
GSX (E) SPORT 1 + 1 600 HO (R) SILVER	593 HO	CAN/U.S.	2811
GSX (E) SPORT 1 + 1600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2815
GSX (E) SPORT 1 + 1600 HO SDI (R) SILVER	593 HO SDI	CAN/U.S.	2814
GSX (E) SPORT 500 SS (R) BLACK	593	CAN/U.S.	2818
GSX (E) SPORT 500 SS (R) BLACK	593	CAN/U.S.	2819
GSX (E) SPORT 500 SS (R) SILVER	593	CAN/U.S.	2816
GSX (E) SPORT 500 SS (R) SILVER	593	CAN/U.S.	2817
GSX (E) SPORT 600 HO (R) BLACK	593 HO	CAN/U.S.	2822
GSX (E) SPORT 600 HO (R) SILVER	593 HO	CAN/U.S.	2820

MODEL	ENGINE TYPE	COUNTRY	MODEL NUMBER
GSX (E) SPORT 600 HO (R) SILVER	593 HO	CAN/U.S.	2821
GSX (E) SPORT 600 HO SDI (R) SILVER	593 HO SDI	CAN/U.S.	2823
GSX (E) LTD 1 + 1 600 HO SDI (R) SILVER	593 HO SDI	CAN/U.S.	2824
MX Z (E) ADRENALINE 500 SS (R) BLACK	593	CAN/U.S.	2831
MX Z (E) ADRENALINE 500 SS (R) YELLOW	593	CAN/U.S.	2825
MX Z (E) ADRENALINE 500 SS (R) YELLOW	593	CAN/U.S.	2829
MX Z (E) ADRENALINE 600 HO (R) BLACK	593 HO	CAN/U.S.	2834
MX Z (E) ADRENALINE 600 HO (R) BLACK	593 HO	CAN/U.S.	2835
MX Z (E) ADRENALINE 600 HO (R) YELLOW	593 HO	CAN/U.S.	2832
MX Z (E) ADRENALINE 600 HO (R) YELLOW	593 HO	CAN/U.S.	2833
MX Z (E) ADRENALINE 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2838
MX Z (E) ADRENALINE 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2839
MX Z (E) ADRENALINE 600 HO SDI (R) YELLOW	593 HO SDI	CAN/U.S.	2836
MX Z (E) ADRENALINE 600 HO SDI (R) YELLOW	593 HO SDI	CAN/U.S.	2837
MX Z (E) ADRENALINE 800 HO (R) BLACK	793 HO	CAN/U.S.	2841
MX Z (E) ADRENALINE 800 HO (R) BLACK	793 HO	CAN/U.S.	2842
MX Z (E) ADRENALINE 800 HO (R) BLACK	793 HO	CAN/U.S.	2843
MX Z (E) ADRENALINE 800 HO (R) BLACK	793 HO	CAN/U.S.	2844
MX Z (E) ADRENALINE 800 HO (R) YELLOW	793 HO	CAN/U.S.	2840
MX Z (E) RENEGADE 600 HO (R) BLACK	593 HO	CAN/U.S.	2847
MX Z (E) RENEGADE 600 HO (R) YELLOW	593 HO	CAN/U.S.	2845
MX Z (E) RENEGADE 600 HO (R) YELLOW	593 HO	CAN/U.S.	2846
MX Z (E) RENEGADE 800 HO (R) BLACK	793 HO	CAN/U.S.	2849
MX Z (E) RENEGADE 800 HO (R) BLACK	793 HO	CAN/U.S.	2852
MX Z (E) RENEGADE 800 HO (R) YELLOW	793 HO	CAN/U.S.	2848
MX Z (E) RENEGADE X 600 HO (R) BLACK	593 HO	CAN/U.S.	2856
MX Z (E) RENEGADE X 600 HO (R) BLACK	593 HO	CAN/U.S.	2857
MX Z (E) RENEGADE X 600 HO (R) BLACK	593 HO	CAN/U.S.	2858
MX Z (E) RENEGADE X 600 HO (R) BLUE	593 HO	CAN/U.S.	2853
MX Z (E) RENEGADE X 600 HO (R) BLUE	593 HO	CAN/U.S.	2855
MX Z (E) RENEGADE X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2860
MX Z (E) RENEGADE X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2861
MX Z (E) RENEGADE X 600 HO SDI (R) BLUE	593 HO SDI	CAN/U.S.	2859
MX Z (E) RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2864
MX Z (E) RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2865
MX Z (E) RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2866

MODEL	ENGINE TYPE	COUNTRY	MODEL NUMBER
MX Z (E) RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2867
MX Z (E) RENEGADE X 800 HO (R) BLUE	793 HO	CAN/U.S.	2862
MX Z (E) RENEGADE X 800 HO (R) BLUE	793 HO	CAN/U.S.	2863
MX Z (E) TRAIL 500 SS (R) BLACK	593	CAN/U.S.	2868
MX Z (E) TRAIL 600 HO (R) BLACK	593 HO	CAN/U.S.	2869
MX Z (E) X 600 HO (R) BLACK	593 HO	CAN/U.S.	2872
MX Z (E) X 600 HO (R) BLACK	593 HO	CAN/U.S.	2873
MX Z (E) X 600 HO (R) BLACK	593 HO	CAN/U.S.	2874
MX Z (E) X 600 HO (R) BLACK	593 HO	CAN/U.S.	2875
MX Z (E) X 600 HO (R) BLUE	593 HO	CAN/U.S.	2870
MX Z (E) X 600 HO (R) BLUE	593 HO	CAN/U.S.	2871
MX Z (E) X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2878
MX Z (E) X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2879
MX Z (E) X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2880
MX Z (E) X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2881
MX Z (E) X 600 HO SDI (R) BLUE	593 HO SDI	CAN/U.S.	2876
MX Z (E) X 600 HO SDI (R) BLUE	593 HO SDI	CAN/U.S.	2877
MX Z (E) X 800 HO (R) BLACK	793 HO	CAN/U.S.	2887
MX Z (E) X 800 HO (R) BLACK	793 HO	CAN/U.S.	2888
MX Z (E) X 800 HO (R) BLACK	793 HO	CAN/U.S.	2889
MX Z (E) X 800 HO (R) BLUE	793 HO	CAN/U.S.	2885
MX Z (E) X 800 HO (R) BLUE	793 HO	CAN/U.S.	2886
MX Z ADRENALINE 500 SS (R) BLACK	593	CAN/U.S.	2891
MX Z ADRENALINE 500 SS (R) BLACK	593	CAN/U.S.	2892
MX Z ADRENALINE 500 SS (R) YELLOW	593	CAN/U.S.	2890
MX Z ADRENALINE 600 HO (R) BLACK	593 HO	CAN/U.S.	2894
MX Z ADRENALINE 600 HO (R) BLACK	593 HO	CAN/U.S.	2895
MX Z ADRENALINE 600 HO (R) YELLOW	593 HO	CAN/U.S.	2893
MX Z ADRENALINE 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2897
MX Z ADRENALINE 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2898
MX Z ADRENALINE 600 HO SDI (R) YELLOW	593 HO SDI	CAN/U.S.	2896
MX Z ADRENALINE 800 HO (R) BLACK	793 HO	CAN/U.S.	2905
MX Z ADRENALINE 800 HO (R) YELLOW	793 HO	CAN/U.S.	2899
MX Z ADRENALINE 800 HO (R) YELLOW	793 HO	CAN/U.S.	2900
MX Z ADRENALINE 800 HO (R) YELLOW	793 HO	CAN/U.S.	2903
MX Z ADRENALINE 800 HO (R) YELLOW	793 HO	CAN/U.S.	2904

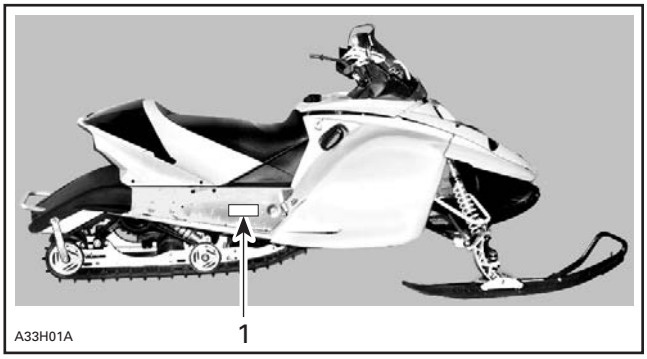
MODEL	ENGINE TYPE	COUNTRY	MODEL NUMBER
MX Z RENEGADE 600 HO (R) BLACK	593 HO	CAN/U.S.	2958
MX Z RENEGADE 600 HO (R) BLACK	593 HO	EUR	2959
MX Z RENEGADE 600 HO (R) YELLOW	593 HO	CAN/U.S.	2956
MX Z RENEGADE 600 HO (R) YELLOW	593 HO	EUR	2957
MX Z RENEGADE 800 HO (R) BLACK	793 HO	CAN/U.S.	2961
MX Z RENEGADE 800 HO (R) YELLOW	793 HO	CAN/U.S.	2960
MX Z RENEGADE X 600 HO (R) BLUE	593 HO	CAN/U.S.	2962
MX Z RENEGADE X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2965
MX Z RENEGADE X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	2966
MX Z RENEGADE X 600 HO SDI (R) BLUE	593 HO SDI	CAN/U.S.	2963
MX Z RENEGADE X 600 HO SDI (R) BLUE	593 HO SDI	CAN/U.S.	2964
MX Z RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2975
MX Z RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2976
MX Z RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2977
MX Z RENEGADE X 800 HO (R) BLACK	793 HO	CAN/U.S.	2978
MX Z RENEGADE X 800 HO (R) BLACK	793 HO	EUR	2979
MX Z RENEGADE X 800 HO (R) BLUE	793 HO	CAN/U.S.	2967
MX Z RENEGADE X 800 HO (R) BLUE	793 HO	CAN/U.S.	2970
MX Z RENEGADE X 800 HO (R) BLUE	793 HO	EUR	2974
MX Z TRAIL 500 SS (R) BLACK	593	CAN/U.S.	2980
MX Z TRAIL 500 SS (R) BLACK	593	CAN/U.S.	2981
MX Z TRAIL 500 SS (R) BLACK	593	CAN/U.S.	2984
MX Z TRAIL 500 SS BLACK	593	CAN/U.S.	2985
MX Z TRAIL 500 SS BLACK	593	CAN/U.S.	2986
MX Z TRAIL 500 SS (R) BLACK	593	EUR	2987
MX Z TRAIL 600 HO (R) BLACK	593 HO	CAN/U.S.	2988
MX Z TRAIL 600 HO (R) BLACK	593 HO	CAN/U.S.	2989
MX Z TRAIL 600 HO BLACK	593 HO	CAN/U.S.	2992
MX Z X 600 HO (R) BLACK	593 HO	CAN/U.S.	2995
MX Z X 600 HO (R) BLACK	593 HO	CAN/U.S.	2996
MX Z X 600 HO (R) BLACK	593 HO	CAN/U.S.	2997
MX Z X 600 HO (R) BLACK	593 HO	CAN/U.S.	2998
MX Z X 600 HO (R) BLACK	593 HO	EUR	4012
MX Z X 600 HO (R) BLUE	593 HO	CAN/U.S.	2993
MX Z X 600 HO (R) BLUE	593 HO	CAN/U.S.	2994
MX Z X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	4016

MODEL	ENGINE TYPE	COUNTRY	MODEL NUMBER
MX Z X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	4017
MX Z X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	4018
MX Z X 600 HO SDI (R) BLACK	593 HO SDI	CAN/U.S.	4024
MX Z X 600 HO SDI (R) BLUE	593 HO SDI	CAN/U.S.	4013
MX Z X 600 HO SDI (R) BLUE	593 HO SDI	CAN/U.S.	4014
MX Z X 600 HO SDI (R) BLUE	593 HO SDI	EUR	4015
MX Z X 800 HO (R) BLACK	793 HO	CAN/U.S.	4028
MX Z X 800 HO (R) BLACK	793 HO	CAN/U.S.	4029
MX Z X 800 HO (R) BLACK	793 HO	CAN/U.S.	4030
MX Z X 800 HO (R) BLACK	793 HO	EUR	4031
MX Z X 800 HO (R) BLACK	793 HO	CAN/U.S.	4032
MX Z X 800 HO (R) BLUE	793 HO	CAN/U.S.	4025
MX Z X 800 HO (R) BLUE	793 HO	CAN/U.S.	4026
MX Z X 800 HO (R) BLUE	793 HO	EUR	4027
SUMMIT ADRENALINE 600 HO (R) ORANGE	593 HO	CAN/U.S.	4033
SUMMIT ADRENALINE 600 HO (R) ORANGE	593 HO	CAN/U.S.	4034
SUMMIT ADRENALINE 600 HO ORANGE	593 HO	EUR	4037
SUMMIT ADRENALINE 800 HO (R) BLACK	793 HO	CAN/U.S.	4035
SUMMIT ADRENALINE 800 HO (R) ORANGE	793 HO	CAN/U.S.	4036
SUMMIT HIGHMARK 800 HO (R) BLACK	793 HO	CAN/U.S.	4038
SUMMIT HIGHMARK 800 HO (R) ORANGE	793 HO	CAN/U.S.	4039
SUMMIT HIGHMARK X 800 HO (R) BLACK	793 HO	CAN/U.S.	4048
SUMMIT HIGHMARK X 800 HO (R) YELLOW	793 HO	CAN/U.S.	4047
SUMMIT HIGHMARK X 800 HO BLACK	793 HO	CAN/U.S.	4050
SUMMIT HIGHMARK X 800 HO YELLOW	793 HO	CAN/U.S.	4049
SUMMIT SPORT 800 HO (R) BLACK	793 HO	CAN/U.S.	4051
SUMMIT SPORT 800 HO (R) ORANGE	793 HO	CAN/U.S.	4059
SUMMIT SPORT 800 HO BLACK	793 HO	CAN/U.S.	4060
SUMMIT SPORT 800 HO ORANGE	793 HO	CAN/U.S.	4061
SUMMIT X 600 HO (R) BLACK	593 HO	CAN/U.S.	4063
SUMMIT X 600 HO (R) YELLOW	593 HO	CAN/U.S.	4062
SUMMIT X 800 HO (R) BLACK	793 HO	CAN/U.S.	4065
SUMMIT X 800 HO (R) YELLOW	793 HO	CAN/U.S.	4064
SUMMIT X 800 HO YELLOW	793 HO	EUR	4066

C: Canada
EUR: Europe
U: United States

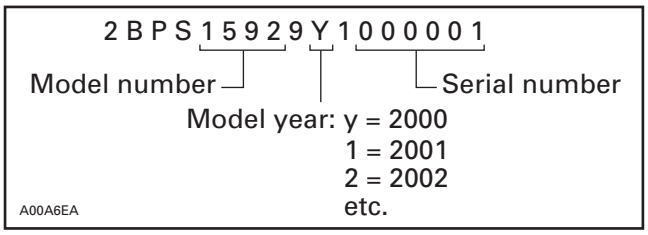
VEHICLE IDENTIFICATION NUMBER

Vehicle Identification Number Location



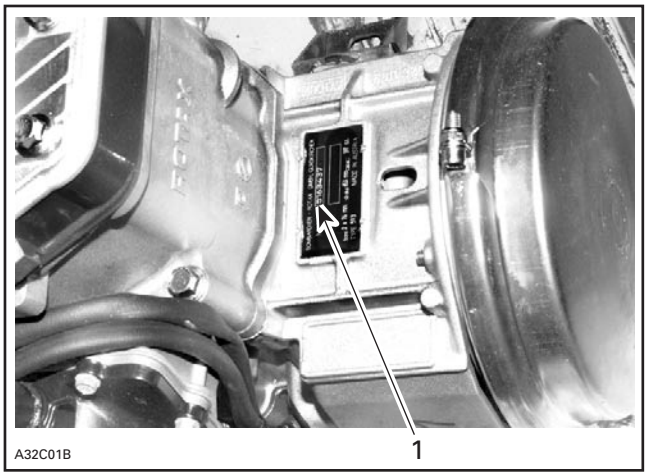
TYPICAL
1. Vehicle identification number

Identification Number Meaning



ENGINE SERIAL NUMBER

Engine Serial Number Location



TYPICAL
1. Engine serial number

LIST OF ABBREVIATIONS USED IN THIS MANUAL

ABBREVIATION	MEANING
A	ampere
amp	ampere
A•h	ampere-hour
AC	alternate current
ACM	acceleration and control modulator
ADSA	advanced direct shock action
AMG	absorbed glass mat
BDC	bottom dead center
BTDC	before top dead center
°C	degree Celsius
cc	cubic centimeter
CDI	capacitor discharge ignition
CTR	center
cm	centimeter
cm^2	square centimeter
cm^3	cubic centimeter
DC	direct current
DESS	digitally encoded security system
DPM	digital performance management
°F	degree Fahrenheit
FC	fan cooled
fl. oz	fluid ounce
ft	foot
GRD	ground
H.A.C.	high altitude compensator
hal.	halogen
HI	high
IFP	internal floating piston
imp. oz	imperial ounce

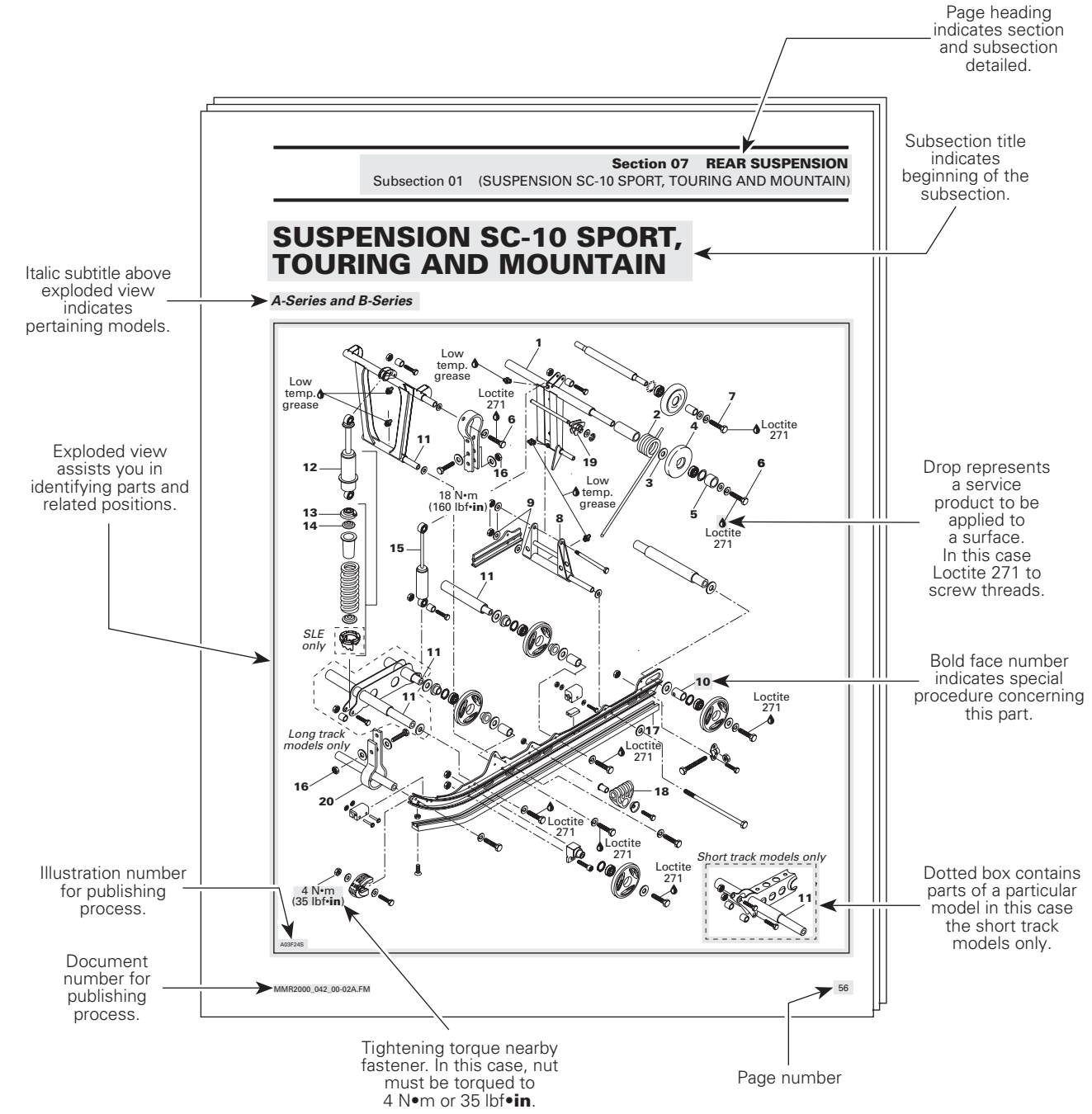
ABBREVIATION	MEANING
in	inch
in^2	square inch
in^3	cubic inch
k	kilo (thousand)
kg	kilogram
km/h	kilometer per hour
kPa	Kilopascal
L	liter
lb	pound
lbf	pound (force)
lbf/in^2	pound per square inch
LH	left hand
LO	low
LT	long track
m	meter
MAG	magneto
Max.	maximum
Min.	minimum
mL	milliliter
mm	millimeter
M.E.	millennium edition
MPEM	multi-purpose electronic module
MPH	mile per hour
N	newton
N.A.	not applicable
no.	number
0	continuity
0.L	open line (open circuit)
O.D.	outside diameter
OPT	optional
oz	ounce
P/N	part number

ABBREVIATION	MEANING
PSI	pound per square inch
PTO	power take off
R	rectangular
RH	right hand
RAVE	Rotax adjustable variable exhaust
RER	Rotax electronic reverse
RPM	revolution per minute
RMS	root mean square
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)
VSA	variable sheave angle

ARRANGEMENT OF THIS MANUAL

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

TYPICAL PAGE

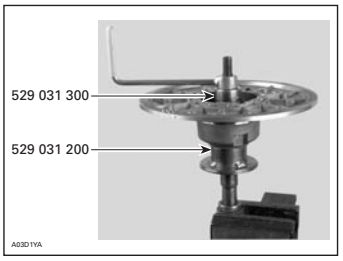


CAUTION: Pay attention to torque specifications. Some of these are in lbf•**in** instead of lbf•ft. Use appropriate torque wrench.

A00A7XS

TYPICAL PAGE

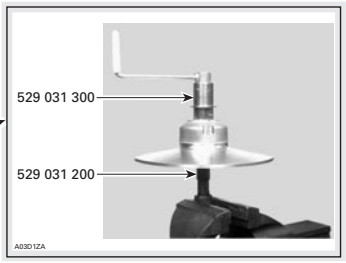
Turn puller handle and sliding half at once to extract the bushing.



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

Coat bushing outside diameter with Loctite 609 (P/N 413 703 100).

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 413 701 000) on the countershaft before final pulley installation.

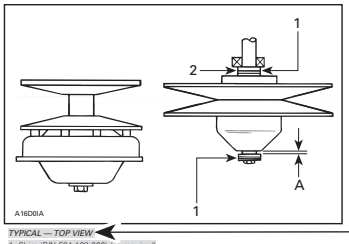
A-Series and B-Series Only

Should installation procedure be required, refer to BRAKE 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 504 108 200) contact it. Measure end play at the mounting screw end between shim(s) and puley. See illustration.



TYPICAL — TOP VIEW

1. Shim (P/N 504 108 200) (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 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 A and B-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.

Illustration always follows text to which it pertains.

Reference to look up a certain section and subsection. In this case it concerns pulleys adjustment.

Subtitle indicates a particular procedure for the named part.

Bold face number following part name refers to exploded view at beginning of subsection.

A00A7YS

GENERAL INFORMATION

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

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

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

ILLUSTRATIONS AND PROCEDURES

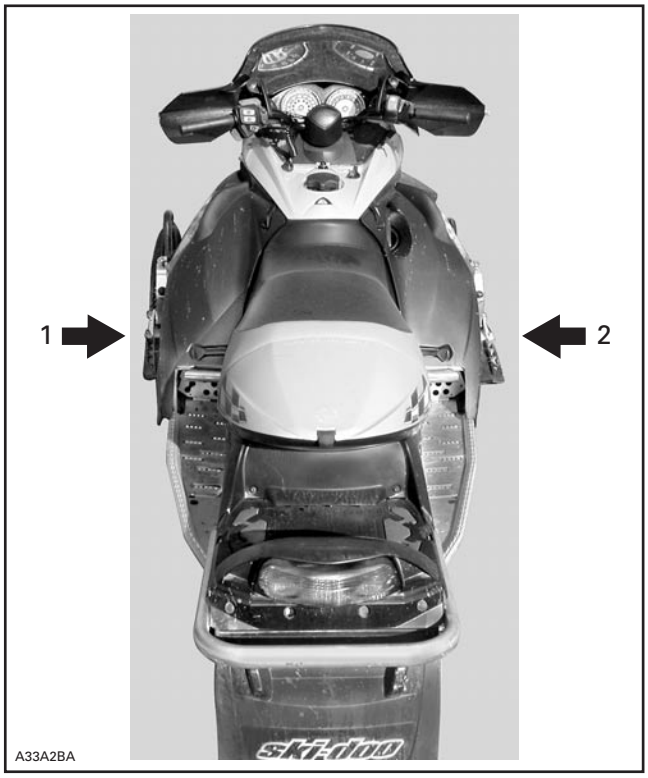
Illustrations and photos show the typical construction of the different assemblies and, in all cases, may not reproduce the full detail or exact shape of the parts shown. However, they represent parts which have the same or a similar function.

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 subsection 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

SELF-LOCKING FASTENERS PROCEDURE

The following describes the most common application procedures when working with self-locking fasteners.

Use a metal brush or a tap to clean the hole properly then use a solvent (Methyl-Chloride), let act during 30 minutes and wipe off. The solvent utilization is to ensure the adhesive works properly.

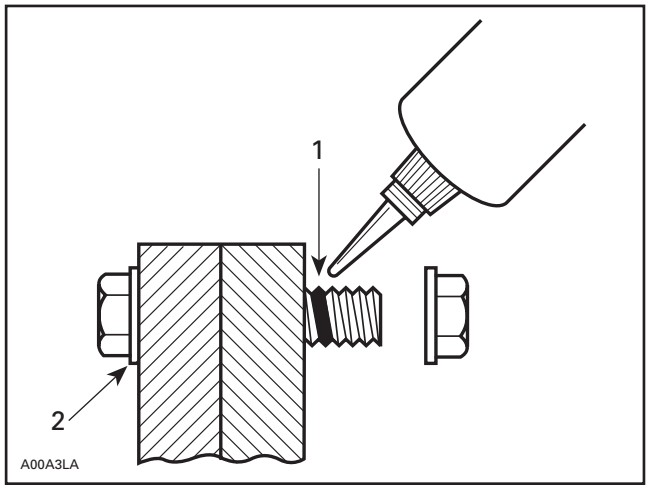
LOCTITE APPLICATION PROCEDURE

The following describes the most common application procedures when working with Loctite products.

NOTE: Always use proper strength Loctite product as recommended in this shop manual.

THREADLOCKER

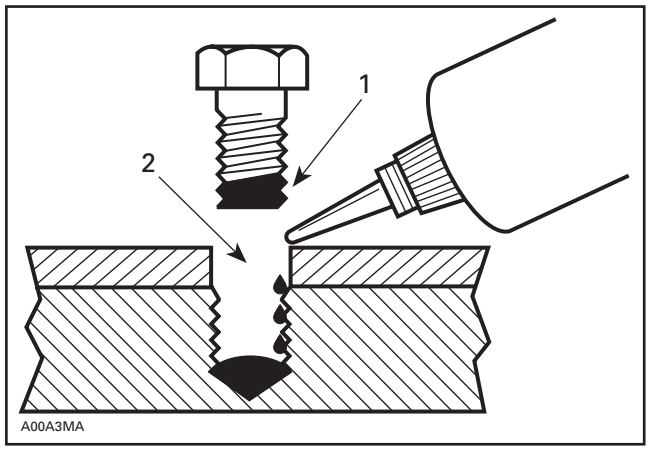
Uncovered Holes (bolts and nuts)



1. Apply here
2. Do not apply

– Clean threads (bolt and nut) with solvent.
– Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
– Choose proper strength Loctite threadlocker.
– Fit bolt in the hole.
– Apply a few drops of threadlocker at proposed tightened nut engagement area.
– Position nut and tighten as required.

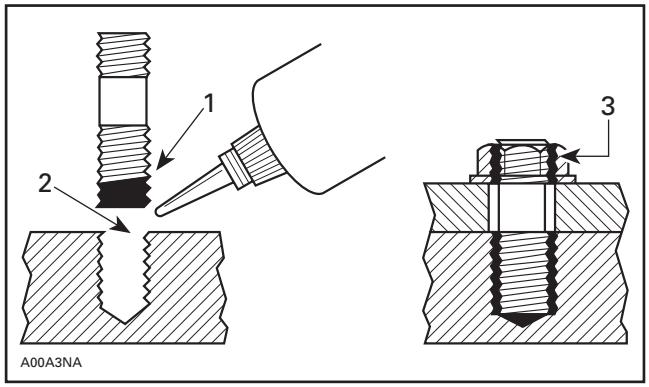
Blind Holes



1. On threads
2. On threads and at the bottom of hole

– Clean threads (bolt and hole) with solvent.
– Apply Loctite Primer N (P/N 293 800 041) on threads (bolt and nut) and allow to dry for 30 seconds.
– Choose proper strength Loctite threadlocker.
– Apply several drops along the threaded hole and at the bottom of the hole.
– Apply several drops on bolt threads.
– Tighten as required.

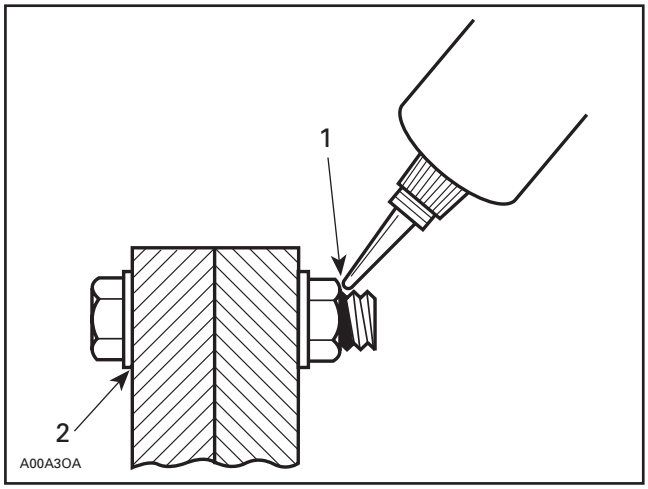
Stud in Blind Holes



1. On threads
2. On threads and in the hole
3. Onto nut threads

– Clean threads (stud and hole) with solvent.
– Apply Loctite Primer N (P/N 293 800 041) on threads and allow to dry.
– Put several drops of proper strength Loctite threadlocker on female threads and in hole.
– Apply several drops of proper strength Loctite on stud threads.
– Install stud.
– Install cover, etc.
– Apply drops of proper strength Loctite on uncovered threads.
– Tighten nuts as required.

Preassembled Parts

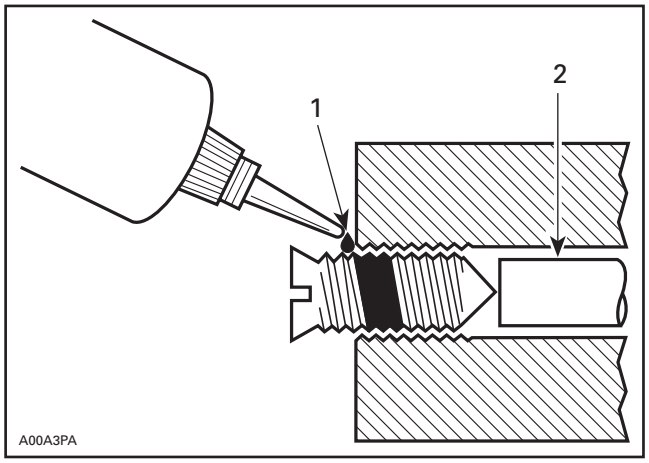


1. Apply here
2. Do not apply

– Clean bolts and nuts with solvent.
– Assemble components.
– Tighten nuts.
– Apply drops of proper strength Loctite on bolt/nut contact surfaces.
– Avoid touching metal with tip of flask.

NOTE: For preventive maintenance on existing equipment, retighten nuts and apply proper strength Loctite on bolt/nut contact surfaces.

Adjusting Screw



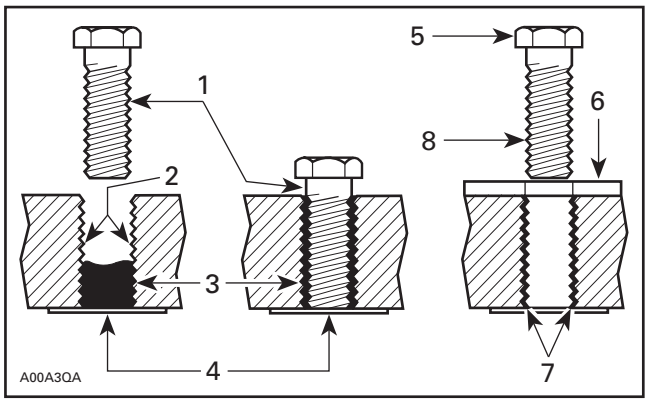
1. Apply here
2. Plunger

– Adjust screw to proper setting.
– Apply drops of proper strength Loctite threadlocker on screw/body contact surfaces.
– Avoid touching metal with tip of flask.

NOTE: If it is difficult to readjust, heat screw with a soldering iron (232°C (450°F)).

STRIPPED THREAD REPAIR

Stripped Threads



1. Release agent
2. Stripped threads
3. Form-A-Thread
4. Tape
5. Cleaned bolt
6. Plate
7. New threads
8. Threadlocker

Standard Thread Repair

– Follow instructions on Loctite FORM-A-THREAD 81668 package.
– If a plate is used to align bolt:
  – Apply release agent on mating surfaces.
  – Put waxed paper or similar film on the surfaces.
  – Twist bolt when inserting it to improve thread conformation.

NOTE: NOT intended for engine stud repairs.

Repair of Small Holes/Fine Threads

Option 1: Enlarge damaged hole, then follow STANDARD THREAD REPAIR procedure.

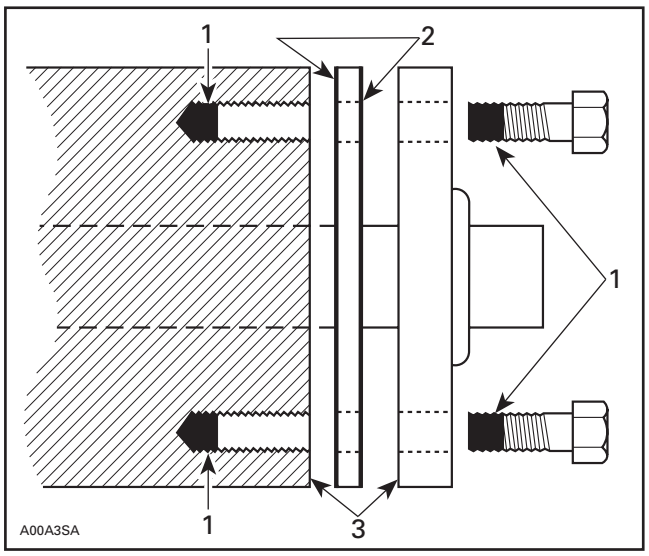
Option 2: Apply FORM-A-THREAD on the screw and insert in damaged hole.

Permanent Stud Installation (light duty)

– Use a stud or thread on desired length.
– DO NOT apply release agent on stud.
– Do a STANDARD THREAD REPAIR.
– Allow to cure for 30 minutes.
– Assemble.

GASKET COMPOUND

All Parts



1. Proper strength Loctite
2. Loctite Primer N (P/N 413 708 100) and Gasket Eliminator 515 (P/N 413 702 700) on both sides of gasket
3. Loctite Primer N only

– Remove old gasket and other contaminants with Loctite Chisel remover (P/N 413 708 500). Use a mechanical mean if necessary.

NOTE: Avoid grinding.

– Clean both mating surfaces with solvent.
– Spray Loctite Primer N on both mating surfaces and on both sides of gasket. Allow to dry 1 or 2 minutes.
– Apply GASKET ELIMINATOR 515 (P/N 413 702 700) on both sides of gasket, using a clean applicator.
– Place gasket on mating surfaces and assemble immediately.

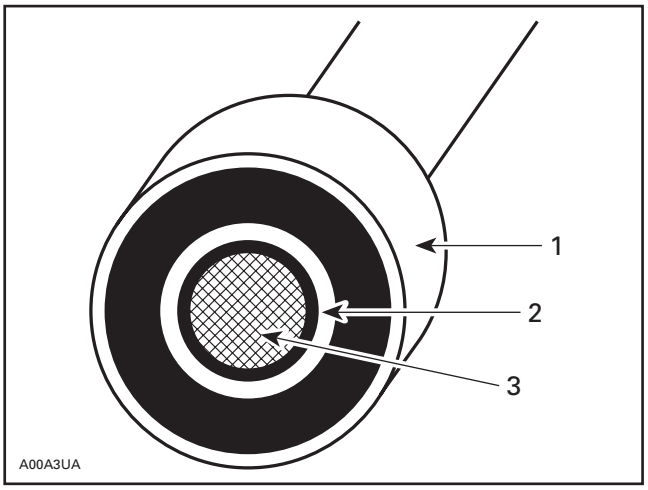
NOTE: If the cover is bolted to blind holes (above), apply proper strength Loctite in the hole and on threads. Tighten.

If holes are sunken, apply proper strength Loctite on bolt threads.

– Tighten as usual.

MOUNTING ON SHAFT

Mounting with a Press



1. Bearing
2. Proper strength Loctite
3. Shaft

Standard

– Clean shaft external part and element internal part.
– Apply a strip of proper strength Loctite on shaft circumference at insert or engagement point.

NOTE: Retaining compound is always forced out when applied on shaft.

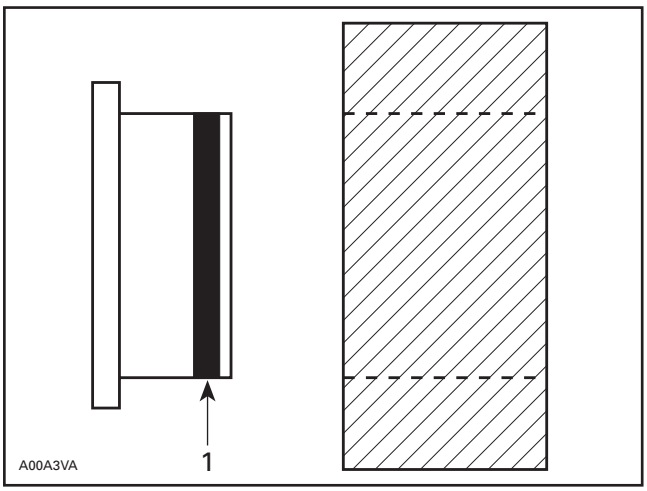
– DO NOT use anti-seize Loctite or any similar product.
– No curing period is required.

Mounting in Tandem

– Apply retaining compound on internal element bore.
– Continue to assemble as shown above.

CASE-IN COMPONENTS

Metallic Gaskets



1. Proper strength Loctite

– Clean inner housing diameter and outer gasket diameter.
– Spray housing and gasket with Loctite Primer N (P/N 293 800 041).
– Apply a strip of proper strength Loctite on leading edge of outer metallic gasket diameter.

NOTE: Any Loctite product can be used here. A low strength liquid is recommended as normal strength and gap are required.

– Install according to standard procedure.
– Wipe off surplus.
– Allow it to cure for 30 minutes.

NOTE: Normally used on worn-out housings to prevent leaking or sliding.

It is generally not necessary to remove gasket compound applied on outer gasket diameter.

TIGHTENING TORQUES

⚠ WARNING

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

Tighten fasteners to torque mentioned in exploded views and text. When they are not specified refer to following table. Bold face size (e.g. M4) indicates nominal value (mean value).

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•in
2	**M4**	18
3	M4	27
4	M5	35
8	M6	71
9	M6	80
10	**M6**	89
11	M6	97
12	M6	106

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
21	M8	15
22	M8	16
23	**M8**	17
24	M8	18
25	M8	18
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

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
76	M12	56
77	M12	57
78	M12	58
79	M12	58
80	**M12**	59
81	M12	60
82	M12	60
83	M12	61
84	M12	62
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

N•m	FASTENER SIZE (8.8 GRADE)	Lbf•ft
144	M14	106
145	M14	107
146	M14	108
147	M14	108
148	M14	109
149	M14	110
150	M14	111

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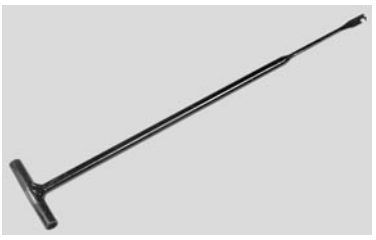
SERVICE TOOLS

This is a list of tools to properly service Ski-Doo snowmobiles. The list includes both the mandatory tools and the recommended tools. If you need to replace or add your tool inventory these items can be ordered through the regular parts channel.

Following mention points out new tool and product: **N –>**

ENGINE — MANDATORY TOOLS

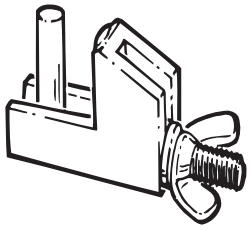
Exhaust spring installer/remover
(P/N 529 035 401)



APPLICATION
All models.

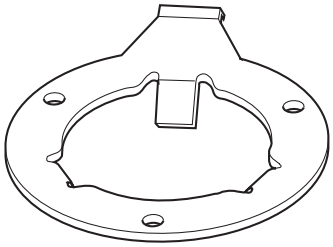
NOTE: This tool replaces exhaust spring installer/remover (P/N 529 035 400).

Hose pincher (2)
(P/N 295 000 076)



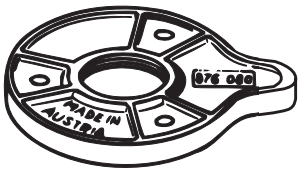
APPLICATION
All vehicles.

Holder wrench
(P/N 420 876 357)



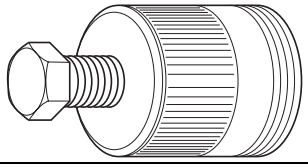
APPLICATION
All axial fan cooled engines.

Magneto puller ring
(P/N 420 876 080)



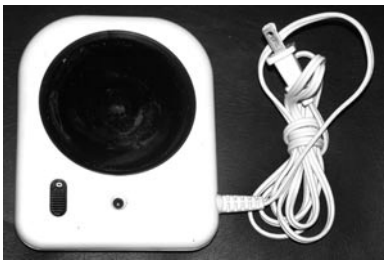
APPLICATION
All axial fan cooled engines.

Magneto puller
(P/N 529 035 547)



APPLICATION
All engines 7.

N–> Bearing heater
(P/N 529 035 969)



APPLICATION
All models.

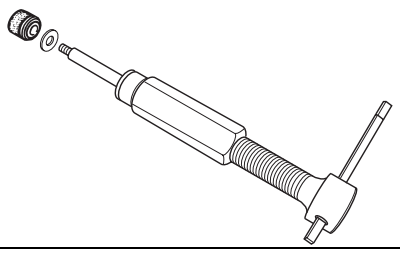
N–> Temperature indicator
(P/N 529 035 970)

APPLICATION
All models.

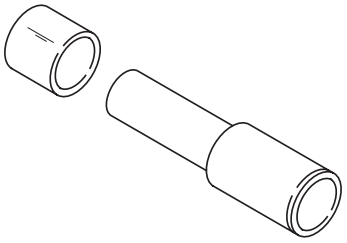
Fuel and oil system leak tester kit
(P/N 529 033 100)

APPLICATION
All models.

1) Piston pin puller
(P/N 529 035 503)



2) Sleeve kit 18 mm
(P/N 529 035 541)
3) Sleeve kit 20 mm
(P/N 529 035 542)

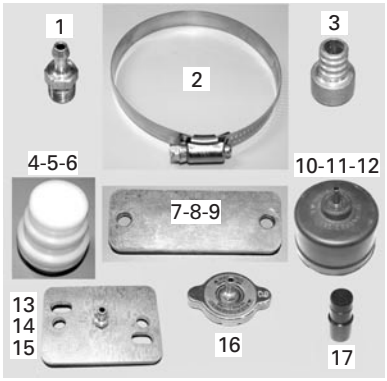


NOTE: 18 mm sleeve kit contains 1 shouldered sleeve and 3 sleeves. 20 mm sleeve kit contains 1 shouldered sleeve and 2 sleeves.

APPLICATION
1) All engines.
2) 277 and 443 engines.
3) 552, 593, 693 and 793 engines.

Engine leak tester kit
(P/N 861 749 100)

NOTE: Should be used with hand pump (P/N 529 021 800).

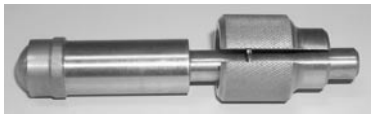


1) Fitting
   (P/N 408 201 100) (2)
2) Clamp
   (P/N 408 803 500)
3) Adapter
   (P/N 517 234 900) (2)
4) Intake plug
   (P/N 529 011 000) (2)
5) Intake plug
   (P/N 529 030 500)
6) Intake plug
   (P/N 529 035 963) (2)
7) RAVE plate
   (P/N 529 011 200) (2)
8) RAVE plate
   (P/N 529 035 971) (2)
9) RAVE plate
   (P/N 529 035 972) (2)
10) Manifold plug
    57 mm (2–1/4 in)
    (P/N 529 021 100)
11) Manifold plug
    63 mm (2–1/2 in)
    (P/N 529 035 961)
12) Manifold plug
    70 mm (2–3/4 in)
    (P/N 529 021 200)
13) Exhaust plate
    (P/N 529 021 300) (2)
14) Exhaust plate
    (P/N 529 024 600) (2)
15) Exhaust plate
    (P/N 529 035 962) (2)
16) Radiator cap
    (P/N 529 021 400)
17) Resonator plug
    (P/N 529 035 973) (2)

APPLICATION
All engines.

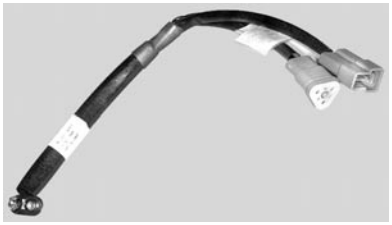
NOTE: To prevent leak in manifold plug, use Loctite Black MAX (P/N 413 408 300).

Piston circlip installer 20 mm
(P/N 529 035 686)



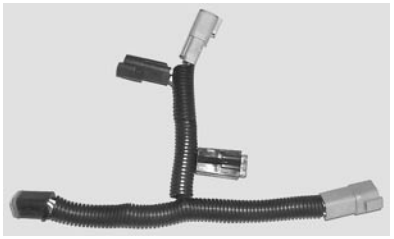
APPLICATION
Engines with tab type circlip.

9–volt adaptor
(P/N 529 035 675)



APPLICATION
All models equipped with a DESS.

Supply harness
(P/N 529 035 869)



APPLICATION
All DESS equipped models.

VCK (Vehicle Communication Kit)
(P/N 529 035 844)

APPLICATION
All models equipped with a DESS.

DESS KEY for BUDS
(P/N 529 035 896)

APPLICATION
All models equipped with a DESS.

Engine removal hook
(P/N 529 035 829)

APPLICATION
REV series.

Lifting ring (2)
(P/N 529 035 830)

APPLICATION
Liquid cooled engines except 4-TEC.

ENGINE — RECOMMENDED TOOLS

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

N–> Support plate
(P/N 529 035 976)

APPLICATION
552 engine type.

N–> Crankshaft distance gauge

a. (P/N 529 035 965)
b. (P/N 529 035 966)
c. (P/N 529 035 967)
d. (P/N 529 035 968)

APPLICATION
a. 552 engine type.
b. 493 and 593 engine type.
c. 593 HO, 593 SDI, 693 and 793.
d. 793 HO and 793 HO SDI.

Hand pump
(P/N 529 021 800)

APPLICATION
All models.

N–> Leak down tester
(P/N 529 035 661)

APPLICATION
1004 and 1503 engines.

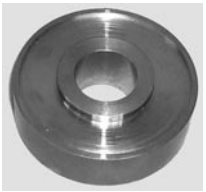
Crankshaft locking tool
(P/N 529 035 900)

APPLICATION
1004 engines.

N–> Crankshaft locking tool
(P/N 529 035 821)

APPLICATION
1503 engines.

N–> Engine support bearing installer
(P/N 529 035 952)



APPLICATION
1503 engines.

N–> Engine support bearing support
(P/N 529 035 953)

APPLICATION
1503 engines.

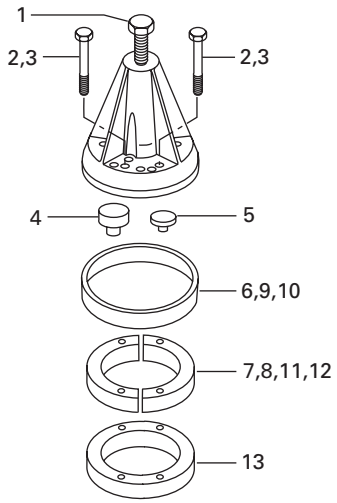
N–> 4-Tooth socket
(P/N 529 035 960)

APPLICATION
1503 engines.

N–> Torque flange remover
(P/N 529 035 958)

APPLICATION
1503 engines.

Crankshaft bearing puller
(P/N 420 877 635)



1) Screw M16 x 1.5 x 150 (P/N 420 940 755)
2) Screw M8 x 40 (4) (P/N 420 840 681)
3) Screw M8 x 70 (4) (P/N 420 841 201)
4) Crankshaft protector PTO (P/N 420 876 552)
5) Crankshaft protector MAG (P/N 420 876 557)
6) Puller ring (P/N 420 977 490) (use with half rings (P/N 420 977 475) or (P/N 420 276 025))
7) Half ring (2) (P/N 420 977 475) (for 72 mm O.D. bearings)
8) Half ring (2) (P/N 420 276 025) (for 62 mm O.D. bearings)
9) Puller ring (P/N 420 977 480)
10) Puller ring (P/N 420 977 494) (for hal rings (P/N 420 977 479))
11) Half ring (2) (P/N 420 977 479) (for 80 mm O.D. bearings)
12) Half ring (2) (P/N 420 876 330) (for 52 mm O.D. bearings)
13) Distance ring (P/N 529 035 964) (for MAG side bearing)

APPLICATION
All engines.

Piston circlip installer
(P/N 529 035 765)

APPLICATION
1004 and 1503 engines.

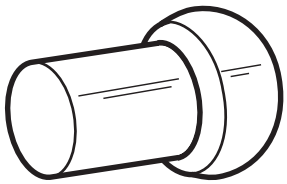
Piston circlip installer

a. 18 mm (P/N 529 035 561)
b. 20 mm (P/N 529 035 562)

APPLICATION
a) All engines except 593, 693 and 793.
b) 2001 and older 593 and 693 engines.

Piston pin/connecting rod bearing centering tool
(P/N 529 009 100)

NOTE: New diameter is 9.65 mm (.380 in).



APPLICATION
All engines except cageless engines.

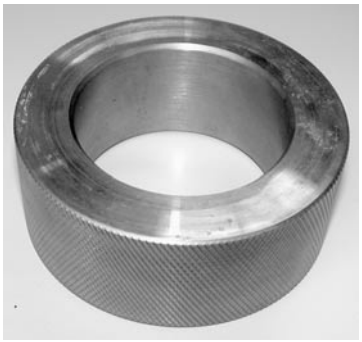
Pusher (55/59 mm)
(P/N 529 035 913)

APPLICATION
1004 engines.

Pusher (38/42 mm)
(P/N 529 035 914)

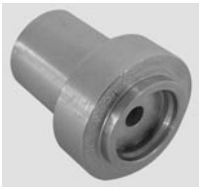
APPLICATION
1004 engines.

Support sleeve
(P/N 529 035 944)



APPLICATION
1004 engines.

N–> Water pump ceramic seal installer
(P/N 529 035 766)

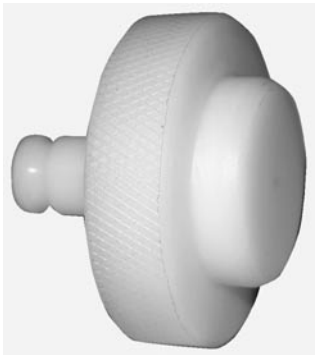


APPLICATION
1004 engines.

N–> Water pump oil seal installer
(P/N 529 035 757)

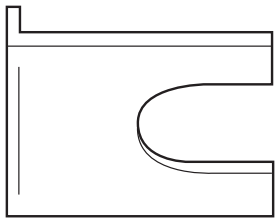
APPLICATION
1004 engines.

PTO cover oil seal installer
(P/N 529 035 910)



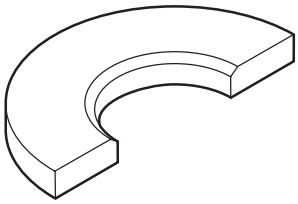
APPLICATION
1004 engines.

Crankshaft feeler gauge
(P/N 420 876 620)



APPLICATION
377 and 443 engines.

Crankshaft distance gauge (5.7 mm)
(P/N 420 876 822)



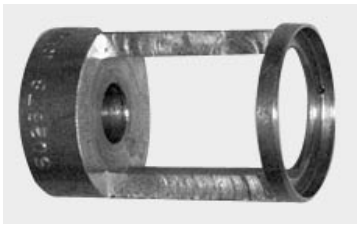
APPLICATION
377 and 443 engines.

N–> Camshaft locking tool
(P/N 529 035 839)

APPLICATION
1004 and 1503 engines.

Valve spring compressor cup
a) (P/N 529 035 764)

N–> b) (P/N 529 035 725)



APPLICATION
A) 1004 engines.
B) 1503 engines.

Ring compressor
Not sold by BOMBARDIER.

Snap-On RC980

APPLICATION
1004 and 1503 engines.

Special pliers for valve stem seal removal
Not sold by BOMBARDIER.

Snap-On YA 8230

APPLICATION
1004 and 1503 engines.

Valve stem seal installer
(P/N 529 035 687)

APPLICATION
1004 and 1503 engines.

Oil VAC
(P/N 529 035 880)

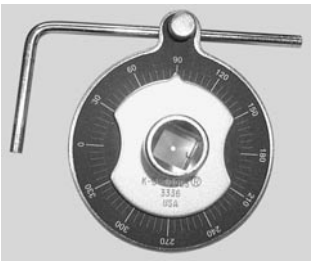
APPLICATION
All liquid cooled models.

Spring compressor clamp
(P/N 529 035 724)

APPLICATION
1004 and 1503 engines.

Torque angle gauge
Not sold by BOMBARDIER.

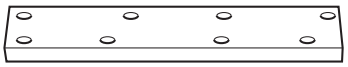
Snap-On TA362



APPLICATION
1004 and 1503 engines.

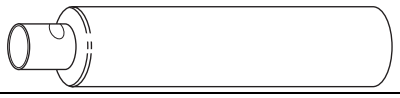
Cylinder aligning tool

a. (P/N 420 876 904) (on exhaust side)
b. (P/N 420 876 171) (on intake side)



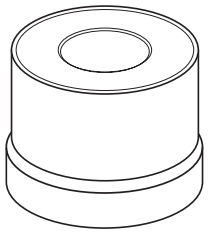
APPLICATION
a. 2-cylinder liquid cooled engines.
b. 2-cylinder fan cooled engines.

Driver tool
(P/N 529 035 521)



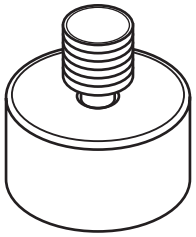
APPLICATION
Mini Z.

Attachment
(P/N 529 035 522)



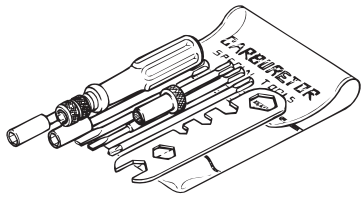
APPLICATION
Mini Z.

Pilot 22 mm
(P/N 529 035 523)



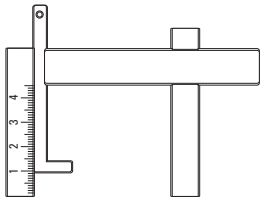
APPLICATION
Mini Z.

Carburetor tool kit
(P/N 404 112 000)



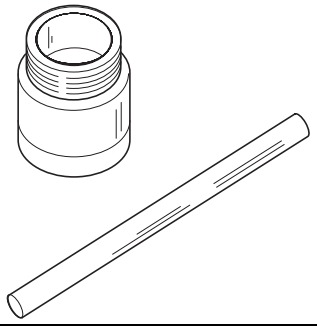
APPLICATION
All models with carburetor(s).

Float level gauge
(P/N 529 035 520)



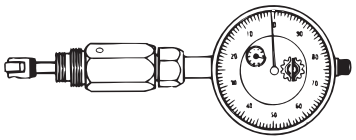
APPLICATION
All models with carburetor(s).

RAVE movement indicator
(P/N 861 725 800)



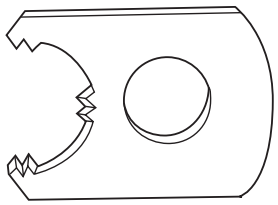
APPLICATION
All RAVE equipped engines.

Dial indicator (TDC gauge)
(P/N 414 104 700)



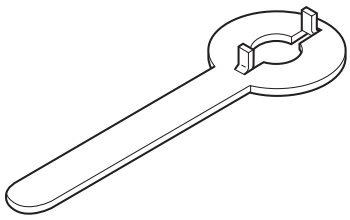
APPLICATION
All engines.

Injection pump gear holder
(P/N 420 876 695)



APPLICATION
377 engines.

Injection pump gear holder
(P/N 420 277 905)

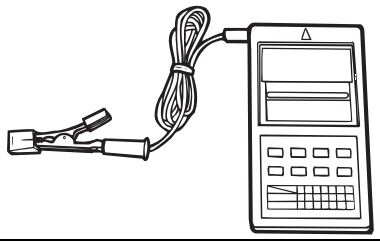


APPLICATION
All liquid cooled engines except 1004 and 1503.

Multimeter
(P/N 529 035 868)

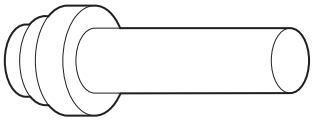
APPLICATION
All models.

Digital/induction type tachometer
(P/N 529 014 500)



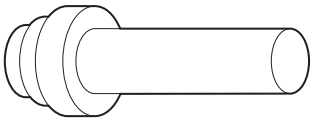
APPLICATION
All engines.

MAG seal pusher
(P/N 420 277 875)



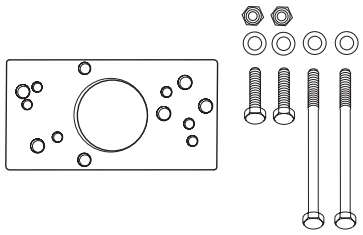
APPLICATION
277 engines.

PTO seal pusher
(P/N 420 876 660)



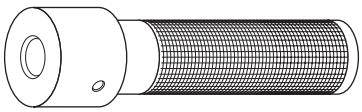
APPLICATION
277 engines.

Base puller plate kit
(P/N 529 024 900)



APPLICATION
277 engines.

Insertion jig handle
(P/N 420 877 650)

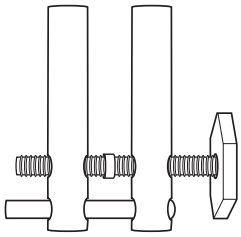


APPLICATION
1004 engines.

Oil pump seal installer
(P/N 529 035 911)

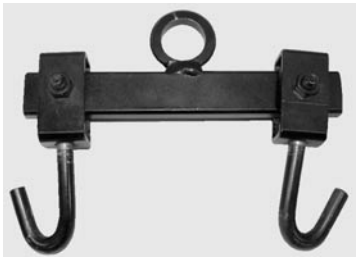
APPLICATION
1004 engines.

Large hose pincher
(P/N 529 032 500)



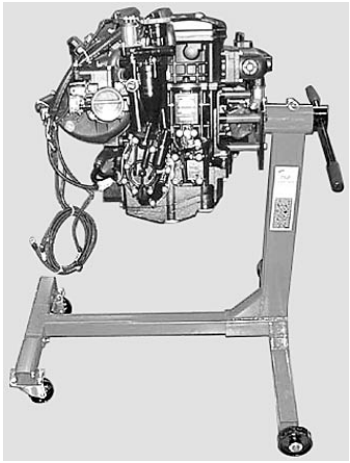
APPLICATION
All vehicles.

N–> 2–stroke engine lifting tool
(P/N 529 035 940)



APPLICATION
2–stroke engines.

Engine stand
Not sold by BOMBARDIER.



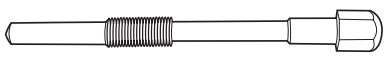
APPLICATION
1503 engines.

TRANSMISSION — MANDATORY TOOLS

Drive pulley retainer
(P/N 529 035 674)

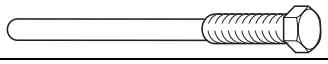
APPLICATION
All TRA, TRA III, TRA IV and TRA IV HD drive pulleys.

Drive pulley puller
(P/N 529 022 400)



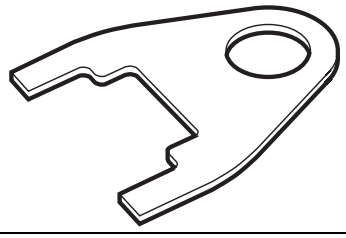
APPLICATION
2003 and up BOMBARDIER Lite drive pulley.
Most TRA, TRA III and TRA IV drive pulleys.

TRA drive pulley puller (25 mm)
(P/N 529 007 900)



APPLICATION
TRA drive pulley for 443 engines.

Forks (3)
(P/N 529 005 500)



APPLICATION
All vehicles equipped with a TRA drive pulley.

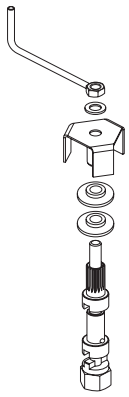
Specific alignment bar
(P/N 529 035 530)

APPLICATION
ZX series with TRA and RER.

Universal alignment bar
(P/N 529 035 831)

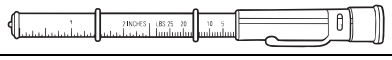
APPLICATION
All models except Elite.

Pulley spring compressor
(P/N 529 035 524)



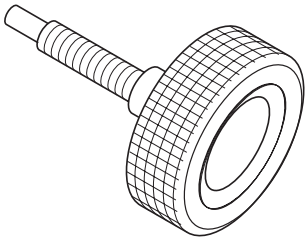
APPLICATION
All models.

Tension tester
(P/N 414 348 200)



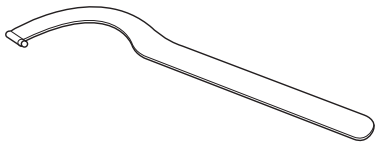
APPLICATION
All models.

Driven pulley opening tool
(P/N 529 017 200)



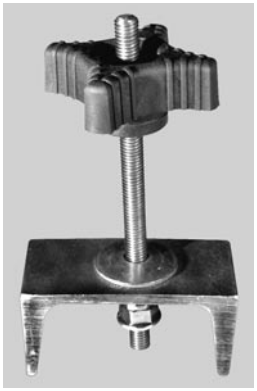
APPLICATION
Most models.

Clutch holder
(P/N 529 027 600)



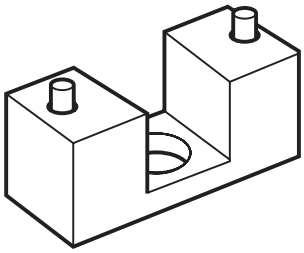
APPLICATION
BOMBARDIER Lite drive pulley.

Driven pulley spring compressor
(P/N 529 035 300)



APPLICATION
Tundra.

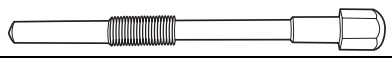
Spring cover tool
(P/N 529 027 300)



APPLICATION
BOMBARDIER Lite drive pulley.

TRANSMISSION — RECOMMENDED TOOLS

N–> Drive pulley puller
(P/N 529 035 959)

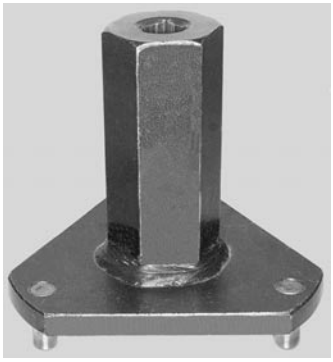


APPLICATION
Elite.

Tapered tool
(P/N 529 035 826)

APPLICATION
Skandic LT.

Spider tool
(P/N 529 025 200)



APPLICATION
Skandic LT.

Drive pulley puller
(P/N 529 025 000)

APPLICATION
Skandic LT.

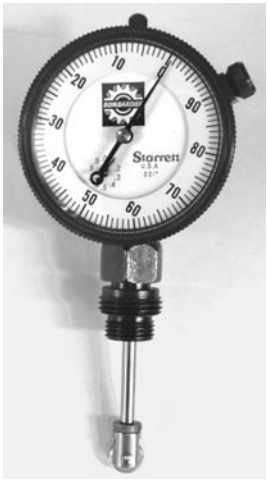
Governor cup
(P/N 529 035 894)

APPLICATION
TRA IV.

N–> TRA IV dial indicator kit
(P/N 529 035 939)

APPLICATION
TRA IV and TRA IV HD.

N–> Short dial indicator
(P/N 295 000 143)



APPLICATION
TRA IV and TRA IV HD.

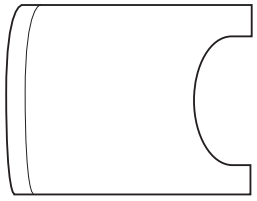
TRA IV drive pulley support
(P/N 529 035 942)

APPLICATION
TRA IV and TRA IV HD.

Driven pulley opening tool
(P/N 529 034 200)

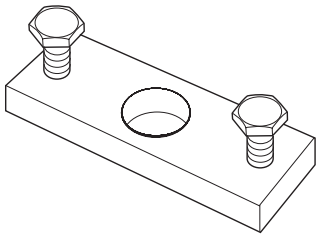
APPLICATION
Tundra.

Alignment tool
(P/N 420 476 010)



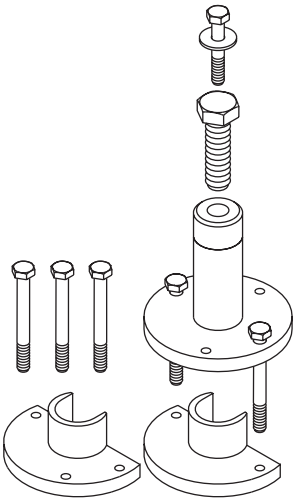
APPLICATION
Skandic WT.

Cam pusher
(P/N 529 012 900)



APPLICATION
Tundra.

Countershaft bearing remover/ installer
(P/N 529 035 699)



APPLICATION
ZX series.

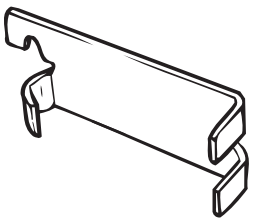
Countershaft bearing remover
(P/N 529 035 812)

APPLICATION
Skandic LT.

Countershaft bearing installer
(P/N 529 035 815)

APPLICATION
Skandic LT.

Spring scale hook (long)
(P/N 529 006 500)



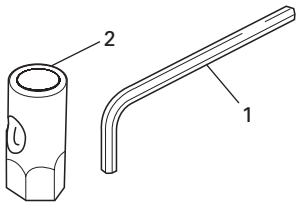
APPLICATION
Tundra.

Transmission adjuster
(P/N 529 030 300)

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

Drive belt tension adjuster tool
(P/N 529 008 700)
Parts included:

1) Hexagonal wrench (P/N 420 876 730)
2) Socket wrench (P/N 529 015 000)



APPLICATION
All vehicles except Tundra and Skandic WT.

Alignment bar
a. (P/N 529 035 808)
b. (P/N 529 035 586)
c. (P/N 529 035 594)
d. (P/N 529 026 900)
e. (P/N 529 026 700)

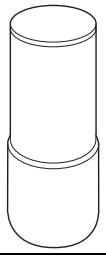
N–> f. (P/N 529 035 974)

APPLICATION
a. Skandic LT.
b. ZX series with BOMBARDIER Lite and RER.
c. Elite model.

NOTE: The alignment bar (P/N 529 035 594) must be modified to fit on Elite. Refer to PULLEY DISTANCE AND ALIGNMENT.

d. Tundra
e. ZX series with TRA.
f. 2004 Skandic WT/SWT/SUV 550.

Burnishing bar
(P/N 529 026 402)

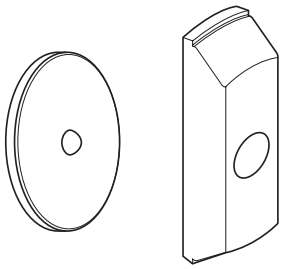


APPLICATION
Tundra and Skandic.

Bushing extractor/installer
(P/N 529 031 300)

APPLICATION
TRA drive pulley spring cover with replaceable bushing.

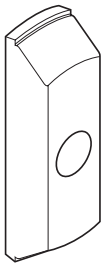
Large bushing extractor
(P/N 529 031 100)



APPLICATION
Formula type driven pulley.

NOTE: Use this tool only with former puller (P/N 529 018 600) that has regular threads.

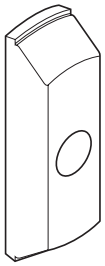
Large bushing extractor
(P/N 529 035 576)



APPLICATION
Formula type driven pulley.

NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads and support plate included with extractor (P/N 529 031 100).

Large bushing extractor
(P/N 529 035 575)



APPLICATION
LPV 27 driven pulley.

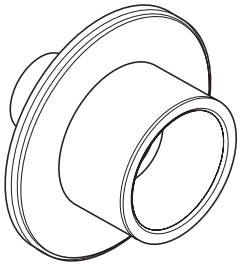
NOTE: Use this tool only with new puller (P/N 529 035 524) that has Acme threads and support plate included with extractor (P/N 529 031 100).

N–> Sliding half bushing remover/installer
(P/N 529 035 931)

APPLICATION
TRA III and TRA IV.

Large bushing installer and small bushing extractor

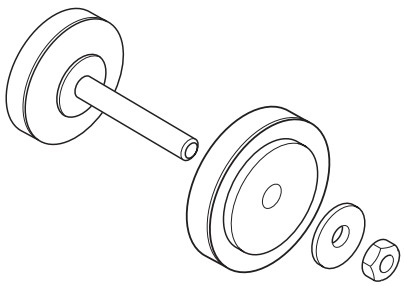
a. (P/N 529 031 200)
b. (P/N 529 035 931)



APPLICATION

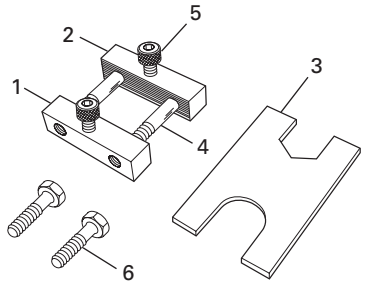
a. All models except Tundra, Skandic WT/SWT.
b. TRA III drive pulley spring cover.

Chaincase seal pusher
(P/N 529 035 584)



APPLICATION
ZX series.

Drive axle sprocket adjuster
(P/N 861 725 700)



Parts included in the kit:

1) Block with threads (P/N 529 010 700)
2) Block without threads (P/N 529 010 800)
3) Plate (P/N 529 010 600)
4) Bolt M10 (2) (P/N 222 007 565)
5) Allen screw M8 (2) (P/N 222 983 065)
6) Screw M8 (2) (P/N 222 082 565)

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

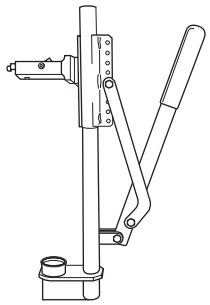
APPLICATION
All vehicles.

Belt tension tool
(P/N 529 035 957)

APPLICATION
Elite.

SUSPENSION — MANDATORY TOOLS

Shock spring removal kit
(P/N 529 035 504)
Replacement clevis pin
(P/N 414 528 400)

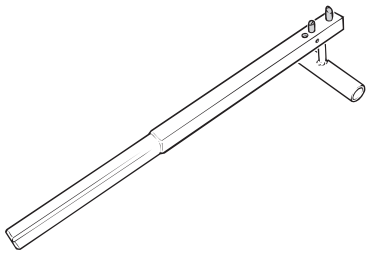


APPLICATION
All suspension with coil spring.

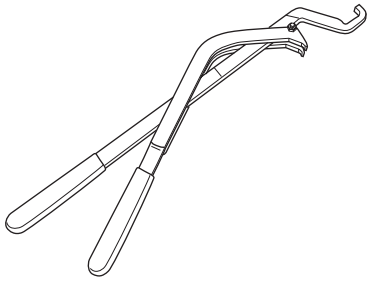
SUSPENSION — RECOMMENDED TOOLS

a) Track cleat remover
(P/N 529 008 200)
Pins
(P/N 529 008 204)

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



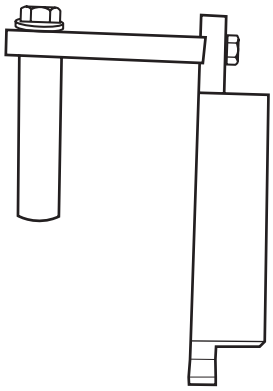
b) Track cleat remover
(P/N 529 028 700)



APPLICATION
a) 1993 and older.
b) All models except Tundra.

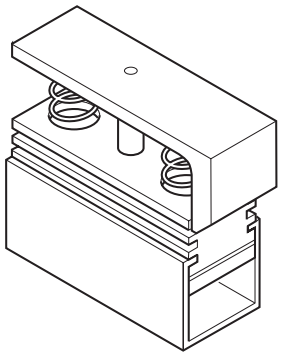
Camber angle tool
(P/N 529 021 600)

NOTE: Angle finder with a magnetic base must be used.
Suggestion: K_D tool no. 2968



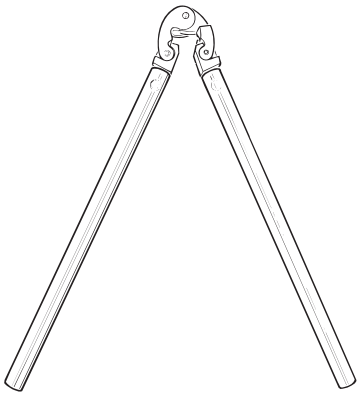
APPLICATION
All DSA front suspensions.

Track tension gauge
(P/N 529 021 500)



APPLICATION
All models.

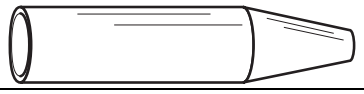
Track cleat installer
a. (P/N 529 028 800) narrow



APPLICATION
a. 1994 and newer.

Dome guide

a. (P/N 529 026 500)
b. (P/N 529 035 728)

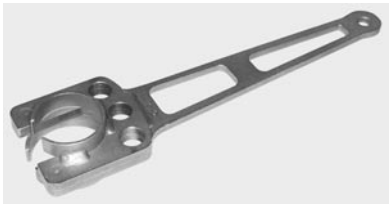


APPLICATION
a. C-36 T/A shocks.
b. C-46 T/A shocks.

N–> Floating piston puller
(P/N 529 035 901)

APPLICATION
T/A shock with external gas reservoir.

Shock wrench
(P/N 529 035 727)

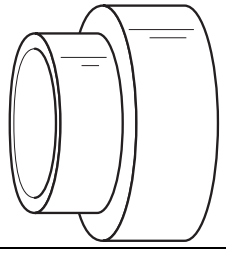


APPLICATION
All T/A shocks.

HPG shock holding tool
(P/N 529 035 769)

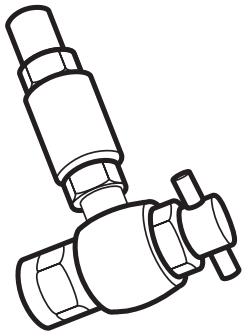
APPLICATION
All HPG shocks.

Piston guide
a. (P/N 529 026 600)
b. (P/N 529 035 608)



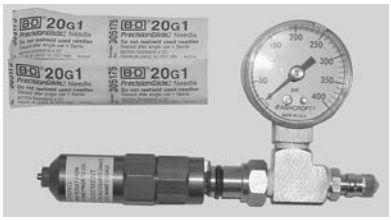
APPLICATION
a. C-36 T/A shocks.
b. C-46 T/A shocks.

Gas shock valve tool (tire valve type)
(P/N 529 035 570)



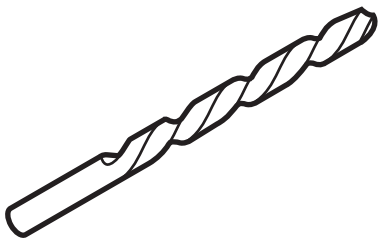
APPLICATION
Some 2000 and up T/A shocks.

Gas fill tool kit (needle type)
(P/N 503 190 102)



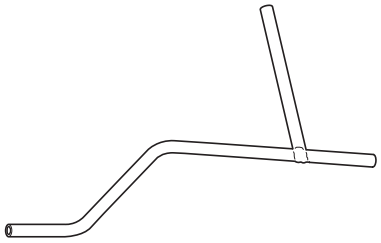
APPLICATION
2003 and up T/A shocks.

Drill bit
(P/N 529 031 800)



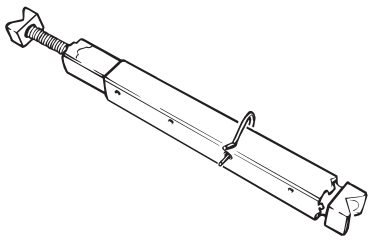
APPLICATION
All 3/16 inch rivets.

Spring installer (bar)
(P/N 529 005 000)



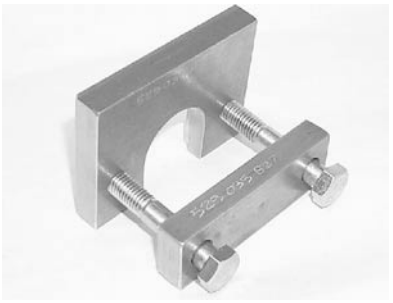
APPLICATION
Tundra and all SC-10 suspensions.

Drive axle holder
(P/N 529 007 200)



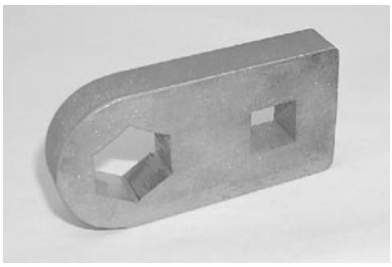
APPLICATION
All models.

Ball joint extractor
(P/N 529 035 827)



APPLICATION
REV series.

N–> Extension to torque ball joint nut
(P/N 529 035 876)



APPLICATION
REV series.

N–> REV ball joint lock
(P/N 529 035 945)

APPLICATION
REV series.

Ball joint remover support
(P/N 529 035 873)

APPLICATION
REV series.

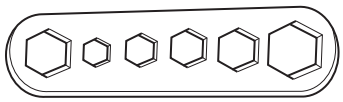
N–> Ball joint installer
(P/N 529 035 975)

APPLICATION
2004 REV series.

Ball joint installer support
(P/N 529 035 875)

APPLICATION
REV series.

Hexagonal wrench
(P/N 529 014 700)



APPLICATION
All SC-10 suspensions.

Suspension adjustment wrench
(P/N 529 032 900)

APPLICATION
SC-10 suspensions.

Adjustment wrench
(P/N 520 000 126)

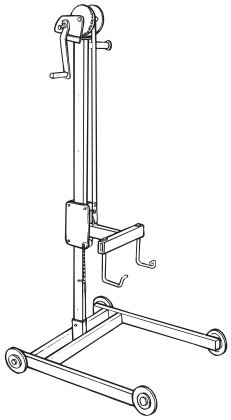
APPLICATION
SC-10 II and III (coupling blocks).

VEHICLE — RECOMMENDED TOOLS

Protective mat
(P/N 529 030 600)

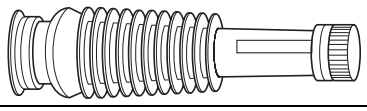
APPLICATION
All vehicle.

Snowmobile jack
(P/N 529 020 000)



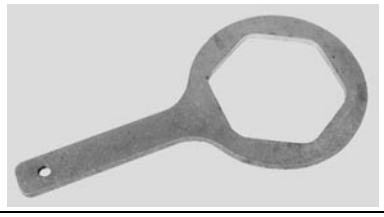
APPLICATION
All models.

Flexible spout for oil container
(P/N 414 837 300)



APPLICATION
All models.

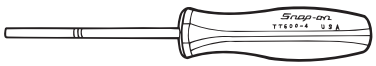
Adjustment wrench
(P/N 529 035 603)



APPLICATION
To remove and install fuel tank nut on ZX series.

Terminal (Packard) remover
Not sold by BOMBARDIER.

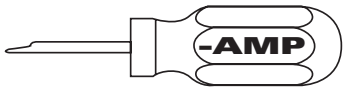
Snap-On TT 600–4



APPLICATION
Models with Packard connectors.

Multilock-terminal housing connector extractor tool
Not sold by BOMBARDIER.

AMP 755430–2

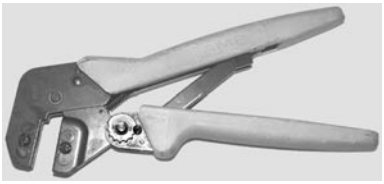


APPLICATION
For AMP multilock-terminals.

N–> DESS socket
(P/N 529 035 943)

APPLICATION
All DESS equipped models.

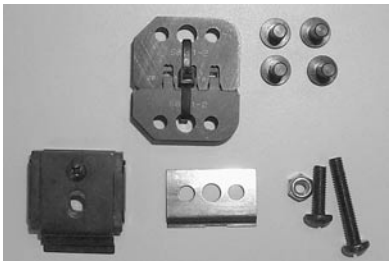
N–> Crimping tool
(dies sold separately)
(P/N 529 035 909)



APPLICATION
To crimp specific terminals.

Crimper die

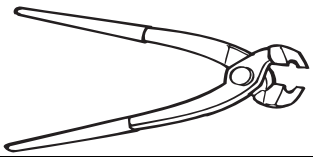
a. (P/N 529 035 828)
b. (P/N 529 035 906)
c. **N –>** (P/N 529 035 908)



APPLICATION
a. AMP multilock connectors.
b. ECM connectors A and B.
c. Some Deutsch connectors.

NOTE: These dies fit on crimping tool (P/N 529 035 909).

Hose clamp pliers
(P/N 295 000 070)



APPLICATION
Some models.

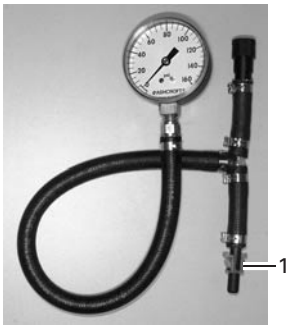
Adjustment wrench
(P/N 529 035 891)

APPLICATION
REV series.

Fuel pump nut wrench
(P/N 529 035 899)

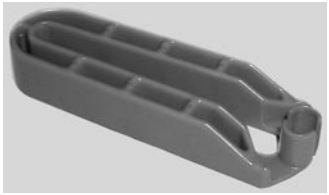
APPLICATION
2-TEC and 1004 engine equipped models.

Pressure gauge
(P/N 529 035 591)
1) Clip
(P/N 529 021 800)



APPLICATION
2–TEC, 1004 and 1503 engine equipped models.

Fuel line remover
(P/N 529 035 714)



APPLICATION
2-TEC, 1004 and 1503 engine equipped models.

Oil pressure gauge
(P/N 529 035 709)

APPLICATION
1004 and 1503 engine equipped models.

Oil pressure adaptor
(P/N 529 035 652)

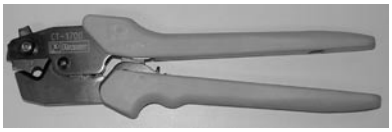
APPLICATION
1004 and 1503 engine equipped models.

Heated grips insertion tool

a. (P/N 529 035 897)
b. (P/N 529 035 936)

APPLICATION
a. ZX liquid cooled models with straight grips.
b. Models with j-hook type grips.

Crimp pliers
(P/N 529 035 730)



APPLICATION
All models with a battery.

N–> Insert pliers
(P/N 295 000 162)

APPLICATION
6 mm insert equipped models.

SERVICE PRODUCTS

Retaining compound
(P/N 413 703 100)
Loctite® RC/609:
Retaining compound
(10 mL) (green)

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

Medium-strength threadlocker
(P/N 293 800 060)
Loctite® 243: Threadlocker
(10 mL) (blue, medium strength)

APPLICATION
Flywheel nut, crankcase studs, etc.

NOTE: This product replaces Loctite (P/N 293 800 015).

High strength threadlocker
(P/N 293 800 005)
Loctite® 271:
Threadlocker (10 mL) (red, high strength)

APPLICATION
Fasteners and studs up to 25 mm (1 in) diameter.

Sealing compound
(P/N 420 297 906)
(30 mL)

APPLICATION
To seal crankcase on all ZX series engines.

NOTE: This product replaces the larger tube (P/N 420 297 905).

Paste gasket
(P/N 413 702 700)
Loctite® 515:
Gasket eliminator (50 mL)

APPLICATION
Crankcase halves and gearbox mating surfaces.

Paste gasket
(P/N 293 800 038)
Loctite® 518:
Gasket eliminator (50 mL)

APPLICATION
Crankcase halves and gearbox mating surfaces.

Loctite® primer
(P/N 293 800 041)
Primer N 128 g (5 oz)

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

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 708 100.

Gasket/paint remover
(P/N 413 708 500)
Loctite® Chisel 510 g (18 oz)

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

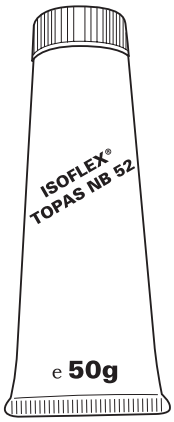
Molykote PG 54
(P/N 420 899 763)
(10 g)

APPLICATION
To lubricate pawl and pawl lock of rewind starter.

Molykote G-n paste
(P/N 711 297 433)
(50 g)

APPLICATION
To lubricate RAVE valve stem on engine with oil seal in RAVE housing.

Isoflex grease
(P/N 293 550 021)
(50 g)



APPLICATION
To lubricate some crankshaft bearings on some engines.

Petamo grease
(P/N 420 899 271)

APPLICATION
To lubricate lip of all ZX series engine crankshaft seals and plain bearings on 4-TEC.

SYNTHETIC BOMBARDIER
4-STROKE engine oil
0W-40
(P/N 293 600 054)
(12 x 1 L)

APPLICATION
4-TEC.

Pre-mix oil
(P/N 413 803 100)
(12 x 500 mL)

APPLICATION
All pre-mix models.

BOMBARDIER FORMULA XP-S II synthetic injection oil
(P/N 293 600 045)
(12 x 1 liter)

(P/N 293 600 046)
(3 x 4 liter)

(P/N 293 600 047)
(205 liter)

APPLICATION
All engines.

NOTE: This synthetic injection oil replaces XP-S and XP-S DI injection oils.

BOMBARDIER injection oil
(P/N 413 802 900)
(12 x 1 liter)

(P/N 413 803 000)
(3 x 4 liters)

(P/N 413 803 200)
(205 liters)

APPLICATION
All engines.

Premixed coolant 50/50
- 37°C (- 35°F)
(P/N 293 600 038)
(16 x 1 L)

APPLICATION
All liquid cooled models.

NOTE: This product replaces pre-mixed coolant (P/N 413 711 802).

Fuel stabilizer
(P/N 413 408 600)
(12 x 8 oz)

APPLICATION
All models.

Chaincase oil
(P/N 413 801 900)
(16 x 250 mL)

APPLICATION
Chaincase lubricant on all fan-cooled models except Skandic WT series.

Storage oil
CANADA: (P/N 413 711 600)
U.S.A.: (P/N 413 711 900)
(350 g spray can) (12 x 350 g)

APPLICATION
All models.

NOTE: Only the P/N has been changed. This product is identical to the P/N 496 014 100.

Synthetic chaincase oil
(P/N 413 803 300)
(12 x 355 mL)

APPLICATION
Chaincase lubricant on all liquid-cooled models and Skandic WT series.

Grease LMZ no. 1
(P/N 413 707 500)
(400 g)

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

Synthetic grease
(P/N 413 711 500)
(400 g)

APPLICATION
Drive axle bearing.

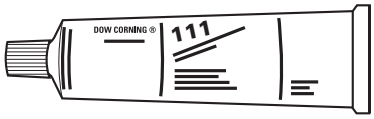
N–> Suspension synthetic grease
(P/N 293 550 033)
(10 tubes of 400 g each)

APPLICATION
For front and rear suspension components and drive axle bearing.

BOMBARDIER LUBE
(P/N 293 600 016)
(12 x 14 oz)

APPLICATION
Steering ball joints on all models.

Molykote 111
(P/N 413 707 000)



APPLICATION
Crankshaft seals on all engines except ZX series ones.

Brake fluid SRF (DOT 4)
(P/N 293 600 063)

APPLICATION
All models with hydraulic brake.

Brake fluid GTLMA (DOT 4)
(P/N 293 600 062)

APPLICATION
All models with hydraulic brake.

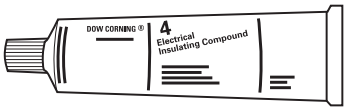
Shock oil
(P/N 293 600 035)
(32 oz)

APPLICATION
T/A shocks.

Anti-seize lubricant
(P/N 293 800 070)
Loctite anti-seize lubricant
236 mL (8 oz)

APPLICATION
Mounting surfaces of driven pulley and brake disc on countershaft.

Silicone dielectric grease
(P/N 293 550 004)
(3 oz)



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

NOTE: Only the P/N has been changed. This product is identical to the (P/N 413 701 700).

Pulley flange cleaner
(P/N 413 711 809)
(320 g)

APPLICATION
Engine crankcase joining surfaces, pulleys and any greasy surfaces.

Heavy duty cleaner
(P/N 293 110 001)
(400 g)
(P/N 293 110 002)
(4 L)

APPLICATION
All models.

Plastic & vinyl cleaner
(P/N 413 711 200)
(6 x 1 L)

APPLICATION
Hood, bottom pan and seat.

High temperature and strength retaining compound
(P/N 413 711 400)
Loctite 648 (5 mL) (green)

APPLICATION
To fasten oil injection nozzle to crankcase.

NOTE: Only the P/N has been changed. This product is identical to the P/N 420 899 788.

Pipe sealant
(P/N 293 800 018)
Loctite 592 (50 mL)

APPLICATION
Engine plugs and senders.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 702 300.

Loctite 5150
(P/N 293 800 086)

APPLICATION
All models to seal bottom pan.

Instant gasket
(P/N 293 800 088)
(7 oz)

APPLICATION
All models.

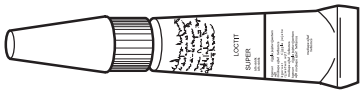
RTV silicone sealant
(P/N 293 800 066)
Loctite 5900 (300 mL)

APPLICATION
Tundra R chaincase cover.

Gel instant adhesive
(P/N 413 708 300)
Loctite 454-40
20 g (.70 oz)

APPLICATION
Isolating foam and rubber strip.

General purpose instant adhesive
(P/N 293 800 021)
Loctite 495 (3 g)



APPLICATION
Rubber to metal bonding and most hard plastic.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 703 200.

Tough adhesive
(P/N 413 408 300)
Loctite Black Max 3 mL (.10 oz)

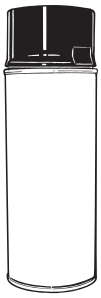
APPLICATION
Shifter boot or grip.

High temperature RTV sealant
(P/N 293 800 090)
Ultra Copper (80 mL)

APPLICATION
All models.

NOTE: Only the P/N has been changed. This product is identical to the P/N 413 710 300.

Paint for frame touch-up
(P/N 413 401 000)
Black semi-gloss (spray can)



APPLICATION
All models with a black frame.

N–> Scratch remover
(P/N 861 774 800)

APPLICATION
All models.

MAINTENANCE CHART

I: Inspect, verify, clean, adjust, lubricate or replace if necessary C: Clean L: Lubricate R: Replace A: Adjust	**10 h or 500 km (300 m.)** (1)	**Weekly or 240 km (150 m.)**	**Monthly or 800 km (500 m.)**	**Once a year or 3200 km (2000 m.)**	**6000 km (3700 m.)**	**Storage** (1)	**Preseason preparation** (1)	**Refer to the following subsection(s)**
ENGINE								
Rewind Starter and Rope						I, L, C	I	04-06
Engine Nuts and Screws	I			I		I		04-01 See TOP END
Exhaust System	I		I			I		04-01 See ENGINE REMOVAL
Engine Lubrication						L		02-02
Cooling System	I			I			I	04-05
Coolant	I					R		04-05
Condition of Seals (4)						I	I	04-01
RAVE Valves (4)				C				04-01 See TOP END
LUBRICATION								
Injection Oil Filter			I			R		04-04
Oil Injection Pump	A			A			A	04-04
FUEL								
Fuel Stabilizer						R		02-02
Fuel Filter							R	02-03
Fuel Lines, Fuel Rail and Connections	I					I	I	05-02
Carburetor	A			A			A, C	04-07
Throttle Cable	I			I		I	I	04-07 and 05-02
Air Filter			C				C	02-03
Fuel Injection System (visual inspection)				I				05-02
Throttle Body Bores and Throttle Plates (4)							C	05-02

I: Inspect, verify, clean, adjust, lubricate or replace if necessary C: Clean L: Lubricate R: Replace A: Adjust	**10 h or 500 km (300 m.) (1)**	**Weekly or 240 km (150 m.)**	**Monthly or 800 km (500 m.)**	**Once a year or 3200 km (2000 m.)**	**6000 km (3700 m.)**	**Storage (1)**	**Preseason preparation (1)**	**Refer to the following subsection(s)**
DRIVE								
Drive Belt	I	I					I	06-01
Drive and Driven Pulleys	I		I	C		I	C	06-02 and 06-03
Tightening Torque of Drive Pulley Screw	I			I			I	06-02
Driven Pulley Preload	I			I		I		06-03
BRAKE								
Brake Fluid	I	I				R	I	06-05
Brake	I	I				I	I	06-05
TRANSMISSION								
Drive Chain Tension	A		A			A		06-06
Countershaft	L		L			L		06-05
Chaincase Oil	I		I			R	I	06-06
Drive Axle End Bearing (2)	L		L			L		08-03
STEERING/FRONT SUSPENSION								
Steering and Front Suspension (2)	A,I,L		A,I	L		A,I,L		09-01 and 09-02
Wear and Condition of Skis and Runners	I	I				I		09-02
SUSPENSION								
Suspension (2)	I		I,L			I,L		See Section 08 and appropriate Subsection
Suspension Stopper Strap				I		I		See Section 08 and appropriate Subsection
Track	I		I			I		08-04
Track Tension and Alignment	A	AS REQUIRED						08-04

I: Inspect, verify, clean, adjust, lubricate or replace if necessary C: Clean L: Lubricate R: Replace A: Adjust	**10 h or 500 km (300 m.) (1)**	**Weekly or 240 km (150 m.)**	**Monthly or 800 km (500 m.)**	**Once a year or 3200 km (2000 m.)**	**6000 km (3700 m.)**	**Storage (1)**	**Preseason preparation (1)**	**Refer to the following subsection(s)**
ELECTRICAL								
EMS Fault Codes (4)	I				I			05-03
Spark Plugs (3) (4)	I		I				R	05-02 and 07-02
Battery (if so equipped)	I		I			I	I	05-02 and 07-03
Headlamp Beam Aiming				A			A	10-01
Wiring Harnesses, Cables and Lines (4)	I		I			I		10-01
Operation of Lighting System (HI/LO beam, brake light, etc.) Test Operation of Engine Cut-Out Switch and Tether Cut-Out Switch	I	I				I		*Operator's Guide*
VEHICLE								
Rags in Air Intake and Exhaust System						R	C	02-02 and 02-03
Engine Compartment	C		C			C		02-02
Vehicle Cleaning and Protection	C		C			C		02-02

(1) To be performed by an authorized Ski-Doo dealer.

(2) Lubricate whenever the vehicle is used in wet conditions (wet snow, rain, puddles).

(3) Before installing new spark plugs at preseason 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.

(4) Emission-related

STORAGE

GENERAL

Proper snowmobile storage is a necessity during the summer months or when a vehicle is not being used for more than one month.

Refer to storage column from MAINTENANCE CHART jointly with the present storage procedure in order to cover each and every aspect of the snowmobile storage procedure. Any worn, broken or damaged parts should be replaced.

⚠ WARNING

Unless otherwise specified, engine should be turned off for storage procedure.

FUEL STABILIZER

With the new fuel additives, it is critical to use the fuel stabilizer (P/N 413 408 600) (250 mL) to prevent fuel deterioration, gum formation and fuel system components corrosion. Follow manufacturer's instructions for proper use.

Pour fuel stabilizer in fuel tank prior to starting engine for internal parts lubrication so that stabilizer flows everywhere in fuel system. Fill up fuel tank completely. Ensure there is no water inside fuel tank.

CAUTION: Should any water be trapped inside fuel tank, severe internal damage will occur to the fuel injection system (if so equipped).

After engine starting, use primer several times so that stabilizer flows inside it.

Do not drain fuel system.

CAUTION: Fuel stabilizer should be added prior to engine lubrication to ensure carburetor protection against varnish deposit.

⚠ WARNING

Fuel is inflammable and explosive under certain conditions. Always work in a well ventilated area. Do not smoke or allow open flames or sparks in the vicinity. Fuel tank may be pressurized, slowly turn cap when opening. Never use an open flame to check fuel level. When fueling, keep vehicle level. Do not overfill or top off the fuel tank and leave vehicle in the sun. As temperature increases, fuel expands and might overflow. Always wipe off any fuel spillage from the vehicle. Periodically inspect fuel system.

ENGINE LUBRICATION

NOTE: Be sure to add fuel stabilizer before starting the engine.

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 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.

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

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 413 711 600) for Canada and (P/N 413 711 900) for USA 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.

ENGINE COMPARTMENT

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

PULLEY PROTECTION

After inspection and interior cleaning of pulleys, spray BOMBARDIER LUBE (P/N 293 600 016) on sheaves. Do not reinstall drive belt.

COUNTERSHAFT LUBRICATION

Driven pulley and brake disc must be floating on the countershaft for efficient operation. Lubricate with anti-seize lubricant (P/N 293 800 070).

CAUTION: Do not lubricate excessively as lubricant could contact and soil brake pads and/or drive belt.

BATTERY

Remove battery, clean its tray and its exterior surface. Charge battery as explained in BATTERY section.

VEHICLE CLEANING

To facilitate the inspection and ensure adequate lubrication of components, it is recommended to clean the entire vehicle.

Remove any dirt or rust.

To clean the entire vehicle, use only flannel cloths or equivalent.

CAUTION: It is necessary to use flannel cloths or equivalent on windshield and hood to avoid further damaging surfaces to clean.

To clean the entire vehicle, including bottom pan and metallic parts use Heavy duty cleaner (P/N 293 110 001 (spray can 400 g) and P/N 293 110 002 (4 L)).

CAUTION: Do not use Heavy duty cleaner on decals or vinyl.

For vinyl and plastic parts use Vinyl & Plastic Cleaner (P/N 413 711 200 (6 x 1 L)).

To remove scratches on windshield or hood use BOMBARDIER Scratch Remover Kit (P/N 861 774 800).

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 with touch-up paint where paint has been scratched off.

Spray all bare metal parts including shock chromed rods with BOMBARDIER LUBE (P/N 293 600 016).

Wax the hood and the painted portion of the frame for better protection. Use a non-abrasive wax such as silicone wax.

NOTE: Apply non-abrasive wax on glossy finish only.

RAGS IN AIR INTAKE AND EXHAUST SYSTEM

Block air intake hole and exhaust system hole using clean rags.

VEHICLE PROTECTION

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 but ventilated 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.

PRESEASON PREPARATION

Proper vehicle preparation is necessary after the summer months or when a vehicle has not been used for more than one month.

Refer to preseason preparation column from MAINTENANCE CHART jointly with the present preseason preparation procedure in order to cover each and every aspect of the snowmobile preseason preparation procedure.

Any worn, broken or damaged parts found during the storage procedure should have been replaced. If not, proceed with the replacement.

⚠ WARNING

Unless otherwise specified, engine should be turned off for preparation procedure.

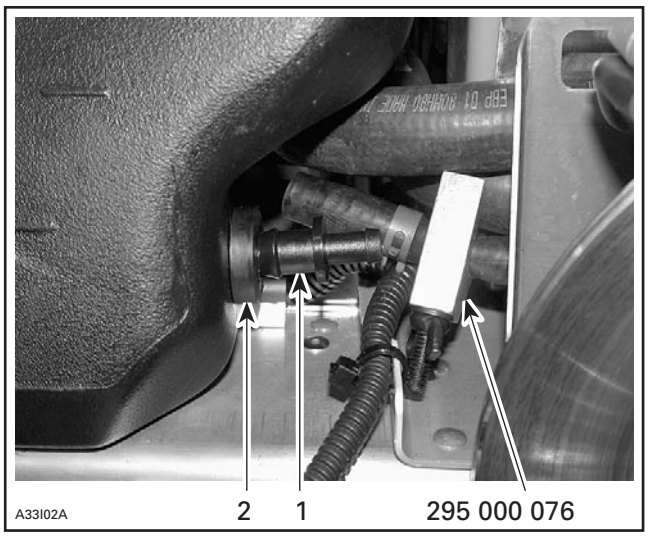
FUEL FILTER REPLACEMENT

All Models except 593 SDI Equipped Models

Drain fuel tank.

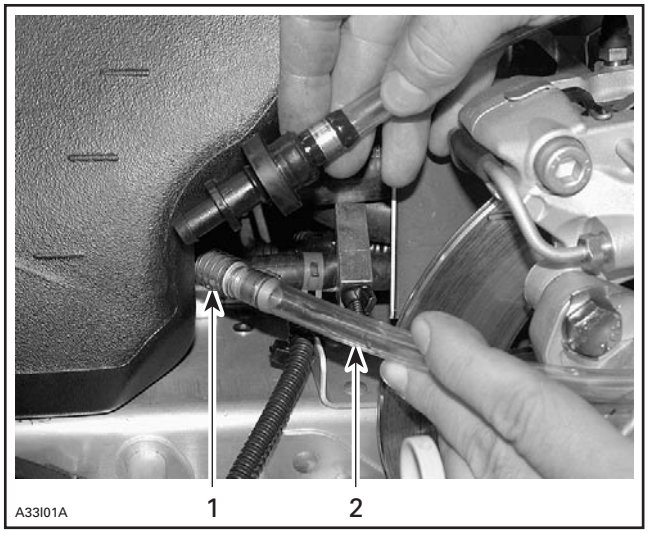
Install a hose pincher (P/N 295 000 076) on supply hose then, unplug support hose.

Pull out male connector from grommet.



1. Male connector
2. Grommet

Pull out grommet from fuel tank then, pull out pickup hose and fuel filter.



1. Fuel filter
2. Pickup hose

Replace fuel filter and grommet. To facilitate the installation, grommet should be on smaller diameter of male connector. Install grommet on fuel tank and push male connector through grommet.

593 SDI Equipped Models

Fuel filter, inlet and outlet hoses come as an assembly.

The fuel filter is located beside the steering column, next to coolant tank.

Using B.U.D.S. release the fuel pressure. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

Remove console to gain access to top of fuel pump module.

Disconnect both ends of fuel filter line.

Unfasten clip retaining fuel line to fuse box support.

Unscrew the fuel filter support nut then remove the filter.

The installation is the reverse of removal procedure.

THROTTLE BODY CLEANING (ON SO EQUIPPED MODELS)

Remove the throttle body from vehicle.

Using the Pulley Flange Cleaner (P/N 413 711 809), remove the dirt ejected by the drive belt from the throttle plate and from both throttle body bores. After throttle body installation, adjust throttle and injection oil cables.

CARBURETOR CLEANING (ON SO EQUIPPED MODELS)

Disassemble carburetor(s) in order to clean all internal parts. Do not hesitate to replace any jets having gum or varnish on their surfaces.

AIR FILTER CLEANING

Check that inside of air silencer 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.

RAGS IN AIR INTAKE AND EXHAUST SYSTEM

Remove rags that were installed during STORAGE preparation.

CLEANING OF DRIVE AND DRIVEN PULLEYS

Clean drive and driven pulleys sheaves with Pulley Flange Cleaner (P/N 413 711 809).

CLEANING OF BRAKE DISK

Remove any rust built-up on braking surfaces. Clean brake disk braking surfaces with Pulley Flange Cleaner (P/N 413 711 809).

DRIVE BELT CONDITION

Inspect belt for cracks, fraying or abnormal wear. Replace if necessary. Make sure to install the proper belt with arrow printed on belt pointing front of vehicle.

SPARK PLUGS

Once preseason preparation is done, start engine with the old spark plug(s) to burn excess storage oil. Then, install new properly gapped spark plug(s).

ENGINE

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

NOTE: For engine management system troubleshooting, refer to appropriate subsection.

SYMPTOM	**ENGINE BACKFIRES.**
CONDITION	NORMAL USE.
TEST/INSPECTION	1. Check spark plugs. a. Carbon accumulation caused by defective spark plug(s). *Clean carbon accumulation from piston and cylinder head and install dry properly gapped spark plug(s).*
	2. Check ignition timing. a. Timing is too advanced. *Set timing according to specifications (refer to TECHNICAL DATA).*
	3. Check for erratic sparks. a. Poor electrical connections. *Repair.* b. Faulty stator. *Replace defective parts.*
	4. Check carburetor. a. Fuel passages obstructed. *Clean carburetor and install new filter(s).* b. Fuel level too low. *Adjust float level according to specifications.*
	5. Check cooling system. a. Low antifreeze level. *Adjust antifreeze level. Proceed with a leakage test (refer to LIQUID COOLING SYSTEM) and repair as required.* b. Defective tank cap. *Replace cap.* c. Defective thermostat. *Replace thermostat.* d. Air in system. *Bleed system.*

SYMPTOM	**ENGINE SUDDENLY TURNS OFF AT HIGH RPM AND/OR WITH LIGHT LOAD.**
CONDITION	NORMAL USE.
TEST/INSPECTION	1. Check that all 3 ground wires are well connected.

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. High acceleration when engine is cold. Piston expands faster than cylinder. *Replace piston(s). Ask driver to refer to the WARM-UP PROCEDURE in the* 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) (foreign particles in needle area and/or varnish formation in carburetor(s)). *Clean carburetor(s) and install new filter(s).* d. Spark plug heat range is too warm. *Install spark plugs with appropriate heat range (refer to TECHNICAL DATA).* e. Improper ignition timing. *Adjust according to specifications (refer to TECHNICAL DATA).* f. Restriction in exhaust system. *Replace.* g. Compression ratio is too high. *Install genuine parts.* h. Too low fuel octane number. *Use proper fuel octane number.* i. Carburetor calibration is too lean. *Adjust according to specifications (refer to TECHNICAL DATA).* j. Improper reed valve adjustment or damage. *Adjust according to specifications (refer to appropriate ENGINE subsection) and/or install Bombardier's recommended reed valve.* k. Poor quality oil. *Use BOMBARDIER injection oil.* l. Leaks at air intake silencer. *Replace air intake silencer grommets.* m. Excessive wear of piston rings. *Replace piston rings.*

SYMPTOM	**ENGINE SUDDENLY TURNS OFF.**
CONDITION	NORMAL USE.
TEST/INSPECTION	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 is due to an incomplete combustion of a poor quality oil. *Clean residue accumulation in combustion chamber and replace piston(s). Use Bombardier injection oil.* b. Spark plug heat range is too high. *Install recommended dry properly gapped spark plugs (refer to TECHNICAL DATA).* c. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA).* d. Inadequate fuel quality. *Use appropriate fuel.* e. Carburetion is too lean. *Adjust according to specifications (refer to TECHNICAL DATA).*
	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). This can also be caused by running engine on choke for too long. Excessive fuel will remove the oil film on the piston and make marks. *Replace piston(s) and check if intake system leaks.*
	7. Piston color is dark due to seizure on intake and exhaust sides. a. Cooling system leaks and lowers coolant level. *Proceed with a leakage test (refer to LIQUID COOLING SYSTEM) and repair as required. Add coolant in cooling system until appropriate level is reached.* b. Accumulation of foreign particles in needle valve 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 overrevving. *Replace piston(s). Check piston/cylinder clearance (refer to TECHNICAL DATA). Adjust drive pulley according to specifications (refer to TECHNICAL DATA) and/or clean pulley sheaves if they are contaminated with greasy particles.*
	9. DPM manifold air vent is obstructed. a. Carburetion is too lean. *Ensure proper air vent.*

SYMPTOM	**PISTON RING AND CYLINDER SURFACES ARE SCRATCHED.**
CONDITION	NORMAL USE.
TEST/INSPECTION	1. Check oil quality. a. Poor quality oil. *Use BOMBARDIER injection 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) 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 and gap. a. Fouled spark plugs or wrong spark plug gap. *Replace or readjust gap.*
	2. Check if there is water in fuel. a. There is water in fuel. *Drain fuel system, then fill with appropriate fuel.*
	RAVE Equipped Engines 3. Check proper operation of RAVE valves. (Refer to ENGINE EQUIPPED WITH RAVE VALVE DOES NOT REACH ITS FULL OPERATING RPM (500 TO 1000 RPM LOWER). *Repair.*
	4. Check items listed in ENGINE RUNS OUT OF FUEL (refer to FUEL AND OIL SYSTEMS subsection).
	5. Check carburetor adjustments and cleanliness. a. Inadequate carburetor adjustments or dirt accumulation. *Adjust according to specifications (refer to TECHNICAL DATA) or clean.*
	6. Check drive belt. a. Worn belt. *Replace belt if width is 3 mm (1/8 in) less than nominal dimension (refer to TECHNICAL DATA).*
	7. Check track adjustment. a. Too much tension and/or improper alignment. *Align track and adjust its tension to specifications (refer to TECHNICAL DATA).*
	8. Check drive pulley. a. Improper calibration screw adjustments (TRA pulley) and/or worn bushing(s). *Adjust according to specifications (refer to TECHNICAL DATA) and/or replace bushing(s).*
	9. 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. Check exhaust system. a. Restriction or exhaust system leakage. *Replace or reseal with Ultra Copper.*
	11. Check ignition timing. a. Decrease in power due to delayed ignition. *Adjust according to specifications (refer to TECHNICAL DATA).*
	12. Check engine compression. a. Worn piston(s) and ring(s). *Replace (refer to TECHNICAL DATA for specifications).*
	13. Check engine cooling system. a. Coolant level is low, cap fails to pressurize system or air circulates through lines. *Adjust level, replace cap or bleed cooling system.*
	14. Check reed valve. a. Improper tightness and/or opening. *Replace or adjust. (Refer to proper ENGINE subsection).*

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 plugs (refer to TECHNICAL DATA).*
	3. Check exhaust system. a. Too much restriction. *Replace.*
	4. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA).*
	5. Check if engine is overheating. (Refer to HIGH ENGINE OPERATING TEMPERATURE).
	6. Check carburetion. a. Fouled and/or improper carburetor components. *Clean or replace according to specifications (refer to TECHNICAL DATA).*
	7. Check compression ratio and combustion chamber volume. 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 OFF. *Place all switches in the RUN or ON position. If it still does not work, connect DESS switch BK/GN and BK/WH wires together (harness side).*
	2. Check fuel level. a. Mixture too lean to start cold engine. *Check fuel tank level and use choke.*
	3. Check spark plug. a. Defective spark plug (no spark) or wrong spark plug gap. *Replace spark plugs or readjust gap.*
	4. Check amount of fuel on spark plug. a. Flooded engine (spark plug wet when removed). *Do not overprime or overchoke. Remove wet spark plugs, turn ignition switch to OFF and crank engine several times. Install clean dry properly gapped spark plugs. Start engine following usual starting procedure.*
	5. Check fuel lines. a. No fuel to the engine (spark plugs dry when removed). *Check fuel tank level ; turn fuel valve on if applicable; check fuel filter, replace if clogged ; check condition of fuel and impulse lines and their connections.*
	6. Check engine compression. a. Insufficient engine compression. *Replace defective part(s) (ex.: piston(s), ring(s), etc.).*
	7. On SDI manual start models, check capacitor. a. Damaged capacitor. *Replace.*

SYMPTOM	**IRREGULAR ENGINE IDLE.**
CONDITION	NORMAL USE AFTER ENGINE WARM UP.
TEST/INSPECTION	1. Check choke. a. Choke plunger may be partially opened. *Readjust.*
	2. Check carburetor adapter. a. Air enters through a crack. *Replace.*
	3. Check air screw position. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA).*
	4. Check dimension of pilot jet. a. Inadequate fuel/air mixture. *Adjust according to specifications (refer to TECHNICAL DATA).*
	5. Check reed valve. a. Improper tightness and/or opening. *Replace or adjust. Refer to proper ENGINE subsection.*
	6. Perform engine leak test. a. Leaking gaskets allow air to enter in engine. *Replace defective parts.*
	7. DPM manifold air vent is obstructed. a. Carburetion is too lean. *Ensure proper air vent.*
	8. On models with carburetors, check throttle slide height. a. Incorrect throttle slide height. *Readjust according to specifications.*
	9. On SDI models, check cleanness of throttle body. a. Deposits inside throttle body. *Clean throttle body bores and plates.*

SYMPTOM	**HIGH ENGINE OPERATING TEMPERATURE.**
CONDITION	NORMAL USE.
TEST/INSPECTION	1. Check carburetion. a. Improperly adjusted or inadequate carburetor components. *Adjust according to specifications (refer to TECHNICAL DATA) or replace inadequate component(s).*
	2. Check cylinder O-rings. a. Worn O-rings. *Replace.*

SYMPTOM	**HIGH ENGINE OPERATING TEMPERATURE.**
CONDITION	NORMAL USE.
TEST/INSPECTION	3. Check ignition timing. a. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA).*
	4. Check if there are leaks at air intake silencer and/or engine crankcase. a. Leak(s). *Repair or replace.*
	5. Check condition and heat range of spark plugs. a. Melted spark plug tip or inadequate heat range. *Replace.*
	Liquid-Cooled Engines 6. Check temperature gauge sensor. a. False reading. *Check terminal connections. If problem persists, replace sensor.*
	7. Check if heat exchangers are clean. a. Dirty heat exchangers. *Clean heat exchangers.*
	8. Check coolant level and check if there is air infiltration in the system or if there are leaks in gasket areas. a. Low coolant level or air in system. *Add coolant until recommended level is reached, bleed system and/or tighten clamps.*
	9. Check if coolant flows through system properly. a. Foreign particles and/or broken coolant pump impeller. *Clean cooling system and/or replace coolant pump impeller.*
	10. Check thermostat. a. Thermostat reacts slowly or not at all. *Replace.*
	11. Check antifreeze concentration. a. Antifreeze concentration is too high. *Adjust concentration according to Bombardier's recommendations.*
	12. Check tank cap. a. Cap does not hold pressure. *Replace.*
	13. Check carburetion. a. Improperly adjusted or inadequate carburetor components. *Adjust according to specifications (refer to TECHNICAL DATA) or replace inadequate component(s).*
	14. Check cylinder head gaskets. a. Worn gaskets. *Replace.*
	15. Check ignition timing. a. Ignition timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA).*

SYMPTOM	**HIGH ENGINE OPERATING TEMPERATURE.**
CONDITION	NORMAL USE.
TEST/INSPECTION	16. Check if there are leaks at air intake silencer and/or engine crankcase. a. Leak(s). *Repair or replace.*
	17. Check condition and heat range of spark plugs. 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) not screwed to the bottom. *Screw valve piston(s) to bottom.*
	2. Check that valve moves freely. a. Valve stuck in closed position. *Clean.*
	3. Check RAVE valve stems. a. Bent RAVE valve stem(s). *Replace.*
	4. Check RAVE valves. a. Jammed valve(s). *Clean.*
	5. Check tension of RAVE springs. a. Inadequate spring tension. *Replace.* b. Inadequate red cap adjustment. *Adjust according to specifications.*
	6. Check RAVE pressure holes. a. Clogged holes. *Clean.*
	7. Check clamps or sleeves. a. Damaged clamp(s) or sleeve(s). *Replace.*
	8. Check exhaust tightness. a. Exhaust system is leaking leading to a too low back pressure. *Replaces parts and reseal.*

SYMPTOM	**ENGINE EQUIPPED WITH RAVE. ENGINE HESITATES AT LOW OR 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 low or spring(s) is (are) broken. *Replace.*
	2. Check RAVE valve cover red adjustment screws. a. Adjustment screw(s) is (are) too loose. *Adjust according to ASSEMBLY PROCEDURE in appropriate engine subsections.*
	3. Check RAVE valve movement (RAVE movement indicator P/N 861 725 800). a. Valve(s) is (are) stuck in open position. *Clean.*

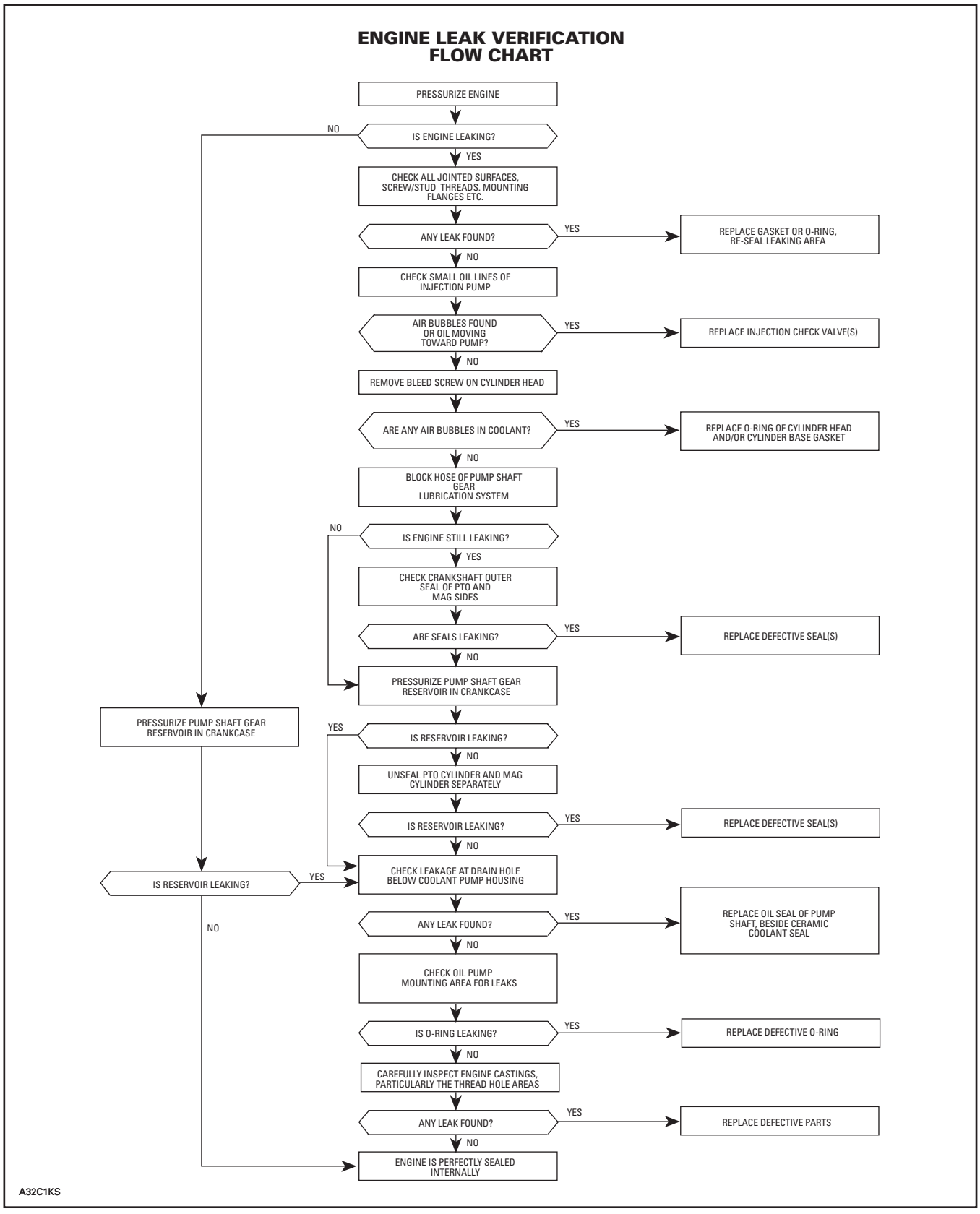
SYMPTOM	**REWIND STARTER ROPE DOES NOT REWIND.**
CONDITION	NORMAL USE.
TEST/INSPECTION	1. Check rewind spring. a. Broken spring. *Replace spring.*

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 for proper fuel octane number according to engine type. a. Too low fuel octane number. *Use appropriate fuel octane number (Refer to Operator's Guide).*
	2. Check fuel lines. a. Bent fuel lines (preventing fuel from flowing through). *Relocate or replace fuel lines.*
	3. Check if carburetor(s) is (are) clean. a. Dirt prevents fuel from flowing through. *Clean.*
	4. Check ignition timing. a. Timing is too advanced. *Adjust according to specifications (refer to TECHNICAL DATA).*
	5. 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.*
	6. Check for carbon accumulation in combustion chamber and/or on piston dome. a. Carbon accumulation. *Remove carbon accumulation.*

SYMPTOM	**ENGINE GENERATES A LOT OF VIBRATIONS.**
CONDITION	NORMAL USE.
TEST/INSPECTION	1. Check engine supports and stopper. a. Loose and/or broken supports or interference between support(s) and chassis. *Retighten to specification (refer to TECHNICAL DATA) or replace.*
	2. Check drive pulley (refer to VIBRATIONS ORIGINATING FROM DRIVE PULLEY).
	3. Check carburetor synchronization. a. Throttle slide height is not the same on each carburetor and/or throttle slides opening is unsynchronized. *Adjust throttle slide heights and throttle cable.*
	4. Check for crankshaft and bearings. a. Loose crankshaft bearings or uneven crankshaft. *Retighten or replace the parts.*

ENGINE LEAK VERIFICATION FLOW CHART



FUEL AND OIL SYSTEMS

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

NOTE: For the SDI fuel system troubleshooting, also refer to appropriate ENGINE MANAGEMENT subsection.

SYMPTOM	**HIGH FUEL CONSUMPTION OR RICH MIXTURE (MODELS WITH CARBURETOR ONLY).**
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 choke adjustment. a. Fuel flows through choke circuit while engine runs. *Readjust choke.*
	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).*
	5. Check needle valve on each carburetor. a. Foreign particles prevent needle valve from closing and/or pounded seating area. *Clean or replace needle valve, then clean seating area.*

SYMPTOM	**FUEL LEAKS IN ENGINE BASE WHEN ENGINE IS STOPPED (MODELS WITH CARBURETOR ONLY).**
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 (MODELS WITH CARBURETOR ONLY).**
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. Check impulse hose. *Replace.* b. Dried diaphragm. *Replace.*
	5. Check if carburetor(s) is (are) clean. a. Varnish. *Clean.*

SYMPTOM	**HIGH INJECTION OIL CONSUMPTION (SDI AND CARBURETOR MODELS ONLY).**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check oil injection pump adjustment. a. Oil injection pump adjusted too rich. *Adjust.*
	2. Check injection pump identification. a. Wrong pump. *Replace with the appropriate pump. Refer to OIL INJECTION SYSTEM.*
	3. Check injection oil lines and their fitting. a. Leaking lines and/or cover. *Replace defective part(s).*
	4. Check injection pump cover gasket. a. Broken gasket. *Replace.*
	5. Check nipple check valve. a. Check valve stuck open. *Replace.*
	6. Check pump. a. Defective pump. *Replace pump or connecting cable.*
	7. Test pump shaft gear reservoir for leaks. a. Leaking seal(s). *Replace seal(s).*

SYMPTOM	**ENGINE LACKS FUEL (SDI MODELS ONLY).**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check fuel filter inline. a. Corrosion due to oxidation. *Replace fuel filter.*
	2. Check if lines are perforated, kinked, or if they leak at fittings. *Replace lines.*
	3. Check fuel pump pressure and flow. a. Dirt clogging fuel filter or pump. b. Wrong position of fuel pickup in the tank. c. Regulator defect. d. Pickup clogged due to dirt or contamination. *Change fuel pickup or replace them.* *Change regulator.* *Perform bleed procedure..*

SYMPTOM	**DPM SEEMS TO BE DEFECTIVE (MODELS WITH CARBURETOR ONLY).**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check electrical connections. a. Corroded terminals. *Clean or replace.*
	2. Fuel mixture is too rich or too poor. a. Possible damage to DPM. *If DPM does not operate properly, unplug compensation solenoid connector while engine is running. The carburetion is now identical to that of carburetors without a DPM, provided that all pipe fittings are tight and that solenoid is in good condition, (it must not be half-open). If problem is resolved with this procedure, DPM is faulty.*
	3. Check for DPM manifold leaking. a. DPM manifold is leaking. *Repair or replace.*

TRANSMISSION AND BRAKE SYSTEM

The following chart is provided to help diagnose 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 FROM A STANDING START.**
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 less than specified in DRIVE BELT.*
	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 height according to specifications (refer to PULLEY DISTANCE AND ALIGNMENT and DRIVE BELT).*
	3. Check if driven pulley sliding half slides freely. 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).*
	5. Refer to VIBRATIONS ORIGINATING FROM DRIVE PULLEY and 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 FROM A STANDING START.
	2. Check driven pulley spring tension. a. Spring tension is too stiff. *Adjust according to specifications (refer to TECHNICAL DATA).*
	3. Check position of the calibration screws. (TRA drive pulley) a. Selected numbers are too high. *Adjust according to specifications (refer to TECHNICAL DATA).*
	4. Refer to VIBRATIONS ORIGINATING FROM DRIVE PULLEY and check items listed.
	5. Check the driven pulley. a. Driven pulley does not open completely. *Clean, readjust or replace driven pulley.*
	6. Check if levers of drive pulley move freely. a. Stuck levers. *Replace lever bushings.*

SYMPTOM	**LOOSE 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 radial play of driven pulley. a. Worn splines. *Replace pulley.*

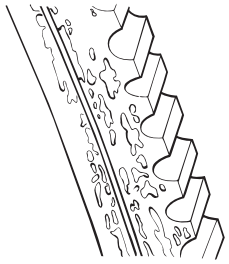
SYMPTOM	**VIBRATIONS ORIGINATING FROM DRIVE PULLEY.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check drive belt. a. Belt width is uneven on several places. *Replace.*
	2. Check tightening torque of drive pulley screw. a. Moving governor cup. *Retighten screw.*
	3. Spring cover screws. a. Spring cover moves and restrains sliding half movement. *Retighten screws.*
	4. Check spring cover (TRA TYPE) and/or sliding half bushings. a. Excessive gap between bushings and fixed half shaft, thus restraining sliding half movements. *Replace bushing(s).*
	5. Check governor cup splines. a. Excessive radial play. *Replace governor cup.*
	6. Check lever assembly. a. Lever assembly is damaged (worn bushing, bent lever etc.). *Replace damaged part.*

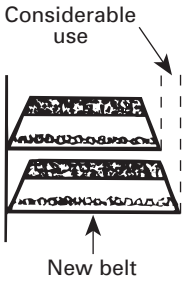
SYMPTOM	**VIBRATIONS ORIGINATING FROM DRIVEN PULLEY.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check sliding half side play. a. Sliding half bushing worn out. *Replace sliding half bushing.*
	2. Check sliding half and fixed half straightness. a. Sliding half/fixed half warped. *Replace.*
	3. Check cam slider shoes. a. One or two slider shoes out of three are broken. *Replace.*

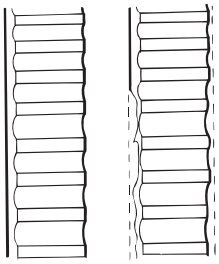
SYMPTOM	**PULLEYS DO NOT DOWN SHIFT PROPERLY.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check driven pulley spring tension. a. Spring tension is too low. *Adjust according to specifications (refer to TECHNICAL DATA) or replace spring.*
	2. Refer to VIBRATIONS COMING FROM DRIVEN PULLEY and check items listed.
	3. Check drive pulley bushings (cleanliness, wear, etc.). a. Bushings stick to fixed half pulley shaft. *Clean or replace.*

SYMPTOM	**IN REVERSE ENGINE FAILS AND DRIVEN PULLEY OPENS TOO FAST (DRIVE BELT IS LOW IN DRIVEN PULLEY).**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check pulley distance and alignment. a. Improper adjustment. *Adjust according to specifications (refer to PULLEY DISTANCE AND ALIGNMENT) and make sure that engine stopper is resting against engine.*
	2. Check for reverse sliding shoes. a. Sliding shoes are worn or missing. *Replace sliding shoes.*
	3. Check spring. a. Spring is weak or insufficient tension. *Replace spring.*

SYMPTOM	**UNEVEN BELT WEAR ON ONE SIDE.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check tightening torque of engine mount bolts. a. Loose engine mount. *Tighten 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.*

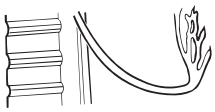
SYMPTOM	**BELT GLAZED EXCESSIVELY OR HAVING BAKED APPEARANCE.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check if drive pulley bushings are worn. a. Slipping due to insufficient pressure on belt sides. *Replace bushing.*
	2. Check condition of drive pulley fixed half shaft. a. Slipping due to rusted drive or driven pulley shafts. *Clean shaft with fine steel wool.*
	3. Check if pulley halves are clean. a. Slipping due to oily pulley surfaces. *Clean pulley halves.*
	4. Check pulley calibration. a. Slipping due to improper pulley calibration. *Calibrate according to specifications.*

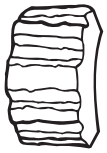
SYMPTOM	**BELT WORN EXCESSIVELY IN TOP WIDTH.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check drive pulley. a. Excessive slippage due to jamming of drive pulley. *Inspect drive pulley.*
	2. Check drive belt identification number. a. Improper belt angle (wrong type of belt). *Replace belt with an appropriate drive belt.*
	3. Check drive belt width. a. Considerable use. *Replace belt if less than specified in DRIVE BELT.*

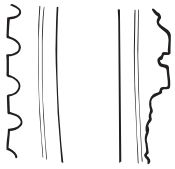
SYMPTOM	**BELT TOO NARROW ON ONE SECTION.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check for frozen track. a. Frozen track. *Free track from ice.*
	2. Check parking brake. a. Parking brake is engaged. *Release parking brake.*
	3. Check track tension/alignment. a. Track too tight. *Adjust track tension and alignment.*
	4. Check drive pulley. a. Drive pulley does not operate properly. *Repair or replace drive pulley.*
	5. Check idle speed. a. Engine idle speed is too high. *Adjust according to specifications.*
	6. Check drive belt length. a. Incorrect belt length. *Replace with an appropriate drive belt (refer to TECHNICAL DATA).*
	7. Check distance between pulleys. a. Incorrect pulley distance. *Readjust according to specifications.*
	8. Check belt height. a. Belt height is incorrect. *Adjust according to specifications.*

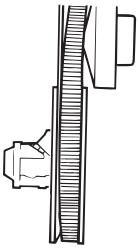
SYMPTOM	**BELT SIDES WORN CONCAVE.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check pulley half surfaces. a. Rough or scratched pulley half surfaces. *Repair or replace.*
	2. Check drive belt identification number. a. Wrong belt. *Replace with an appropriate drive belt (refer to TECHNICAL DATA).*

SYMPTOM	**BELT DISINTEGRATION.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check drive belt identification number. a. Excessive belt speed. *Wrong type of belt. Replace with proper type of belt (refer to TECHNICAL DATA).*
	2. Check if pulley halves are clean. a. Oil on pulley surfaces. *Clean pulley surfaces with fine emery cloth and wipe clean using pulley flange cleaner (P/N 413 711 809) and a cloth.*

SYMPTOM	**BELT CORD POP OUT.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check pulley alignment. a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA).*

SYMPTOM	**FATIGUE CRACKS BETWEEN COGS.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check drive belt condition. a. Belt considerably worn, worn out. *Replace.* b. Distortion of natural belt shape due to improper storage. *Store properly.*

SYMPTOM	**TOOTH CHUNK OUT.**
CONDITION	NORMAL USE
TEST/INSPECTION 	1. Check drive belt rotational direction. a. Improper belt installation. *Replace.*
	2. Check if drive belt rubs against components. a. Belt rubs against fixed components. *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 	1. Check pulley alignment. a. Pulley misalignment. *Align pulley according to specifications (refer to TECHNICAL DATA).*
	2. Check drive belt identification number. a. Wrong type of belt. *Replace with an appropriate drive belt.*

BRAKE SYSTEM

HYDRAULIC BRAKE

SYMPTOM	**SPONGY BRAKE CONDITION.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Contaminated brake fluid. *Replace brake fluid and bleed system. If the problem persists, replace master cylinder.*

SYMPTOM	**BRAKE FLUID LEAKAGE.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check for loosen hose connectors. *Replace copper washers and retighten.*
	2. Check for damaged hose, master cylinder and caliper. *Replace part(s) and check for proper mounting.*

SYMPTOM	**BRAKE SYSTEM IS NOISY.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check brake pad thickness. a. Pads are worn out. *Replace.*
	2. Check key/keyway. a. Key/keyway is worn out. *Replace parts.*

ELECTRICAL SYSTEM

The following chart is provided to help diagnose 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 MPEM on liquid-cooled models. a. Open circuit. *Repair.*
	4. Check continuity between MPEM and solenoid switch. a. Open circuit. *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. Low battery. *Recharge battery and check recharge system and wires.*
	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 brushes. a. Poor contact of brushes. *Replace brushes.*
	6. Check commutator. a. Burnt commutator. *Machine commutator on a lathe. Respect outer diameter wear limit. Refer to ELECTRIC STARTER.*

SYMPTOM	**STARTER TURNS BUT DOES NOT CRANK THE ENGINE.**
CONDITION	NORMAL USE
TEST/INSPECTION	7. Check engine. a. Engine seized. *Overhaul the engine.*
	8. Check height of commutator mica. a. Commutator mica too high. *Undercut mica.*
	9. Check field coil resistance. a. Shorted field coil. *Repair or replace yoke.*
	10. Check armature resistance. a. Shorted armature. *Repair or replace armature.*
	11. Check tension of brush springs. a. Weak brush spring tension. *Replace springs.*
	12. Check yoke assembly magnets. a. Weak magnets. *Replace yoke assembly.*
	13. 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 brackets. a. Worn or broken brackets. *Replace brackets.*
	4. Check movement of clutch on splines. a. Poor movement of clutch on splines. *Clean and correct.*
	5. Check clutch bushing. a. Worn clutch bushing. *Replace clutch.*
	6. Check starter bushings. a. Worn starter bushing(s). *Replace bushing(s).*

SYMPTOM	**STARTER TURNS, BUT OVERRUNNING CLUTCH PINION DOES NOT MESH WITH RING GEAR.**
CONDITION	NORMAL USE
TEST/INSPECTION	7. Check ring gear. a. Worn ring gear. *Replace ring gear.*
	8. Check for proper starter rotation direction. a. Starter turns in wrong direction, incorrectly installed brushes, wrong polarity or wrong starter. *Replace starter or reconnect properly.*

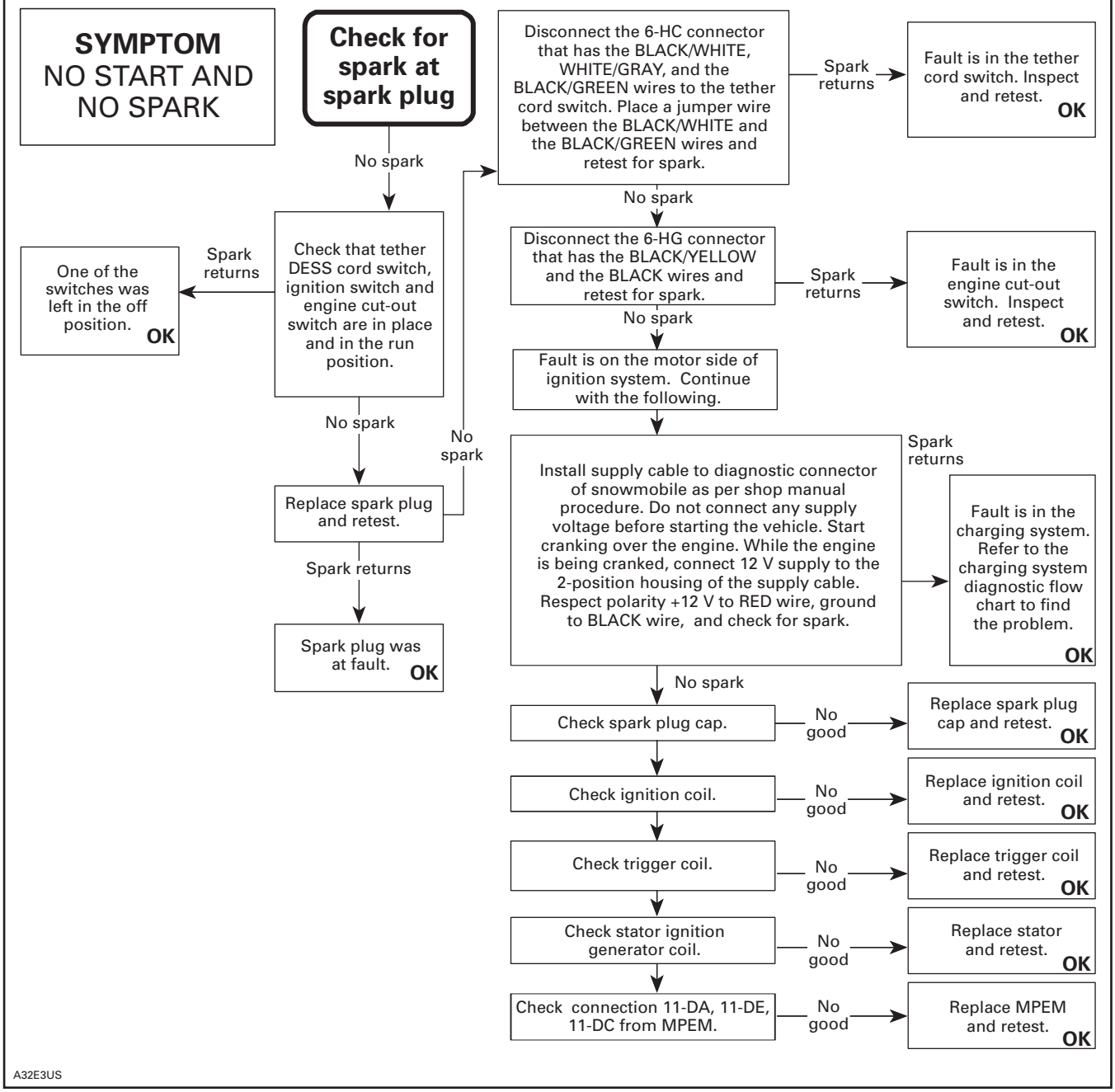
SYMPTOM	**ELECTRIC STARTER KEEPS TURNING WHEN ENGINE IS STARTED.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check clutch. a. Jammed clutch pinion gear. *Replace or clean.*
	2. Check movement of clutch on splines. a. Clutch is stuck on splines. *Clean.*
	3. Check starter brackets. a. Broken bracket(s). *Replace bracket(s).*
	4. Check starter relay. a. Shorted starter relay winding(s). *Replace starter relay.*
	5. Check starter relay contacts. a. Melted starter relay contacts. *Replace starter relay.*
	6. Check starter relay. a. Starter relay returns poorly. *Replace starter relay.*
	7. Check start switch contacts. a. Contacts shorted. *Replace start switch.*

SYMPTOM	**NOISE OCCURENCE WHEN STARTING ENGINE.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check if ring gear is well-mounted to drive pulley fixed half. a. Loose and/or broken bolts. *Retighten bolts using thread locker or replace ring gear and drive pulley fixed half.*

SYMPTOM	**ELECTRIC STARTER SOMETIMES DOES NOT WORK WHEN ACTIVATED.**
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 or burnt fuse. *Clean or replace.*
	3. Check wiring harness connections. a. Oxidized connections. *Clean or replace defective terminals.*
	4. Check START/RER switch. a. Defective contacts in START/RER switch. *Replace.* b. Moisture in START/RER switch. *Blow dry START/RER switch.*
	5. Check solenoid of electric starter. a. Shorted solenoid wiring harness or corroded contact washer. *Replace.*

IGNITION SYSTEM DIAGNOSTIC FLOW CHART

360 W - 2 CYLINDER



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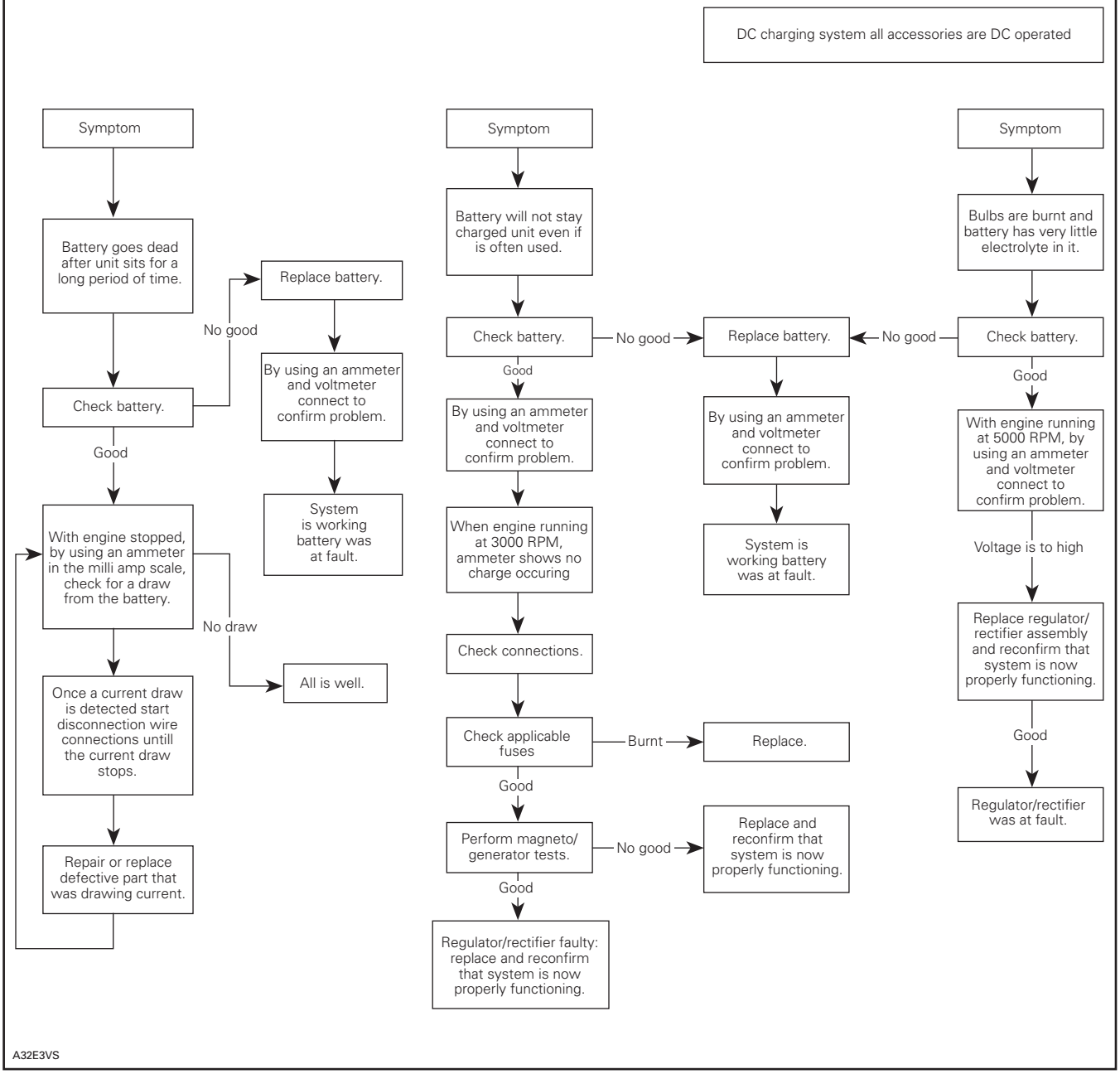
CHARGING SYSTEM DIAGNOSTIC FLOW CHART

360 W - 2 CYLINDER



SYMPTOM	**THE MPEM DOES NOT WORK.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check that high tension coil wires do not touch any metal parts. a. Short circuit. *Isolate and reroute wires.*

SYMPTOM	**ENGINE STALLS.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Refer to IGNITION SYSTEM DIAGNOSTIC FLOW CHART.

SYMPTOM	**ENGINE IS MISFIRING — ERRATIC SPARK AT SPARK PLUG.**
CONDITION	RIDING ON WET SNOW.
TEST/INSPECTION	1. Check if spark plug wires and/or spark plug cap seals are sealing out moisture. a. Defective wires and/or seals. *Replace defective part.*
	2. Check 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(s) and/or cable(s)/cap(s). 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. Check spark plugs. 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). Engine related problem. *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. a. Carburetion is too rich. *Adjust according to specifications (refer to TECHNICAL DATA).*
	2. Check injection oil consumption. a. Injection pump flow is too high. *Adjust according to specifications or replace.*
	3. Check oil quality. a. Poor quality oil (creation of deposits). *Use Bombardier injection oil.*
	4. Check engine compression. a. Leaking piston ring(s). *Replace.*

SYMPTOM	**SPARK PLUG TIP IS LIGHT GRAY.**
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).*
	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.*
	6. Check if primary compression leaks. a. Primary compression leaks. *Perform leak down test and repair as necessary.*

SYMPTOM	**RER (ROTAX ELECTRONIC REVERSE) DOES NOT WORK.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check idle speed. a. Wrong idle speed. *Adjust according to specification (refer to TECHNICAL DATA).*
	2. Check spark plug. a. Faulty spark plug. *Replace.*
	3. Check engine compression. a. Too low engine compression; engine stalls when pushing RER button. *Rebuilt the engine.*
	4. Check drive belt height. a. Wrong belt height. *Adjust according to specification (refer to DRIVE BELT).*
	5. Check carburetor synchronization and air screw adjustment. a. Wrong adjustment. *Adjust according to specification (refer to TECHNICAL DATA) and read carburetor subsection.*
	6. Check switch electrical connections. a. Bad electrical connections or damaged wires. *Clean or replace.*
	7. Check MPEM. a. Faulty MPEM. *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 Vdc. 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 Vdc. 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. Check if 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.*
	5. Hot Grips brand: Verify if they were connected in parallel by mistake. a. Excessive electrical load to magneto/generator. *Reconnect as recommended by manufacturer.*
	6. 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.*
	7. Check if heating grips installation overloads the magneto 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 sender unit for free movement and/or correct arm position. a. Defective or damaged part. *Correct or replace sender unit.*
	2. 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	**NO ELECTRICAL ACCESSORIES WORK WHEN ENGINE IS ON IDLE.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check idle speed. a. Too low idle speed. *Readjust to specifications.*
	2. Verify regulator. a. Faulty regulator. *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. *Replace brake switch.*
	3. Check wiring harness. a. Shorted wiring harness. *Replace or repair wiring harness.*

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 continuity of wires. a. Corroded terminals and/or broken wires. *Replace terminal(s) or crimp defective wires.*
	2. Check tachometer part number. a. Models with 360 W magneto have a different tachometer. *Replace with appropriate one.*

SUSPENSION AND TRACK

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

SYMPTOM	**SUSPENSION IS TOO LOW.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check condition of springs. a. Springs are weakened or broken. *Replace springs.*
	2. Check springs preload. a. Low spring preload. *Increase preload to the recommended position.*
	3. Check springs. a. Installed springs are too soft. *Install optional stiffer springs, refer to service bulletin SPRING REFERENCE ACCORDING TO LOAD.*

SYMPTOM	**REAR SUSPENSION BOTTOMS OUT.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check condition of springs. a. Springs are weakened or broken. *Replace springs.*
	2. Check springs preload. a. Low spring preload. *Increase preload to the recommended position.*
	3. Check springs. a. Springs installed are too soft. *Install optional stiffer springs, refer to service bulletin SPRING REFERENCE ACCORDING TO LOAD.*
	4. Check the rear shock motion ratio position. a. It is adjusted in soft position. *Adjust rear shock motion ratio to firm position.*
	5. Check condition of the rear shock absorber. a. Damaged rear shock absorber. *Replace rear shock absorber.*

SYMPTOM	**REAR SUSPENSION IS TOO STIFF.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check rear spring preload. a. Too much preload. *Adjust to a softer position.*
	2. Check springs. a. Springs installed are too stiff. *Install optional softer springs, refer to service bulletin SPRING REFERENCE ACCORDING TO LOAD.*
	3. Check the rear shock motion ratio position. a. It is adjusted in firm position. *Adjust rear shock motion ratio to soft position.*
	4. Check track tension. a. Track is too tight. *Adjust.*
	5. Check if axles are properly lubricated. a. Improper lubrication and/or contaminated grease (sticky oil sludge). *Clean and/or lubricate.*
	6. Check condition of the rear shock absorber. a. Damaged rear shock absorber. *Replace rear shock absorber.*

SYMPTOM	**WHEN HANDLEBAR IS TURNED, SNOWMOBILE UNDERSTEERS.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check ski runner condition. a. Worn ski runners. *Replace.*
	2. Check ski spring preload. 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 preload. a. Insufficient ski pressure on the ground. *Loosen spring tension.*

SYMPTOM	**HANDLEBAR IS DIFFICULT TO TURN.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check if the handlebar turns freely when skis are off the ground. a. Ball joints corrosion restrains movement. *Lubricate or replace the ball joint.* b. Component need proper lubrication. *Lubricate. Refer to MAINTENANCE.* c. Bent parts *Replace parts.*
	2. Check ski spring preload. a. Too much preload. *Reduce ski spring preload.*
	3. Check position of stopper strap. a. Too much weight when stopper strap is short. *Lengthen front arm stopper strap.*
	4. Check position of front arm spring adjustment cam(s). a. When spring tension is weak, more weight is transferred to the skis. *Increase spring preload.*
	5. Check swing arm camber. a. Too much ski leg inclination. *Adjust camber to specifications.*

SYMPTOM	**THE SNOWMOBILE ZIGZAGS.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check ski runner condition. a. Worn or bent ski runners. Replace 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).*
	3. Check if bushings are too loose in steering system. a. Bushings are too loose. *Replace.*
	4. Check ski pressure. a. Too much pressure on skis. *Reduce ski spring preload and/or increase center spring preload.*
	NOTE: If all parts are in good condition and the customer still complains about an unstable snowmobile, consider the installation of optional Proactive Control System.

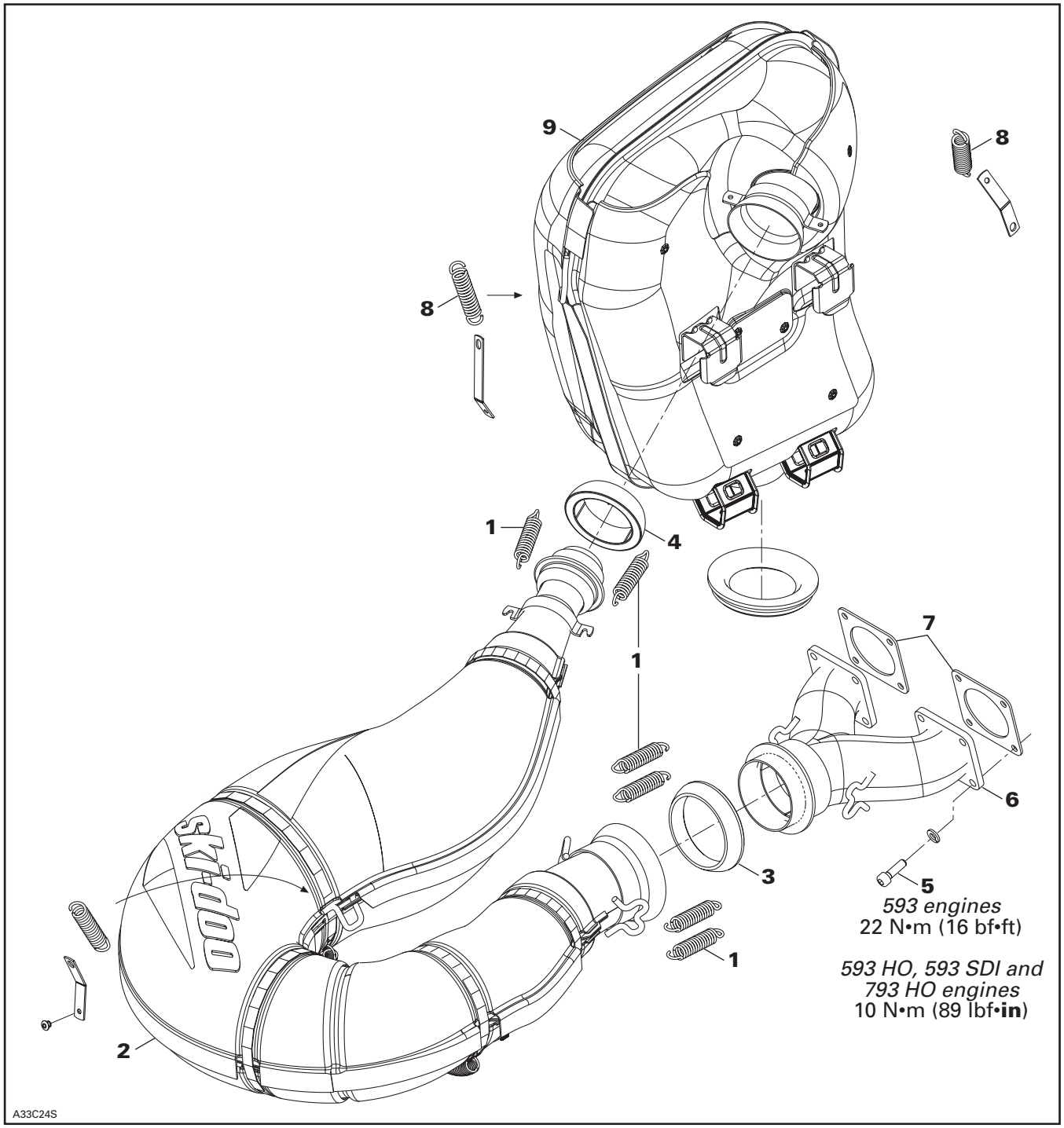
SYMPTOM	**SLIDER SHOES WEAR OUT PREMATURELY/OR TRACK CLEATS BECOME BLUE.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check track tension. a. Pressure is too great on slider shoes. *Adjust according to specifications (refer to TECHNICAL DATA). Replace defective parts.*
	2. Check idler wheel condition. a. Stuck bearing, flat spot on wheel or damaged wheel. *Replace defective parts.*
	3. Check snow conditions or lack of snow. a. Lack of lubrication of slider shoes. *Ask driver to ride in appropriate snow conditions (see Operator's Guide).*
	4. Check slider shoes and/or suspension retaining screws. a. Twisted slider shoes or loose retaining screws. *Replace defective parts and/or tighten loose screws.*

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	**NOISE OR VIBRATION COMING FROM THE TRACK.**
CONDITION	NORMAL USE
TEST/INSPECTION	1. Check slide suspension retaining bolts. a. Missing bolt(s) (some components interfere with track rotation). *Replace missing bolt(s).*
	2. Check condition of idler wheel(s). a. Idler 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 several teeth of drive shaft sprockets are broken. *Replace sprocket(s).*
	5. Check track tension. a. Track is too loose. *Adjust to recommended tension.*
	6. Check track rods and/or internal traction teeth. a. One or several track rods and/or teeth are broken. *Replace track.*

593, 593 HO, 593 HO SDI AND 793 HO ENGINE TYPES

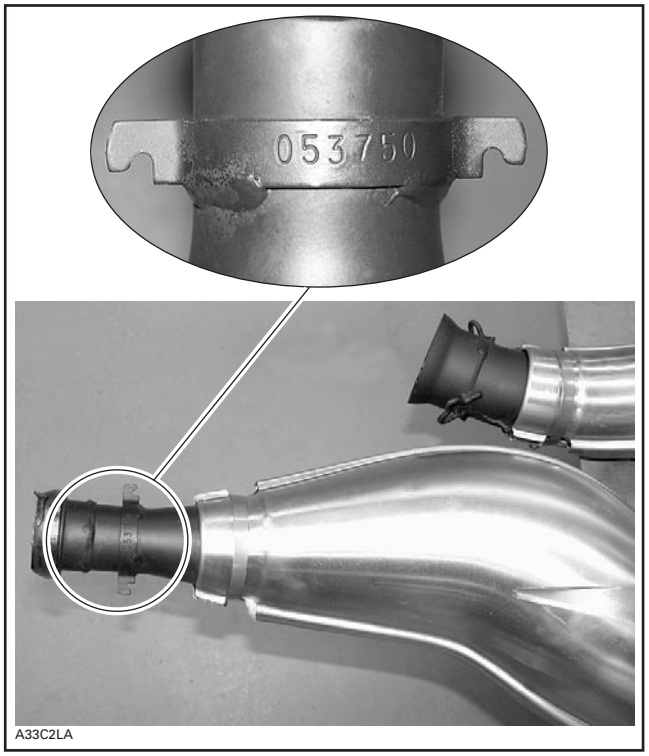
EXHAUST SYSTEM



TUNED PIPE

Identification

Each tuned pipe is identified by a number. To use the proper tuned pipe with the proper vehicle, check the number on the welded clamp at the end of tuned pipe. This number depicts the 6 last numbers of Bombardier part number.



TYPICAL

Removal

Open hood and right side panel.

Remove:

– all exhaust springs **no. 1**
– tuned pipe **no. 2**
– both exhaust gasket **no. 3** and **no. 4**.

Inspection

Check:

– tuned pipe shield for damages
– tuned pipe ends for cracks or damages.

Installation

Install doughnut shaped exhaust gasket **no. 3** with both of its notches aligned with Y-manifold protrusions.

If the gaskets are damaged, replace them.

NOTE: No RTV sealant required on doughnut shaped exhaust gaskets.

Install all exhaust springs.

MANIFOLD

Removal

Remove:

– tuned pipe **no. 2**
– doughnut shaped exhaust gasket **no. 3**
– manifold screws **no. 5**
– manifold **no. 6**
– gaskets **no. 7**.

Inspection

Check if the manifold is cracked or damaged. Replace if necessary.

Installation

Install the manifold with new gaskets.

Torque manifold screws **no. 5**.

ENGINE TYPES	TORQUE
593	22 N•m (16 lbf•ft)
593 HO, 593 SDI and 793 HO	10 N•m (89 lbf•**in**)

Install tuned pipe.

MUFFLER

Identification

Each muffler is identified by a number. To use the proper muffler with the proper vehicle, check the number on the welded clamp at the end of muffler. This number depicts the 6 last numbers of Bombardier part number.

TYPICAL

Removal

Remove tuned pipe **no. 2**.

Disconnect the EGTS (Exhaust Gas Temperature Sensor) on SDI models.

Remove springs **no. 8** retaining the muffler **no. 9**.

Remove the muffler.

Inspection

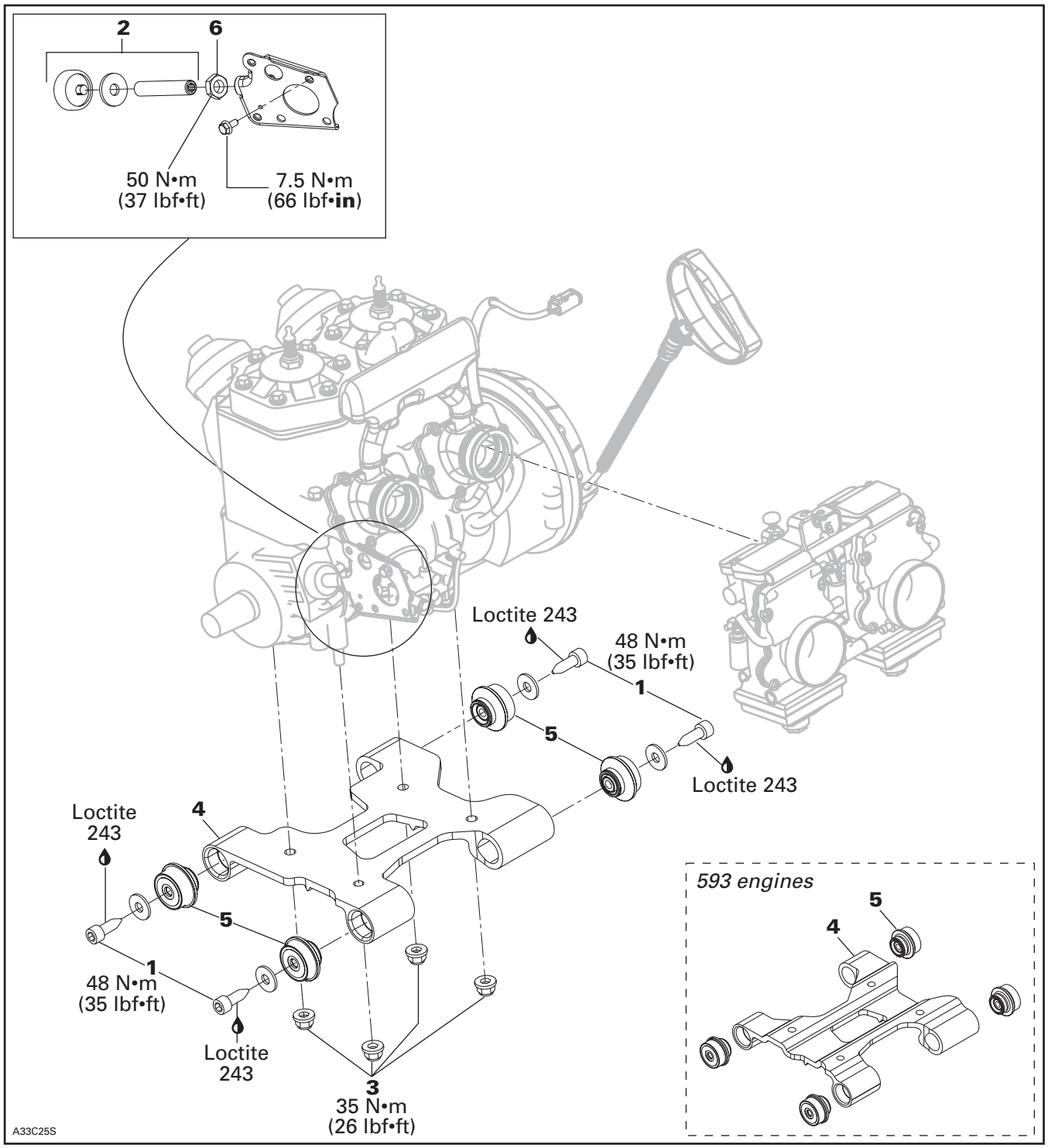
Check the muffler for cracks or other damages.

Refer to the COMPONENT INSPECTION AND ADJUSTMENT section to verify the EGTS.

Installation

For installation, reverse the removal procedure.

ENGINE SYSTEM



REMOVAL FROM VEHICLE

Vehicle and Engine Preparation

Place vehicle at workstation that will have access to an engine-lifting hoist. Then start with initial preparation of vehicle by doing the following.

Remove windshield.

Remove the RH side panel.

Disconnect BLACK (-) cable from battery, then the RED (+) cable.

⚠ WARNING

Always disconnect battery or starter cables exactly in the specified order, BLACK (-) cable first. It is recommended to disconnect electrical connections prior to disconnecting fuel lines.

On **SDI models**, release the fuel pressure of the system. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

From the Front of Vehicle

Remove tuned pipe, refer to EXHAUST SYSTEM.


A33C26A

Remove starter.

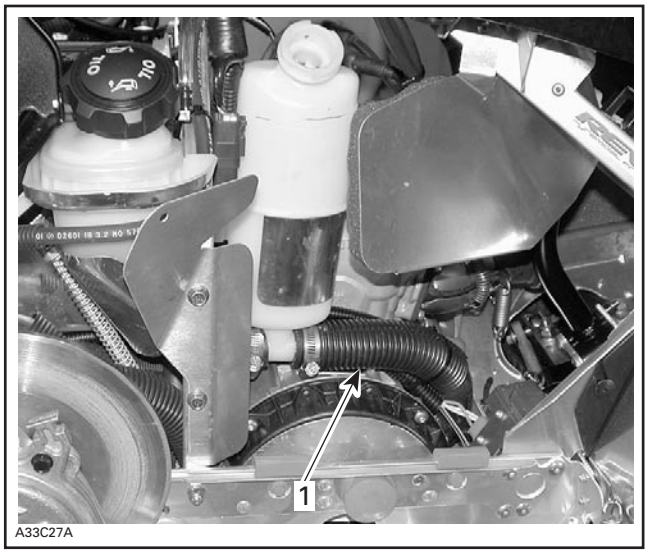
NOTE: Remove BLACK starter cable from vehicle, not from starter.

On right side of vehicle, do the following:

Remove muffler.

Drain coolant reservoir.

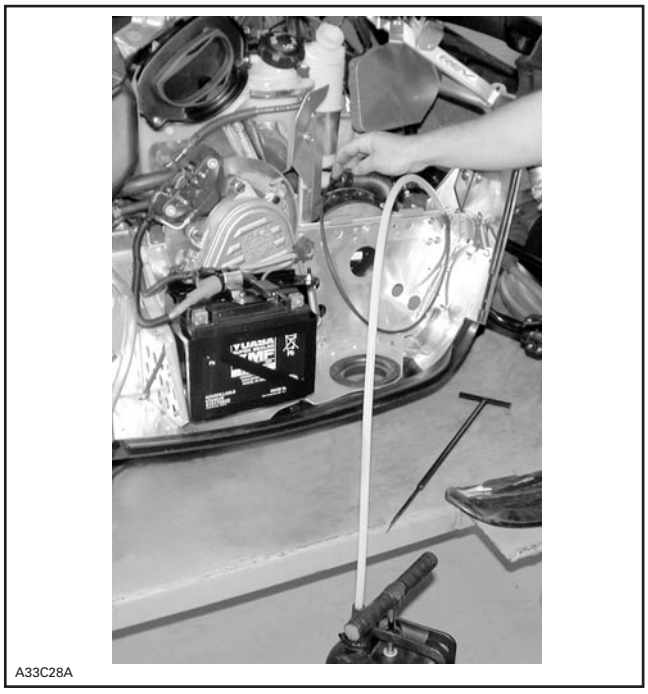
Unplug from the coolant reservoir the hose going to the engine.



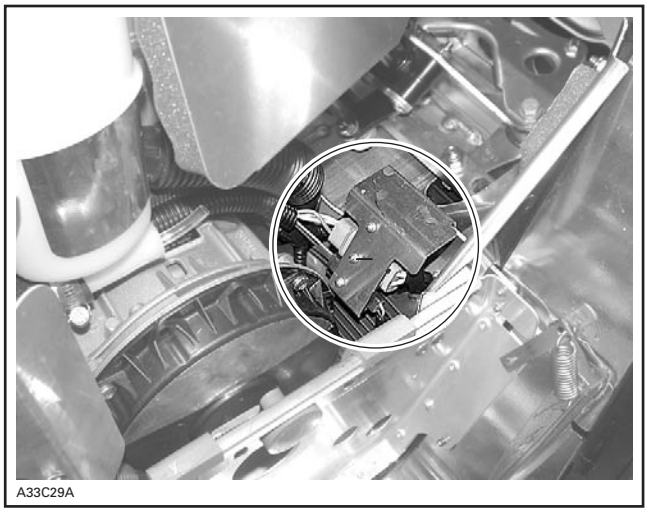
A33C27A

1. Coolant hose between reservoir and engine

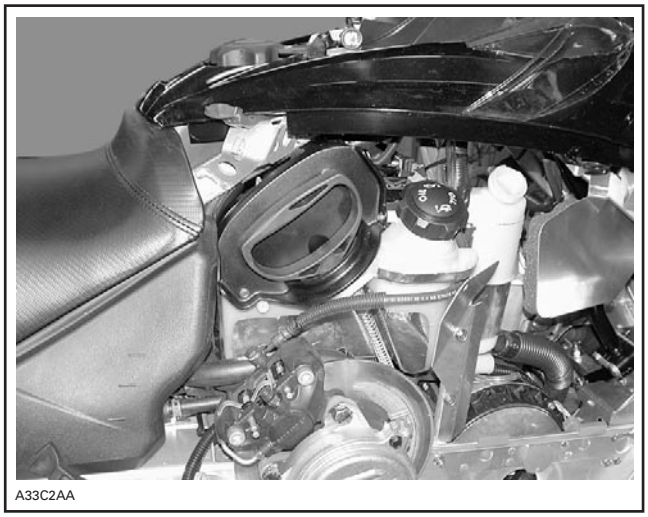
Using pump (P/N 529 035 880), drain maximum coolant from hose and engine.


A33C28A

Unplug magneto and trigger coil connectors.


A33C29A

Remove rewind starter handle.


A33C2AA

Unplug heather carburetor hose from coolant reservoir.

Unscrew oil injection reservoir then separate coolant reservoir.

On left side of vehicle, do the following:

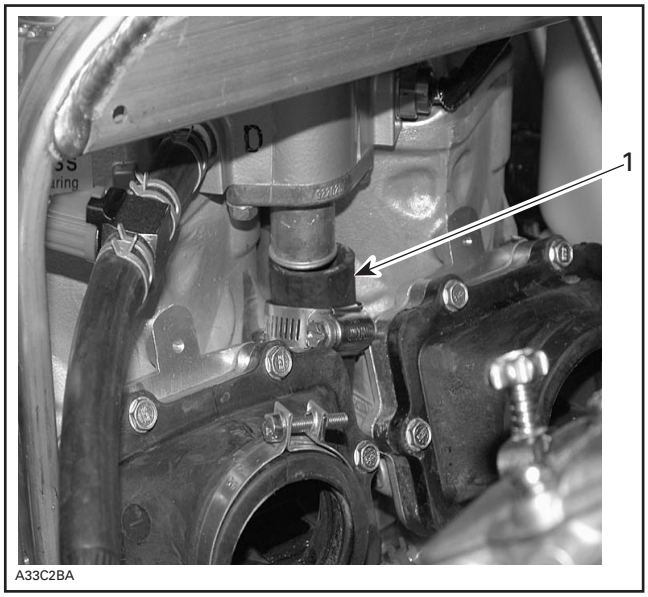
Remove:

– tool box
– belt guard
– belt drive
– drive pulley (refer to DRIVE PULLEY)
– air intake silencer (unplug ATS (Air Temperature Sensor) connector).

NOTE: On **SDI models**, unplug APS (Air Pressure Sensor) and ATS (Air Temperature Sensor) connectors.

Separate carburetors or throttle body from engine.

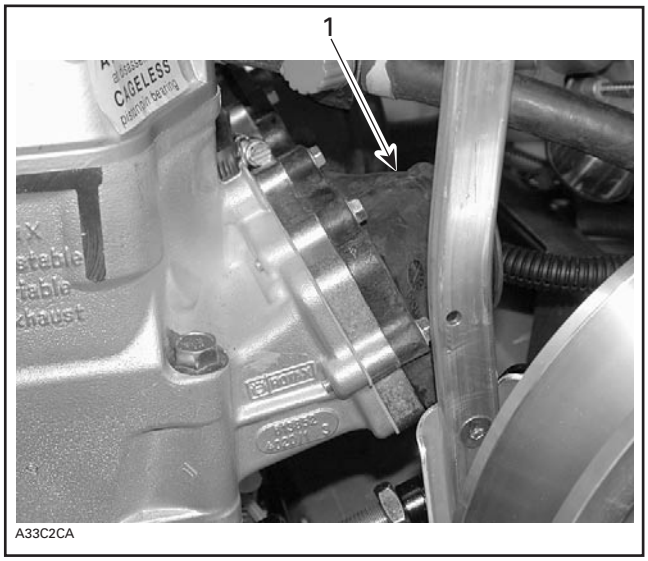
Unplug coolant hose located between cylinder head and radiator.



A33C2BA

1. Coolant hose between cylinder head and radiator

Remove reed valves with their gaskets.

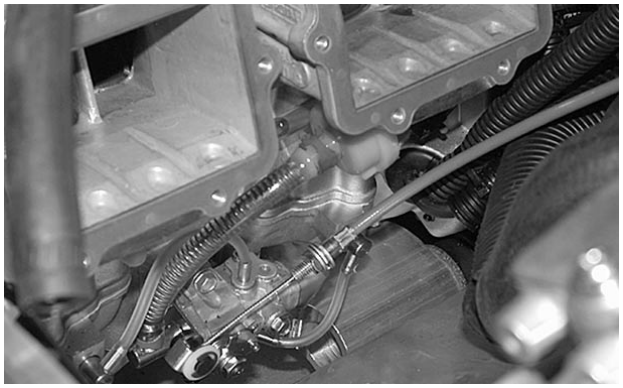


A33C2CA

TYPICAL — 793 HO ENGINE TYPE SHOWN
1. Reed valve

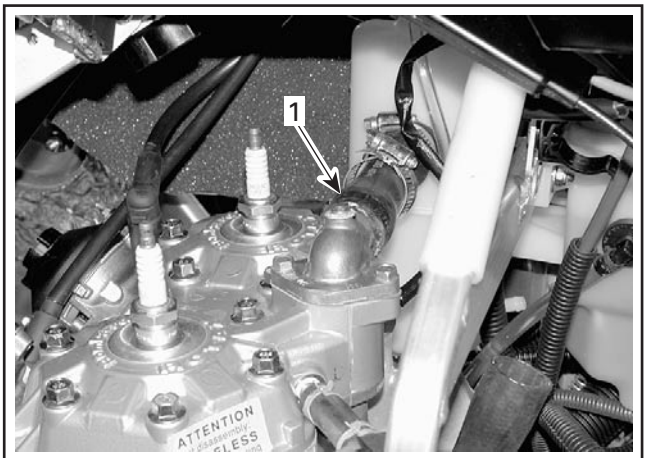
Unplug magneto connector from MPEM.

Detach oil pump cable from oil pump.


A33C2DA

Unplug spark plug cables.

Detach upper thermostat hose from thermostat housing.



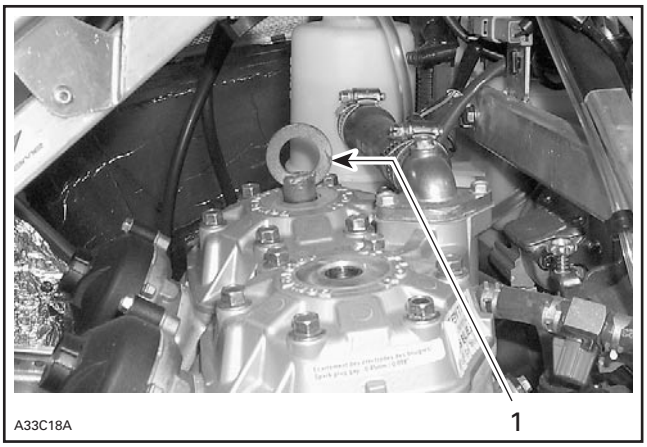
A33C2EA

1. Remove this hose

Disconnect temperature sensor connectors.


A33C2FA

Remove spark plugs and install spark plug lift ring (P/N 529 035 830) at the farthest spark plug hole.

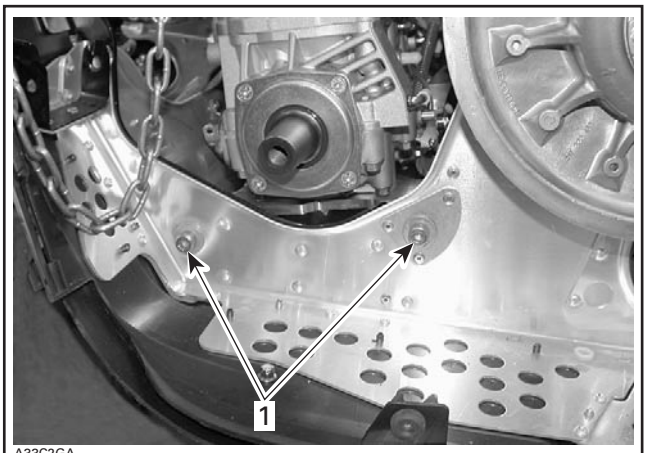


A33C18A

1. Spark plug lift ring

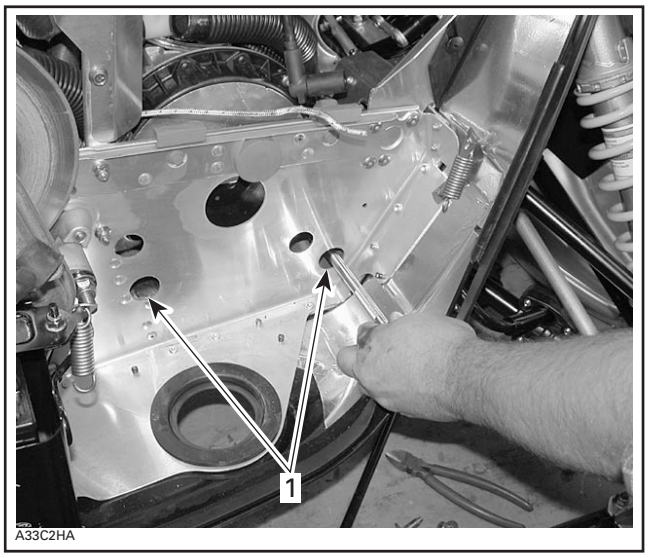
Remove RAVE valves.

Unscrew engine support bolts **no. 1**.



A33C2GA

LEFT SIDE OF VEHICLE
1. Engine support bolts



RIGHT SIDE OF VEHICLE
1. Holes to reach engine support bolts

Unscrew the engine stopper **no. 2** completely.

Lift the engine a little then unplug oil pump hoses and the crankcase vent hose.

On **SDI models**, disconnect all engine connectors (CPS, WTS, KS and injectors).

Lift and slide out engine using engine removal hook (P/N 529 035 829).

Unscrew engine support nuts **no. 3** then separate support **no. 4** from engine.

INSPECTION

Check if engine support **no. 4** is cracked, bent or otherwise damaged. Replace if necessary.

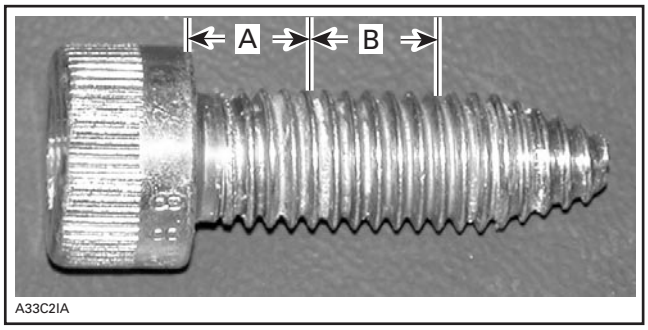
Check rubber mounts **no. 5** on engine support. Replace them if brittle, cracked or otherwise damaged.

INSTALLATION

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

Install engine support under engine then torque engine support nuts to 35 N•m (26 lbf•ft).

Before installing engine support bolts **no. 1**, apply Loctite 243 (P/N 293 800 060) as shown in the following illustration.



A. Do not apply Loctite in this area, ± 10 mm (.39 in)
B. Loctite area, ± 8 mm (.31 in)

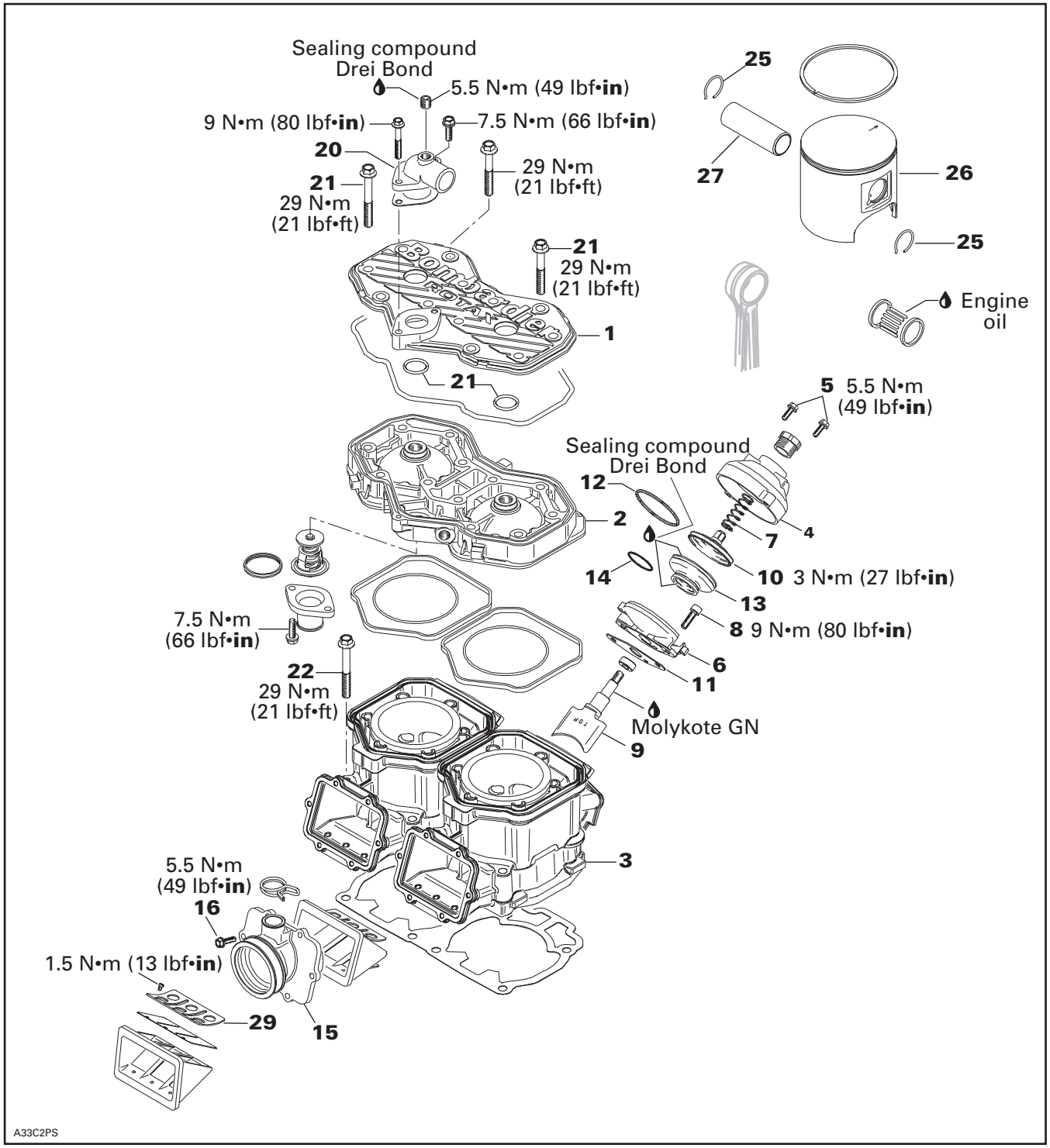
Torque engine support bolts to 48 N•m (35 lbf•ft).

Hand torque engine stopper **no. 2** then torque its nut **no. 6** to 50 N•m (37 lbf•ft).

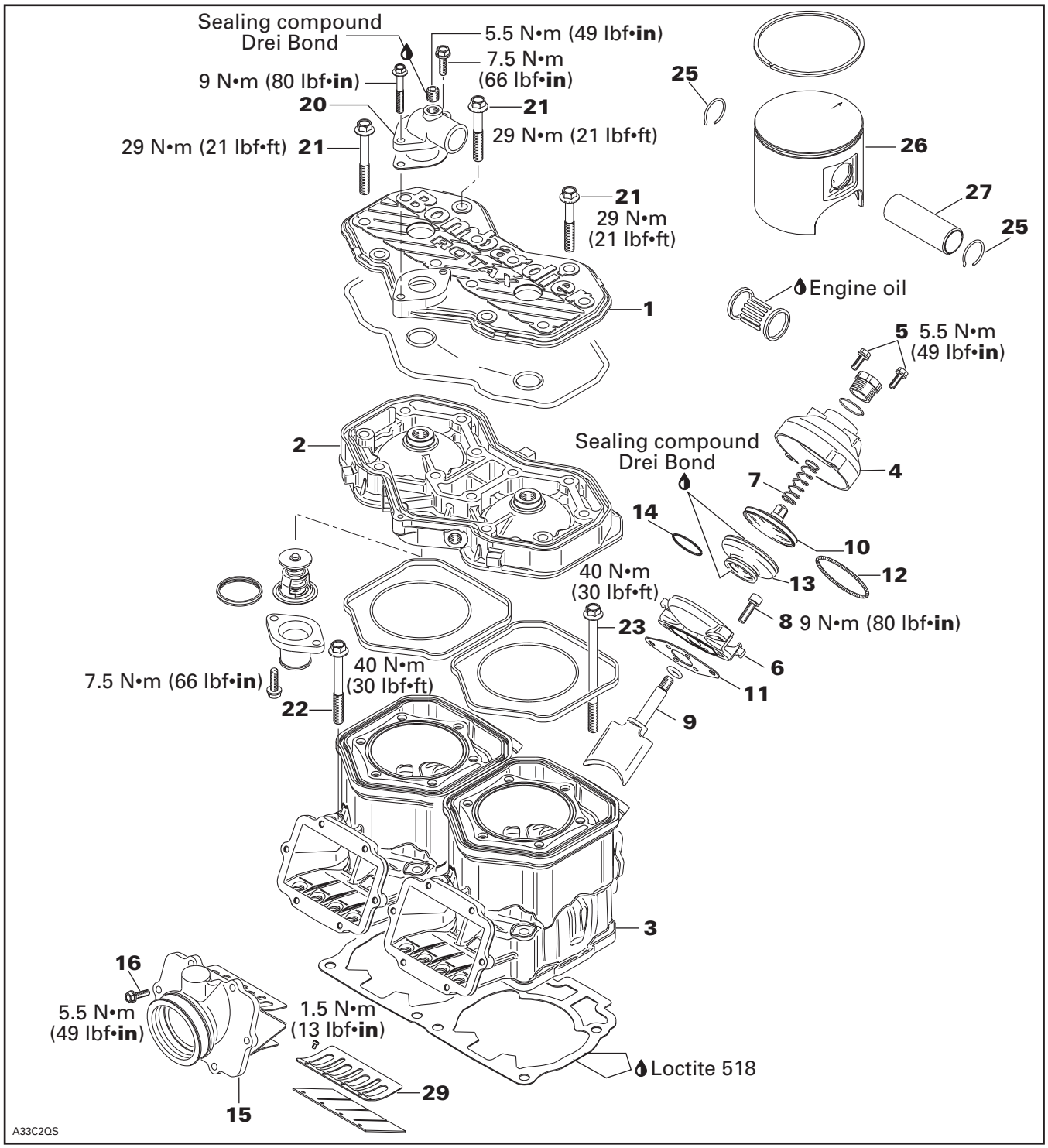
Reinstall all removed parts by using the appropriate component/system reinstallation procedures described in this shop.

TOP END

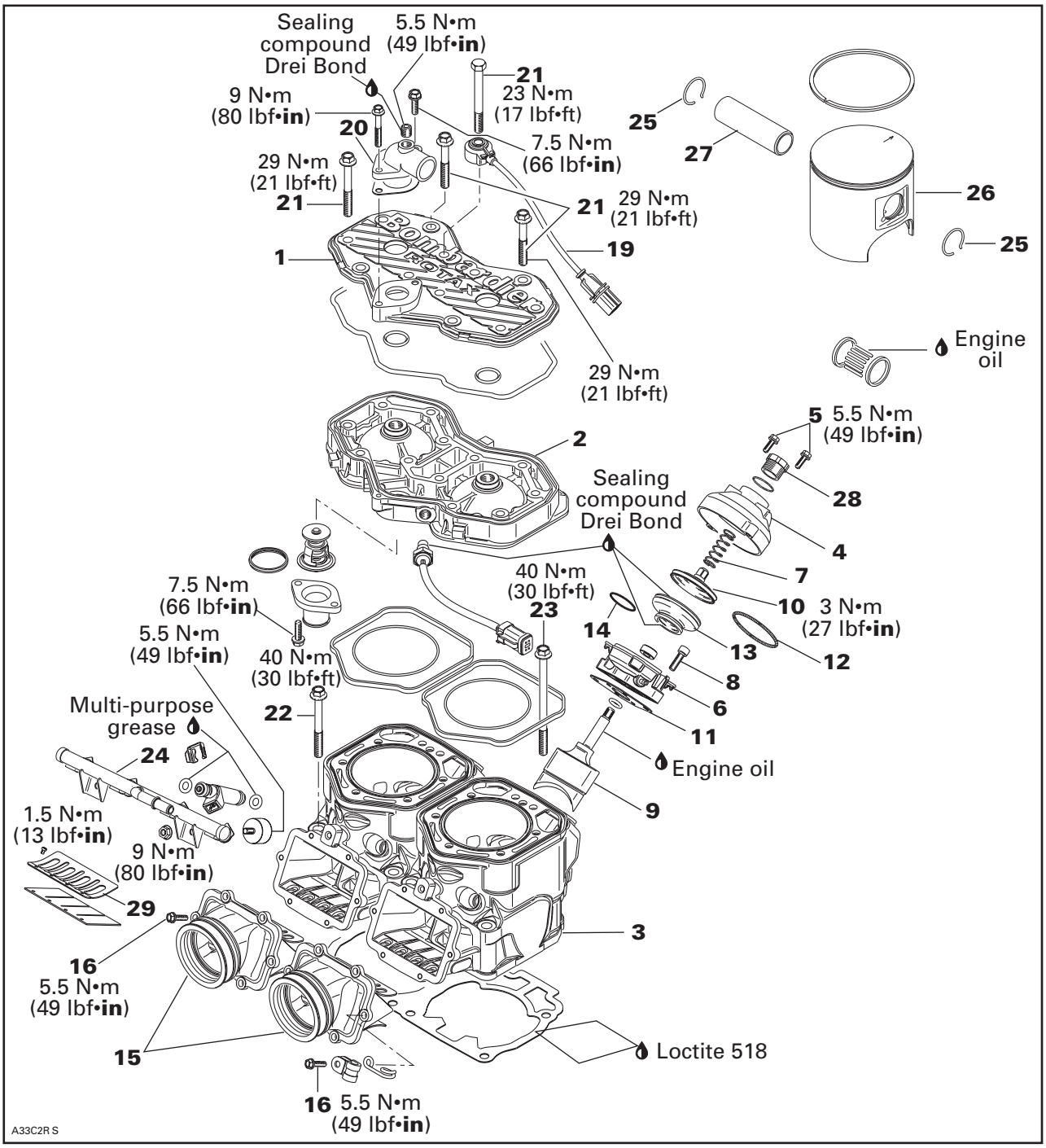
593 Engine Types



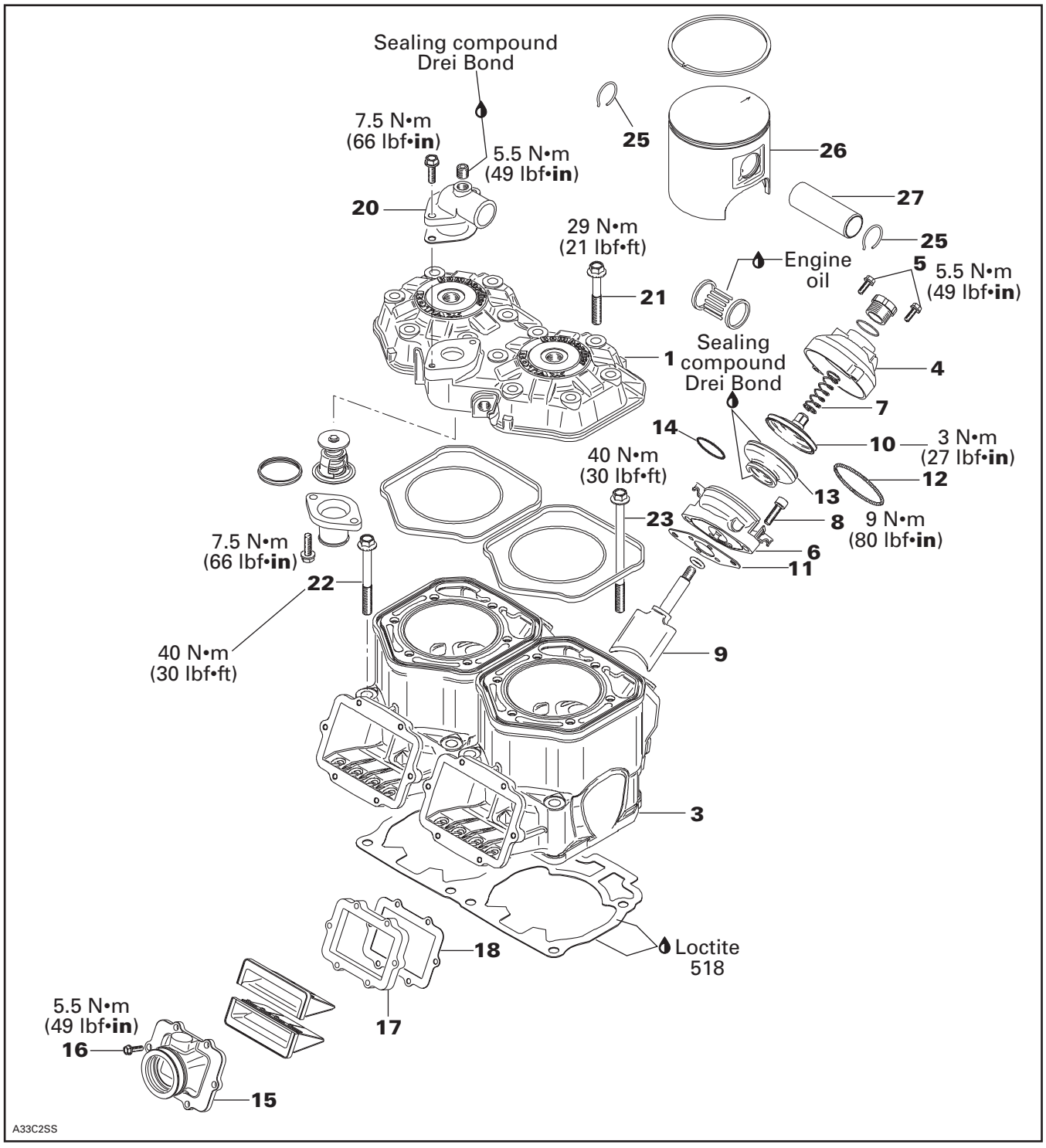
593 HO Engine Types



593 SDI Engine Types



793 HO Engine Types



TROUBLESHOOTING

Before completely disassembling the engine, check airtightness. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT.

COMPONENT REMOVAL WITH THE ENGINE INSTALLED

Most engine components can be removed with engine on vehicle such as:

- cylinder head cover **no. 1**
- cylinder head **no. 2**
- cylinder(s) **no. 3**
- piston(s)
- piston ring(s)
- rewind starter
- oil pump
- water pump
- magneto flywheel
- RAVE valve(s)
- reed valve(s).

CLEANING

Discard all gaskets and O-rings.

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

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

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

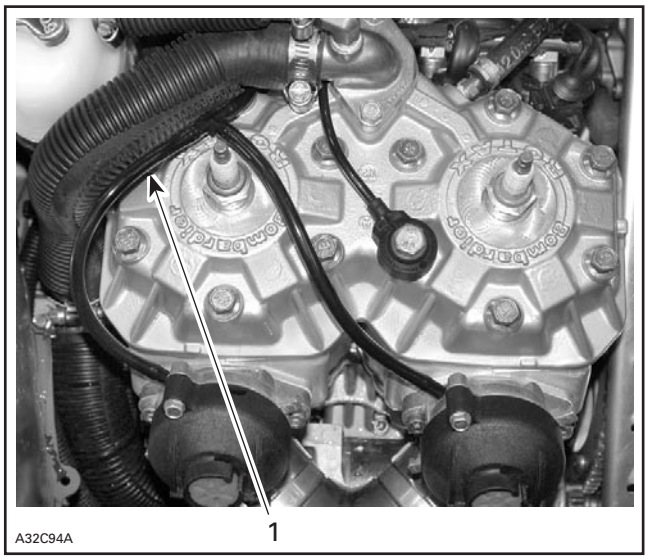
Clean the piston ring groove with a groove cleaner tool or with a piece of broken ring.

RAVE VALVE BASIC OPERATION

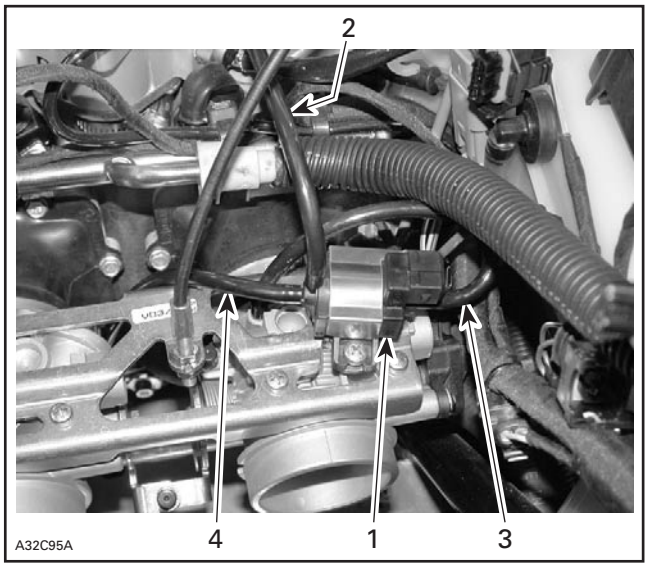
SDI Models

The RAVE valves change the height of the exhaust port. The RAVE valve solenoid, which is controlled by the ECM, allows positive crankcase pressure to inflate the bellows and open the RAVE valves.

To open the RAVE valves, the ECM activates a solenoid which directs the pressure to the valves.



1. Pressure from solenoid



1. Solenoid
2. Pressure to RAVE valves
3. Vent to throttle body
4. Pressure with check valve from crankcase

To close the RAVE valves, the ECM deactivates the solenoid. The RAVE valves are opened to the intake manifold.

Maintenance

All Models

There are no wear parts anywhere in the system and there are no adjustments to be periodically checked. The only possible maintenance required would be cleaning of carbon deposits from the guillotine slide. Cleaning intervals would depend upon the user's riding style and the quality of the oil used.

Bombardier suggests annual cleaning of the valve. If a customer uses lower quality oil, than recommended, more frequent cleaning may be required.

No special solvents or cleaners are required when cleaning the valve.

On **SDI models**, check if solenoid heating element is still functional once a year, the element should be warm after one minute of riding. At the same time, check if crankcase check valve is still functional.

NOTE: Make sure hoses are not kinked or damaged.

Boring Precaution

All Models

In its stock configuration, the RAVE valve guillotine has a minimum of 0.5 mm (.020 in) clearance to the cylinder bore measured at the center line of the cylinder. This is the minimum production clearance.

DISASSEMBLY

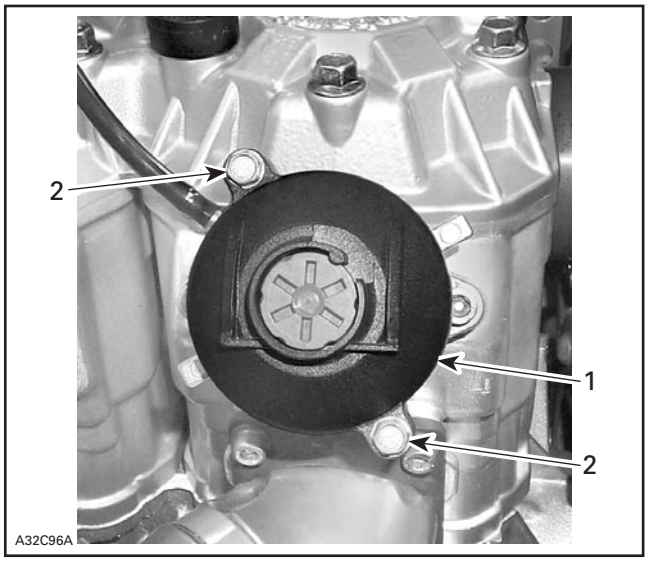
RAVE System

NOTE: RAVE stands for Rotax Adjustable Variable Exhaust.

Remove RAVE valve cover **no. 4** by removing screws **no. 5**.

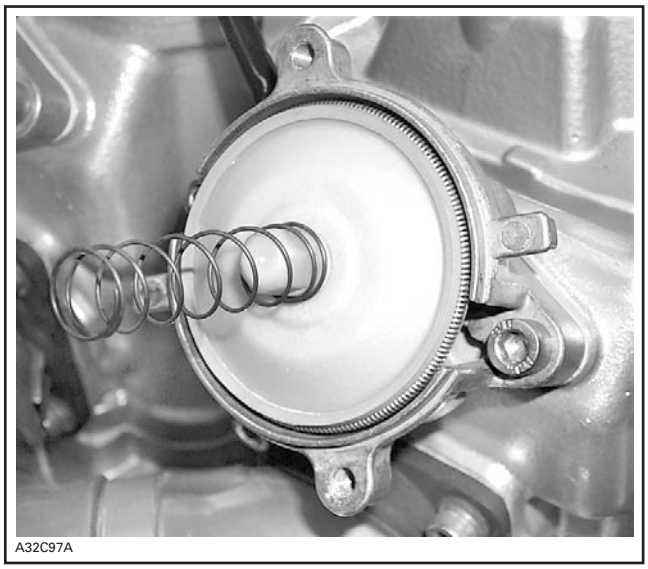
⚠ WARNING

Firmly hold cover to valve base no. 6. The compression spring no. 7 inside the valve is applying pressure against the cover.



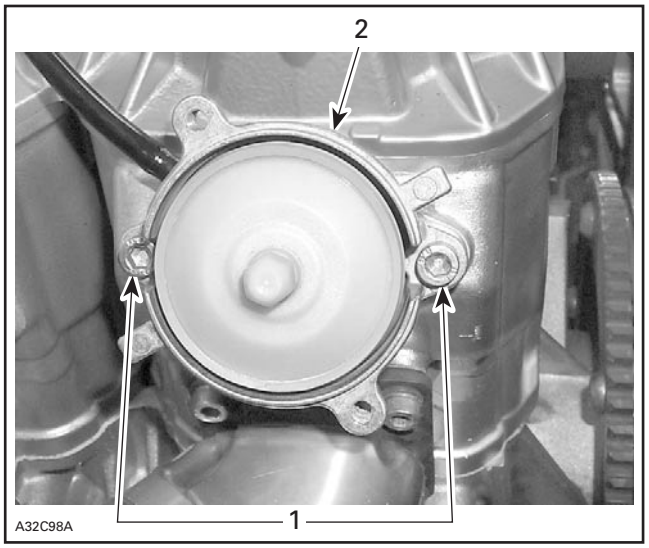
TYPICAL
1. Cover
2. Retaining screws

Remove the compression spring **no. 7**.



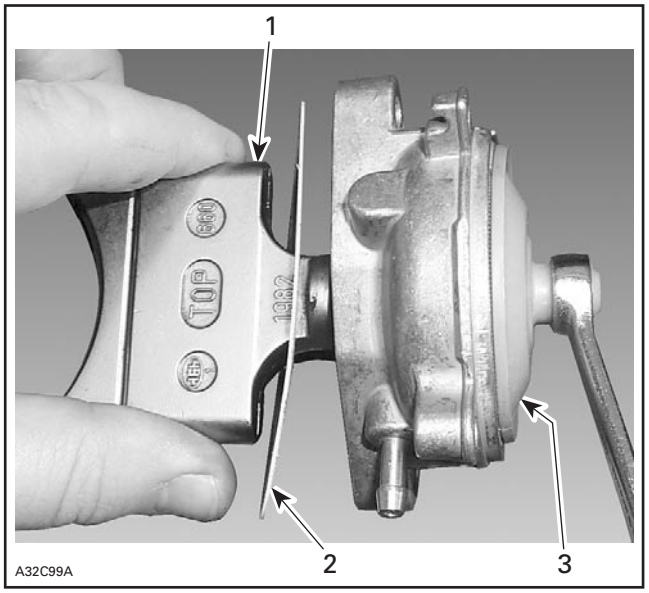
TYPICAL

Unscrew the Allen socket screw **no. 8** then remove the RAVE valve base **no. 6**.



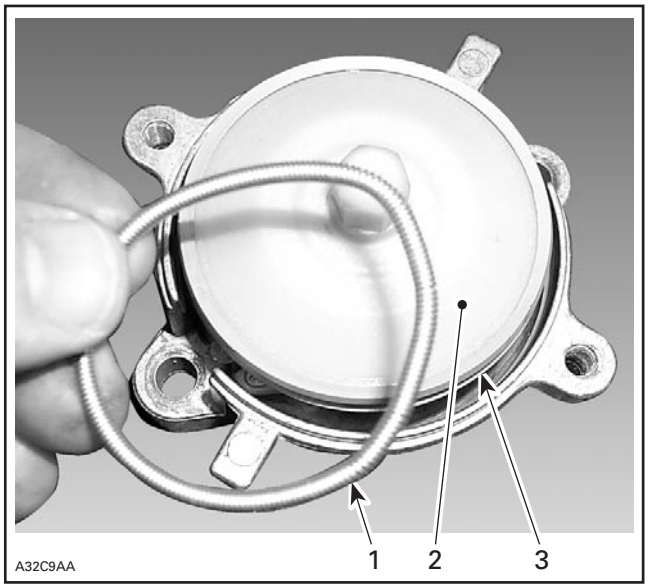
TYPICAL
1. *Allen socket screws*
2. *RAVE valve base*

Unscrew and remove the guillotine **no. 9** from the valve piston **no. 10** than remove the gasket **no. 11**.



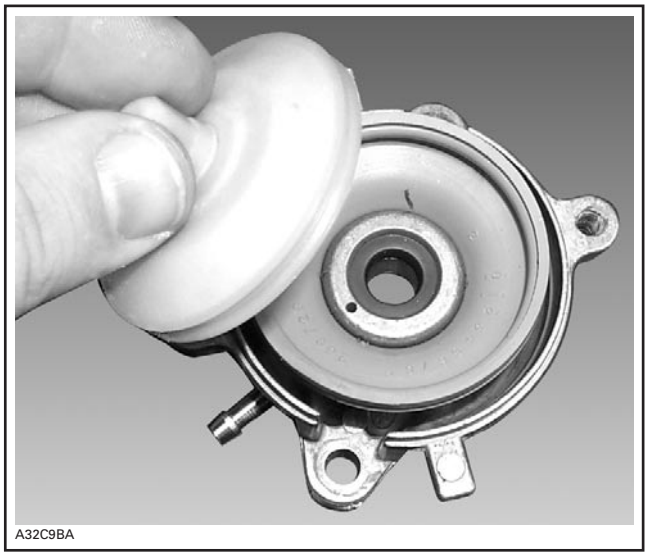
TYPICAL
1. *Guillotine*
2. *Gasket*
3. *Valve piston*

Remove spring **no. 12** retaining bellows **no. 13** to valve piston.



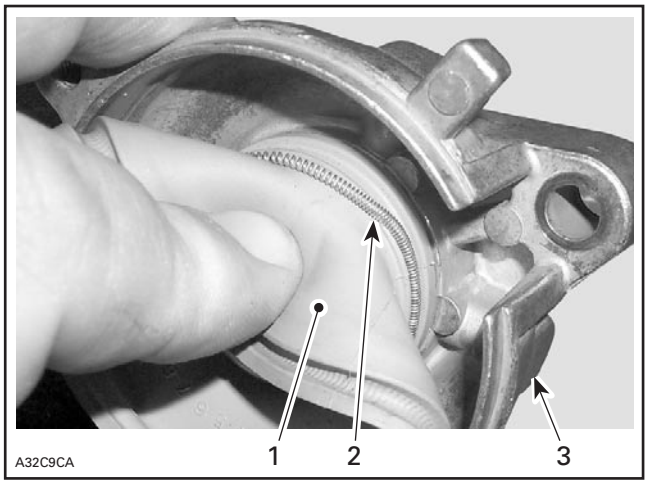
TYPICAL
1. *Spring*
2. *Valve piston*
3. *Bellows*

Remove valve piston.



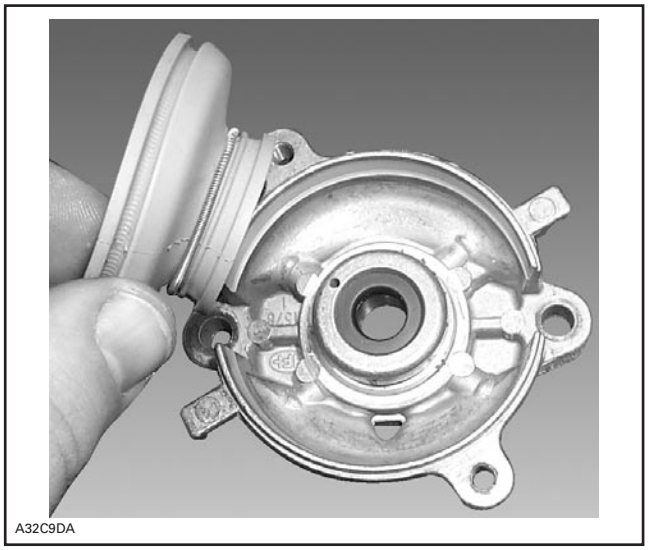
TYPICAL

Remove the small spring **no. 14** retaining bellows to valve base.



TYPICAL
1. Bellows
2. Small spring
3. Valve base

Remove bellows from valve base.



TYPICAL

REED Valve

593 Engine Types

Remove intake resonator on top of reed valves no. 15.

All Engine Types

Unscrew reed valve screws no. 16 then remove reed valve(s).

793 HO Engine Types

Remove connecting flange no. 17 and gasket no. 18.

Cylinder Head Cover

All Engine Types

Unplug spark plug cables.

SDI Engine Types

Disconnect the knock sensor no. 19.

793 HO Engine Types

Disconnect the temperature sensor connector.

All Engine Types

Unplug coolant hose from upper thermostat housing no. 20.

Unscrew all cylinder head cover screws no. 21.

Cylinder Head

All Engine Types except 793 HO

Remove the cylinder head cover no. 1.

Disconnect the temperature sensor connector.

Remove the cylinder head no. 2.

Cylinder

SDI Engine Types

Release the fuel pressure of the system. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

All Engine Types except 793 HO

Remove cylinder head no. 2.

793 HO Engine Types

Remove cylinder head cover no. 1.

SDI Engine Types

Unplug fuel injector connectors then remove the fuel rail no. 24. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

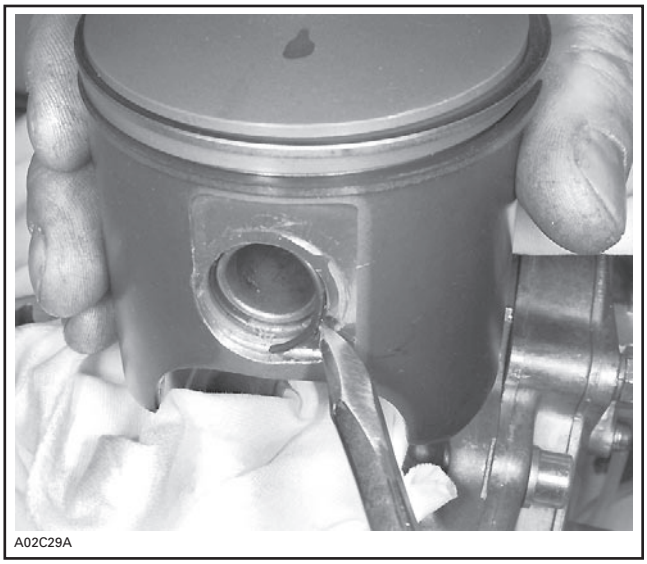
All Engine Types

Remove manifold and RAVE valves.

Unscrew cylinder screws no. 22 and no. 23 then remove the cylinder(s) no. 3.

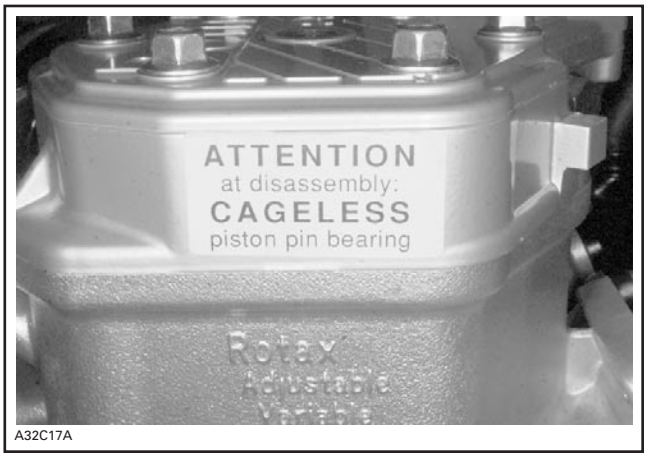
Piston

Place a clean cloth or rubber pad (P/N 529 023 400) over crankcase. Then with a pointed tool inserted in piston notch, remove both circlips no. 25 from piston no. 26.


A02C29A

TYPICAL

All engines are equipped with cageless piston pin bearings.

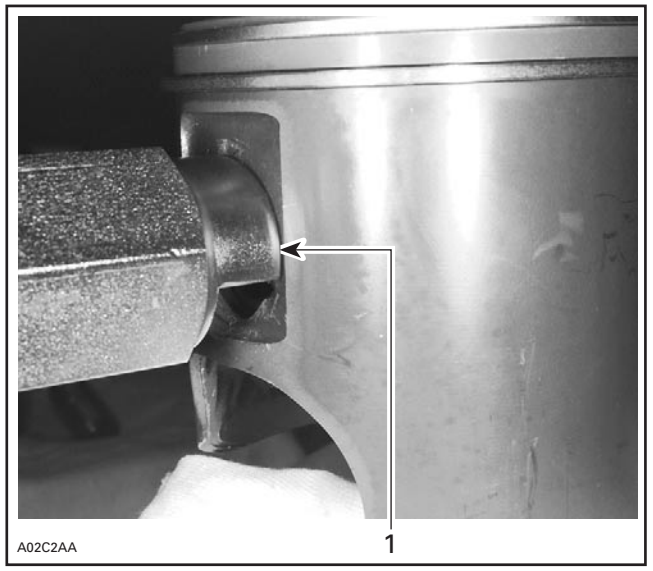


A32C17A

Use piston pin puller (P/N 529 035 503) along with 20 mm sleeve kit (P/N 529 035 542). Use also a locating sleeve.

NOTE: The locating sleeve is the same that contains new cageless bearing.

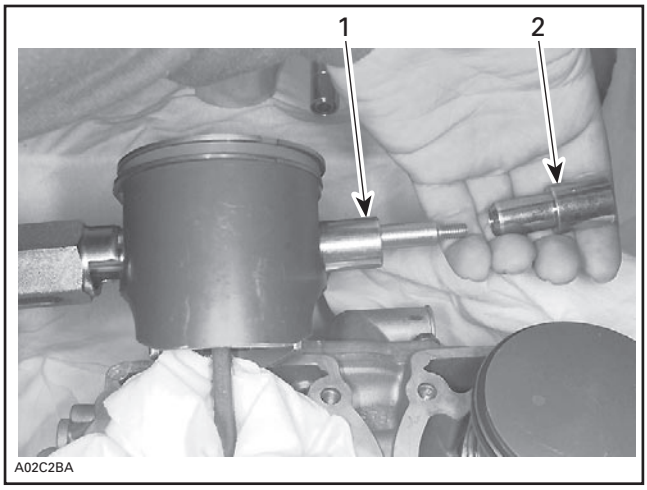
Insert piston pin puller (P/N 529 035 503) making sure it sits squarely against piston.



A02C2AA

TYPICAL
1. Properly seated all around

Install sleeve then shouldered sleeve over puller rod.

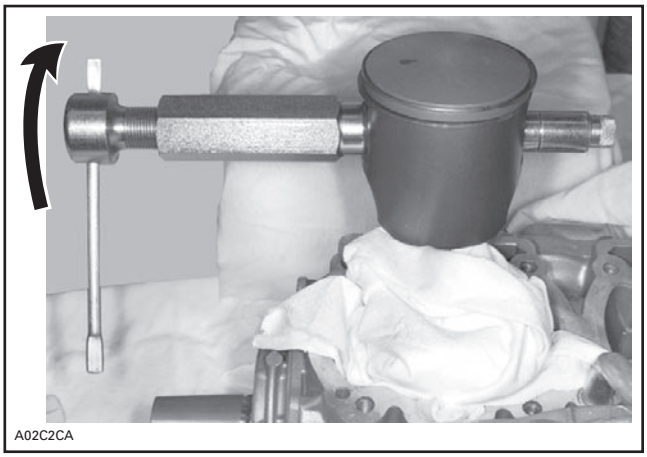


A02C2BA

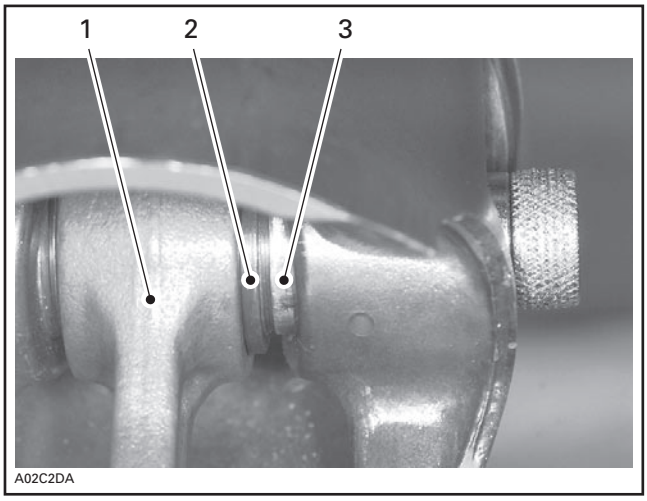
TYPICAL — INSTALLATION OF SLEEVE KIT
1. Sleeve
2. Shouldered sleeve

Screw (LH threads) extracting nut.

Pull out piston pin **no. 27** by unscrewing puller until shouldered sleeve end is flush with thrust washer of piston pin bearing.


A02C2CA

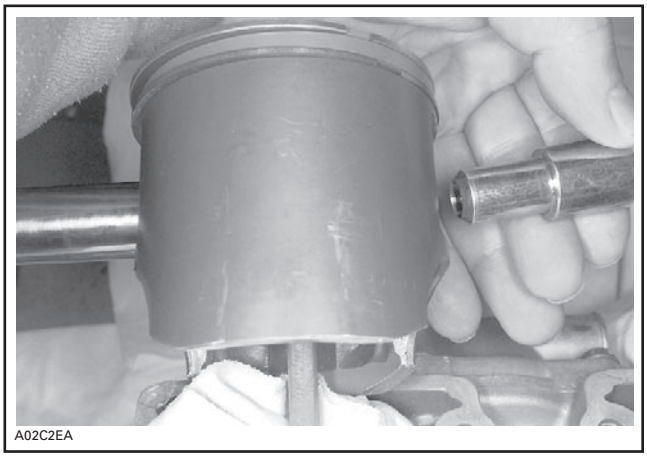
TYPICAL — PISTON PIN EXTRACTION



A02C2DA

TYPICAL
1. *Sleeve inside bearing*
2. *Thrust washer*
3. *Shouldered sleeve end*

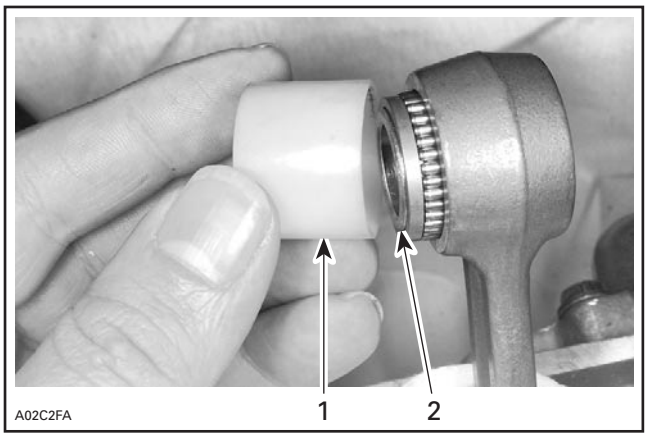
Remove puller. Pull out shouldered sleeve carefully.


A02C2EA

TYPICAL

Remove piston from connecting rod.

Install locating sleeve. Then push needle bearings along with thrust washers and sleeve.



A02C2FA

TYPICAL
1. *Locating sleeve*
2. *Sleeve*

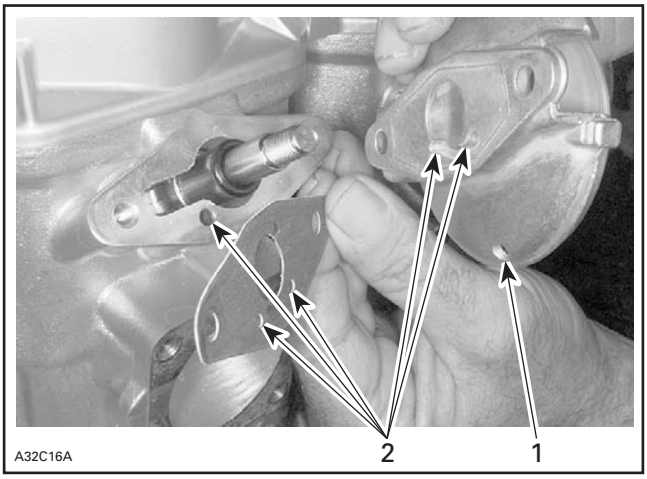
INSPECTION

Cylinder Head Cover, Cylinder Head and Cylinder

Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT.

RAVE System

Check valve rod housing and cylinder for clogged passages (**all models except SDI**).



A32C16A

1. Draining hole
2. Passages

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

Check for cracked, dried or perforated bellows **no. 13**.

Check if the compression springs **no. 7** are in specifications.

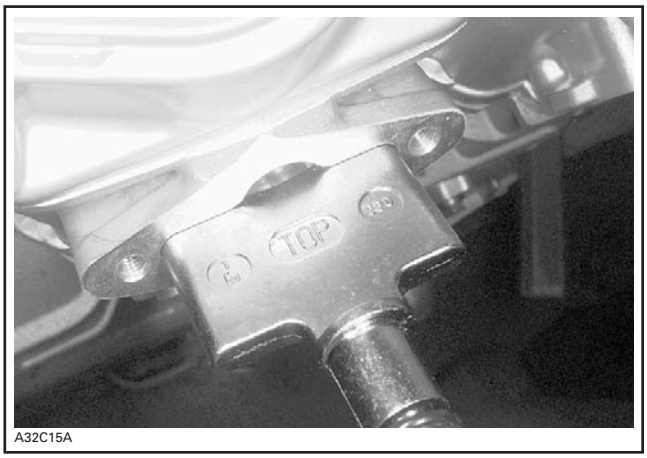
ENGINE TYPE	SPRING P/N	COLOR	WIRE DIA. mm (in)	FREE LENGTH mm (in)
593	420 239 944	Brown	0.9 (.035)	48.5 (1.91)
593 HO	420 239 944	Brown	0.9 (.035)	48.5 (1.91)
593 HO SDI	420 239 942	Black	0.8 (.031)	42.5 (1.67)
793 HO (All models except Summit)	420 239 941	Blue	0.8 (.031)	52.5 (2.07)
793 HO (All Summit)	420 239 942	Black	0.8 (.031)	42.5 (1.67)

ASSEMBLY

RAVE System

Apply sealing compound Drei Bond (P/N 420 297 906) in the groove of valve base and in the piston valve groove, then install bellows.

Install RAVE valve with its mention top as illustrated in the following photo.



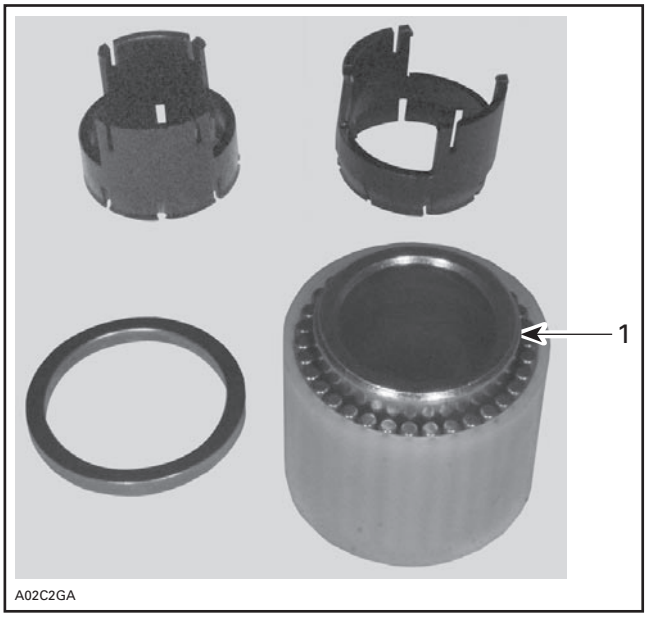
A32C15A

Tighten red cap screw **no. 28** to bottom.

Piston

When installing a new cageless bearing, replace half plastic cages with sleeve.

NOTE: 593, 593 HO, 593 SDI and 793 HO engine cageless bearings have 28 needles.



A02C2GA

TYPICAL
1. Sleeve

Lubricate needle bearings and thrust washers with injection oil then install washers on each end of needles.

Insert cageless bearing into connecting rod.


A02C2HA

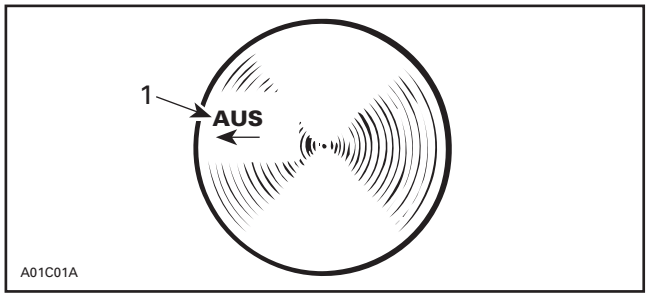
TYPICAL — CAGELESS BEARING AND SLEEVE INSTALLED

Heat piston using bearing heater (P/N 529 035 969).


A32CBHA

CAUTION: Piston temperature must not exceed 46°C (115°F). Never use direct flame to heat the piston and never freeze the pin.

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



A01C01A

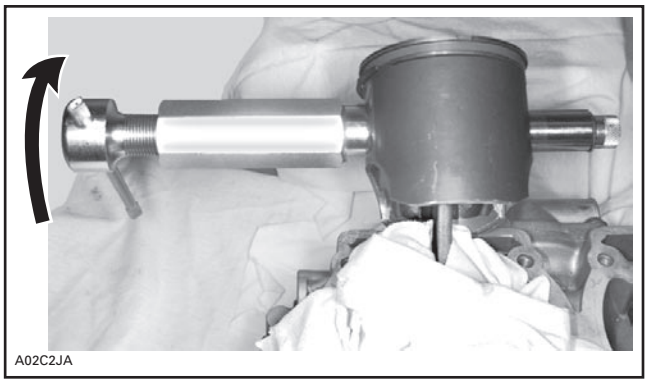
1. Exhaust

Install shouldered sleeve.


A02C2IA

TYPICAL — SHOULDERED SLEEVE INSTALLATION

Install piston pin puller and turn handle until piston pin is correctly positioned in piston.


A02C2JA

TYPICAL

All Models

CAUTION: Always install new circlips.

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

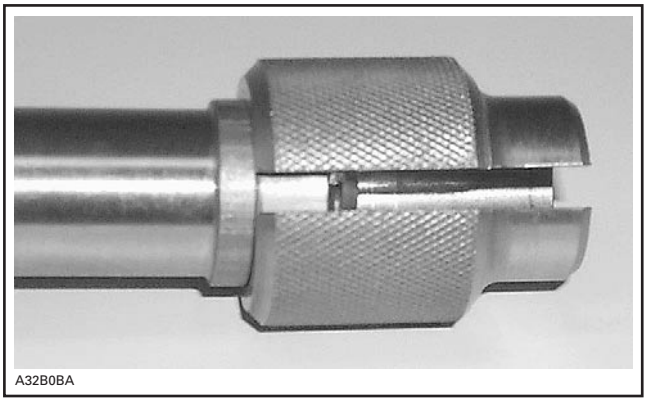
ENGINE TYPE	PISTON CIRCLIP INSTALLER (P/N)
All	529 035 686

Use circlip installer (P/N 529 035 686) to install new mono-hook circlips **no. 25**.

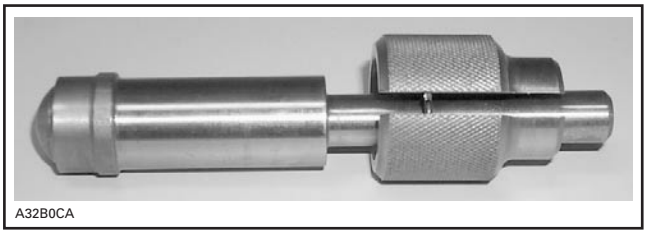
Insert circlip into support so that, when installed in piston groove, the tab faces upward.

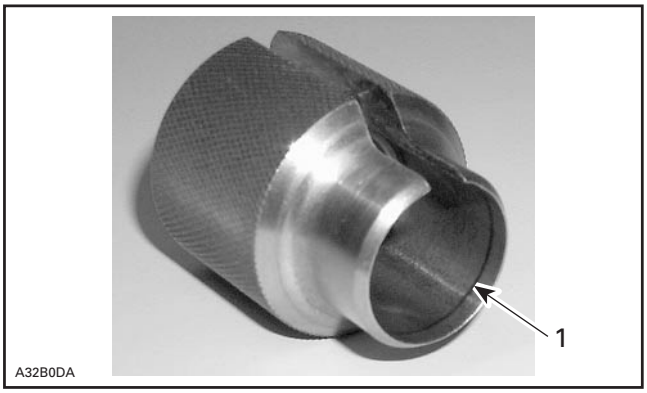

A32B0AA

With round end of pusher, position circlip perpendicularly to the support axis.


A32B0BA

With the other end of the pusher, push circlip into the support groove.


A32B0CA



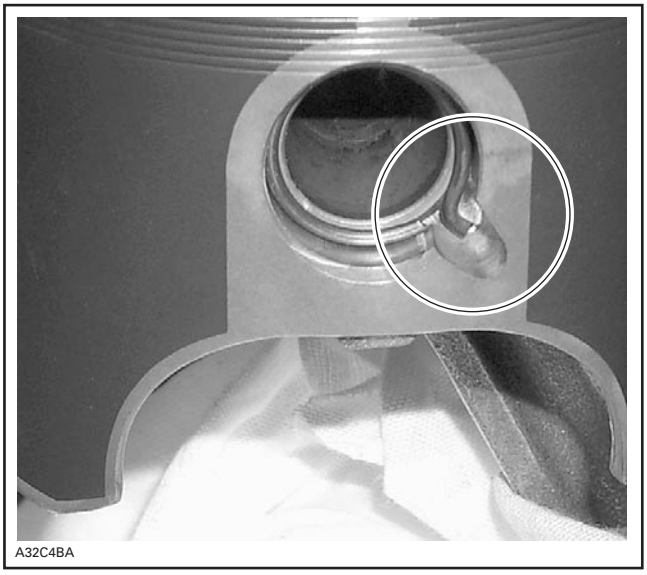
A32B0DA

1. Groove


A32B0EA

CIRCLIP READY TO BE INSTALLED ON PISTON

Using a plastic hammer, tap pusher to put circlip in place. Make sure to install new circlips with tab toward top as per following photo.


A32C4BA

TAB TOWARD TOP

CAUTION: Always install new mono-hook circlips. If circlip installation fails at the first attempt, always retry with a new one because, on a second attempt, the circlip will lose its normal retaining capabilities.

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

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

Cylinder Head Cover, Cylinder Head and Cylinder

Make sure parts sealing surfaces are flat. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT and look for CYLINDER HEAD WARPAGE.

Clean cylinders and crankcase mating surfaces with Loctite Chisel (P/N 413 708 500).

Coat crankcase mating surface with Loctite 518 (P/N 293 800 038). Choose the right gasket thickness according to combustion chamber volume. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT. Install it on crankcase. Coat gasket with Loctite 518.

CAUTION: Always install a gasket of the proper thickness. Failure to do so may cause detonation and severe engine damage.

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

Install cylinders. Do not tighten.

Install new rubber ring and round O-rings on each cylinder.

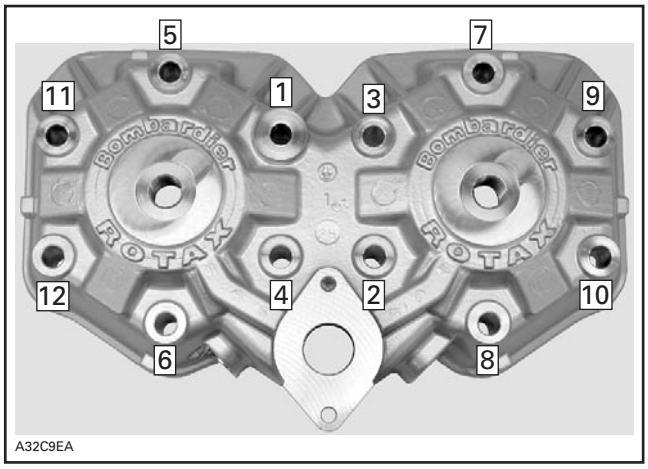
NOTE: Carefully clean screws before reinstallation, specifically under screw head.

Install exhaust manifold with gaskets. Do not tighten yet.

Torque cylinder screws in a crisscross sequence as per the following table.

M8	29 N•m (21 lbf•ft)
M10	40 N•m (29 lbf•ft)

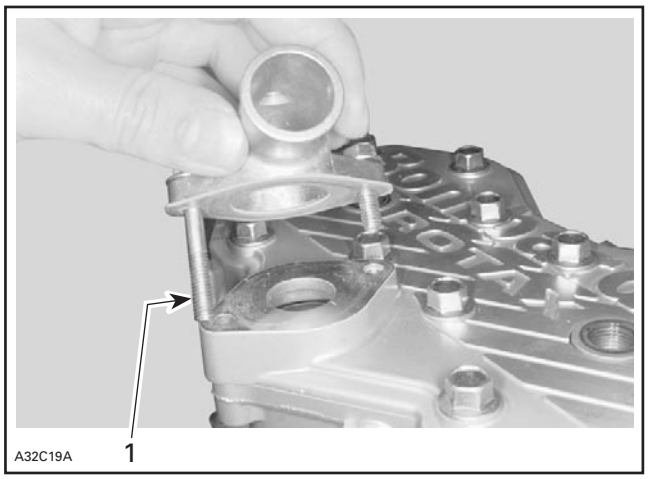
At assembly, torque cylinder head screws to 29 N•m (21 lbf•ft) in the following illustrated sequence.



TYPICAL

Tighten exhaust manifold bolts in a criss-cross sequence.

Apply Loctite 243 (P/N 293 800 060) on screws threads. Install outlet socket and tighten screws. Note position of longer screw.



1. Longer screw

Reed Valve

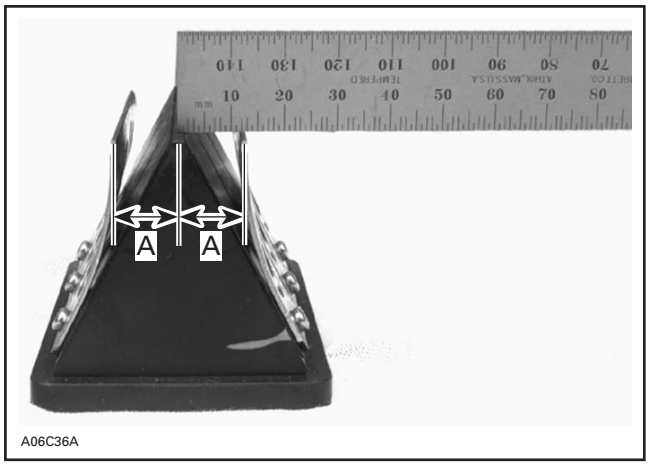
All Engine Types except 793 HO

Blades have a curved shape. Install with their curve facing reed block.

With blade stopper **no. 29** removed, check reed valve for proper tightness. There must not be any play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

In case of a play, turn blade upside down and recheck. If there is still a play, replace blade and/or valve body.

Check distance from blade stopper outer edge and distance from center of reed valve block.



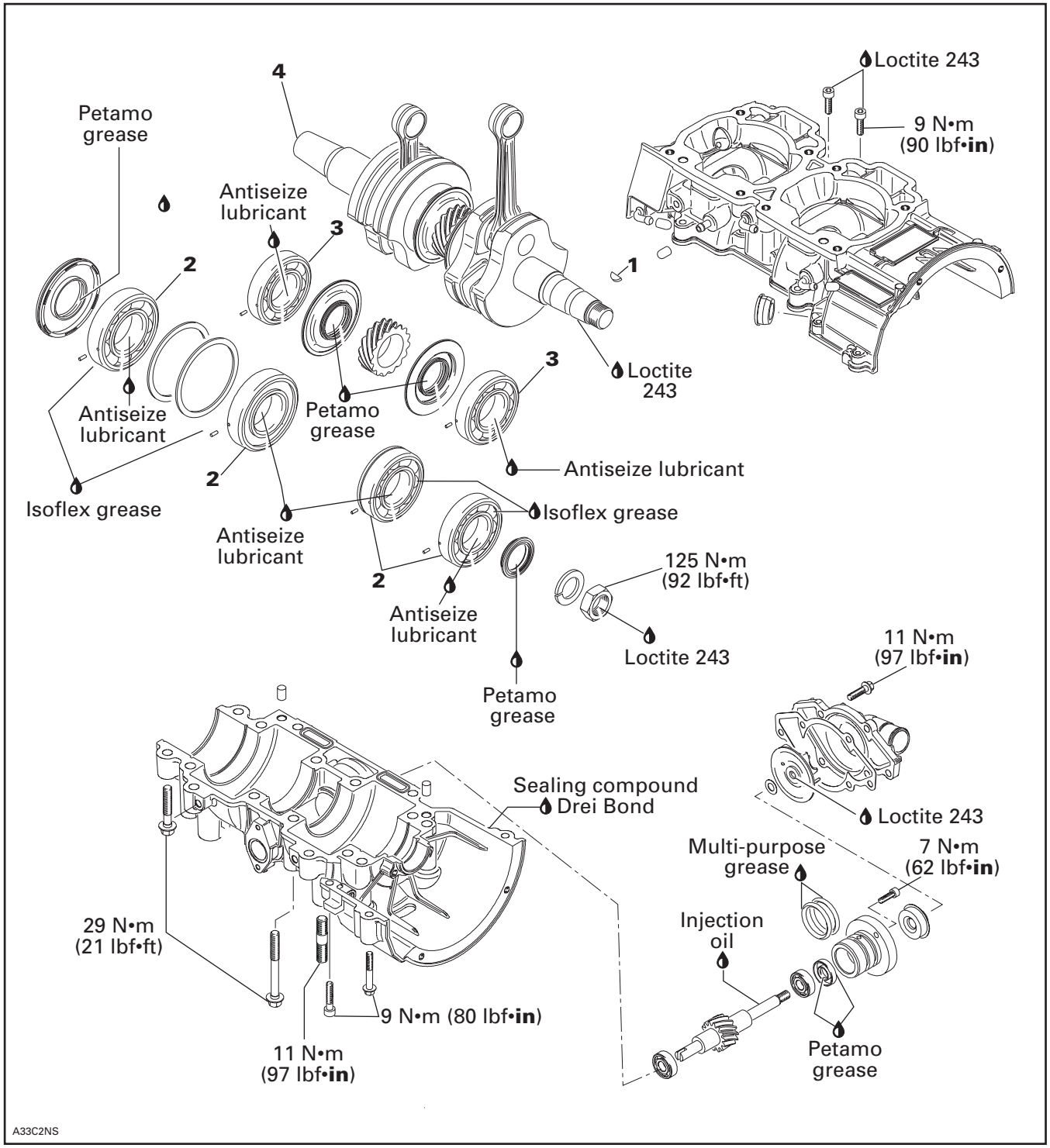
TYPICAL
A. 18.7 - 0, + 0.75 mm (.736 - 0, + .030 in)

Bent blade stopper as required to obtain the proper distance.

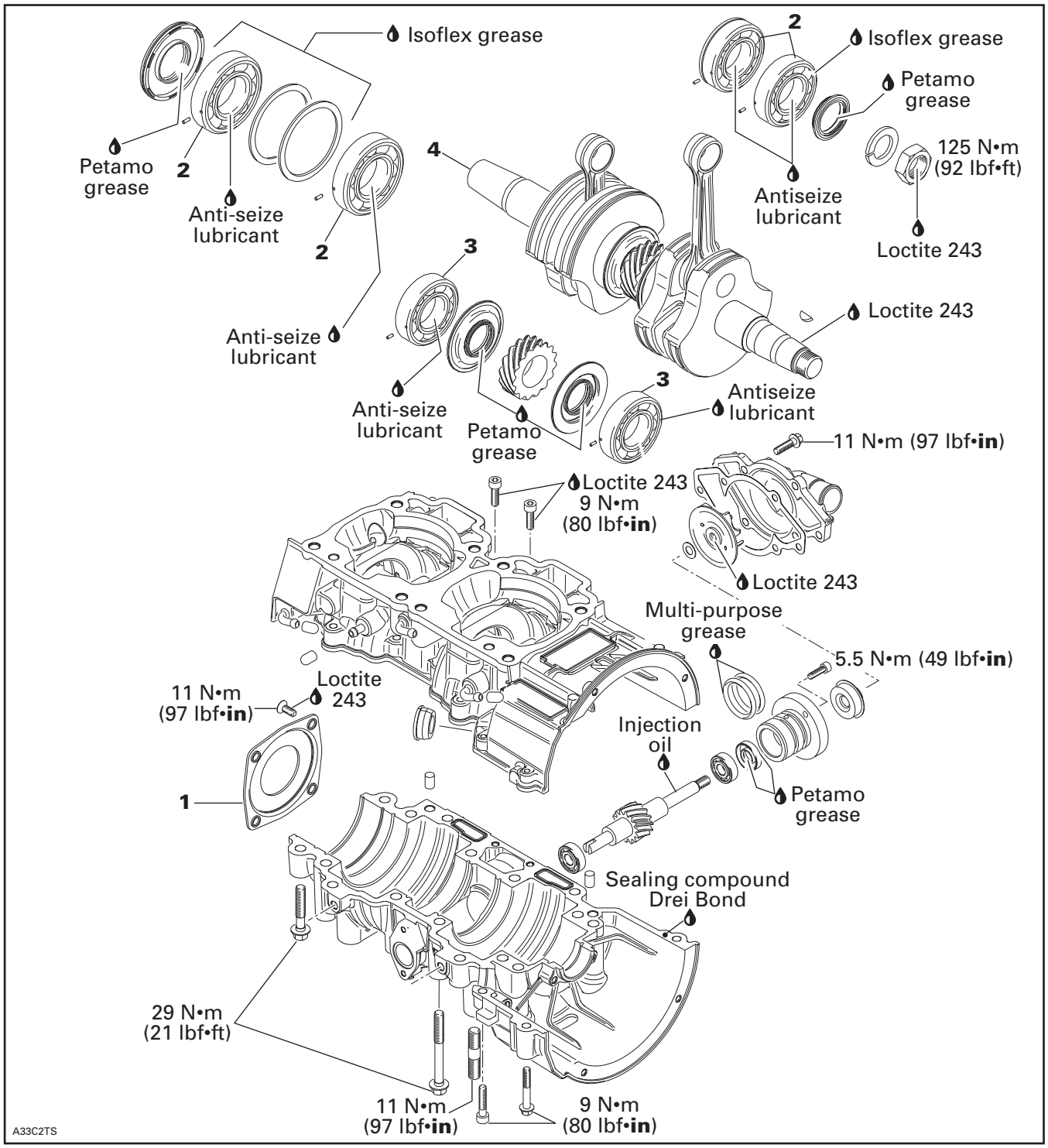
Blade stoppers may slightly interfere with cylinder during installation. Adjusted distance will be reduced automatically upon installation.

BOTTOM END

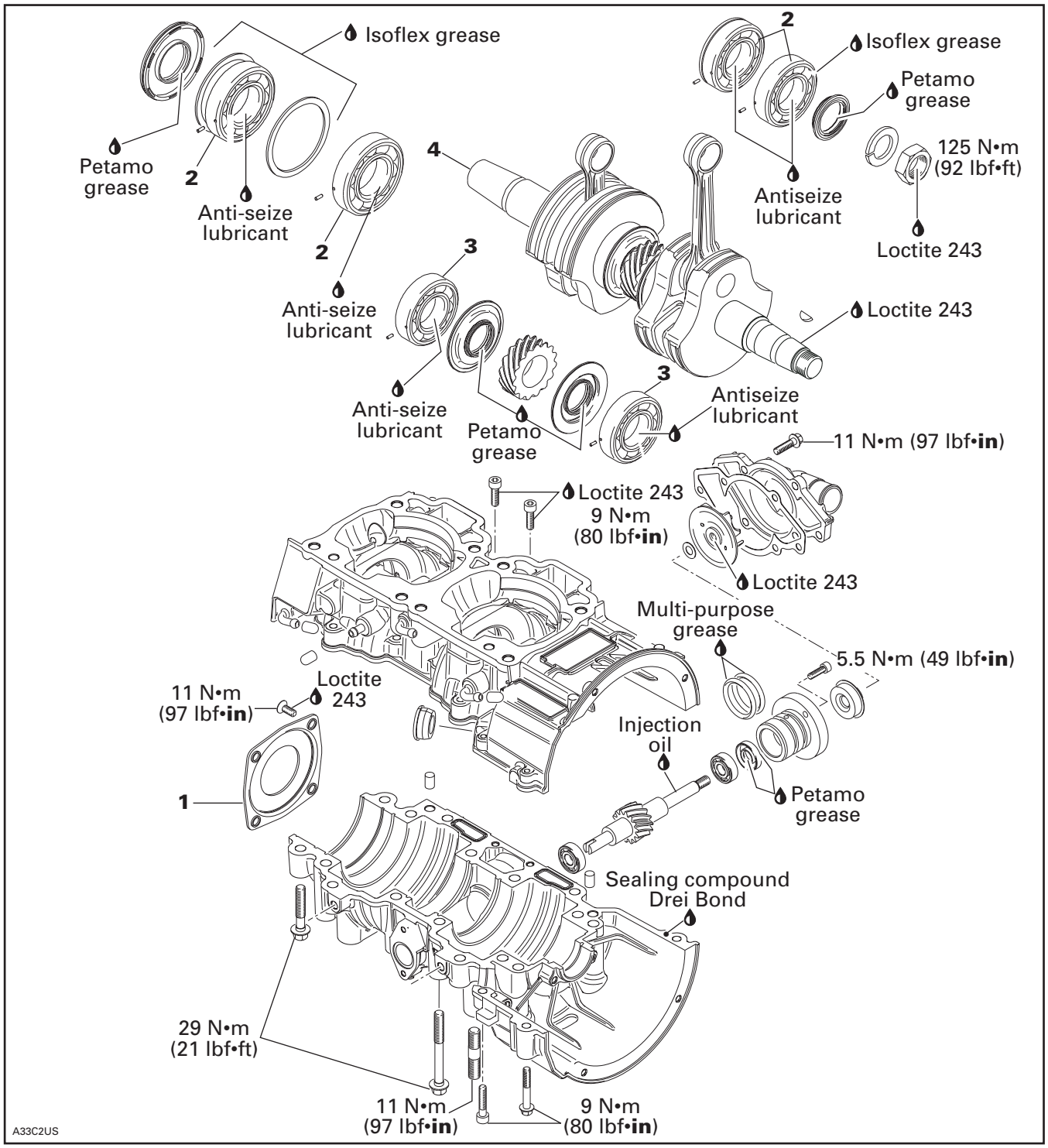
593 Engine Types



593 HO Engine Types



593 SDI and 793 HO Engine Types



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

CLEANING

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

Clean all metal components in a non-ferrous metal cleaner. Use gasket remover (P/N 413 708 500) accordingly.

Remove old paste gasket from crankcase mating surfaces with gasket remover (P/N 413 708 500).

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

DISASSEMBLY

General

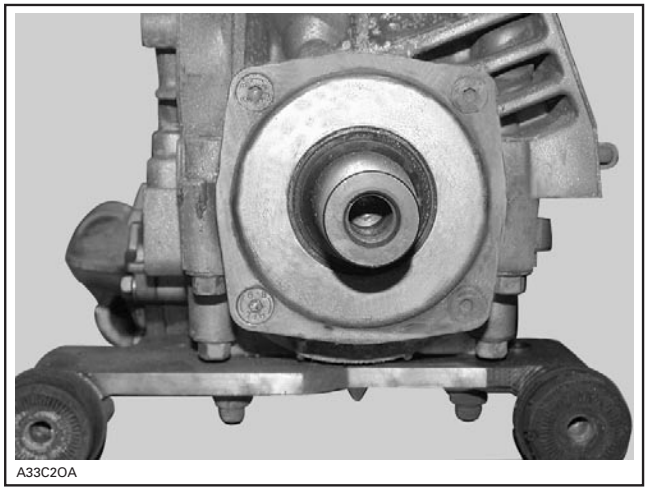
Remove cylinder head and cylinder.

Remove rewind starter.

To remove magneto, refer to CDI SYSTEM.

593 HO, 593 SDI and 793 HO Engine Types

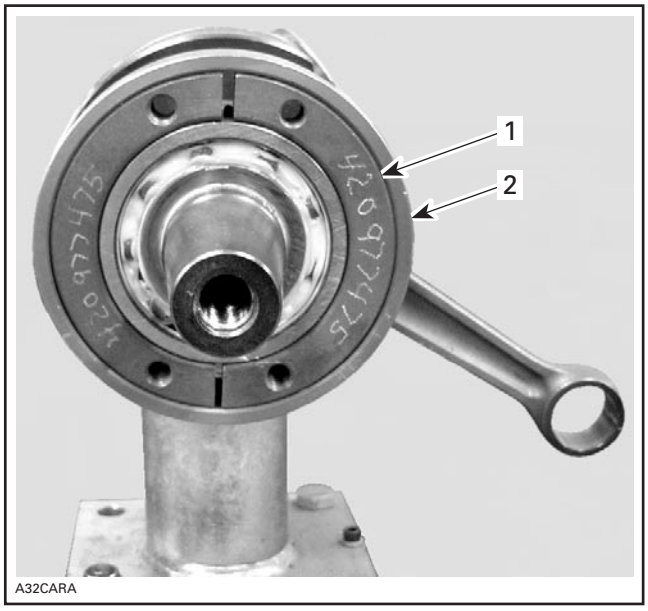
Remove oil seal cover no. 1.


A33C2OA

TYPICAL

Crankshaft Bearing

To remove bearings no. 2 and no. 3 from crankshaft no. 4, install half rings (P/N 420 977 479) and puller ring (P/N 420 977 494) on the outer bearing.



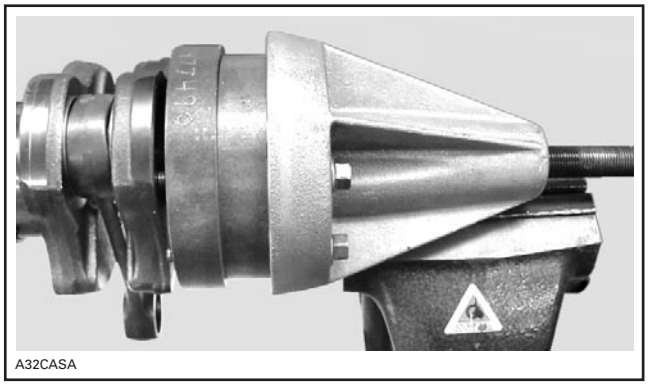
A32CARA

1. Half ring
2. Puller ring

NOTE: Apply grease (P/N 413 711 500) on crankshaft end in order to hold in place the crankshaft protector (P/N 420 876 552) on PTO side and (P/N 420 876 557) on MAG side.

Using screws (P/N 420 840 681), install bearing puller (P/N 420 877 635) on the half rings.

Secure the bearing puller in a vise by one of its rib.


A32CASA

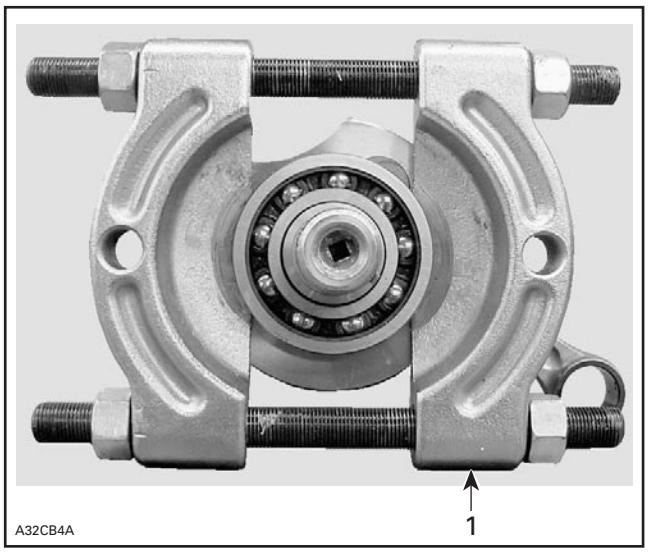
BEARING PULLER SECURED IN THE VISE

CAUTION: Never use any air impact tool for tightening the puller bolt. Lubricate the bolt with BOMBARDIER LUBE (P/N 293 600 016) to avoid damaging the threads.

Screw in the puller bolt until the bearing comes out.

Follow the same procedure for the inner bearing

NOTE: In the case of damaged bearing or less clearance between crankshaft counterbalance and the bearing or on the MAG side bearing, use a bearing separator such as Snap-On tool CJ 951 or SPX/OTC tool 1124 to facilitate the removal.



1. Bearing separator

INSPECTION

Refer to LEAK TEST AND ENGINE DIMENSIONS MEASUREMENT.

ASSEMBLY

Coat lip of all seals with Petamo grease (P/N 420 899 271).

Crankshaft Bearing

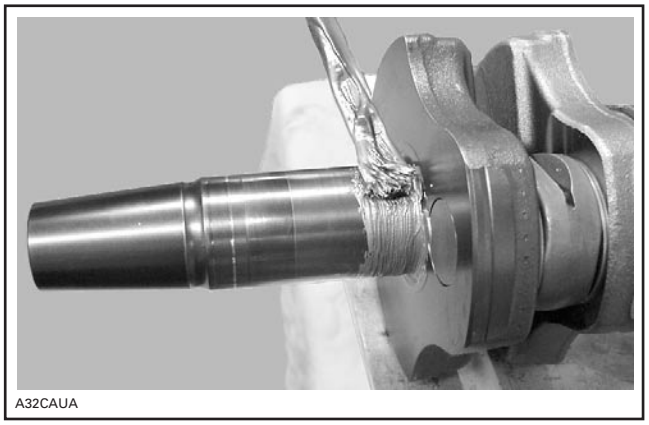
CAUTION: Never reinstall a bearing that has been removed.

Inspect crankshaft ends for damage.

Clean crankshaft ends with sand paper no. 180 to remove possible seal marks and debris.

Remove all residue using pulley flange cleaner (P/N 413 711 809.)

Smear anti-seize lubricant (P/N 413 701 000) on part of crankshaft where bearing fits.


A32CAUA

Heat up the bearing(s) using bearing heater (P/N 529 035 969). This will expand bearings and ease installation. If required, put a suitable plate or shim to avoid the direct contact between integrated seal with the heating surface.


A32CB7A

CAUTION: Bearing(s) should not be heated to more than 80°C (176°F). Do not heat bearing(s) on direct flame, or with a heat gun or in an oil bath. Inappropriate bearing(s) heating may result in inner seals or cage failure.

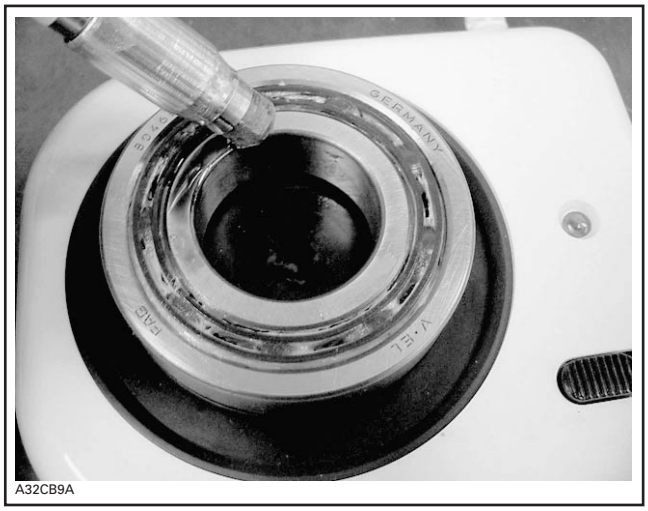
Turn bearing several times to obtain an even heating process.

NOTE: Normally it takes approximately 10 minutes to heat up a bearing so in the event of replacing bearing, it's recommended to start the bearing heating process prior to removal operation. Two bearings can be heated at the same time on one bearing heater.

A32CB8A

1. Bearings

Probe the inner race of the bearing with the temperature indicator stick (P/N 529 035 970). Stick will liquefy when the bearing reach the proper temperature


A32CB9A

⚠ WARNING

Do not touch heated bearing with bare hands. Always wear heat resisting gloves before handling the heated bearing(s).

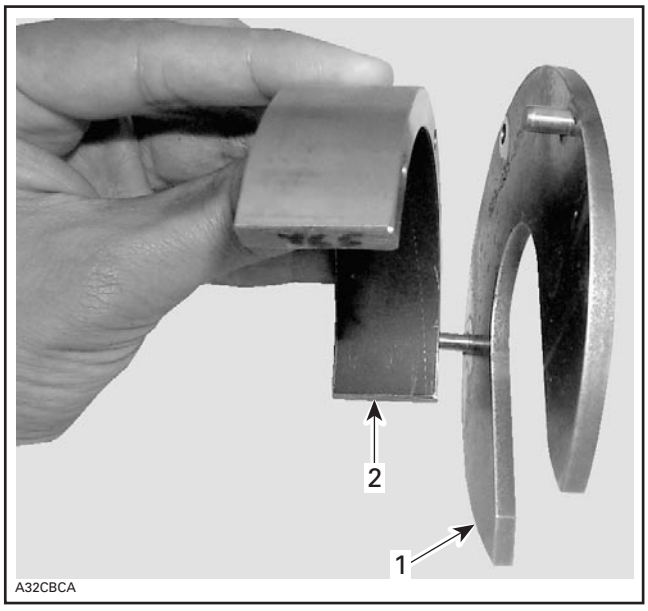
Slide in the inner PTO bearing with the integrated seal facing crankshaft. Push bearing to end position.

NOTE: Heated bearings will slide onto the crankshaft. If required, push with a steel tube on the inner ring of the bearing. **Pay special attention to correct positioning of the drive pins and/or retaining discs.**

Install retaining discs.

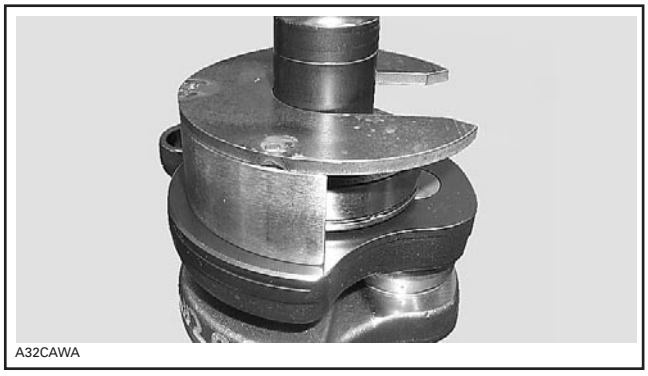
Install support plate (P/N 529 035 976) with appropriate distance gauge; refer to following table.

DISTANCE GAUGE P/N	APPLICATION
529 035 966	593 engine
529 035 967	593 HO
529 035 968	593 SDI and 793 HO



1. Support plate
2. Distance gauge

Install bearing locator tool.



Slide in the heated outer PTO bearing onto the crankshaft until it contacts the distance gauge.

Slide-in the first MAG bearing **with the integrated seal facing crankshaft**. Push bearing to the bottom with pusher , using a rubber hammer.


A32CC4B

Slide-in the second bearing until it contacts the first one.


A32CC5B

NOTE: To prevent seal pop-out, it is recommended to use PTO seal

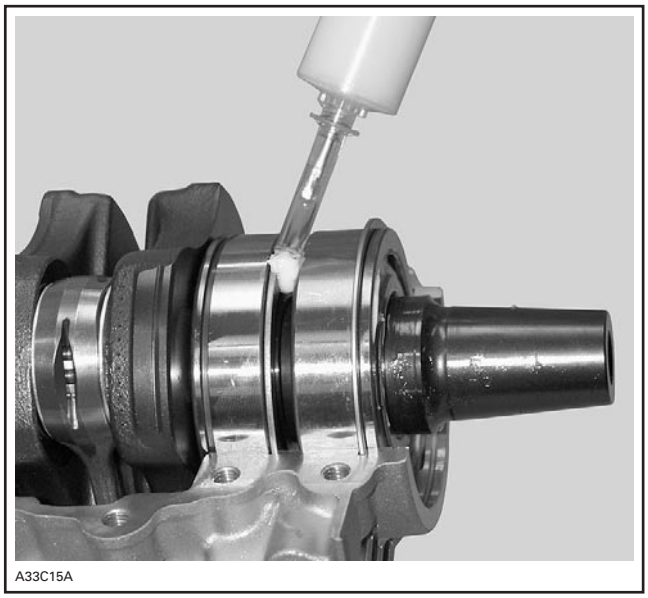
CAUTION: Use only the recommended Isoflex grease. Make sure not to push Isoflex grease between outside bearing race and half crankcase.

NOTE: The 50 g tube corresponds to 50 cc of grease.

Put 50 to 55 mL of grease in a syringe.

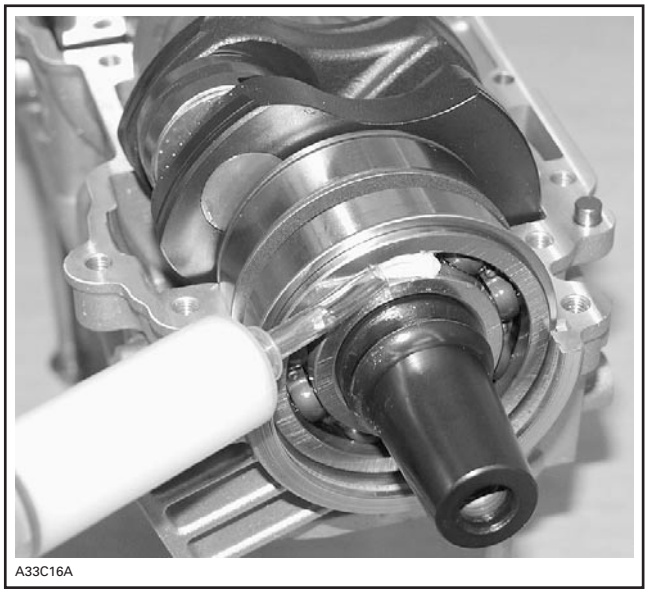
CAUTION: Do not exceed the recommended amount of grease

Fill inner side of PTO side bearing with Isoflex grease (about 10 mL).

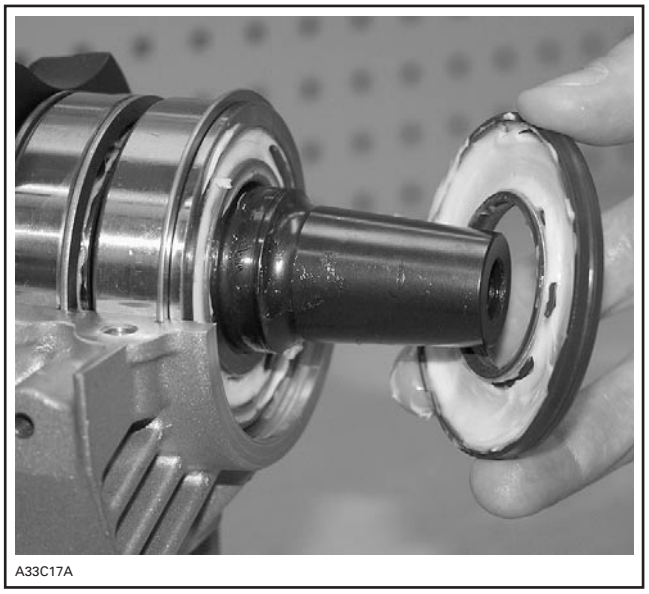

A33C15A

PTO SIDE BEARING FILLED WITH ISOFLEX GREASE

With the syringe, fill the outer ball bearing and inner side of outer seal with 40 to 45 mL of Isoflex grease.


A33C16A

BALLS COATED WITH A SEAM OF GREASE

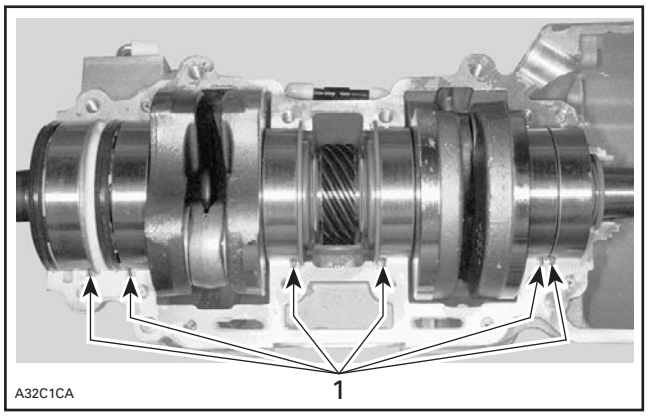


TYPICAL — FILL WITH GREASE AND SET IN PLACE

Apply 6 mL of grease to MAG side outer bearing.

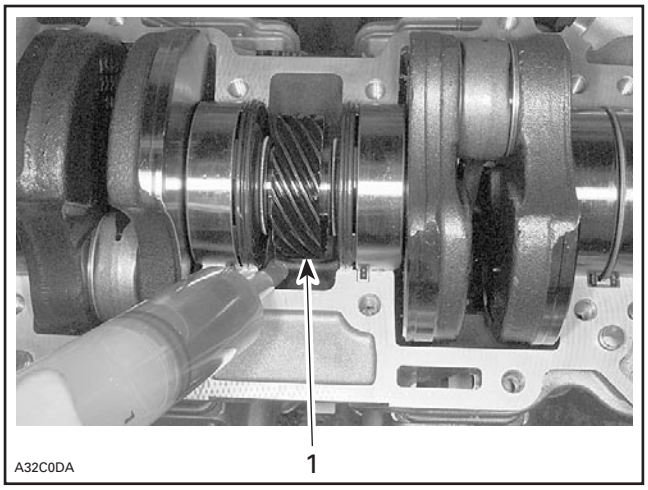
NOTE: If replaced with new bearing, do not apply grease as new bearings come with grease already applied.

At crankshaft installation, position drive pins as illustrated.



TYPICAL
1. Position pins

Pour 50 mL (2 U.S. oz) of injection oil in the pan under central gear to lubricate pump gearing as per photo.



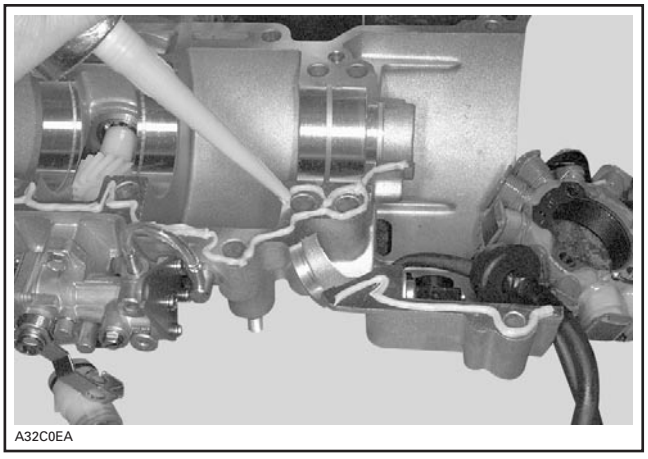
1. Oil bath

Crankcase Assembly

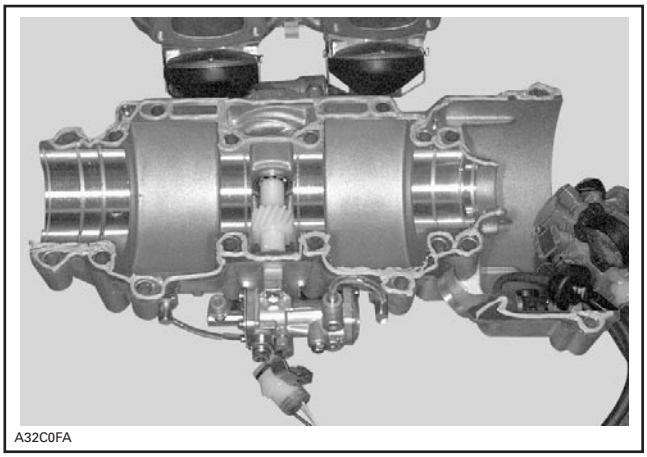
IMPORTANT: The total assembly sequence, including sealing compound spreading, screwing and torquing of bolts according to the proper sequence, must be performed within 10 minutes. Do not wait between each bolt torquing. All bolts must be torqued in a row.

Before screwing both parts of crankcase, seal it with sealing compound (P/N 420 297 906). Make sure surfaces are clean and degreased before applying sealing compound.

Spread a seam of **1.2 mm (1/16 in)** maximum in diameter on surface of lower crankcase half.

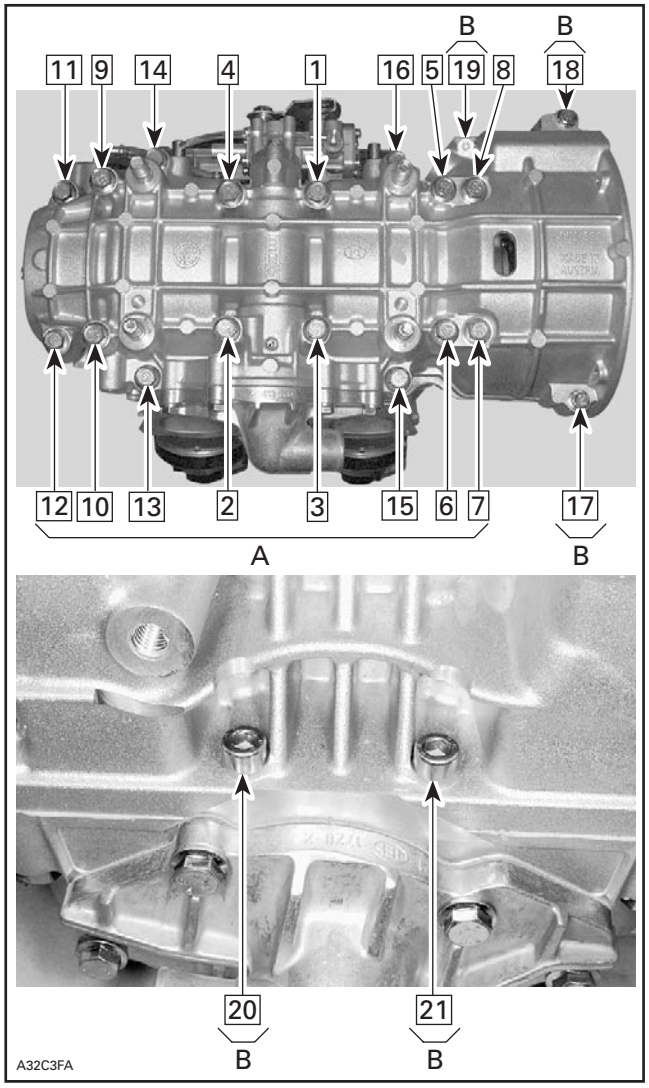


As far as possible, sealing compound must be applied in one run to avoid any risks of leakage through the crankcase.



SEAMING COMPLETED — CONTACT SURFACES COVERED AND SCREW HOLES SURROUNDED

Screw all crankcase bolts in place in the following sequence and to the appropriate torque; this must be done in two steps torquing: first, screw bolts up to 60% of the final torque (18 N•m (13.5 lbf•ft) for most of the bolts), then, tighten to the required torque (i.e. 29 N•m (21 lbf•ft)).



A. Torque bolts 1 through 16 to 29 N•m (21 lbf•ft)
*B. Torque bolts 17 through 21 to 9 N•m (80 lbf•**in**)*

593 HO, 593 SDI and 793 HO Engine Types

Install oil seal cover.

BREAK-IN

After rebuilding an engine, always observe a break-in period as described in Operator's Guide.

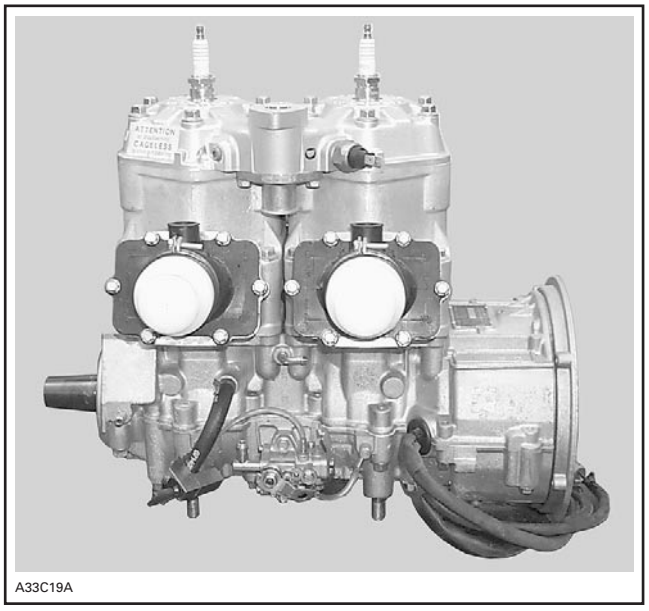
ENGINE LEAK TEST AND DIMENSION MEASUREMENT

LEAK TEST

The following gives verification procedures for 593 and 793 types of engines.

PREPARATION

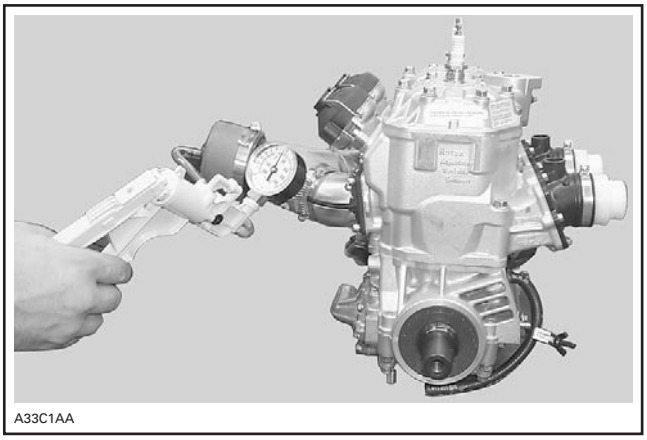
– Remove tuned pipe.
– Install plug over exhaust manifold.
– Remove carburetors/throttle body assembly (as applicable).
– Unplug fuel inlet line from fuel rail.
– Insert plugs in intake rubber boots. Tighten with existing clamps.


A33C19A

– Using a hose pincher (P/N 295 000 076), block impulse hose.
– Install air pump on 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.


A33C1AA

– Activate pump and pressurize engine to 34 kPa (5 PSI). Do not exceed this pressure.
– Engine must stand this pressure during 3 minutes. If pressure drops before 3 minutes, check tester kit by spraying a soapy solution on pump cylinder, 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

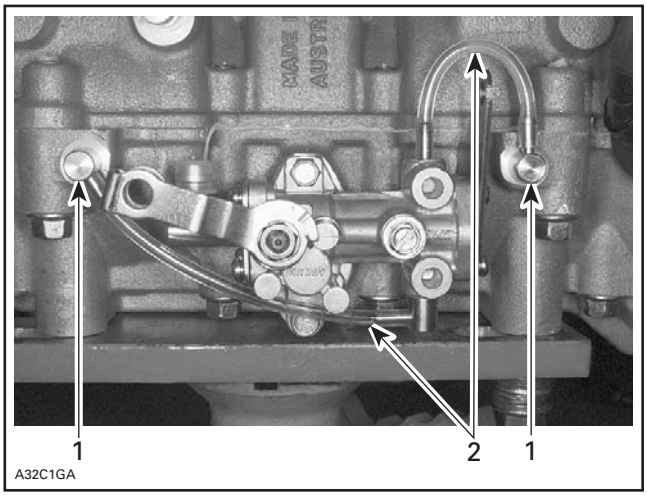
  • If there is a leak at the tested location, it is recommended to continue testing next items before overhauling engine. There is a possibility of more than one leak.
  • If there is no leak at the tested location, continue pumping to maintain pressure and continue with next items until leak is found.

Engine

Check the following:

– All jointed surfaces and screw/stud threads of engine:
  - spark plug base, insulator
  - cylinder head
  - RAVE valve bellows, piston and housing
  - cylinder crankcase halves (joint)
  - oil injection pump mounting flange (O-ring)
  - coolant pump housing
  - bleed screws/plugs
  - crankcase grease reservoir fitting.

– Small injection oil lines coming from pump.



TYPICAL
1. *Injection nipples*
2. *Small injection oil lines*

Check for air bubbles or oil column going toward pump. It indicates defective check valve in injection nipples.

– Remove cooling system cap.

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

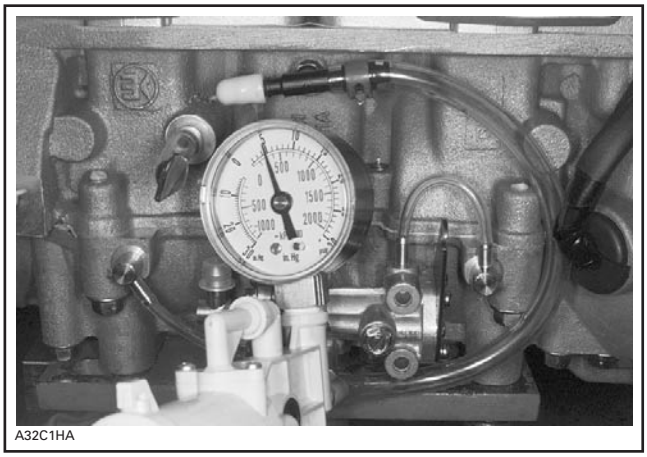
– Remove drive pulley then check crankshaft outer seal.

– Remove rewind starter and magneto system then check crankshaft outer seal.

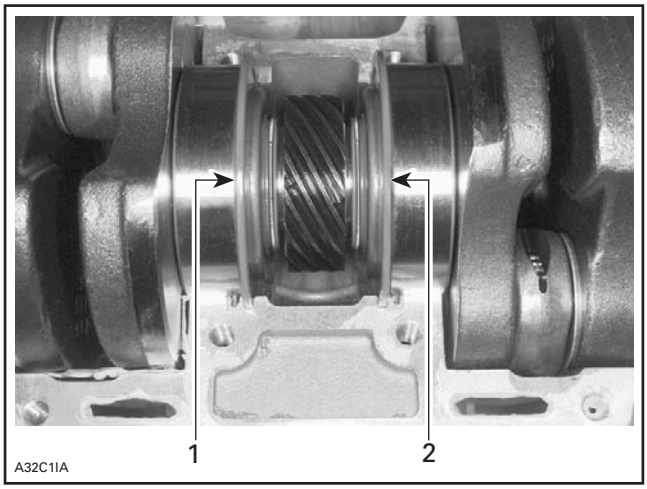
– Check pump shaft gear oil reservoir.

Pump Shaft Oil Gear Reservoir

Install air pump on adapter and pressurize as above.

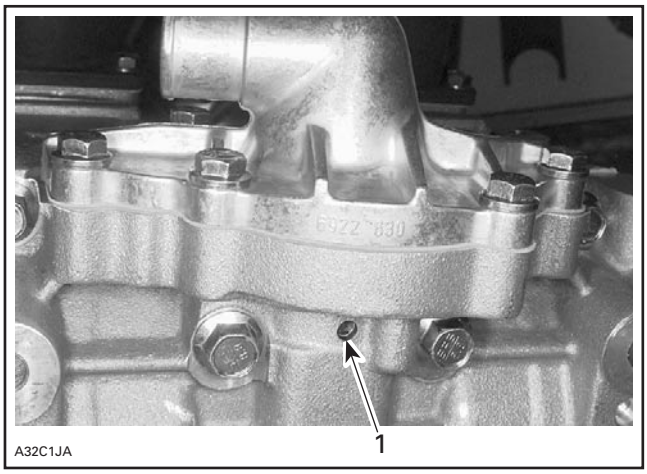


If pressure drops, it indicates a defective crankshaft inner seal.



TYPICAL — CRANKSHAFT INSTALLED IN UPPER HALF CRANKCASE
1. *Crankshaft inner seal on PTO side*
2. *Crankshaft inner seal on MAG side*

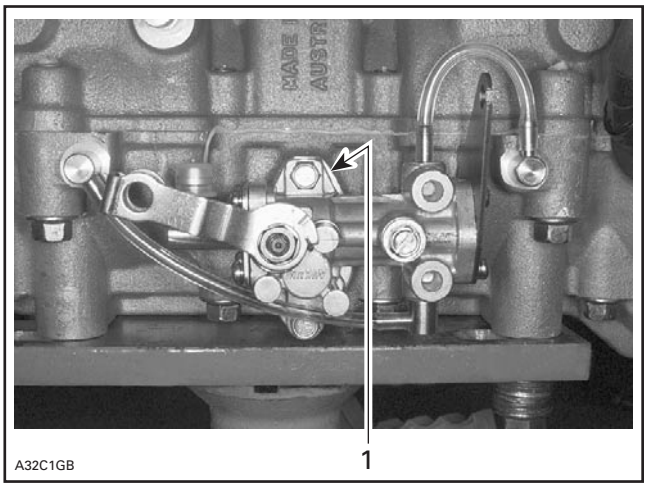
– Check weep hole below coolant pump housing with soapy water.



1. Weep hole

If there is a leak, it indicates that a pump shaft is defective (oil seal beside coolant ceramic seal).

– Leaks can be also on oil pump side. Check mounting area for leaks.



TYPICAL
1. Check mounting area

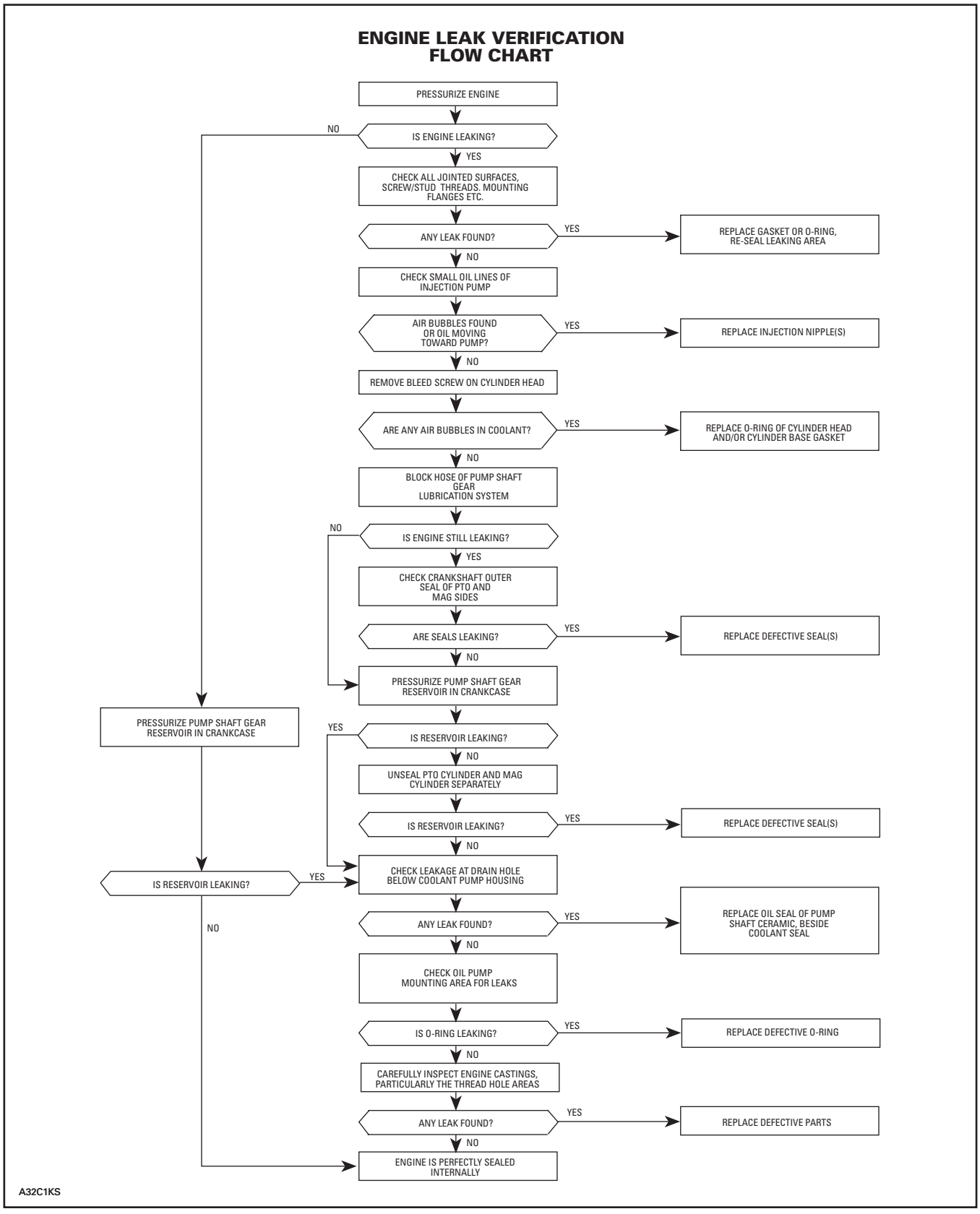
– If leak still persists, it indicates a defective casting somewhere in engine.

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

FINALIZING REASSEMBLY

After reassembling engine, always recheck for leakage.

ENGINE LEAK VERIFICATION FLOW CHART



ENGINE DIMENSION MEASUREMENT

This section covers all engine types.

CYLINDER HEAD WARPAGE

ENGINE TYPE	MAXIMUM
All	0.05 mm (.002 in) per 50 mm (2 in) of surface
	0.5 mm (.020 in) for total length of cylinder head

Check gasketed surface of the cylinder head with a straightedge and a feeler gauge.

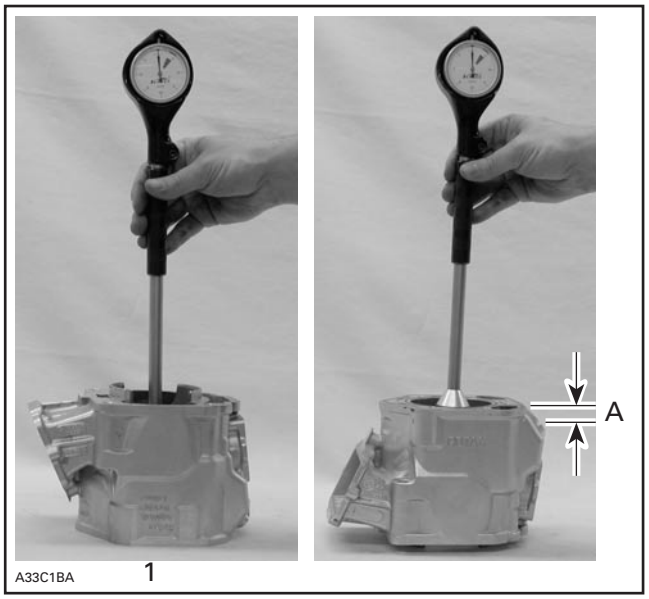
CYLINDER TAPER

ENGINE TYPE	MAXIMUM
All	0.10 mm (.004 in)

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

If the difference exceeds the specified dimension the cylinder should be rebored and honed or should be replaced. Nikasil cylinder can be honed using diamond hone but can not be rebored.

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



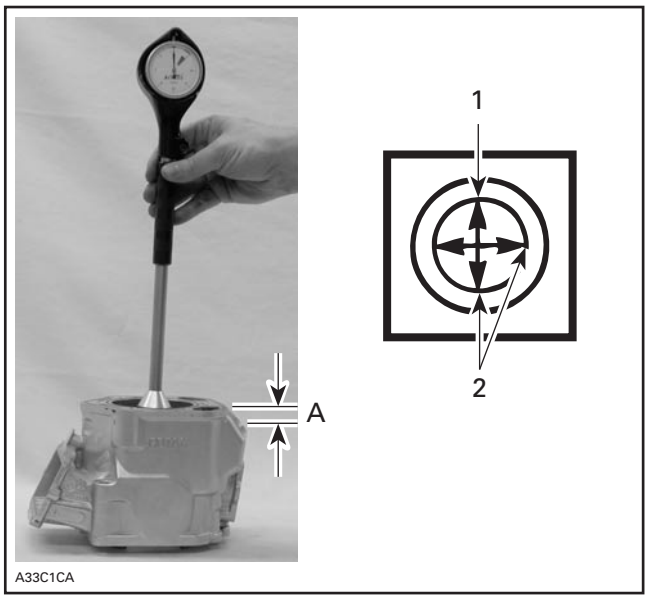
1. Below the intake port
A. 16 mm (5/8 in) from top

CYLINDER OUT OF ROUND

ENGINE TYPE	MAXIMUM
All	0.08 mm (.003 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. Nikasil cylinder can be honed using diamond hone but cannot be rebored.

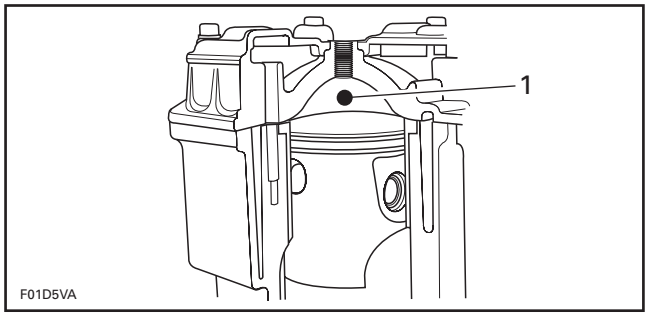
NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



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

COMBUSTION CHAMBER VOLUME MEASUREMENT

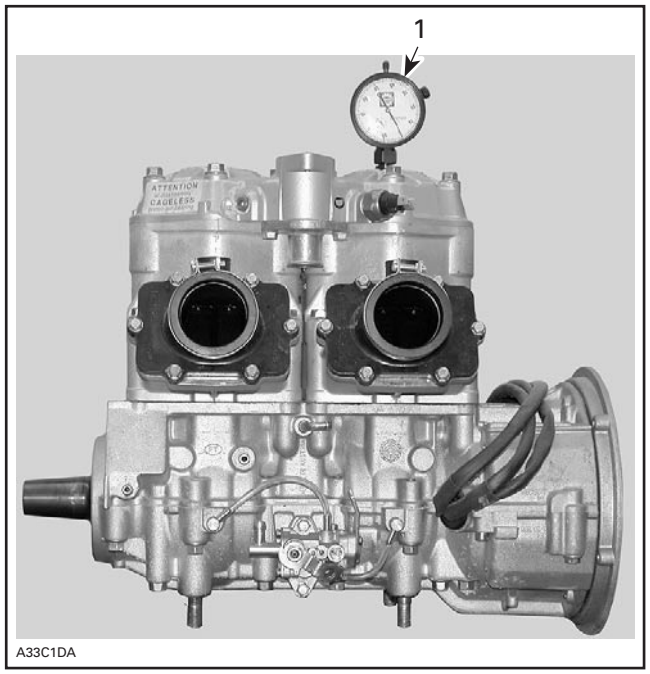
The combustion chamber volume is the region in the cylinder head above the piston at Top Dead Center. It is measured with the cylinder head installed on the engine.



1. Combustion chamber

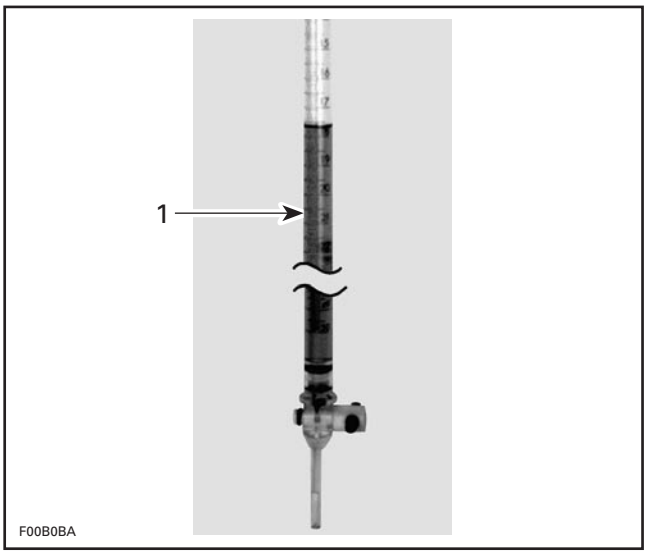
NOTE: When checking the combustion chamber volume, engine must be cold, piston must be free of carbon deposits and cylinder head must be leveled.

– Remove both spark plugs and bring one piston to Top Dead Center a using a TDC gauge.



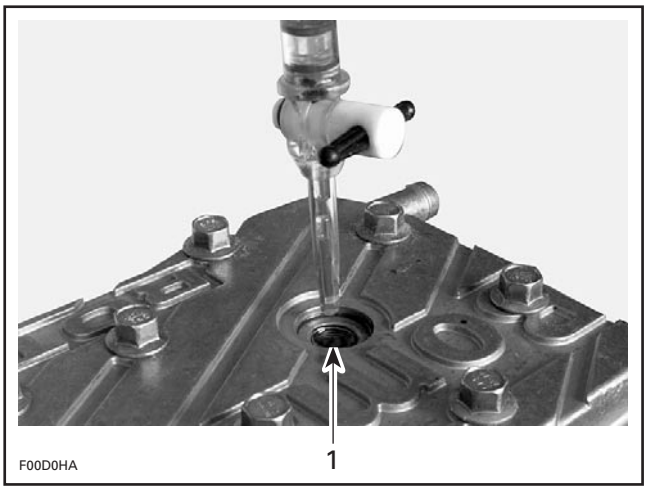
1. Bring piston to TDC

– Obtain a graduated burette (capacity 0 - 50 cc) and fill with an equal part (50/50) of gasoline and injection oil.



1. Graduated burette (0 - 50 cc)

– Open burette valve to fill its tip. Add liquid in burette until level reaches 0 cc.
– Inject the burette content through the spark plug hole until liquid touches the top spark plug hole.



1. Top of spark plug hole

NOTE: The liquid level in cylinder must not drop for a few seconds after filling. If so, there is a leak between piston and cylinder. The recorded volume would be false.

– Let burette stand upward for about 10 minutes, until liquid level is stabilized.
– Read the burette scale to obtain the quantity of liquid injected in the combustion chamber.

NOTE: When the combustion chamber is filled to top of spark plug hole, it includes an amount of 2.25 cc corresponding to the spark plug well.

– Repeat the procedure for the other cylinder.

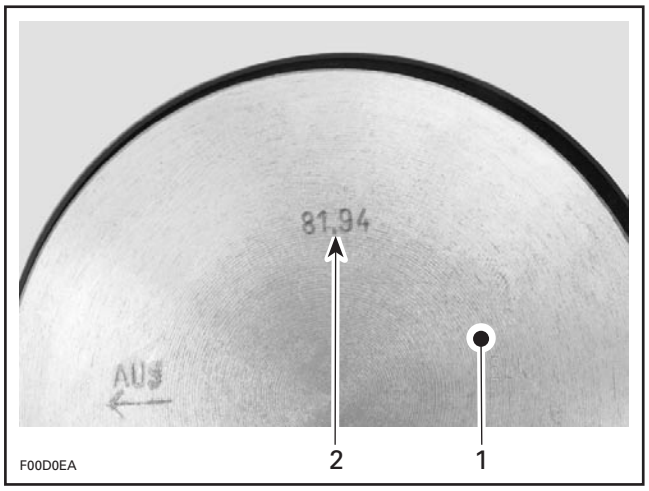
ENGINE TYPE	COMBUSTION CHAMBER VOLUME (cc) (up to top thread of spark plug hole)
593	26.67 ± 1.29 - 1.18
593 HO/SDI	26.4 ±1.2
693	31.71 + 1.51 - 1.38
793 HO	36.34 + 1.73 - 1.58

– Install a thicker or thinner cylinder/crankcase gasket (refer to *Parts Catalogs*) in order to obtain the specified combustion chamber volume or the nearest.

ENGINE TYPE	CHANGE IN COMBUSTION CHAMBER VOLUME (cc) for every 0.1 mm (.004 in) of gasket thickness
593 HO	0.41
793 HO	0.53

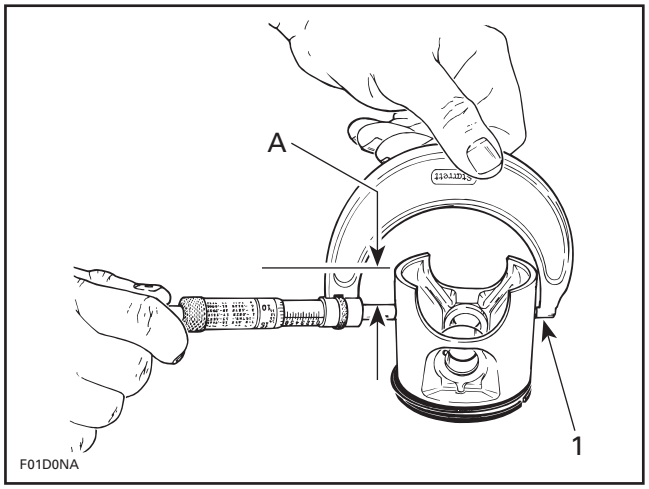
USED PISTON MEASUREMENT

Note the measurement on the piston dome.



1. Piston dome
2. Piston measurement

Using a micrometer, measure piston skirt at 15 mm (.590 in) perpendicularly (90°) to piston pin.



1. Measuring perpendicularly (90°) to piston pin axis
A. 15 mm (.590 in)

ENGINE TYPE	MAXIMUM PISTON SKIRT WEAR mm (in)
All	0.15 (.006)

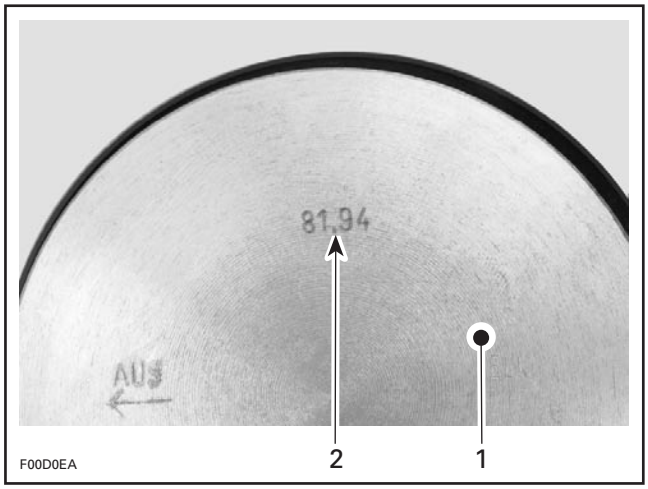
The measured dimension must not be less than 0.15 mm (.006 in) of the one scribed on piston dome. Otherwise, install a new piston.

CYLINDER/PISTON CLEARANCE

Used and New Pistons

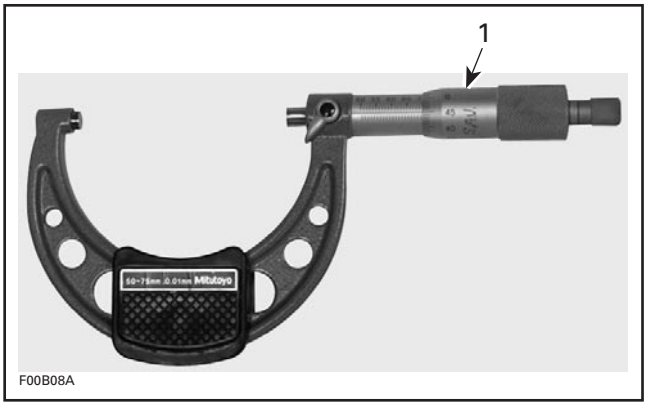
IMPORTANT: Make sure used piston is not worn more than specified. See USED PISTON MEASUREMENT above.

Take the measurement on the piston dome.



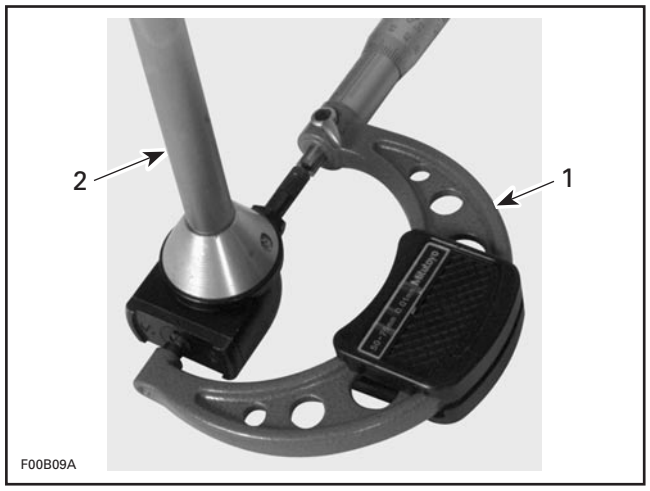
1. Piston dome
2. Piston measurement

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

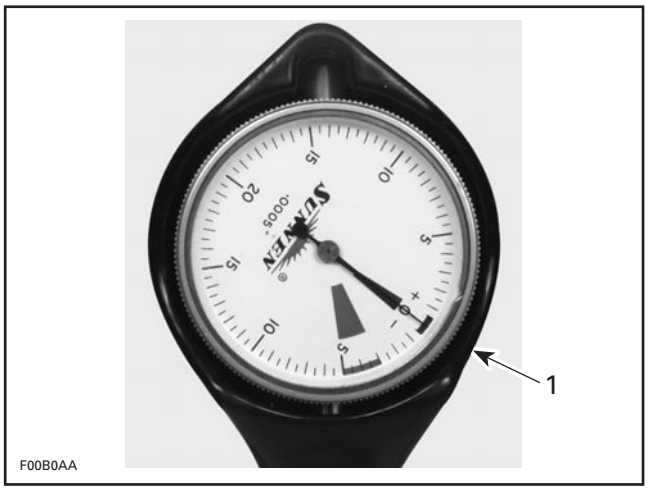


1. Micrometer set to the piston dimension

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



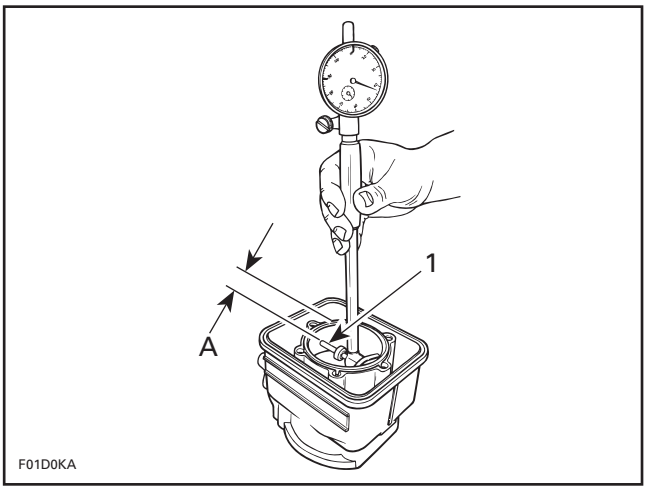
1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0 (zero)

IMPORTANT: Always remove cylinders from crankcase before measuring.

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)

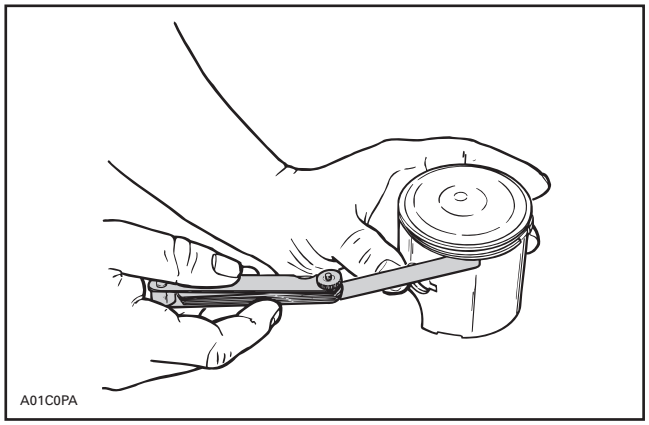
Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance. If clearance exceeds specified tolerance, replace cylinder or rebore and install oversize piston depending on engine type. Refer to TECHNICAL DATA.

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.

IMPORTANT: The total piston/cylinder clearance (actual cylinder diameter minus actual piston skirt diameter) should be within 0.30 mm (.012 in).

RING/PISTON GROOVE CLEARANCE

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

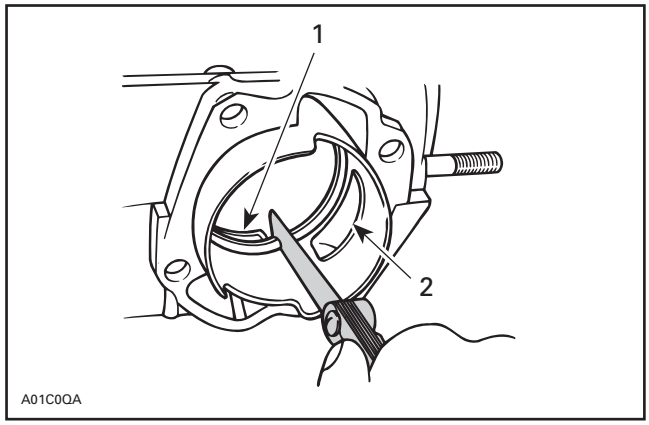


RING END GAP

Position ring half-way between transfer ports and intake port.

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.



1. Transfer port
2. Intake port

CRANKSHAFT DEFLECTION

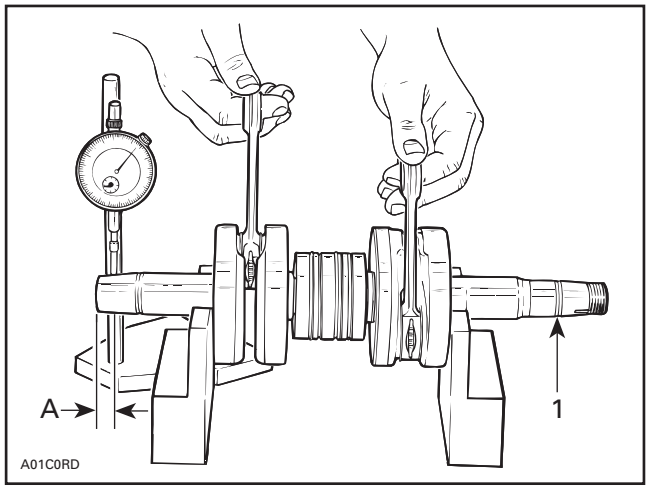
Crankshaft deflection is measured with a dial indicator.

Measuring (in crankcase)

First, check deflection with crankshaft in crankcase. 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. 3 mm (1/8 in)

Crankshaft Deflection on PTO Side

ENGINE TYPE	MAXIMUM ON PTO SIDE mm (in)
All	0.06 (.0024)

Crankshaft Deflection on MAG Side

ENGINE TYPE	MAXIMUM ON MAG SIDE mm (in)
593, 593 HO/SDI, 793 HO	0.05 (.002)

Crankshaft Deflection in Center of Crankshaft

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

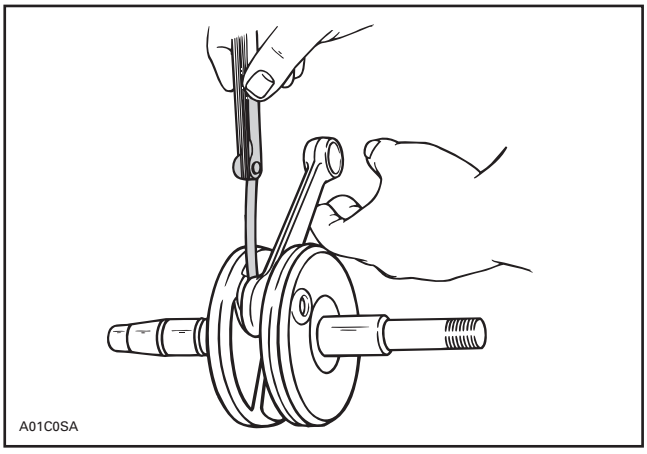
NOTE: Crankshaft deflection cannot be correctly measured between centers of a lathe.

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
593	0.39 - 0.74 mm (.015 - .029 in)	1.20 mm (.047 in)
593 HO/SDI, 693, 793 HO	0.31 - 0.67 mm (.012 - .026 in)	1.20 mm (.047 in)

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



TYPICAL

CRANKSHAFT END-PLAY

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

CHECKING CRANKSHAFT ALIGNMENT

Install a degree wheel (P/N 529 035 607) on crankshaft end.

Remove both spark plugs.

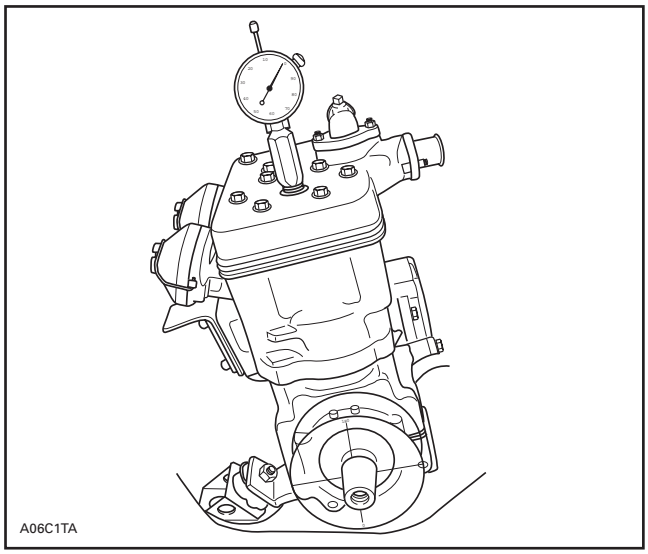
Install a TDC gauge (P/N 414 104 700) in spark plug hole on MAG side.

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 center cylinder.

Bring PTO piston to top dead center. Degree wheel must rotate with crankshaft.

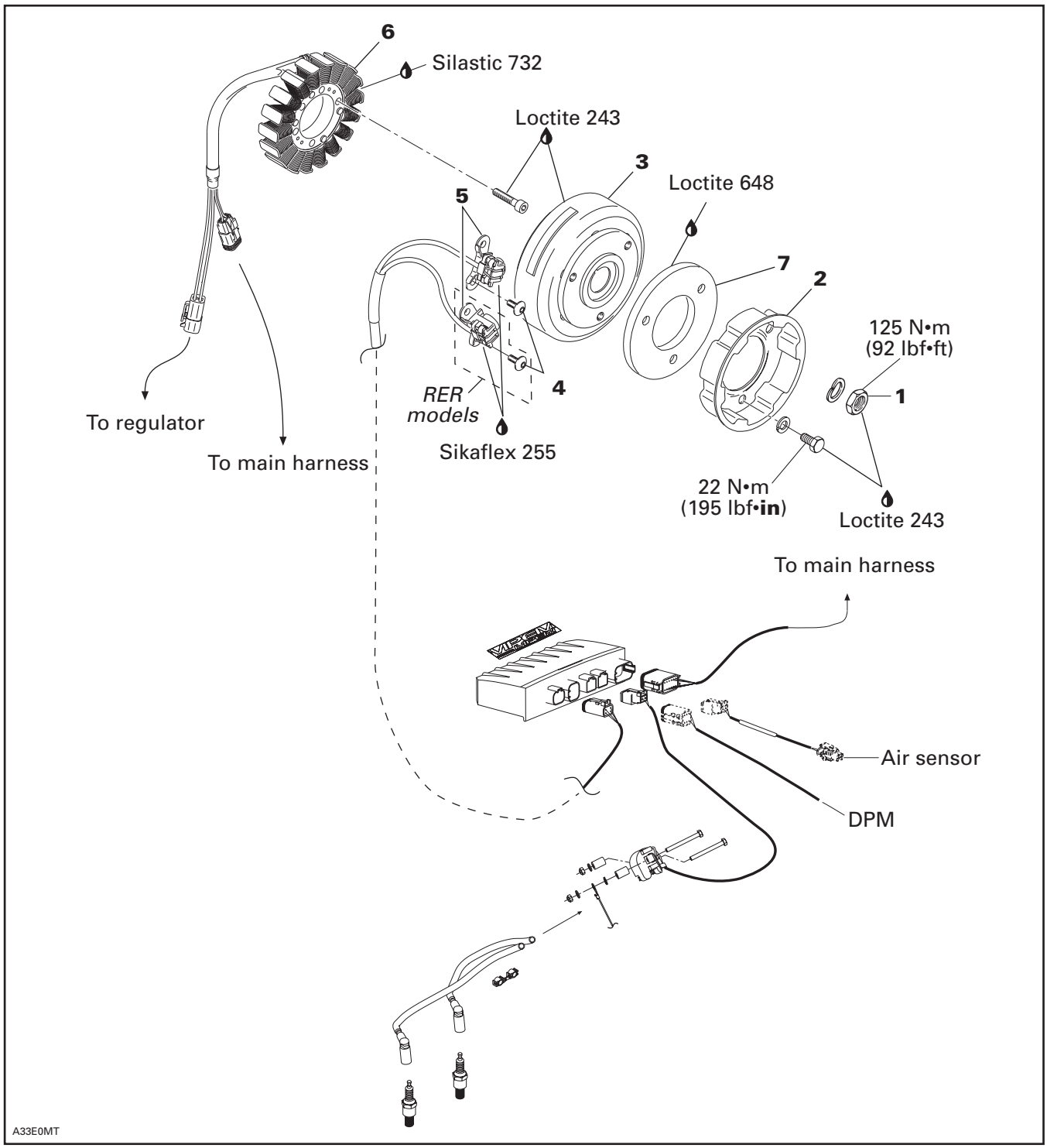


TYPICAL

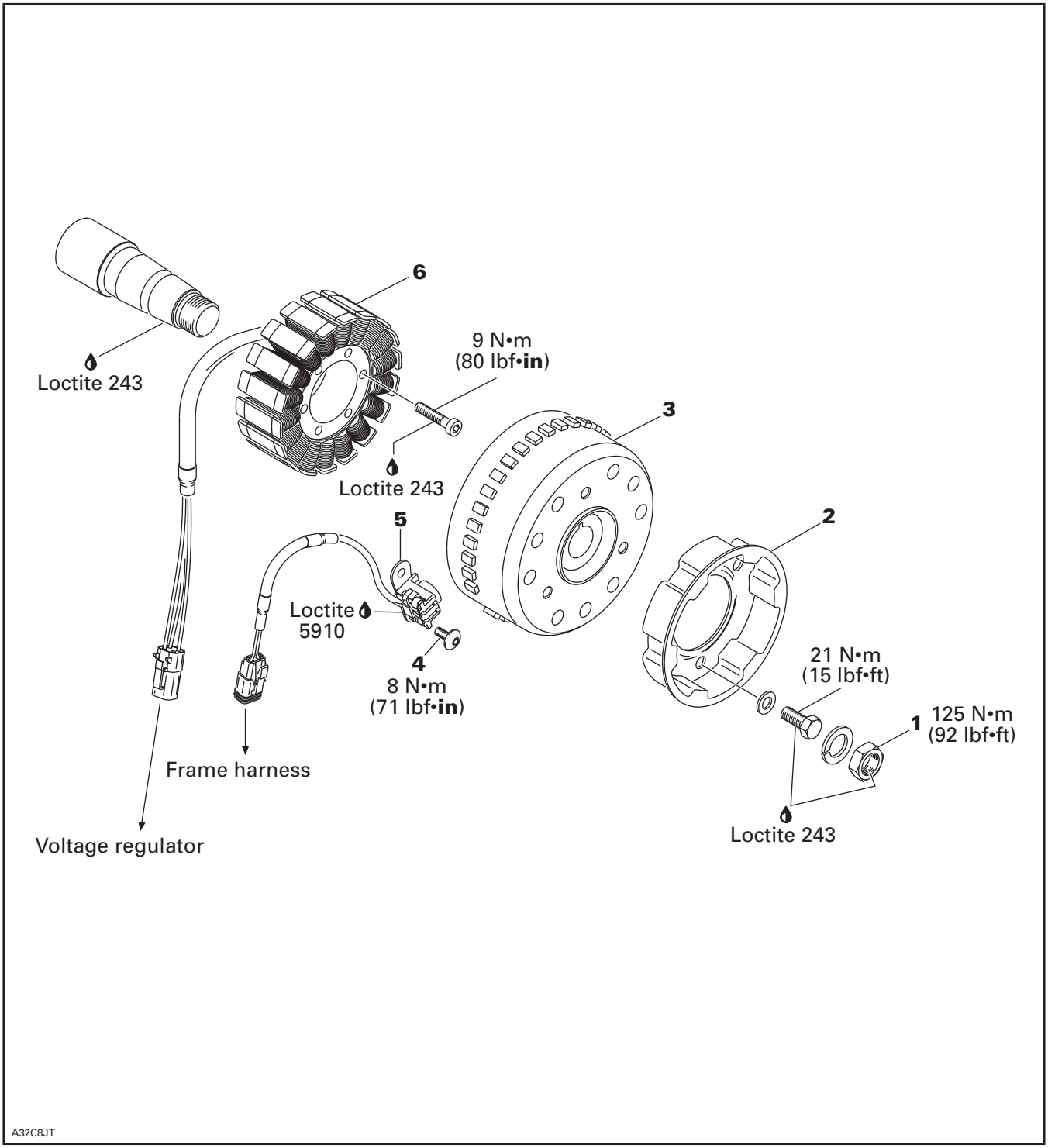
Interval between cylinders must be 180° ± 0.5.

Any other reading indicates a misaligned (twisted) crankshaft.

MAGNETO SYSTEM



480 W on REV Series



GENERAL

NOTE: The following procedures can be done without removing the engine. To facilitate magneto removal, hold drive pulley with tool (P/N 529 027 600).

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to SELF-LOCKING FASTENERS and LOCTITE APPLICATION at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strictly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

CLEANING

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

CAUTION: Clean stator and magneto flywheel using only a clean cloth.

DISASSEMBLY

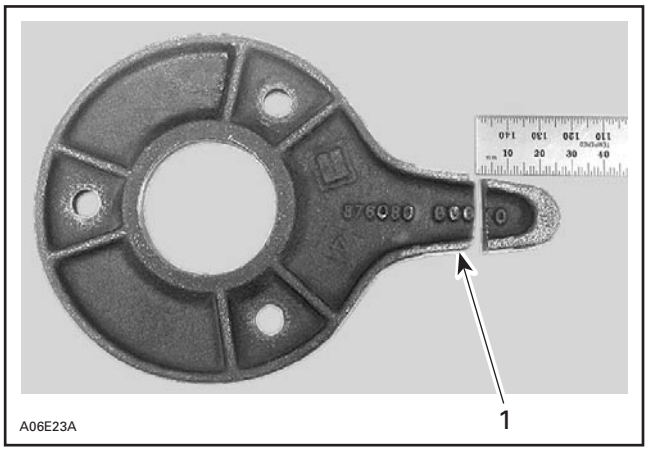
Magneto Flywheel

To gain access to magneto flywheel no. 3 assembly, remove the following parts as needed on different engines:

– tuned pipe and muffler
– rewind starter
– starting pulley no. 2.

To remove magneto flywheel nut no. 1:

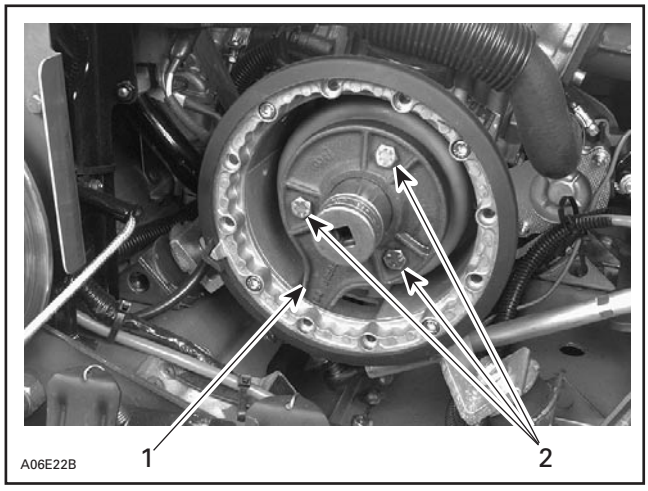
– Use magneto puller ring (P/N 420 876 080). Former puller must be modified as shown.



1. Cut by 25 mm (1 in)

– Install puller ring with its tab in magneto housing opening.

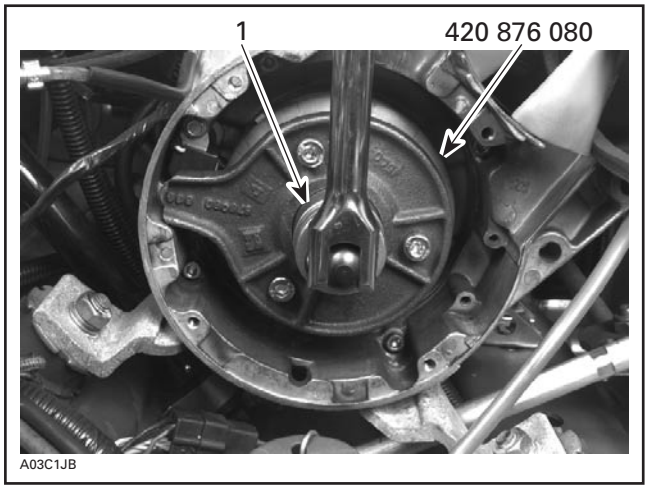
CAUTION: Use only M8 x 20 mm screws to bolt puller to magneto flywheel. When a counterweight no. 7 is installed on magneto flywheel use M8 x 30 mm screws.



TYPICAL
1. Tab in magneto housing opening
2. M8 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, first tap on the fastener to break threadlocker bond. This will avoid thread breakage.



TYPICAL
1. 30 mm socket

To remove magneto flywheel, install crankshaft protector (P/N 420 876 557) on crankshaft end. Screw puller (P/N 529 035 547) into puller ring.

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

Stator

NOTE: Always check stator **no. 6** before changing it, refer to TESTING PROCEDURE.

Remove:

– magneto flywheel **no. 3**
– all Allen socket screws retaining stator to magneto housing
– grommet from crankcase where trigger coil and stator wires exit magneto housing.

Unplug the trigger coil connectors and pull the wires through the grommet location.

NOTE: To pass the stator connector into the grommet location it is necessary to pass the trigger coil connector first.

Unplug the stator connector and remove the stator.

Trigger Coil

NOTE: Always check trigger coils **no. 5** before changing them. Refer to OVERVIEW section.

To replace the trigger coil(s), remove the following:

– magneto flywheel **no. 3**
– Air intake silencer to allow an access to the trigger coil connectors (if necessary).
– Disconnect trigger coil connector housing(s).
– grommet from crankcase where trigger coil wire(s) exit(s) magneto housing.
– retaining screws **no. 4**.
– trigger coil(s) and carefully pull wires.

ASSEMBLY

Trigger Coil

For installation, reverse the removal procedure.

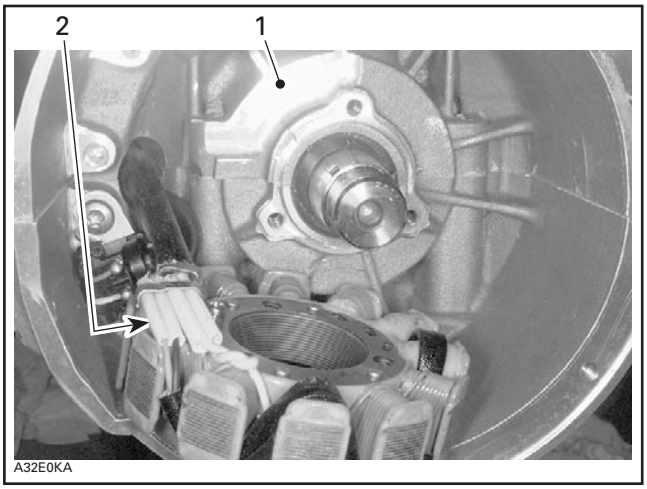
NOTE: It is important to remove the old silicon at trigger coil location then apply new silicon. Screw trigger coil then stick the trigger coil wires in the silicon.

Stator

Insert the stator connector into crankcase grommet then the trigger coil connector(s).

Install the grommet on crankcase

Position stator **no. 6** so that its wire protectors are over crankcase recess.



1. Crankcase recess
2. Wire protectors

NOTE: During installation, make sure the stator harness is located on the left side.

Apply Loctite 243 on threads of stator screws then torque them to 9 N•m (80 lbf•**in**).

Reinstall all other removed parts.

Magneto Flywheel

Clean crankshaft extension (taper) and apply Loctite 243 (blue) on taper, then position Woodruff key, magneto flywheel **no. 3** and lock washer on crankshaft.

Clean magneto flywheel nut threads and apply Loctite 243 (blue) then tighten nut **no. 1** to 125 N•m (92 lbf•ft) for liquid cooled engines.

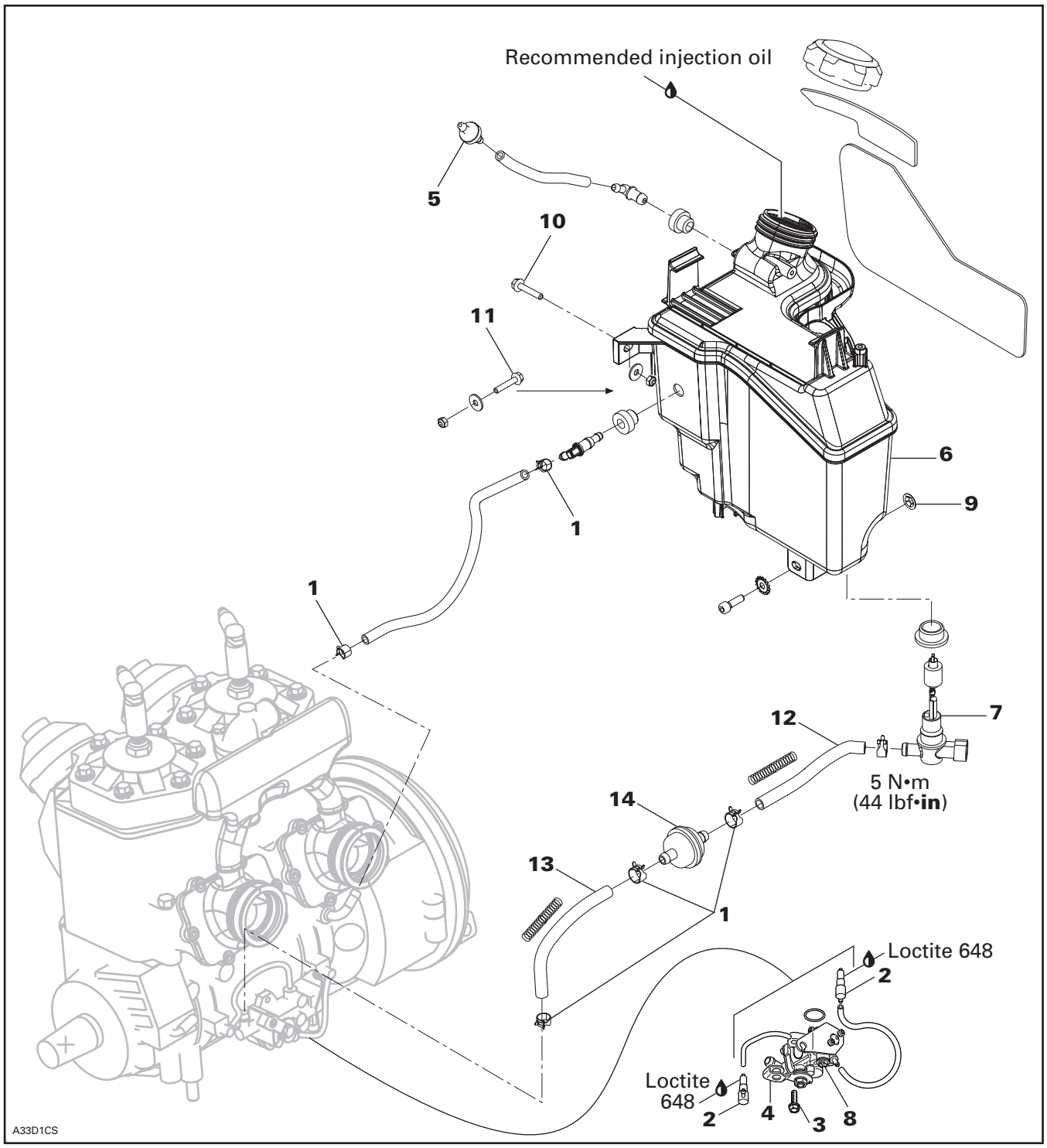
At reassembly coat all electric connections except Deutsch housings (waterproof housing) with silicone dielectric grease (P/N 293 550 004) to prevent corrosion or moisture penetration.

CAUTION: Do not use silicone «sealant», this product will corrode contacts. Do not apply silicone dielectric grease on any Deutsch waterproof housing otherwise housing seal will be damaged.

Ignition Timing

Check as described in IGNITION TIMING.

OIL INJECTION SYSTEM



GENERAL

During assembly/installation, use the torque values and service products as in the exploded views.

Clean threads before applying a threadlocker. Refer to SELF-LOCKING FASTENERS and LOCTITE APPLICATION at the beginning of this manual for complete procedure.

⚠ WARNING

Torque wrench tightening specifications must strickly be adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be installed or replaced with new ones where specified. If the efficiency of a locking device is impaired, it must be renewed.

⚠ WARNING

Wipe off any oil spills. Oil is highly flammable.

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

OIL TYPE

MODEL	OIL TYPE
2-TEC SDI	BOMBARDIER FORMULA XP-S II synthetic injection oil (1)
All others 2-stroke engines	BOMBARDIER FORMULA XP-S II synthetic injection oil OR BOMBARDIER injection oil (2) (3)

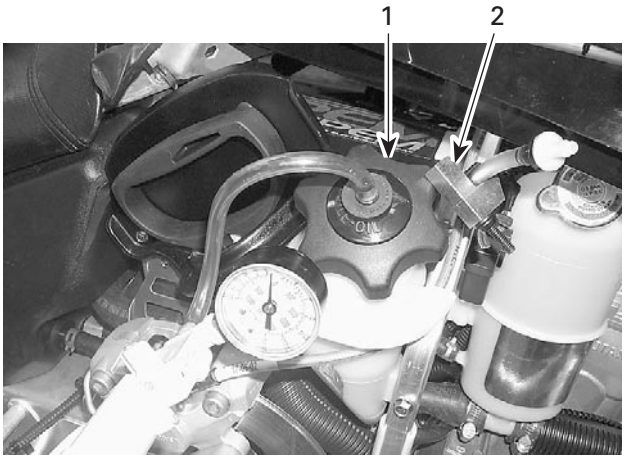
(1) **CAUTION: The BOMBARDIER Formula XP-S II synthetic injection oil is specially formulated and tested for the severe requirement of these engines. Use of any other brand two-stroke oil may void the limited warranty. Use only BOMBARDIER Formula XP-S II synthetic injection oil. There is no known equivalent on the market for the moment. If a high quality equivalent were available, it could be used.**
(2) If BOMBARDIER injection oil is not available, API TC high-quality low ash two-stroke injection oil may be used.
(3) BOMBARDIER FORMULA XP-S II synthetic injection oil and BOMBARDIER injection oil are compatible, they can be mixed together.

OIL SYSTEM LEAK TEST

The following test will indicate any leak from oil reservoir and all other component of oil system.

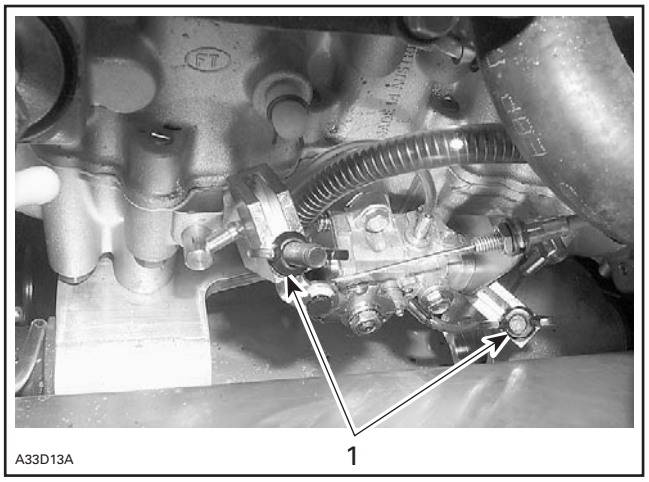
Install on oil reservoir special cap of leak testing kit (P/N 529 033 100).

Install hose pinchers (P/N 295 000 076) on oil reservoir check valve outlet hose.



1. Special cap on reservoir
2. Hose pinchers on check valve outlet hose

Remove air silencer and carburetor to gain access to the oil pump hoses.Install hose pinchers (P/N 295 000 076) on outlet hoses.



1. Hose pinchers on outlet hoses

Connect leak testing kit pump to special cap.

Pressurize oil system to 21 kPa (3 PSI). That pressure must not drop during 3 minutes.

If pressure drops, locate leak(s) and repair/replace leaking component(s).

NOTE: An oil pump shaft test must be done to complete the oil system leak test. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT for the procedure.

OIL PUMP IDENTIFICATION

Pump Lever

Different engines need different pumps. See identification on lever **no. 4**.

CAUTION: Always mount proper pump on engine.

ENGINE TYPE	OIL PUMP IDENTIFICATION
593, 593 HO and 593 HO SDI	02
793 HO and SDI	01

CLEANING

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

DISASSEMBLY

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

Injection Oil Reservoir

Empty injection oil reservoir **no. 6** by siphoning injection oil.

Remove:
- air box
- upper screw (near reservoir cap)
- rewind starter support and grip
- hose protector support
- electronic module (MPEM)
- lower nut **no. 9**, screw **no. 10** and **no. 11**.

NOTE: Cut the ties retaining the wiring harness if necessary.

Injection Oil Level Sensor

To remove the switch, use the following procedure.

Remove injection oil reservoir, as mentioned above..

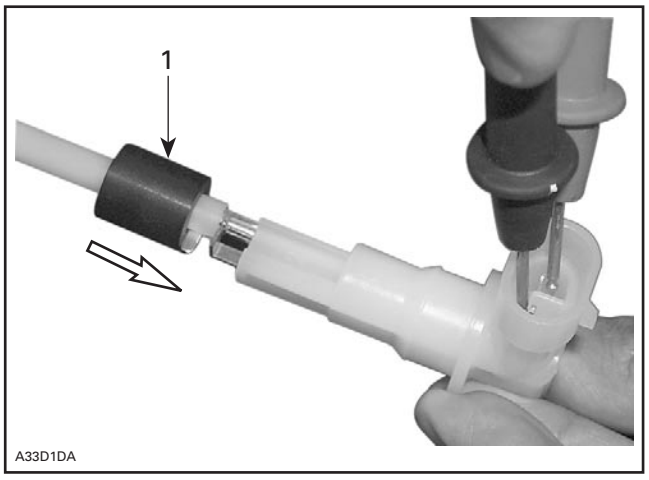
Unplug switch connector.

Pull oil level switch **no. 7** out of reservoir.

Before replacing the injection oil level sensor **no. 7**, check it according to the following procedure:

CAUTION: Do not remove or bend the reed switch protective float lock. It can damage the reed switch glass.

With the float magnet ring at the lowest position. Using an ohmmeter, probe the connector.



1. Float magnet at the end position

Reading below 0 ohm reflects the proper sensor function. Replace the oil level sensor if reading above 0 ohm.

Injection Oil Filter

Remove air box and carburetor or throttle body.

Siphon injection oil reservoir.

Disconnect oil filter hose **no. 12** from the reservoir **no. 6**.

Disconnect oil hoses **no. 12** and **no. 13** from the oil filter **no. 14** and remove it.

Injection Oil Pump

NOTE: Before removing the injection oil pump **no. 8**, check its operation. Refer to the end of this section.

Remove:

– air box
– carburetor or throttle body
– screw **no. 3**.

Unplug all hoses connected to oil pump **no. 4**.

NOTE: Mark hose locations for installation.

Disconnect the oil pump cable.

Check Valve

NOTE: Before removing check valve **no. 2**, check its operation. Refer to the end of this section.

Remove air box and carburetor or throttle body.

Clean check valve area to remove oil or dirt.

Heat check valve **no. 2** then pull it out of crankcase.

ASSEMBLY

NOTE: During installation, always check for spring clips **no. 1** tightness.

Injection Oil Reservoir

For installation, reverse the removal procedure.

Injection Oil Level sensor

For installation, reverse the removal procedure.

Injection Oil Filter

For installation, reverse the removal procedure.

NOTE: The filter must be installed with the arrow pointing toward the pump.

Injection Oil Pump

For installation, reverse the removal procedure. However, pay attention to the following.

Torque the 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.

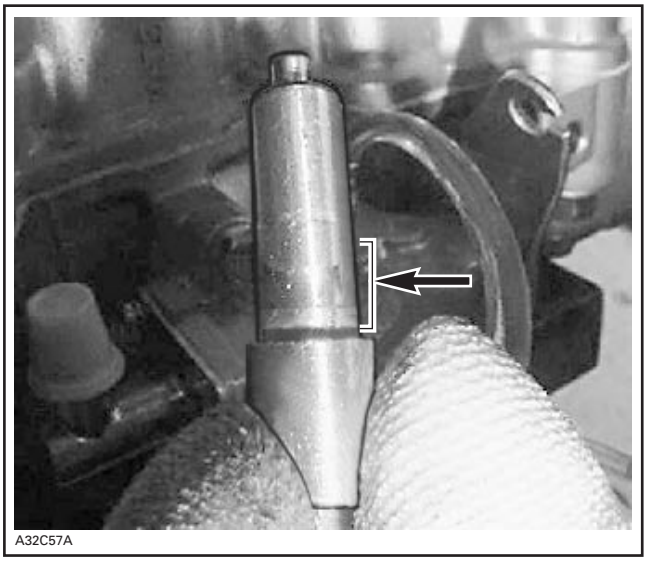
Install cable lock washer on left side of support.

Verify cable and oil pump lever operation then adjust cable.

Check Valve

Apply Loctite 648 (green) (P/N 413 711 400) on the outer diameter of the check valve (machined section). Take care that Loctite is ONLY in this area.

NOTE: Prior to coating it with Loctite, make sure check valve body is clean and dry. Clean from dirt or oil, if any, with pulley flange cleaner (P/N 413 711 809).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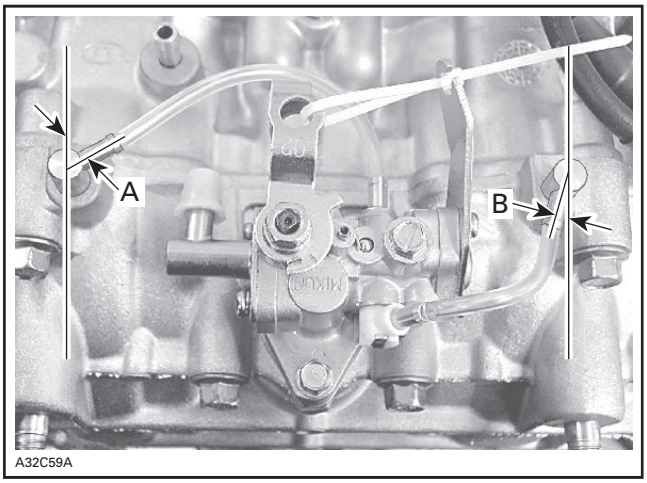
APPLY LOCTITE ON THIS AREA ONLY

Install the check valve in the correct position as described on next photos into the crankcase lower side.



A32C59A

TYPICAL
A. PTO side 45° ± 5° from cylinder axis to the top
B. MAG side 20° ± 5° from cylinder axis to the bottom

Punch in the check valve carefully with a plastic hammer.

Clean the crankcase from surplus of Loctite 648 with a rag.

ADJUSTMENT

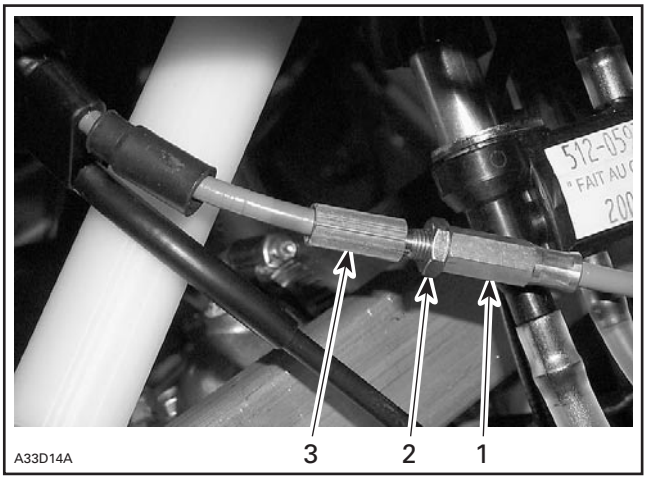
Oil Pump Cable

Prior to adjusting the pump, make sure throttle cable adjustment is completed and engine is stopped.

Stretch the adjusting cable through a maximum force of 32 N•m (7.2 lbf•ft).

NOTE: It is better to have two persons to check the cable distance. One stretching the cable and other taking measurements.

Check the visible distance of the stretched cable, while one person is stretching it and other checking the distance.

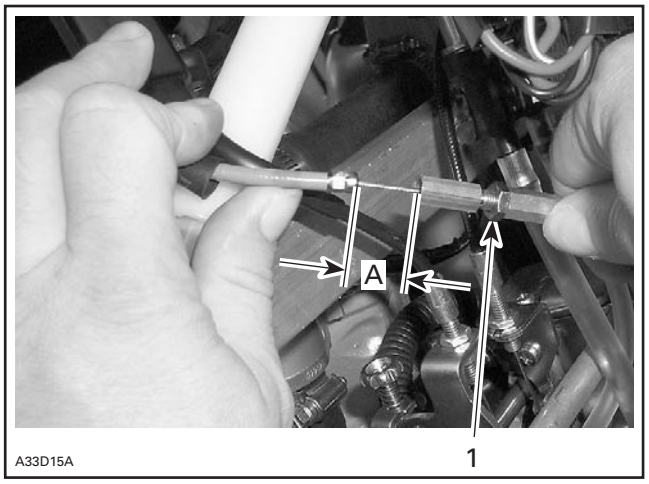


A33D14A

1. Adjusting cable
2. Lock nut
3. Adjusting screw

Refer to the following table to know the visible stretched distance of the cable.

MODELS	VISIBLE STRETCHED DISTANCE
593 , 593 HO, 593 HO SDI and 793 HO	18 ± 0.3 mm 0.71 ± 0.12 in
793 SDI	19.5 ± 0.3 mm 0.77 ± 0.12 in



TYPICAL
1. Lock nut
A. Visible stretched distance

If the visible distance is less or more than specified above, adjust the cable distance accordingly. To do so, loosen lock nut, turn adjusting screw in or out, retighten lock nut.

To Bleed Oil Lines

Bleed main oil line (between reservoir and pump) by loosening the bleeder screw **no. 8** until air has escaped from the line. Add injection oil as required.

Reinstall all parts.

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

NOTE: Make a J hook out of mechanical wire to lift the lever.

⚠ WARNING

No ensure not 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. Unplug small oil lines from pump. Start engine and stop it as soon as it fires.

Check that oil in small oil lines has been sucked up (this will be indicated by a clear section of small oil lines). Repeat the procedure until this condition is attained.

Reconnect small oil lines, start engine and run at idle while holding the pump lever in fully open position. Oil columns must advance into small oil lines.

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

NOTE: Through normal use, oil level must not drop in small tubes. If oil drops, verify check valve operation in injection nozzle. 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 clockwise rotating drill rotate pump shaft. Oil must drip from outer fittings while holding lever in a fully open position. If not replace pump.

Check Valve

For all engines, check valve **no. 2** is part (built-in) of injection nozzle.

To verify the check valve, proceed the same as for checking pump operation on vehicle. First unplug oil line from check valve. After restarting the engine, check that a clear section in small oil line is present. Reconnect oil line.

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

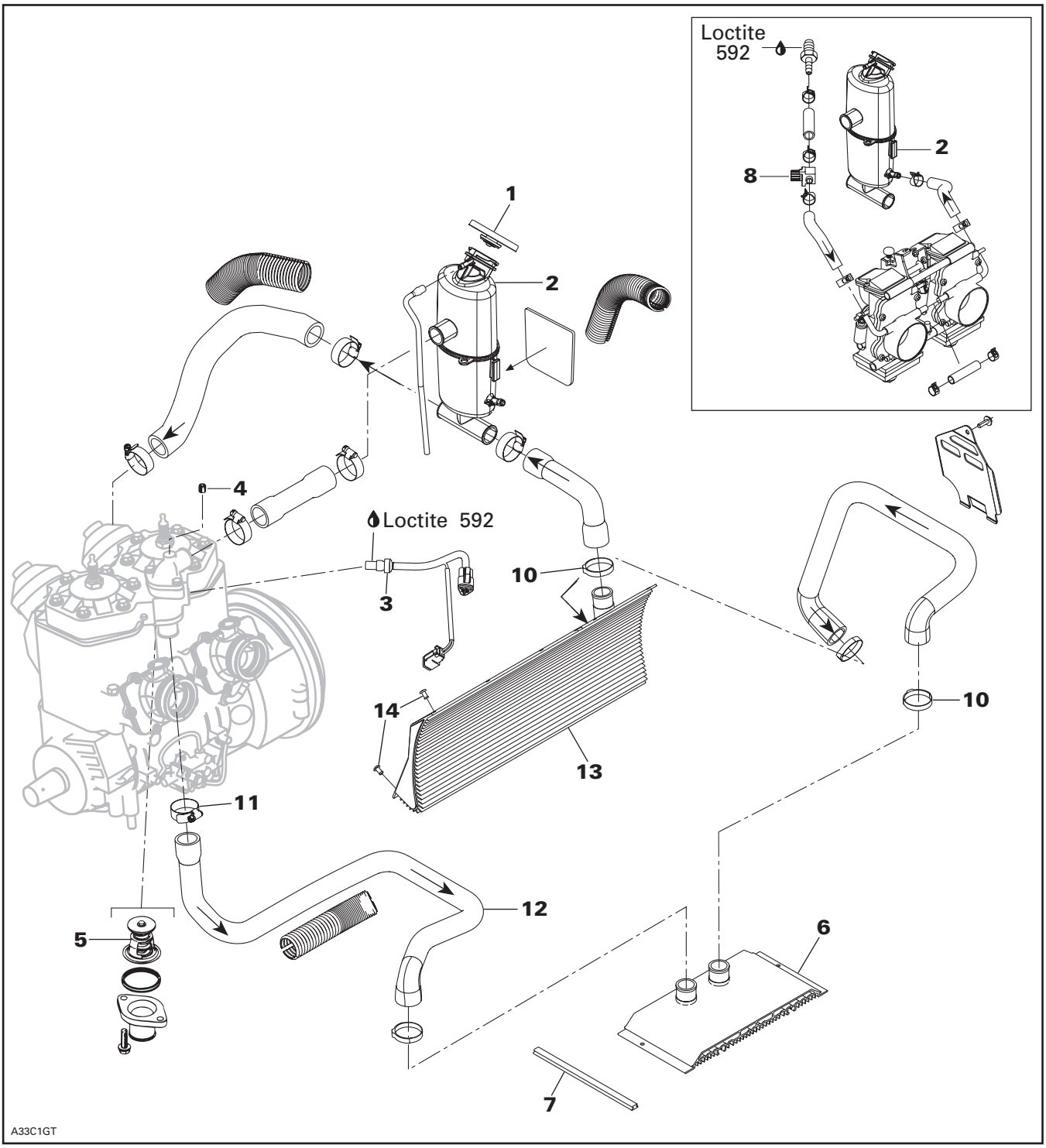
Oil Reservoir Check Valve

It allows air to get into the reservoir. To verify this one-way check valve, remove it along with the hose. Make sure that it holds pressure and that it does not let air go through.

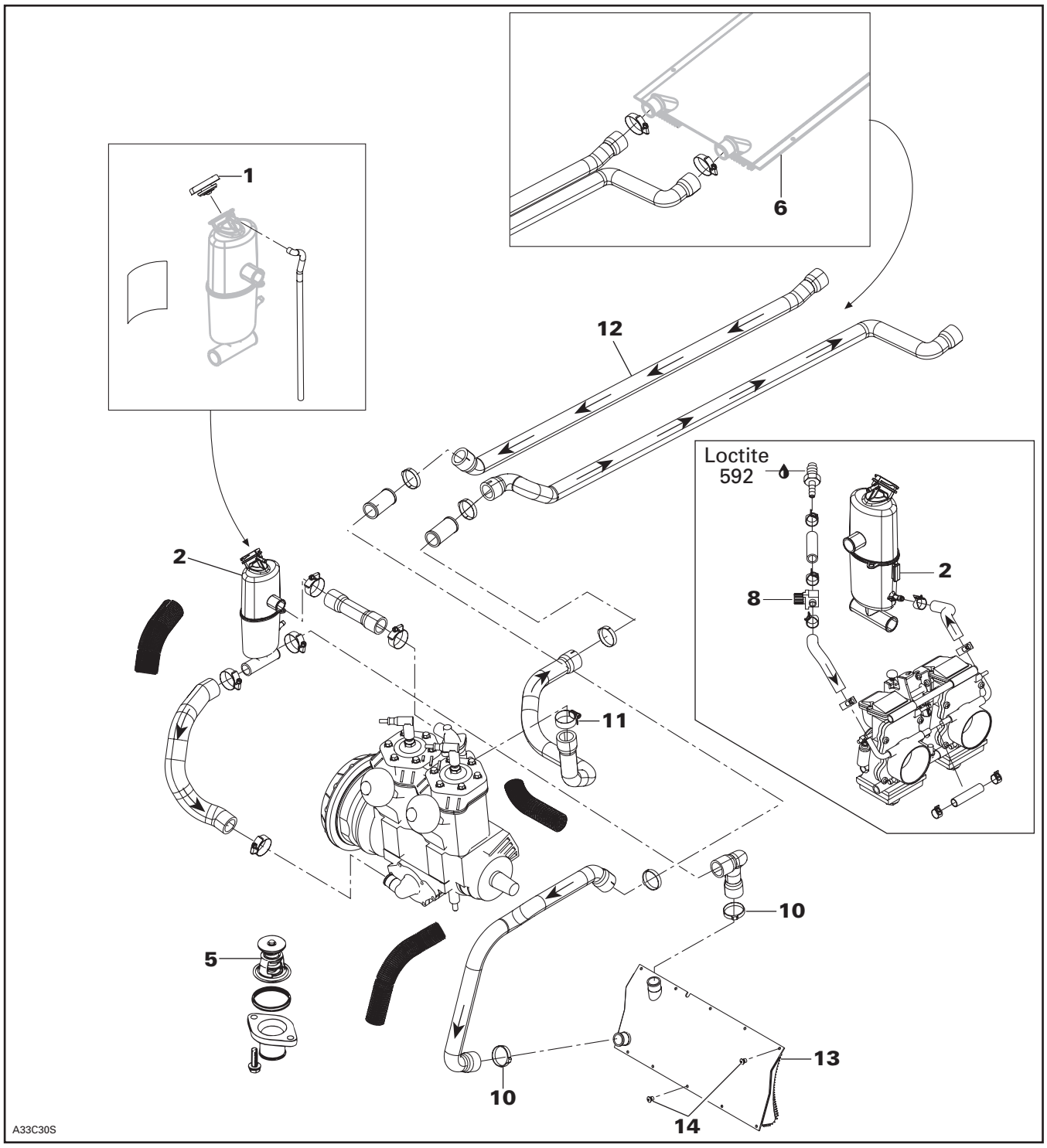
While installing this check valve make sure that the black side is towards the reservoir.

LIQUID COOLING SYSTEM

All Models except Summit



All Summit Models



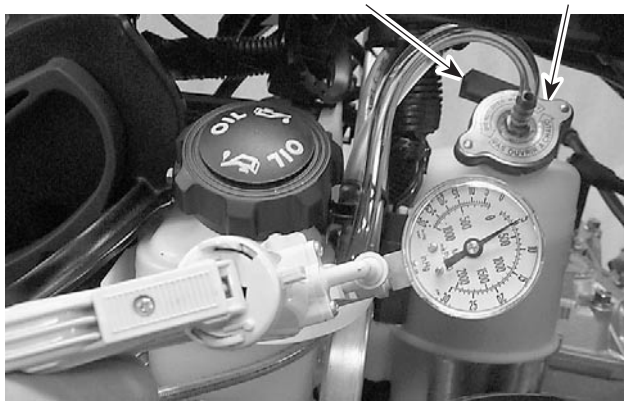
COOLING SYSTEM LEAK TEST

⚠ WARNING

To prevent burning yourself, do not remove the radiator cap if the engine is hot.

Install special radiator cap (P/N 529 021 400) included in engine leak tester kit (P/N 861 749 100) on coolant tank. Install hose pincher (P/N 295 000 076) on overflow hose. Using pump also included in kit pressurize all system through coolant reservoir to 100 kPa (15 PSI).

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



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INSPECTION

Check general condition of hoses and clamp tightness.

DRAINING THE SYSTEM

⚠ WARNING

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

To drain the cooling system, siphon the coolant mixture from the coolant tank **no. 2** using the siphon tool (P/N 529 035 880). Disconnect hose at water pump to drain coolant from engine.

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

DISASSEMBLY AND ASSEMBLY

Coolant Pump

Refer to BOTTOM END section.

Sender and Plug

Apply Loctite 592 (P/N 293 800 018) thread sealant on sender **no. 3** and plug **no. 4** to avoid leaks.

Pressure Cap

Check if the cap **no. 1** pressurizes the system for 3 minutes. If not, install a new 90 kPa (13 PSI) cap (do not exceed this pressure).

Coolant Tank

For removal, drain cooling system before removing coolant tank **no. 2**.

Remove all hoses from coolant tank.

Remove injection oil reservoir retaining screws to slide down the coolant tank to disengage it from oil tank.

NOTE: It is necessary to move oil tank for an easier removal/installation of coolant tank.

Check if the tank is cracked or melted. Replace if necessary.

For installation, reverse the removal procedure.

Front Radiator

Remove all debris between radiator fins. A clean radiator is more efficient than a dirty one.

Check if the radiator fins are damaged. Replace the front radiator **no. 13** if necessary.

NOTE: A radiator with many broken fins does not work properly.

For disassembly, drain cooling system.

Remove rear suspension (refer to REAR SUSPENSION).

Using Supertanium™ bit (P/N 529 031 800), drill all rivets **no. 14** retaining front radiator to the frame or grind the rivets with a grinding disk.

Pull the radiator a little and remove the Oetiker clamps **no. 10**.

For installation, reverse the removal procedure.

Rear Radiator and Rear Radiator Protector

Refer to FRAME for rear radiator removal/installation procedures.

For cleaning and inspection refer to FRONT RADIATOR.

Radiator and Radiator Protector

Insert radiator protector **no. 7** into radiator C-rail and crimp C-rail at rear end. Refer to FRAME for radiator **no. 6** removal.

Thermostat

For disassembly of thermostat **no. 5**, drain the cooling system (see above).

Unscrew clamp **no. 11** retaining hose **no. 12** to the water outlet socket.

Remove:

– water outlet
– socket screws
– gasket thermostat.

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

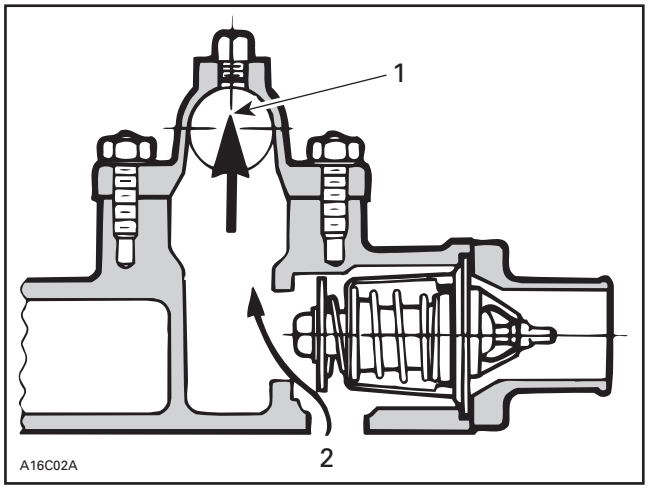
To check thermostat, put in water and heat water. Thermostat should start to open when water temperature reaches the following degree.

ENGINE	TEMPERATURE
All	42°C (108°F)

It will be almost fully open at 50°C (122°F).

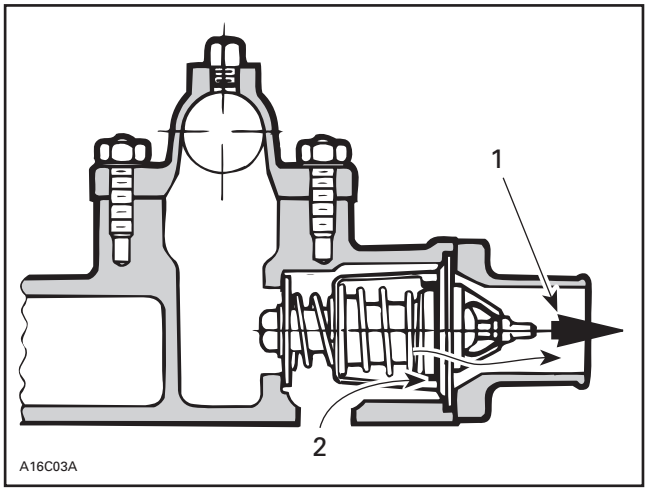
Thermostat is a double action type.

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



TYPICAL — CLOSED THERMOSTAT, COLD ENGINE
1. To reservoir
2. From cylinders

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



TYPICAL — OPEN THERMOSTAT, WARM ENGINE
1. To radiators
2. From cylinders

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

For installation, reverse the removal procedure.

COOLING SYSTEM REFILLING PROCEDURE

CAUTION: To prevent rust formation or freezing condition, always replenish the system with the Bombardier premixed coolant or with 50% antifreeze and 50% water. Pure antifreeze without water freezes (like slush ice). Always use ethylene glycol antifreeze containing corrosion inhibitors specifically recommended for aluminum engines.

System Capacity

Refer to TECHNICAL DATA.

Refilling Procedure

IMPORTANT: USE THE 50/50 PREMIXED COOLANT - 37°C (- 35°F) (P/N 293 600 038). Do not reinstall pressure cap.

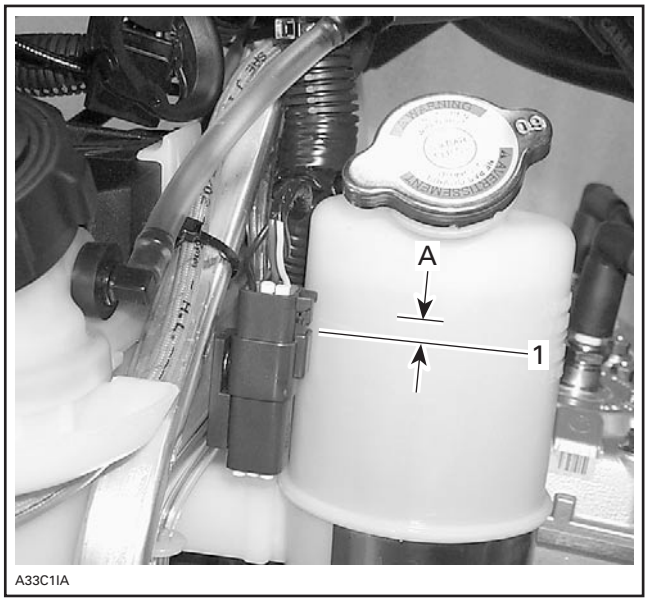
With engine cold, refill coolant tank up to COLD LEVEL line. Start engine. Refill up to line while engine is idling until rear radiators are warm to the touch (about 4 to 5 minutes). Always monitor coolant level while filling tank to avoid emptying. Install pressure cap.

Lift rear of vehicle and support it safely.

Activate throttle lever 3 - 4 times to bring engine speed to 7000 RPM.

Apply the brake.

Lower vehicle back on ground and add coolant up to 15 mm (1/2 in) above the COLD LEVEL line.



1. Cold level line
A. 15 mm (1/2 in)

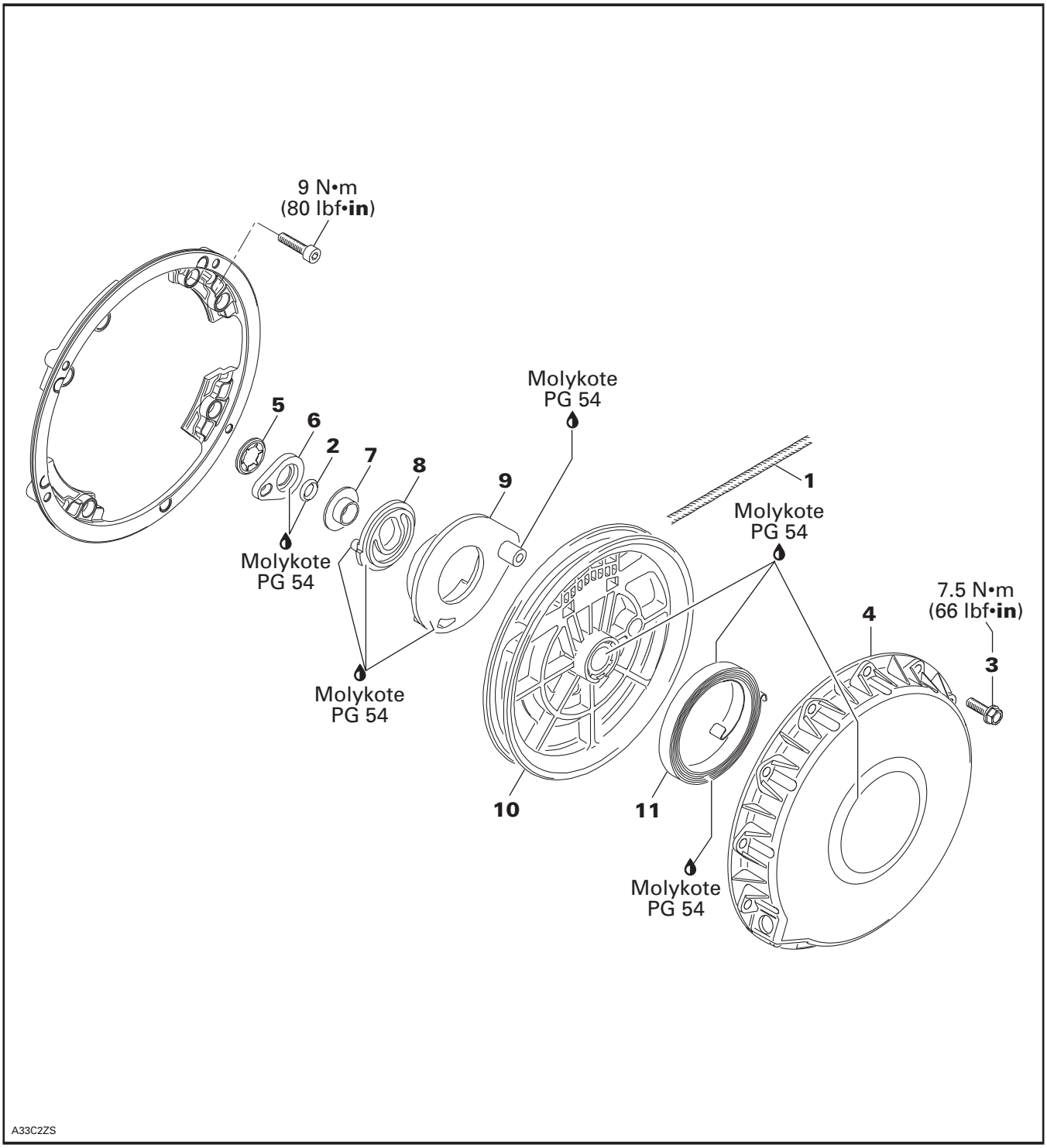
Lift front of vehicle of 60 cm (24 in) and support it safely. Let the vehicle idle for two minutes.

Put vehicle back on ground and add coolant up to 15 mm (1/2 in) over COLD LEVEL line.

When engine has completely cooled down, recheck coolant level in coolant tank and refill up to line if needed.

Check for coolant mixture freezing point. Specification is - 37°C (- 35°F). Adjust as necessary.

REWIND STARTER



INSPECTION

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 be lubricated periodically using Molykote PG 54 (P/N 420 899 763). Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Check if rope **no. 1** is fraying, replace if so.

When pulling starter grip, mechanism must engage within 30 cm (1 ft) of rope pulled. If not, disassemble rewind starter, clean and check for damaged plastic parts. Replace as required, lubricate, reassemble and recheck. Always replace O-ring **no. 2** every time rewind starter is disassemble.

When releasing starter grip, it must return to its stopper and stay against it. If not, check for proper spring preload or damages. Readjust or replace as required.

When pulling starter grip 10 times in a row, it must return freely. If not, check for damaged parts or lack of lubrication. Replace parts or lubricate accordingly.

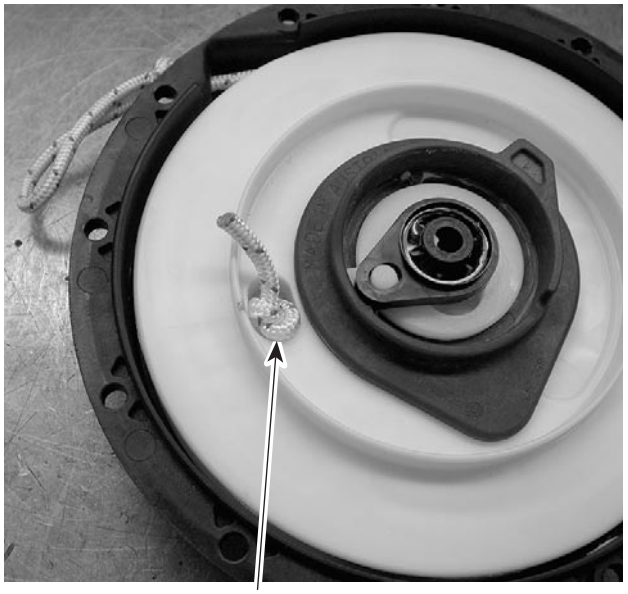
REMOVAL

Using a small screwdriver, extract rope knot from starter grip. Cut rope close to knot. Tie a knot near starter.

Remove screws **no. 3** securing rewind starter housing **no. 4** to engine then remove rewind starter.

ROPE REPLACEMENT

Pull out rope. Hold rewind starter in a vise. Slide rope and untie the knot. Pull out the rope completely.



1. Knot to be untied

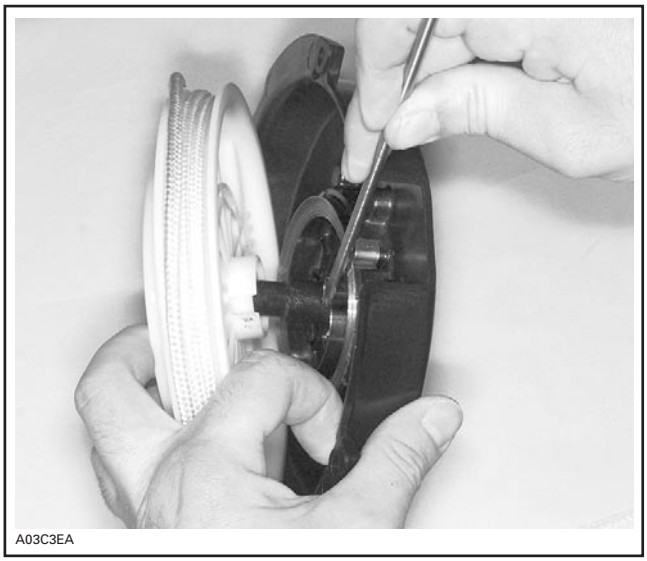
NOTE: When rope is completely pulled out, spring preload is 4-1/2 turns.

DISASSEMBLY

Undo knot previously tied at removal. Carefully let sheave unwind to release spring preload.

Remove push nut **no. 5** and discard. Remove locking element **no. 6**, O-ring **no. 2**, step collar **no. 7**, pawl lock **no. 8** and pawl **no. 9**.

Remove sheave **no. 10** from rewind starter housing **no. 4**. Hold spring with a screwdriver.



Take out knot and then pull out rope **no. 1**.

ASSEMBLY

At assembly, position spring **no. 11** outer end into spring guide notch then wind the spring counterclockwise into guide.

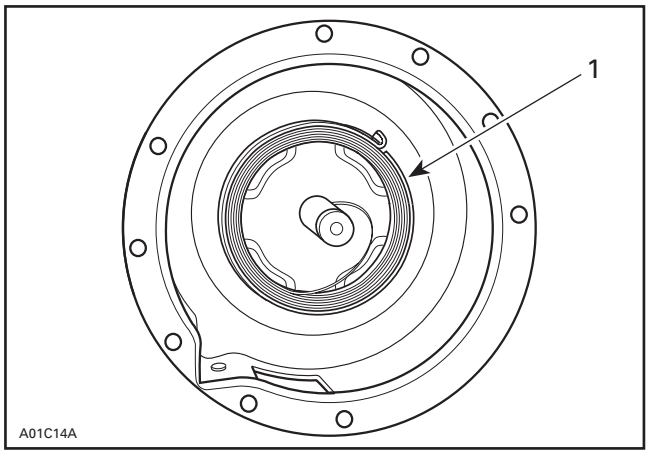
⚠ WARNING

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

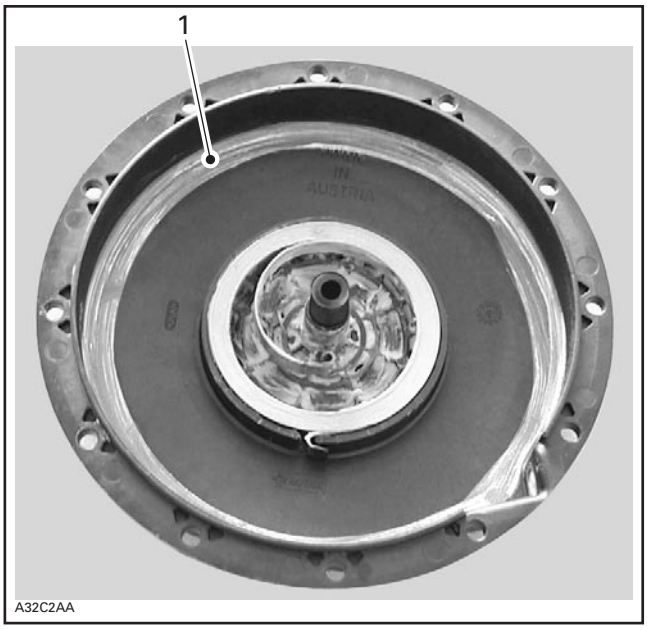
TYPICAL
1. Outer end into guide notch

CAUTION: It is of the utmost importance that the rewind starter spring be lubricated periodically using Molykote PG 54 (P/N 420 899 763). Otherwise, rewind starter component life will be shortened and/or rewind starter will not operate properly under very cold temperatures.

Lubricate spring assembly and 1 cm (1/2 in) wide on bottom of housing with Molykote PG 54 (P/N 420 899 763).



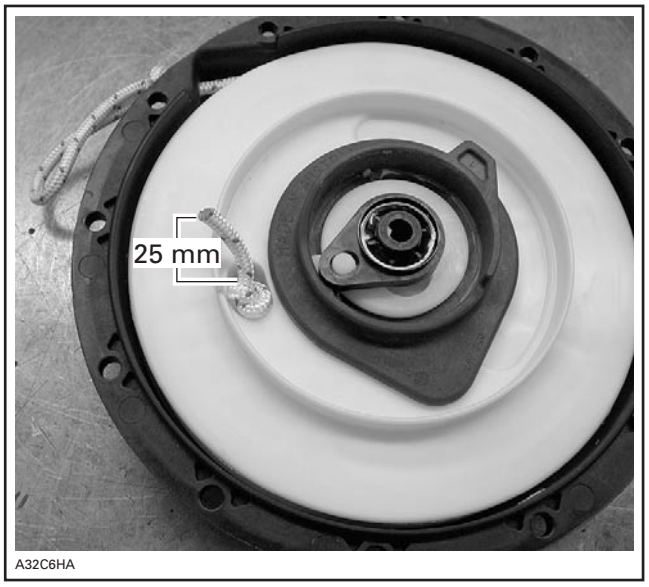
TYPICAL
1. Molykote PG 54 inside spring guide



1. Molykote PG 54 applied 1 cm (1/2 in) wide on bottom of housing

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

To install rope **no. 1**, insert rope into sheave **no. 10** orifice and lock it by making a knot, leaving behind a free portion of about 25 mm in length. Fuse rope end with a lit match and insert it into sheave.



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FREE PORTION

A32C6IA

FREE PORTION INSERTED INTO SHEAVE

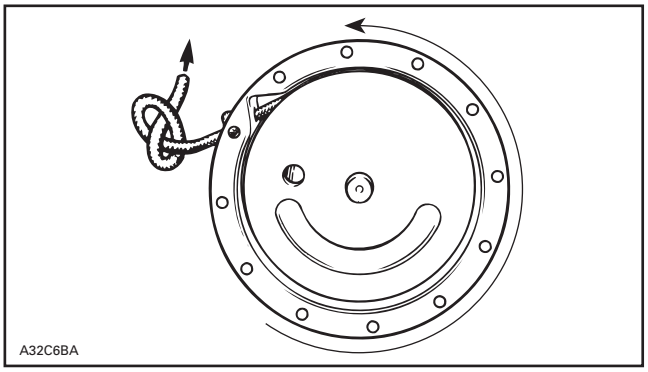
Lubricate housing post with Molykote PG 54 . Install sheave.

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 rope exit hole. This will give 1/2 turn of preload.

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



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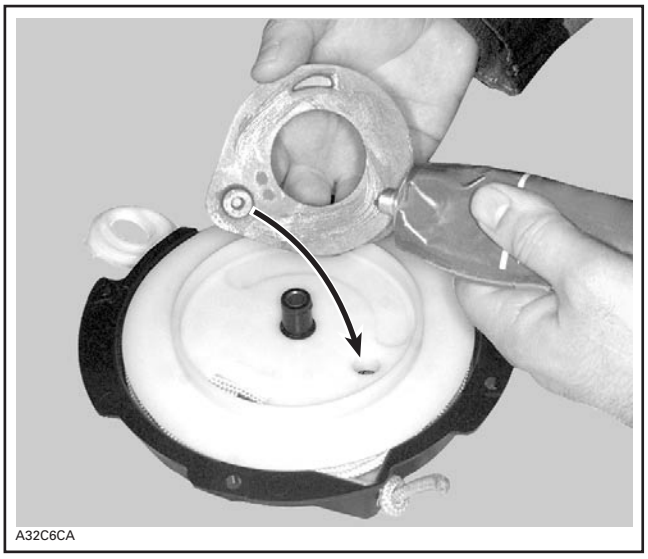
TYPICAL

Lubricate pawl **no. 9** with Molykote PG 54 (P/N 420 899 763) then install over rope sheave.



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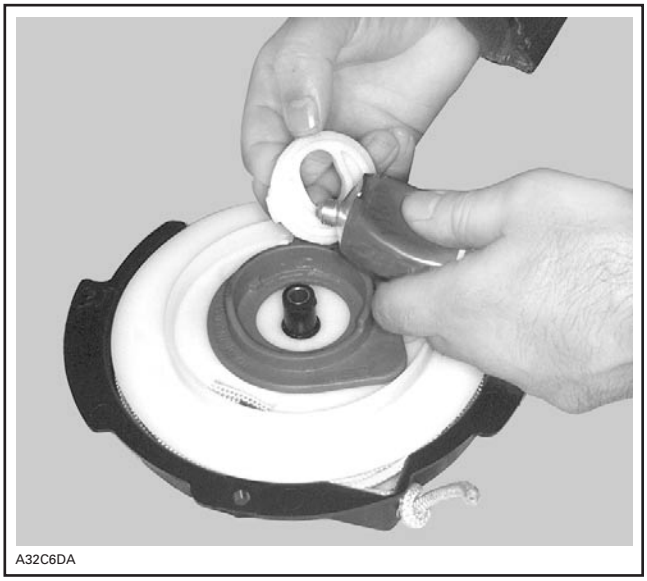
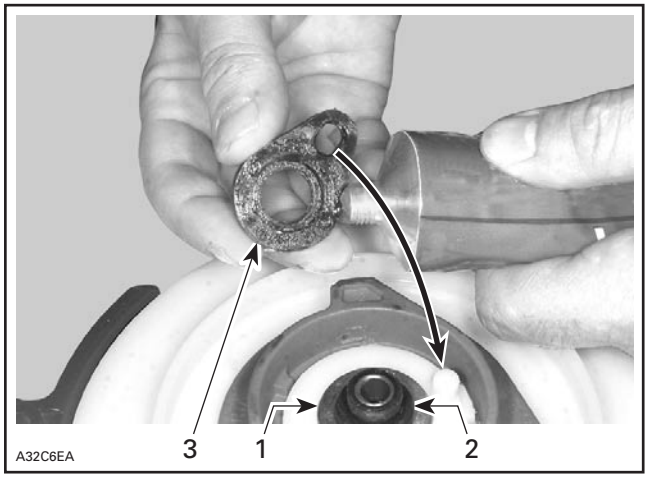
Lubricate pawl lock **no. 8** with Molykote PG 54 (P/N 420 899 763). Install over pawl.


A32C6DA

Install step collar **no. 7** with its sleeve first. Lubricate a new O-ring **no. 2** and locking element **no. 8** with Molykote PG 54 (P/N 420 899 763). Install over pawl lock.



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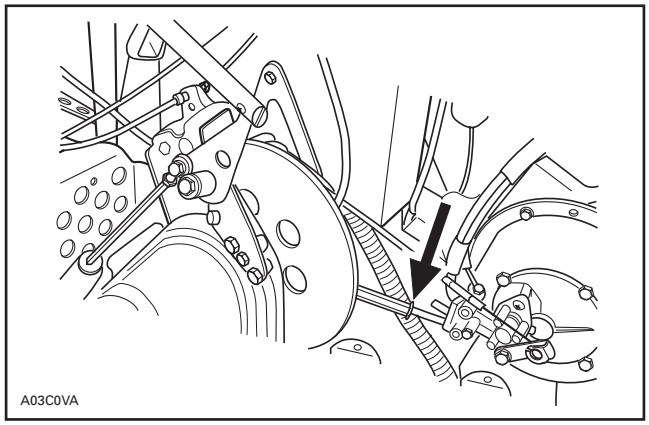
1. Step collar
2. O-ring
3. Locking element

Install a new push nut **no. 5**.

INSTALLATION

Fuse rope end with a lit match.

Thread starter rope **no. 1** through rope guide when applicable.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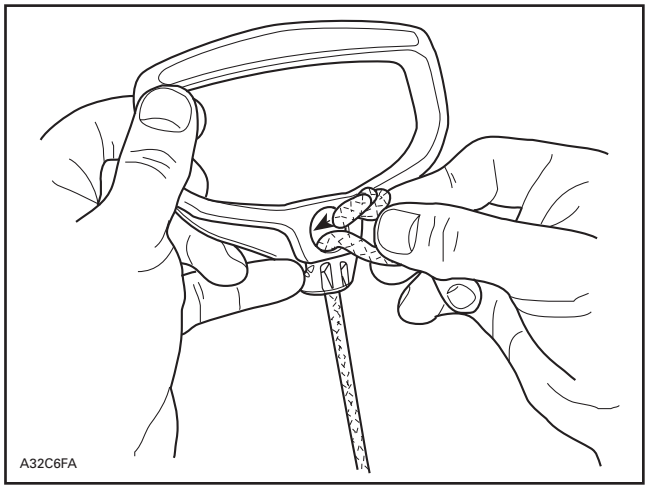
TYPICAL

Reinstall rewind starter assembly on engine.

Prior to installing starter grip on new rope, it is first necessary to fuse the rope end with a lit match. Pass rope through starter grip and tie a knot in the rope end. Fuse the knot with a lit match then insert rope end down and pull the starter grip over the knot.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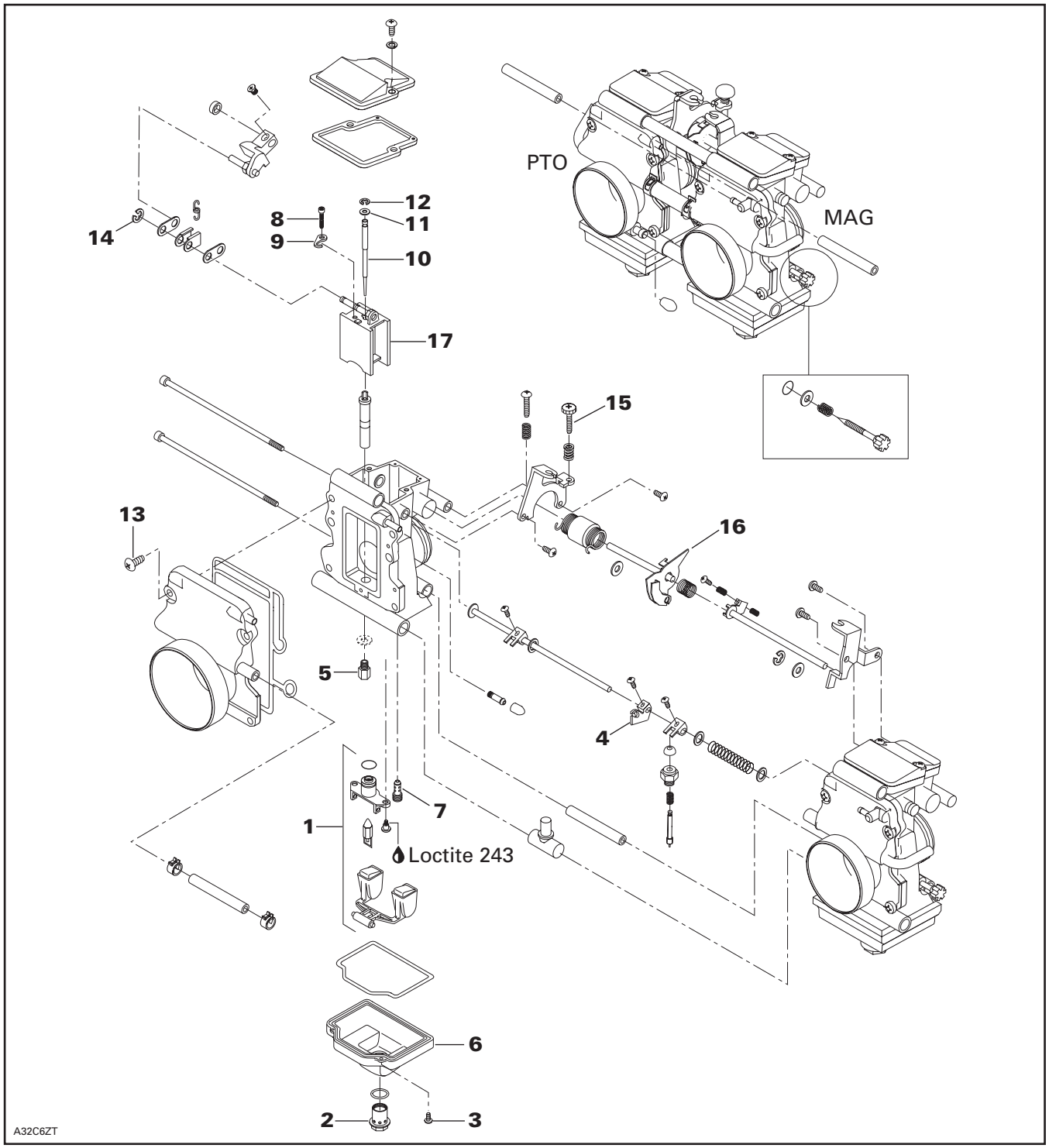
TYPICAL

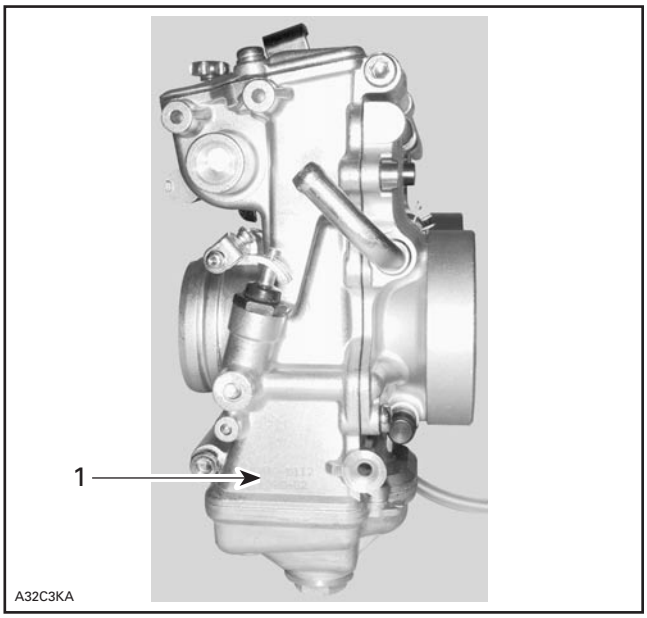
CARBURETOR AND THROTTLE CABLE

CARBURETOR TM TYPE



IDENTIFICATION

TM type dual carburetor ass'y is identified on PTO side carburetor body.



TYPICAL
1. Identification: TM 40-B112

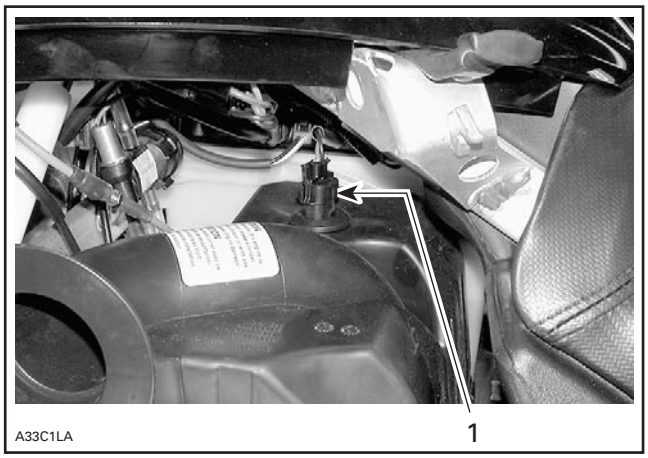
REMOVAL

All Models

Lift hood and open LH side panel.

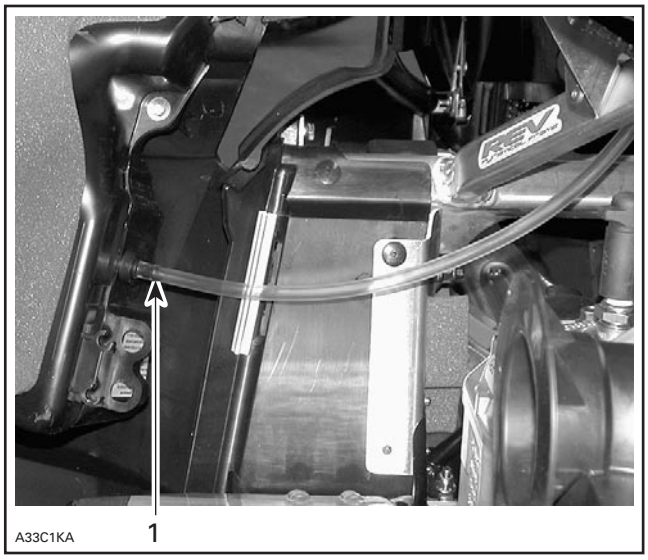
DPM Models

Disconnect air temperature sensor connector at air silencer.



1. Disconnect

Disconnect DPM air vent hose nipple from air silencer.



1. Disconnect here

Non-DPM Models

Disconnect carburetor float bowl vent hose nipple from air silencer.

DPM Models

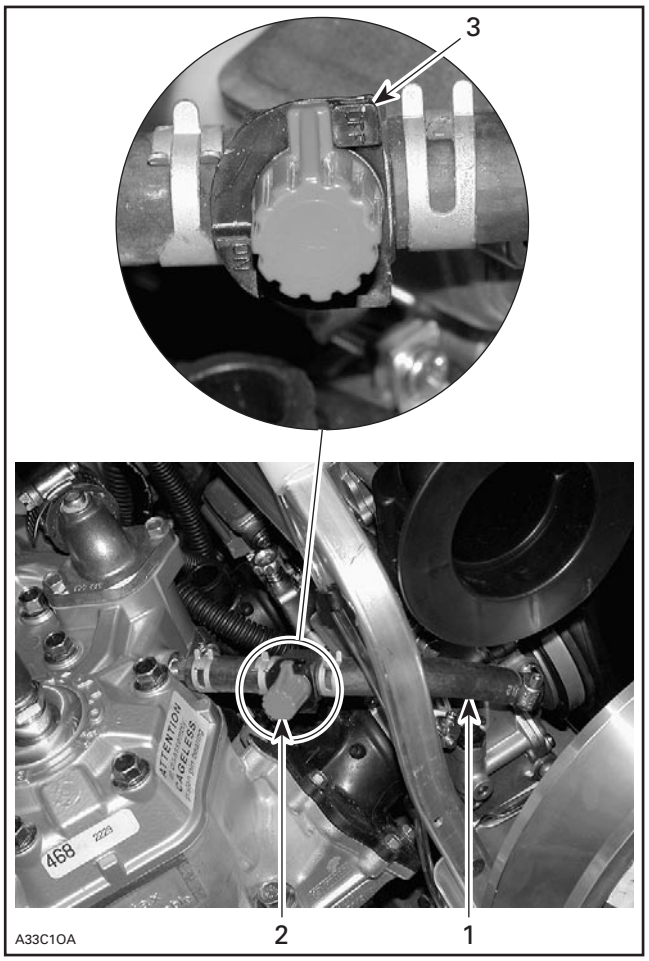
Unhook DPM manifold from its support.

All Models

Loosen clamps retaining air silencer adapter to carburetor assembly and remove air silencer.

Heated Carburetor Models

Close valve at heated carburetor coolant inlet line.



1. *Inlet line*
2. *Valve*
3. *OFF*

Disconnect heated carburetor coolant **inlet** line taking care to recuperate coolant.

All Models

Disconnect throttle and choke cables.

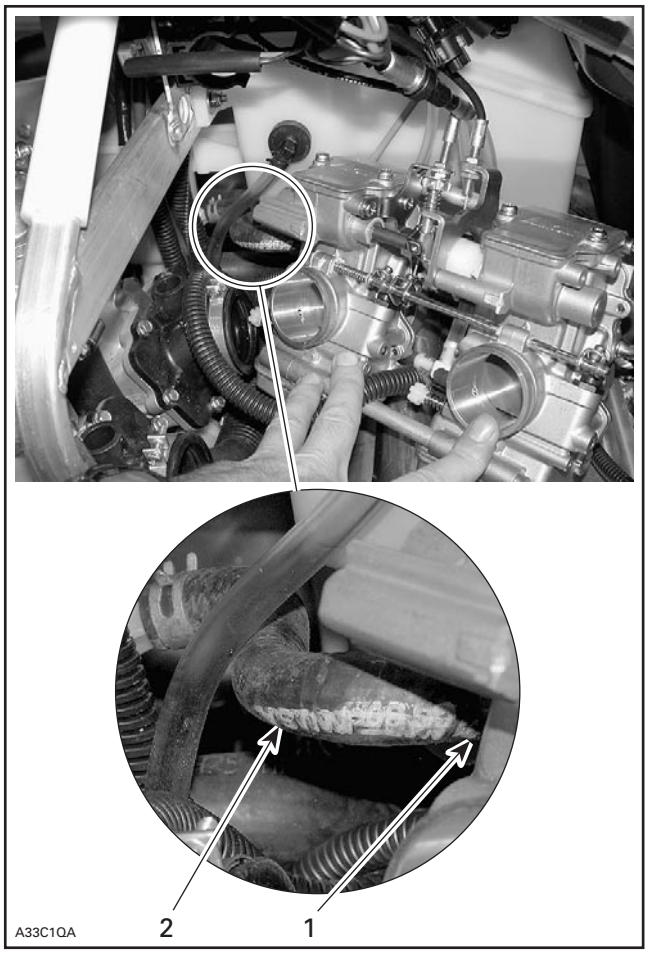
Loosen clamps retaining dual carburetor assembly to carburetor sockets.

Remove dual carburetor assembly, pinch and disconnect fuel line. Take care to recuperate fuel.

⚠ WARNING

Fuel is flammable and explosive under certain conditions. Always wipe off any fuel or oil spillage from the vehicle. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

Pinch heated carburetor coolant **outlet** line.



1. *Outlet line*
2. *Pinch here*

Disconnect **outlet** line from carburetor assembly taking care to recuperate coolant.

CLEANING AND INSPECTION

All Models

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. When jets are very dirty or coated with varnish and gum, replace them.

⚠ WARNING

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

Check throttle slide for wear. Replace as necessary.

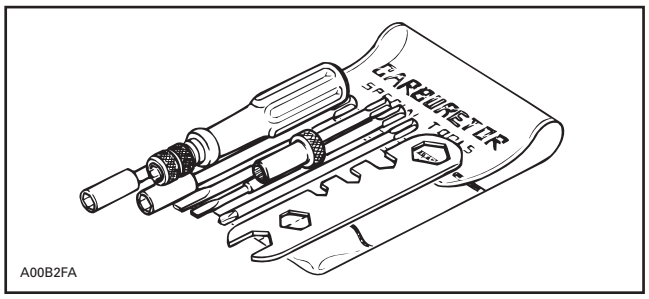
Check for fuel soaked into float no. 1; replace as necessary.

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

Inspect throttle and choke cables and housings for any damage. 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 404 112 000).



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Float Bowl

Unscrew drain screw no. 2 and screw no. 3. Remove float bowl no. 6.

Float and Needle Valve Ass'y

Unfasten both screws then, pull out float and needle valve ass'y.

At assembly, apply Loctite 243 on screw threads.

Main Jet

The main jet no. 5 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. A service bulletin will give information about calibration according to altitude and temperature.

Main jet no. 5 may be removed without removing float bowl no. 6 by first removing drain screw no. 2.

Pilot Jet

Use narrow screwdriver from carburetor tool kit (P/N 404 112 000) to unfasten pilot jet no. 7.

Throttle Slide

⚠ WARNING

It is critical to the free operation of the throttle slide that the 2 connecting plates as assembled in one carburetor be of the exact same length. Always replace the connecting plates by a pair of new ones that were matched at the factory for length and discard the old ones. Simultaneously replace all the plates of the carburetors of a same rack.

Do not disassemble throttle slide no. 17 needlessly.

CAUTION: After throttle slide reassembly, proceed with a leak test. See below for procedure.

Heated Carburetor Models

Disassemble both carburetors at the same time. Coolant hose between carburetor throttle slide covers must remain in place during the complete disassembly and assembly.

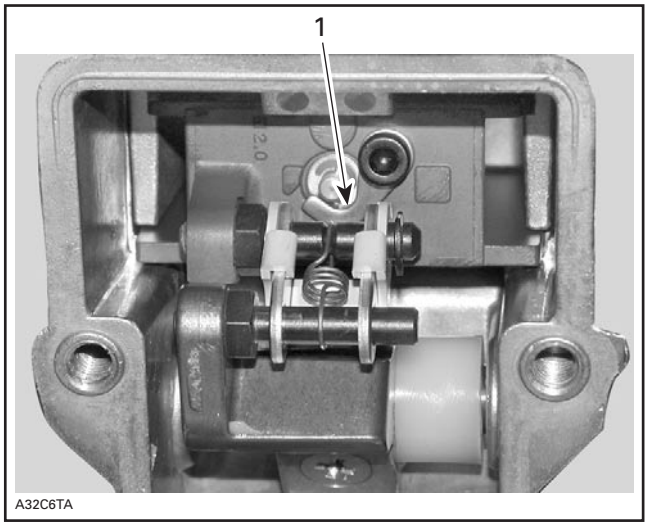
All Models

Remove carburetor cover.

Loosen needle retainer screw no. 8.

Fully open throttle and hold in this position for the following step.

Move aside needle retainer no. 9.



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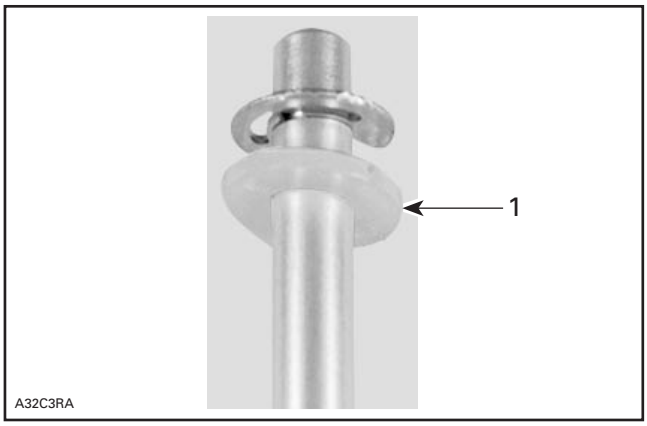
1. Needle retainer moved aside

Turn dual carburetor ass'y upside down to free needle **no. 10**. Take care not to loose plastic washer **no. 11** under needle circlip **no. 12**.

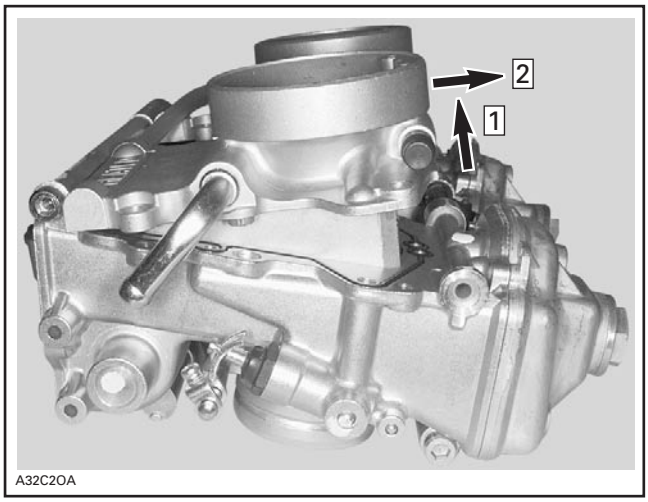


1. Plastic washer

Unscrew throttle slide cover screws **no. 13**.

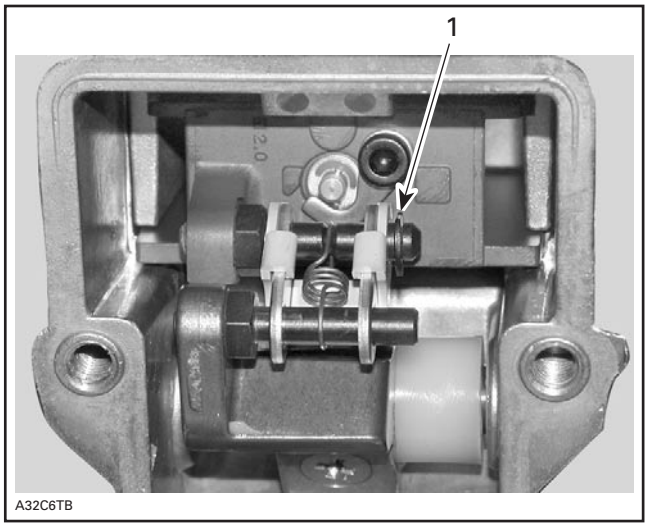
Open throttle 3/4 wide and keep that opening.

Lift throttle slide covers bottom first until they are free from carburetor bodies. Then, slide them out.



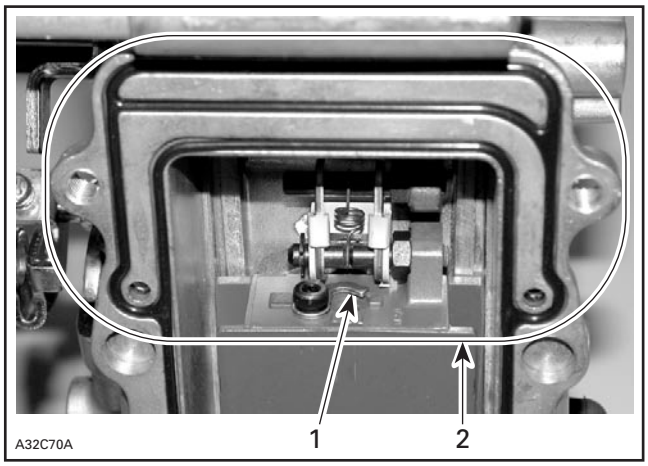
1. Lift bottom first
2. Slide out

Remove circlip **no. 14** retaining throttle slide.



1. Circlip

At throttle slide assembly, needle retainer must face carburetor body.



1. Needle retainer
2. Ensure O-ring gasket is properly seated in nipple area

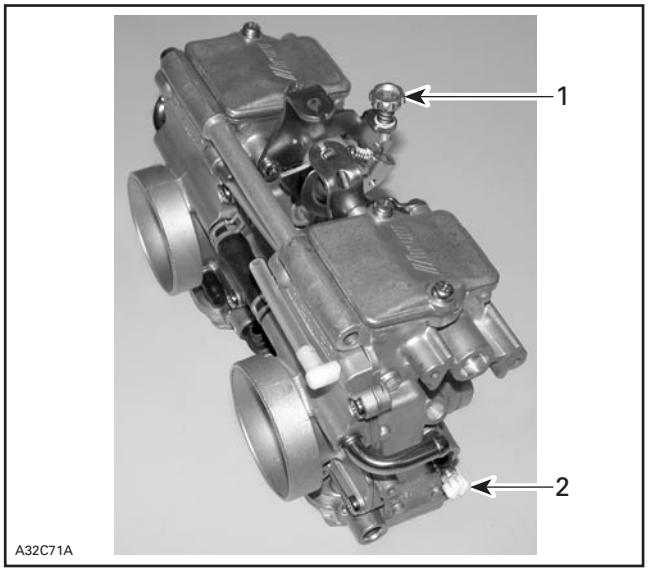
After inserting throttle slide cover in place and before installing screws, ensure O-ring gasket is properly seated in its groove especially in the area around vent nipple. See illustration above.

CARBURETOR ADJUSTMENTS

Adjustments should be performed following this sequence:

– pilot screw adjustment
– carburetor synchronization and throttle slide height (preliminary idle speed adjustment)
– throttle cable adjustment
– choke cable adjustment

– oil pump and carburetor synchronization
– final idle speed adjustment (engine running).



1. Idle speed screw
2. Pilot screw (one on each carburetor)

Pilot Screw Adjustment

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

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

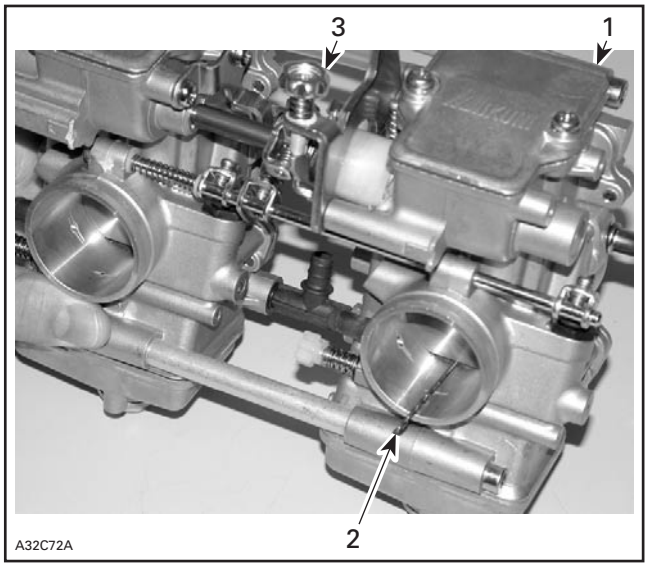
Refer to TECHNICAL DATA for the specifications.

Carburetor Synchronization and Throttle Slide Height (preliminary idle speed adjustment)

First proceed on PTO carburetor.

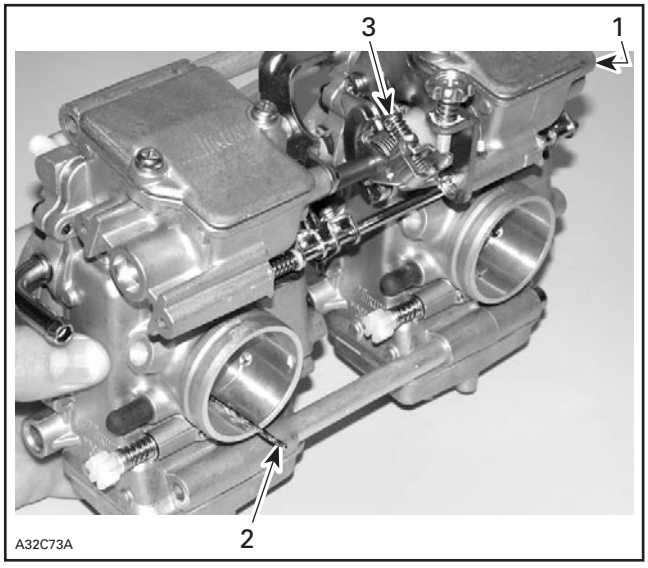
Use a drill bit to measure throttle slide height (see following table) on **outlet** side of carburetor (engine side).

Adjust by turning idle speed screw **no. 15**.



1. Adjust PTO carburetor first
2. Drill bit used as a gauge to measure throttle height
3. Idle speed screw

For MAG carburetor use synchronization screw. Use same drill bit as for PTO carburetor to measure throttle slide height. Turn synchronization screw to adjust.



1. PTO carburetor adjusted first
2. Drill bit used as a gauge to measure throttle height
3. Synchronization screw

NOTE: Make sure that throttle cable does not hold throttle slide. Loosen cable adjuster accordingly.

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

MODELS	THROTTLE SLIDE HEIGHT (drill bit size) ± 0.1 mm (± .004 in)
GSX 500 ss Sport MX Z 500 ss Trail MX Z 500 ss R Adrenaline/Trail	1.5 (.059)
GSX 600 R Sport MX Z 600 Trail MX Z 600 R Adrenaline/ Renegade/ Renegade X/Trail/X	1.6 (0.063)
Summit 600 R Adrenaline/X	2.0 (.079)
GSX 800 R Limited MX Z 800 R Adrenaline/ Renegade/ Renegade X/X	1.7 (0.067)
Summit 800 Sport Summit 800 R Adrenaline/HM/HM X/HMXtrem/Sport/X	2.0 (.079)

INSTALLATION

CAUTION: Never allow throttle slide(s) to snap shut.

Install dual carburetor assembly.

Make sure dual carburetor assembly is properly inserted into carburetor sockets, hold it in place and tighten retaining clamps.

Secure heated carburetor inlet and outlet lines with clamps, tighten to 1.5 to 2.0 N•m (13 to 18 lbf•**in**) and remove pincher on outlet line.

Allow coolant to flow from coolant tank to carburetor before opening valve.

Connect all hoses to dual carburetor assembly and to DPM, making sure there are no kinked hoses after reconnection.

Throttle Cable Adjustment

To adjust throttle cable, refer to THROTTLE CABLE at the end of this section.

Choke Cable Adjustment

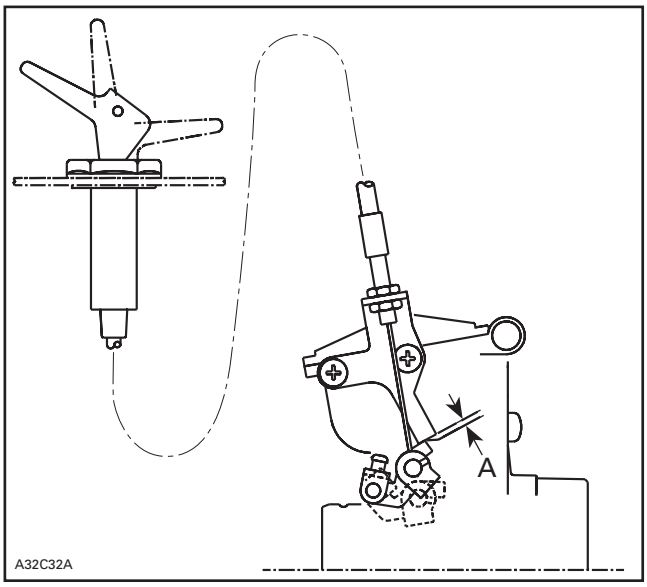
Adjust choke cable as per following procedure:

Loosen choke cable housing adjusting and locking nuts.

Connect choke cable on starter lever no. 4.

While choke lever is fully open, pull choke cable until starter lever reaches the stopper. Tighten cable housing adjusting and locking nuts in this position.

As a confirmation, the gap between the stopper and the bracket should be within 0 and 0.5 mm (0 and 1/64 in).



A. Within 0 and 0.5 mm (0 and 1/64 in)

Reinstall air silencer and DPM.

Reconnect DPM air vent hose at air silencer.

Make sure dual carburetor assembly properly slides into air silencer adapters; hold it in place and tighten clamps.

Reconnect DPM air vent hose nipple to air silencer.

Reconnect air temperature sensor connector to air silencer.

Idle Speed Final Adjustment

CAUTION: Before starting engine for the final idle adjustment, make sure that oil pump is adjusted. The oil injection pump adjustment must be checked after each time carburetor idle is adjusted. Refer to OIL INJECTION SYSTEM.

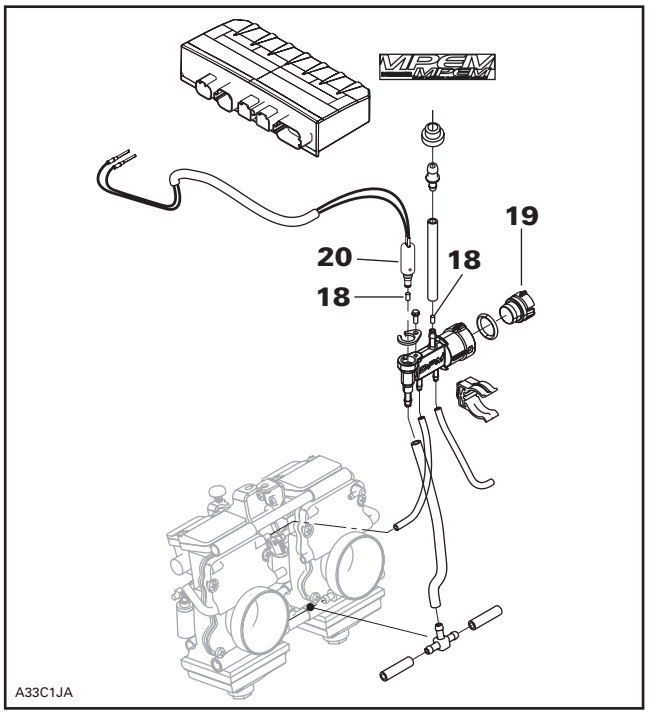
Start engine and allow it to warm then adjust idle speed to specifications by turning idle speed screw clockwise to increase engine speed or counterclockwise to decrease it.

Refer to TECHNICAL DATA for the specifications.

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

DPM

Some Models



TESTING

Air Temperature Sensor

At 20 °C (68 °F), the sensor resistance must be 2500 Ω ± 300.

Sensor should also be tested through all its operating range. Use the following chart.

Replace sensor if not within specifications.

TEMPERATURE		RESISTANCE (OHMS)
°C	°F	
- 30	- 22	28 000
- 20	- 4	14 500
0	32	5 500
20	68	2 500
40	104	1 200
60	140	600
80	176	320
100	212	180
120	248	120

Solenoid and MPEM

Static Test

Unplug electric connector of solenoid no. 20 and connect it to a 12 V battery. The solenoid must sound when it opens. Otherwise, replace solenoid. Repeat test several times.

Dynamic Test

Air temperature sensor must be at 20 °C (68 °F). For the test, operate the engine at the RPM specified in the following chart.

MODEL	TEST RPM
GSX 800 R Limited MX Z 600 R Renegade MX Z 800 R Adrenaline/Renegade/ Renegade X/X Summit 600 R Adrenaline/X Summit 800 R Adrenaline/HM/HM X/HM Xtrem/X	3800

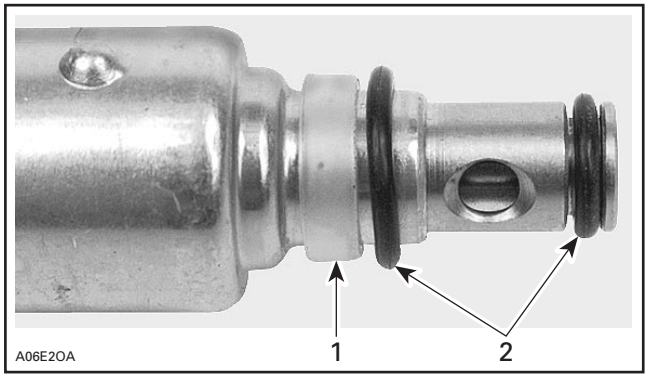
The solenoid must vibrate.

Otherwise, ensure fuse(s), wiring harness and connections are in good condition and if so, try a new MPEM and retest. Refer to ELECTRICAL section.

PARTS REMOVAL AND INSTALLATION

Solenoid

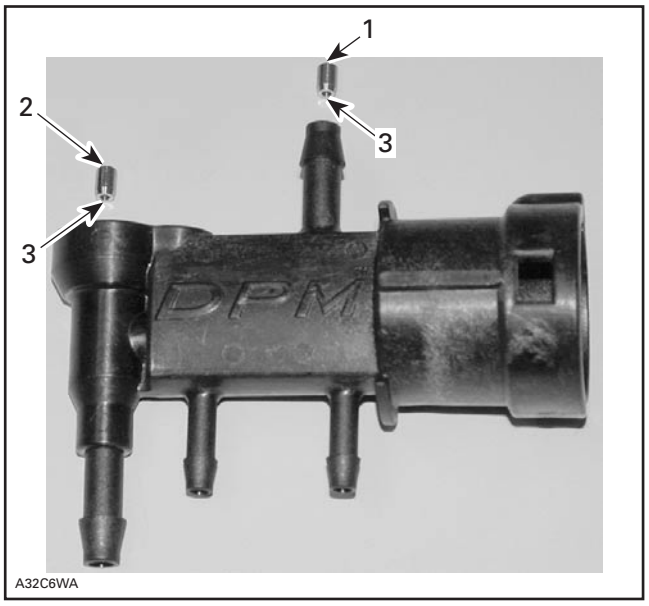
At reassembly, ensure that solenoid seals are in place.



1. Plastic seal
2. O-rings

Jet

When installing jet **no. 18** in DPM, ensure to position the taper end as shown.



1. Vent jet
2. Lean jet
3. Taper end here

Pay also attention not to mix jets. Refer to the following table for the proper inner diameter size. Refer to the illustration above for the jet location.

MODEL	INSIDE DIAMETER mm (in)	
	VENT JET	LEAN JET
GSX 800 R Limited MX Z 600 R Renegade MX Z 800 R Adrenaline/Renegade/ Renegade X/X Summit 600 R Adrenaline/X Summit 800 R Adrenaline/ HM/HM X/HM Xtrem/X	1.2 (.047)	2.0 (.079)

Cap

Prior to installing cap **no. 19**, ensure O-ring is in good condition. To install cap, firmly push until tabs click and lock on both sides in DPM.

DPM MANIFOLD TESTING

Visual Inspection

With DPM manifold removed from vehicle and all hoses disconnected from DPM manifold, inspect for any broken fittings or missing dust caps. If any part is broken, replace DPM manifold and **do not proceed** with leak test procedure. If any part is missing, order necessary part as listed in parts catalog, replace, **then perform leak test procedure**.

If there is no apparent breakage or missing part on DPM manifold, perform the following leak test procedure.

Leak Testing

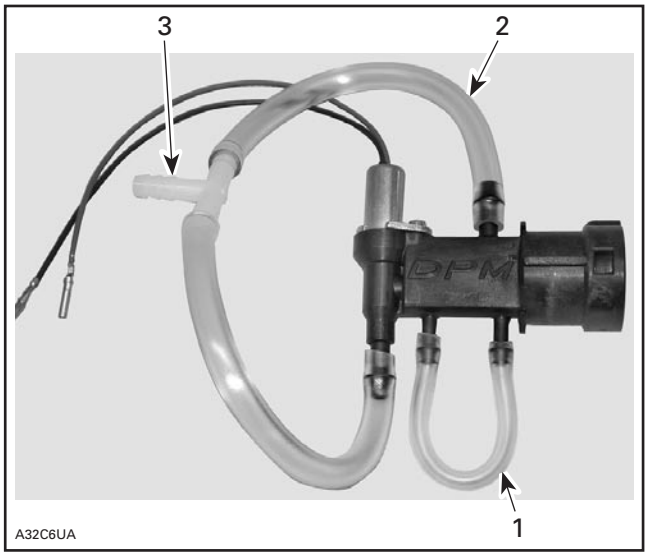
Required Items

The following items will be required:

– Water column with at least 350 mm (13-3/4 in) in height.
– Engine leak test kit (P/N 861 749 100).
– 4.8 mm (3/16 in) T-fitting.
– 6 mm (15/64 in) T-fitting.
– 3.5 mm (9/64 in) ID x 100 mm (4 in) hose.
– 6 mm (15/64 in) ID x 300 mm (12 in) hose.

DPM Manifold Preparation

Connect hoses as shown.

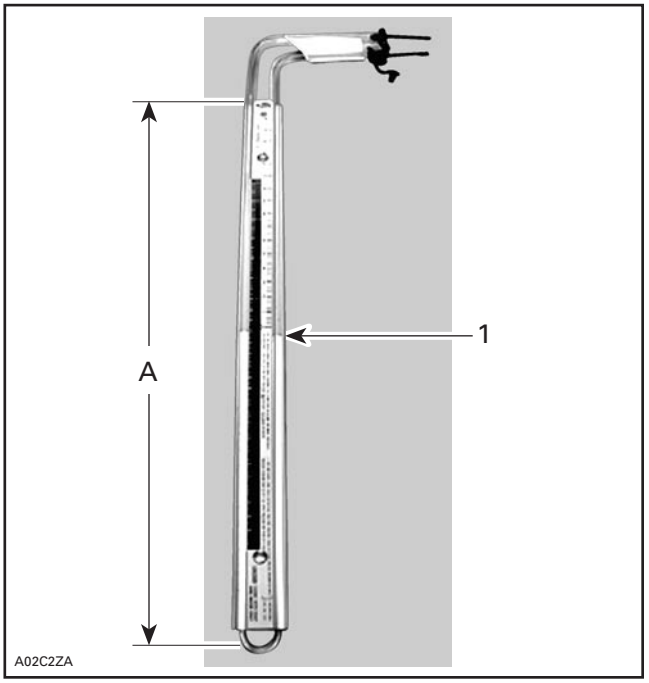


1. 3.5 mm (9/64 in) ID hose
2. 6.0 mm (15/64 in) ID hose
3. 6.0 mm (15/64 in) T-fitting

Water Column Preparation

Mount water column vertically and secure it to a wall or workbench.

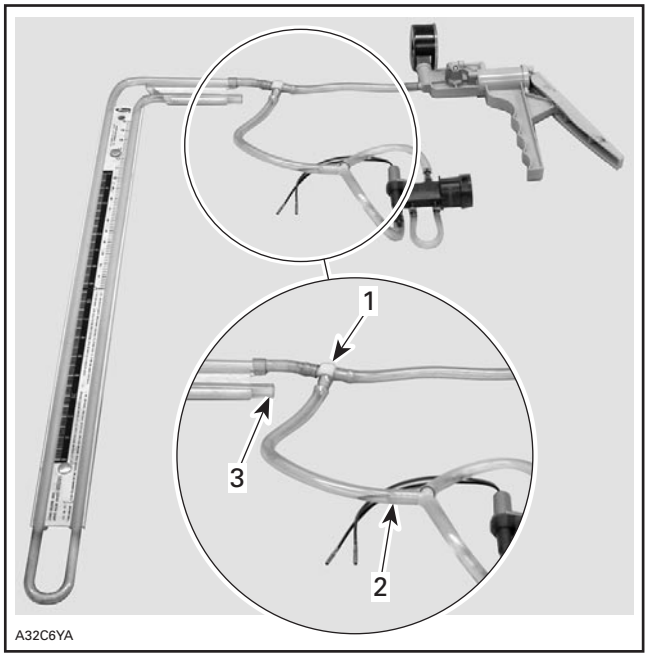
Fill water column to center line (at least 175 mm (6-7/8 in)) in height. Refer to following photo.



1. Center line at 175 mm (6-7/8 in)
A. 350 mm (13-3/4 in)

Connecting the Pump, DPM Manifold and Water Column

Connect hoses as shown.



1. 4.8 mm (3/16 in) T-fitting
2. T-fitting
3. Vented to atmosphere

Collect hose into one of the water column tubes, leave the other tube at atmospheric pressure.

Testing

Set pump to «vacuum».

CAUTION: Never use pump directly on DPM to make a pressure test. The vacuum produced by the pump is too high and would damage DPM components. Use the water column as explained above.

Apply negative pressure (vacuum) until the extremities of the water in the tube attain a difference of 350 mm (13-3/4 in).

Stop pumping and allow water levels to stabilize in tube.

Analysis

If water level remains unchanged, the DPM manifold **is not** defective.

If water level drops slowly to return to an even level in **more than** 10 seconds, the DPM manifold **is not** defective.

If water level drops to an even level in **less than** 10 seconds, the DPM manifold **is** defective. Replace DPM manifold parts, (refer to *Parts Catalog*) and re-test. If test fails again, replace DPM manifold.

If you are unable to attain any amount of vacuum (water level increases and decreases immediately in tube), check your set-up and re-do the test.

If you still cannot attain any vacuum, DPM manifold **is** defective. Replace DPM manifold.

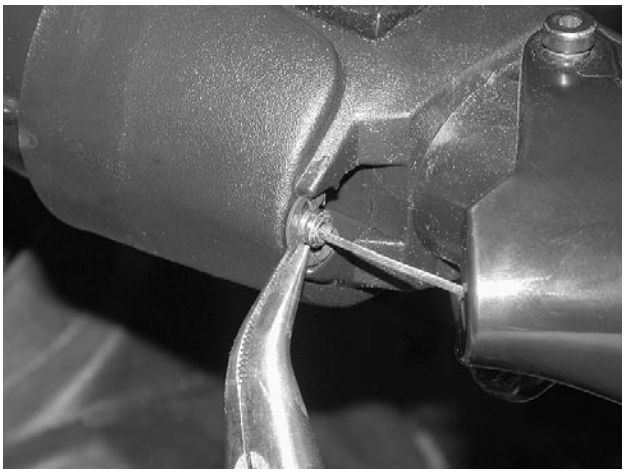
THROTTLE CABLE

THROTTLE/OIL PUMP CABLE REMOVAL

NOTE: Before removing the cable from vehicle, note its routing for installation.

Using long nose pliers to hold the cable, push the end of cable out of its location.

Remove the retaining circlip.



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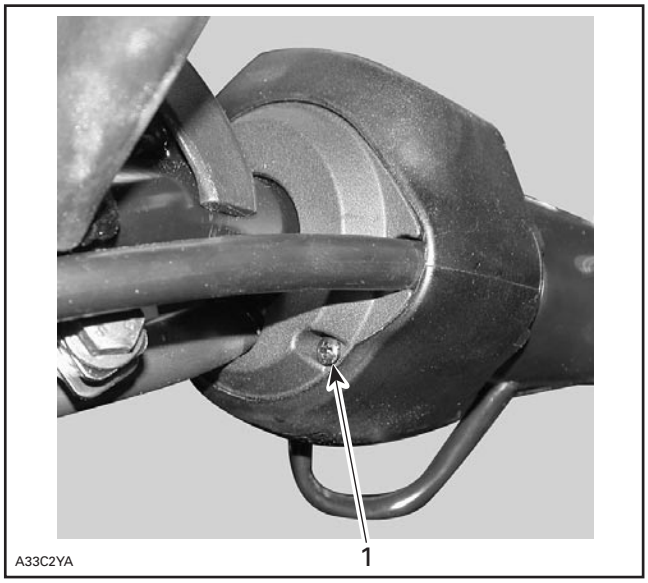
TYPICAL

Remove the handle cover.



A33C2YA

1. Handle cover screw

Unhook the cable sheath then remove the cable from handle.

Remove air intake silencer.

Disconnect the cable end from carburetors or throttle body.

Disconnect cable end from oil pump.

NOTE: The carburetors or the throttle body can be removed to allow an easier access to the oil pump.

THROTTLE/OIL PUMP CABLE INSTALLATION

For installation, reverse the removal procedure.

To adjust throttle and oil pump cables see further in this section.

THROTTLE CABLE ADJUSTMENT

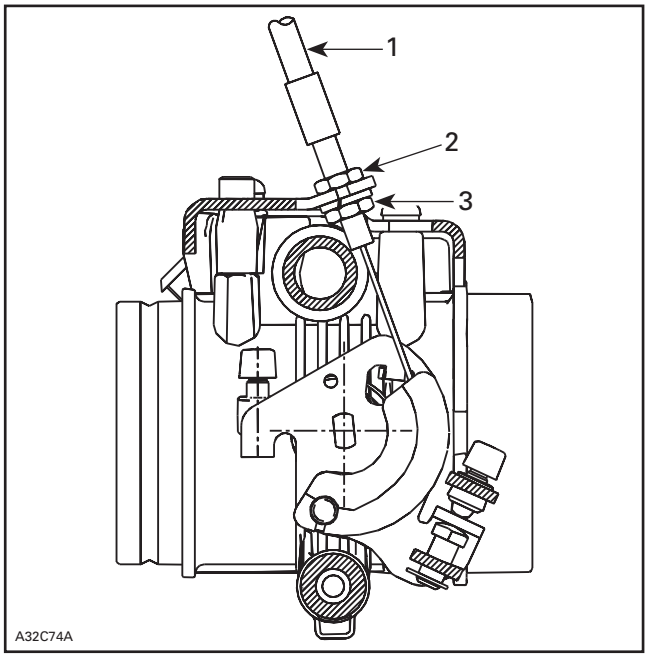
Adjust throttle cable as per following procedure:

Loosen throttle cable housing adjusting and locking nuts.

Connect throttle cable barrel to carburetor cam lever **no. 16**.

While holding throttle lever to wide open throttle position, pull on the throttle cable until mechanism touches the stopper. In this position, turn cable housing adjusting nut and tighten lock nut.

Also ensure that, when throttle is released to idle position, the idle adjusting screw end touches its stopper.



1. Throttle cable
2. Adjusting nut
3. Locking nut

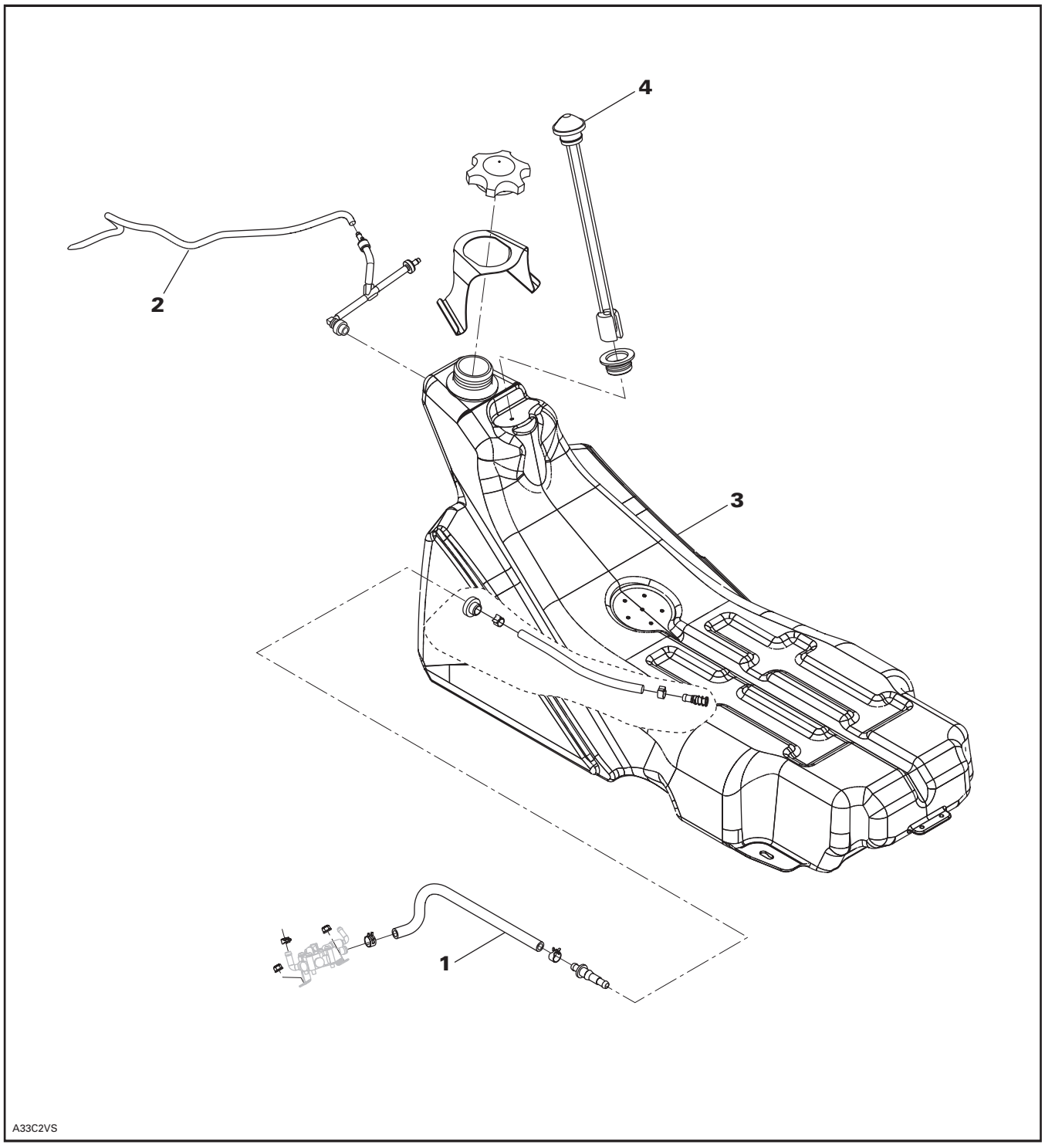
After throttle cable adjustment, synchronized carburetors (refer to CARBURETOR SYNCHRONIZATION) and adjusted oil pump cable (refer to OIL INJECTION PUMP).

SDI Models

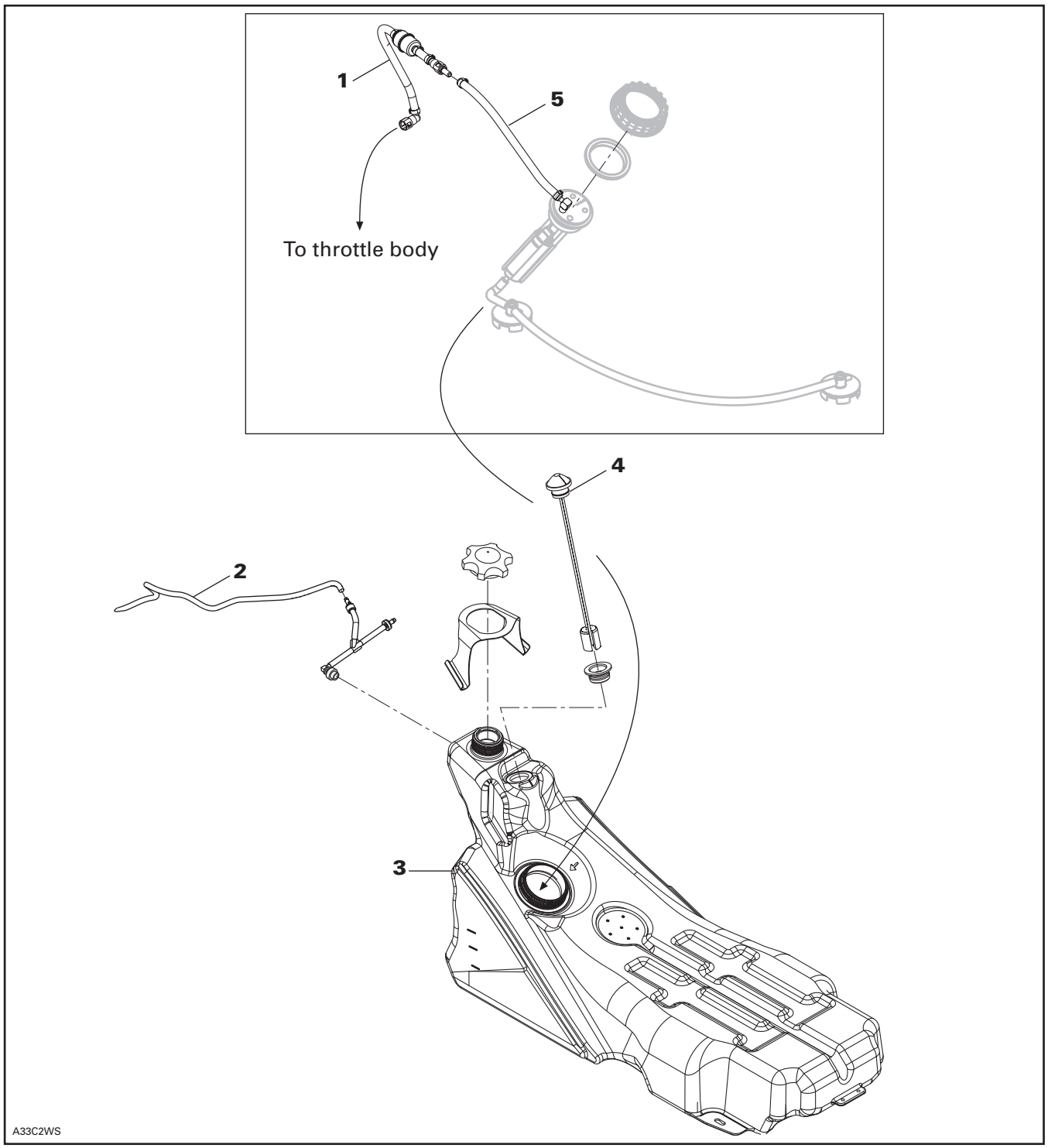
Refer to COMPONENT INSPECTION AND ADJUSTMENT in ENGINE MANAGEMENT (2-TEC).

FUEL TANK AND FUEL PUMP

All Models except SDI



SDI Models



FUEL FILTER

For fuel filter servicing, refer to PRESEASON PREPARATION.

FUEL TANK

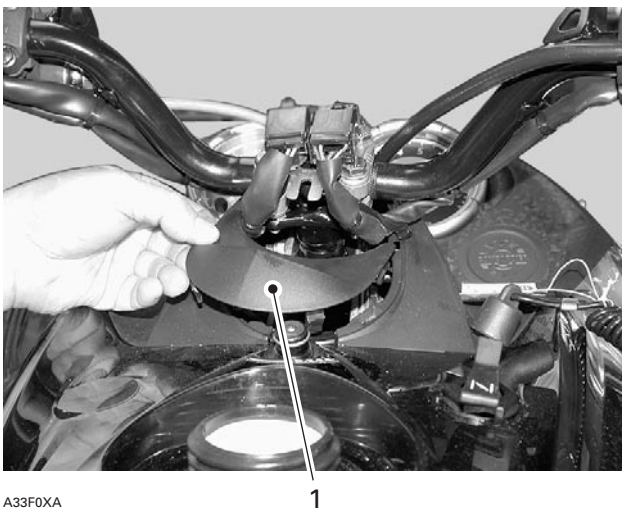
Removal

Remove seat, refer to BODY.

Remove fuel tank cap.

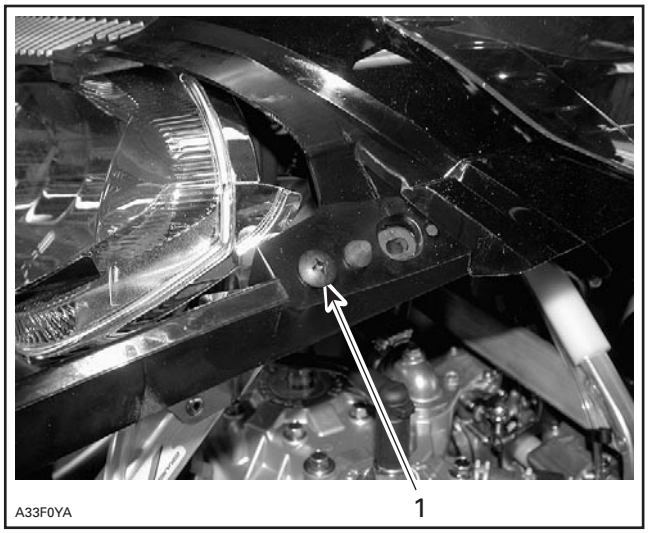
Remove filler neck plastic nut using special tool (P/N 529 035 891).

Unclip and remove console center trim cap.



1. Remove this cap

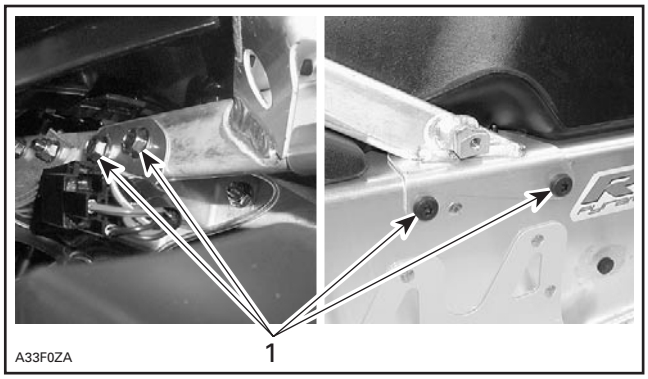
Remove retaining screw on both sides of center console; this will allow lifting of console just enough to ease tank removal.



1. Remove this screw on both sides

Remove both sides fuel tank aluminum braces:

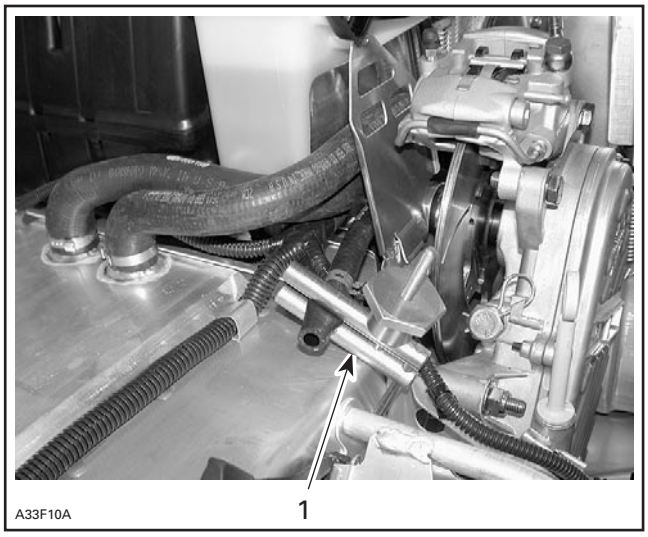
– by removing and discarding lower M8 x 20 Torx screws (2 on each side);
– and by removing upper M8 flanged hexagonal bolts (2 on each side) and discarding their nuts.



1. Remove and discard lower Torx screws on both sides — remove upper flanged hexagonal bolts and discard their nuts on both sides

All Models except SDI

Empty fuel tank and install a hose pincher on fuel line **no. 1** as shown in following photo.



FUEL TANK REMOVED
1. Hose pincher installed on fuel line

SDI Models

Release fuel pressure of the system. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

Empty fuel tank **no. 3**.

Install a hose pincher on fuel pump hose **no. 5** then disconnect it from fuel line **no. 1**.

Unplug fuel pump connector.

All Models

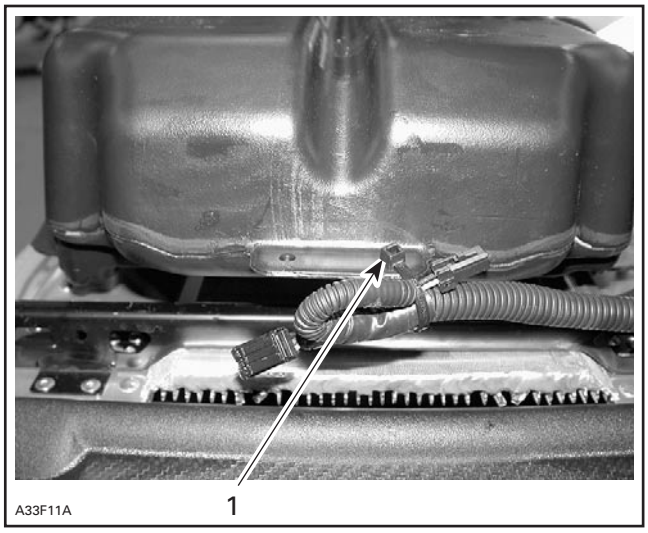
⚠ WARNING

Whenever a fuel line is disconnected, obstruct line with a hose pincher (P/N 295 000 076) or (P/N 529 032 500). Fuel is flammable and explosive under certain conditions. Always wipe off any fuel or oil spillage from the vehicle. Ensure work area is well ventilated. Do not smoke or allow open flames or sparks in the vicinity.

Unplug vent tube **no. 2** from tank.

Some Models

Cut locking tie holding wiring harness to fuel tank at rear.



1. Cut this locking tie

Remove fuel tank **no. 3** and set it aside.

Installation

Reinstall fuel tank and plug-in vent tube.

⚠ WARNING

Make sure vent tube is not kinked.

Connect fuel line and remove hose pincher.

Reinstall right and left fuel tank aluminum braces using new lower Torx screws (with Scotch Grip) and previously removed upper flanged hexagonal bolts with new M8 flanged elastic stop nuts.

Reinstall filler neck nut using special tool (P/N 529 035 891).

Reinstall fuel cap.

Reinstall center console.

Reinstall console center trim cap.

Reinstall seat.

SDI Models

Perform a fuel pressure test and a fuel bleeding procedure. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

IMPULSE/FUEL LINES SPRING CLIPS (ALL MODELS)

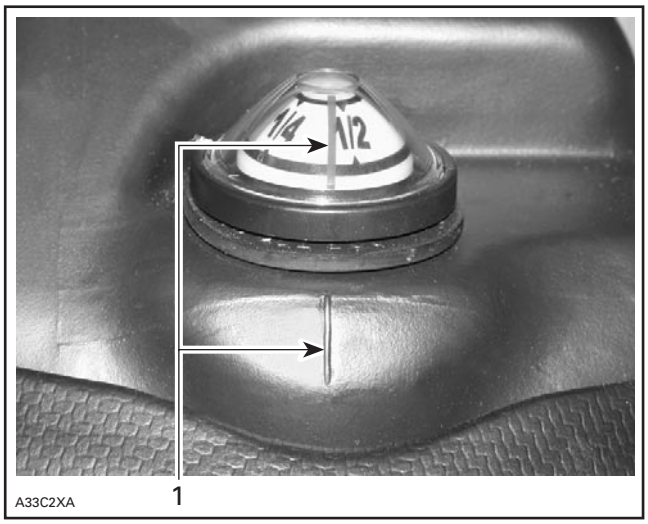
Always reposition spring clips after any repair to prevent possible leaks. If a spring clip seems loose, replace it with a new one.

FLOAT-TYPE FUEL LEVEL GAUGE

To remove gauge **no. 4** from fuel tank, pull gauge out of its grommet then remove grommet.

For reinstallation, proceed as follows:

– Install grommet halfway on gauge.
– Insert grommet in fuel tank until it bottoms.
– Firmly push gauge in grommet until it bottoms and so that its red line aligns with the line on the fuel tank.



1. Align red line with line on tank

ELECTRIC FUEL LEVEL SENSOR

Inspection

All Models except SDI

Visually inspect the condition of connectors and wiring throughout the circuit. Connections must be clean and tight, and wiring free of damage. Repair as necessary. Use silicone dielectric grease to prevent corrosion at the connectors. Operate the engine to see if the problem has been corrected.

SDI Models

Fuel level sensor is integrated to the fuel pump. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

Fuse Replacement

Some Models

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

SDI Models

A 0.5 amp. fuse protects fuel level sensor circuity in fuse box.

FUEL LEVEL SENSOR SCREWS

All Models except SDI

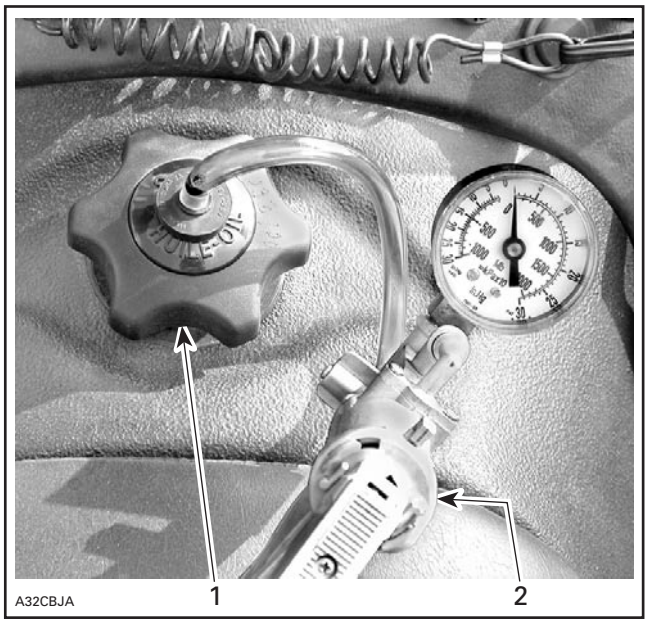
Torque fuel level sensor retaining screws to 1 N•m (8 lbf•**in**) in a criss-cross sequence and then to 2.4 N•m (21 lbf•**in**), using the same sequence.

FUEL SYSTEM PRESSURIZATION

Fill up fuel tank.

Install on fuel tank, the special cap of leak testing kit (P/N 529 033 100).

Using air pump from engine leak test kit (P/N 861 749 100), inject air into fuel tank. See next photo.



TYPICAL
1. Special cap on tank
2. Air pump

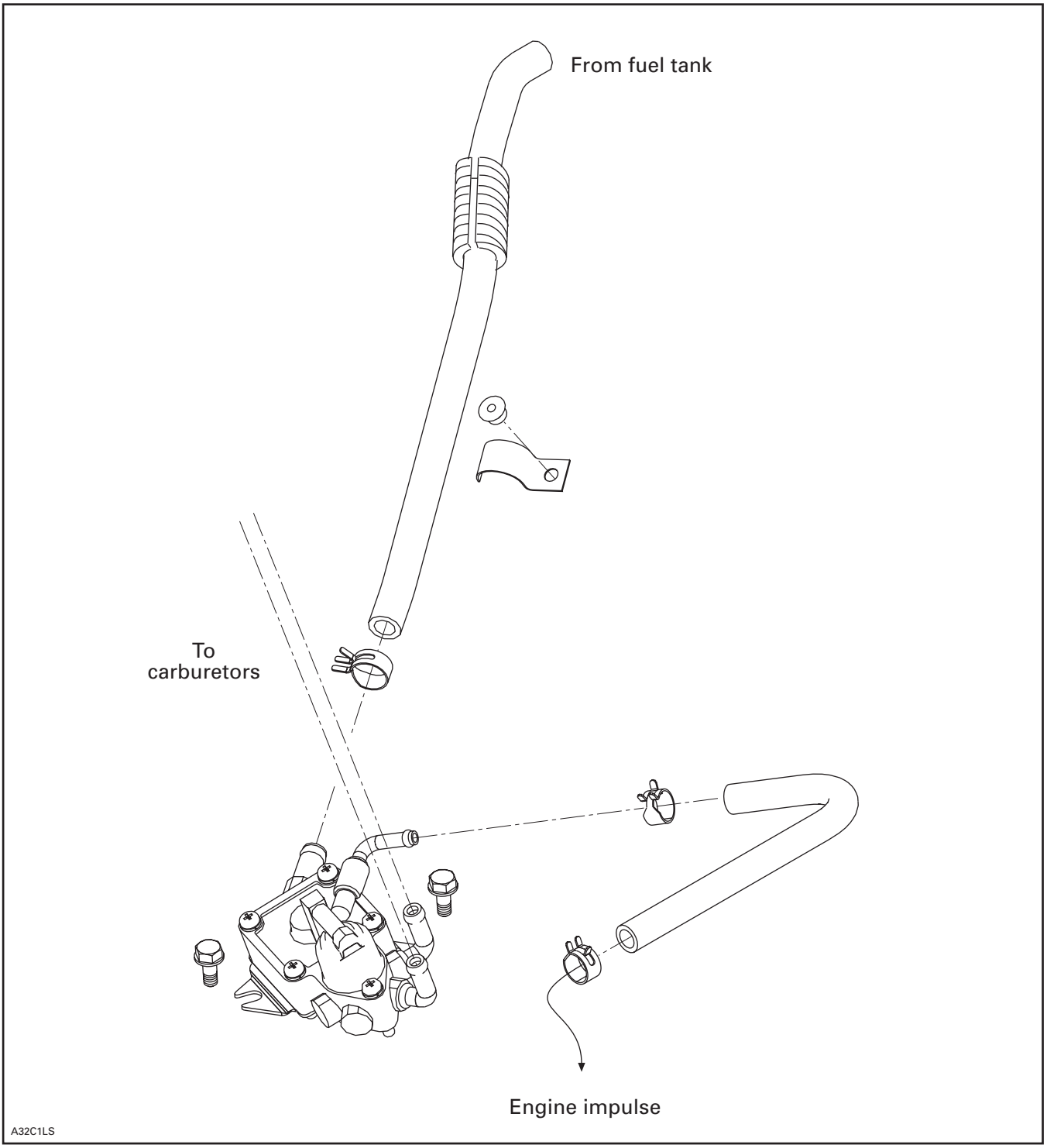
Pressurize fuel system to 21 kPa (3 PSI). The pressure must not drop during 3 minutes.

If pressure drops, locate fuel leak(s) and repair/replace leaking component(s).

To ease locating leak(s) at fuel tank vent fitting, fuel gauge or fuel cap, spray soapy water on components; bubbles will indicate leak location(s).

FUEL PUMP

All Models except SDI



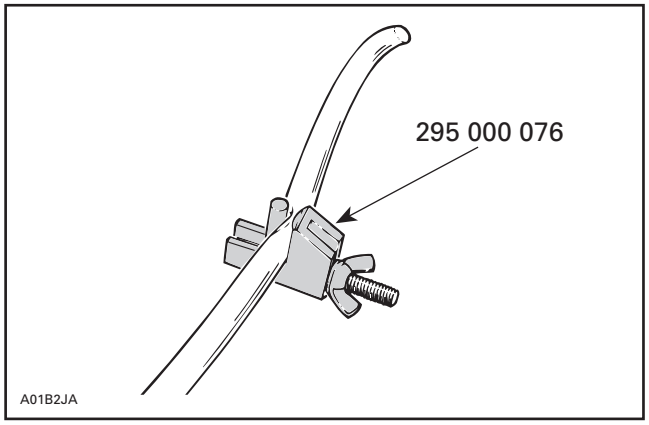
NOTE: The following instructions are not applicable on SDI models. See COMPONENT INSPECTION AND ADJUSTMENT concerning fuel pump procedure on these models.

REMOVAL

Remove air intake silencer and carburetors.

NOTE: Do not disconnect cables from carburetors.

Install a hose pincher (P/N 295 000 076) on fuel supply line close to pump inlet.



Disconnect fuel outlet line(s).

Disconnect impulse line.

Remove screws securing fuel pump to chassis.

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 also under vacuum.

NOTE: Plug remaining outlet with finger while checking outlet valve.

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

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

CLEANING AND INSPECTION

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

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

⚠ WARNING

Solvent with 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.

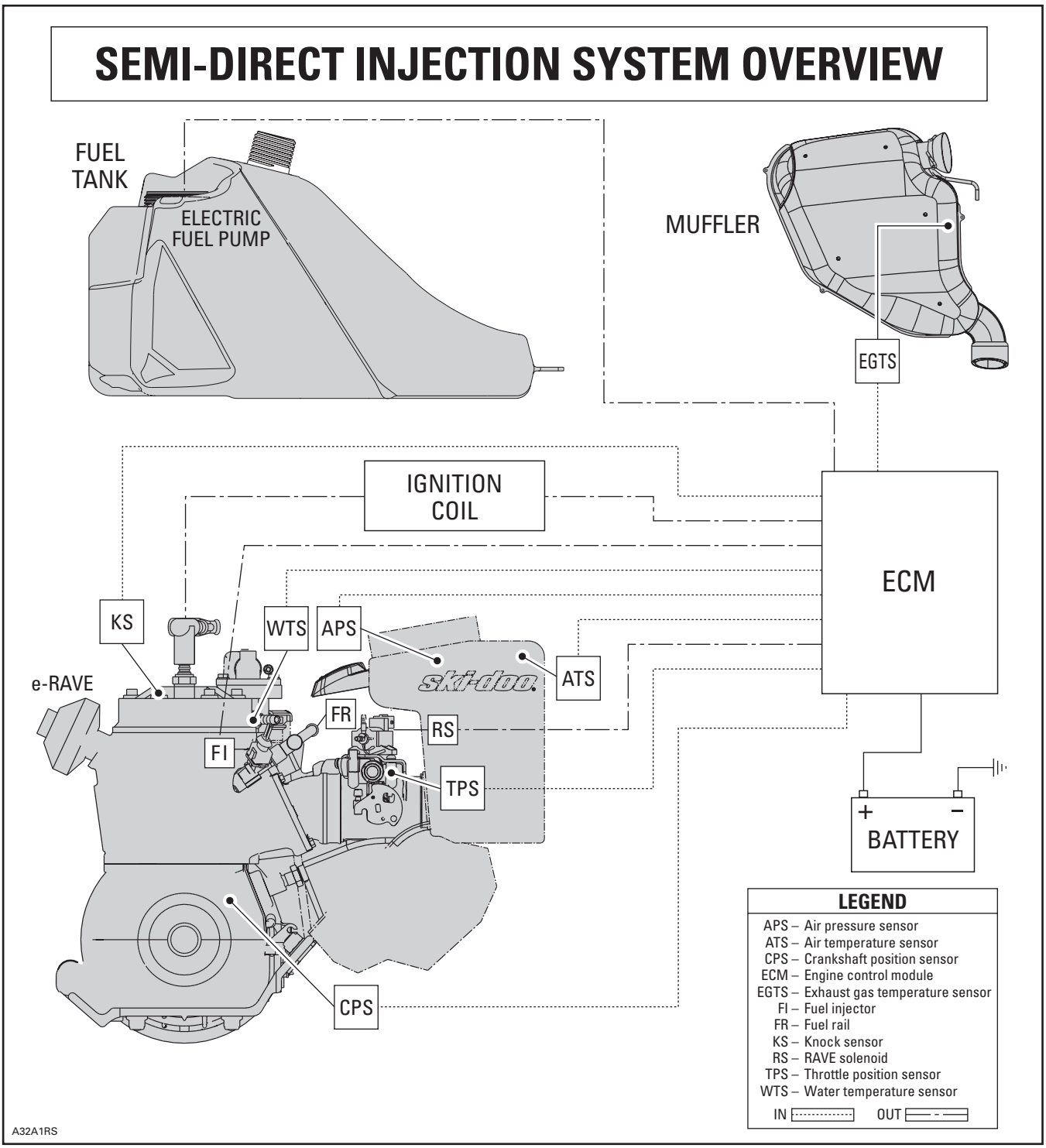
INSTALLATION

Inverse removal procedure.

⚠ WARNING

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

OVERVIEW



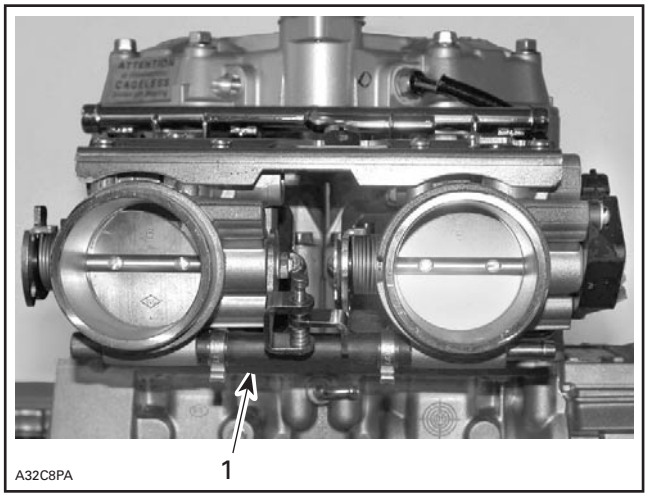
TYPICAL

OPERATING PRINCIPLE

For this SDI 2-stroke engine, a highly advanced engine management system (EMS) has been used to ensure a high power output combined with cleanest combustion. An ECM (Engine Control Module) calculates the proper air/fuel mixture and ignition timing for each cylinder separately. The fuel is injected into the transfer port of each cylinder.

AIR INDUCTION

Through air filter mounted LH side panel, air goes into air silencer. The ECM measures at this point air pressure and temperature. Then, air for combustion is drawn through two throttle bodies. The air flow is controlled by two throttle plates. The air continues through the reed valves into the cylinder base then the crankcase.



THROTTLE BODY ASSEMBLY
1. Coolant-heated line

FUEL DELIVERY SYSTEM

GENERAL

When the piston reaches the correct position, the ECM opens the fuel injectors and fuel is discharged into the transfer ports of cylinders. This air/fuel mixture is then ignited by the spark plug.

COMPONENT DESCRIPTION

Fuel Pump and Fuel Pressure Regulator

They provide fuel pressure and flow rate to the system.

The fuel pump module is located inside the fuel tank. The module includes the fuel pump, the fuel pressure regulator and the fuel level sensor (if so equipped).

The fuel pressure regulator controls the pressure in the system and allows the excess of fuel to return to the fuel tank. The fuel pressure regulator regulates the fuel pressure at 400 kPa (58 PSI).

Fuel Rail

The fuel rail is a small tube on which the four injectors are mounted. It ensures at all times that enough fuel at the right pressure can be delivered to the fuel injectors. The fuel rail is fed by the fuel pump module.

Fuel Injectors

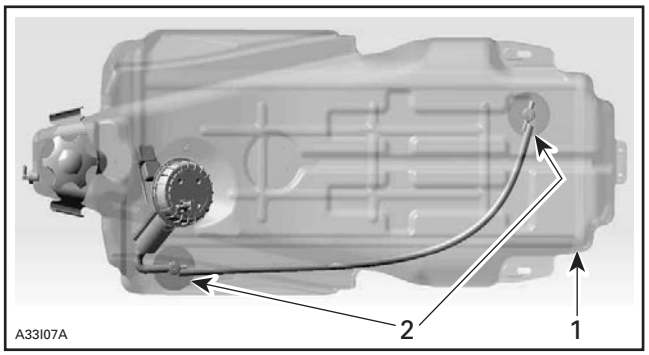
Fuel injectors (two per cylinder) are used to inject fuel into the transfer port of cylinder.

Throttle Body

It is a dual throttle body mounted on the engine intake side. Fitted on this dual throttle body, there is a TPS (Throttle Position Sensor) that sends information to the ECM.

Fuel Pickups

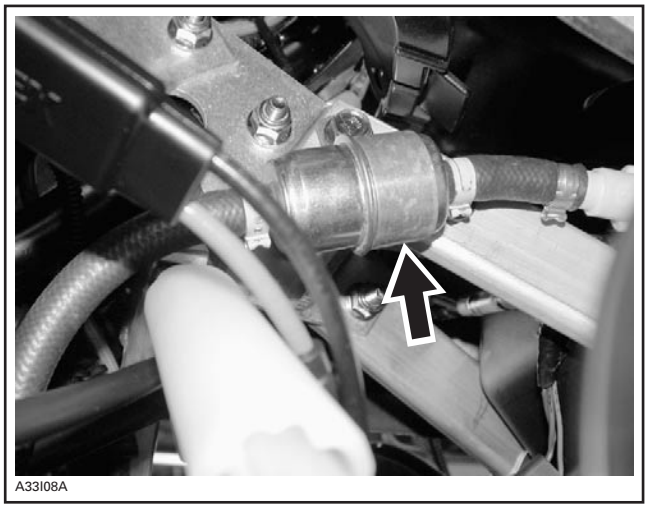
The two fuel pickups come with 70 micron filter. One is located at the front right side of the fuel tank and the other at the rear left side.



1. Fuel tank
2. Fuel pickups

In-Line Fuel Filter

The in-line 10 micron fuel filter is fastened under the steering console. It comes as a complete assembly.



ENGINE MANAGEMENT SYSTEM (EMS)

The EMS (Engine Management System) is equipped with an ECM which controls the ignition system, the vehicle electrical system, the fuel injection system and the electronically controlled RAVE.

TYPICAL — ECM

The ECM is mounted in the front of the vehicle.

The ECM is directly powered by the battery. It is responsible for the following engine management/electrical functions:

– interpreting information
– distributing information
– start/stop function
– DESS (Digitally Encoded Security System)
– ignition control
– injection control

NOTE: The ECM applies the proper maps (injection and ignition) for optimum engine operation in all conditions.

– engine RPM limiter

– RER (Rotax Electronic Reverse)
– etc.

The ECM features a permanent memory that will keep the programmed tether cord cap(s) code, fault codes and other vehicle information, even when the battery is removed from the vehicle.

EMS — GENERAL FUNCTIONS

Automatic Power Shut-Down

The ECM is equipped with an automatic power shut-down. This feature prevents the battery from losing its charge if the tether cord cap is left on the post when the engine is not running for more then 30 seconds. The ECM will remain offline until the electric starter or the rewind starter is activated. The ECM will shut down all outputs after 5 seconds when the tether cord cap is removed.

Antidrive Feature

This system allows the engine to reach pulley engagement speed only if a programmed tether cord cap is installed on DESS post. See below for details.

Digitally Encoded Security System (DESS)

The following components are specially designed for this system: ECM, tether cord cap and DESS post.

The tether cord cap contains a magnet and a ROM chip. The magnet actually closes the reed switch inside the post which is the equivalent of a mechanical ON/OFF switch. The chip has a unique digital code.

NOTE: Actually, it is the memory of the ECM which is programmed to recognize the digital code of the tether cord cap. This is achieved with the VCK (Vehicle Communication Kit P/N 529 035 981). Refer to their operation manual or help system to program a tether cord cap.

The system is quite flexible. Up to 8 tether cord caps may be programmed in the memory of the vehicle ECM. They can also be erased individually.

NOTE: If desired, a tether cord cap can be used on other vehicle equipped with the DESS. It only needs to be programmed for that vehicle.

When starting the engine with a tether cord cap on the post, the DESS is activated and will emit audible signals:

– 2 short beeps indicate a working tether cord cap. Vehicle can be driven.
– 1 short beep indicates a wrong tether cord cap is being used or that something is defective. Vehicle can not be driven.

The memory of the ECM features two self-diagnostic modes for the DESS operation. Refer to DIAGNOSTIC PROCEDURES section for more information.

The memory of the ECM is permanent. If the battery is disconnected, no information is lost.

Note that the DESS anti-drive circuitry is already activated on all new ECMs.

Gauges Current Supply

The purpose of this function is to allow reading of gauges without the engine running. It will give access to most functions of the information center gauge without starting the engine.

Gauges are supplied with current for 30 seconds when connecting the tether cord cap on its post and pressing the START/RER switch.

NOTE: Each time the tether cord cap is connected to the post and START/RER switch is depressed, the fuel pump is activated for 2 seconds to build up pressure in the fuel injection system.

Engine Starting

If the ECM recognizes a valid tether cord cap, it allows engine to rev above 3000 RPM.

If the tether cord cap is left on the DESS post for more than 30 seconds after stopping the engine, the ECM will shut down. The current supply to gauges will be stopped as explained in the ANTIDRIVE FEATURE section.

Engine RPM Limiter

The ECM will limit the maximum engine speed.

Low-Oil Level Warning Device

When the oil falls under a certain level, the low oil level LED will be illuminated. The buzzer will also be activated intermittently.

High Coolant Temperature Warning Device

When the coolant temperature is getting to high, the ECM sends out signals to the buzzer and the high temperature LED.

Power Distribution

The ECM distributes power from battery to all accessories. Accessories are protected by fuses located in the fuse holder. Fuses are identified besides their holder.

IMPORTANT: The sensors and injectors are continuously powered with the supply from the battery. **The ECM switches the ground to complete the electrical circuits it controls.** Take this into account when troubleshooting the electrical system.

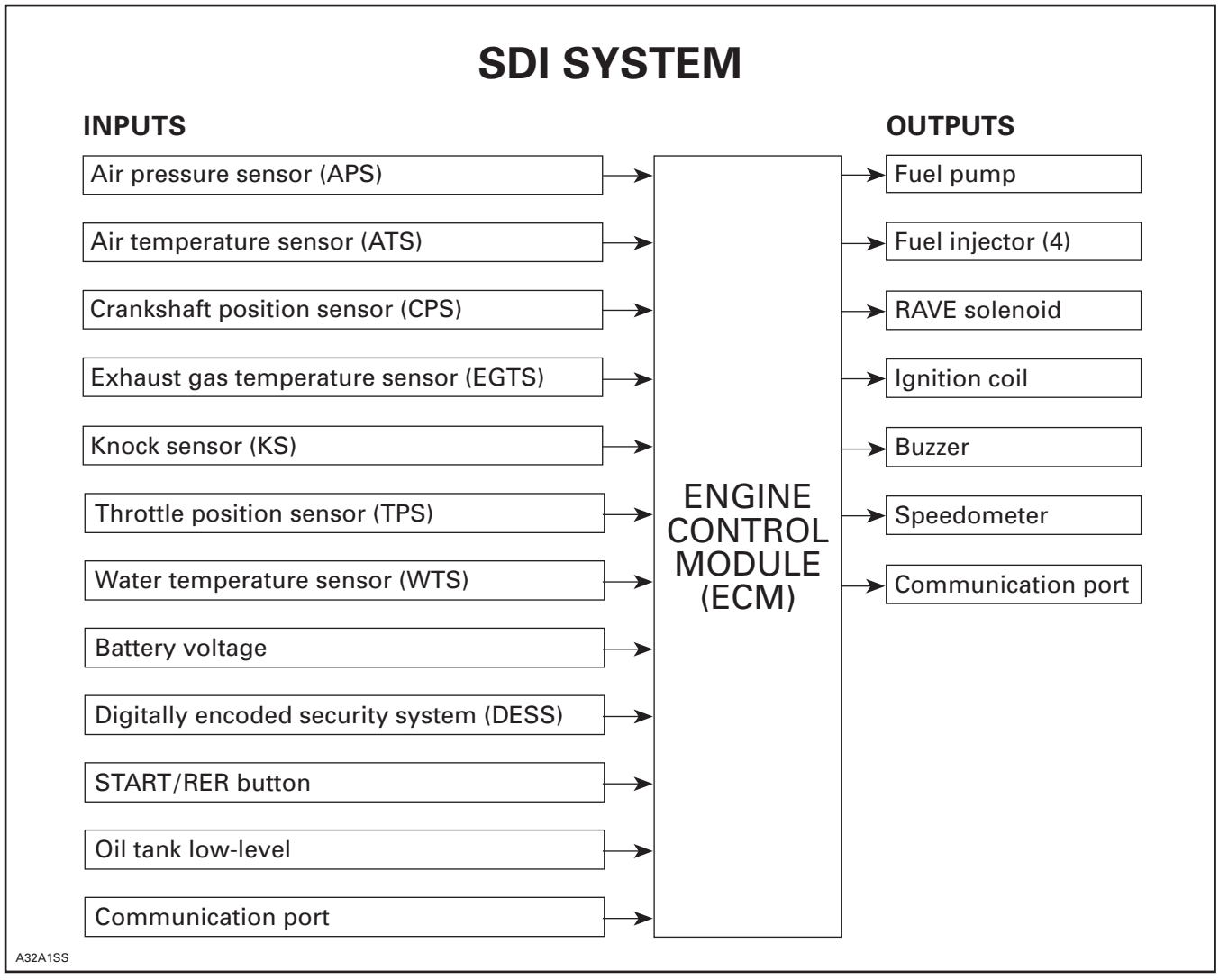
Electric Start SDI Models

The system uses 2 relays: an ignition relay (R1) and a headlights and accessories relay (R2).

Manual Start SDI Models

The system uses 3 relays: an ignition relay (R1), a second for the headlights and the accessories (R2) and a third for the capacitor circuit (R4).

ECU — ENGINE MANAGEMENT FUNCTIONS



This engine management system controls the fuel injection, the ignition timing and the electronically controlled RAVE.

As shown in the SDI CONTROL SYSTEM illustration, the ECM is the central point of the fuel injection system. It reads the inputs, makes computations, uses pre-determined parameters and sends the proper signals to the outputs for proper engine management.

The ECM also stores the fault codes and general information such as: operating conditions, vehicle hours, serial numbers, customer and maintenance information.

ELECTRONIC FUEL INJECTION

The ECM receives the signals from different sensors which indicate engine operating conditions at milli-second intervals.

Signals from sensors are used by the ECM to determine the injection parameters (fuel maps) required for optimum air-fuel ratio.

The CPS and TPS are the primary sensors used to control the injection and ignition timing. Other sensors are used for secondary input.

IGNITION TIMING

The ECM is programmed with data (it contains ignition mappings) for optimum ignition timing under all operating conditions. Using engine operating conditions provided by the sensors, the ECM controls the ignition timing for optimum engine operation.

ELECTRONICALLY CONTROLLED RAVE

The electronically controlled RAVE (e-RAVE) offers two performance enhancements to conventional RAVE system.

– The opening of the valve is now activated electronically. A solenoid holds the valve closed. The ECM monitors altitude, engine temperature, throttle position and RPM, and operates the solenoid in optimal conditions.
– The valve is now opened by crankcase pressure, as opposed to exhaust pressure. The greater and more constant pressure from the crankcase opens the valve more crisply.

NOTE: An electric heating element has been added to the RAVE solenoid to ensure proper function in very cold weather.

KNOCK SENSOR

A knock sensor is mounted on top of the cylinder head. It detects specific vibration that would be typically generated by engine detonation. If detonation occurs, the knock sensor detects it and the ECMs retards the ignition advance and extend the injection period temporarily (it goes in a specific mode) until detonation stops.

ENGINE MODES OF OPERATION

The ECM controls different operation modes of the engine to allow proper operation for all possible conditions: Cranking, start up, idle, warm up, normal operation, engine speed limiter, flooded engine and limp home (see below).

FLOODED ENGINE (DROWNED MODE)

If the engine does not start and it is fuel-flooded, this special mode can be activated to prevent fuel injection and ignition while cranking. Proceed as follows:

With tether cord cap on its post while engine is stopped, press completely and HOLD throttle lever.

Press the START/RER button. The mode is now on.

The engine should be cranked for 20 seconds.

NOTE: No spark occurs on drowned mode.

Release START/RER button and throttle lever. Try to start the engine normally.

If the engine does not start, it may be necessary to remove the spark plugs and crank the engine with rags over spark plug holes. Refer to COMPONENT INSPECTION AND ADJUSTMENT.

MONITORING SYSTEM

The ECM monitors the electronic components of the fuel injection system and some components of the electrical system.

When a fault occurs, it sends visual messages through the referring LED and/or audible signals through a buzzer to inform you of a particular condition. Refer to the DIAGNOSTIC PROCEDURES section for the referring LED and the buzzer coded signals chart.

LIMP HOME MODES

Besides the signals as seen above, the ECM may automatically set default parameters to the engine management to ensure the adequate operation of the vehicle if a component of the fuel injection system is not operating properly.

NOTE: Sensor failures will not lead to a limp home mode, warning will follow by the check engine LED and in some cases the buzzer.

When minor fault occurs, the fault and message/buzzer will disappear automatically, when the condition disappears.

Depending on the severity of the malfunction, the vehicle speed may be reduced and not allowed to reach its usual top speed.

The engine RPM may be limited if some critical components fail. In this case, releasing throttle and letting the engine returning to idle speed may allow normal operation to come back. If it does not work, try removing and reinstalling the tether cord cap on DESS post.

These performance-reduced modes allow the rider to go back home which would not be possible without this advanced system. Refer to the DIAGNOSTIC PROCEDURES for a complete chart.

If a fault occurs and involves a limp home mode operation, the engine management system will reduce engine RPM gradually to the proper level.

DIAGNOSTIC MODE

The malfunctions are recorded in the memory of the ECM. The memory of the ECM can be checked using the VCK (Vehicle Communication Kit) (P/N 529 035 981) to see the fault codes. Refer to the DIAGNOSTIC PROCEDURES section.

The ECM and the VCK are able to communicate through a connector on the vehicle. The B.U.D.S. software, version G2.10, P2.10 or up must be used for this system.

CHARGING SYSTEM

The ignition system consists of different sub-systems where some are interrelated.

Unregulated AC current is produced by the magneto. AC current is rectified and regulated between 13.4 and 15 volts for the vehicle electrical system.

Vehicle 12-volt battery supplies the ECM with DC current.

Refer to MAGNETO SYSTEM.

The following type of ignition system is used:

– Digital Inductive System.

MAGNETO SYSTEM

The magneto is the primary source of electrical energy. It transforms magnetic field into electric current (AC).

The magneto has a 3 phases, delta wound stator on 18 poles. Capacity is 480 watts.

DOUBLE IGNITION COIL

Double ignition coil has two separate windings, one for each spark plug.

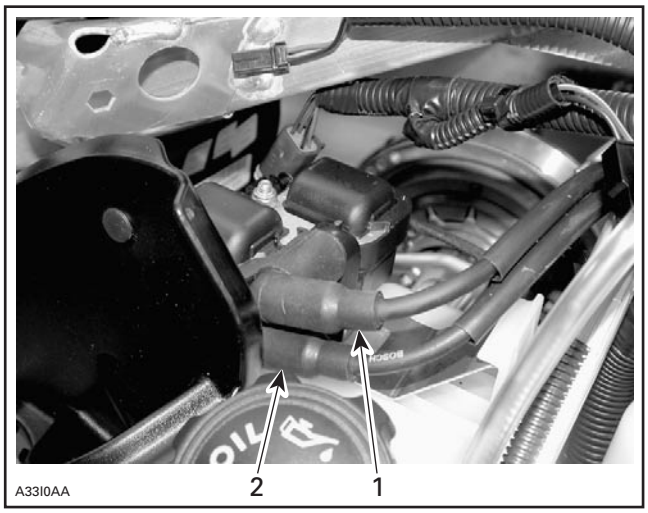
Ignition coil induces voltage to a high level in the secondary windings to produce a spark at the spark plug.

Two separate windings receive input from the ECM. Each winding provides high voltage to its corresponding spark plug.

This ignition system allows spark plugs to spark independently.

CAUTION: Do not interchange spark plug cables. Match reference (PTO or MAG printed on high tension cable yellow tag) with corresponding cylinder spark plug.

Double ignition coil is located underneath air silencer.



TYPICAL
1. PTO side high tension cable
2. MAG side high tension cable

TRIGGER COIL

Trigger coil is used for:

1) Forward engine rotation.
2) Reverse engine rotation.
3) As a crankshaft position sensor (CPS). This information is sent to the ECM.

COMPONENT INSPECTION AND ADJUSTMENT

GENERAL

Engine problems are not necessarily related to the electronic fuel injection system.

It is important to ensure that the mechanical integrity of the engine/propulsion system is present:

– good transmission system operation
– good engine compression and properly operating mechanical components, no leaks etc.
– fuel pump connection and fuel lines without leaks.

Check the chart in TROUBLESHOOTING section to have an overview of problems and suggested solutions.

When replacing a component, always check its operation after installation.

FUEL SYSTEM

⚠ WARNING

The fuel system of a fuel injection system holds much more pressure than that of a carbureted snowmobile. Prior to disconnecting a hose or to removing a component from the fuel system, follow the recommendation described here. Pay attention that some hoses may have more than one clamp at their ends. Ensure to reinstall the same quantity of clamps at assembly.

– Use the VCK (Vehicle Communication Kit) (P/N 529 035 981) to release the fuel pressure in the system. Look in the **Activation** section of the software B.U.D.S. (version G 2.10, P 2.10 or higher).

⚠ WARNING

Fuel lines remain under pressure at all times. Always proceed with care and use appropriate safety equipment when working on pressurized fuel system. Wear safety glasses and work in a well ventilated area. Do not allow fuel to spill on hot engine parts and/or on electrical connectors. Proceed with care when removing/ installing high pressure test equipment or disconnecting fuel line connections. Use the VCK to release fuel pressure prior to removing a hose. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to minimize spilling. Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions. Always work in a well ventilated area. Always disconnect battery or remove 30 A fuse prior to working on the fuel system. After performing a pressure test, release the pressure.

– Always disconnect battery properly or remove 30 A fuse prior to working on the fuel system. Refer to BATTERY section.

When the job is done, ensure that hoses from fuel rail going to fuel pump are properly secured in their supports. Then, pressurize the fuel system. Perform the fuel pressure test as explained in this section.

Properly reconnect the battery or reinstall 30 A fuse.

⚠ WARNING

Ensure to verify fuel line connections for damage and that NO fuel line is disconnected prior to installing the tether cord cap on the DESS post. Always perform the high pressure test if any component has been removed. A pressure test must be done before connecting the tether cord cap. The fuel pump is started and pressure quickly builds-up each time the tether cord cap is installed and the START/RER button is depressed (or rewind starter is pulled).

To check fuel rail for leaks, first pressurize the system then spray soapy water on all hose connections, regulators and injectors. Air bubbles will show the leaking area. Check also for leaking fuel or fuel odor.

⚠ WARNING

Never use a hose pincher on injection system high pressure hoses.

ELECTRICAL SYSTEM

It is important to check that the electrical system is functioning properly:

– battery
– capacitor (manual start SDI models)
– fuses
– DESS
– ignition (spark)
– ground connections
– wiring connectors.

It is possible that a component seems to operate in static condition but in fact, it is defective. In this case, the best way to solve this problem is to remove the original part and replace it with one which is in good condition.

Never use a battery charger to substitute temporarily the battery, as it may cause the ECM (engine control module) to work erratically or not to work at all. Check related-circuit fuse solidity and condition with an ohmmeter. Visual inspection could lead to false results.

⚠ WARNING

All electrical actuators (injectors, fuel pump, ignition coils and starter solenoid) may be suddenly supplied by the battery when the tether cord cap is installed and the start button is depressed or if engine is rotated (manually or with the rewind starter). Even a small movement of the crankshaft or the usage of the supply cable (P/N 529 035 869) will automatically activate the actuators. Always disconnect the tether cord cap and the battery prior to disconnecting any electric or electronic parts.

To perform verifications, a good quality multimeter such as Fluke 111 (P/N 529 035 868) should be used.

Pay particular attention to ensure that pins are not out of their connectors or out of shape. The troubleshooting procedures cover problems not resulting from one of these causes.

CAUTION: Ensure all terminals are properly crimped on wires and connector housings are properly fastened.

CAUTION: Check if wiring harness shows any signs of scoring prior to replace the ECM.

Before replacing a ECM, always check electrical connections. Make sure that they are very tight and they make good contact and that they are corrosion- free. Particularly check ECM ground connections. Ensure that contacts are good and clean. A "defective module" could possibly be repaired simply by unplugging and replugging the ECM. The voltage and current might be too weak to go through dirty wire pins. Check carefully if pins show signs of moisture, corrosion or if they look dull. Clean pins properly and then coat them prior to assembling as follows:

Apply a silicon-based dielectric grease or other appropriate lubricant.

NOTE: Do not apply dielectric grease or other lubricant on the ECM connectors.

If the newly replaced ECM works, try the old one and recheck if it works.

Ensure that all electronic components are genuine – any modification on the wiring harness may lead to generate fault codes or bad operation.

NOTE: For diagnostics purposes, use Vehicle Communication Kit (VCK). See DIAGNOSTIC PROCEDURES subsection.

After a problem has been solved, ensure to clear the fault(s) in the ECM using the VCK. Refer to DIAGNOSTIC PROCEDURES subsection.

RESISTANCE MEASUREMENT

When measuring the resistance with an ohmmeter, all values are given for a temperature of 20°C (68°F). The resistance value of a resistance varies with the temperature. The resistance value for usual resistor or windings (such as injectors) **increases** as the temperature increases. However, our temperature sensors are NTC types (Negative Temperature Coefficient) and work the opposite which means that the resistance value **decreases** as the temperature increases. Take it into account when measuring at temperatures different from 20°C (68°F). Use this table for resistance variation relative to temperature for **temperature** sensors.

TEMPERATURE SENSOR TABLE					
TEMPERATURE		RESISTANCE (ohms)			
°C	°F	ATS	EGTS	WTS for	
				GAUGE	ECM
- 40	- 40		169.7		72412
- 35	- 31				52637
- 30	- 22	28000			38681
- 25	- 13				28718
- 20	- 4	14500	185.1	733.8	21529
- 15	5			587.7	16288
- 10	14			474	12431
- 5	23			384.8	9565
0	32	5500	200.5	314.3	7418
5	41			258.4	5807
10	50			213.7	4582
15	59			177.7	3644
20	68	2500		148.7	2919
25	77		219.6	125	2355
30	86			105.6	1912
35	95			98.69	1562
40	104	1200		76.5	1284
45	113			65.54	1062
50	122		238.5	56.38	882.6
55	131			48.72	738.9
60	140	600		42.28	622

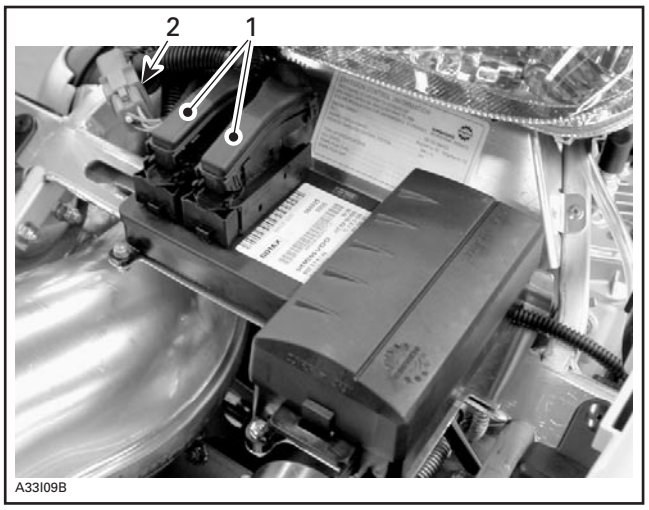
TEMPERATURE SENSOR TABLE					
TEMPERATURE		RESISTANCE (ohms)			
°C	°F	ATS	EGTS	WTS for	
				GAUGE	ECM
65	149			36.82	526.3
70	158			32.19	447.5
75	167			28.24	382.3
80	176	320		24.86	328.1
85	185			21.95	282.8
90	194			19.45	244.8
95	203			17.28	212.8
100	212	180	275.9	15.4	185.6
105	221				162.4
110	230				142.7
115	239				125.9
120	248				111.5
125	257				99.02
130	266	90			88.26
135	275				78.93
140	284				70.81
145	293				63.71
150	302		312.7		57.49
200	392		349.0		
250	482		384.6		
300	572		419.7		
350	662		454.2		
400	752		488.1		
450	842		521.4		
500	932		554.1		
600	1112		617.8		
700	1292		679.2		
800	1472		738.2		
900	1652		794.9		
1000	1832		849.2		

The resistance value of a temperature sensor may test good at a certain temperature but it might be defective at other temperatures. If in doubt, try a new sensor.

Also remember this validates the operation of the sensor at room temperature. It does not validate the over temperature functionality. To test it, the sensor could be removed from the engine/air silencer and heated with a heat gun while it is still connected to the harness to see if the ECM will detect the high temperature condition and generate a fault code.

ENGINE CONNECTOR PIN-OUTS

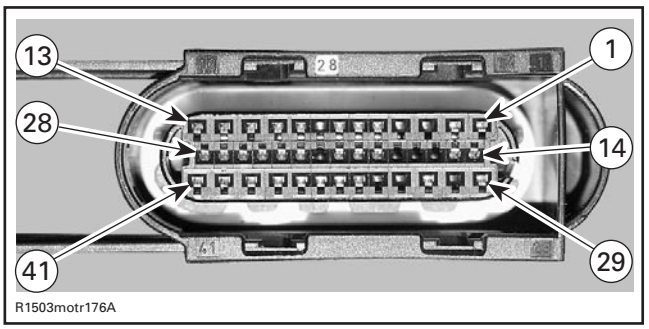
Connector Position



1. ECM connectors
2. Engine connector

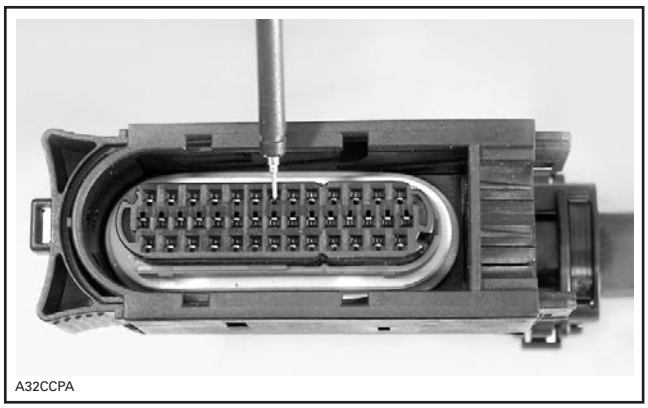
ECM Connector

Use this diagram to locate the pin numbers on the ECM connector of the wiring harness when performing tests.



ECM CONNECTOR PIN-OUT (WIRING HARNESS SIDE)

CAUTION: Probe on top of terminal only. Do not try to probe inside terminal or to use a paper clip to probe inside terminal, it will damage the square-shaped terminal and this could lead to improper function of the engine management system.



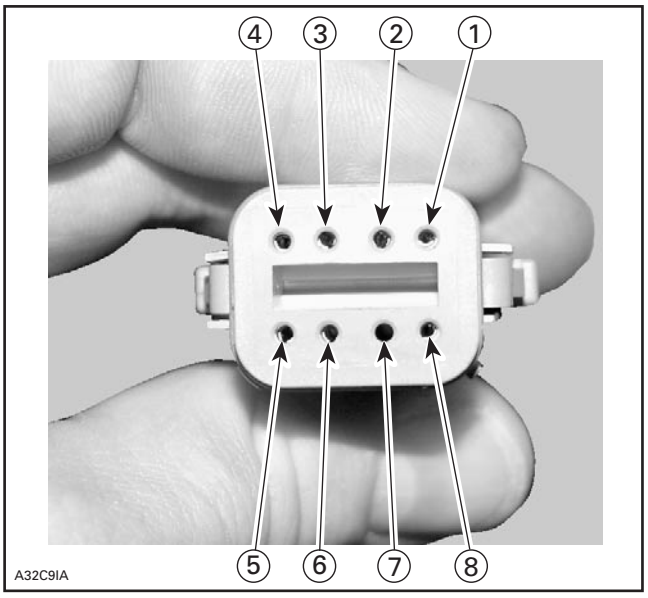
PROBE ONLY ON THE PIN NOZZLE OF FEMALE CONNECTOR

CAUTION: Do not disconnect the ECM connector needlessly. They are not designed to be disconnected/reconnected repeatedly.

NOTE: Do not apply dielectric grease or other lubricant on the ECM connectors.

Engine Connector

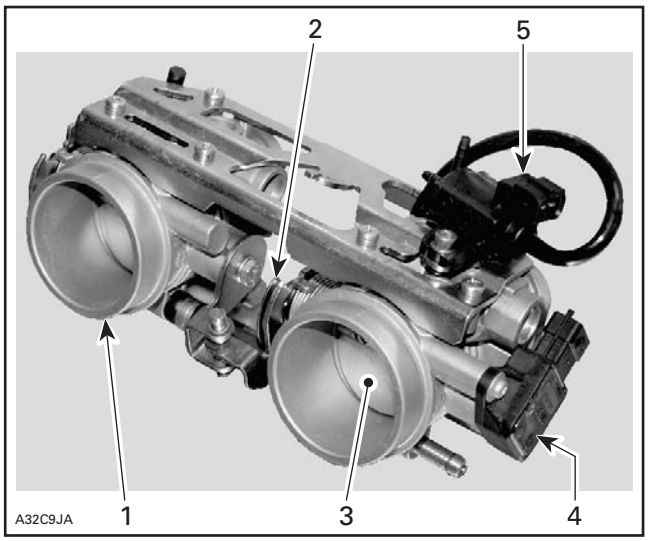
Use this illustration to locate the pin numbers on the engine connector of the wiring harness when performing tests.



ENGINE CONNECTOR PIN-OUT (WIRING HARNESS SIDE)

AIR INDUCTION SYSTEM

THROTTLE BODY



1. Throttle body
2. Throttle cable attachment
3. Throttle plate
4. TPS
5. E-RAVE solenoid

Mechanical Inspection

Check that the throttle plate moves freely and smoothly when depressing throttle lever. Take this opportunity to lubricate the throttle cable.

IMPORTANT: The throttle body is designed to be tamper proof. Changing the zero position stop screw or synchronization screw or modifying them in any way will not increase performance but may cause poor startability and erratic idling.

Before replacing any part, check the following as these could be causing the fault. Perform the test while the engine is not running.

– Throttle cable adjustment too tight. Not returning fully to idle stop.
– Throttle body idle set screw is loose or worn.
– Throttle linkage between the two throttles has moved.
– TPS is loose.
– Corroded or damaged wiring or connectors.
– Throttle body has been replaced and the **Closed Throttle** reset has not been performed.
– ECM has been replaced and the **Closed Throttle** reset has not been performed.

Electrical Inspection

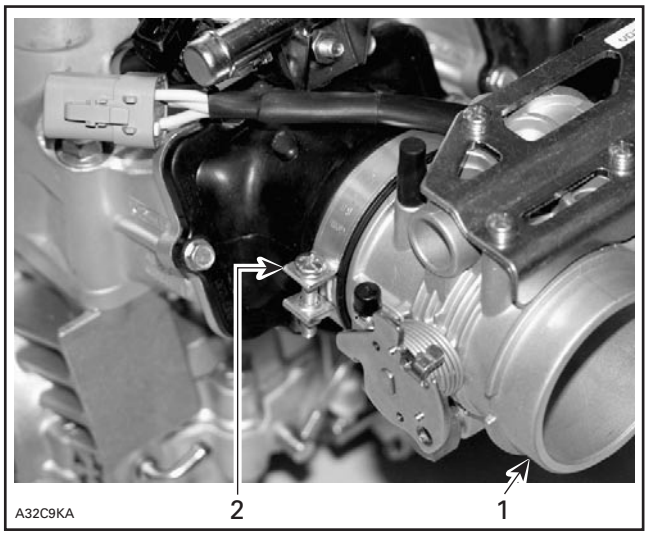
Refer to THROTTLE POSITION SENSOR (TPS) in ELECTRONIC MANAGEMENT below.

Replacement

Removal

To remove the throttle body from engine, proceed as follows:

– Disconnect connectors from ATS (Air Temperature Sensor) and APS (Air Pressure Sensor).
– Disconnect air intake silencer from throttle body. Move boot away.
– Drain cooling system.
– Remove clamps and hoses for throttle body heating from nipples.
– Disconnect connectors and hoses from e-RAVE solenoid and TPS.
– Disconnect throttle cable.
– Unscrew retaining clamps of throttle body.



1. Throttle body
2. Clamp

– Slightly pull throttle body out.

Installation

Installation of the new throttle body is the reverse of the removal procedure. Pay attention to the following details.

Refill and bleed the cooling system, refer to LIQUID COOLING SYSTEM.

For TPS and e-RAVE solenoid replacement procedures, refer to the respective paragraph in ELECTRONIC MANAGEMENT below.

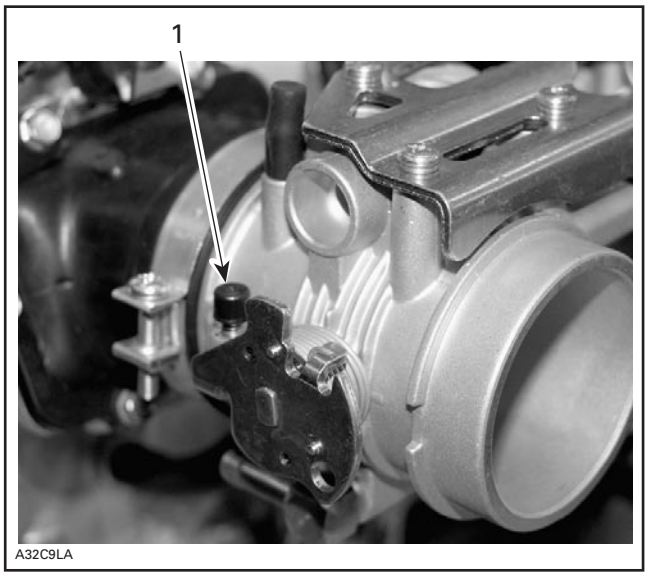
Adjustment

Throttle Body Synchronization

CAUTION: It is not allowed to perform any change on the synchronization screw.

Before installation, clean throttle plates and bores with Pulley flange cleaner (P/N 413 711 809).

NOTE: The throttle body is designed as a single part for both cylinders. No synchronization is required as it has already been done at the factory. However, proceed with throttle cable and closed TPS adjustments as described below.

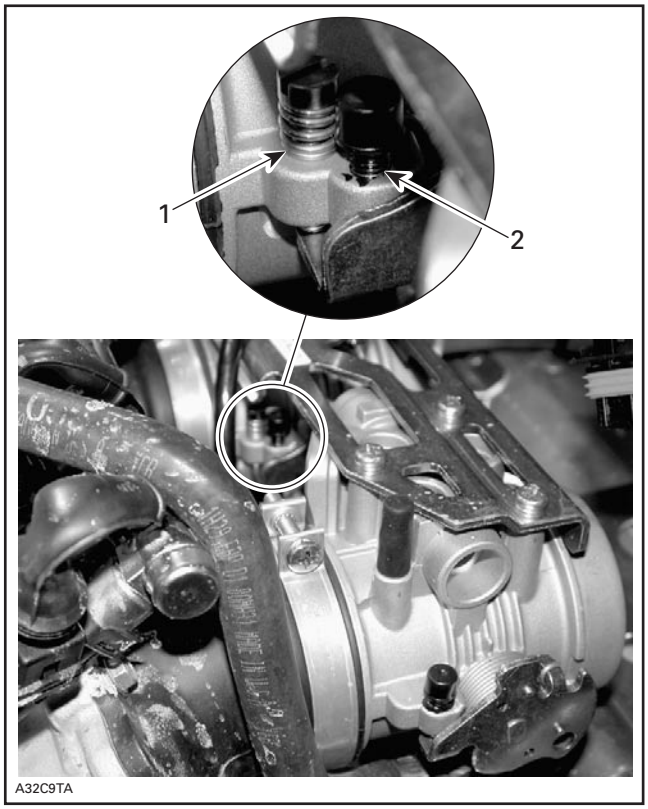


THROTTLE BODY
1. Zero position stopper screw

CAUTION: It is not allowed to perform any change on the zero position stopper screw.

The adjustment of the zero position stopper screw is optimized by the throttle body manufacturer and locked to prevent any modification.

CAUTION: Never attempt to adjust the zero position stopper screw (the capped one) or the idle speed adjustment would be impaired. Besides, no adjustment could be performed by the dealer nor the factory to correct the zero position stopper screw. The throttle body would need to be replaced.



1. Idle speed screw
2. Zero position stopper screw

CAUTION: Do not alter or tamper with throttle cable adjustment or routing. It may cause poor startability and erratic idling.

The only screw that has to be adjusted is the idle speed screw and it has to be adjusted only with the closed throttle reset procedure or for high altitude application. This has to be done only if the ECM or throttle body are replaced or if screw has been tampered with by mistake. Refer to THROTTLE POSITION SENSOR (TPS) in ELECTRONIC MANAGEMENT below.

Throttle Cable Adjustment

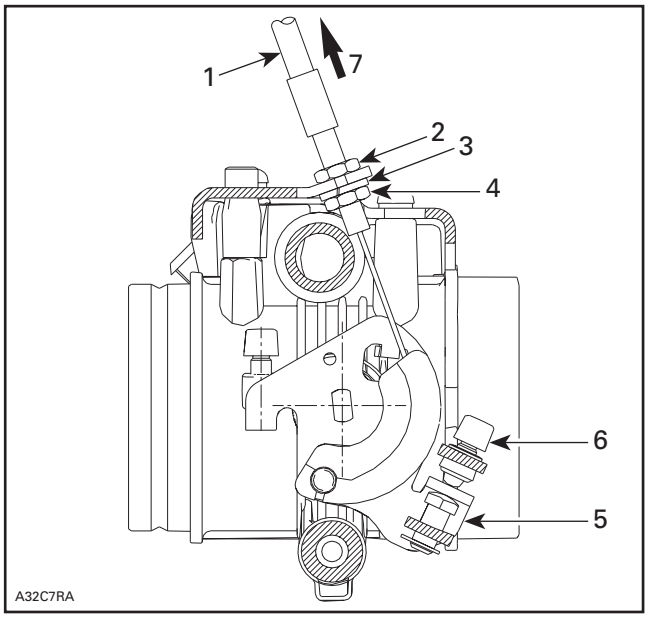
If closed throttle reset is required, then do it before throttle cable adjustment.

Mechanically adjust the throttle cable.

Handlebar and throttle cable must be at their normal position.

Adjust top nut to have a small free play at idle position.

Tighten bottom nut to 4.5 N•m (40 lbf•**in**).



1. Cable sheath
2. Upper nut
3. Lock washer
4. Lower nut
5. Throttle lever
6. Adjusting screw
7. Pull in this direction

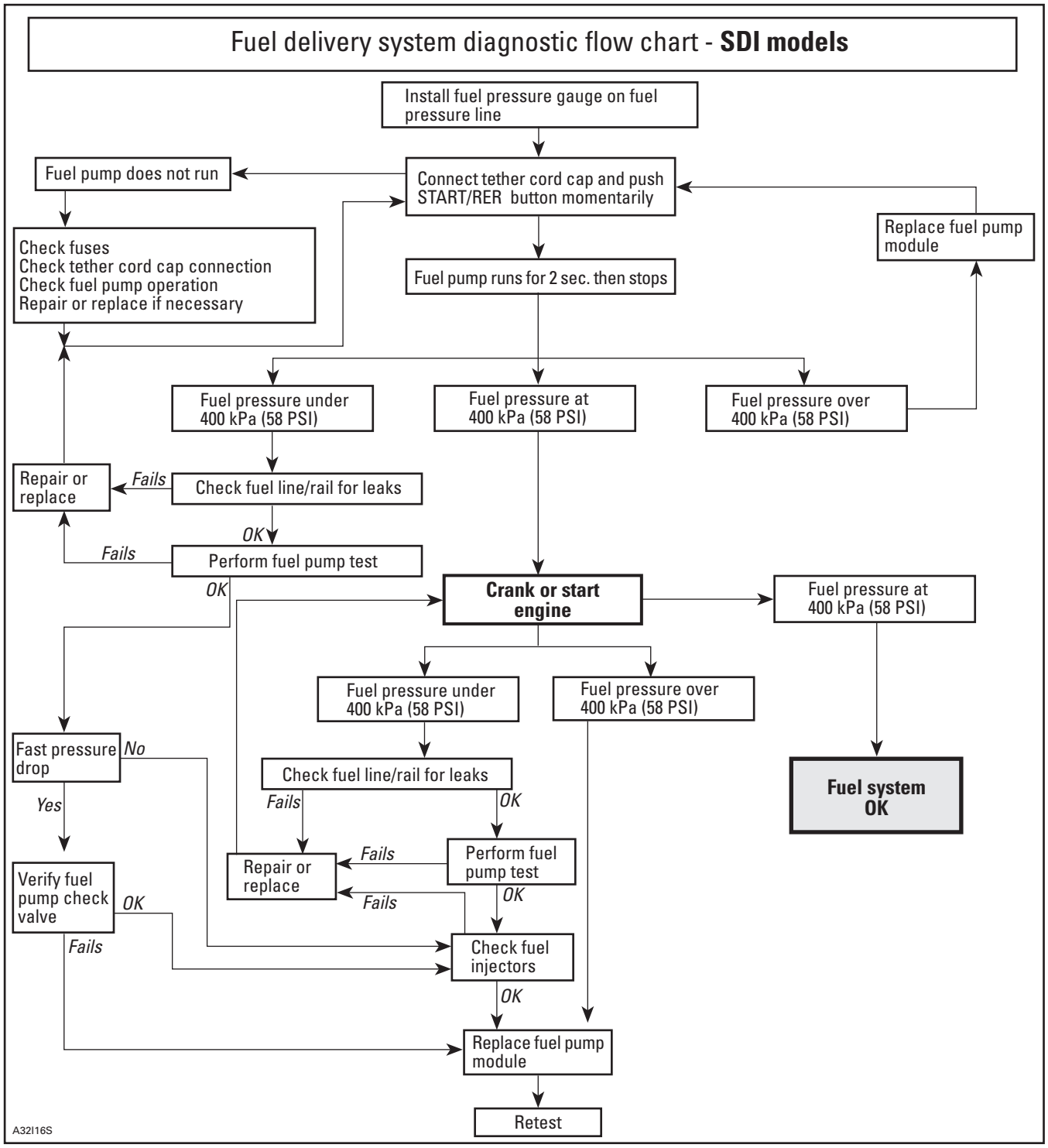
Activate the throttle lever a few times. Make sure throttle cam of throttle body rests against idle speed screw without any tension on the cable.

Using the VCK with B.U.D.S., perform the wide open verification. In monitoring tab check if throttle opening is within 82° to 86° when in wide open position on throttle lever.

Closed Throttle Reset

Perform the **Closed Throttle** reset as described in THROTTLE POSITION SENSOR (TPS) in ELECTRONIC MANAGEMENT below.

FUEL DELIVERY



FUEL PUMP

Fuel Pressure Test

Before proceeding to the pressure test, ensure the battery is fully charged. Battery voltage must be over 12 volts.

Release the fuel pressure in the system using B.U.D.S. Refer to the **Activation** tab.

⚠ WARNING

The fuel hose may be under pressure. Cover the fuel line connection with an absorbent shop rag. Slowly disconnect the fuel hose to release the pressure. Wipe off any fuel spillage inside engine compartment.

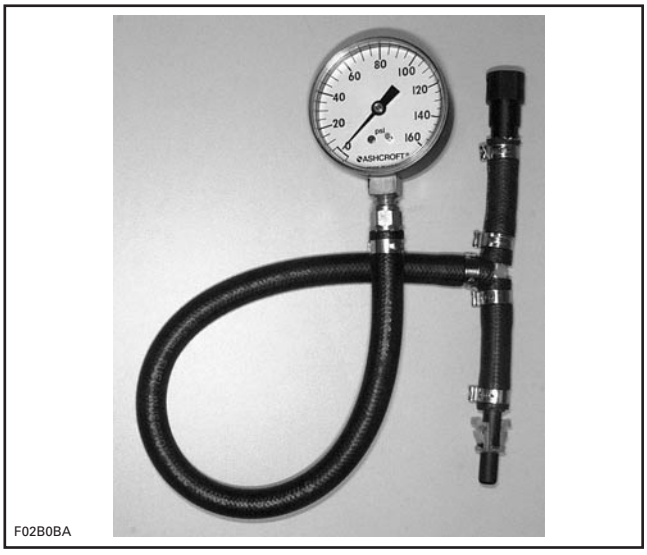
The pressure test will show the available pressure at the fuel pump outlet. It validates the pressure regulator, the fuel pump and leaks in the system.

Ensure there is no leak from hoses and fittings. Repair any leak.

Ensure there is enough gas in fuel tank.

Disconnect outlet hose from fuel pump.

Install fuel pressure gauge (P/N 529 035 591) between disconnected hose (inline installation).



TYPICAL — FUEL PRESSURE GAUGE (P/N 529 035 591)

Remove tether cord cap. Depress START/RER button and observe fuel pressure. **Do not crank engine.** Repeat twice. Release pressure using B.U.D.S. between tests so that the gauge is "reset" to zero (0).

FUEL PRESSURE (when depressing start button)
400 kPa (58 PSI)

Crank or start engine and observe fuel pressure. The fuel pressure should be the same as above.

If pressure is within limits, fuel pump and pressure regulator are working adequately.

A rapid pressure drop indicates leakage either from the fuel rail or from the fuel pump check valve. Check fuel rail for leaks. If it is not leaking then replace fuel pump.

A slow pressure drop indicates leakage either from the fuel injector or from the fuel pressure regulator. Check fuel injector for leaks (see below). If it is not leaking then replace fuel pump module.

Release fuel pressure in the system using B.U.D.S. Look in the **Activation** tab.

Remove pressure gauge and reinstall fuel hose.

⚠ WARNING

Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions. Always work in a well ventilated area.

Reinstall removed parts.

Electrical Test

When depressing the START/RER button, the fuel pump should run for 2 seconds to build up the pressure in the system.

If the pump does not work, disconnect the plug connector from the fuel pump.

Install a temporary connector to the fuel pump connector and apply voltage (12 V) to this test harness.

NOTE: Place the (+) on pin 4 and the (-) on pin 3.

If pump does not run, replace the fuel pump module.

Otherwise, probe terminals 4 and battery ground of fuel pump connector on vehicle harness side. When depressing the START/RER button, you should read battery voltage for approximately 2 seconds (then, the voltage will drop). If battery voltage does not appear, the problem can be in harness or in fuel pump connector. Repair or replace appropriate part (fuel pump may be blown).

Check continuity between terminal 3 of the fuel pump connector on the vehicle harness side and terminal 29 of the ECM connector B. If there is no continuity the problem is in the harness.

Fuel Filter Replacement

Connect VCK(P/N 529 035 981). Use B.U.D.S. to release fuel pressure.

Disconnect fuel filter line assembly from fuel rail and from fuel supply hose.

Install a new fuel filter line assembly. Bleed fuel system as described in fuel bleeding procedure.

Fuel Pump Module Replacement

Removal

Remove seat. Connect VCK (P/N 529 035 981). Use B.U.D.S. to release fuel pressure.

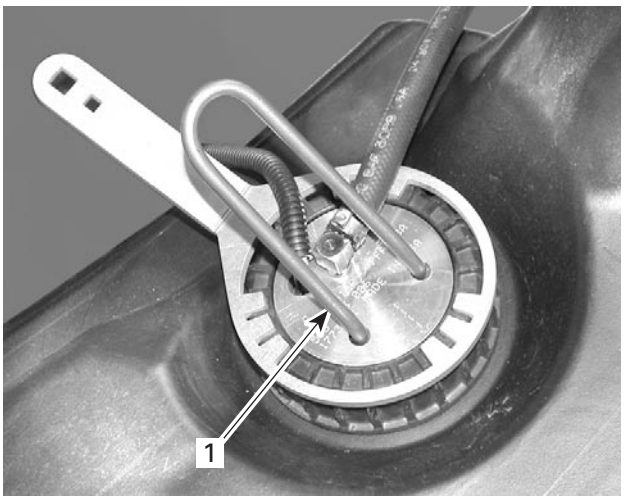
Drain fuel tank as much as possible.

Disconnect fuel supply hose from fuel filter line ass'y.

Disconnect fuel pump electrical connector.

With two screwdrivers or a bent rod holding the flange, unscrew fuel pump nut using fuel pump nut wrench (P/N 529 035 899).

A32I11A



A32I19A

1. Bent rod

Models with Electric Fuel Gauge

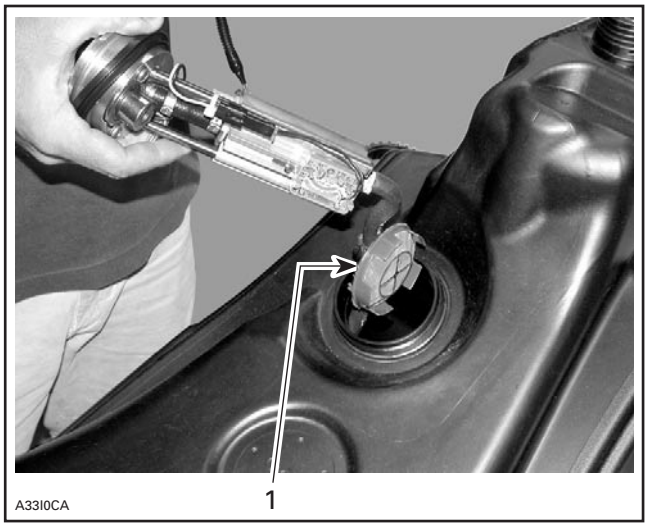
Pull fuel pump module out of fuel tank to expose sensor body. Unclip retainer from sensor body, then remove float ass'y from sensor body.

A33I0BA

FLOAT ASS'Y REMOVAL

All Models

Remove fuel pump module. Take care of fuel pick-ups when pulling out fuel pickup hoses.



1. Fuel pickup

Installation

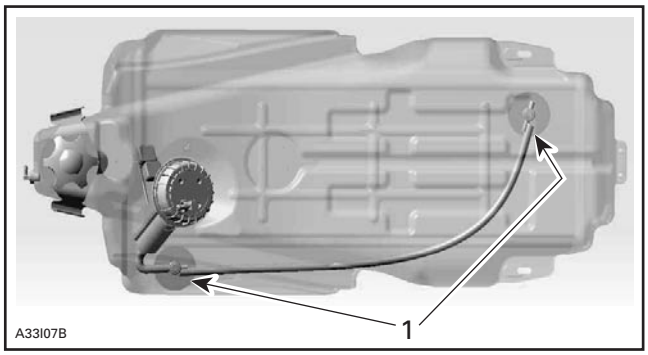
For installation, reverse the removal process but pay attention to the following.

Install a new gasket.

CAUTION: Make sure that hose clamps are tight to avoid the hoses to turn on their fitting. Make sure that position of hoses and fuel pick-ups in relation to fuel pump is as per following photo.

Insert rear fuel pickup through fuel pump hole at an angle to reach the proper position.

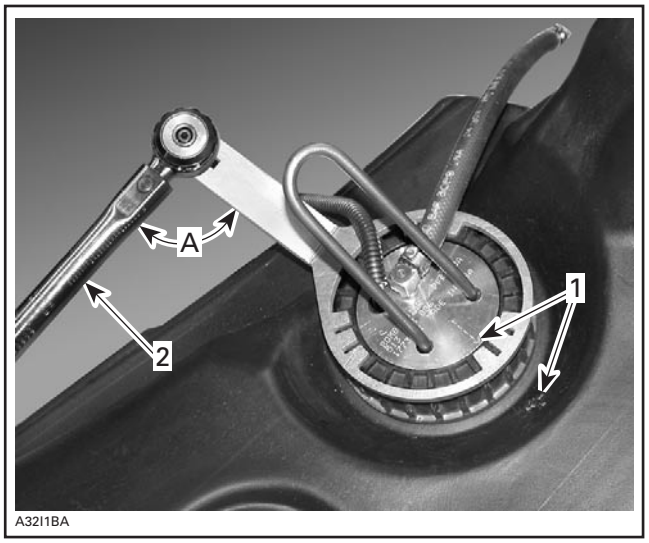
CAUTION: Do not twist hoses during installation. Fuel pickups must be positioned in the fuel tank as per following illustration.



1. Fuel pickups with their strainer facing downward

Align the arrow on fuel pump module with the one on fuel tank. Keep arrows aligned during fuel pump module nut tightening.

Install a torque wrench perpendicularly (90°) to fuel pump nut wrench (P/N 529 035 899). Torque fuel pump nut to 27 - 30 N•m (20 - 22 lbf•ft).



1. Arrows
2. Torque wrench
A. 90°

Bleed the fuel system as following procedure.

Fuel Bleeding Procedure

The rear fuel pickup hose has to be bled.

Pour 12 L (3.17 U.S. gal.) of recommended fuel in the fuel tank.

Apply parking brake. Start the engine. Let it run at idle speed.

Lift the front of vehicle at a 45° angle.

Put the vehicle back on the ground.

Do the above procedure three times.

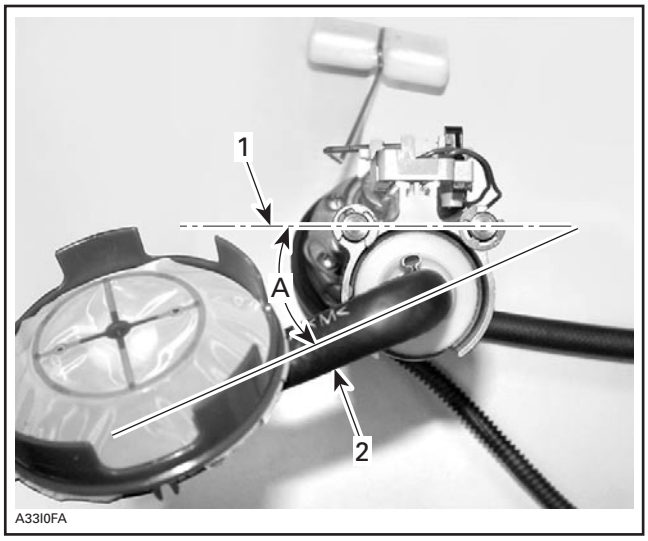
Stop the engine. The rear fuel pickup hose is now bled.

Fuel Hose Kit (P/N 861 302 400)

Remove fuel pump module as explained above.

Unfasten blue hose clamp retaining old fuel hose ass'y to pump inlet nipple. Remove old fuel hose ass'y.

Install fuel hose ass'y to pump at an angle of 17° ± 3° from retaining rods axis.



1. Retaining rods axis
2. Fuel hose ass'y
A. 17° ± 3°

Install a new blue hose clamp on fuel hose ass'y.

Install a new gasket, then reinstall fuel pump module as explained above.

Float and Resistor Card Ass'y Kit (P/N 861 302 500)

Remove fuel pump module as explained above.

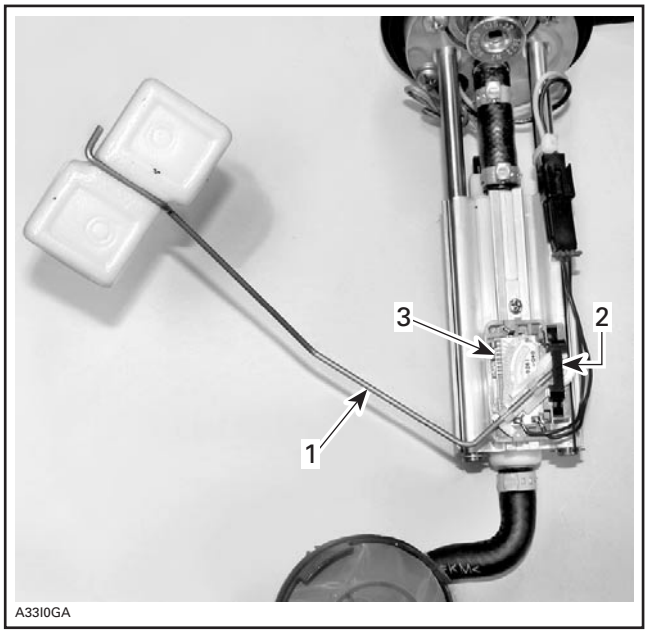
Loosen screw retaining lock plate. Slide lock plate out of aluminum extrusion.

Cut locking tie retaining electric connectors of resistor card ass'y. Unplug the connectors.

Slide old float and resistor card ass'y out of aluminum extrusion.

Assemble the new float to the new resistor card. Installer the retainer.

Slide new float and resistor card ass'y in aluminum extrusion.



1. Float
2. Retainer
3. Resistor card

Install a new gasket, then reinstall fuel pump module as explained above.

Pump Ass'y Kit (P/N 861 302 600)

Remove fuel pump module as explained above.

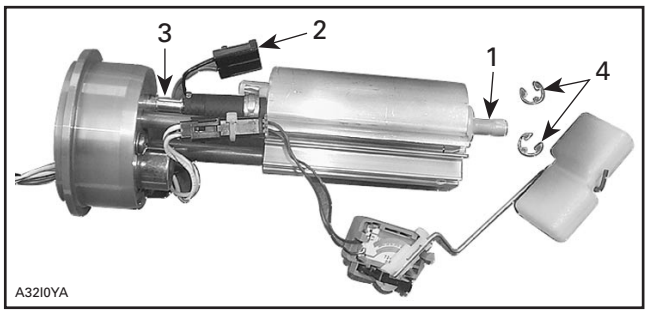
Disconnect fuel pickup hose from pump inlet nipple.

Unlock and remove lock plate of resistor card ass'y if so equipped.

Disconnect pump electric connector.

Disconnect pump outlet hose from pump module flange nipple.

Remove E-clips. Slide pump ass'y out of retaining rods. Make sure that float and resistor card ass'y slides along the aluminum extrusion.



TYPICAL
1. Pump inlet nipple
2. Pump electric connector
3. Pump module flange nipple
4. E-clips

Reverse removal procedure for installation.

Install a new gasket, then reinstall fuel pump module as explained above.

Regulator Kit (P/N 861 302 100)

Remove fuel pump module as explained above.

Remove 2 screws retaining regulator to pump module flange.

Replace O-rings with new ones. Install them in pump module flange bore.

CAUTION: Regulator O-rings must be installed in pump module flange bore.

Reverse removal procedure for installation.

Install a new gasket, then reinstall fuel pump module as explained above.

FUEL RAIL

Pressure at fuel rail is supplied and controlled by the fuel pump module. Refer to FUEL PUMP for pressure test.

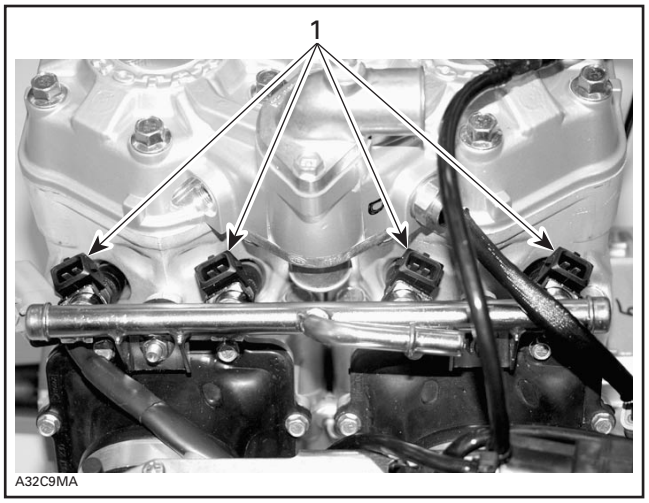
Fuel Rail Replacement

Removal

Release the fuel pressure in the system using B.U.D.S. Look in the **Activation** tab.

Disconnect fuel hose at the connector.

Wrap a rag around the hose end to prevent rail draining.



1. Fuel injectors

Disconnect wiring harness from the four fuel injectors.

Cut tie raps and remove the wiring harness from the fuel rail.

Unscrew rail retaining nuts.

Gently pull rail up by hand, working each side slightly at a time.

Pull rail out with fuel injectors.

If necessary remove fuel injectors as described below.

Installation

For installation, reverse the removal process but pay attention to the following.

Replace O-rings with new ones.

A thin film of injection oil should be applied to O-rings of fuel injectors to ease installation in cylinder.

Torque rail retaining nuts to 10 N•m (89 lbf•**in**).

Make sure that injector clips are well in place.

Add dielectric grease (P/N 293 550 004) to injector electrical connector.

When installing fuel line connector to the fuel rail, put some oil on the O-ring to ease installation.

⚠ WARNING

Perform a fuel pressure test and ensure that there is no leak. Refer to FUEL PUMP above. Run engine and check for leaks.

FUEL INJECTORS

Leakage Test

To perform a leakage test, the injectors and fuel rail have to be removed from the engine. Refer to REMOVAL in FUEL RAIL REPLACEMENT for the procedure.

NOTE: Do not detach injectors from the fuel rail.

Reconnect the fuel line and the wiring harness.

Place each injector in a clean bowl.

Install the tether cord cap on the DESS post and press the engine START/RER button to activate the fuel pump.

Check for fuel leakage from the injector nozzle. There should be less than 1 drop per minute. Perform the test for 2 minutes.

If not within specification, replace the fuel injector(s).

The leakage test is validated when performing the FUEL DELIVERY SYSTEM DIAGNOSTIC FLOW CHART elsewhere in this section.

Electrical Test

Tether cord cap must be on DESS post.

Using the vehicle communication kit (VCK) with the B.U.D.S. software, energize the fuel injector from the **Activation** section.

If the injector does not work, disconnect the plug connector from the injector.

Install a temporary connector to the injector with wires long enough to make the connection outside the engine compartment and apply voltage (12 V) to this test harness.

This will validate the injector mechanical and electrical operation.

If it does not work, replace it.

Wake up ECM using START button and measure voltage between pin 1 (of injector on harness side) and battery ground.

If 12 V is read, disconnect connector A from the ECM and check continuity of circuit as per following table.

CIRCUIT NUMBER (ECM connector «DA»)	INJECTOR NUMBER
DA-15	1/1 (MAG external)
DA-33	2/1 (PTO external)
DA-14	1/2 (MAG internal)
DA-30	2/2 (PTO internal)

If it is good, check the resistance of the fuel injector circuit.

Resistance Test

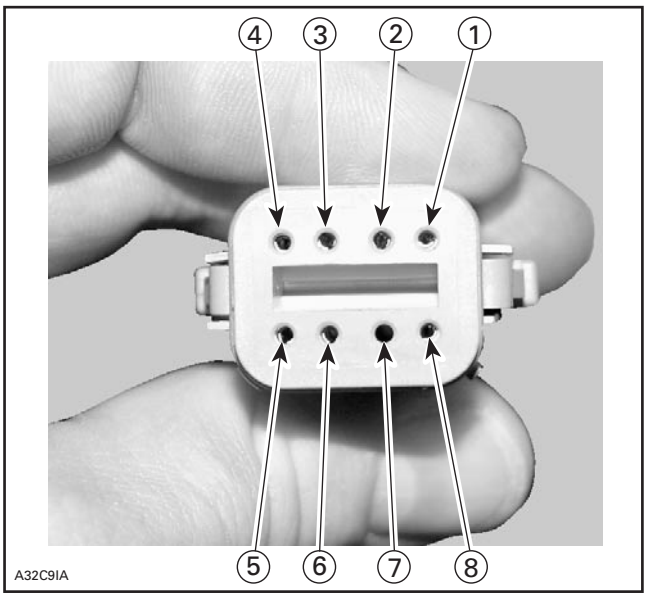
Disconnect the injector from the wiring harness and check the resistance of the injector itself.

The resistance should be around 14.5 Ω.

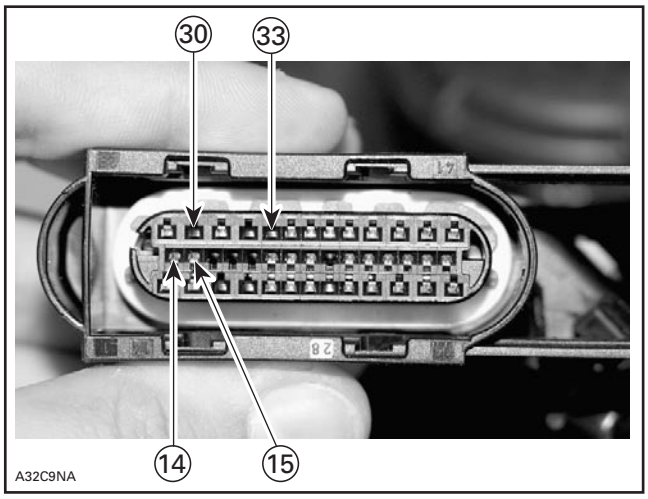
If resistance value is incorrect, replace the injector.

Reconnect the injector and disconnect the connector A from the ECM as well as the engine connector.

Using a multimeter, check resistance value between terminals as shown in the table below.



ENGINE CONNECTOR



ECM CONNECTOR

COMPONENT	CONTACT LOCATION
Fuel injector 1 cylinder 1	4 (Engine Connector) and A-15 (ECM connector)
Fuel injector 2 cylinder 2	3 (Engine Connector) and A-14 (ECM connector)
Fuel injector 1 cylinder 1	4 (Engine Connector) and A-33 (ECM connector)
Fuel injector 2 cylinder 2	3 (Engine Connector) and A-30 (ECM connector)

The resistance should be around 14.5 Ω.

If resistance value is correct, try a new ECM. Refer to ECM REPLACEMENT procedures elsewhere in this section.

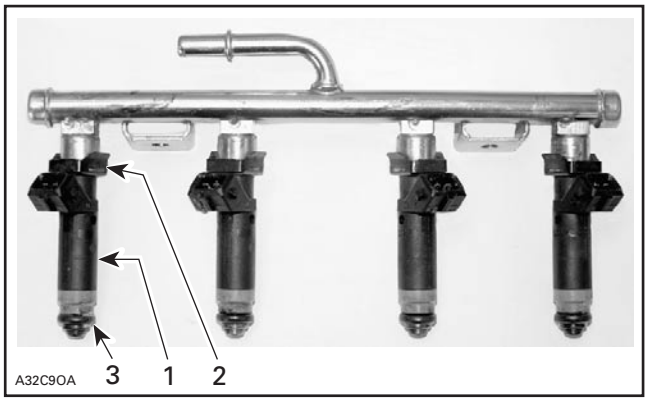
NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

If resistance value is incorrect, repair the wiring harness/connectors or replace the wiring harness between ECM connector and fuel injector.

Fuel Injector Replacement

Removal

Before removing the injectors, the fuel rail has to be removed from the engine. Refer to REMOVAL in FUEL RAIL REPLACEMENT for the procedure.



FUEL RAIL ASS'Y
1. *Fuel injector*
2. *Injector clip*
3. *O-ring*

Then remove the injector clip. Now the fuel injector can be easily pulled out of the fuel rail.

Installation

For the installation, reverse the removal procedure. Pay attention to the following details.

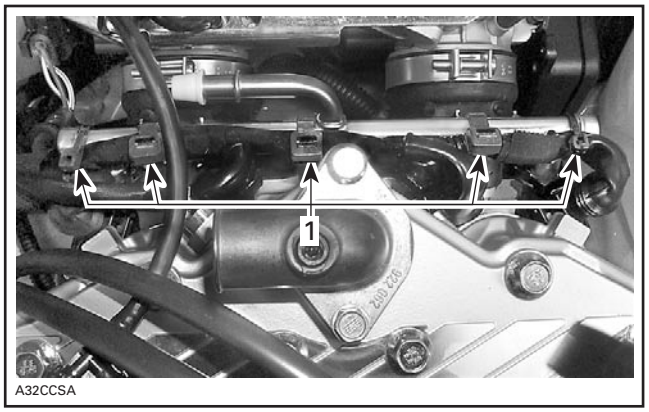
Insert injectors with your hand. Do not use any tool. Ensure clip and injector are properly installed.

Replace O-rings with new ones.

NOTE: A thin film of engine oil should be applied to O-rings to ease insertion in rail.

Torque rail retaining nuts to 10 N•m (89 lbf•**in**).

Attach injector wires with locking tie as shown in following photo.



1. *Locking ties*

⚠ WARNING

Perform a fuel pressure test and ensure that there is no leak. Refer to FUEL PUMP above. Run engine and check for leaks.

ELECTRONIC MANAGEMENT

ECM REPLACEMENT

General

Prior to replacing a suspected ECM, ensure that all the recommendations in the general introduction of this section have been followed.

IMPORTANT: When the ECM is replaced, the tether cord cap(s) and the **Closed Throttle** must be reprogrammed/reset. Refer to their specific section for adjustment.

To allow transferring the previous recorded information from the old ECM to the new one, use the vehicle communication kit (VCK) with the B.U.D.S. software. Use **Replace ECM** in the **ECM** menu. Follow instructions provided by the help system.

NOTE: If the old ECM can still communicate, it must be read inside B.U.D.S. prior to removing it from the vehicle to carry vehicle information and history to the new ECM.

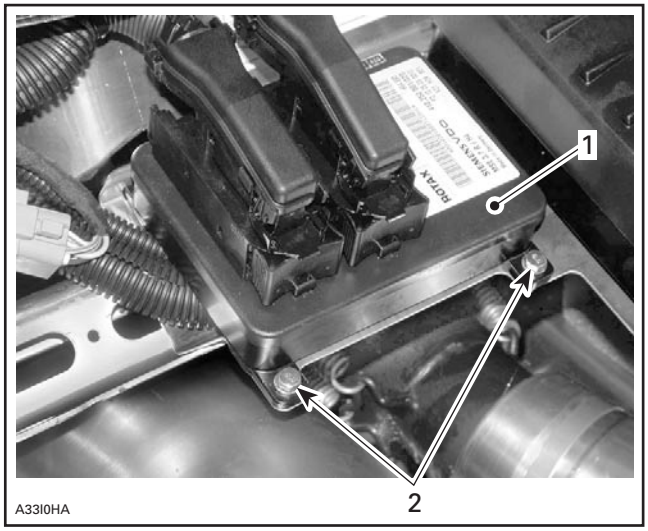
ECM Replacement

Disconnect battery cables.

⚠ WARNING

Battery BLACK (-) cable must always be disconnected first and connected last.

Disconnect both connectors from ECM.



1. *ECM*
2. *Retaining screws*

Unscrew all retaining screws and remove the engine ECM from its support.

Install the new ECM to the support.

Reconnect ECM connectors to ECM, and then battery cables.

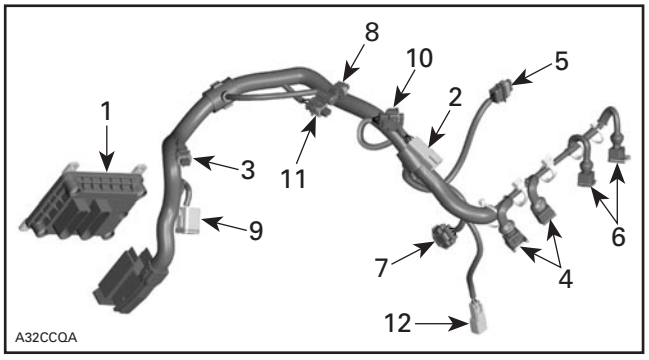
Transfer the data from the previous ECM to the new one using B.U.D.S. then proceed with the required resets and reprogram tether cord cap(s), if you were unable to transfer the data.

NOTE: If data cannot be transferred, manually enter information in **Vehicle** tab.

After performing the required resets, ensure to clear all faults from the newly replaced ECM.

Start the engine and increase engine speed above 5000 RPM to be sure no fault appears.

ENGINE WIRING HARNESS



1. ECM
2. CTS connector
3. EGTS connector
4. Fuel injector connector (cylinder MAG side)
5. Ignition coil connector
6. Fuel injector connector (cylinder PTO side)
7. TPS connector
8. ATS connector
9. Engine connector
10. APS connector
11. KS connector
12. CPS connector

NOTE: Check if wiring harness shows any signs of scoring.

Resistance Test

Check continuity of the circuits according to the wiring diagram in the WIRING DIAGRAMS section of this manual.

If wiring harness is good, check the respective sensor/actuator as described in this section.

Otherwise, repair the connectors, replace the wiring harness or the ECM as diagnosed.

Removal

Remove air intake silencer.

Disconnect the wiring harness from all sensors/actuators.

Disconnect the connector from the ECM.

Cut all locking tie which are holding the wiring harness in position.

Remove complete wiring harness.

Installation

First connect the connector A to the ECM and the engine connector to the vehicle wiring harness.

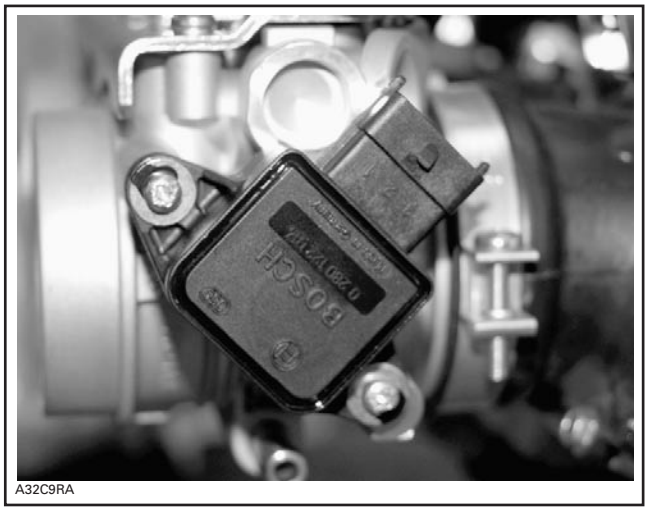
Reconnect the wiring harness to all sensors/actuators and reinstall all locking tie that have been removed.

Install all remaining parts, which have been removed.

THROTTLE POSITION SENSOR (TPS)

General

The throttle position sensor (TPS) is a potentiometer that sends a signal to the ECM which is proportional to the throttle shaft angle.



THROTTLE POSITION SENSOR (TPS)

IMPORTANT: Prior to testing the TPS, ensure that mechanical components/adjustments are adequate according to THROTTLE BODY in AIR INDUCTION SYSTEM above.

The ECM may generate several fault codes pertaining to the TPS. Refer to SYSTEM FAULT CODES in DIAGNOSTIC PROCEDURES section for more information.

Wear Test

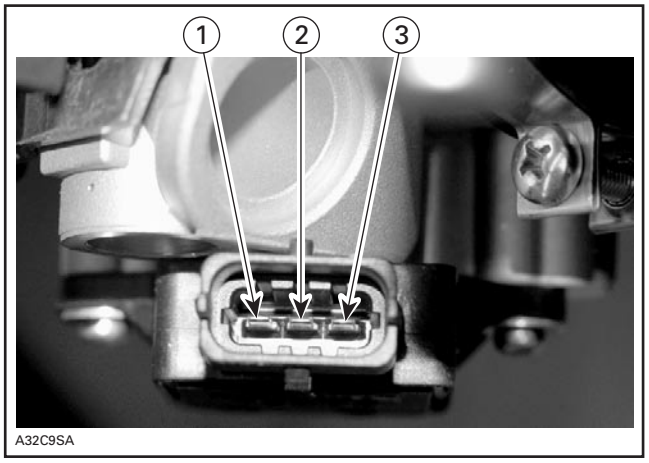
While engine is not running, activate throttle and pay attention for smooth operation without physical stops of the cable.

Using the vehicle communication kit (VCK) with the B.U.D.S. software, use the **Throttle Opening** display under **Monitoring**.

Slowly and regularly depress the throttle. Observe the needle movement. It must change gradually and regularly as you move the throttle. If the needle "sticks", bounces, suddenly drops or if any discrepancy between the throttle movement and the needle movement is noticed, it indicates a worn TPS that needs to be replaced.

Voltage Test

Check the voltage output from ECM to the desired throttle position sensor.



TPS

Disconnect plug connector from throttle position sensor. To unlock connector, insert a small screwdriver between the folded tab. To see the connector pin-out and its pin numbers, temporarily remove the connector shield joining the harness.

Install the tether cord cap, turn OFF engine cut-out switch and push START/RER button momentarily to activate the ECM.

Connect a voltmeter between pin 1 and 2 in the wiring harness.

Voltage should be 5 V.

Check the continuity between pin 3 on wiring harness TPS connector and pin 24 on wiring harness ECM connector.

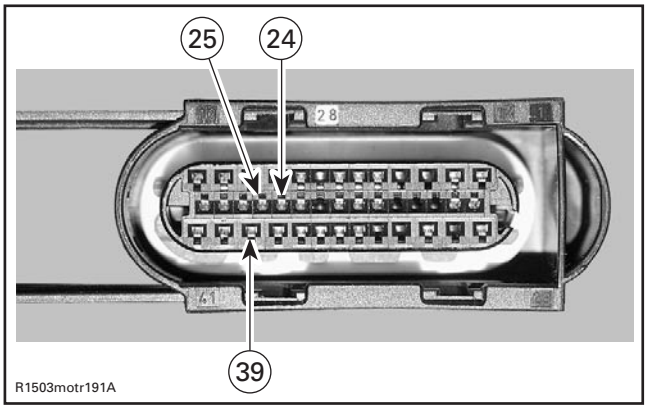
If tests are good, replace the TPS.

If voltage tests are not good, continue to check the resistance of the rest of the TPS circuit.

Resistance Test

Reconnect the TPS.

Disconnect the connector DA from the ECM.



Using a multimeter, check resistance value between terminal DA-25 and DA-39.

The resistance should be 1600 - 2400 Ω in any throttle position.

Check the resistance between terminal DA-24 and terminal DA-39 with the throttle plate in **idle** position.

The resistance should be approximately 1000 Ω.

Check the resistance between terminal DA-24 and terminal DA-39 with the throttle plate in **wide open** position.

The resistance should be 2500 Ω.

Check the resistance between terminal DA-24 and DA-25 with throttle plate in **idle** position.

The resistance should be 2500 Ω.

Now check the resistance with the throttle plate in **wide open** position.

The resistance should be approximately 1000 Ω.

NOTE: When measuring between pins DA-24 and DA-39, resistance **value increases** while depressing throttle lever. When measuring between pins DA-24 and DA-25, resistance **value decreases** while depressing throttle lever. The resistance value should change smoothly and proportionally to the throttle movement. Otherwise, replace TPS.

If resistance values are correct, try a new ECM. Refer to ECM REPLACEMENT procedures elsewhere in this section.

NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

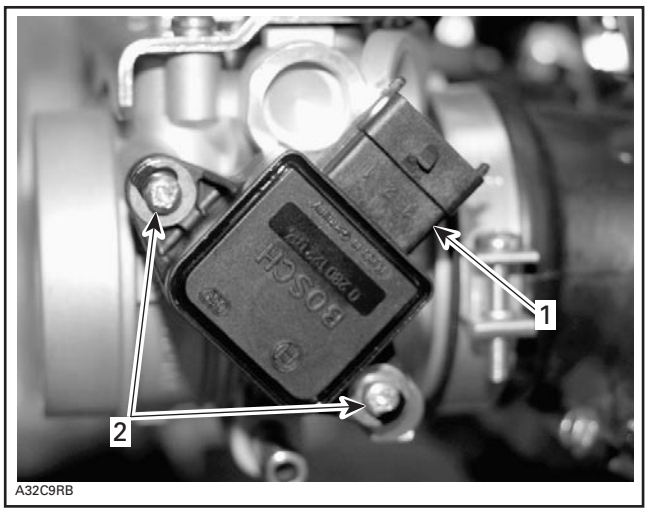
If resistance values are incorrect, repair connector or replace the wiring harness between ECM connector and the TPS.

Replacement

Remove the throttle body as described above.

Loosen two screws retaining the TPS.

Remove TPS.



THROTTLE BODY
1. *Throttle position sensor (TPS)*
2. *Screws*

Install the new TPS.

Apply Loctite 243 on the TPS retaining screws, then torque to 3 N•m (27 lbf•**in**).

Reinstall remaining removed parts.

Proceed with the **Closed Throttle Reset**. See below.

Closed Throttle Reset

NOTE: This operation performs a reset of the values in the ECM.

This reset is very important. The setting of the TPS will determine the basic parameters for all fuel mapping and several ECM calculations in idle speed control of the engine.

NOTE: Reset must be done each time the throttle position sensor (TPS) is loosened or removed or throttle body or ECM is replaced.

CAUTION: An improperly set TPS may lead to poor engine performance.

Use the vehicle communication kit (VCK) with the B.U.D.S. software to perform this adjustment.

Unscrew idle speed screw until the throttle body plate stop lever rest against its zero position stopper screw (capped screw). If necessary, loosen the throttle cable. Open throttle approximately one quarter then quickly release. Repeat 2 - 3 times to settle throttle plate.

Push the **Reset** button in the **Setting** section of B.U.D.S.

The following message will be displayed:

Make sure the idle screw is not in contact with the throttle stopper. Click OK to continue.

Follow instructions and click OK.

Another message will appear to ask you to perform a ECU tracking shut down to save the changes into the ECU permanent memory.

Remove the tether cord cap from the DESS post and wait until the message disappears before reinserting the tether cord cap.

Re-power up the ECM by pushing the START/RER button momentarily.

The throttle opening displayed in B.U.D.S. should be 0.00 (0.05 maximum).

If TPS is not within the allowed range while resetting the **Closed Throttle**, the ECM will generate a fault code and will not accept the setting.

Now, the idle speed screw has to be adjusted. To do this, screw in the idle speed screw until B.U.D.S. throttle opening displays value as per following table.

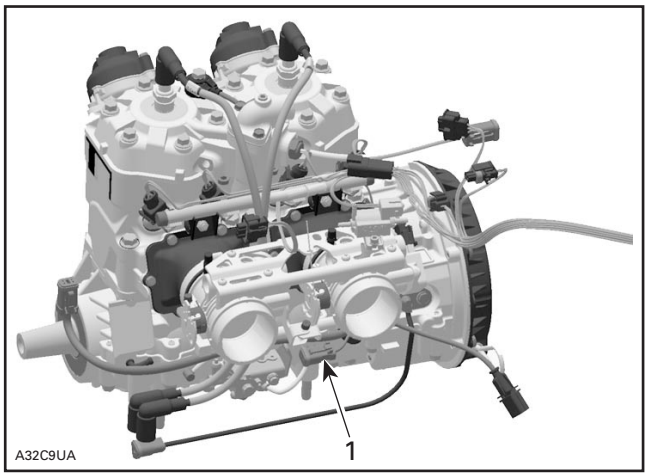
ENGINE TYPE	VALUE	
	AT SEA LEVEL	ABOVE 1800 m (6000 ft)
593 SDI	3.9°	4.1°

If throttle cable has been loosen during the procedure, adjust a throttle cable.

Start engine and make sure it operates normally through its full engine RPM range. If fault codes appear, refer to SYSTEM FAULT CODES in the DIAGNOSTIC PROCEDURES section for more information.

CRANKSHAFT POSITION SENSOR (CPS)

NOTE: The CPS is the trigger coil used for forward and reverse.



1. CPS connector

NOTE: Take into account that a CPS fault can be triggered by missing encoder wheel teeth. First check fault codes then check the teeth condition if necessary. See below.

Disconnect CPS wiring harness connector. Probe terminals coming from CPS while cranking engine. Voltage should be within 1-2 Vac. Otherwise, inspect wiring and replace CPS if wiring is good.

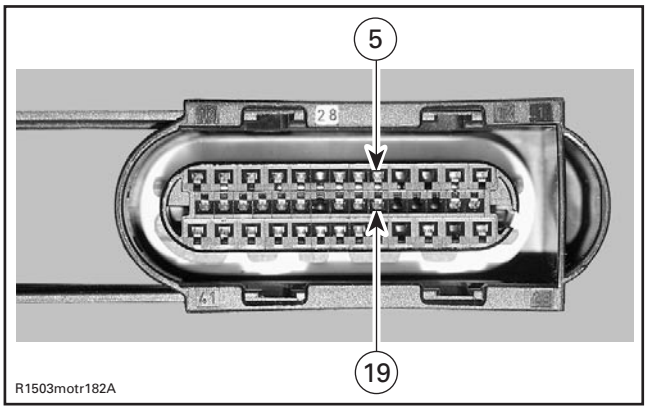
Resistance Test

Disconnect the CPS plug connector from the wiring harness and check the resistance of the sensor itself.

The resistance should be between 190 Ω and 300 Ω.

Otherwise, replace the CPS.

If resistance tests good, **reconnect** the CPS and disconnect the connector DA on the ECM.



Using a multimeter, recheck resistance value between terminals 5 and 19.

If resistance value is correct, try a new ECM. Refer to ECM REPLACEMENT procedures elsewhere in this section.

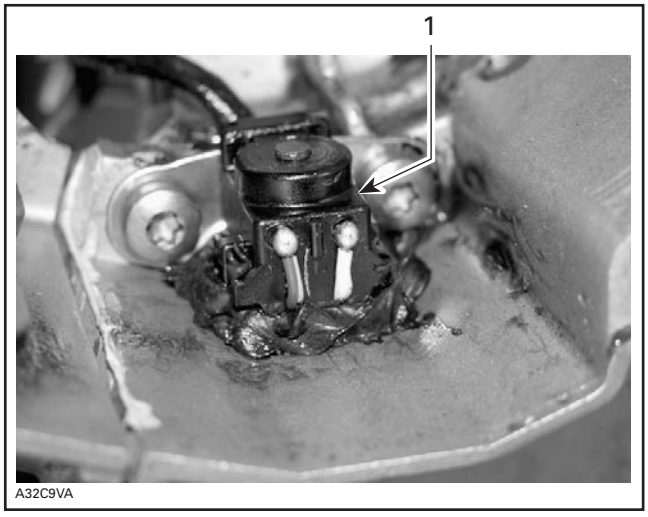
NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the CPS.

Replacement

Disconnect connectors and remove the rewind starter, then the magneto flywheel. Refer to MAGNETO SYSTEM.

Remove CPS.



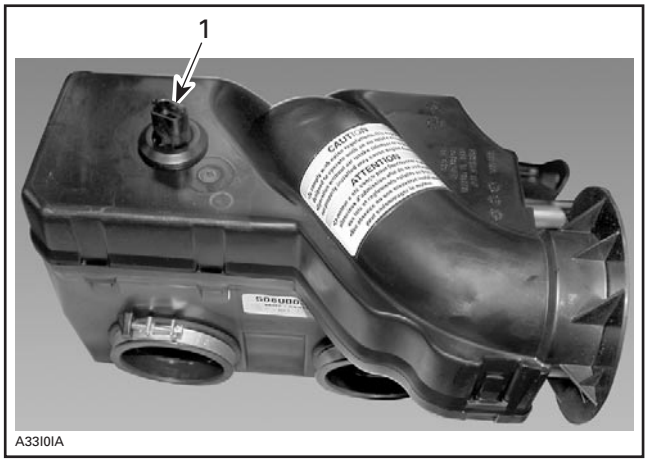
1. CPS inside crankcase

When installing new CPS apply Loctite 5910 between CPS and crankcase.

Torque to 8 N•m (71 lbf•**in**).

Reinstall remaining removed parts.

AIR TEMPERATURE SENSOR (ATS)



1. Air temperature sensor (ATS)

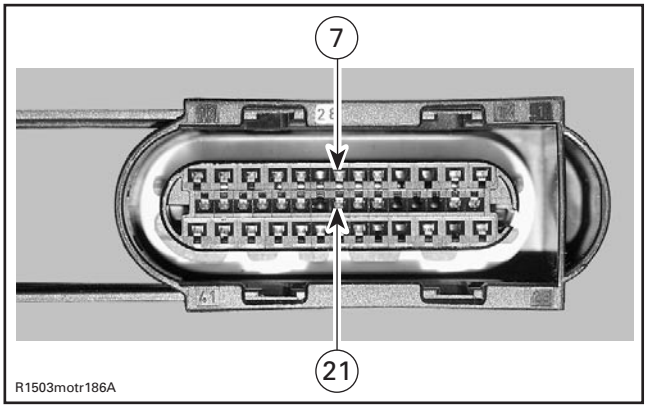
Resistance Test

Disconnect the plug connector from the ATS and check the resistance of the sensor itself.

Refer to TEMPERATURE SENSOR TABLE at the beginning of this section to find the corresponding resistance value for this sensor temperature.

If out of specification, replace the sensor.

If resistance tests good, **reconnect** the ATS and disconnect the connector DA on the ECM.



Using a multimeter, recheck resistance value between terminals 7 and 21.

If resistance value is correct, try a new ECM. Refer to ECM REPLACEMENT procedures elsewhere in this section.

NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the ATS.

Replacement

Disconnect the connector of the ATS.

Pull the ATS out of the air intake silencer.

Follow this procedure to install the ATS.

First, install the ATS rubber ring.

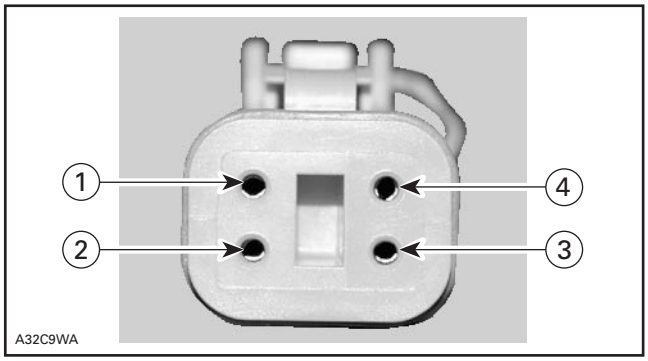
NOTE: If the rubber ring is installed on ATS sensor, remove it before ATS installing.

Spray soapy water on ring. Install ring on air intake silencer then push the sensor in place. Reconnect it.

COOLANT TEMPERATURE SENSOR (CTS)

Resistance Test

Disconnect the plug connector from the CTS and check the resistance of the sensor itself.



The resistance between pin 1 and 2 is used for temperature gauge.

Refer to TEMPERATURE SENSOR TABLE at the beginning of this section to find the corresponding resistance value for this sensor temperature.

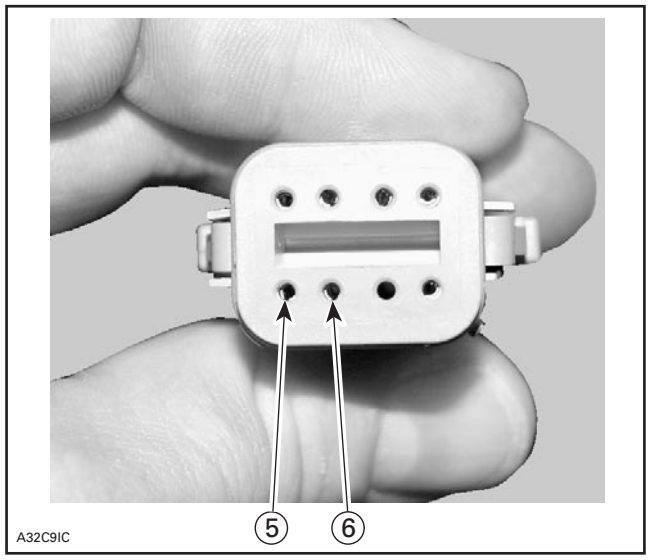
If out of specification, replace the sensor.

The resistance between pin 3 and 4 is used for ECM.

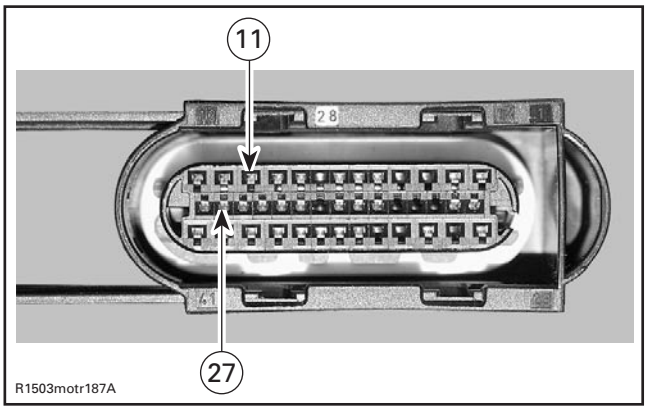
Refer to TEMPERATURE SENSOR TABLE at the beginning of this section to find the corresponding resistance value for this sensor temperature.

If out of specification, replace the sensor.

If resistance tests good,**reconnect** the WTS and disconnect the connector A on the ECM as well as the engine connector.



ENGINE CONNECTOR



ECM CONNECTOR A

Using a multimeter, recheck resistance value between terminals 5 and 6 on engine connector. This resistance is used for temperature gauge.

Refer to TEMPERATURE SENSOR TABLE at the beginning of this section to find the corresponding resistance value for this sensor temperature.

Recheck also resistance value between terminals 11 and 27 on ECM connector A. This resistance is used for ECM.

Refer to TEMPERATURE SENSOR TABLE at the beginning of this section to find the corresponding resistance value for this sensor temperature.

If resistance value is correct, try a new ECM. Refer to ECM REPLACEMENT procedures elsewhere in this section.

NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the CTS.

Replacement

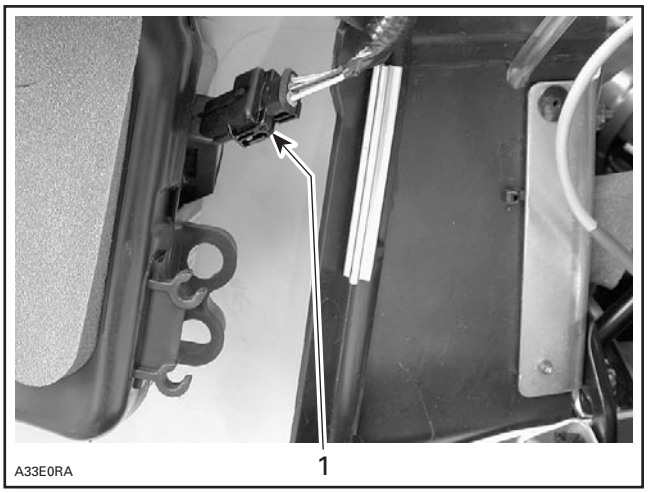
Drain cooling system.

Disconnect CTS connector and remove CTS. Install the new CTS and torque to 12 N•m (106 lbf•**in**).

Reinstall remaining removed parts.

Refill engine coolant and bleed cooling system. Refer to LIQUID COOLING SYSTEM section.

AIR PRESSURE SENSOR (APS)



INSIDE LH SIDE PANEL
1. Air pressure sensor (APS)

Ensure sensor is correctly installed on air intake silencer. Otherwise, the APS could generate a fault code. Remove sensor and check for oil or dirt on its end and if problem persists, check the wiring harness. Perform the following tests.

Voltage Test

Check the voltage output from ECM to the APS.

Install the tether cord cap, turn OFF engine cut-out switch and push START/RER button momentarily to activate the ECM.

Disconnect plug connector from APS and connect a voltmeter between pin 1 and 2 of wiring harness.

Voltage should be 5 V.

Check the continuity between pin 3 on APS connector and pin 18 on ECM connector.

If tests are good, replace the APS.

If tests are not good, continue to check the continuity of the rest of the APS circuit on the harness.

Disconnect the connector A from the ECM.

Using a multimeter, check continuity of circuits as per following table.

CIRCUIT NUMBER (ECM CONNECTOR DA)	APS CONNECTOR
DA-3	PIN 1
DA-4	PIN 2
DA-18	PIN 3

If wiring harness is good, try a new ECM. Refer to ECM REPLACEMENT procedures elsewhere in this section.

NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

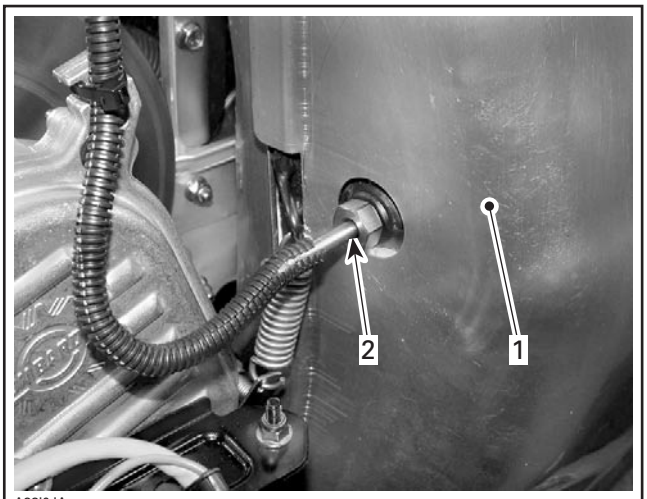
Otherwise, repair the connectors or replace the wiring harness between ECM connector and the APS.

Replacement

Disconnect APS connector and remove the APS. The ATS is retained with a screw.

Install the new APS.

EXHAUST GAS TEMPERATURE SENSOR (EGTS)



1. Muffler
2. Exhaust gas temperature sensor (EGTS)

Resistance Test

Disconnect the plug connector from the EGTS and check sensor resistance.

Refer to TEMPERATURE SENSOR TABLE at the beginning of this section to find the corresponding resistance value for this sensor temperature.

If out of specification, replace the sensor.

If resistance tests good, **reconnect** the EGTS and disconnect the connector DA on the ECM.

Using a multimeter, recheck resistance value between terminals 10 and 26.

If resistance value is correct, try a new ECM. Refer to ECM REPLACEMENT procedures elsewhere in this section.

NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

If resistance value is incorrect, repair the connector or replace the wiring harness between ECM connector and the EGTS.

Replacement

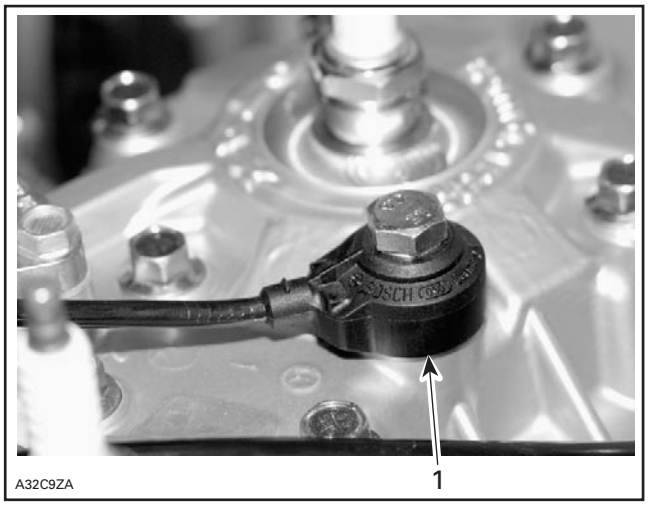
Disconnect EGTS connector and remove EGTS.

Apply anti-seize lubricant (P/N 293 800 070) over EGTS threads to prevent possible seizure.

Torque the new EGTS to 45 N•m (33 lbf•ft).

Replug connector.

KNOCK SENSOR (KS)



1. Knock sensor (KS)

Dynamic Test

Lift rear of vehicle off the ground and support it with a wide-base mechanical stand.

Using the vehicle communication kit (VCK) with the B.U.D.S. software, monitor the knock sensor using the Faults section.

Start the engine and bring engine RPM above 6000 RPM. If no fault code occurs, the knock sensor is good.

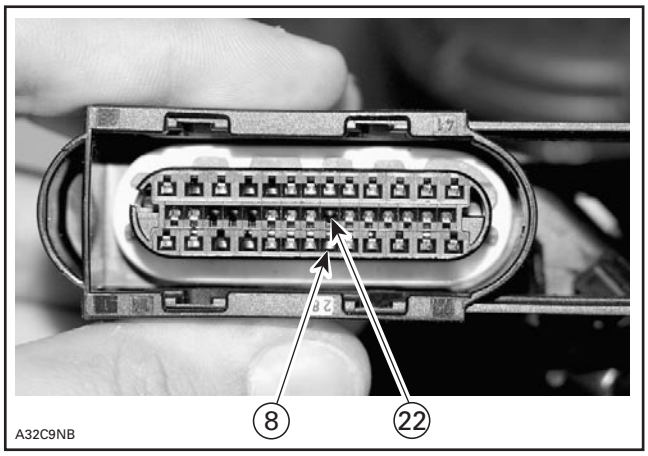
Otherwise, do the following.

Ensure sensor and head contact surfaces are clean and mounting bolt and washer are correct and properly torqued down.

Check the knock sensor circuit on wiring harness.

Disconnect the connector from knock sensor harness.

Disconnect connector DA form the ECM and check continuity of circuit as per following table.



CIRCUIT NUMBER (ECM CONNECTOR A)	KS CONNECTOR
DA-22	PIN 1
DA-8	PIN 2

If test is not good, repair the connector or replace the wiring harness between ECM connector and knock sensor.

Replacement

Unscrew and remove knock sensor from cylinder head.

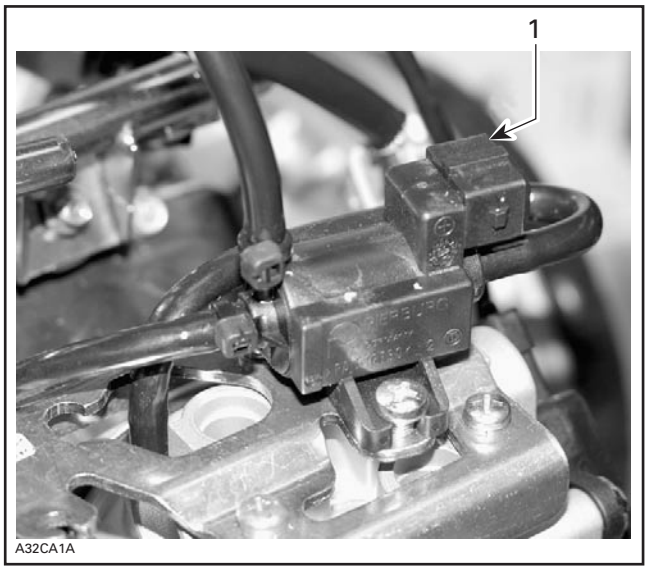
Clean contact surface, then install the new knock sensor.

Torque screw to 24 N•m (18 lbf•ft).

CAUTION: Improper torque might prevent sensor to work properly and lead engine to severe damage of internal components.

Replug connector.

E-RAVE SOLENOID



1. E-RAVE solenoid

Resistance Test

Disconnect the solenoid connector.

Check resistance value between both terminals of the solenoid.

The resistance value should be approximately 30 Ω.

Voltage Test

Install the tether cord cap and push the START/RER button momentarily to activate ECM.

Battery voltage should be present on VIOLET/GREY wire. If test fail, fuse may be blown.

Continuity Test

BROWN/WHITE wire must show continuity between solenoid connector and pin 15 on connector DB from the ECM.

If test fail, repair connector or replace wiring harness between ECM connector and solenoid.

Replacement

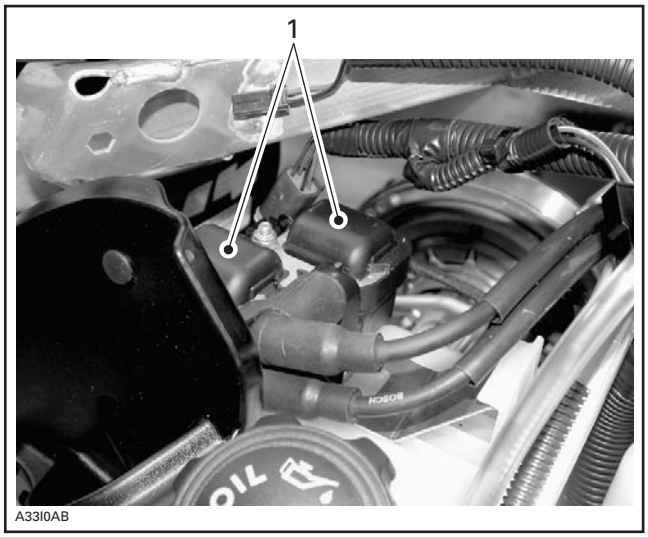
Remove the air intake silencer. Unplug the solenoid connector and all hoses.

NOTE: Mark hose locations for installation.

Remove solenoid screws then the solenoid.

For installation, reverse the removal procedure.

DOUBLE IGNITION COIL



1. Ignition coil

NOTE: The ECM energizes the primary side of each ignition coil individually. It can detect if the double ignition coil is connected otherwise a trouble code will appear upon starting.

Using the vehicle communication kit (VCK) with the B.U.D.S. software, energize the ignition coil from the **Activation** section.

You should hear the spark occurring. In doubt, use an inductive spark tester or a sealed tester – available from after-market tool/equipment suppliers – to prevent spark occurring in the engine compartment. Otherwise, perform the following checks.

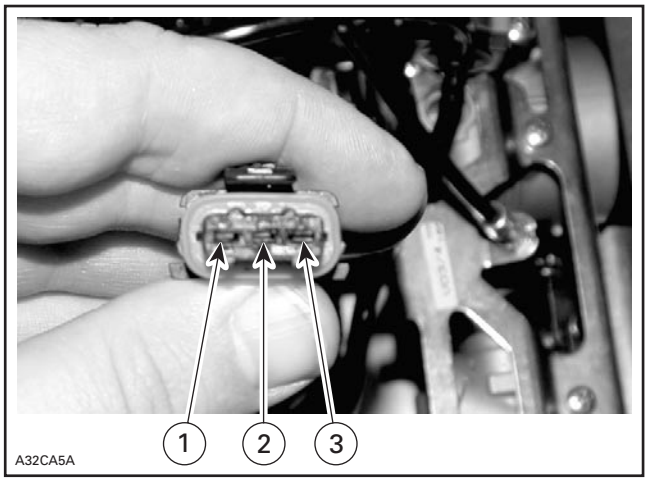
An ignition coil with good resistance measurement can still be faulty. Voltage leak can occur at high voltage level which is not detectable with an ohmmeter. Replacing the ignition coil may be necessary as a test.

Voltage Test

⚠ WARNING

When disconnecting coil from spark plug, always disconnect coil from main harness first. Never check for engine ignition spark from an open coil and/or spark plug in the engine compartment as spark may cause fuel vapor to ignite.

Disconnect the plug connector from the ignition coil and check the voltage supplied by the battery.



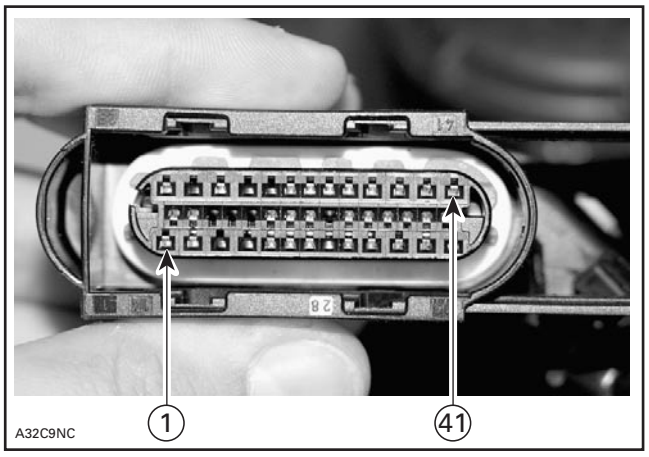
Install **tether cord cap** on the DESS post and push the START/RER button momentarily to activate the ECM.

Check voltage between terminal 2 of ignition coil connector on the wiring harness and battery ground.

Battery voltage should be present (approx. 12 V).

If 12 V is NOT read, check continuity between terminal 2 of ignition coil and the corresponding fuse. Otherwise repair wiring harness.

If 12 V is read, disconnect the connector A from the ECM and check the continuity of appropriate circuit 41 (cylinder 1) or 1 (cylinder 2) and of ignition coil connector, pin 3 and pin 1 respectively.



ECM CONNECTOR

If wiring harness is defective, repair the connector or replace the wiring harness between ECM connector and the ignition coil.

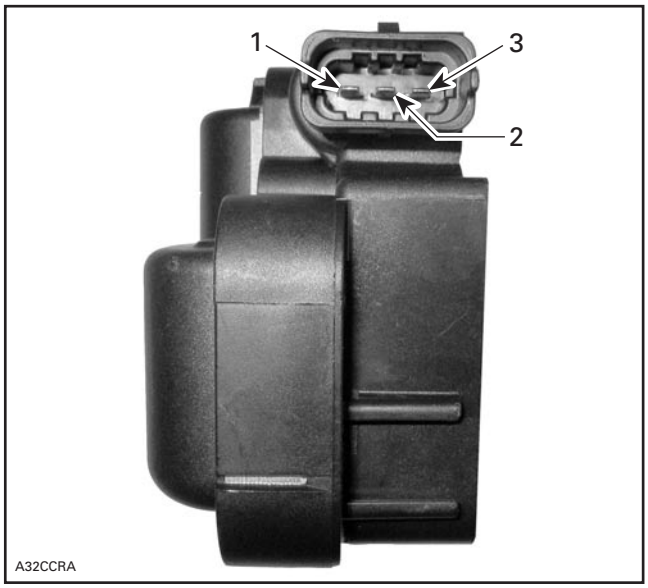
If wiring harness is good, test resistance of primary winding of ignition coil.

Resistance Test

Remove spark plug cables from ignition coil.

Using a multimeter, check the resistance of primary winding.

NOTE: The secondary winding can not be measured with an ohmmeter. Try a new double ignition coil if necessary.



1. Terminal 1a
2. Terminal 15
3. Terminal 1b

For primary winding, check the resistance between terminal 15 and terminal 1a (cylinder 1) of the ignition coil and between terminal 15 and terminal 1b (cylinder 2) respectively.

The resistance should be between 0.40 and 1.15 Ω at 20°C (68°F).

If the resistance of one of both windings is not good, replace the ignition coil.

If the windings test good, try a new ECM.

NOTE: Check if wiring harness shows any signs of scoring prior to replace the ECM.

⚠ WARNING

Always reconnect ignition coil cables at the same spark plugs where they come from. Otherwise, severe backfire may occur with possible damage to exhaust system components.

TDC SETTING (TOP DEAD CENTER)

Refer to IGNITION TIMING section.

CAPACITOR

⚠ WARNING

Capacitor may be charged. Once discharged, a transient recovery voltage may be generated in the capacitor after a while. Always discharge capacitor before servicing.

Removal

Remove the 30 A fuse.

Connect a test light to capacitor terminals during a complete minute to discharge capacitor.

⚠ WARNING

Do not short–circuit both capacitor terminals.

Disconnect capacitor terminals and unfasten capacitor.

Inspection

Visual Inspection

Check for pin holes in the pressure relief valve on top of capacitor. If any pin hole is present, discard capacitor.

Charge Hold Test

Connect a 12 V test lamp to capacitor terminals during a complete minute to discharge capacitor.

Connect a switch (in OFF position) between a 12 V battery positive post and the capacitor positive post. Connect the battery negative post to the capacitor negative post. Turn on the switch for 2 seconds. Disconnect the capacitor from the battery.

Note battery voltage.

⚠ WARNING

Always respect the polarity when connecting the capacitor.

Wait 5 minutes, then measure capacitor voltage. It must be within 1 V maximum of battery voltage.

If in doubt, proceed with the following residual voltage test.

Residual Voltage Test

Connect a 12 V test lamp to capacitor terminals during a complete minute to discharge capacitor.

Connect a switch (in OFF position) between a 12 V battery positive post and the capacitor positive post. Connect the battery negative post to the capacitor negative post. Turn on the switch for 2 seconds. Disconnect the capacitor from the battery. Note battery voltage.

⚠ WARNING

Always respect the polarity when connecting the capacitor.

Connect a switch (in OFF position) and a 300 Ω 5 W resistor to the capacitor. Turn on the switch for 12 seconds ± 1 second of discharge.

Residual voltage after 12 seconds ± 1 second of discharge must be above 5 volts.

Installation

Connect a 12 V test lamp to capacitor terminals during a complete minute to discharge capacitor.

Make sure 30 A fuse is removed.

Install the capacitor.

Make sure to connect BLACK wire to negative terminal and RED/WHITE to positive terminal.

⚠ WARNING

Always respect the polarity when connecting the capacitor.

Install the 30 A fuse.

ENGINE START/RER BUTTON VERIFICATION

A quick operation test can be done using the vehicle communication kit (VCK) with the B.U.D.S. software, using the **Monitoring** section. Press the START/RER button and look at the START/RER button LED. It should turn on, indicating the starting system is working on the input side of the starting system (START/RER button, ECM and wiring). You know now the problem is on the output side of the starting system (ECM output signal to starting solenoid, wiring harness going to the solenoid and starter motor. Refer to STARTING SYSTEM for testing procedures). Otherwise, check the input side as follows.

Disconnect the two connectors of the steering harness.

Measure the resistance of the two wires on the small connector (BEIGE and BLACK) for 0 Ω. Depress start button and the reading should change from 0 Ω to infinitely high.

Release the start button and measure the resistance between pin 2 (BEIGE wire) of the small connector and pin 6 (RED/BROWN wire) on the big connector for infinitely high resistance to 0 Ω while the start button is depressed.

⚠ WARNING

Always respect the wire position when connecting the switch. Refer to the wiring diagram.

Test continuity of circuit DB-19. If it is good, try a new ECM. Otherwise, repair harness/connectors.

DESS SWITCH VERIFICATION

If 2 short beeps are not heard when starting the engine, refer to DIAGNOSTIC PROCEDURES.

The following continuity tests can also be performed using an ohmmeter.

Disconnect switch wires.

Tether Cord Cap Removed

Connect test probes to switch BLACK/GREEN and BLACK/WHITE wires. Measure resistance, there should be NO continuity (open circuit).

Connect one test probe to the WHITE/GREY wire and the other test probe to the switch top terminal. Measure resistance, it must be close to 0 ohm.

Connect one test probe to the BLACK/GREEN wire and the other test probe to the switch ring. Measure resistance, it must be close to 0 ohm.

Tether Cord Cap on DESS Post

Connect test probes to switch BLACK/GREEN and BLACK/WHITE wires. Measure resistance, it must be close to 0 ohm.

SPARK PLUGS

Disassembly

Disconnect the spark plug cable from the spark plug.

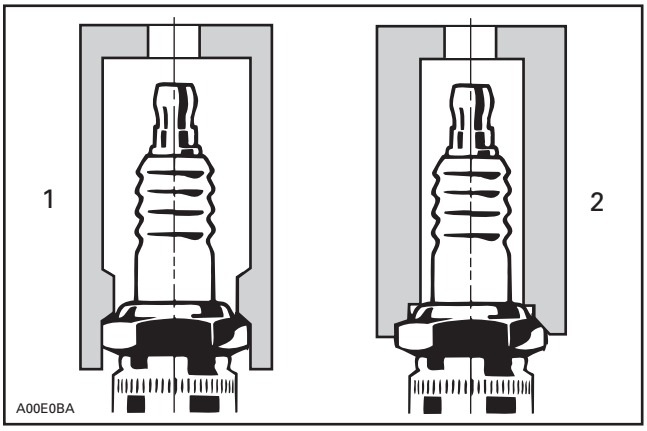
First unscrew the spark plug one turn.

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

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 the following chart.
2) Apply anti-seize lubricant over the spark plug threads to prevent possible seizure.
3) Hand screw spark plug into cylinder head. Then, tighten the spark plug clockwise an additional 1/4 turn with a proper socket.



1. Proper socket
2. Improper socket

ENGINE	SPARK PLUG	TORQUE	GAP mm (in)
593 SDI 2-TEC	NGK BR 9 ECS	Hand tighten + 1/4 turn with a socket	0.8 (.031)

CRANKING SYSTEM

See above for start/stop switch and the DESS post testing. Refer to STARTING SYSTEM section for other tests.

DIAGNOSTIC PROCEDURES

GENERAL

Here is the basic order suggested to diagnose a suspected engine management or fuel injection related problem:

– Check the chart in TROUBLESHOOTING section to have an overview of problems and suggested solutions.
– Check if the engine management system (EMS) pilot lamp lights up. If so, use the VCK (Vehicle Communication Kit) and look for fault codes to diagnose the trouble.
– Check all fuses, battery and capacitor (on so equipped models).
– Check fuel pressure.
– Check spark plugs condition.
– Check all connections of the wiring harness.

Refer to COMPONENT INSPECTION AND ADJUSTMENT section for procedures.

TROUBLESHOOTING

The following chart is provided to help in diagnosing the probable source of simple troubles.

Monitoring Beeper Coded Signals

CODED SIGNALS	POSSIBLE CAUSE	REMEDY
2 short beeps (when engine is started). DESS/RER pilot lamp also blinks.	Confirms that proper tether cord cap is installed. Engine can rev above clutch engagement.	No problem detected. Good ride.
1 short beep every 1.5 seconds (when engine is started). DESS/RER pilot lamp also blinks. Engine cannot reach pulley engagement speed. Vehicle cannot be driven.	Bad DESS system connection. Defective tether cord cap. Dirt or snow in tether cord cap. Defective DESS post.	Reinstall tether cord cap correctly over post. Use another programmed tether cord cap. Clean tether cord cap. Replace DESS post.
1 long beep per second.	Reverse is selected.	Vehicle can be driven in reverse.
3 short beeps per second. DESS/RER pilot lamp also blinks. Engine cannot reach pulley engagement speed. Vehicle cannot be driven.	Wrong tether cord cap is installed.	Install proper tether cord cap. Program key into ECM.
3 short beeps per second. Engine overheating pilot lamp also blinks.	Engine is overheating.	Stop engine immediately and allow to cool. Check cooling system.
1 long beep (2 seconds) every 15 minutes.	Low battery voltage.	Check battery and charging system.
4 short beeps every 2 minutes. Oil pilot lamp also lights up.	Low oil level on 2-TEC models.	Check oil level and replenish as soon as possible.

Many other codes use the engine pilot lamp and the buzzer to indicate a problem. Refer to B.U.D.S. for possible causes and service actions.

P CODE	EMS PILOT LAMP	BUZZER	DESCRIPTION
P0106	0	15	Air pressure sensor voltage out of range.
P0337	0	15	No crankshaft signal detected.
P0336	0	15	High engine RPM detected.
P0339	0	15	Crankshaft signal fault.
P0654	0	15	Tachometer RPM signal shorted to battery.
P0654	0	15	Tachometer RPM signal open circuit or shorted to ground.
P0617	0	15	Starter relay shorted to battery.
P0616	0	15	Starter relay open circuit or shorted to ground.
P1670	0	15	Buzzer shorted to battery.
P1671	0	15	Buzzer open circuit or shorted to ground.
P0650	0	15	EMS pilot lamp shorted to battery.
P0650	0	15	EMS pilot lamp open circuit or shorted to ground.
P1675	0	15	Relay 2 shorted to battery.
P1676	0	15	Relay 2 open circuit or shorted to ground.
P1148	0	15	Safety fuel cut off detected.
P1611	0	15	P+ Test of ISC output signal failed.
P0513	0	15	Incorrect DESS® key.
P0601	0	15	Faulty module (software of hardware damaged).
P1677	0	15	Relay 3 shorted to battery.
P1678	0	15	Relay 3 open circuit or shorted to ground.
P1648	0	15	Battery lamp shorted to battery.
P1649	0	15	Battery lamp open circuit or shorted to ground.
P0655	0	15	Engine temperature lamp shorted to battery.
P0655	0	15	Engine temperature lamp open circuit or shorted to ground.
P1646	0	15	Engine temperature lamp shorted to battery.
P1647	0	15	Engine temperature lamp open circuit or shorted to ground.
P0648	0	15	DESS lamp shorted to battery.
P0648	0	15	DESS lamp open circuit or shorted to ground.

P CODE	EMS PILOT LAMP	BUZZER	DESCRIPTION
P1654	0	15	Oil lamp shorted to battery.
P1658	0	15	Oil lamp open circuit or shorted to ground.
P0117	2	15	Engine temperature sensor voltage too low.
P0118	2	15	Engine temperature sensor voltage too high.
P0116	2	15	Engine temperature sensor functional problem.
P0112	2	15	Air temperature sensor voltage too low.
P0113	2	15	Air temperature sensor voltage too high.
P0111	2	15	Air temperature sensor functional problem.
P0427	2	15	Exhaust temperature sensor voltage too low.
P0428	2	15	Exhaust temperature sensor voltage too high.
P0426	2	15	Exhaust temperature sensor functional problem.
P0107	2	15	Air pressure sensor voltage too low.
P0108	2	15	Air pressure sensor voltage too high.
P0608	2	15	Sensor's power supply voltage too low.
P0608	2	15	Sensor's power supply voltage too high.
P0232	2	15	Fuel pump shorted to battery.
P0231	2	15	Fuel pump open circuit or shorted to ground.
P0080	2	15	RAVE® solenoid shorted to battery.
P0079	2	15	RAVE® solenoid open circuit or shorted to ground.
P0326	2	15	Knock sensor signal below minimum noise.
P1502	2	15	TOPS functional problem.
P0351	2	15	No ignition output cylinder # 1 (MAG for 2 cyl. engine).
P0352	2	15	No ignition output cylinder # 2 (PTO for 2 cyl. engine).
P0262	2	15	Injector cyl. # 1 OR outer MAG injector (2 cyl.), shorted to battery.
P0261	2	15	Injector cyl. # 1 OR outer MAG injector (2 cyl.), open circuit or shorted to ground.
P0265	2	15	Injector cyl. # 2 OR outer PTO injector (2 cyl.), shorted to battery.

P CODE	EMS PILOT LAMP	BUZZER	DESCRIPTION
P0264	2	15	Injector cyl. # 2 OR outer PTO injector (2 cyl.), open circuit or shorted to ground.
P0268	2	15	Injector cyl. # 3 OR inner MAG injector (2 cyl.), shorted to battery.
P0267	2	15	Injector cyl. # 3 OR inner MAG injector (2 cyl.), open circuit or shorted to ground.
P0271	2	15	Inner PTO injector shorted to battery.
P0270	2	15	Inner PTO injector open circuit or shorted to ground.
P0122	2	15	Throttle position sensor voltage too low.
P0123	2	15	Throttle position sensor voltage too high.
P0601	2	15	TPS learns unlikely or checksum fault.
P1102	2	15	Throttle position sensor adaptation failure.
P1104	2	15	Throttle position sensor adaptation canceled.
P1655	2	15	DESS® shorted to battery.
P1656	2	15	DESS® line shorted to ground.
P0604	2	15	RAM fault.
P0605	2	15	EEPROM fault.
P0602	2	15	MPEM not coded.
P0605	2	15	EEPROM checksum fault.
P0605	2	15	Coding ID checksum fault.
P0605	2	15	Coding checksum fault.
P0605	2	15	Programming checksum fault.
P0562	0	5	Battery voltage too low.
P0563	2	5	Battery voltage too high.

VCK (VEHICLE COMMUNICATION KIT)

The VCK (Vehicle Communication Kit) (P/N 529 035 981) is the primary tool to diagnose engine management and fuel injection related problems.

NOTE: The MPEM programmer does not work on SDI models.

The SDI models require B.U.D.S. version G2.1 or P2.1 or above.

B.U.D.S. (Bombardier Utility and Diagnostic Software) is designed to allow actuators, sensors and electronic equipments inspection, diagnostic options and reset such as the closed throttle.

For more information pertaining to the use of the software B.U.D.S., use its help which contains detailed information on its functions.

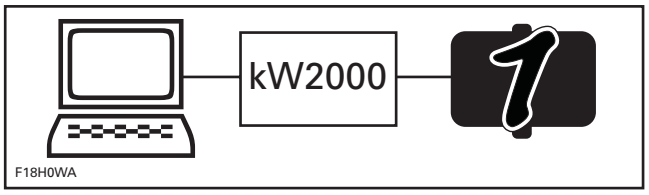
⚠ WARNING

If the computer you are using is connected to the power outlet, there is a potential risk of electrocution when working in contact with water. Be careful not to touch water while working with the VCK.

IMPORTANT: When using the software B.U.D.S., with the **SDI engine**, ensure that the protocol "KW2000" is properly selected in "**MPI**" (multi protocol interface) under "**Choose protocol**".

When B.U.D.S. is connected to the vehicle, the status bar shows the protocol (KW2000) and the number 1 to the right. To communicate with the ECM, number 1 must be displayed.

Number 1 means that one module is connected.



ONE MODULE IS CONNECTED

If an "X" is shown, this means that no communication between the MPI and the ECM is possible. In this case possible causes are:

– ECM is not powered-up
– wrong protocol is used
– bad connection between MPI and module.

ECM Supply

To power-up the ECM, push the START button shortly while the engine cut-out switch is depressed and the tether cord cap installed on DESS post. If your intention is to program the vehicle key, use GRAY diagnostic key (P/N 529 035 896) on DESS post.

The supply cable (P/N 529 035 869) may also be used. Just the fact to connect it between MPI and vehicle will power-up the ECM.

VCK Supply

The VCK (MPI box) can use the vehicle power for its supply. Four AA batteries or an AC/DC power supply can also be used. Make sure to respect MPI specification if a power supply is used.

Writing in ECM

When writing in ECM through B.U.D.S., there will be an "EMS Tracking" message that will say "Remove key from vehicle". When this occurs, remove the tether cord cap from its post and wait until the message disappears (it lasts approximately 15 seconds after tether cord cap removal).

2-TEC SYSTEM FAULT CODES

General

The faults registered in the ECM (engine control module) are kept when the battery is disconnected.

IMPORTANT: After a problem has been solved, ensure to clear the fault(s) in the ECM using the VCK. This will properly reset the appropriate counter(s). This will also record that the problem has been fixed in the ECM memory.

Many fault codes at the same time is likely to be burnt fuse(s).

For more information pertaining to the code faults (state, count, first, etc.) and report, refer to B.U.D.S. online help.

Supplemental Information

– Electrical noise is picked up by the ECM. Ensure that all connections are in good condition, also grounds (battery, ECM, engine and ignition system), they are clean and well tightened and that all electronic components are genuine — particularly in the ignition system. Installing non-resistive spark plugs may lead to generate fault code.
– Electrical noise might also lead engine to occasional cutout without generating a fault code.
– If everything is in good condition, try a new ECM.

When using the service action suggested in the Fault section of B.U.D.S., the system circuits are referred to as DA-41, which means connector "A" on the ECM and the circuit D41.

TPS (Throttle Position Sensor) Faults

Faults which are reported in B.U.D.S. fall into two groups TPS faults and adaption faults. These are displayed on the B.U.D.S. system as TPS OUT OF RANGE and TPS ADAPTION FAILURE.

TPS "OUT OF RANGE" Fault

It is caused by the sensor reading going out of its allowable range. This fault can occur during the whole range of movement of the throttle.

To diagnose this fully, it is recommended to operate the throttle through its full range. It is also recommended to release the throttle quickly as this may also reveal a fault that is intermittent.

POSSIBLE CAUSES	RESULT	ACTION
Check if connector is disconnected from TPS	Yes	Reconnect.
Check if sensor is loose	Yes	Tighten sensor and reset **Closed Throttle**.
Inspect sensor for damage or corrosion	Yes	Replace sensor and reset **Closed Throttle**.
Inspect wiring (voltage test)	Failed	Repair.
Inspect wiring and sensor (resistance test)	Failed	If bad wiring, repair. If bad TPS, replace and reset **Closed Throttle**.
Test sensor operation (wear test)		Replace sensor and reset **Closed Throttle**.

TPS "ADAPTATION FAILURE" Fault

It is caused by the idle position moving out of an acceptable range.

Following failures can be effected by a TPS "Adaption Failure":

– Idle speed is out of range.
– Engine stops, when throttle is released quickly.
– Engine runs inconsistent in low partload or low RPM.

POSSIBLE CAUSES	RESULT	ACTION
Sensor has been replaced and TPS closed position not reset	Yes	Reset **Closed Throttle**.
Throttle body has been replaced and TPS closed position not reset	Yes	Reset **Closed Throttle**.
EMS has been replaced and TPS closed position not reset	Yes	Reset **Closed Throttle**.
Throttle cable too tight	Yes	Adjust cable and reset **Closed Throttle**.
Sensor is loose	Yes	Tighten sensor and reset **Closed Throttle**.
Throttle bracket is loose	Yes	Fix and reset **Closed Throttle**.
Adjustment screw worn or loose	Yes	Adjust idle speed screw using B.U.D.S.

DRIVE BELT

APPLICATION CHART

MODEL	PART NUMBER	MINIMUM WIDTH (wear limit) mm (in)
All 593/HO/SDI engine equipped models	417 300 197	34.2 (1–11/32)
All 793 HO engine equipped models	417 300 166	35.3 (1–3/8)

INSPECTION

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 drive belt width. Replace the drive belt if width is under minimum recommended width (see table above).

CHECKING NEUTRAL FUNCTION

⚠ WARNING

Always check neutral function when servicing.

Apply parking brake. Vehicle must be on the ground and on a plane level surface. No one should be in front of vehicle.

Attach vehicle tether cord to your clothing. Stand aside of vehicle, then start engine.

⚠ WARNING

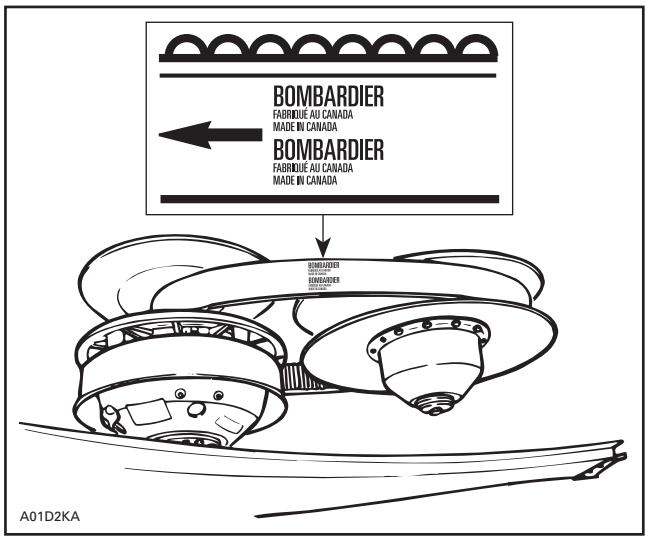
Do not sit on vehicle.

Release parking brake. Vehicle must not creep when engine is idling. Otherwise, make sure that:

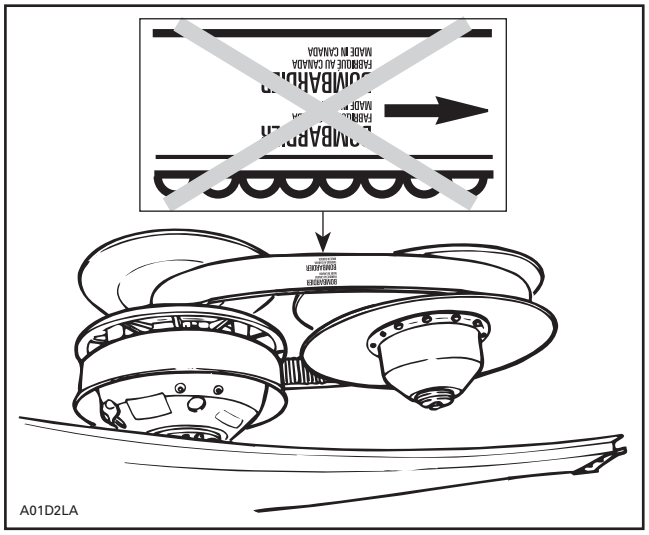
– idle speed is as specified
– proper belt is installed
– pulley center-to-center is as specified
– belt deflection is as specified.

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 HEIGHT MEASUREMENT AND ADJUSTMENT

Measurement

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

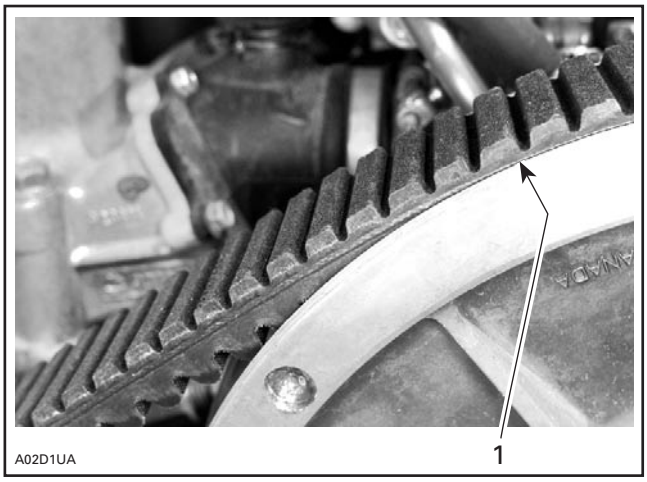
NOTE: To obtain an accurate drive belt height measurement, it is suggested to allow a break-in period of 50 km (30 miles).

Before checking the belt height, ensure that a good-condition proper belt (refer to the APPLICATION CHART) is installed.

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

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

MODEL	BELT HEIGHT
All models	Top edge of drive belt cord should be flush with driven pulley edge.



1. Flush

Adjustment

Before adjusting the belt height, ensure that a good-condition proper belt (refer to the APPLICATION CHART) is installed.

Adjust pulley distance according to specification, refer to PULLEY DISTANCE AND ALIGNMENT.

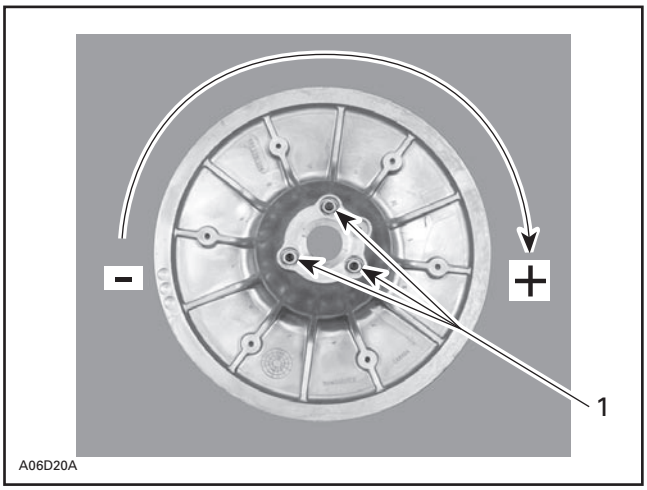
Models Equipped with Formula Type Driven Pulley

Adjust drive belt height using Allen screws, as shown.

To lower belt in driven pulley: turn Allen screws clockwise.

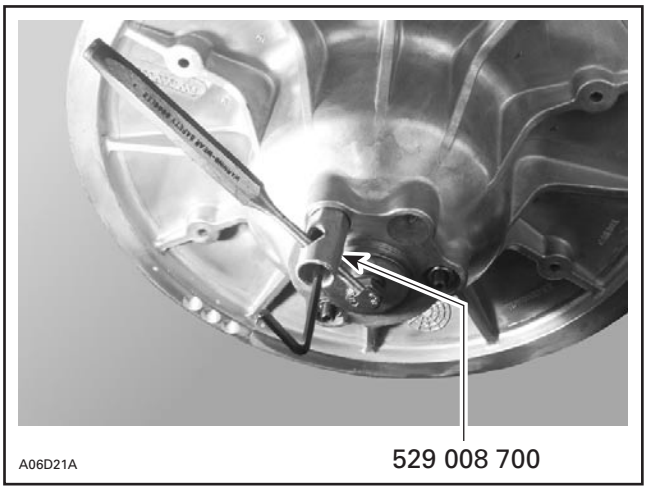
To raise belt in driven pulley: turn Allen screws counterclockwise.

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



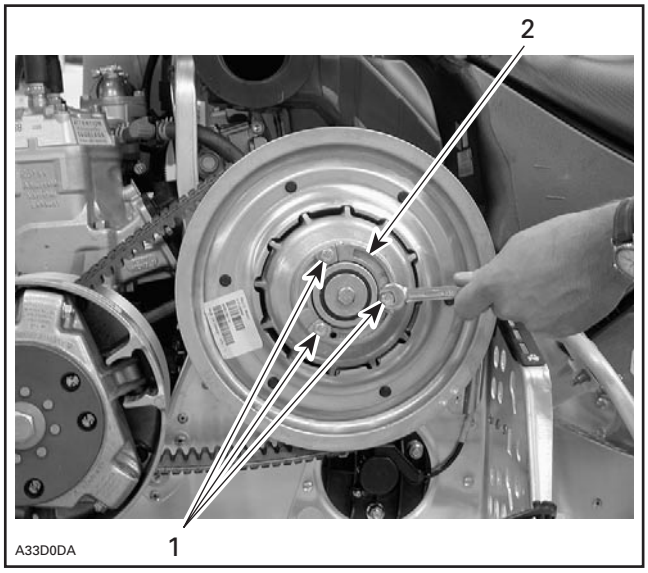
TYPICAL
1. Allen screws with jam nuts

Allen screws must be restrained while tightening jam nut to prevent throwing adjustment out. Use drive belt tension adjuster (P/N 529 008 700).



TYPICAL

Models Equipped with HPV Type Driven Pulley

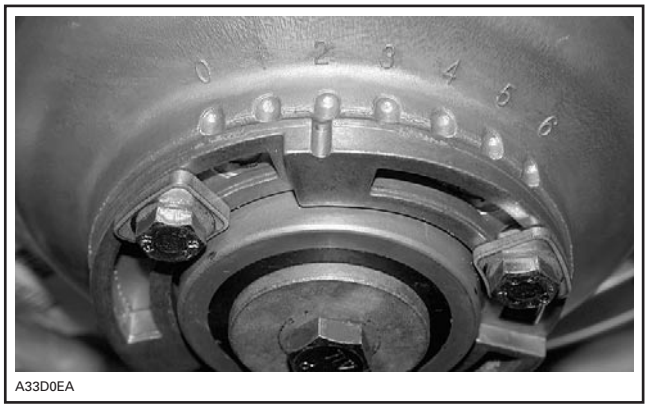


1. Screws
2. Adjustment ring

Loosen screws and turn adjustment ring as follows:

To lower belt in driven pulley: turn adjustment ring counterclockwise and tighten the screws.

To raise belt in driven pulley: turn ring clockwise and tighten the adjustment screws.



DRIVEN PULLEY NOTCHES

Turn the adjustment ring up to one notch, tighten the screws, then rotate driven pulley to allow drive belt to settle in pulley. Check height, if required the adjustment ring can be turned up to 1/4 or 1/2 the notch. Check height, repeat as required.

NOTE: Notches are there on the driven pulley for reference purpose only and the desired adjustment can be attained at any point.

DRIVE BELT DEFLECTION MEASUREMENT (REFERENCE ONLY)

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

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

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.

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

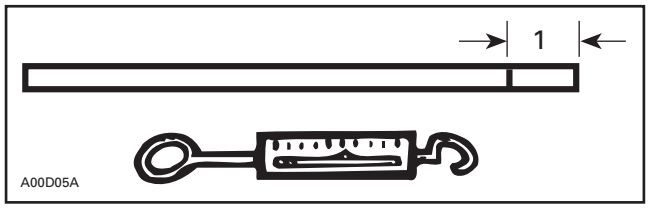
MODEL	DEFLECTION † mm (in)	FORCE kg (lb)
All models	32 ± 5 (1.260 ± .197)	11.5 (25)

† FOR REFERENCE ONLY

To Check Tension

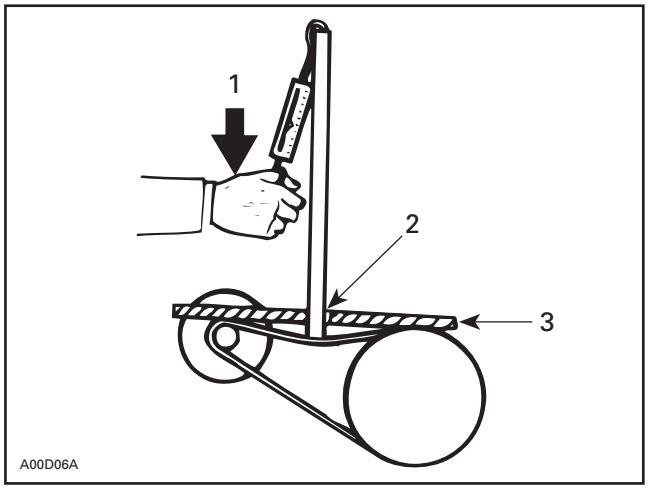
Position a reference rule on drive belt.

Wooden Stick and Spring Scale Method



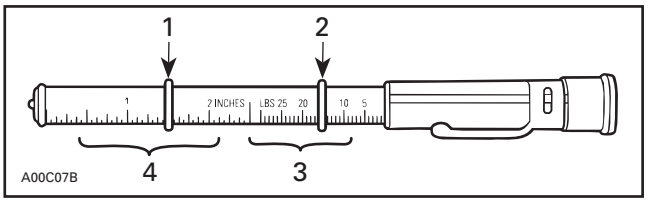
1. Mark specified deflection

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



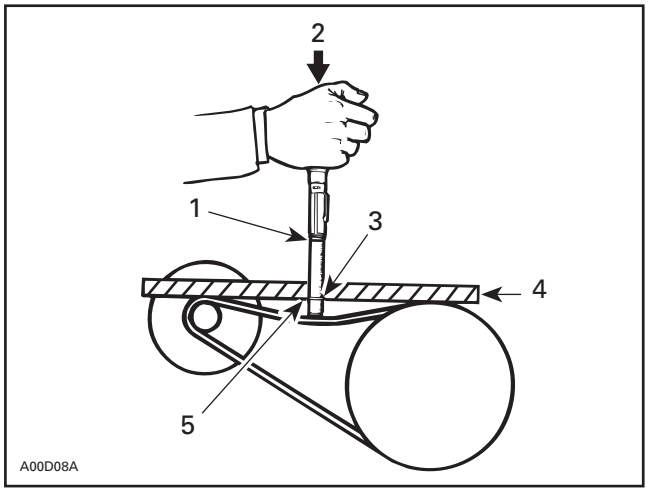
1. Force
2. Read deflection here
3. Reference rule

Or use the belt tension tester (P/N 414 348 200).



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 0 (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.



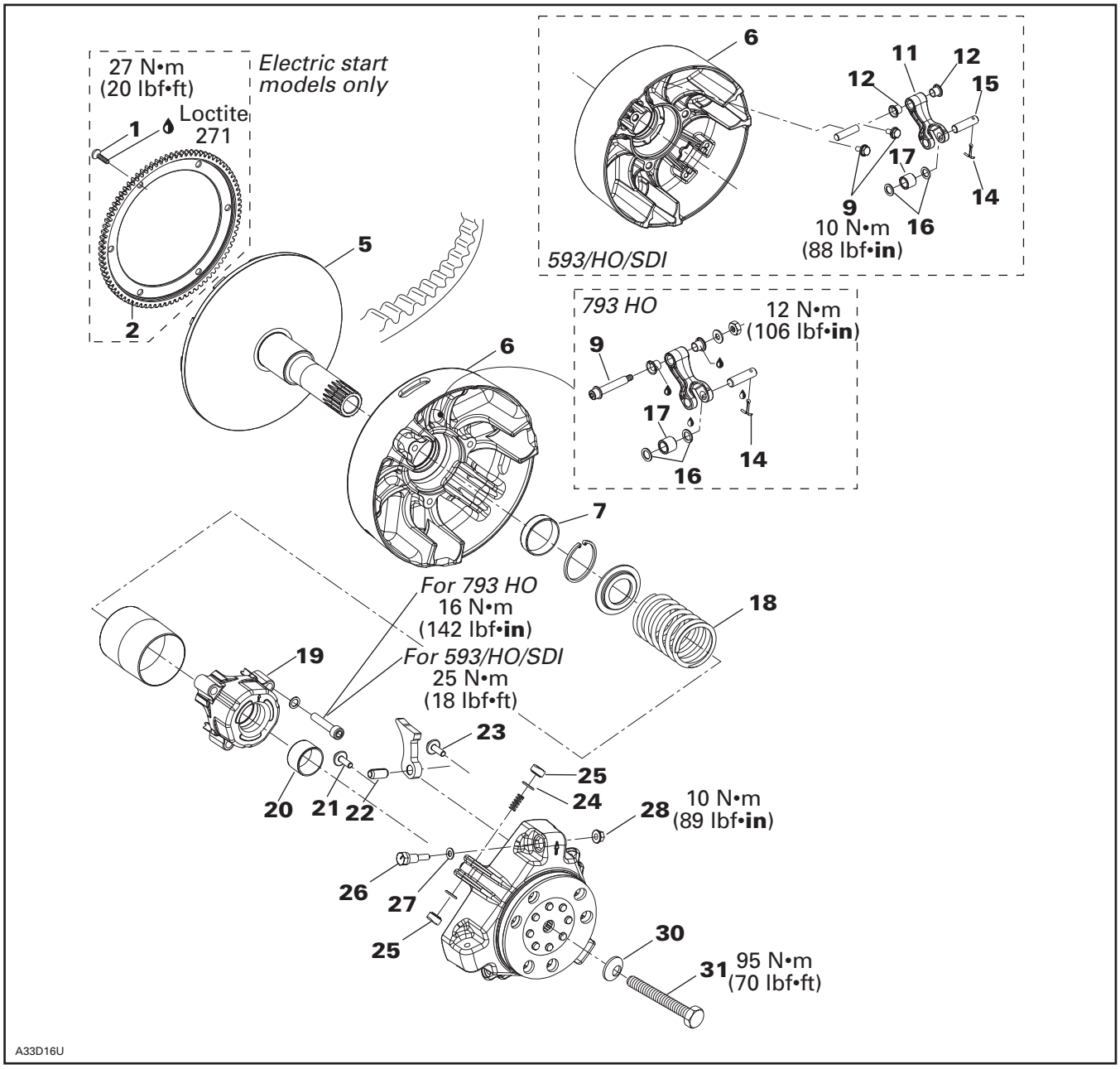
1. Upper O-ring — force
2. Force
3. Lower O-ring — deflection
4. Reference rule
5. Deflection

DRIVE PULLEY

TRA III

All REV Series Models

NOTE: These are lubrication free drive pulleys. Always refer to appropriate parts catalog for replacement part. Most parts of TRA III are not interchangeable with those of the TRA.



GENERAL

Some drive pulley components (return spring, ramp) can be changed to improve vehicle performance in high altitude regions. A service bulletin will give 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 drive pulley stands for Total Range Adjustable drive pulley.

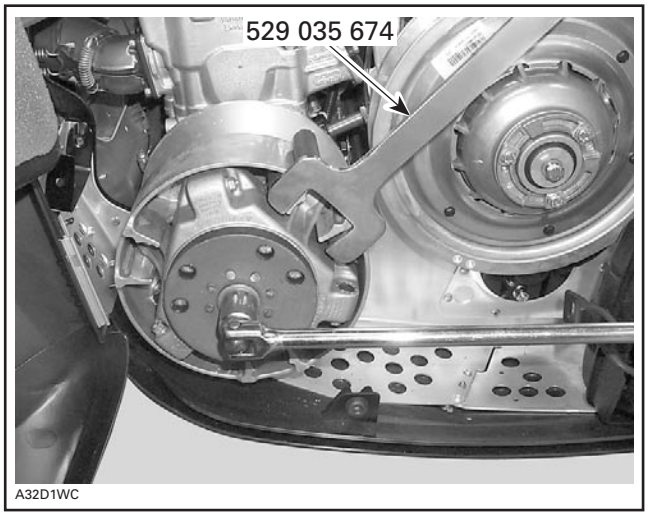
⚠ WARNING

Any drive pulley repairs must be performed by an authorized Bombardier snowmobile dealer. Sub-component installation and assembly tolerances require strict adherence to procedures detailed.

REMOVAL

30,31, Conical Spring Washer and Screw

Secure drive pulley retainer (P/N 529 035 674) over a sliding half tower.



INSERT THE TOOL IN SLIDING FLANGE TOWER

⚠ 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 529 022 400).

CAUTION: These pulleys have metric threads. Do not use imperial threads puller. Always tighten puller by hand to ensure that the drive pulley has the same type of threads (metric vs imperial) prior to fully tightening.

To Remove Drive Pulley Ass'y:

Retain drive pulley with drive pulley retainer (P/N 529 035 674) .

Install puller in pulley shaft then tighten.

DISASSEMBLY

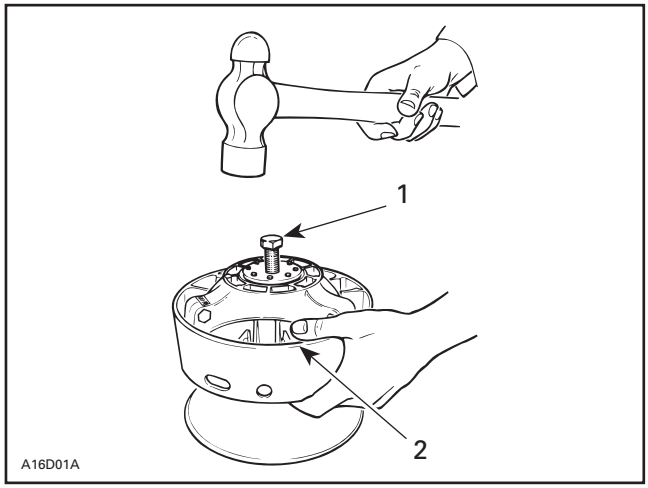
1,2, Screw and Ring Gear

CAUTION: Retaining screws must be heated before disassembly. Do not exceed 150°C (300°F).

5,6, Fixed and Sliding Halves

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.



TYPICAL
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.

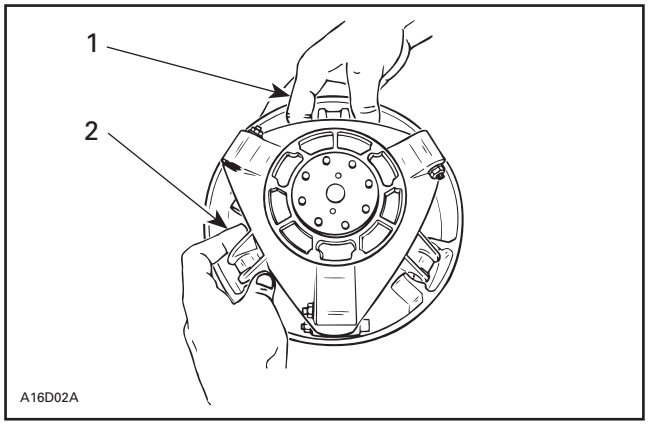
32, Cushion Drive

CAUTION: Do not disassemble cushion drive. Governor cup and cushion drive are factory balanced as an assembly.

25,29, Slider Shoe and Governor Cup

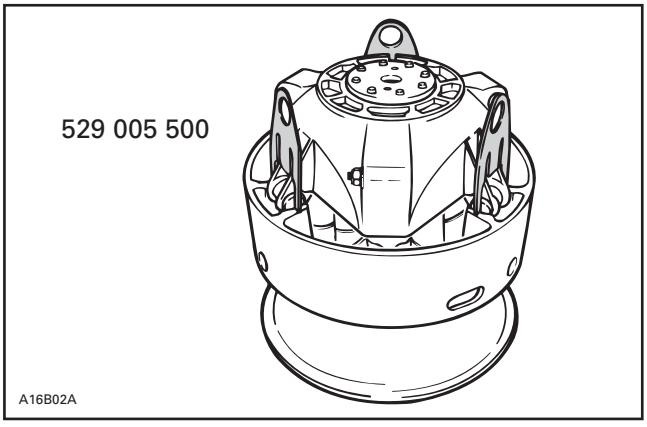
Carefully lift governor cup until slider shoes come at their highest position into guides.

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



1. Hold slider shoes
2. Lift one housing at a time

NOTE: To ease disassembly, forks (P/N 529 005 500) should be used to hold slider shoes prior to removing governor cup.



19, Spring Cover Ass'y

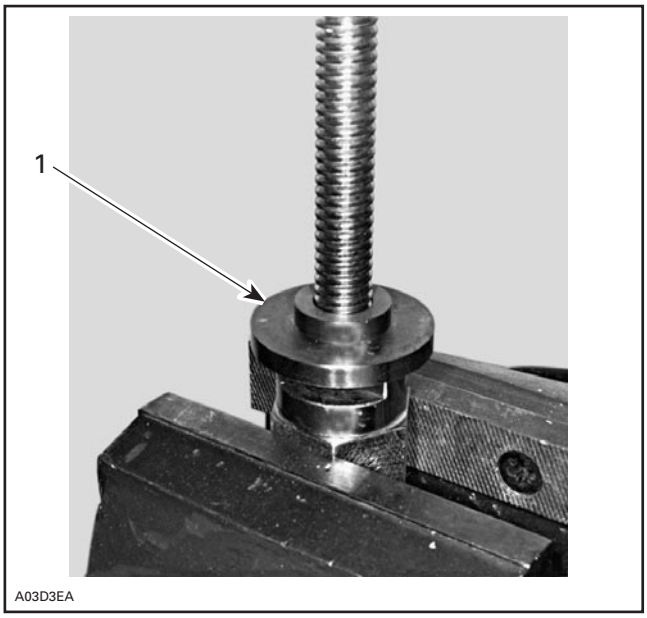
It is pushed by clutch spring pressure.

⚠ WARNING

Clutch spring is very strong. Never attempt to remove spring cover without the recommended tools.

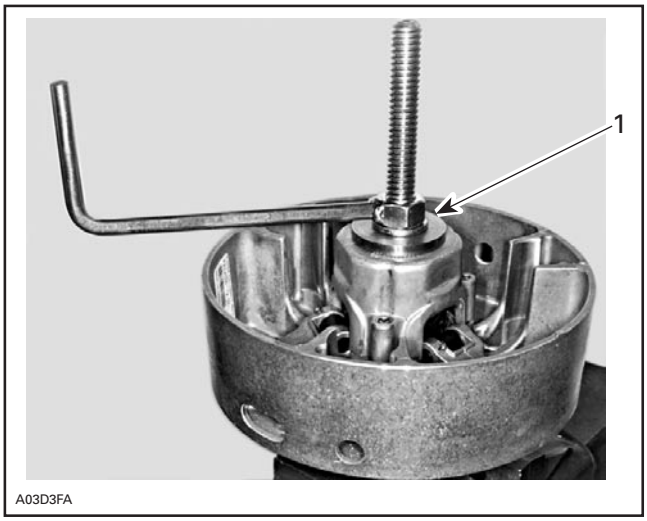
Use spring compressor (P/N 529 035 524).

Install support guide.



1. Support guide

Install sliding half then a second support guide. These support guides will prevent bushing damages.



1. Support guide

Remove 3 Allen screws retaining spring cover then unscrew compressor.

CLEANING

5,6, Fixed and Sliding Halves

Clean pulley halves and shaft with fine steel wool and dry cloth.

5,29, Fixed Half/Crankshaft End and Governor Cup/Fixed Half Post

Parts must be at room temperature before cleaning.

Using a paper towel with Pulley flange cleaner (P/N 413 711 809) , clean crankshaft tapered end and the taper inside the fixed half of the drive pulley, crankshaft threads and retaining screw threads.

Before installation of drive pulley, clean also crankshaft threads and retaining screw threads.

⚠ WARNING

This procedure must be performed in a well-ventilated area.

CAUTION: Avoid contact between cleaner and crankshaft seal because damage may occur.

Remove all hardened oil deposits that have baked on crankshaft and pulley tapered surfaces with coarse or medium steel wool and/or sand paper no. 600.

CAUTION: Do not use any other type of abrasive.

Reclean mounting surfaces with paper towel and cleaning solvent.

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.

24,25, O-ring and Slider Shoe

Check if O-rings are cracked, cut or crushed. Replace as required.

Check slider shoes for wear. Replace if groove is not apparent on top.

5,29, Fixed Half and Governor Cup

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

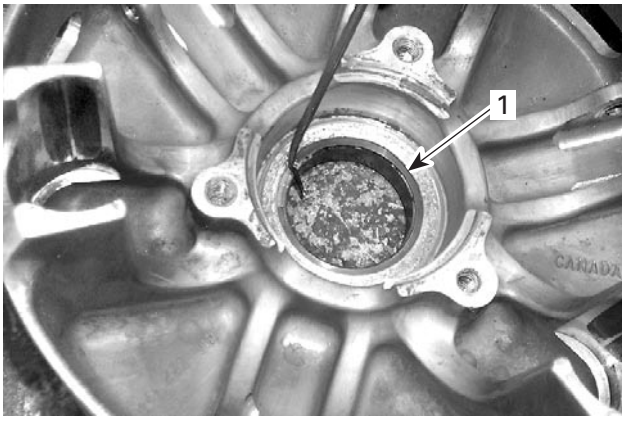
7,20, Sliding Half and Spring Cover Bushing

Visually inspect coating. Replace if worn.

Sliding Half Bushing Replacement

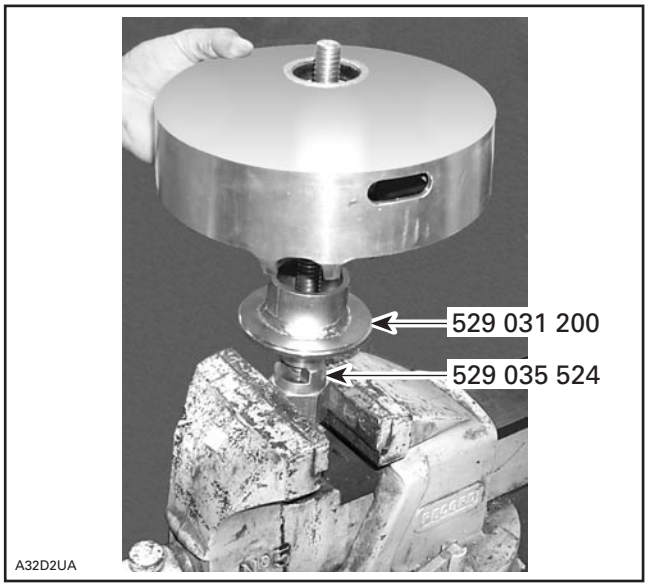
NOTE: In case of worn out bushing, it is advisable to replace whole sliding half ass'y as replacing just the bushing may reduce the drive pulley performance.

Remove circlip from the sliding half.



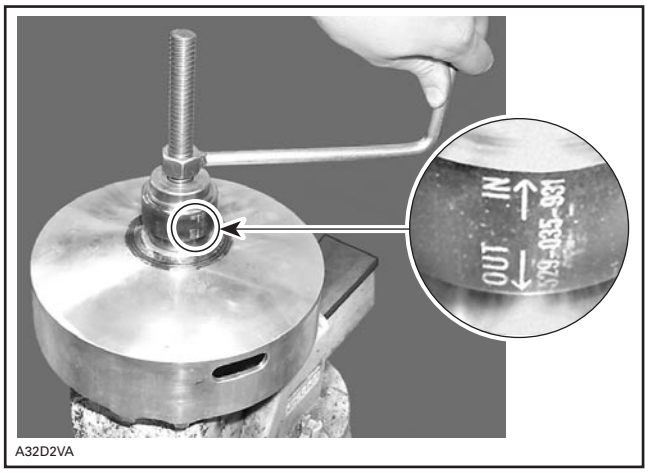
1. Circlip

Secure the spring compressor (P/N 529 035 524) in a vise. Mount tool (P/N 529 031 200) and the sliding half ass'y on it.

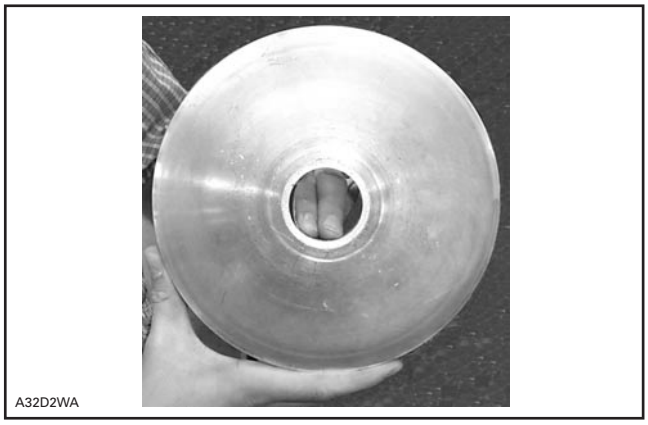


Use tool (P/N 529 035 931) to press out old bushing.

NOTE: Make sure to use the tool (529 035 931) as marked; to remove the bushing press using the side marked "OUT", as shown below in the picture.



Use a soft sand paper to clean sliding half bushing mounting surface.

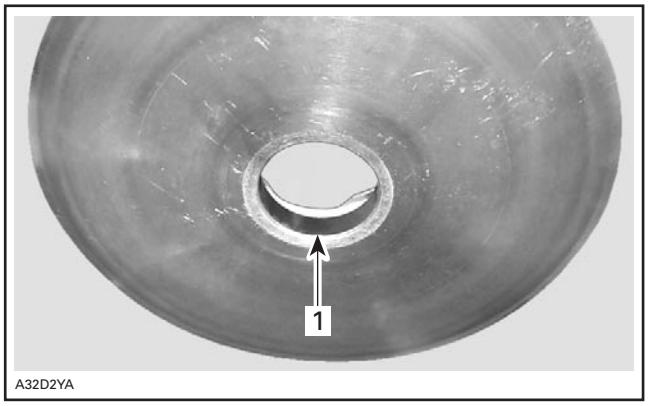


Clean sliding half bushing mounting surface with pulley flange cleaner (P/N 413 711 809).

To install a new bushing, secure the spring compressor (P/N 529 035 524) in a vise and mount the sliding half ass'y. Insert the bushing from inner side of sliding half ass'y.

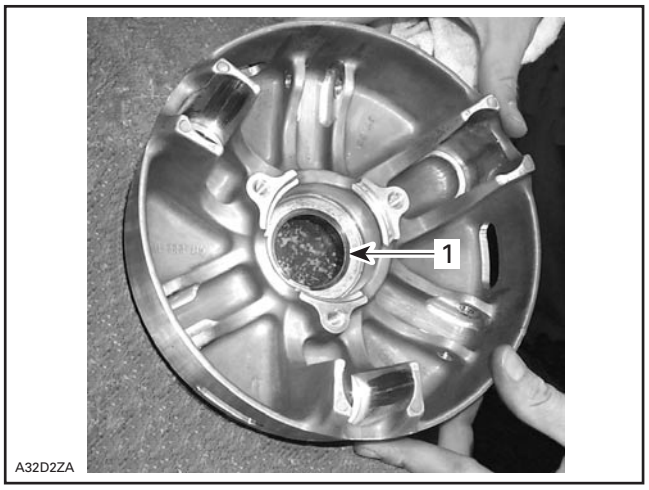
Mount tool (P/N 529 035 931) with side marked "IN" to press in a new bushing.

NOTE: Make sure that the bushing is well seated on the sliding half ass'y.



1. Bushing

Install the circlip.



1. Circlip

Spring Cover Bushing Replacement

Under normal use there is no need to replace this bushing.

In case of replacement, it's recommended to replace spring cover ass'y.

ASSEMBLY

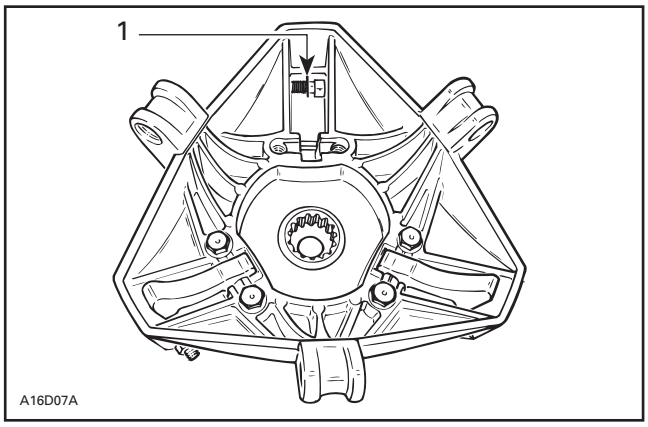
NOTE: This drive pulley is lubrication free. Do not lubricate any component.

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

Apply Loctite 271 (P/N 413 702 900) on threads and then torque to 27 N•m (20 lbf•ft).

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

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



TYPICAL
1. Washer

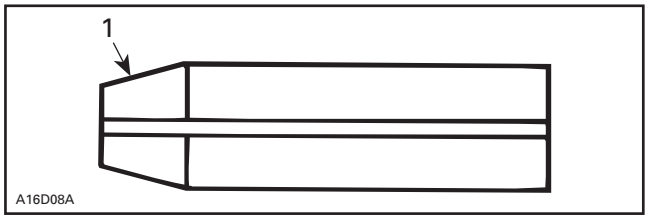
Torque locking nut to 10 N•m (89 lbf•**in**).

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.

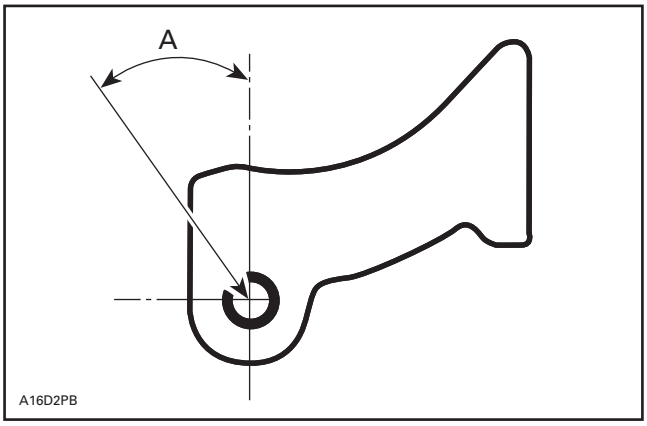
21,22,23, Screw, Dowel Tube and Ramp

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

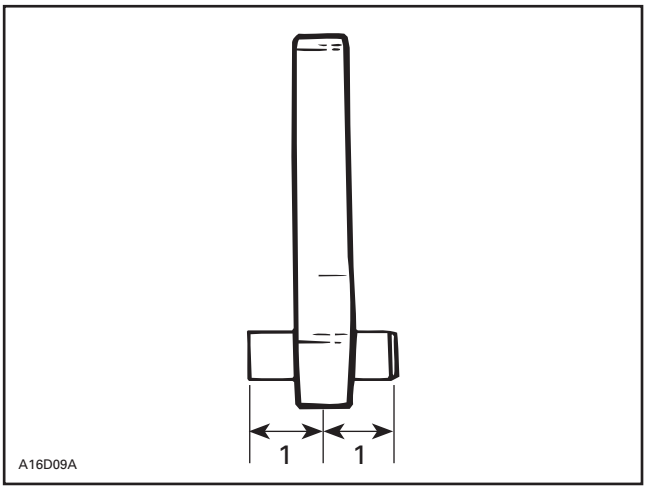


1. Chamfered side

Position dowel tube split at the angle A.



MODEL	ANGLE (A)
With TRA III	45 ± 3°



1. Equal distance

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

9,11,13,14, Screw, Lever Ass'y, Nut and Cotter Pin

NOTE: While installing lever assemblies make sure that the curved sides of the levers are outwards as shown.

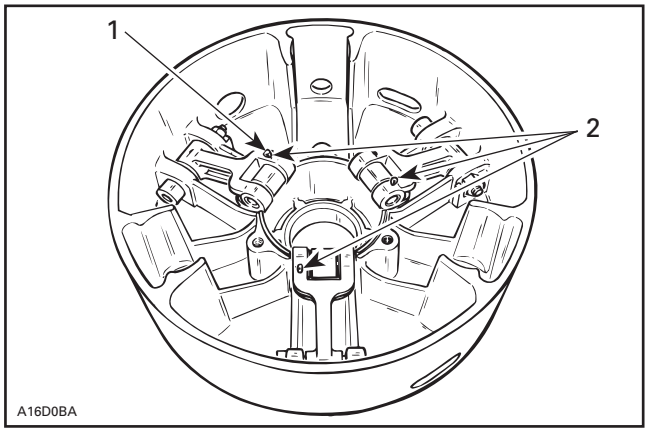
Always install lever assemblies so that cotter pins are on the shown side. Besides install cotter pin head on top when lever is sat at bottom of sliding half. Bend cotter pin ends to sit perfectly against lever.

⚠ WARNING

Whenever replacing centrifugal levers, always replace all 3 at the same time. Otherwise, drive pulley misbalancing will occur because of levers difference.

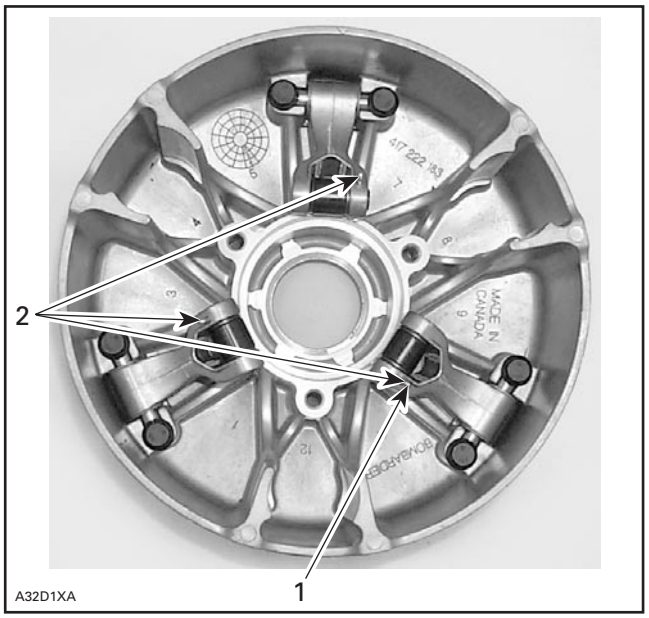
CAUTION: Lever assemblies must be installed so that cotter pins are on the same side.

793 HO Engine Equipped Models Only



TYPICAL
1. Head on top
2. All on the same side

593 /HO/SDI Engine Equipped Models Only



1. Head on top
2. All on the same side

All Models

Torque nuts **no. 9** as per the exploded view.

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

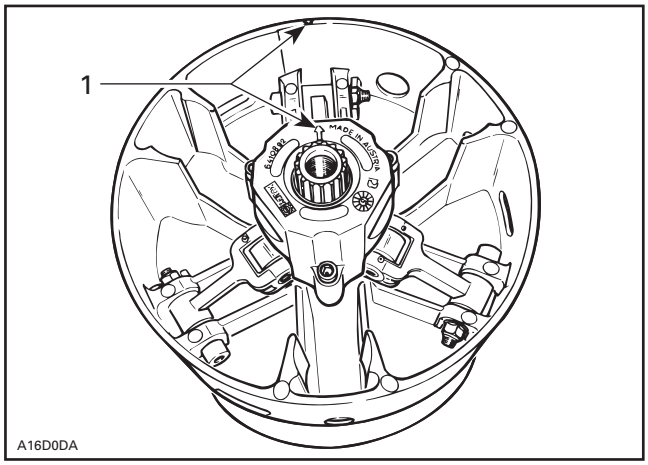
5,6,18,19, Fixed Half, Sliding Half, Spring, Spring Cover and Screw

To install spring cover, use spring compressor (P/N 529 035 524).

Assemble fixed and sliding halves. Note that fixed halves have different taper angle. Match taper angle with crankshaft.

Lift sliding half against spring cover and align spring cover arrow with sliding half mark.

793 HO Engine Equipped Models



TYPICAL
1. Align

593/HO/SDI Engine Equipped Models Only

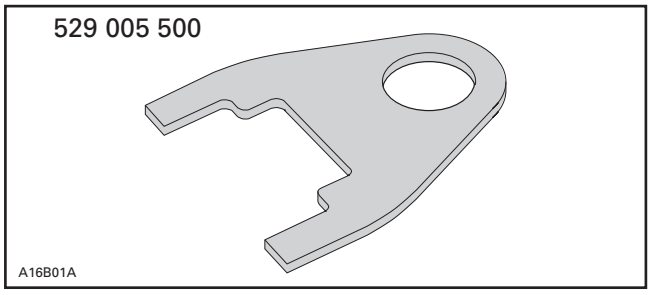
1. Align

All Models

Tighten screws to proper torque as mentioned in exploded view.

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

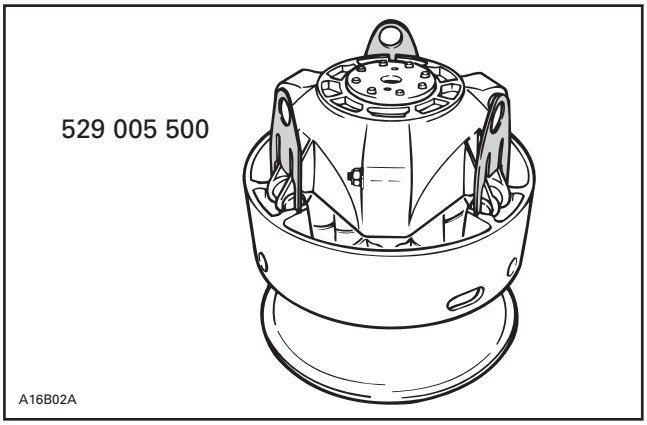
To install governor cup, use following tool:



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 that grooves are positioned vertically.

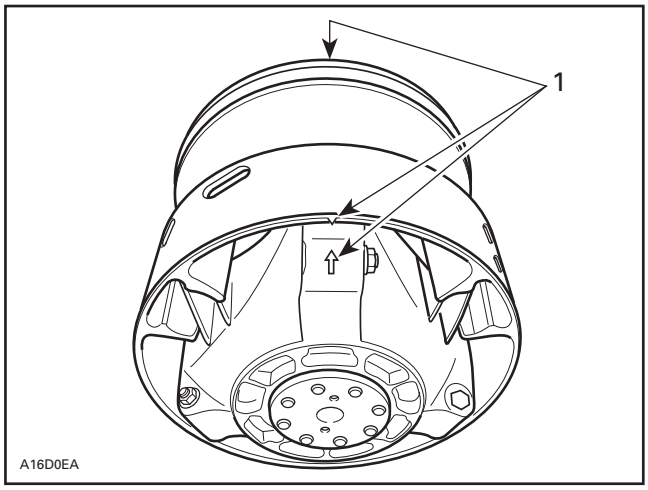
Install fork (P/N 529 005 500) into slider shoe grooves to maintain them for governor cup installation. Proceed on 3 set of slider shoes.



TYPICAL

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.



TYPICAL
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.

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 following installation procedure must be strictly adhered.

Install drive pulley on crankshaft extension.

Install a new conical spring washer with its concave side towards drive pulley then install screw.

⚠ WARNING

Never substitute conical spring washer and/or screw with jobber ones. Always use Bombardier genuine parts for this particular case.

Use holder. See removal procedure.

Torque screw to 80 to 100 N•m (59 to 74 lbf•ft).

Install drive belt and 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.

Retorque screw to 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 the maximum horsepower RPM given in TECHNICAL DATA.

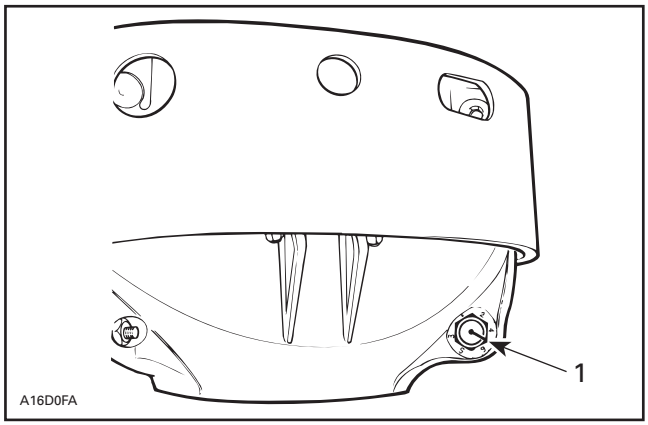
NOTE: Use precision digital tachometer for engine RPM adjustment.

NOTE: The adjustment has an effect on high RPM only.

To adjust, modify ramp end position by turning calibration screws.

26,28,29, Calibration Screw, Locking Nut and Governor Cup

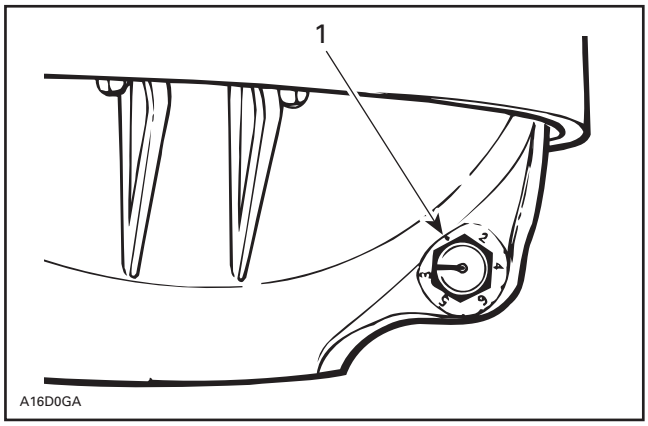
Calibration screw has a notch on top of its head.



1. Notch

Governor cup has 6 positions numbered 2 to 6. Note that in position 1 there is no stamped number (due to its location on casting).

See TECHNICAL DATA for original setting.



1. Position 1 (not numbered)

Each number modifies maximum engine RPM by about 200 RPM.

Lower numbers decrease engine RPM in steps of 200 RPM and higher numbers increase it in steps of 200 RPM.

Example:

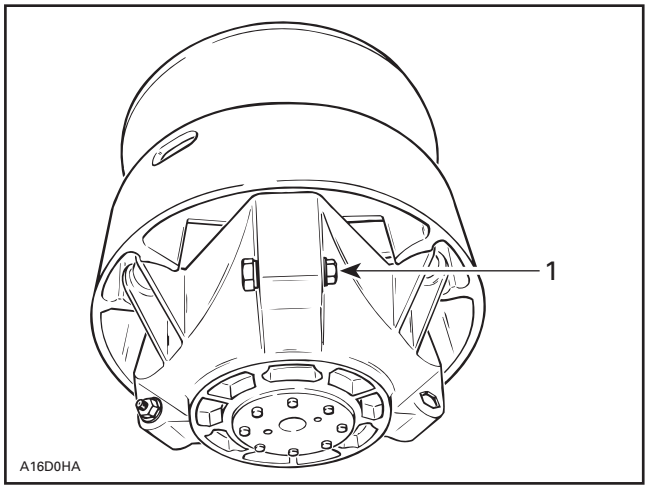
Calibration screw is set at position 3 and is changed to position 5. So maximum engine RPM is increased by about 400 RPM.

To Adjust:

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

CAUTION: Do not completely remove calibration screw otherwise its inside washer will fall off.

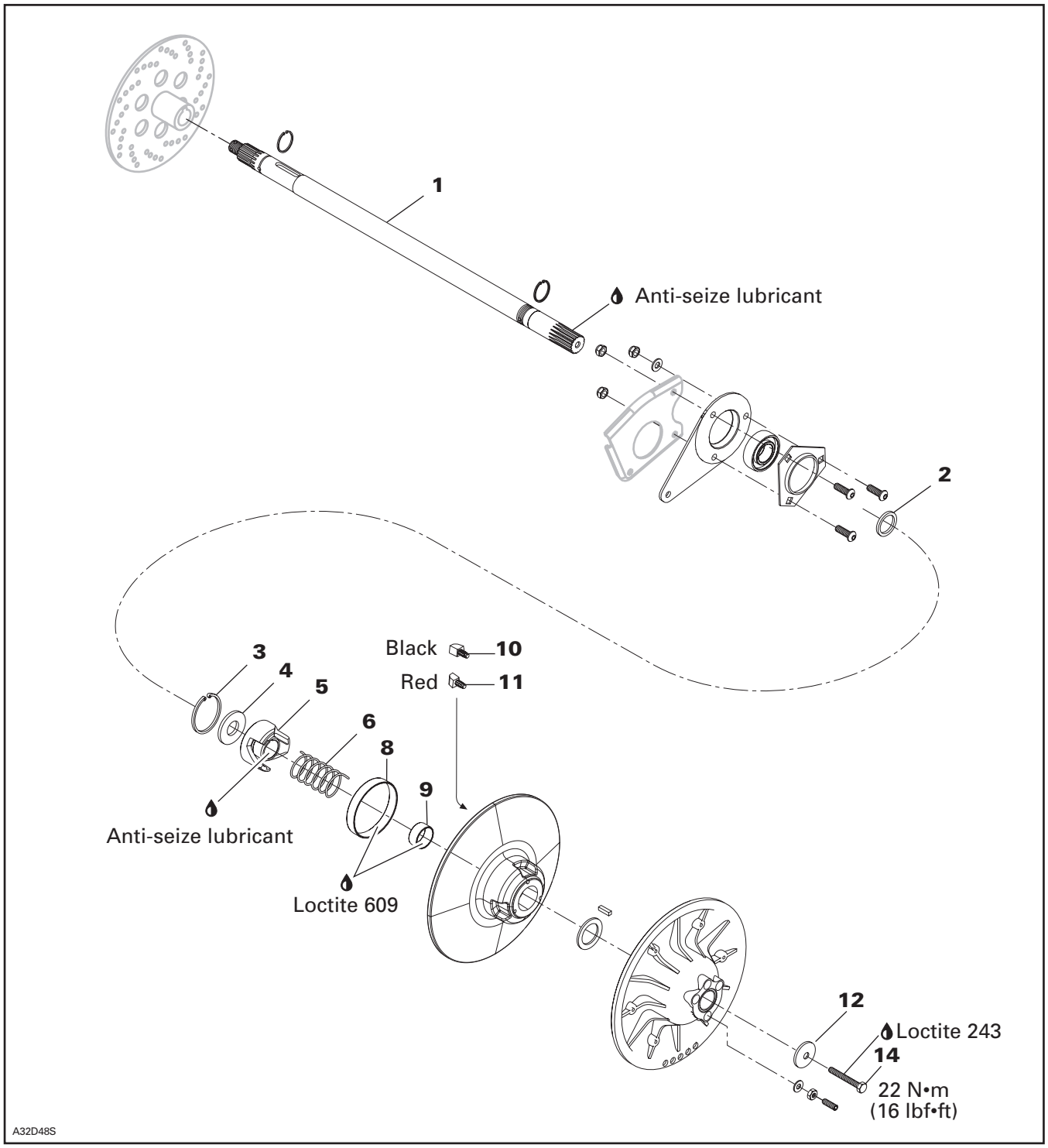
CAUTION: Always adjust all 3 calibration screws and make sure they are all set at the same number.



TYPICAL
1. Loosen just enough to permit rotating of calibration screw

DRIVEN PULLEY

FORMULA RER



REMOVAL

Remove guard and drive belt from vehicle.

Remove pulley retaining screw **no. 14** and shouldered washer **no. 12** then pull the driven pulley from the countershaft.

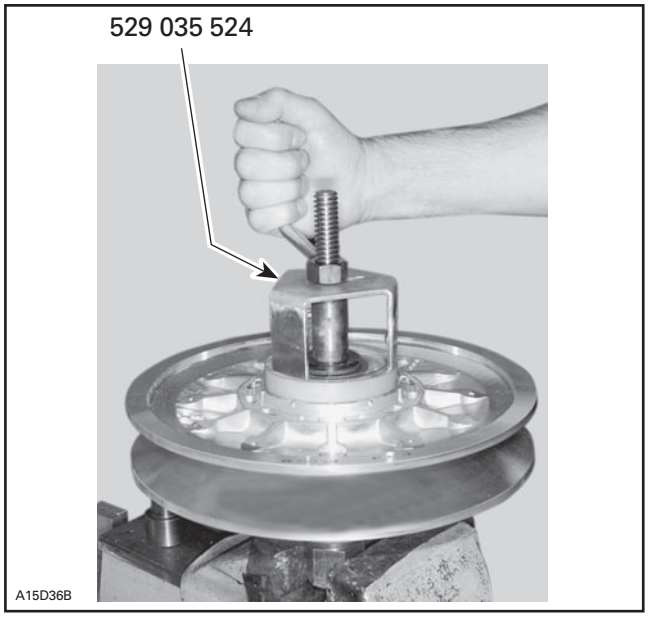
Take care not to lose spacer **no. 2**.

Countershaft

Should countershaft **no. 1** removal be required, refer to BRAKE then look for COUNTERSHAFT and BRAKE DISC REMOVAL.

DISASSEMBLY

Use spring compressor (P/N 529 035 524).



TYPICAL

Remove circlip **no. 3** and washer **no. 4** to disassemble the outer cam and the 2 pulley halves.

⚠ WARNING

Driven pulley cam is spring loaded, use above mentioned tool.

CLEANING

Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing **no. 8** and **no. 9** 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 pulley flange cleaner (P/N 413 711 809) to clean pulley halves.

INSPECTION

Bushings

Check the bushings **no. 8** and **no. 9** 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.

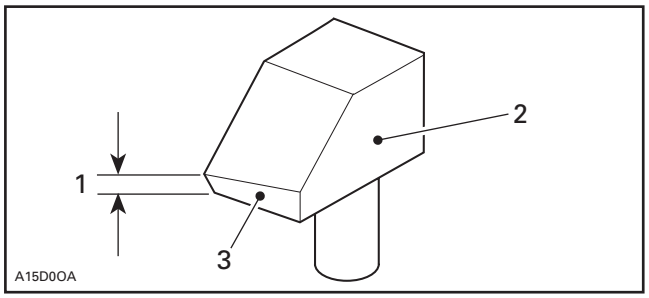
DRIVEN PULLEY BUSHING WEAR LIMIT mm (in)	
Small bushing	38.30 (1.508)
Large bushing	108.2 (4.260)

Slider Shoe

Black slider shoe = forward.

Red slider shoe = reverse.

Check cam slider shoes **no. 10** and **no. 11** for wear. Replace when inside edge thickness 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

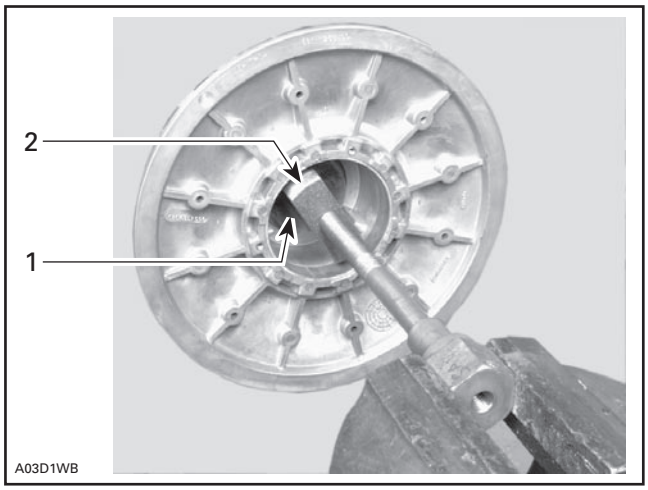
BUSHING REPLACEMENT

Large Bushing

Remove Allen screws if applicable. Heat to break Loctite bond.

Install support plate included in tool (P/N 529 031 100) inside sliding half.

Place extractor (P/N 529 035 575) below bushing.



TYPICAL
1. Support plate
2. Extractor

Mount screw head of new puller (P/N 529 035 524) 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.

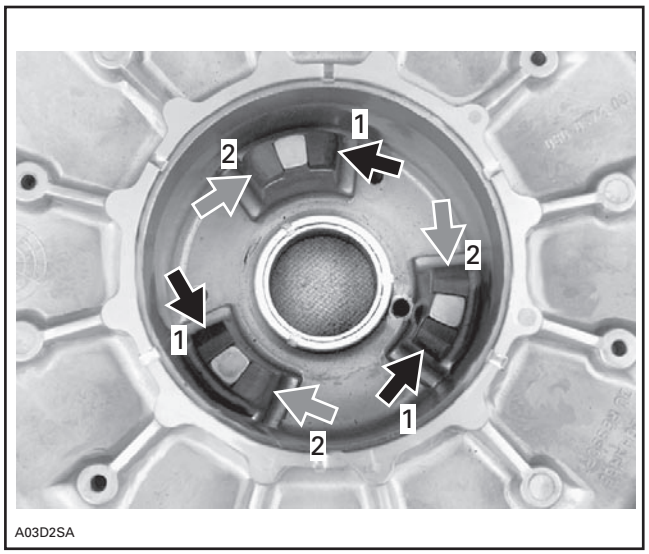
Coat bushing outside diameter with Loctite 609 (P/N 413 703 100). Place new bushing on sliding half and slightly tap to engage squarely the bushing in the sliding.

ASSEMBLY

Cam Slider Shoe

When replacing slider shoes **no. 10** and **no. 11**, always install a new set (3 shoes) to maintain equal pressure on the cam.

Install slider shoes as per following photo. Red slider shoes are being used for reverse and black ones for forward.



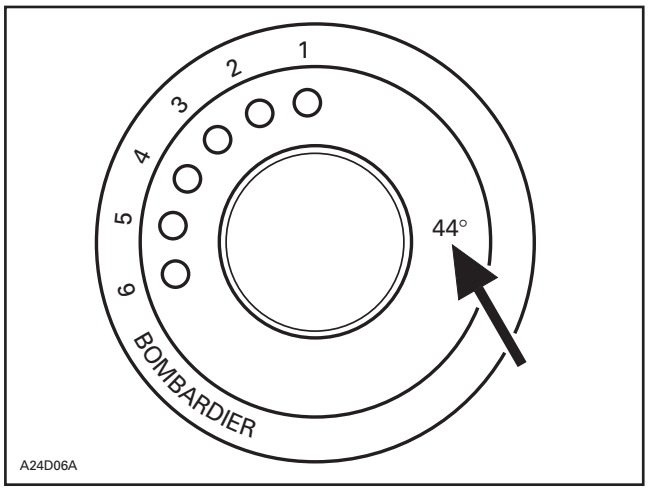
1. BLACK slider shoe
2. RED slider shoe

Assemble driven pulley components by reversing the disassembly procedure.

Cam and Spring

Make sure to install proper cam. Refer to TECHNICAL DATA.

Cam angle is identified on cam.



Install spring **no. 6** in sliding half with its end inserted in hole B.

Position cam **no. 5** then insert spring in adjusting hole no. 2 into outer cam.

IMPORTANT: With the spring ends at positions B and 2, spring preload is equal to zero (0). To work properly, the driven pulley must have a zero preload.

Compress outer cam using spring compressor (P/N 529 035 524). Install washer **no. 4** then secure outer cam with circlip **no. 3**.

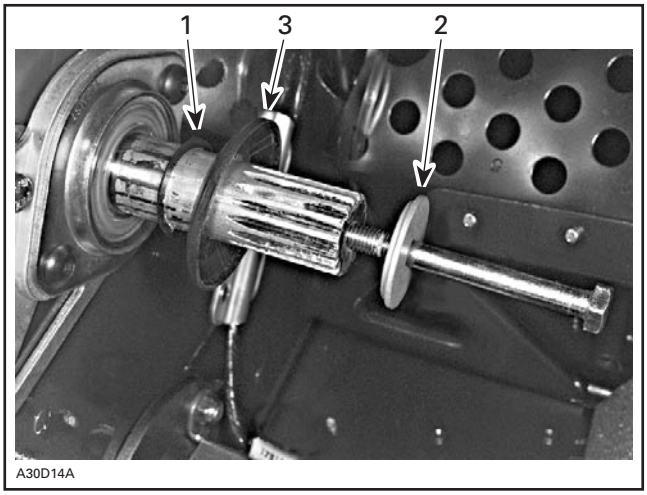
CAUTION: Ensure that circlip is properly inserted into shaft groove and that spacer recess is facing circlip.

INSTALLATION

Countershaft

CAUTION: Always apply anti-seize lubricant (P/N 293 800 070) on the countershaft before final pulley installation.

Make sure that spacer **no. 2** is on countershaft **no. 1** before installing driven pulley. Note also that washer shoulder is facing driven pulley.



TYPICAL
1. Spacer
2. Shoulder on this side
3. Concave side facing driven pulley

Should installation procedure be required, refer to BRAKE then look for BRAKE DISC and COUNTERSHAFT BEARING ADJUSTMENT.

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

Pulley Retaining Screw

Torque pulley retaining screw **no. 14** to 25 N•m (18 lbf•ft).

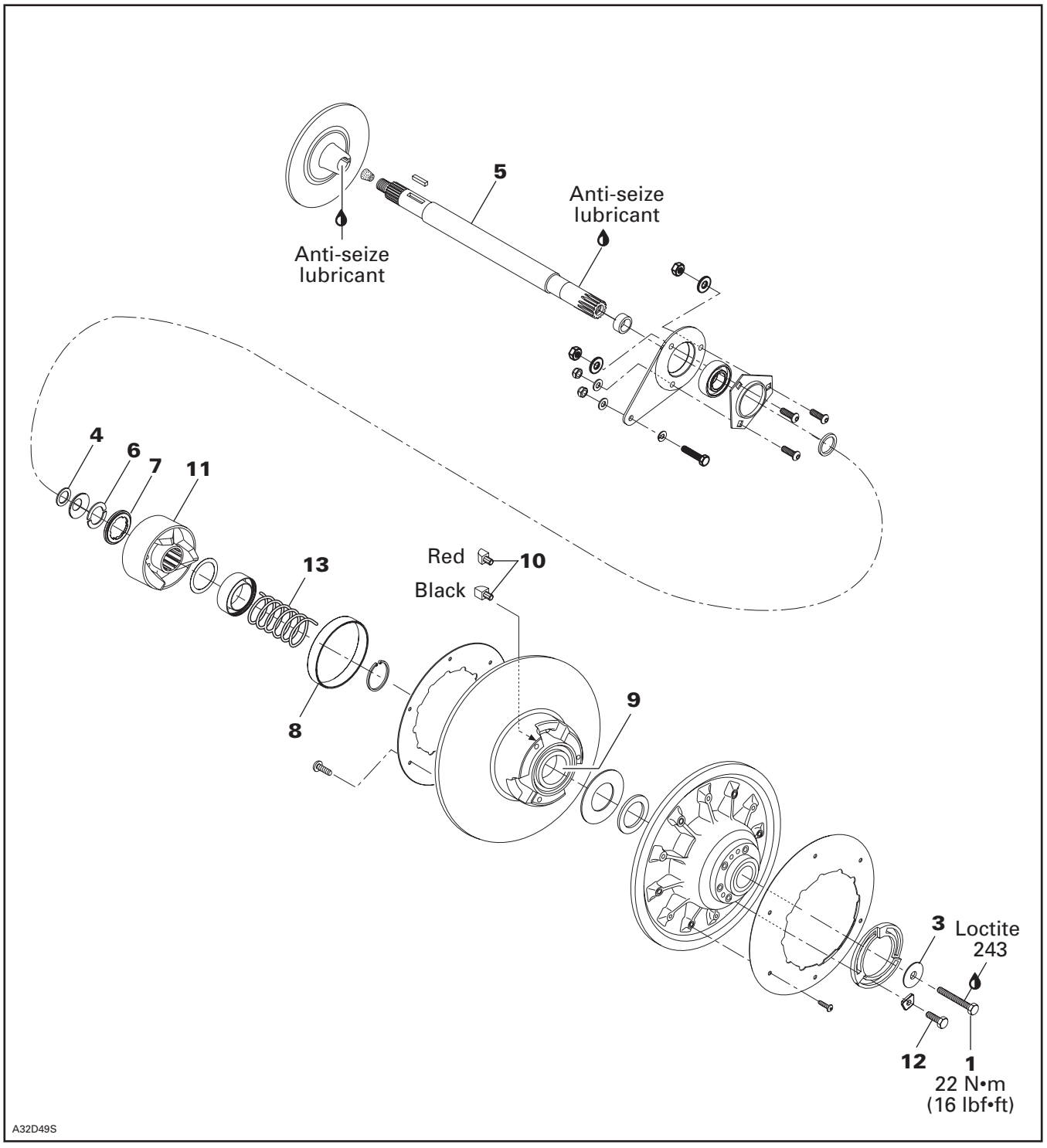
ADJUSTMENT

Pulley Alignment and Drive Belt Deflection

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

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

HPV VSA

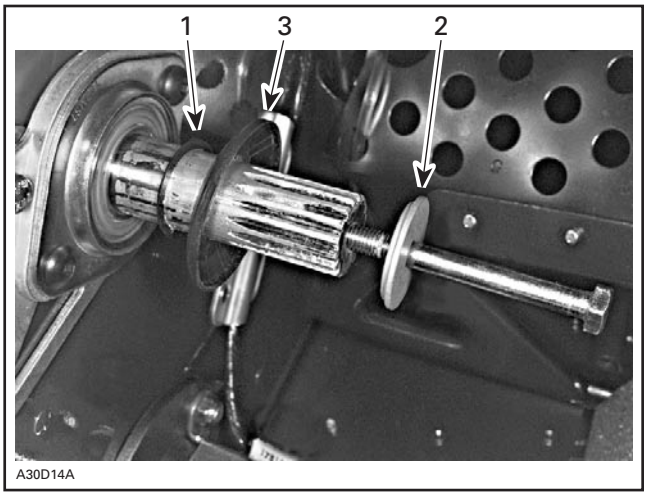

5
Anti-seize lubricant
Anti-seize lubricant
4
6
7
11
13
Red
10
Black
9
8
3
Loctite 243
12
1
22 N•m
(16 lbf•ft)
A32D49S

REMOVAL

Remove guard and drive belt from vehicle.

Remove cap screw **no. 1** and shouldered washer **no. 3** then pull the driven pulley from the countershaft.

Note shouldered washer position for reinstallation. Take care not to lose spacer **no. 4**.



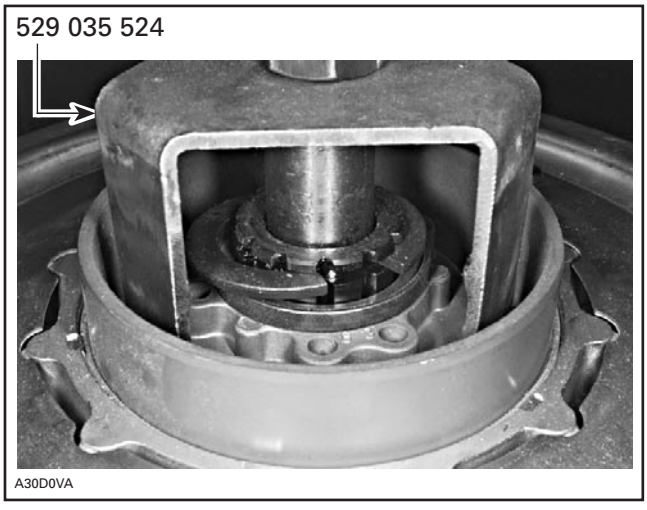
1. Spacer
2. Shoulder on this side
3. Concave side facing driven pulley

Countershaft

Should countershaft **no. 5** removal be required, refer to BRAKE then look for COUNTERSHAFT AND BRAKE DISC REMOVAL.

DISASSEMBLY

Use spring compressor (P/N 529 035 524).



Remove half keys **no. 6** and washer **no. 7** to disassemble the cam and the 2 pulley halves.

⚠ WARNING

Driven pulley cam is spring loaded, use above mentioned tool.

CLEANING

Large Bushing and Small Bushing

During break-in period (about 10 hours of use), teflon from bushing **no. 8** and **no. 9** 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.

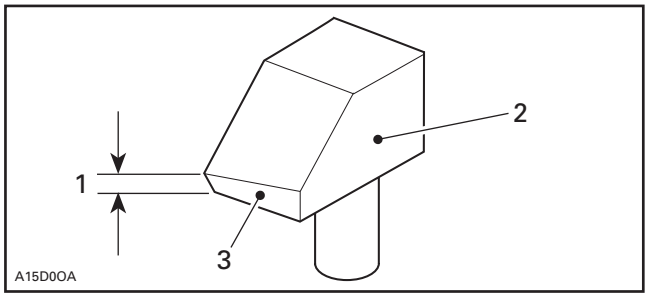
Pulley Half Cleaning

Use pulley flange cleaner (P/N 413 711 809) to clean pulley halves.

INSPECTION

Slider Shoe

Check cam slider shoes **no. 10** for wear. Replace when inside edge thickness of cam slider shoe slope base is worn to 1 mm (.039 in) or less.



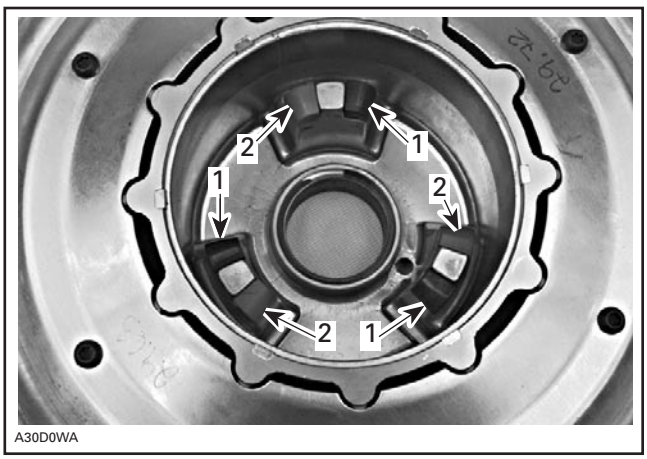
1. Measure thickness of slope base here
2. Sliding pulley side
3. Slope base

ASSEMBLY

Cam Slider Shoe

When replacing slider shoes **no. 10**, always install a new set (3 shoes) to maintain equal pressure on the cam.

Install slider shoes as per following photo. Red slider shoes are being used for reverse and black ones for forward.



1. BLACK slider shoe
2. RED slider shoe

Screws

Screws **no. 12** are machined at their end. With the adjustment ring steel to position 0 (zero), screw ends are flush with inner side of fixed pulley half when tighten.

CAUTION: If any of these screws is not flush with inner side of sliding pulley, bushings will worn unequally.

Assemble driven pulley components by reversing the disassembly procedure.

Cam

Coat cam **no. 11** interior with anti-seize lubricant.

INSTALLATION

Countershaft

CAUTION: Always apply anti-seize lubricant (P/N 293 800 070) on the countershaft before final pulley installation.

Should installation procedure be required, refer to BRAKE then look for BRAKE DISC and COUNTERSHAFT BEARING ADJUSTMENT.

Reinstall the pulley on the countershaft **no. 5** by reversing the removal procedure.

ADJUSTMENT

Pulley Alignment and Drive Belt Height

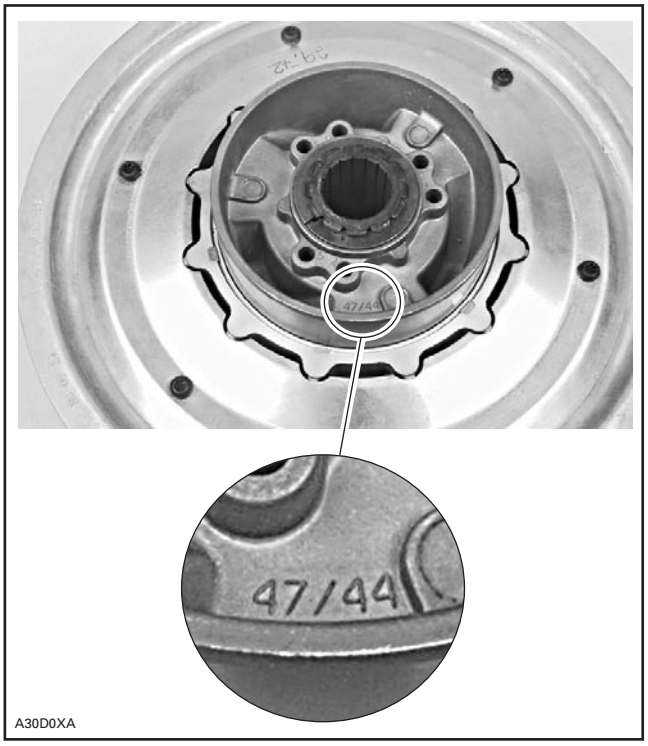
Refer to PULLEY DISTANCE AND ALIGNMENT and DRIVE BELT to perform adjustments.

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

Cam

Make sure to install proper cam **no. 11**. Refer to TECHNICAL DATA.

Cam angle is identified on cam.



NOTE: For high altitude regions, a service bulletin will give information about calibration according to altitude.

PULLEY DISTANCE AND ALIGNMENT

GENERAL

Both pulley distance and pulley alignment must be checked out to ensure the highest efficiency of the transmission system. Furthermore, optimum drive belt operation and minimal wear will be obtained only with proper pulley alignment.

CAUTION: Before checking pulley adjustment, the rear suspension must be mounted on the vehicle and track tension/alignment must be done. Always check pulley adjustment after suspension is adjusted.

⚠ WARNING

Failure to correctly perform pulley alignment may cause the vehicle to creep forward at idle.

All Pulley Alignment Specifications Refer to:

X = Distance between straight bar and drive pulley fixed half edge, measured between pulleys.

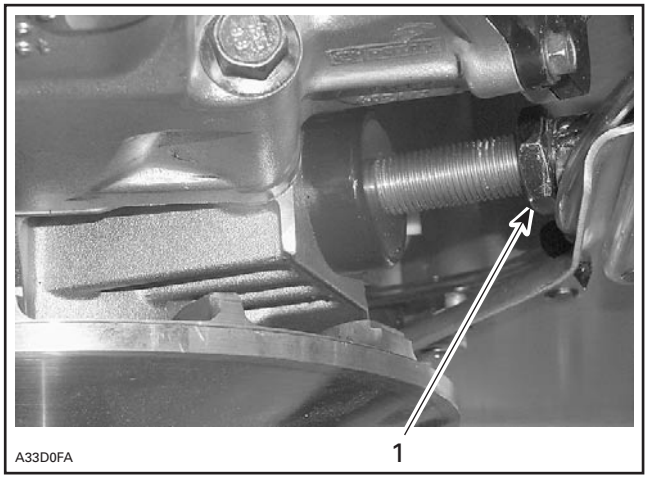
Y = Distance between straight bar and drive pulley fixed half edge, measured at the end of straight bar.

Z = Distance between outside diameter of pulleys (not adjustable on the REV Series models).

GENERAL PROCEDURE

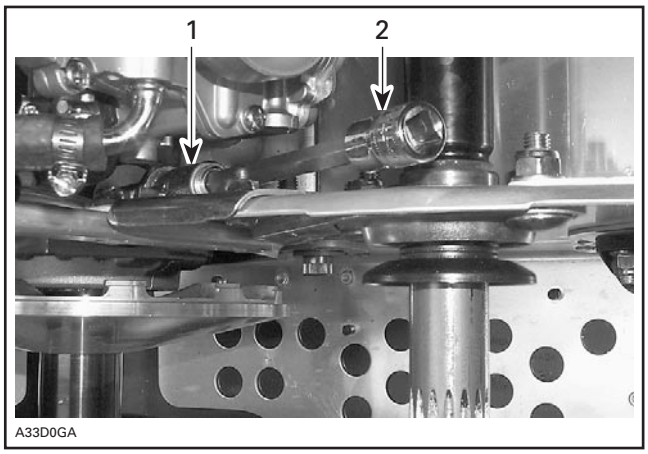
Remove guard, drive belt and air silencer.

Loosen lock nut.



1. Lock nut

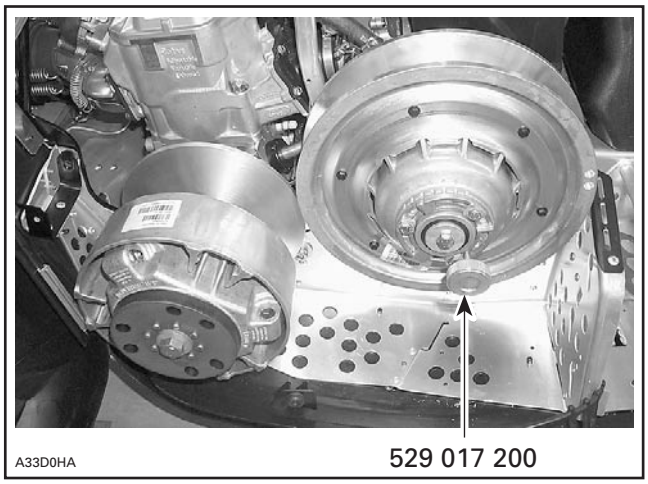
Untighten torque rod using a long hexagonal key.



TYPICAL

1. Torque rod
2. Hexagonal key

By using driven pulley opening tool (P/N 529 017 200) push the sliding half to open the driven pulley.



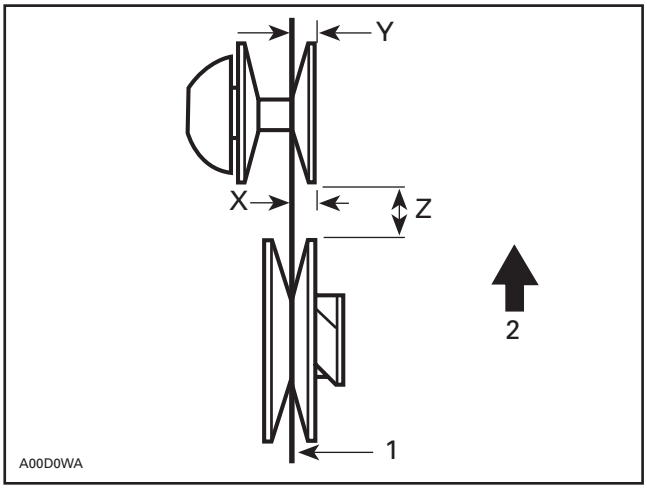
DRIVEN PULLEY OPENING TOOL

Insert a straight bar 9.5 mm (.373 in) square, 48 cm (19 in) long or the proper alignment bar 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).



TYPICAL
1. Straight bar
2. Front of vehicle

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

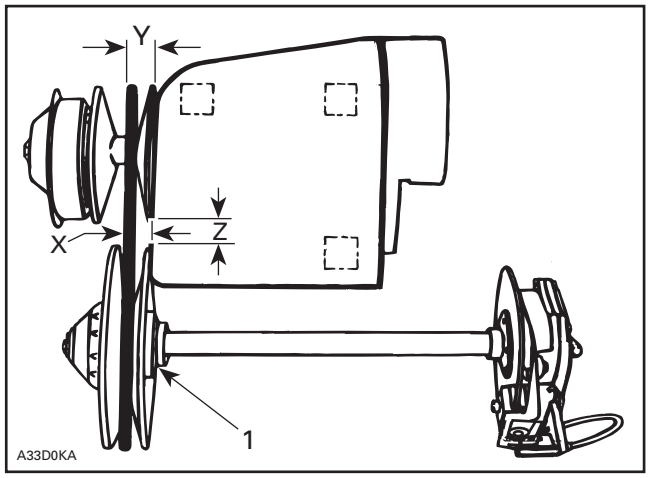
Drive Belt Deflection

NOTE: When pulley distance and alignment are adjusted to specifications, refer to DRIVE BELT 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 BAR P/N
	Z	X	Y-X	
	± 0.50 mm (.020 in)			
ALL REV SERIES MODELS WITH FORMULA VSA OR FORMULA VSA RER	19.0 (0.748)	37.0 (1.456)	1.5 (0.060)	529 035 831
ALL REV SERIES MODELS WITH HPV VSA	20.0 (0.787)	37.0 (1.456)	1.5 (0.060)	



TYPICAL
1. Contact

ALIGNMENT BAR IN PULLEYS

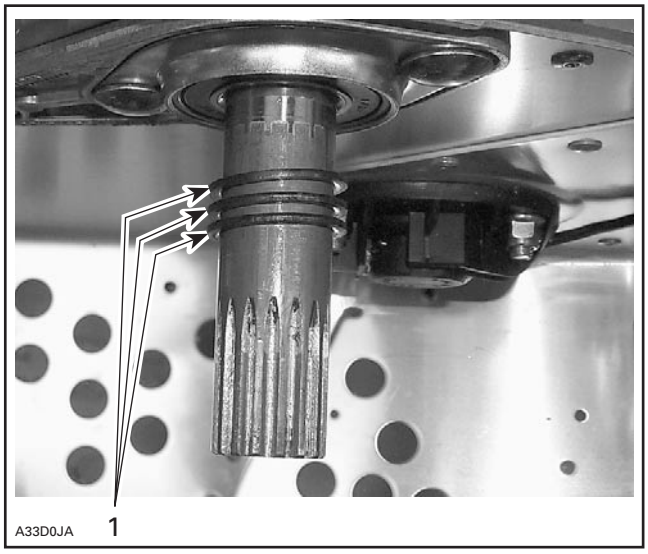
NOTE: Prior to performing pulley adjustment, loosen torque rod and lock nut as mentioned above in the GENERAL PROCEDURE.

Pulley Distance Adjustment Method

Pulley distance adjustment cannot be done on REV Series models.

Pulley Alignment Method

Remove driven pulley and add or remove spacer(s) as required to obtain the specified alignment.

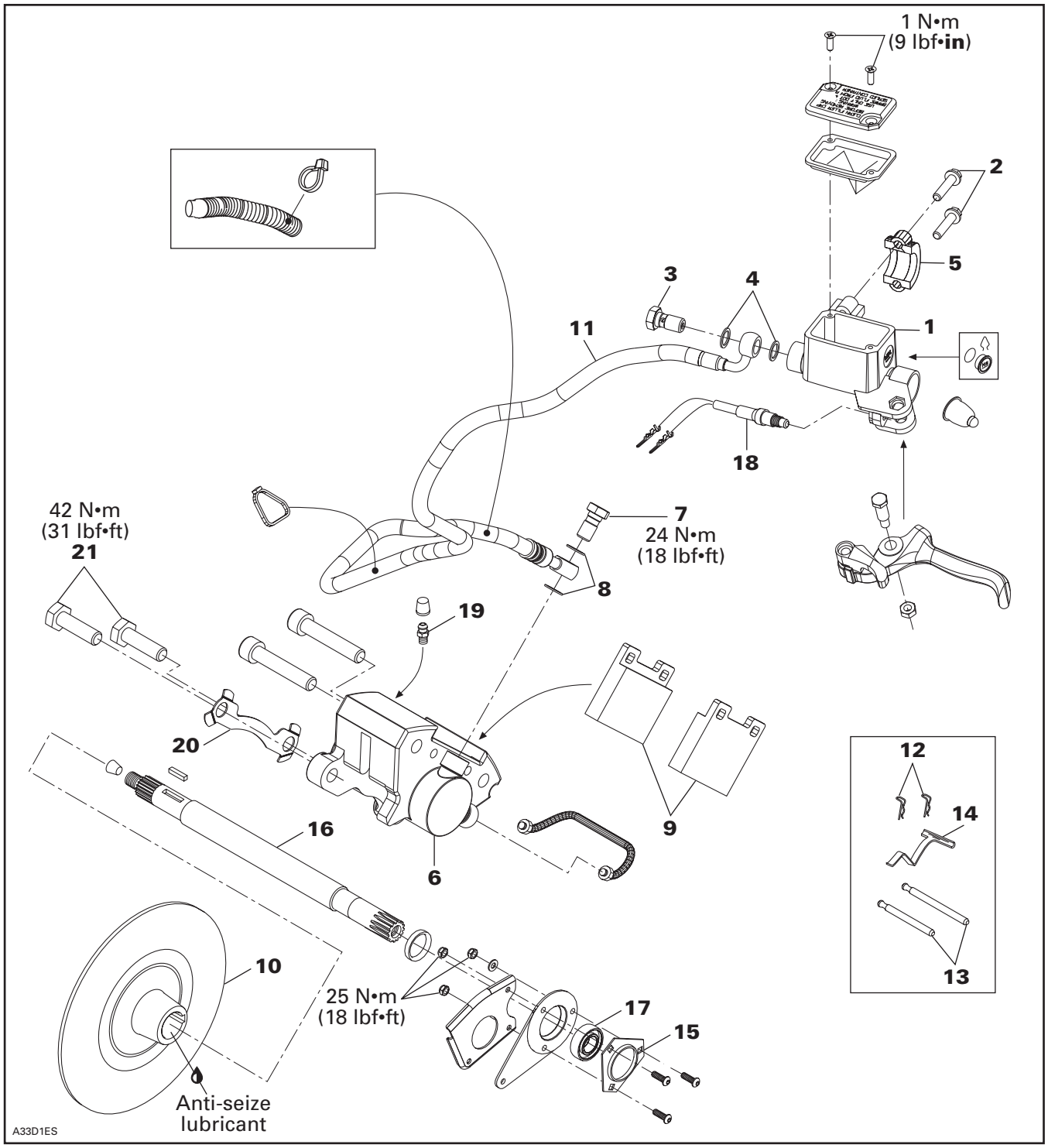


1. Spacers

NOTE: After alignment, hand tighten torque rod so it slightly contacts engine crankcase. Do not over tighten, it will disalign pulleys.

BRAKE

HYDRAULIC BRAKE



BRAKE FLUID

The brake fluid must be changed in accordance with the maintenance chart.

Use recommended brake fluid SRF (DOT 4) (P/N 293 600 063) or GTLMA (DOT 4) (P/N 293 600 062).

CAUTION: Use only DOT 4 brake fluid, SRF (P/N 293 600 063) or GTLMA (P/N 293 600 062). Do not use fluids other than the recommended one, nor mix different fluids for topping up.

MASTER CYLINDER

Removal

The master cylinder **no. 1** is located on the LH side of handlebar. To remove it, unscrew both screws **no. 2** retaining the brake lever to the handlebar.

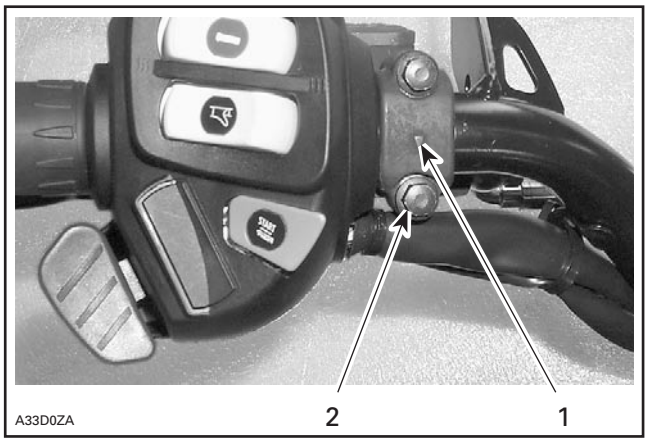
Place a container under Banjo bolt **no. 3** then unscrew it. Discard the sealing rings **no. 4**.

Installation

The installation is the reverse of removal procedure. Pay attention to the following.

Always use new sealing rings **no. 4** during installation.

Install clamp **no. 5** with its arrow pointing at downwards. Tighten to 8 N•m (71 lbf•**in**) lower screw before upper one.



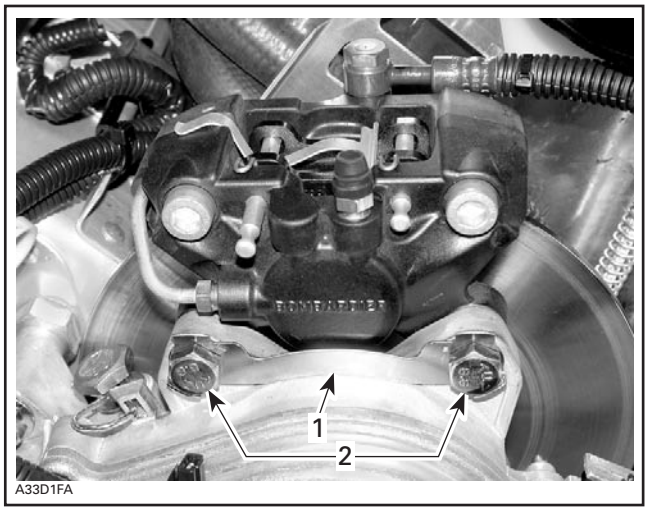
TYPICAL
1. *Arrow on upper clamp pointing downwards*
2. *Tighten lower screw first*

Bleed the brake system. Refer to BLEEDING.

CALIPER

Removal

Unscrew screws **no. 21** and remove locking tab **no. 20** to pull out caliper **no. 6** from chaincase.



1. *Locking tab*
2. *Screws*

CAUTION: Do not let the caliper hang by the hose and do not stretch or twist the hose.

Unscrew the bleeder screw **no. 19** and drain the brake system.

To completely drain the brake fluid, continuous press the brake lever until all fluid escaped out.

CAUTION: Spilling brake fluid on plastic, rubber or painted parts can cause severe damage. Protect these parts by covering them with rags while servicing brake system.

Place a container under caliper . Do not remove the Banjo bolt **no. 7** completely during draining.

When the system is empty, remove the Banjo bolt. Discard the sealing washers **no. 8**.

Inspection

Remove brake pads **no. 9**, refer further in this section.

Check pistons for scratches , rust or other damages. If so, replace the caliper as an assembly.

NOTE: Only brake pads are available as spare parts.

Installation

Push pistons all the way in to allow caliper installation over brake disc.

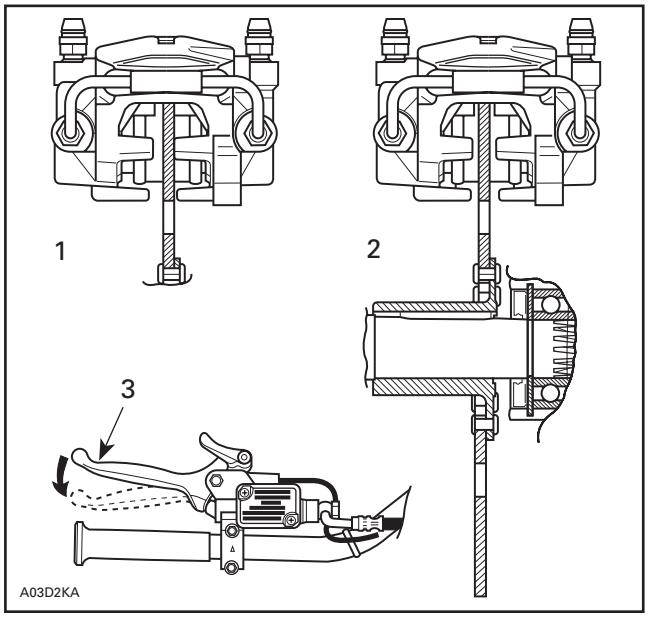
Install the Banjo bolt **no. 7** with two new sealing rings **no. 8**.

Fasten caliper on chaincase. Do not forget to install and fold locking tab over caliper bolt.

Fill the brake system and bleed it. Refer to BLEEDING in this section.

The brake disc **no. 10** 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.



TYPICAL
1. *Brake disc not centered*
2. *Brake disc centered*
3. *Apply brake before checking*

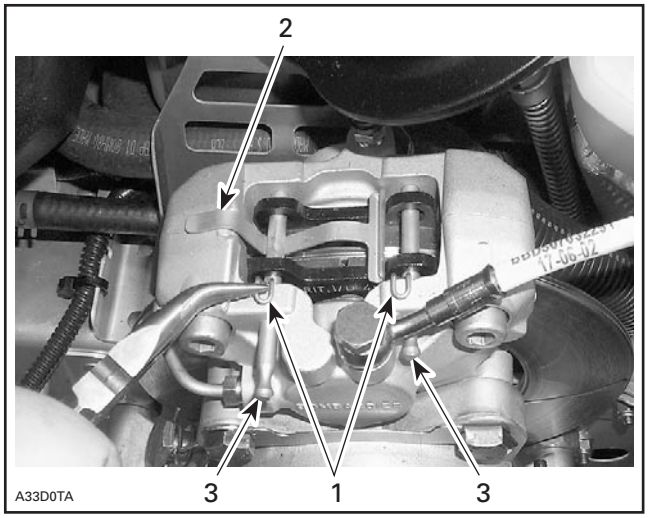
Apply brake then recheck.

BRAKE PADS

Removal

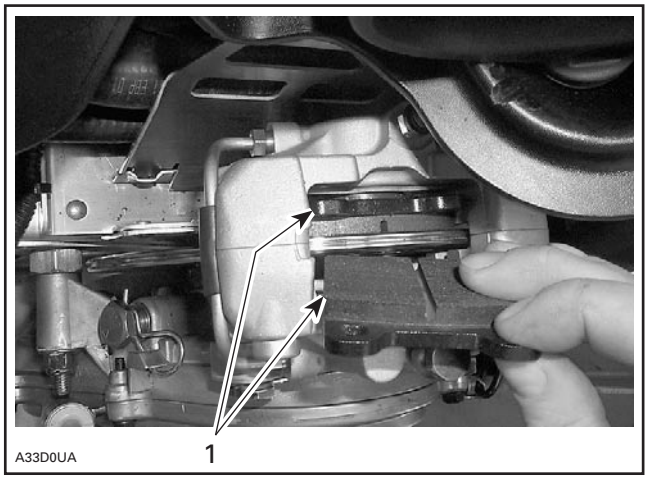
Brake pads removal procedure is as follows:

– Remove 2 retainers **no. 12** from the pins **no. 13**.
– Pull out the pins which releases the spring **no. 14**.



TYPICAL
1. *Retainer*
2. *Spring*
3. *Pins*

– Remove the brake pads **no. 9**.

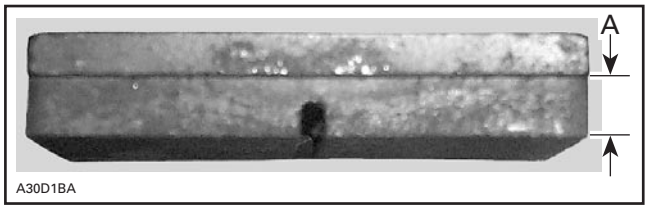


TYPICAL
1. *Brake pad*

Inspection

Brake pads **no. 7** must be replaced when lining is 1 mm (1/32 in) thick or less.

CAUTION: Brake pads must always be replaced in pairs.



A. 1 mm (1/32 in) minimum

Installation

Install:

– new brake pads
– spring and push 2 pins to lock the brake pads
– 2 retainers in the pin holes.

⚠ WARNING

Avoid getting fluid, oil or grease on brake pads. Contaminated brake pads can affect stopping capacities.

Press the brake lever until both new pads are touching the brake disc.

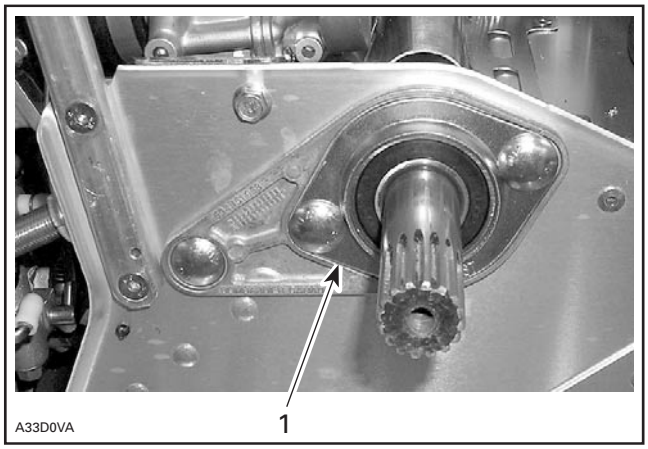
Center the brake disc into the caliper. Refer to CALIPER

BRAKE DISC

Removal

Brake disc **no. 10** can be removed without removing chaincase. Proceed as follows:

– Remove belt guard, belt and driven pulley.
– Remove air silencer.
– Unbolt bearing support **no. 15** from chassis.



1. Bearing Support

– Unscrew caliper from chaincase.
– Open chaincase and remove upper sprocket.
– Pull countershaft **no. 16** toward driven pulley side to free from chaincase and disc.
– Remove disc.

Inspection

Check for scoring, cracking or bending, replace as required.

CAUTION: Brake disc should never be machined.

Installation

Apply anti-seize lubricant (P/N 293 800 070) on shaft.

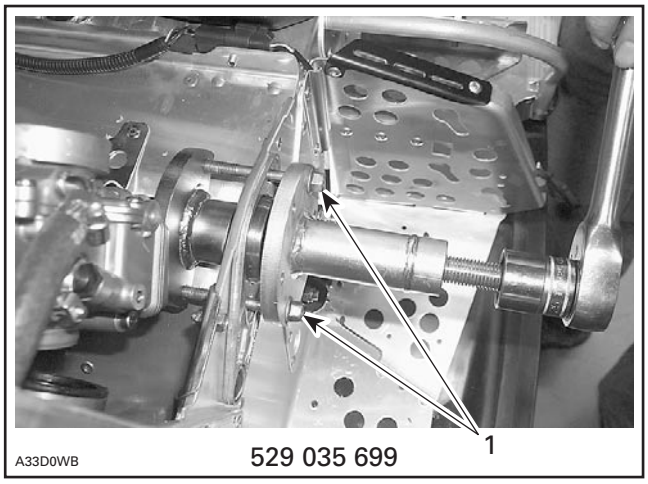
The disc hub exceeds the disc more from one side than from the other. Install disc with the longer exceeding portion toward driven pulley.

Reinstall all removed parts.

COUNTERSHAFT BEARING

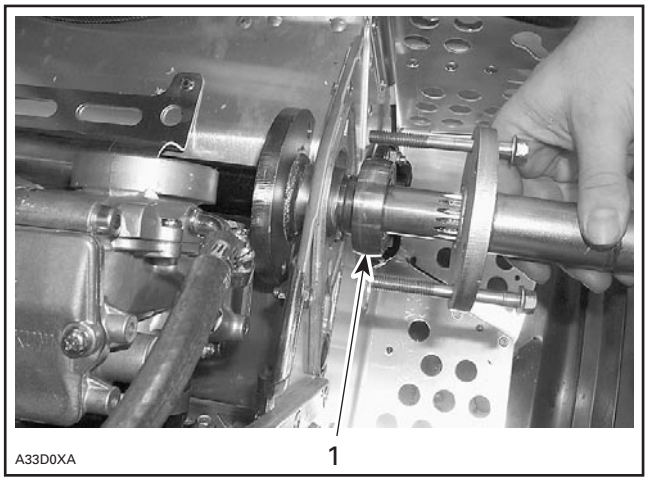
Removal

Unbolt bearing support **no. 15**. Install screw from remover (P/N 529 035 699).



1. Screws

Install remover (P/N 529 035 699) on countershaft for complete bearing **no. 17** removal.



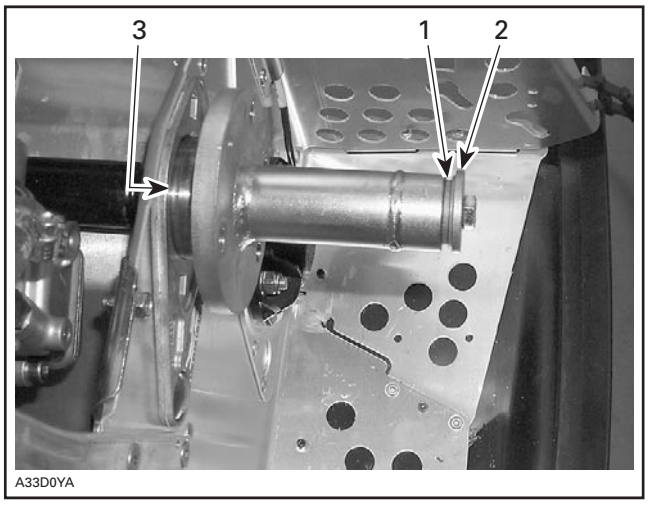
TYPICAL
1. Bearing

Installation

Insert countershaft (with brake disc) from chaincase side through countershaft support (driven pulley side), then insert into chaincase.

Install countershaft bearing **no. 17** using proper tool.

To install bearing on countershaft, use remover (P/N 529 030 100) and some flat washers of 3 mm (1/8 in) total thickness. Using original retaining screw and shouldered washer tighten until bearing rests against circlip.



1. Washers use as a 3 mm (1/8 in) spacer
2. Original retaining screw and shouldered washer
3. Bearing against circlip

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.

Torque castellated nut of upper sprocket to 45 to 75 N•m (33 to 55 lbf•ft).

Close chaincase referring to CHAINCASE.

COUNTERSHAFT

REMOVAL

Proceed the same as for countershaft bearing removal and then remove the countershaft **no. 16**.

Inspection

Check countershaft for bending, rust or other damages. Replace if necessary.

Installation

The installation is the reverse of removal procedure.

BRAKE LIGHT SWITCH

Removal

The brake light switch **no. 18** is located near the brake lever. To remove the switch, use the following.

Disconnect the switch.

Take out the master cylinder from the handlebar.

Overturn the master cylinder so that the bottom is on the top.

Fix the master cylinder in a rigid way preferably in a vise.

Pull out the switch wire and rubber cover.

Activate the parking brake.

With the help of a proper tool, unscrew the switch body paying attention to apply a torque in axial direction with steps of little torque angles and paying attention to not apply a force in radial direction (flexion).

Remove the glue remaining with alcohol on a piece of cotton and then clean the seat threads with the clamp screw. If there is resistance to the advance of the clamp screw, use a proper wrench.

NOTE: In case of switch body breaking during the unscrewing activity, act mechanical restoring the threads on master cylinder seat and then go on with the installation procedure.

Installation

NOTE: The brake light switch is not adjustable.

Put the switch on the seat, rotating it only for 1 or 1.5 turns.

Put one drop of Loctite 609 (P/N 413 703 100) on the free switch threads.

Screw the switch by hand until it is in a correct position.

For safety reasons, check the activation of the switch by pulling the brake lever. In case of no switch activation, repeat all the procedure replacing a new switch.

NOTE: If parking brake release during the mounting operations, set the master cylinder in a sloping position (with lever on the top) and hold the master cylinder lever for 3/4 times.

Reinstall the master cylinder on the handlebar taking it in a horizontal position avoiding the risk of glue contamination for the switch rod.

Release the parking brake.

Wait 24 hours to allow glue to set.

Recheck if switch is working properly.

BLEEDING

Bleed brake system as follows:

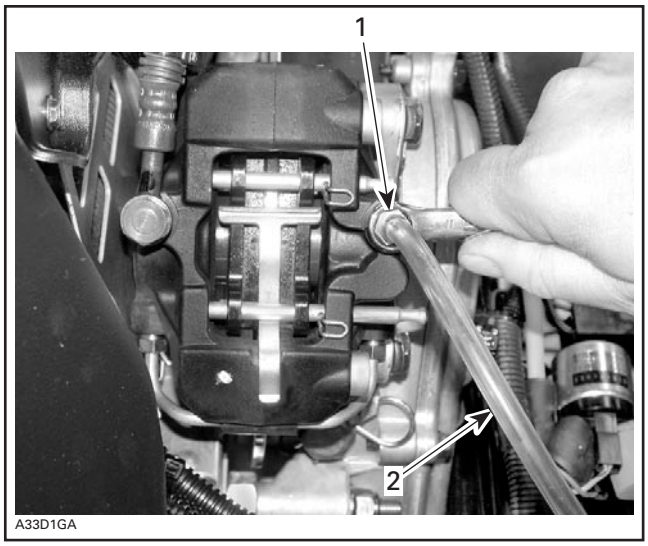
Keep sufficient recommended brake fluid in reservoir at all times.

CAUTION: Use only DOT 4 brake fluid, SRF (P/N 293 600 063) or GTLMA (P/N 293 600 062). Do not use fluids other than the recommended one, nor mix different fluids for topping up.

Install a clear hose on bleeder **no. 19**. Route this hose to a container. Open bleeder.

Pump brake lever until no air escapes from hose.

Close bleeder.

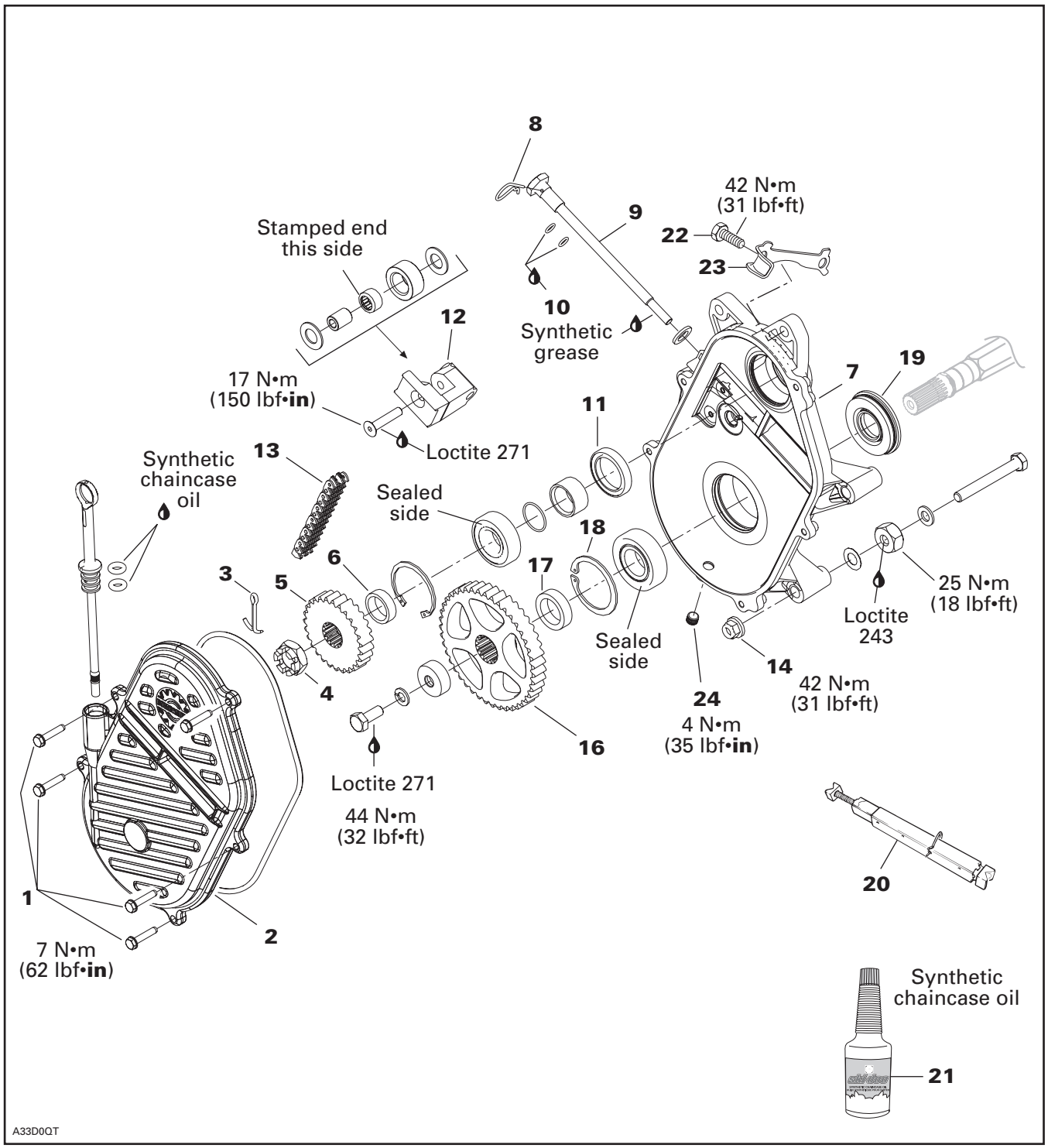


1. Open bleeder
2. Clear hose to catch used brake fluid

⚠ WARNING

Avoid getting oil on brake pads.

CHAINCASE


8
9
42 N•m
(31 lbf•ft)
22
23
Stamped end
this side
10
Synthetic
grease
12
19
7
17 N•m
(150 lbf•in)
11
Loctite 271
13
Synthetic
chaincase
oil
Sealed
side
18
6
17
3
5
25 N•m
(18 lbf•ft)
Loctite
243
Sealed
side
14
42 N•m
(31 lbf•ft)
4
24
4 N•m
(35 lbf•in)
16
Loctite 271
44 N•m
(32 lbf•ft)
20
1
2
7 N•m
(62 lbf•in)
Synthetic
chaincase oil
21
A33D0QT

REMOVAL AND DISASSEMBLY

To remove chaincase proceed as follows.

Remove battery and battery rack (if so equipped) to gain access, refer to BATTERY section.

Remove hair pin **no. 8**. Release drive chain tension by unscrewing tensioner adjustment screw.

Drain oil by removing drain plug **no. 24**.

3,4,5,6,13,16,17, Cotter Pin, Nut, Sprocket, Shim and Drive Chain

Apply parking brake.

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

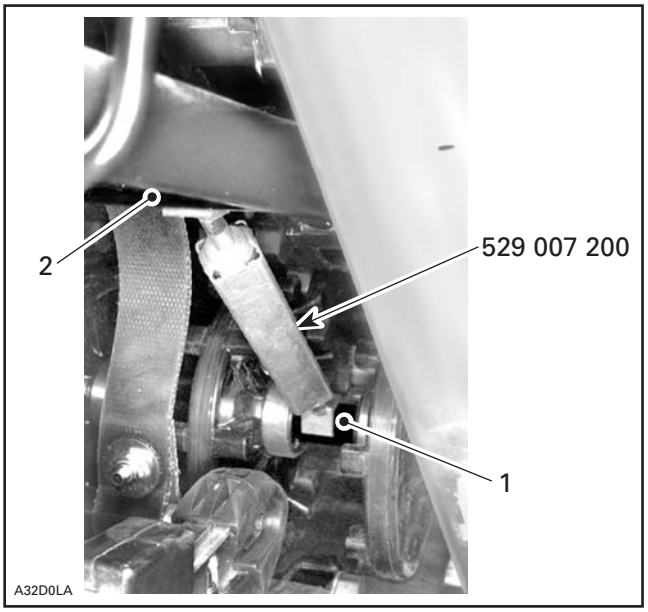
NOTE: Should countershaft removal be required, refer to BRAKE then look for COUNTERSHAFT REMOVAL.

Release parking brake.

Remove 3 nuts **no. 14**.

Unfold locking tab **no. 23** then remove caliper retaining screws **no. 22**.

Release track tension, use drive axle holder **no. 20** (P/N 529 007 200).

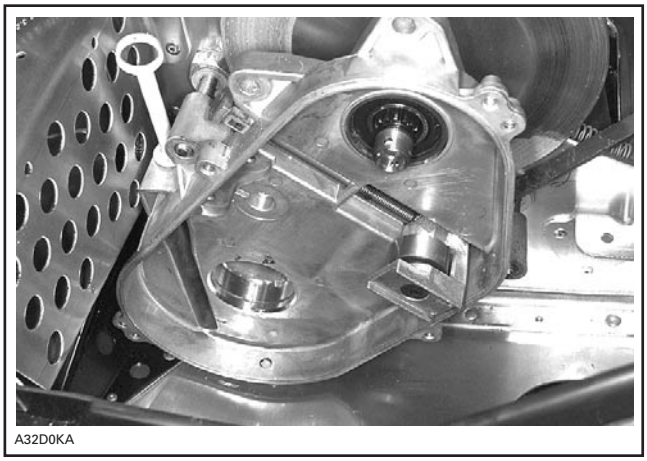


TYPICAL
1. Drive axle
2. Suspension front arm upper axle

Pry out drive axle oil seal **no. 19** from chaincase.

Pull chaincase from drive axle and countershaft.

Using 2 large prybars inserted between chaincase housing **no. 7** and frame, pry complete assembly from vehicle.



TYPICAL — CHAINCASE HOUSING REMOVAL

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 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, a service bulletin will give information about calibration according to altitude.

INSTALLATION AND ASSEMBLY

Reverse removal and disassembly procedure and pay attention to the following. Replace oil seals, gaskets O-rings and drain plug.

11, Oil Seal

Using an appropriate pusher, press the oil seal into chaincase hub. Oil seal must fit flush with the chaincase edge.

NOTE: Should installation procedure for countershaft be required, refer to BRAKE.

5,16, Sprockets

Position the sprockets with the backside of writing facing the chaincase cover. Sprocket hub faces toward chaincase.

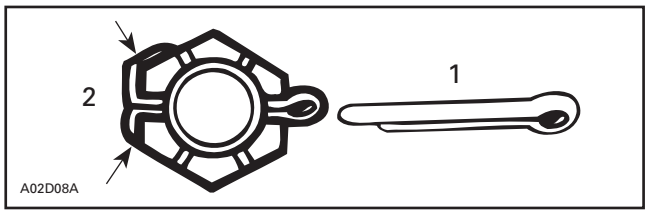
4, Upper Sprocket Castellated Nut

Torque to 45 to 75 N•m (33 to 55 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

NOTE: Brake disc key must be in good condition before checking if chain is loose.

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

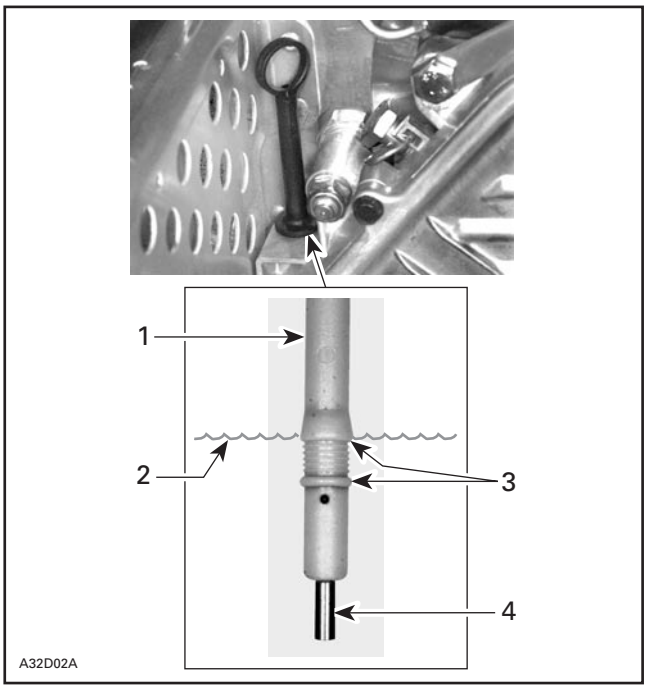
If the specified free-play is not reached with the tensioner screw fully tightened, replace chain and check the condition of sprockets.

21, Chaincase Oil

Pour 250 mL (8.5 U.S. oz) of synthetic chaincase oil (P/N 413 803 300) into chaincase.

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

Check oil level with the dipstick then add if required. Remove metal particles from magnet.



TYPICAL
1. Dipstick
2. Oil level
3. Level between marks
4. Magnet

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

ADJUSTMENT

Pulley Alignment

Refer to PULLEY DISTANCE AND ALIGNMENT.

Track Tension and Alignment

Refer to TRACK.

DRIVE CHAIN

SILENT CHAIN

Only 13-plates wide type of silent chain is compatible for REV series models. Do not use chain other that the 13-plates wide on REV series models. Fit chain on top sprocket to make sure that you are using right one according to width. Refer to TECHNICAL DATA.

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

IGNITION TIMING

593, 593 HO, 593 HO SDI and 793 HO Engines

Normally ignition timing adjustment should not be required. It has been set at factory and it should remain correctly adjusted since every part is fixed and not adjustable. The only time the ignition timing might have to be changed would be when removing and reinstalling the magneto housing, replacing the crankshaft, the magneto flywheel, the trigger coil or the MPEM or ECM. If the ignition timing is found incorrect, first check for proper crankshaft alignment. This might be the indication of a twisted crankshaft. Refer to LEAK TEST AND ENGINE DIMENSION MEASUREMENT.

The ignition timing can be checked with either the engine hot or cold. Also, the ignition timing is to be checked at 3500 RPM with a timing light.

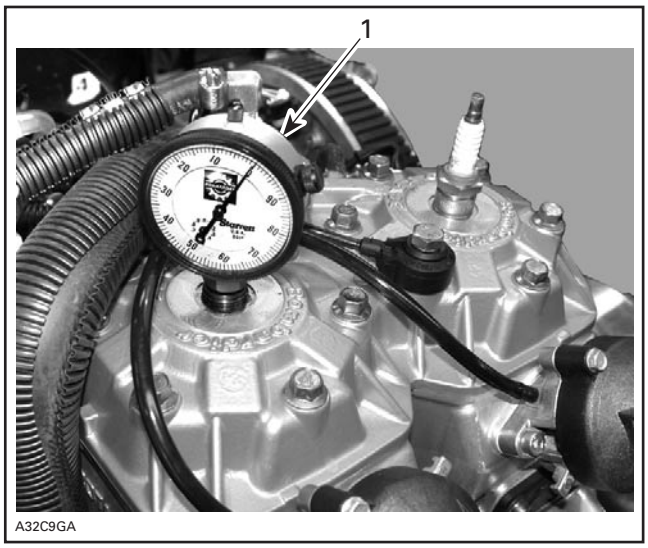
Engine retard timing varies depending on engines/models for their first hours of operation.

ENGINE/MODELS	ENGINE RETARD TIMING (°)/DURATION (h)
593	- 3°/1 h
593 HO, 593 HO SDI	- 2°/3 h
793 HO	- 2°/3 h

NOTE: Between 3000 and 4000 RPM, the spark advance does not change. So when checking ignition timing at 3500 RPM, a change in engine speed within ± 500 RPM will not affect the timing mark when checked with the timing light.

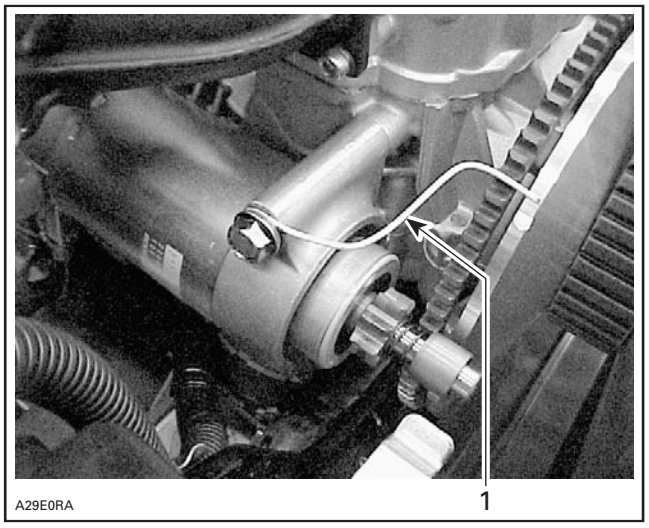
SCRIBING A TIMING MARK

- Clean the area around the MAG spark plug, and remove it.
- Install the TDC gauge in the spark plug hole, (magneto side) and adjust as follows:
  - Position the MAG piston at approximately TDC.



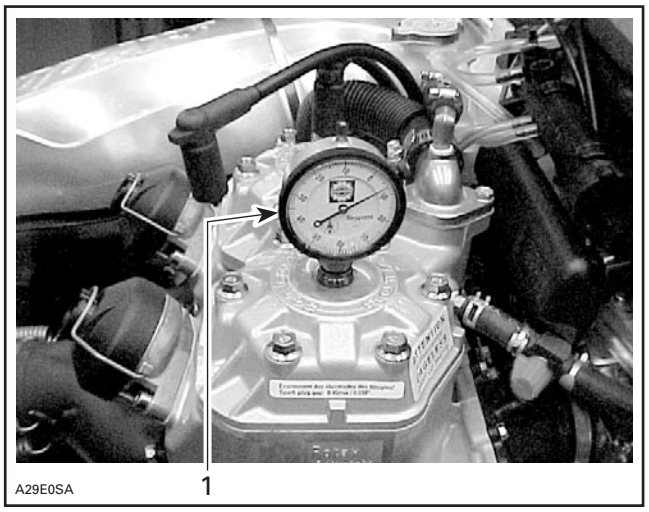
TYPICAL
1. TDC gauge on MAG side

  - Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
  - Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
  - Position the dial face toward the PTO. 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.
- Locate the piston TDC position as follows:
  - Slowly rotate the drive pulley back and forth across TDC while observing the needle. Note that the needle stops moving only as the piston is changing direction.
  - Rotate the dial face so that «0» is in line with the needle when it stops moving.
  - Again, slowly rotate the drive pulley back and forth across TDC and adjust the dial face to «0», until the needle always stops exactly at «0» before changing direction.
  - «0» now indicates exact TDC.
- Rotate the drive pulley clockwise, one-quarter turn then carefully rotate it counterclockwise until the needle indicates the specified measurement, indicated in TECHNICAL DATA.
- Twist a wire as shown and use it as a pointer. Install the wire on upper starter bolt.

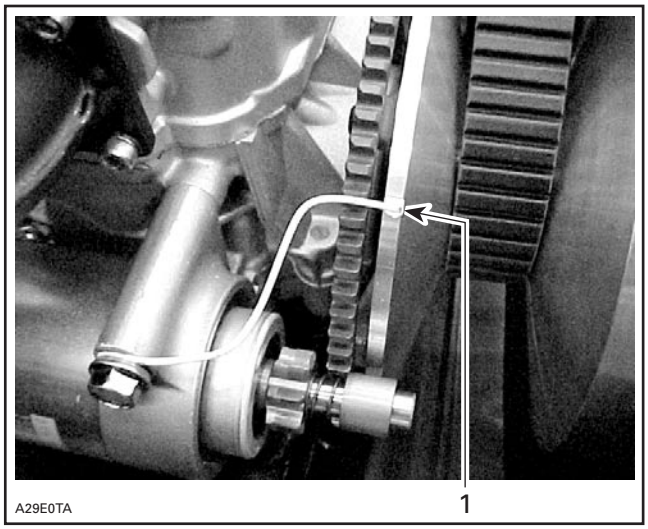


1. Pointer

- With the TDC gauge indicating specified timing, scribe a mark on drive pulley inner half in line with pointer end.



TYPICAL
1. TDC gauge indicating specified timing



1. TIMING MARK IN LINE WITH POINTER END

CHECKING IGNITION TIMING

Use a timing light.

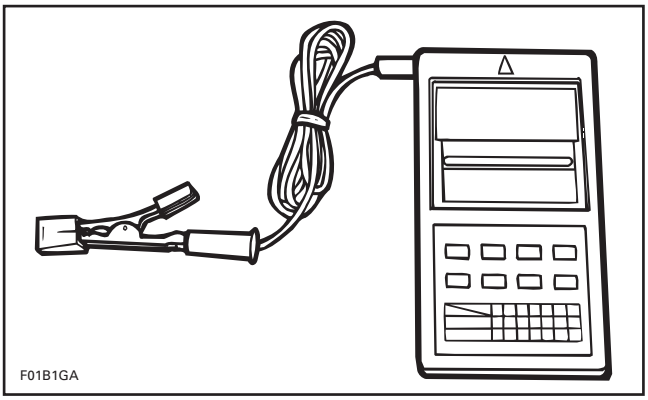
To check the ignition timing proceed as follows:

⚠ 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.

Connect the timing light pick-up to a spark plug cable.

Connect a digital induction type tachometer (P/N 529 014 500).



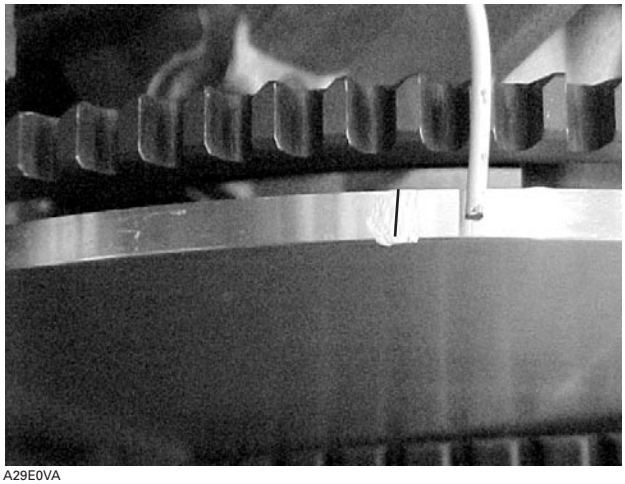
TACHOMETER

Start the engine and point timing light on timing mark. Bring engine to 3500 RPM for a brief instant.

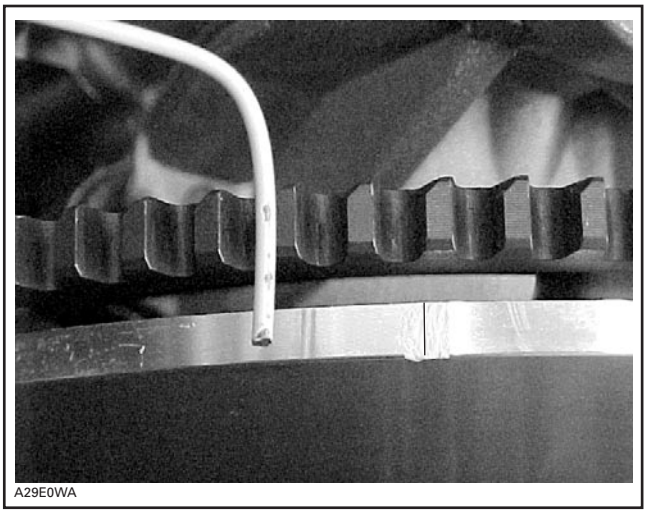

A29E0UA

The timing mark must be aligned with pointer end. If such is not the case, note if timing is retarded or advanced.

ENGINE TYPE	TOLERANCE
593	± 1°
593 HO, 593 HO SDI, 793 HO	± 0.5°


A29E0VA

TIMING RETARDED BY ABOUT 1°


A29E0WA

TIMING ADVANCED BY ABOUT 2°

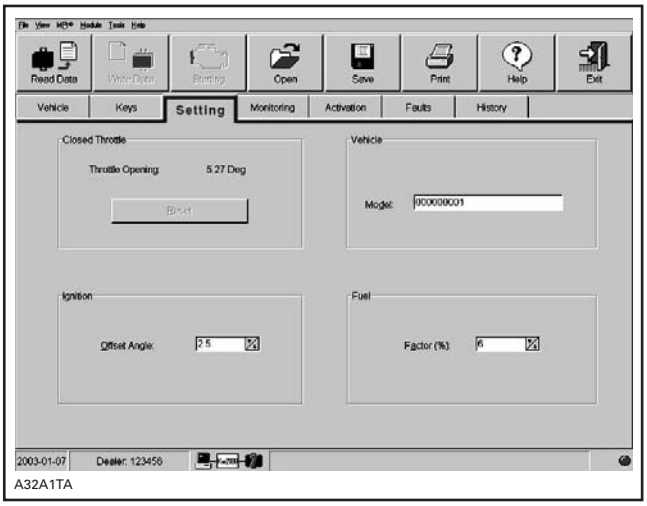
CHANGING TIMING

All Engine Types

NOTE: To change the timing on the SDI engines, the VCK is mandatory. The MPEM programmer cannot be used with these engines.

VCK (Vehicle Communication Kit)

VCK (Vehicle Communication Kit) (P/N 529 035 981) can be used, with B.U.D.S. software to change the ignition timing. Look under the proper **Setting** section of the B.U.D.S. software to change the ignition timing.



A32A1TA

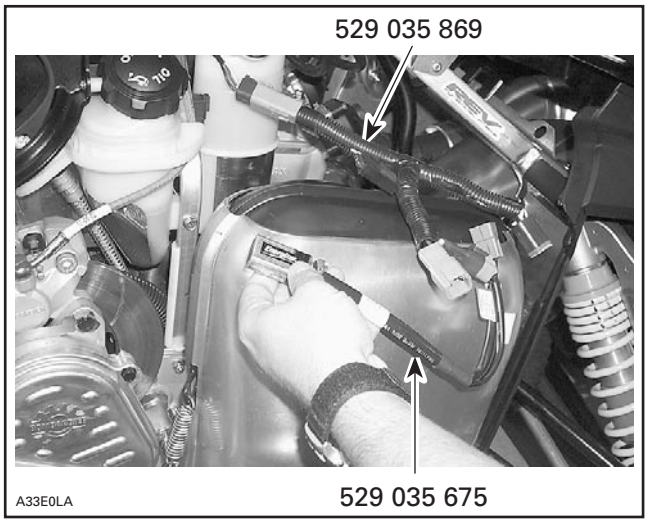
Detailed information about the B.U.D.S. software and its usage is available under its **Help** section.

MPEM Programmer

All Engine Types except SDI

Timing can also be changed using the MPEM programmer (P/N 529 035 878).

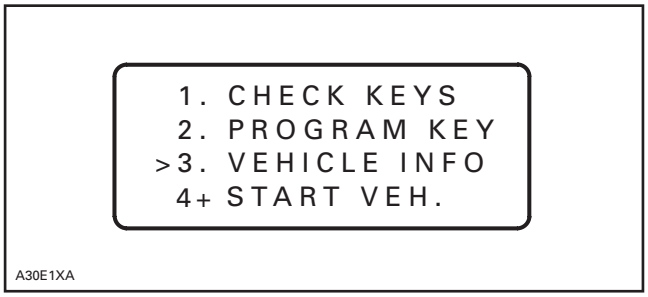
Connect 9-volt adaptor (P/N 529 035 675) to supply cable (P/N 529 035 869) and supply cable to diagnostic connector, located on right side of the vehicle.



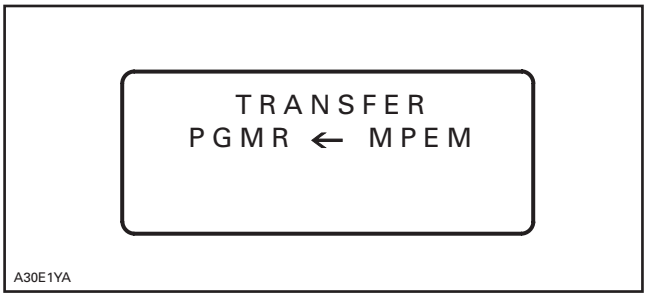
Connect MPEM programmer to DESS post.

Turn on programmer then enter password.

From main menu select no. 3. INFO VEHICLE.

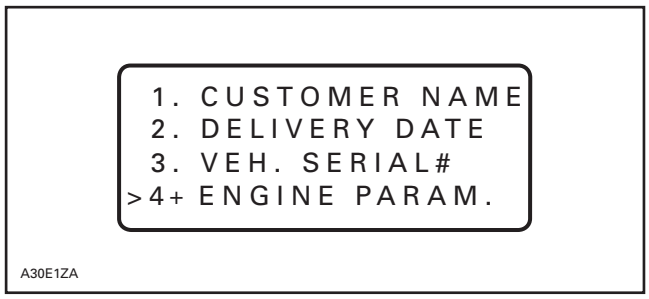


Vehicle information is transferred from MPEM to programmer.

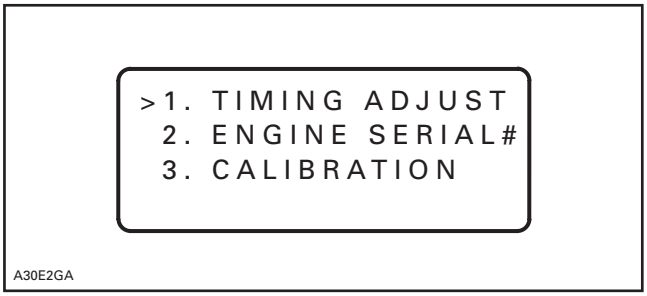


NOTE: In fact the programmer takes a **copy** of all vehicle parameters scribed in MPEM. This copy will be modified within the programmer then transferred to the MPEM.

Select no. 4. ENGINE PARAMETER.

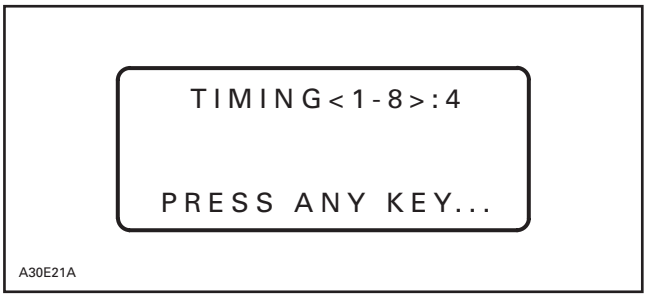


Select no. 1 TIMING ADJUSTMENT.

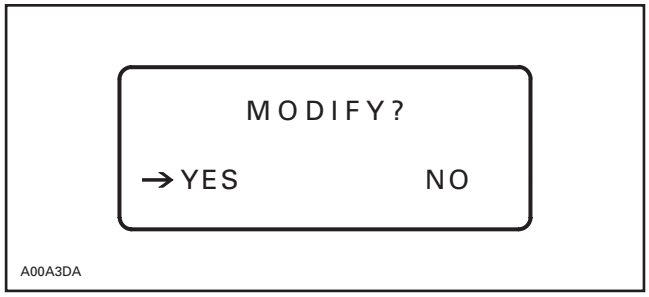


Press ENTER.

Now the display shows the engine timing correction factor that is programmed in the MPEM. In the following example timing correction factor is no. 4.

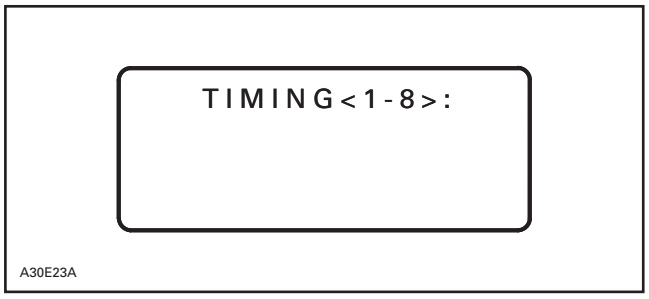


Press any key.



Select YES using the key ↔.

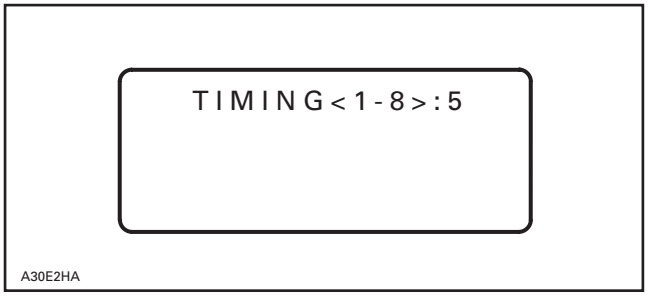
Press ENTER.



Select a timing correction factor corresponding to correction needed.

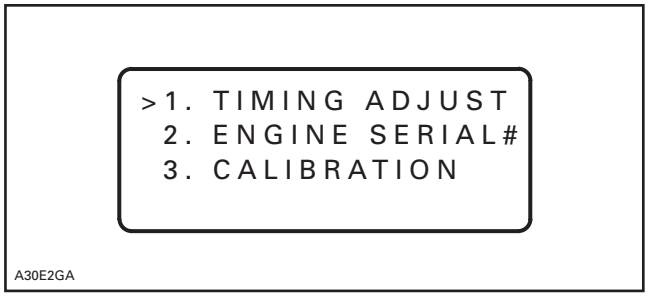
Example: Timing mark as verified with a timing light at 3500 RPM was too early by 2°. The correction factor programmed is no. 4.

Select correction factor no. 5. This will retard the timing by 2° because the difference between correction factor no. 4 and no. 5 is - 2° (passing from 1° to - 1°).

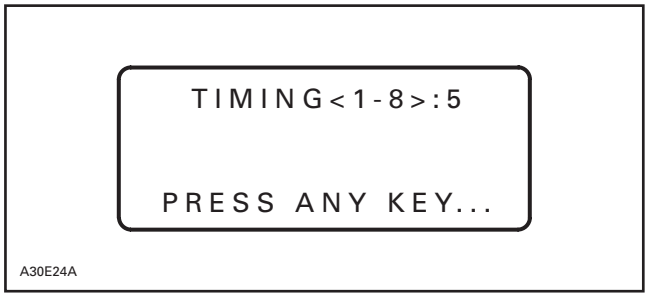


IGNITION CORRECTION FACTOR	
CORRECTION FACTOR PROGRAMMED IN MPEM	IGNITION TIMING CORRECTION
2	3°
3	2°
4	1°
1	0°
5	- 1°
6	- 2°
7	- 3°
8	- 4°

Press ENTER.

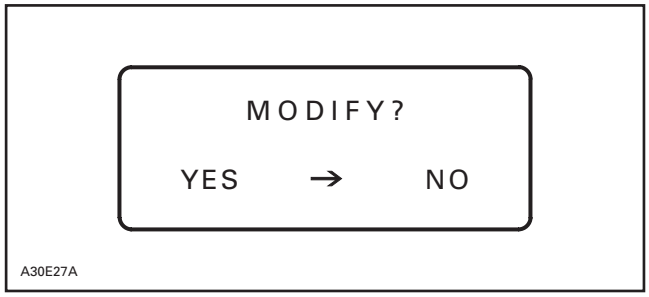


Press ENTER.

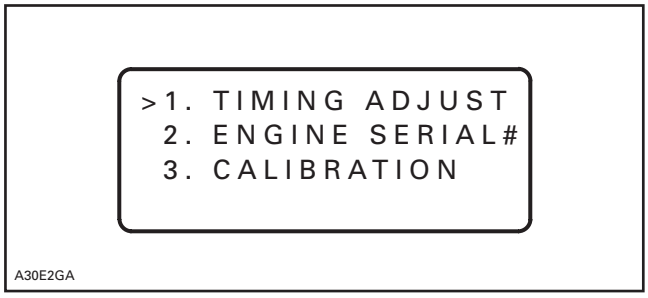


The display confirms that correction factor has been changed to no. 5.

Press any key.

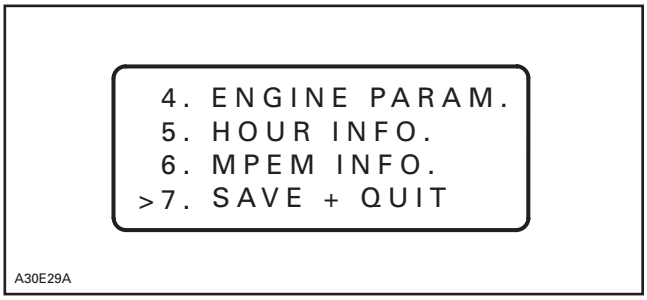


If the new correction factor selected above is the good one select NO and press ENTER. Otherwise select YES to choose an other correction factor.

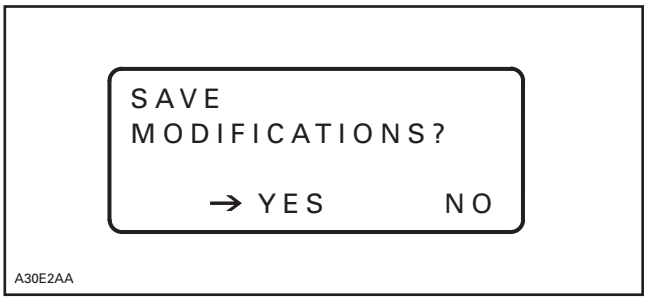


Press MENU.

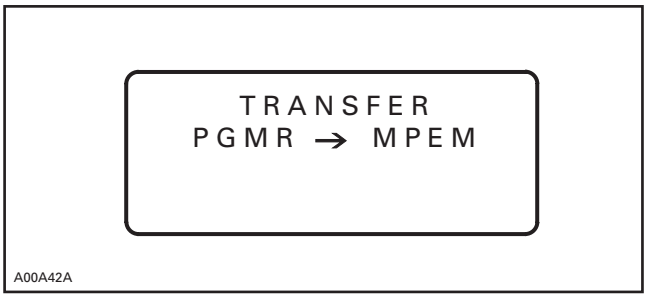
Scroll to no. 7 SAVE AND QUIT.



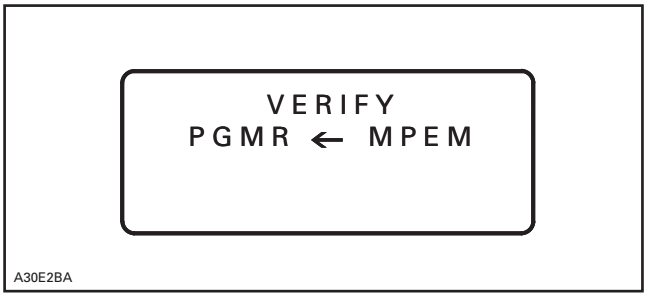
Press ENTER.



Press ENTER.

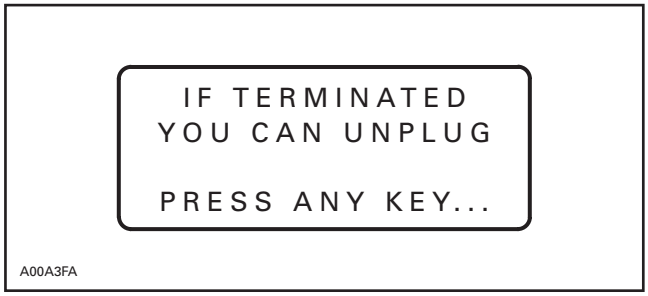


During a very short period of time the following message will appear.

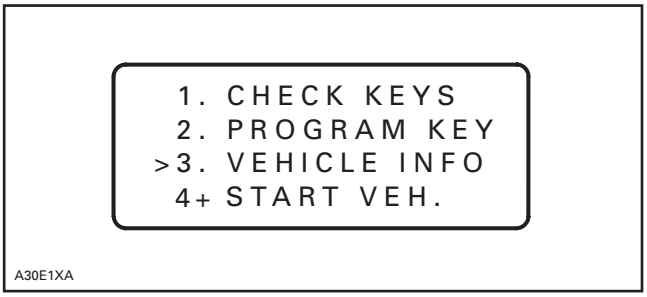


After the programmer has verified, following message will appear.

Press any key.



Press any key.



Unplug supply cable and 9-volt adaptor.

Recheck ignition timing with timing light when completed.

SPARK PLUGS

DISASSEMBLY

First unscrew the spark plug 1 turn.

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

⚠ WARNING

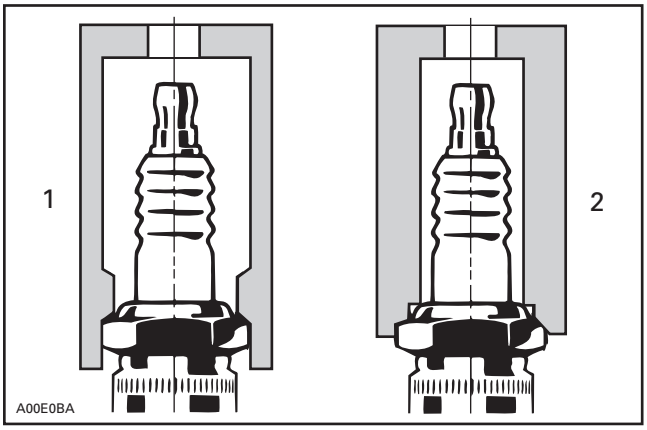
Whenever using compressed air, always wear protective eye wear.

SPARK PLUG INSTALLATION

Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

CAUTION: Do not adjust electrode gap of spark plug BR9ECS.

1) Apply anti-seize lubricant (P/N 293 800 070) over the spark plug threads to prevent possible seizure.
2) Hand screw spark plug into cylinder head and tighten with a torque wrench and a proper socket.



TYPICAL
1. Proper socket
2. Improper socket

SPARK PLUG TIGHTENING TORQUE

MODEL	SPARK PLUGS	TORQUE N•m (lbf•ft)
All models	NGK	27 (20)

BATTERY

NOTE: For manual start SDI models with a small battery/capacitor arrangement, refer to ENGINE MANAGEMENT SECTION.

GENERAL

Sealed valve regulated lead acid (VRLA) battery are used. They are non-spillable and maintenance reduced — no electrolyte level to be checked and readjusted. No ventilation tube is attached to the battery.

SUPPLIER P/N	BOMBARDIER P/N
YTX20L-BS	515 1756 42

REMOVAL

⚠ WARNING

Battery BLACK negative cable must always be disconnected first and connected last.

⚠ WARNING

Never charge or boost battery while installed on vehicle.

Open right side panel of vehicle.

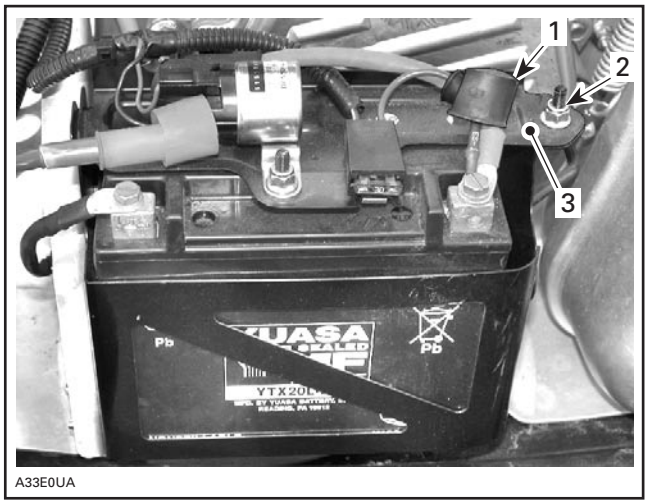
Disconnect BLACK negative cable end from the terminal.

Slide off rubber boot from RED cable and disconnect it.

Unscrew the bracket retaining nut and lift bracket to remove it.

Put bracket aside.

Remove battery.



A33E0UA

1. Rubber boot of RED positive cable terminal
2. Bracket retaining nut
3. Battery bracket

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, cables and battery posts using a solution of baking soda and water.

Remove corrosion from battery cable terminals and battery posts using a firm wire brush. Battery top should be cleaned by soft brush and any grease-cutting soap or baking soda solution.

INSPECTION

Visually inspect battery casing for cracks, leaks or other possible damage. Discoloration, warping or raised top, indicates that battery has overheated or been overcharged. 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.

BATTERY CHARGE TESTING

Voltmeter Test

NOTE: To determine the battery state of charge, these sealed batteries have to be tested with a voltmeter. They also need to be tested when their voltage is stabilized. Disconnect battery to have open connectors and wait 1-2 hours prior to reading the voltage. The same condition is required after a battery has been charged.

Batteries with a voltage above 12.8 V do not need to be charged.

Batteries with a voltage of 12.8 V and below need to be charged. Refer to BATTERY CHARGING below.

BATTERY STORAGE

CAUTION: A discharged battery will freeze and it may damage its casing. A damaged casing will allow electrolyte spillage that may damage surrounding parts.

Disconnect and remove battery from the vehicle.

The battery must always be stored in fully charged condition.

Clean battery terminals and cable connections using a wire brush. Apply a light coat of dielectric grease (P/N 293 550 004) or petroleum jelly on terminals.

Clean battery casing using a solution of baking soda and water. Rinse battery with clear water and dry well using a clean cloth.

Charge the battery every month if stored at temperature **below** 15°C (60°F).

Charge the battery every two week if stored at temperature **above** 15°C (60°F).

ACTIVATION OF NEW BATTERY

Refer to the instructions provided with the battery.

BATTERY CHARGING

⚠ WARNING

Always wear safety glasses and charge in a ventilated area. Never charge or boost battery while installed on vehicle. Do not open the sealed caps during charging. Do not place battery near open flame.

CAUTION: If battery becomes hot, stop charging and allow it to cool before continuing.

NOTE: Sealed VRLA batteries have an internal safety valve. If battery pressure increases due to overcharging, the valve opens to release excess pressure, preventing battery damage.

Perform BATTERY CHARGE TESTING above then proceed as described here.

An automatic charger is the fastest and most convenient way for error-proof charging.

When using a constant current charger, charge battery according to the chart below.

Battery Voltage Below 12.8 V and Above 11.5 V

STANDARD CHARGING (recommended)		
BATTERY TYPE	TIME	CHARGE
YTX20L-BS	4–9 hours	2 A

QUICK CHARGING		
BATTERY TYPE	TIME	CHARGE
YTX20L-BS	50 minutes	10 A

Battery Voltage Below 11.5 V

Batteries with voltage below 11.5 V requires special procedures to recharge. In charging an overdischarged battery, its internal resistance may be too high to charge at a normal charging voltage. Therefore, it may be necessary to raise the voltage of the battery initially to 25 V as a maximum, and charge for approximately 5 minutes.

If the charger ammeter shows no change in current after 5 minutes, you need a new battery. Current flowing into the battery at high voltage can become excessive. Monitor amperage and adjust voltage as necessary to keep current at the battery's standard amp rating. Charge for approximately 20 hours.

INSTALLATION OF BATTERY

Reinstall battery and secure bracket properly.

Connect RED positive cable it to positive battery terminal. Connect RED wire (coming from 30 A fuse).

Connect BLACK negative cable LAST.

⚠ WARNING

Battery BLACK negative cable must always be disconnected first and connected last.

⚠ WARNING

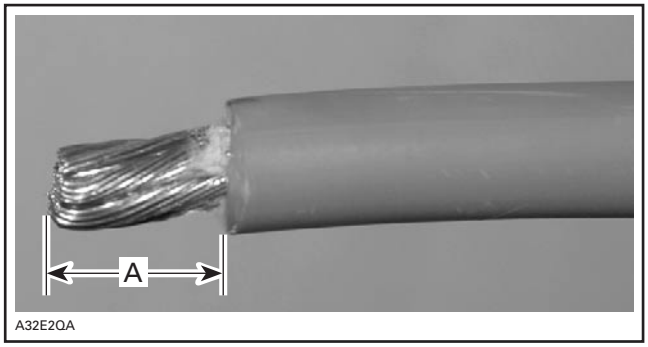
Never charge or boost battery while installed on vehicle.

Cover the RED positive terminal with rubber boot.

Apply silicone dielectric grease (P/N 293 550 004) on battery posts and connectors.

CABLE TERMINAL INSTALLATION

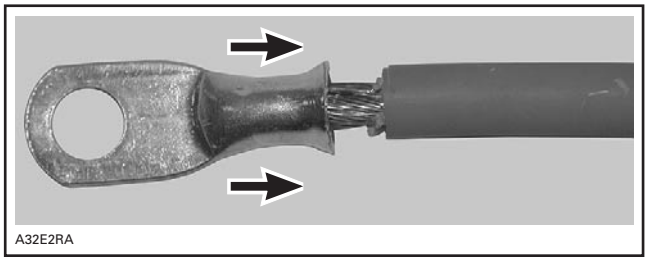
Carefully strip the wire approximately to 10 mm (1/2 in) in length, using a wire stripping tool or sharp blade/knife.



A. 10 mm (1/2 in)

NOTE: Make sure not to cut wire strands while stripping the wire.

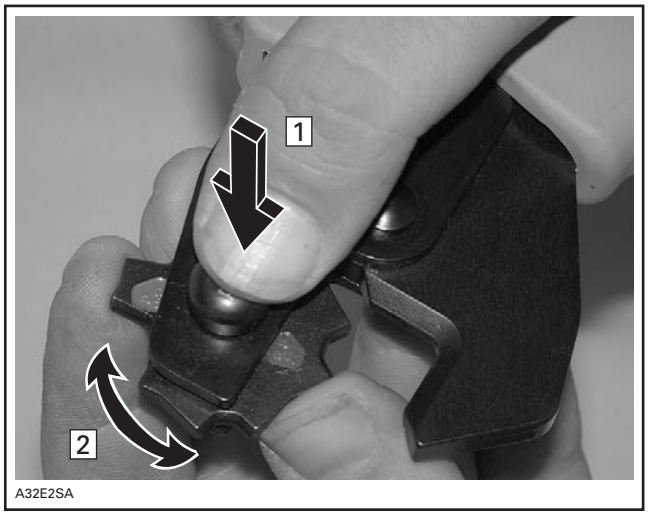
Install the appropriate terminal on the wire according to the requirement. Refer to appropriate parts catalog.



INSTALLATION OF TERMINAL

Follow the instructions provided with the crimp pliers (P/N 529 035 730) to select the proper position of the tool.

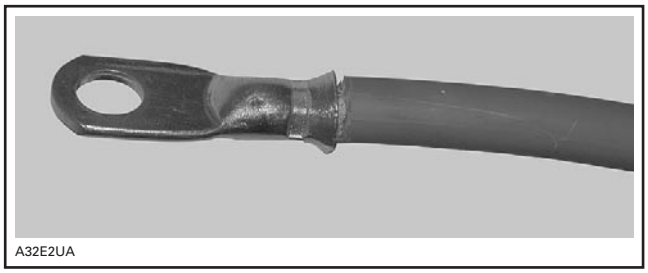
NOTE: Different wires require different crimp pliers settings, so make sure to follow the instruction supplied with the tool.



POSITIONING THE CRIMP PLIERS
1. Press
2. Rotate

After positioning the crimp pliers, crimp the terminal already installed on wire.

CRIMPING OF WIRE



PROPERLY CRIMPED WIRE

To verify, if the wire is properly crimped, apply some pulling force on wire and the terminal at the same time from both directions.

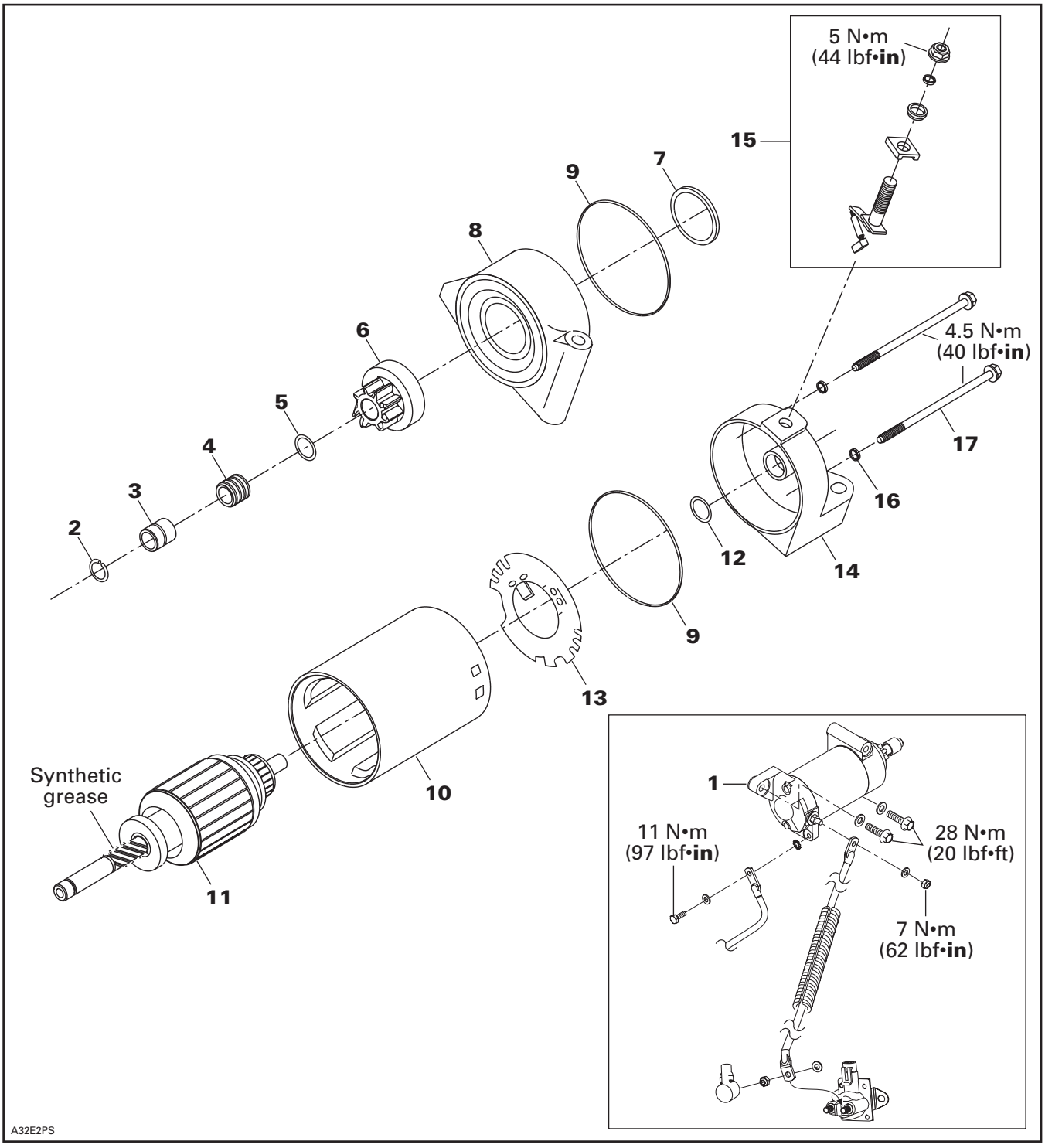
CAUTION: Never solder the wire to the terminal. Soldering can change the property of the wire and it can become brittle and break.

Install the protective heat shrink rubber tube (P/N 278 001 692) on the terminal. Heat the heat shrink rubber tube using the heat gun so that it grasps the wire and the terminal.

CAUTION: Make sure that the protective heat shrink rubber tube has been properly installed and no part of wire is exposed.

ELECTRIC STARTER

REV Series Models with Electric Starting



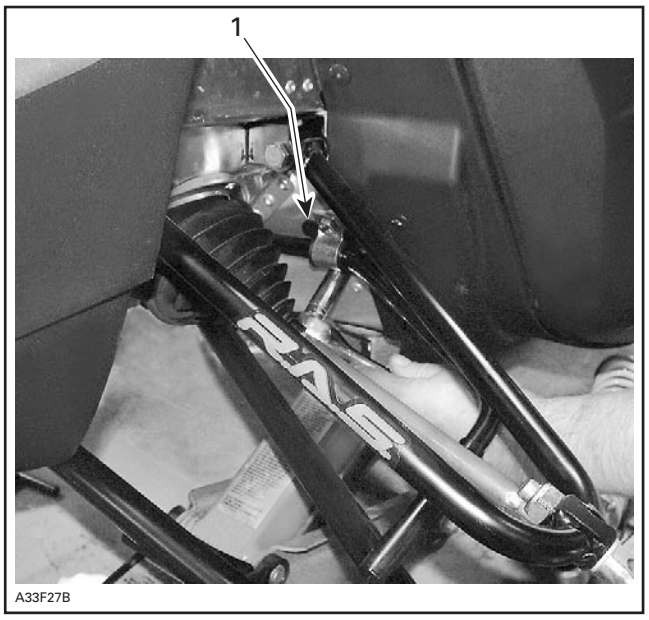
REMOVAL

– Disconnect BLACK (-) cable from battery.
– Disconnect RED (+) cable from battery.

⚠ WARNING

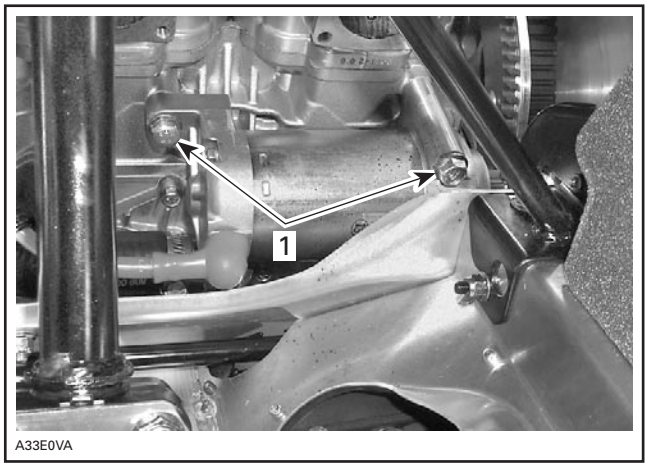
Always disconnect BLACK (-) cable first and connect last.

– Remove tuned pipe.
– Disconnect RED cable from starter.
– Disconnect ground cable from starter.
– Remove stabilizer bar clamp to access the lower starter retaining bolt.



1. Clamp

– Unbolt and remove starter from engine.



1. Bolts to be removed

DISASSEMBLY

Before disassembling, trace index marks on starter housing **no. 10** and starter housing assembly **no. 8** to ease further assembly.

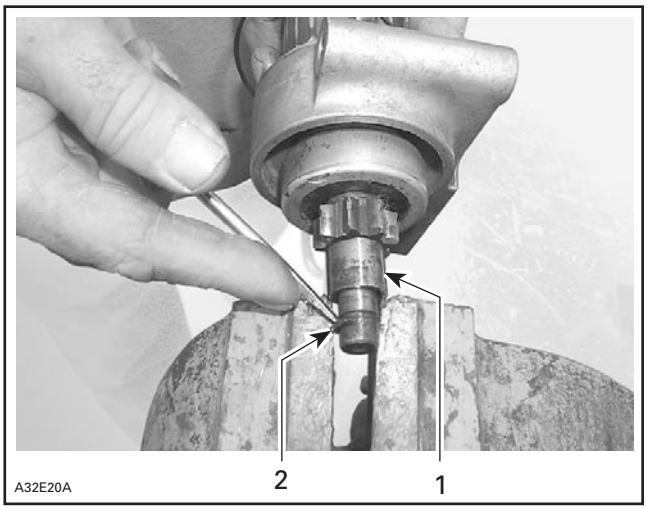
Remove starter through bolts **no. 17**. Separate end frame housing **no. 14** from starter housing **no. 10**. Withdraw starter housing from armature **no. 11**.

Brush holder **no. 13** can be removed from end frame housing **no. 14** by disconnecting the end frame attached brush from brush holder **no. 13**.

Check the radial play between the armature shaft and end frame bearing. Replace the end frame bearing or replace starter. If parts are in good condition then coat with synthetic grease (P/N 413 711 500) before reinstalling them.

Push back the collar **no. 3** using a screwdriver.

Remove snap ring **no. 2**. Remove collar **no. 3** and spring **no. 4**.



1. Collar
2. Snap ring

Turn starter clutch **no. 6** clockwise to remove it from armature assembly **no. 11**.

Pull housing from armature.

CLEANING

CAUTION: Yoke assembly and drive unit assembly must not be immersed in cleaning solvent.

Clean brushes and holders with a clean cloth soaked in solvent. Brushes must be dried thoroughly with a clean cloth.

Blow brush holders clean using compressed air.

⚠ WARNING

Always wear safety glasses when using compressed air.

Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean and dry cloth.

Clean engine ring gear teeth and drive unit (clutch).

NOTE: Bushings or bearings must not be cleaned with grease dissolving agents.

Immerse all metal components in cleaning solution. Dry using a clean and dry cloth.

INSPECTION

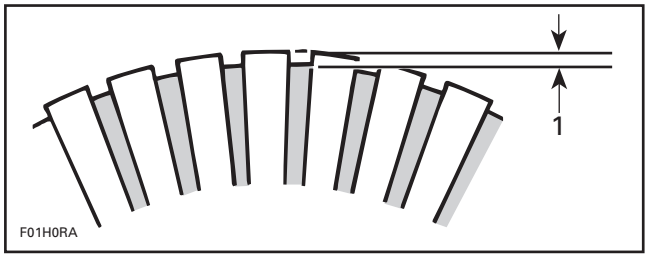
All Models except 4-Tec Engines

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.

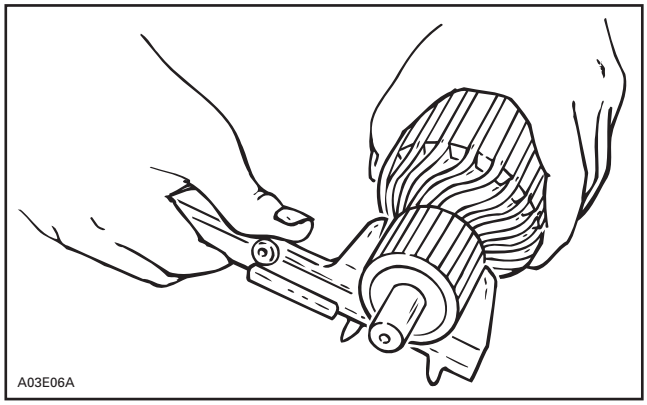
Check the commutator for mica depth. If the depth is less than 0.20 mm (.008 in), undercut the mica. Be sure that no burrs are left and no copper dust remains between the segments after the undercutting operation is completed.



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.

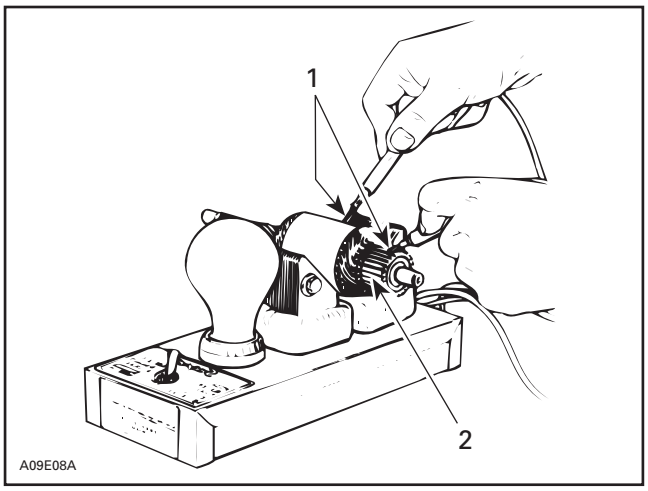
Check commutator outer diameter. If less than specified value, replace.



MODEL	WEAR LIMIT
All models	27 mm (1.063 in)

Test for Ground Circuit in the Armature

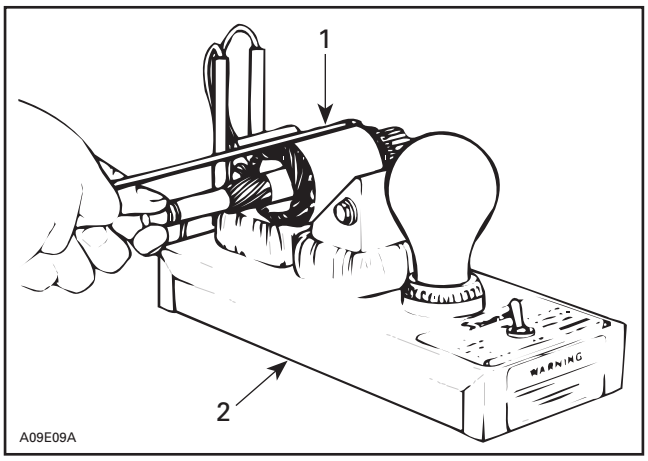
Use growler test probes. Check between armature core and the commutator bars. If growler lamp turns on, bars are grounded. If so, replace armature.



1. Test probes
2. Commutator bars

Test Armature for Shorted Winding

When the armature is rotated in the growler with a steel strip (hacksaw 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).

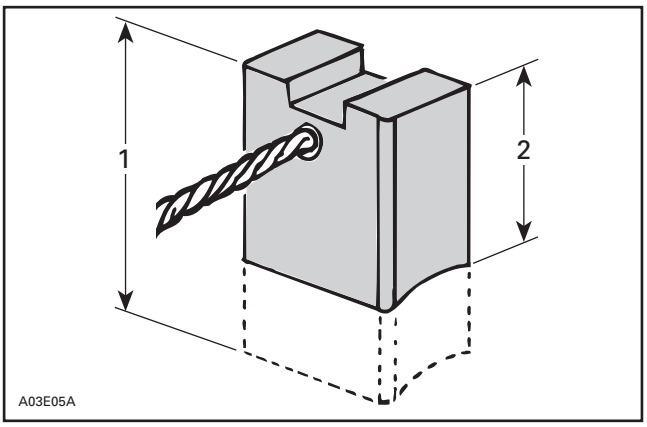
Brush Holder

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.

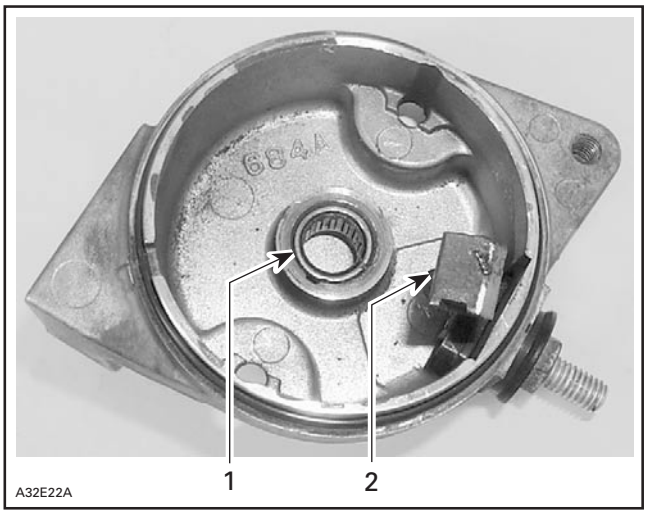
MODEL	LENGTH	
	NEW	WEAR LIMIT
All	10 mm (.400 in)	6 mm (.236 in)



TYPICAL
1. New
2. Wear limit

End Housing

Check the mica insulation of the positive brush and also the roller bearing condition. Replace, if necessary.



1. Roller bearing
2. Positive brush

Overrunning Clutch

The pinion of the overrunning clutch should turn smoothly in a clockwise direction, and should not slip in a counterclockwise direction. If defective, replace.

Check the pinion teeth for wear and damage. If defective, replace.

Relay

Inspect connections and clean as necessary. Relay condition can be checked with an ohmmeter. Install test probes on large connectors of relay when it is activated (+ on RED/GREEN wire and - on relay body for the fan cooled models and - on the BLACK wire for liquid cooled models).

IMPORTANT: No current must be present on large cables when using ohmmeter, otherwise meter could be damaged.

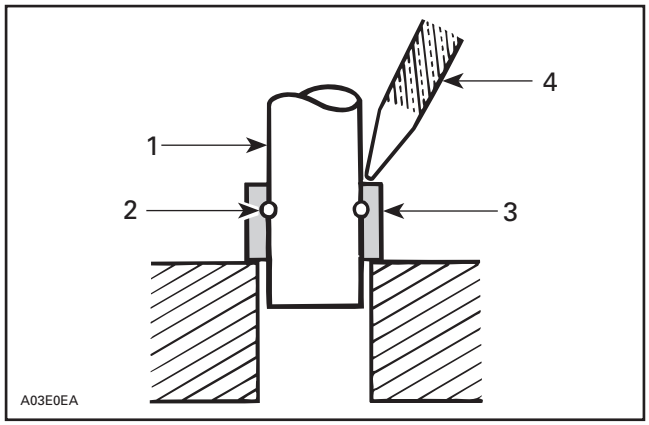
ASSEMBLY

Reverse the order of disassembly to reassemble starter. However, attention should be paid to the following operations.

Prior to assembling, coat sliding surfaces on armature shaft splines, overrunning clutch and bushing with synthetic grease (P/N 413 711 500).

After placing collar **no. 3** on armature shaft **no. 11**, fit new snap ring **no. 2** on armature shaft, then make sure that it is properly secured.

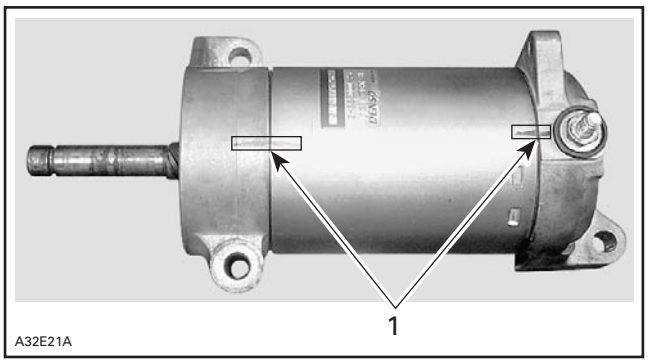
Slide collar **no. 3** over snap ring **no. 2** and secure in place by punching it at two or three places.



1. Armature shaft
2. Snap ring
3. Collar
4. Punch

Starter Housing Assembly and Starter Housing

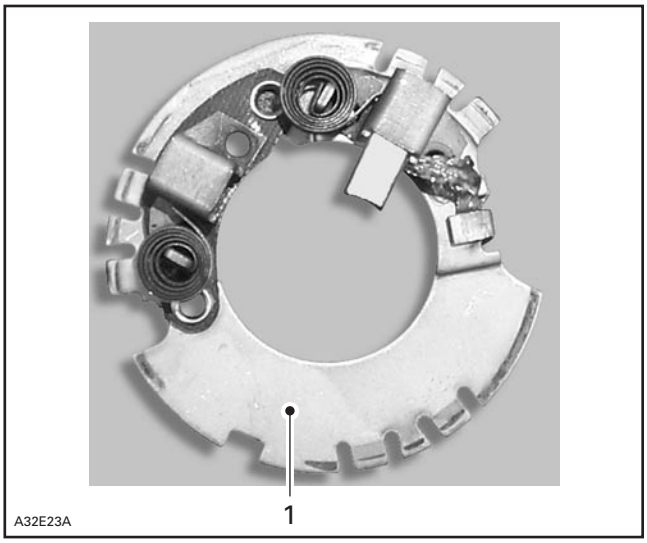
Align previously traced indexing marks.



TYPICAL
1. Aligned indexing marks

Open brushes and slide over commutator.

Align end frame locating notch with yoke locating protrusion and properly sit brush holder **no. 13** into housing **no. 14**.



1. Brush holder

To ease end frame installation, retain brush holder with a small screwdriver while installing armature assembly.

CAUTION: Make sure to place two end housings on a flat surface before tightening the through bolts.

CAUTION: Make sure end frame fits perfectly on yoke.

INSTALLATION

– Use new teflon washers on the 3 bolts retaining starter to engine.
– Torque the bolts to 28 N•m (20 lbf•ft).
– Make sure that starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.
– Connect the RED battery cable and the RED wire to the large terminal of the starter.

⚠ WARNING

Always disconnect ground cable first and connect last.

– Torque large terminal nut to 7 N•m (62 lbf•**in**).
– Connect ground cable to the starter with star washer in between.
– Torque ground cable connecting bolt to 11 N•m (97 lbf•**in**).

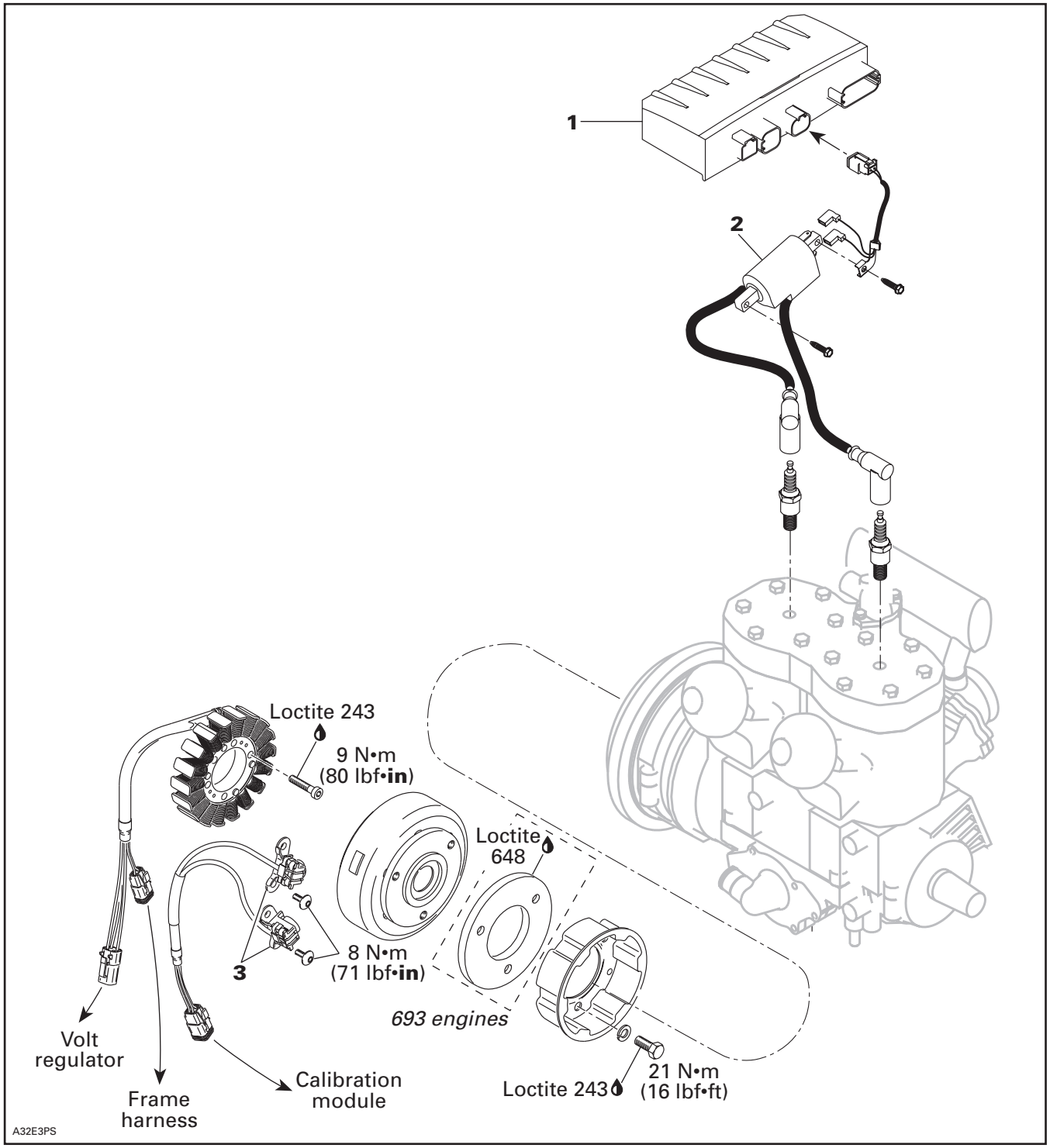
TESTING PROCEDURE

GENERAL

The following chart gives the engine types with their implemented system.

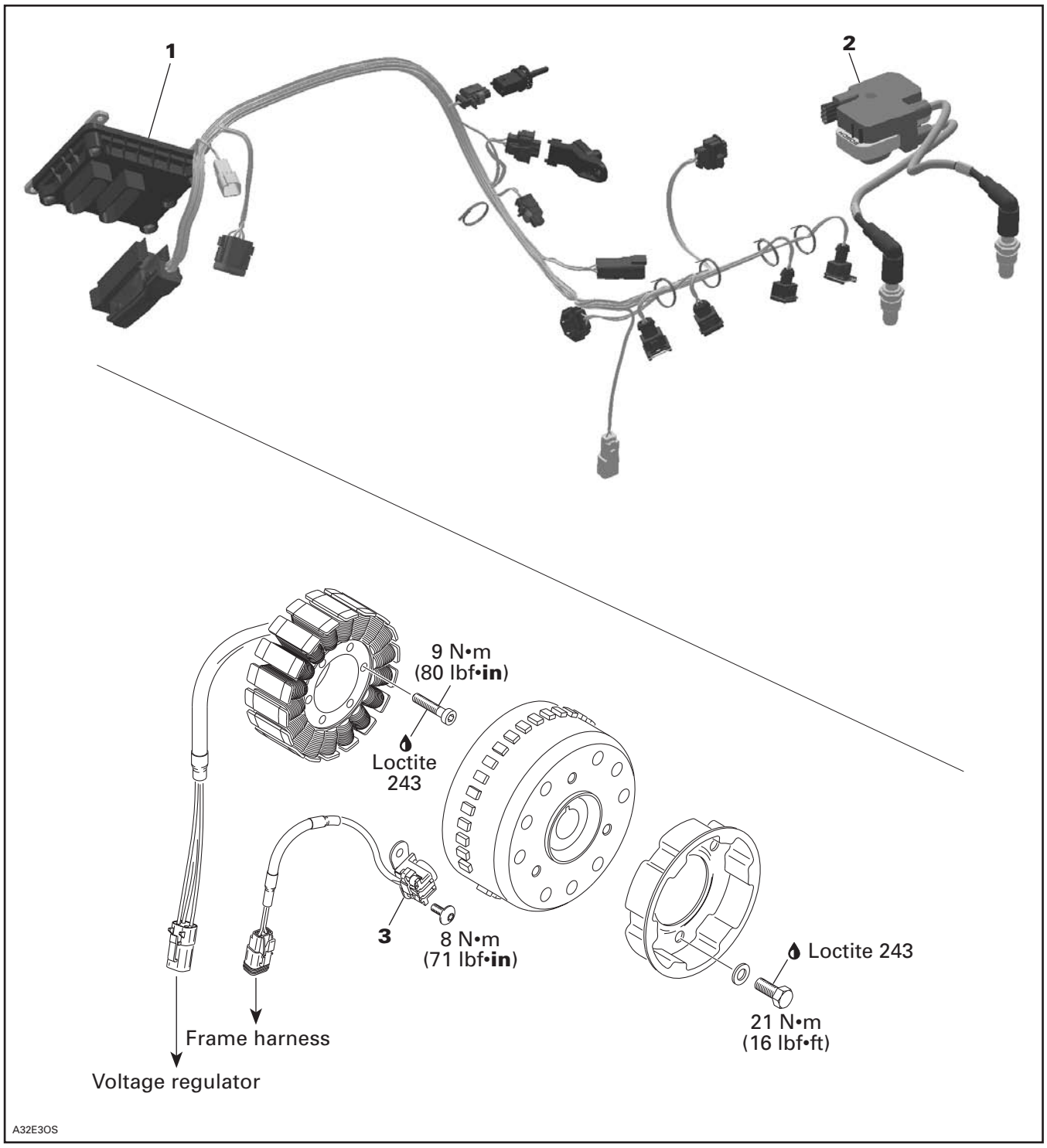
MODELS	IGNITION SYSTEM	CHARGING SYSTEM OUTPUT
All REV liquid cooled except SDI models	BOMBARDIER DC 360 W	360
SDI models	BOMBARDIER DC 480 W	480

Bombardier DC 360 W



1. *MPEM*
2. *Ignition coil*
3. *Trigger coils*

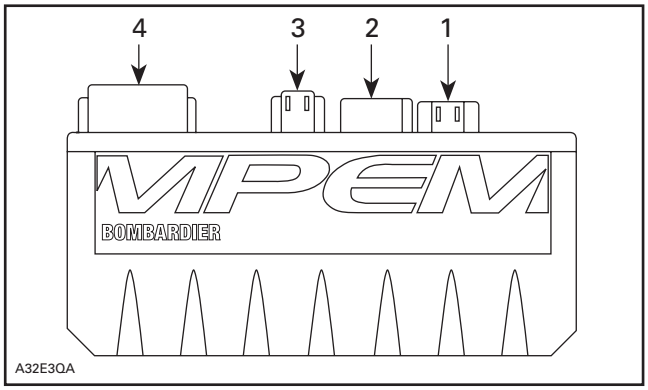
Bombardier DC 480 W



1. *ECM*
2. *Ignition coil*
3. *Trigger coil*

Multi-Purpose Electronic Module (MPEM) Connections

Bombardier 360 W



1. *Trigger coil*
2. *Cooling temperature sensor*
3. *High tension coil*
4. *DESS, ignition and engine stop switches, DESS pilot lamp*

Bombardier 480 W

For more informations concerning the Engine Control Module (ECM) refer to OVERVIEW in ENGINE MANAGEMENT (2-TEC) section.

TYPICAL — ECM

CHECKING CALIBRATION PROGRAM

Using VCK (Vehicle Communication Kit)

All Models

The VCK (P/N 529 035 981) can be used with the B.U.D.S. software to check the calibration. Detailed information about the B.U.D.S. software and its usage is available under its **Help** section.

Using MPEM Programmer

All Models except SDI

Calibration can also be checked using the MPEM programmer (P/N 529 035 878).

CAUTION: Do not interchange MPEM from a model to an other. Even if the P/N stamped on the MPEM is the same, calibration program may be different. When ordering a new MPEM always refer to appropriate model parts catalog. The service P/N published in parts catalogs are the ones with the good calibration program according to model.

With Engine Running

If the below mentioned tool is not available start engine. Turn on programmer then enter password.

Increase engine speed to 2000 - 2500 RPM then follow the same procedure as WITH ENGINE STOPPED.

CAUTION: Engine must run till the end of the procedure.

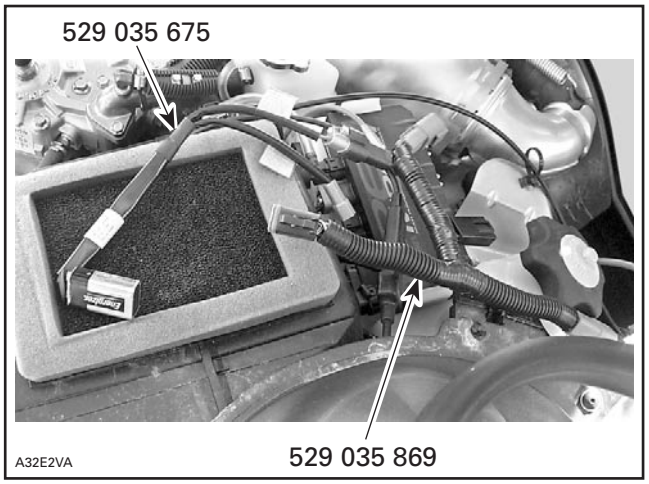
When data are being transferred, you must rev the engine at 2000 - 2500 RPM and make sure connection between programmer and vehicle is good.

IMPORTANT: In following procedure each time ← **Trs** symbol appears, make sure to rev engine between 2000 and 2500 RPM.

Engine will misfire while vehicle information is being transferred from MPEM to programmer. If engine stalls, restart it, keep engine speed at 2000 - 2500 RPM and select no. 3 VEHICLE INFO again.

With Engine Stopped

Connect 9-volt adaptor (P/N 529 035 675) to supply cable (P/N 529 035 869) and supply cable to diagnostic connector, located on right side of the vehicle.



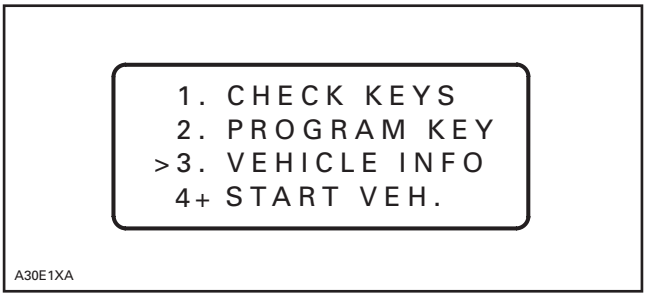
TYPICAL

When cables are connected a beeping signal from the reverse buzzer will be heard (if vehicle is so equipped). This indicates that the MPEM is now ready to transfer programming operations.

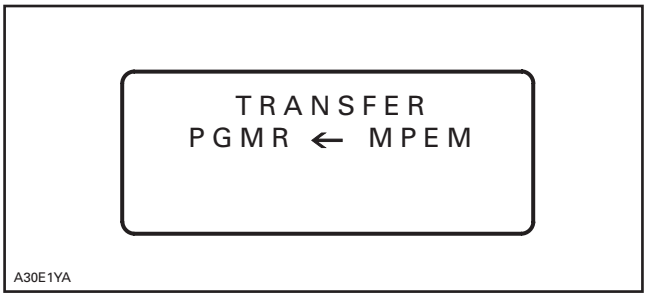
Once MPEM calibration program checking is done, unplug 9 volt adaptor and supply cable.

Turn on programmer then enter password.

From main menu select no. 3. VEHICLE INFO; ← Trs.



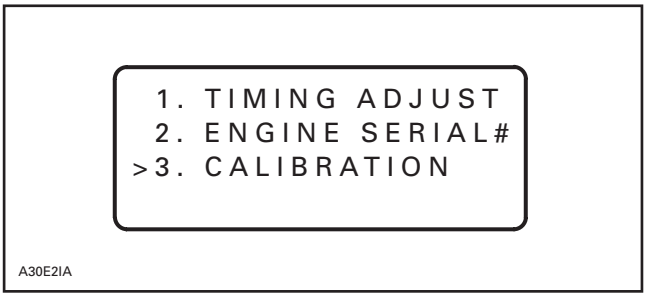
Vehicle information is transferred from MPEM to programmer.



NOTE: In fact the programmer takes a **copy** of all vehicle parameters scribed in MPEM. This copy will be modified within the programmer then transferred to the MPEM.

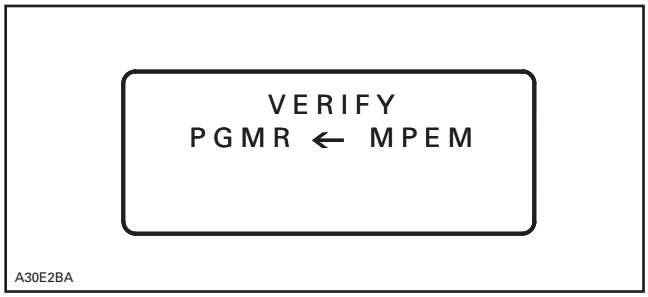
Select no. 4. ENGINE PARAMETER.

Select no. 3 CALIBRATION.

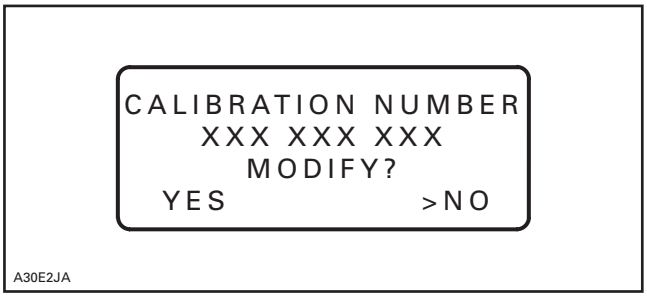


Press ENTER ← Trs.

Following screen appears temporarily:



And then following screen showing the actual calibration number in the MPEM.



Check for proper calibration number. See table below.

Select NO and press ENTER.

Press MENU twice; ← Trs then turn off programmer, unplug it from MPEM. Remove 9-volt adaptor.

Stop engine when using WITH ENGINE RUNNING procedure.

MODEL	ENGINE	CALIBRATED MPEM P/N	CALIBRATION P/N	MPEM P/N
GSX				
Sport 500 SS	593	512 059 850	512 059 849	512 059 796
Sport 600	593 HO	512 059 852	512 059 932	512 059 796
Limited 800	793 HO	512 059 853	512 059 854	512 059 799
MX Z				
Adrenaline 500 SS	593	512 059 850	512 059 849	512 059 796
Adrenaline 600	593 HO	512 059 852	512 059 932	512 059 796
Adrenaline 800	793 HO	512 059 855	512 059 854	512 059 796
Renegade 600	593 HO	512 059 861	512 059 932	512 059 799
Renegade X 600	593 HO	512 059 852	512 059 932	512 059 796
Renegade 800	793 HO	512 059 853	512 059 854	512 059 799
Renegade X 800	793 HO	512 059 853	512 059 854	512 059 799
Trail 500 SS	593	512 059 848	512 059 849	512 059 795
Trail 500 SS (R)	593	512 059 850	512 059 849	512 059 796
Trail 600	593 HO	512 059 851	512 059 932	512 059 795
Trail 600 (R)	593 HO	512 059 852	512 059 932	512 059 796
X 600	593 HO	512 059 852	512 059 932	512 059 796
X 800	793 HO	512 059 853	512 059 854	512 059 799
Summit				
Adrenaline 600	593 HO	512 059 866	512 059 867	512 059 799
X 600	593 HO	512 059 866	512 059 867	512 059 799
Adrenaline 800	793 HO	512 059 868	512 059 869	512 059 799
X 800	793 HO	512 059 868	512 059 869	512 059 799
HM 800	793 HO	512 059 868	512 059 869	512 059 799
HM X 800	793 HO	512 059 868	512 059 869	512 059 799
HM Xtrem 800	793 HO	512 059 868	512 059 869	512 059 799
Sport 800	793 HO	512 059 870	512 059 928	512 059 795
Sport 800 (R)	793 HO	512 059 871	512 059 928	512 059 796

NOTE: When a new MPEM is necessary, always order CALIBRATED MPEM P/N.

CHANGING MPEM CALIBRATION PROGRAM

Using VCK (Vehicle Communication Kit)

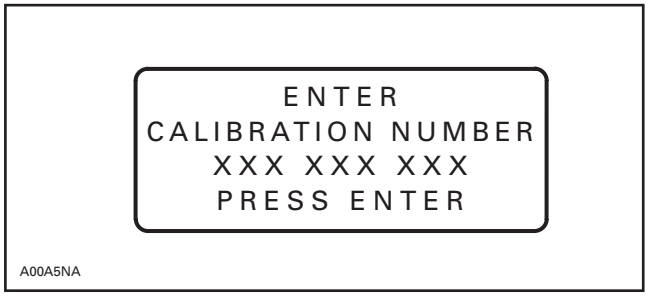
All Models

The VCK (P/N 295 035 981) can be used with the B.U.D.S. software to change the MPEM calibration. Detailed information about the B.U.D.S. software and its usage is available under its **Help** section.

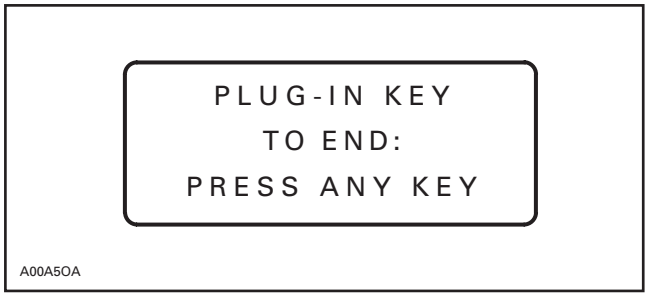
Using MPEM Programmer

All Models except SDI

Proceed the same as for checking MPEM calibration but select YES to MODIFY? and press ENTER following screen appears:

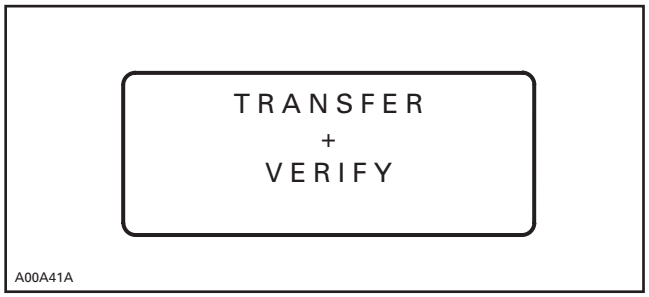


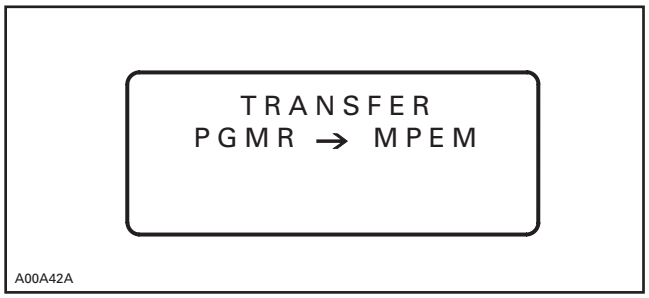
Enter new calibration number and press ENTER, following screen appears:

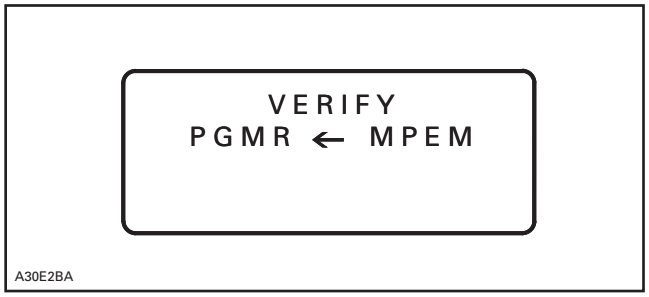


Simultaneously with the following operation a transfer will occur; ← **Trs**. At this point, be ready to rev the engine so it won't fall below the 2000 RPM mark when not using 9-volt adaptor.

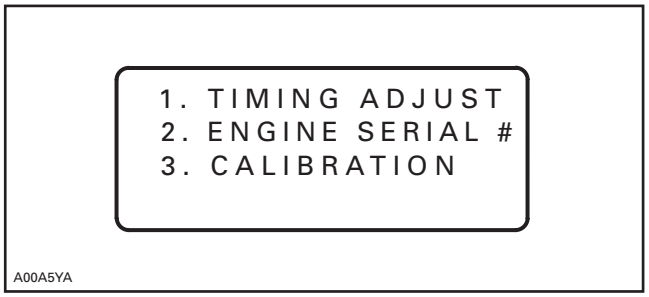
Plug-in the desired calibration cartridge (special red key) onto the programmer post, the following screens will appear temporarily:



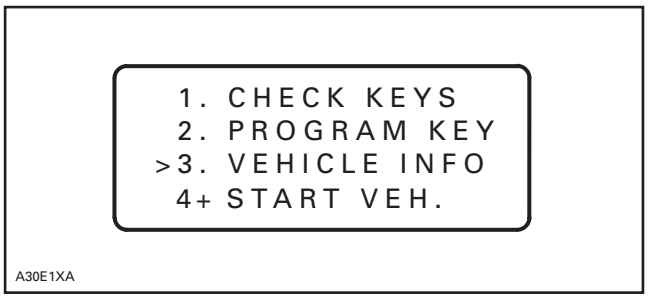




Press any key, display will show followed by next screen:



Press MENU twice, following screen will show:



After procedure is completed, ensure engine idle speed with engine hot is 1800 - 2000 RPM.

Stop the engine.

SYSTEM TESTING

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 switch, DESS switch or tether cut-out switch and engine cut-out switch.
4) Ignition generator coil.
5) Trigger coil.
6) MPEM voltage (liquid cooled models only).
7) High voltage coil (liquid cooled models only).
8) Buzzer testing.

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 (68 °F) (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

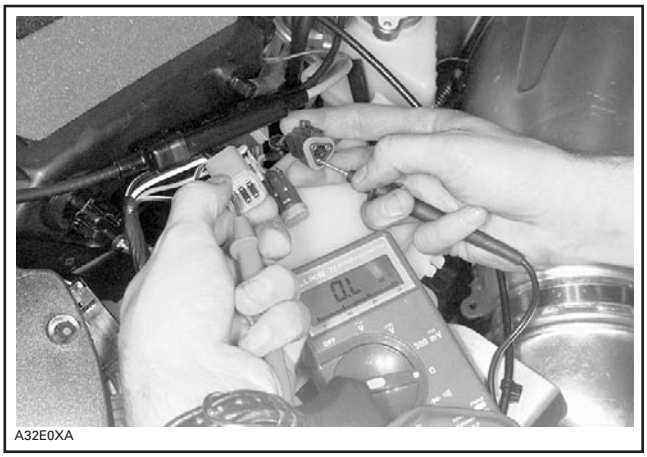
During this operation, it is important to use the snowmobile spark plug and not a new one. Bring the plug in contact with the engine. Pull rewind starter. If no spark is produced, replace the spark plug with a new one and do the test again.

2. Electrical Connector Testing

Make sure that none of the connectors are disconnected.

3. Ignition Switch, DESS Switch or Tether Cut-Out Switch and Engine Cut-Out Switch Testing

Disconnect connector housings and check resistance as indicated in IGNITION table.


A32E0XA

TYPICAL

If readings are acceptable, go on to next step.

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

Ignition Switch (if so equipped)

Disconnect switch housing. Using a multimeter, check between MAG and GRD terminals if the circuit is open (0.L MΩ) in operating position and if the circuit is closed (0 Ω) in off position.

DESS Switch

All Models

Check using a multimeter by connecting probes to BLACK/GREEN and BLACK/WHITE wires. The multimeter should indicate a closed circuit (0 Ω) in operating position and a open circuit (0.L MΩ) in off position.

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

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

Engine Cut-Out Switch

All Models

Unplug switch block connected to main wiring harness. Check using a multimeter by connecting probes to appropriate wires. Refer to corresponding ignition and electrical system testing table in this subsection. The multimeter should indicate an open circuit (0.L MΩ) in operating position and a close circuit (0 Ω) in off position.

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 MΩ).

Repair or replace if necessary.

4. ignition Generator Coil Testing

Resistance Testing

– Disconnect housing between the magneto and the MPEM.
– Connect multimeter probes to appropriate wires and measure resistance. Refer to corresponding IGNITION and ELECTRICAL SYSTEM TESTING table in this subsection.

A32E0YA

TYPICAL

– Compare readings with those appearing in the IGNITION table.

Voltage Testing

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.

– Disconnect housing between the magneto and the MPEM.
– Connect multimeter probes to appropriate wires. Refer to corresponding ignition and electrical system testing table in this subsection. Bring the selector switch to V and the scale to 00.0 Vac.

– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

5. Trigger Coil Testing

Resistance Testing

– Connect probes to appropriate wires from trigger coil housing. Refer to corresponding ignition and electrical system testing table in this subsection.

A32E10A

TYPICAL

– Compare readings with those appearing in the IGNITION table.

Voltage Testing

– Connect probes to appropriate wires from trigger coil housing. Refer to corresponding IGNITION and ELECTRICAL SYSTEM TESTING table in this subsection.
– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

6. MPEM Voltage Testing

– Disconnect the housing between module and high voltage coil.
– Connect multimeter probes to WHITE/BLUE and BLACK wires coming out from module. Place the selector switch to V and the scale to 00.0 Vac.

A32E0ZA

TYPICAL

– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

7. High Voltage Coil Testing

Resistance Testing

– Unplug housing between high tension coil and MPEM.
– Connect multimeter probes to WHITE/BLUE and BLACK wires and measure resistance.

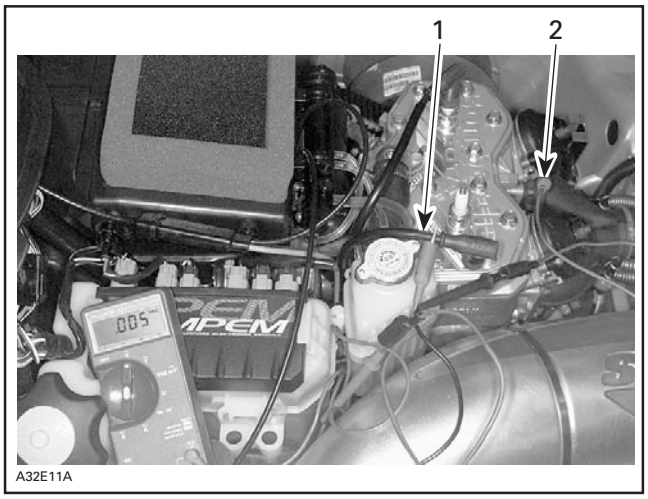
A32E12A

– Compare readings with those appearing in the IGNITION table.

Voltage Testing

– Disconnect spark plug cap from spark plug.
– Fasten alligator clip to spark plug cable, near the spark plug.

– Connect other multimeter wire to engine (ground), then place selector switch to V and scale to 0.00 Vac.

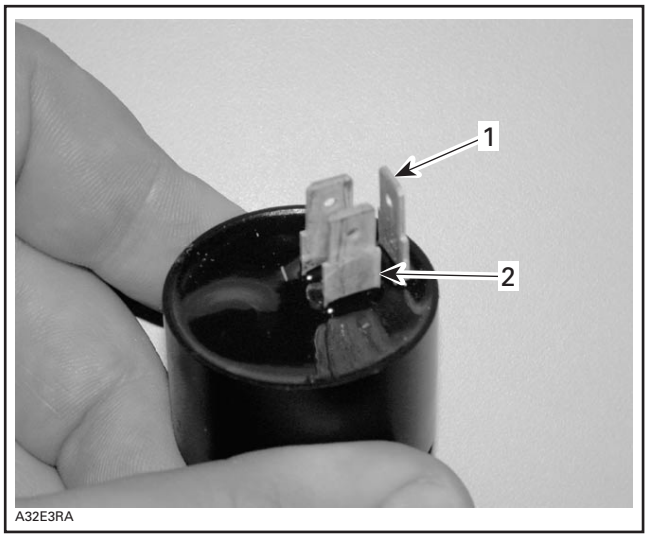


1. MAG side spark plug cable
2. Connected to ground

– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.
– Compare readings with those appearing in the IGNITION table.

8. Buzzer Testing

NOTE: Before testing the buzzer, make sure the connectors are installed on proper buzzer tabs.

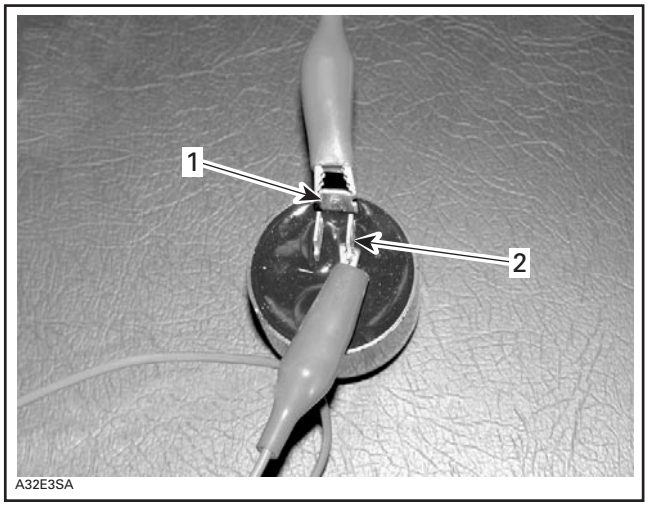


1. BEIGE/BLACK wire on positive tab
2. GREEN/RED wire on negative tab.

Using jumper wires, connect battery positive post to buzzer positive tab.

Connect battery negative post to buzzer negative tab. See next photo.

CAUTION: To avoid buzzer damage, ensure that polarity is respected.

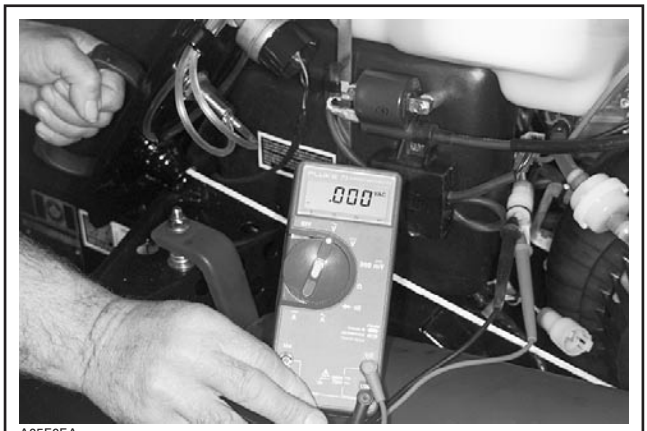


TYPICAL — 12-VOLT BATTERY PLUGGED TO BUZZER
1. Buzzer positive tab
2. Buzzer negative tab

A continuous sound should be heard. if not, replace the buzzer with a new one.

Lighting Generator Coil Voltage Testing

– Disconnect housing from engine (YELLOW wires).
– Connect multimeter probes to YELLOW wires, then place selector switch to V and scale to 0.00 Vac.
– Activate the manual starter and check values indicated by the multimeter.
– Repeat operation 3 times.



TYPICAL

– 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 IGNITION or LIGHTING table.

Set the multimeter as indicated.

NOTE: For the 480 W models, use B.U.D.S. software.

360 W MODEL (ignition and electrical system testing)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				MULTIMETER SCALE	VALUE (ohms)	MULTIMETER SCALE	VALUE (volt)	
Engine stop switch	Running insulation	BK and BK/YL	11–DA-3–F 11–DA-6–F	00.0 Ω or auto range	0.L	—	—	Engine cut-out switches must be in run position.
	Continuity in STOP position	BK and BK/YL	11–DB-3–F 11–DA-6–F	00.0 Ω or auto range	00.0 - 00.5	—	—	Engine cut-out switches must be in stop position.
DESS switch	Insulation with DESS removed	BK/WH and BK/GN	11–DA-4–F 11–DA-5–F	00.0 Ω or auto range	0.L	—	—	Tether cap must be in place.
	Continuity with DESS in run position	BK/WH and BK/GN	11–DA-4–F 11–DA-5–F	00.0 Ω or auto range	00.0 - 00.5	—	—	Tether cap must be in place.
MPEM	Ground connection	BK and negative battery terminal or body	11–DA-3–F	00.0 Ω or auto range	00.0 - 00.5	—	—	—
MPEM power (with battery)	Power from battery	RD/GY and BK	11–DA-12–F 11–DA-3–F	—	—	00.0 Vdc	Same as battery voltage	Voltage always present.
	Power from regulator	RD/BR and BK	11–DA-1–F 11–DA-3–F	—	—	00.0 Vdc	1 to 2 volts	While cranking engine.
MPEM power (without battery)	Power from regulator	RD/BU and BK	11–DA-2–F 11–DA-3–F	—	—	00.0 Vdc	3 to 5 volts	While cranking engine.
MPEM output voltage	Voltage to ignition coil	WH/BU and BK	Wires from primary of high voltage coil	—	—	00.0 Vdc	225.0 to 275.0	With tether cap in place and engine cut-out switches in run position. While cranking engine.
Trigger coil no. 1	Resistance and output	BU/YL and WH/YL	11–DE-4–F 11–DE-1–F	00.0 Ω or auto range	190 - 300	00.0 Vdc	.200 – .350	While cranking engine.
Trigger coil no. 2	Resistance and output	GN/YL and GY/YL	11–DE-3–F 11–DE-2–F	00.0 Ω or auto range	190 - 300	00.0 Vdc	.200 – .350	While cranking engine.

360 W MODEL (ignition and electrical system testing)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				MULTIMETER SCALE	VALUE (ohms)	MULTIMETER SCALE	VALUE (volt)	
High voltage coil	Primary winding resistance	WH/BU and BK	11–DC-2–F 11–DC-1–F	00.0 Ω or auto range	00.2 to 0.5	—	—	Disconnect the ignition coil from the MPEM
	Secondary winding resistance spark plug wires and cap included	Between both spark plug caps	Between both spark plug caps	00.0 Ω	14.5 k to 23.5 k	—	—	Do not attempt to remove spark plug caps from the wires.
	Secondary winding resistance spark plug wires removed	Male terminal to male terminal	On male terminals of high voltage coil	00.0 Ω	9.6 k to 14.4 k	—	—	With spark plug wires removed from high voltage coil.
	Secondary winding voltage	BK and engine	On spark plug wire insulation and on engine	—	—	00.0 Vdc	1.5 to 2.5	Do not probe into spark plug cap with spark plug wire removed from spark plug.
Start/RER switch (with battery)	Start/RER signal at MPEM	BE and BK	11–DA-7–F 11–DA-3–F	—	—	00.0 Vdc	Battery voltage	When start/RER switch is activated in all conditions.
Charging voltage	Battery voltage to switch from 5 A fuse	RD/GY and negative battery terminal	12–HG-5 and negative battery terminal	—	—	00.0 Vdc	Battery voltage	The 5 A fuse is located on the electrical config harness.
Start/RER switch (without battery)	RER signal at MPEM	BE/BK	11–DA-7–F 11–DA-3–F	—	—	00.0 Vdc	11 to 13 volts	When RER button is activated and the engine is running.
Start/RER switch (all)	Continuity from start/RER switch to MPEM	BE and BE	12–HG-8–M 11–DA-7–F	00.0 Ω or autorange	1.0 Ω	—	—	—
	Voltage supply from regulator	RD/BU and negative battery terminal	5–RR-87–F and negative battery terminal	—	—	Above battery voltage below 15 volts	00.0 Vdc	—
Charging current	Current to battery	RD and RD/WH	6–FA-A-F 6–FA-B-F	—	—	10 A scale	2–4 A	Engine @ 5000 RPM with fully charged battery. With 30 A fuse removed and ammeter in series.
Lighting generator coil	Output	YL and YL and GN	2–MO-(1, 2, 3)-F	00.0 Ω or autorange	00.0 to 00.5 3 times	00.0 Vac	3.5 to 5.5 3 times	Do the test between A and B, A and C and B and C using manual starter.
	Coil insulation	YL and engine	2–MO-(1, 2, 3)-F and engine	00.0 Ω or autorange	0.L	—	—	The term engine refers to the metal parts connected to the magneto housing.

360 W MODEL (ignition and electrical system testing)								
PART	TEST TO BE PERFORMED	WIRE COLOR	MULTIMETER PROBE CONNECTION	RESISTANCE Ω		VOLTAGE V		NOTE
				MULTIMETER SCALE	VALUE (ohms)	MULTIMETER SCALE	VALUE (volt)	
Relay (with battery)	Coil	WH/GN and BK	5–RC-85–F 5–RC-86–F	—	—	00.0 Vdc	10.5 to 13.5	Engine idling (1500 to 1800 RPM)
	Contacts	RD/WH and RD/BR	5–RC-87–F 5–RC-30–F	—	—	00.0 Vdc	00.0 to 0.10	Engine idling (1500 to 1800 RPM)
Relay (without battery)	Coil	WH/GN and BK	5–RC-85–F 5–RC-86–F	—	—	00.0 Vdc	10.5 to 13.6	Engine idling (1500 to 1800 RPM)
	Contacts	RD/BU and RD/BR	5–RC-87–F 5–RC-30–F	—	—	00.0 Vdc	00.0 to 0.11	Engine idling (1500 to 1800 RPM)

NOTE: If voltage is present at the coil and contact, replace the relay.

An approved automotive spark plug tester is preferred for testing the secondary winding voltage.

All cranking tests are performed with the manual starter. Faster cranking speeds may produce higher voltages.

Ignition and electric starter will not work if the Engine stop switches is in the kill position.

Charging system test should be performed if a no spark condition is encountered on this vehicle.

INSPECTION OF HEATING ELEMENTS

NOTE: All measurements must be performed at 21°C (70°F).

Throttle Lever Heating Element

Current Measurement

HIGH INTENSITY	BROWN wire	0.23 A minimum
LOW INTENSITY	BROWN /YELLOW wire	0.13 A minimum

Handlebar Grip Heating Element

Resistance Measurement

All Models except SDI

INTENSITY	WIRES	OHMS
HIGH	BLACK and ORANGE/VIOLET	13.7 to 16.7*
LOW	BLACK and ORANGE	6.8 to 8.4*

SDI Models

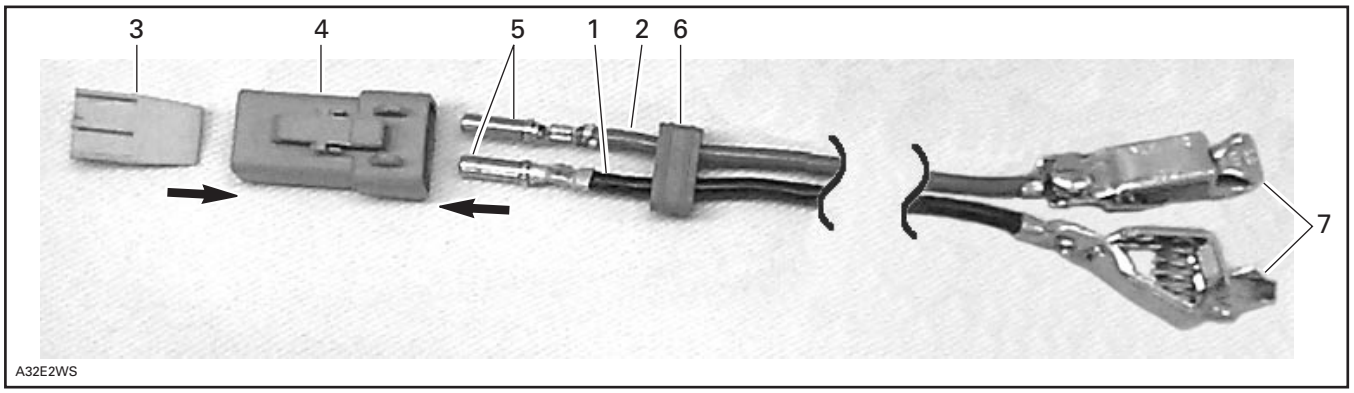
INTENSITY	WIRES	OHMS
HIGH	BLACK and ORANGE/VIOLET	17 to 23.5*
LOW	BLACK and ORANGE	8.5 to 11.8*

*When measuring resistance at terminals the actual value will be half the measurement in table. The reason for that is the elements are connected in parallel. Therefore the total resistance is half the resistance of one element.

HEADLIGHT AND ACCESSORIES SYSTEM TESTING

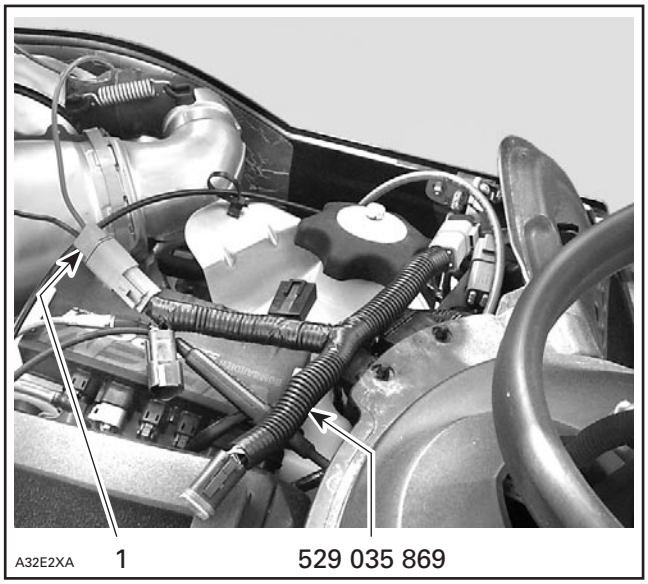
360 W Models Only

Make an homemade adaptor as shown below.



1. Black wire in position no. 1
2. Red wire in position no. 2
3. P/N 278 001 671
4. P/N 278 001 673
5. P/N 515 175 567 (2)
6. Seal (included with housing)
7. Alligator clips

Connect 12-Volt supply to the 2 position housing of the supply cable (P/N 529 035 869). Respect polarity by connecting 12V to RED wire and ground to BLACK wire.



1. Homemade adaptor

Connect supply cable (P/N 529 035 869) to diagnostic connector, located on right side of the vehicle. Now the headlight and accessories systems are supplied with 12 volts. Refer to appropriate wiring diagram in wiring diagram section to troubleshoot headlight system.

Once headlight system testing is done, disconnect supply cable from vehicle and then 12-Volt supply from the supply cable.

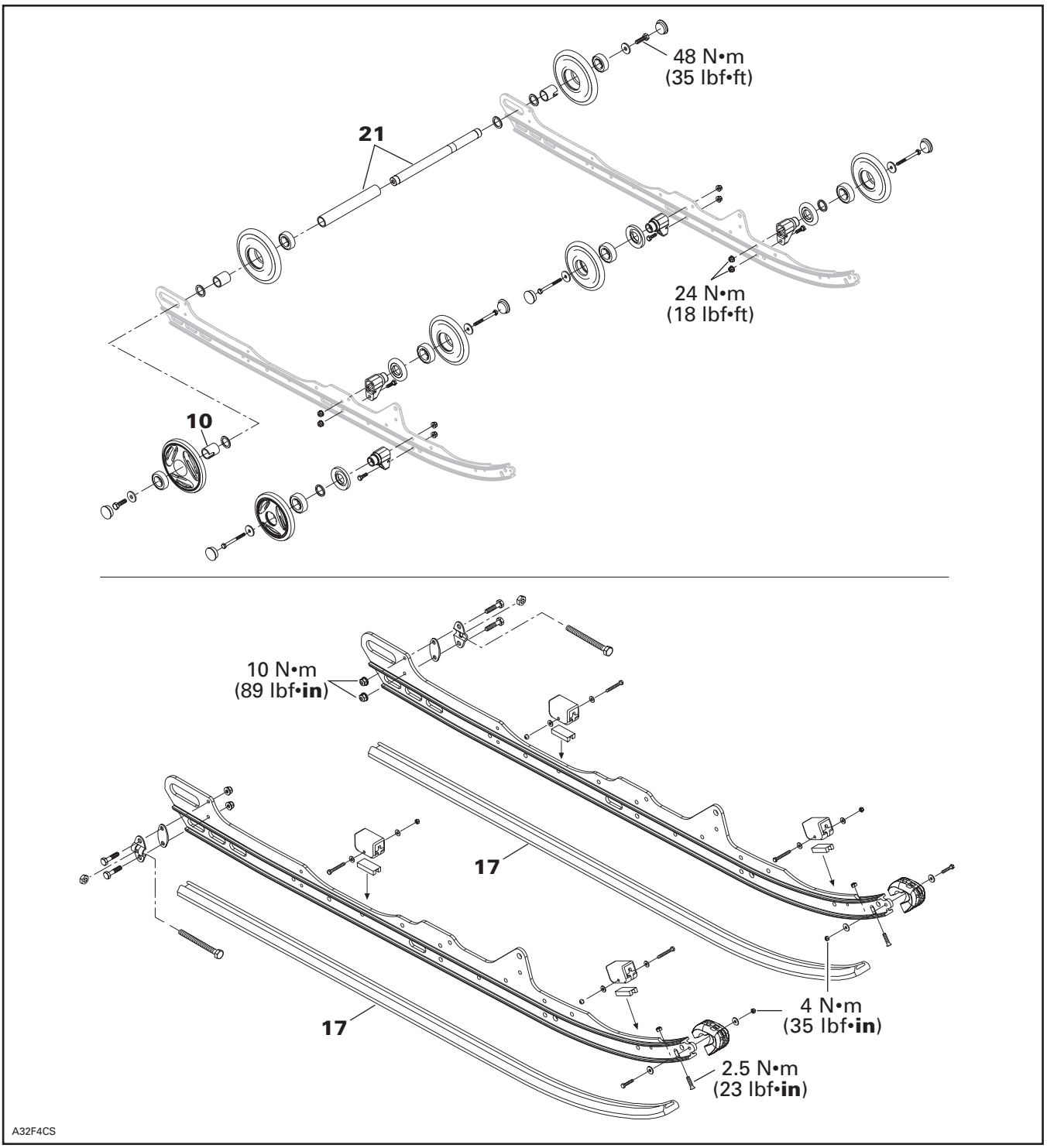
480 W Models (SDI engines)

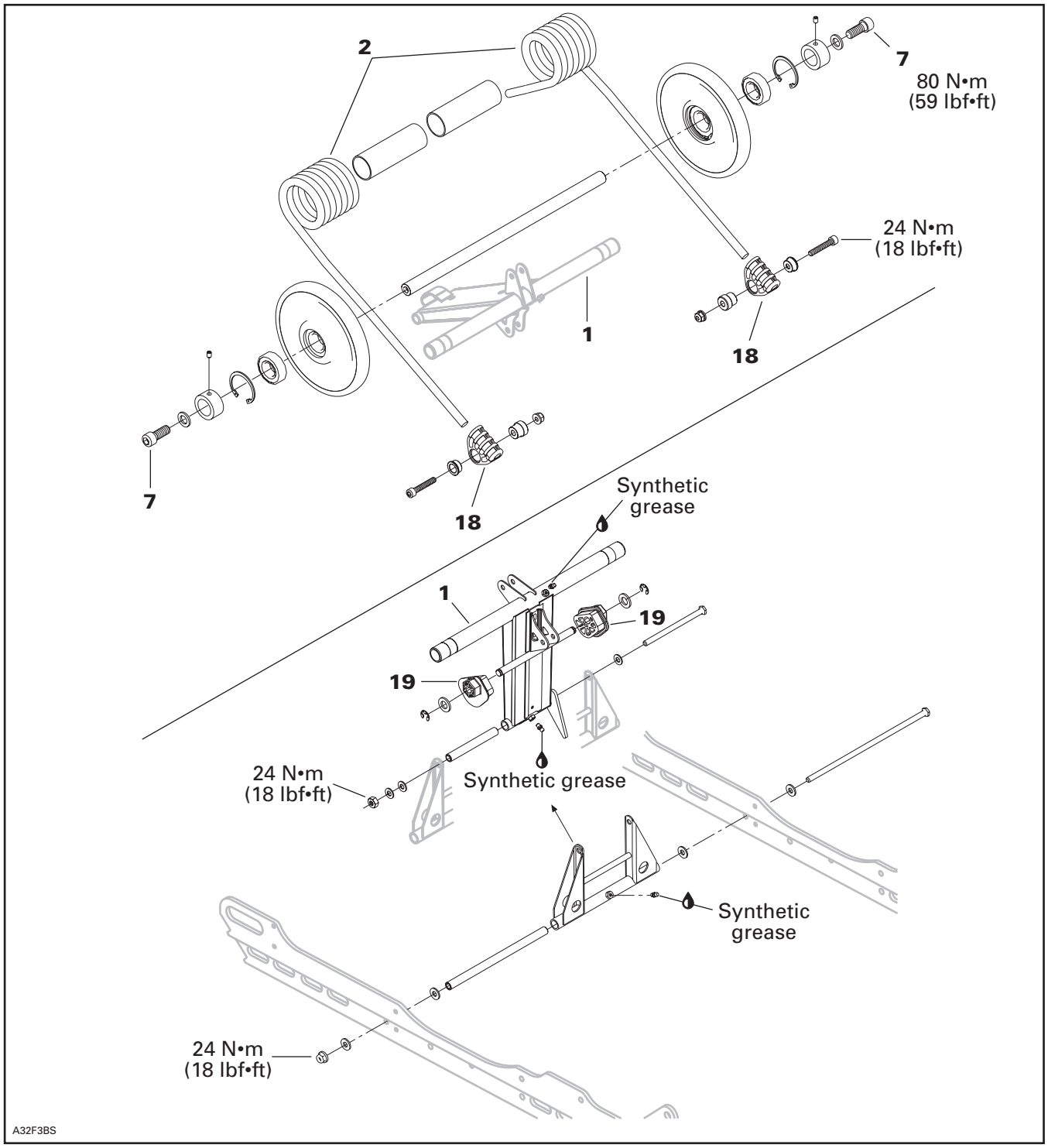
Connect VCK (P/N 529 035 981). In BUDS, click on the relay 2 (R2) button to supply headlight system with 12 volts.

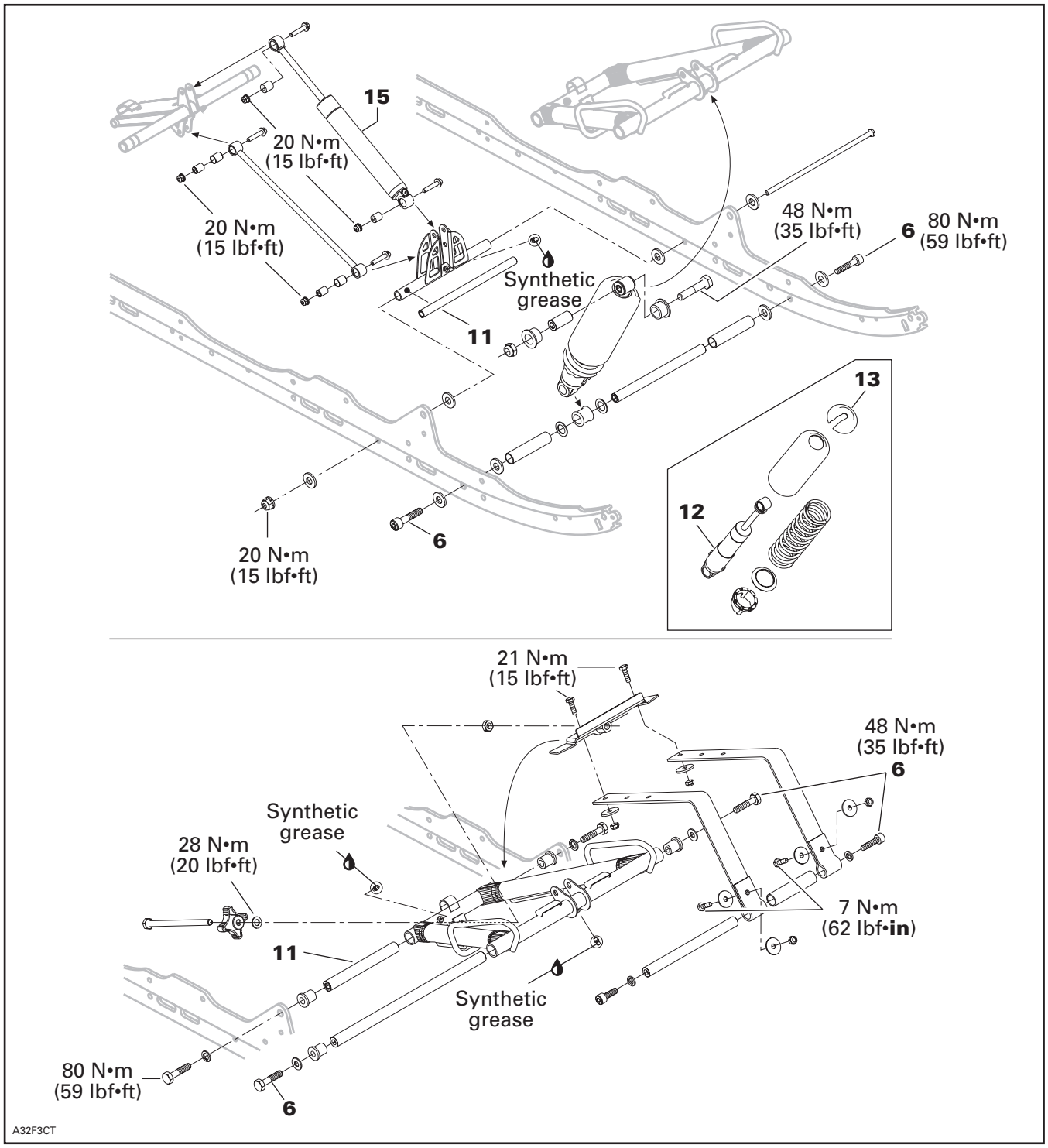
To supply 12 volts in the accessories system, click on the relay 3 (R3) button.

Use the wiring diagram in WIRING DIAGRAM section to troubleshoot headlight and accessories systems.

SC-10 SUSPENSION




2
7
80 N•m
(59 lbf•ft)
24 N•m
(18 lbf•ft)
1
18
7
18
Synthetic
grease
1
19
19
24 N•m
(18 lbf•ft)
Synthetic grease
Synthetic
grease
24 N•m
(18 lbf•ft)
A32F3BS


15
20 N•m
(15 lbf•ft)
20 N•m
(15 lbf•ft)
48 N•m
(35 lbf•ft)
6
80 N•m
(59 lbf•ft)
Synthetic
grease
11
13
12
6
20 N•m
(15 lbf•ft)
21 N•m
(15 lbf•ft)
48 N•m
(35 lbf•ft)
6
Synthetic
grease
28 N•m
(20 lbf•ft)
7 N•m
(62 lbf•in)
11
Synthetic
grease
80 N•m
(59 lbf•ft)
6
A32F3CT

COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

Rear Axle

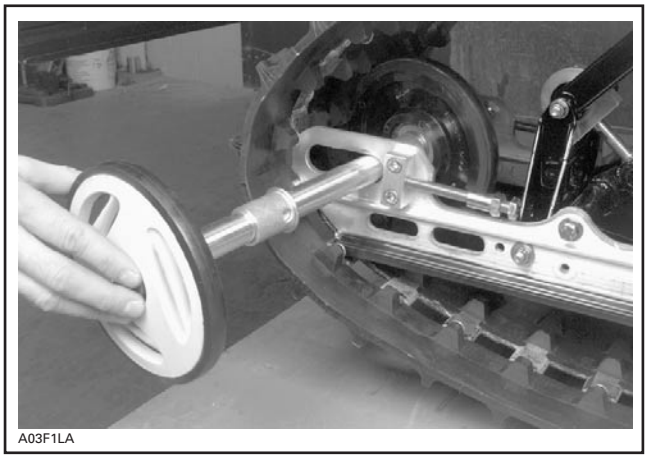
Remove screw on rear axle **no. 21** on side of offset wheel.

Completely loosen track tension.

Pull out rear axle from opposite side of offset inner wheel.

At assembly, align spacer hole with adjusting bolt.

Make sure to reinstall washer on each side of runner.


A03F1LA

TYPICAL

Rear Shock

Lift rear of vehicle.

A32F4BA

Remove nut on top end of rear shock **no. 15**.

Remove nut on bottom end of shock.

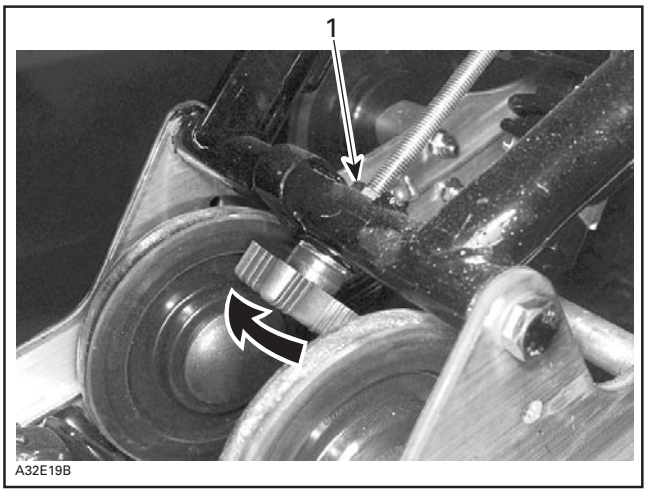
In case of gas shocks, completely loosen stopper strap or unfasten one end of them.

Installation is reverse of removal procedure.

CAUTION: Take care not to damage grease fitting.

Front Shock

Unfasten one end of stopper strap(s) or loosen the adjuster knob to release shock pressure.



A32E19B

1. Loosen lock nut, turn adjuster knob counterclockwise

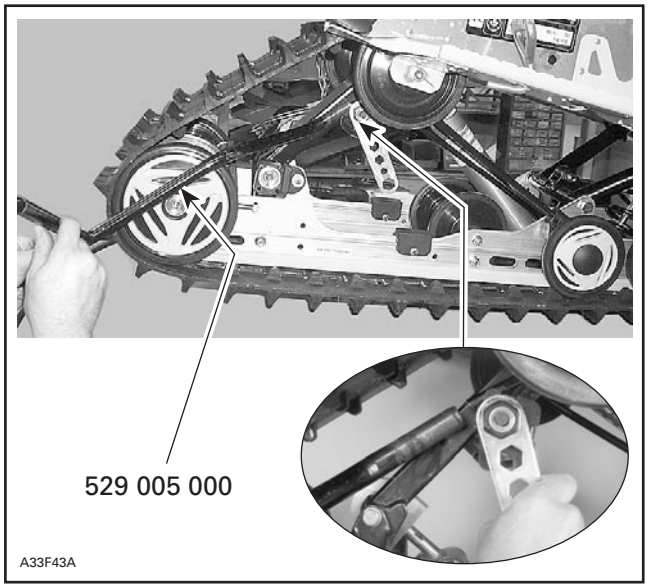
Unbolt front shock **no. 12** from the top.

Remove the front idler wheels to gain access to the axle retaining self-locking screws **no. 6**. Follow the instructions provided in this section to unfasten these screws. Slide out the axle and remove the shock.

Rear Spring

Decrease spring preload by turning cams accordingly.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 005 000), remove both springs from adjusting cams.



Remove spring **no. 2** ends from adjusting cams.

Unbolt rear arm top axle from chassis.

SUSPENSION ASSEMBLY REMOVAL

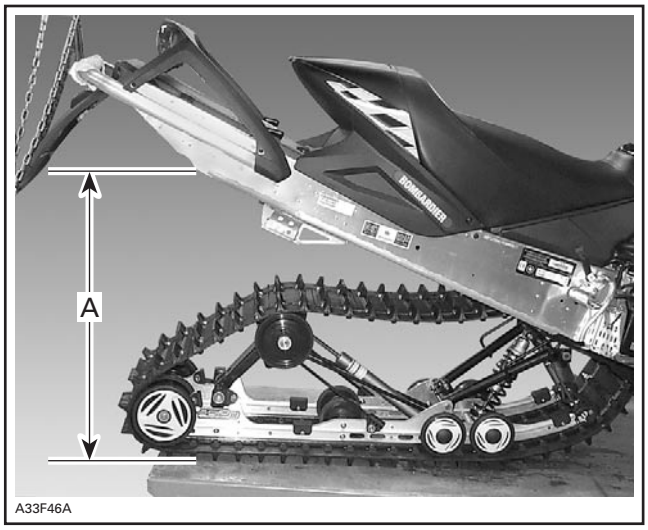
Decrease spring preload by turning cams **no. 19** accordingly.

Lift rear of vehicle and support it off the ground.

Loosen track tension.

Remove rear arm top axle screws **no. 7** from chassis.

Lift rear of vehicle at least 1 m (3 ft).



TYPICAL
A. At least 1 m (3 ft)

Remove screws **no. 6** retaining front arm to tunnel.

Remove suspension.

Self-Locking Screws

CAUTION: These self-locking screws must always be replaced by new ones every time they are removed.

NOTE: To prevent axle from turning when unscrewing self-locking screws **no. 6** and **no. 7**, proceed as follows:

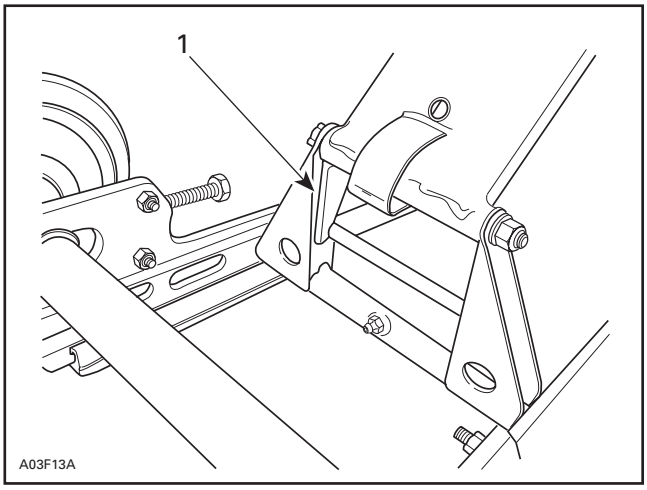
- Remove one self-locking screw then install a 10 mm shorter non-self-locking one in place. Torque as specified in exploded view.
- Remove the opposite self-locking screw.
- Remove the temporary installed non-self-locking screw.
- If it doesn't work, heat screw head to melt threadlocker.

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to TRACK.

Rear Arm

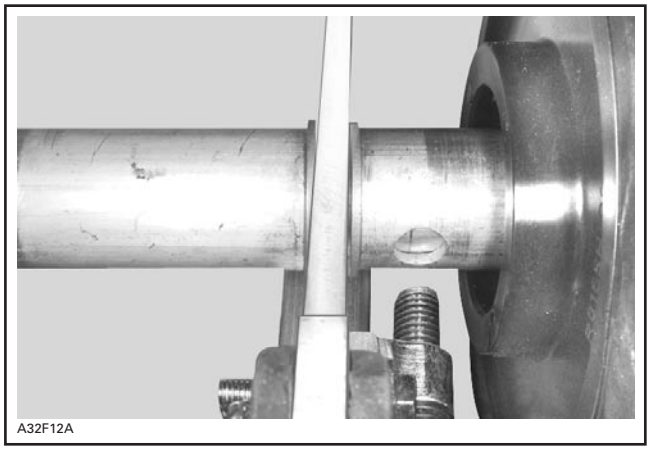
At installation, rear arm **no. 1** stroke limiter must be on rear side.



1. Stroke limiter on rear side

Outer Bushing

At installation, hole of outer bushing **no. 10** must face adjustment screw.

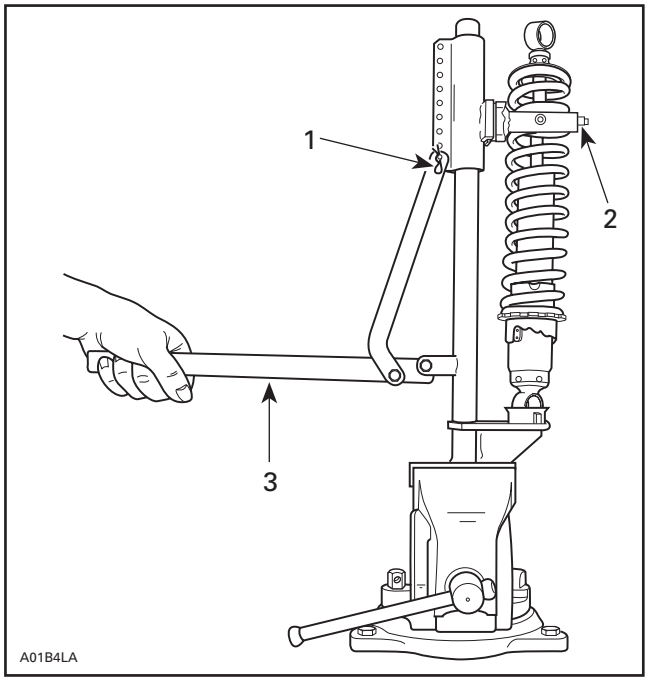


Front Shock, Spring Stopper and Cap

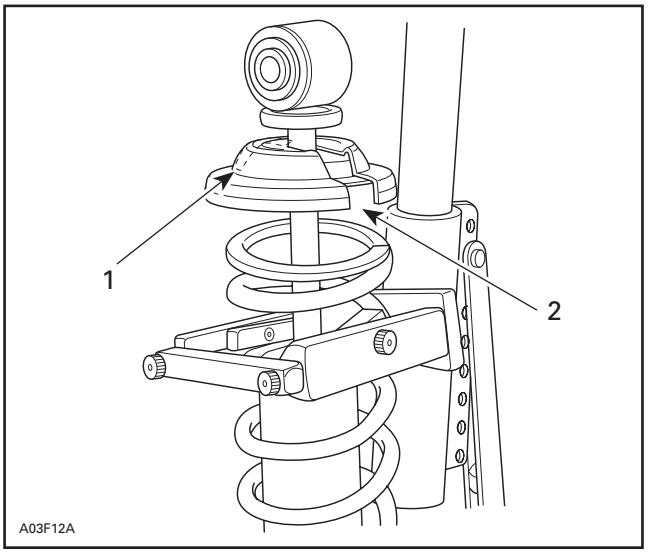
Use shock spring remover (P/N 529 035 504) and put it in a vise. Mount shock **no. 12** in it and turn shock so that a spring coil rests against spring compressor jaw.

Close and lock bar. Place handle horizontally by changing position of clevis pin.

Push down on handle until it locks. Remove spring stopper **no. 13** and cap then release handle.



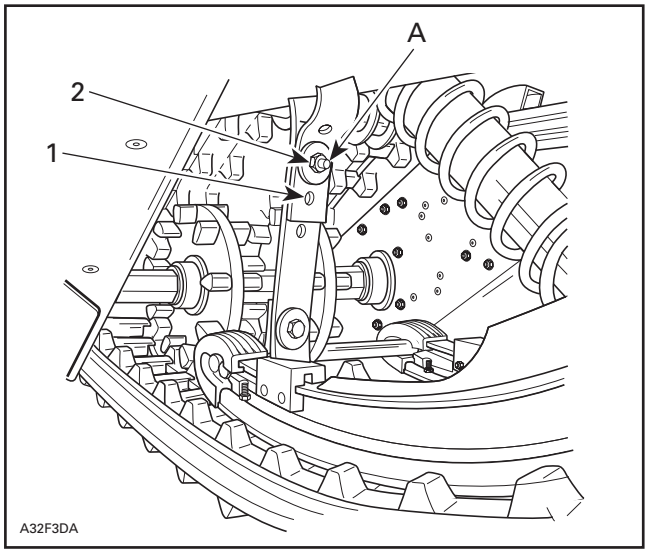
1. Clevis pin
2. Bar
3. Handle placed horizontally



1. Cap opening
2. Spring stopper opening

Stopper Strap

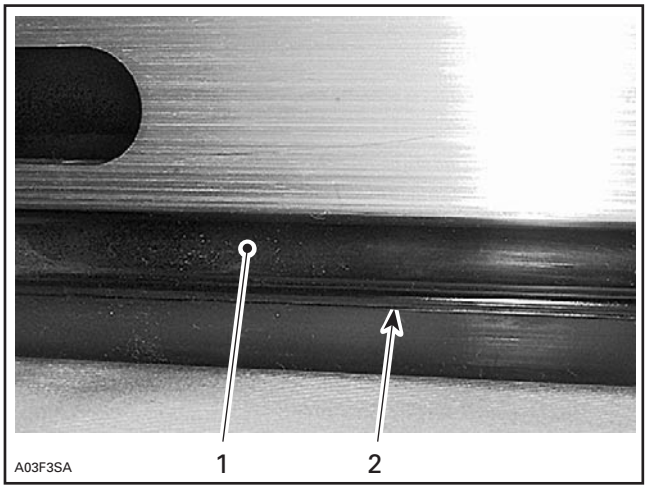
Inspect strap **no. 20** for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through proper hole from the end. Torque nut to 7 N•m (62 lbf•**in**).



ALL MODELS EXCEPT SUMMIT LIQUID COOLED MODELS
1. 1st hole
2. 2nd hole
*A. 7 N•m (62 lbf•**in**)*

Slider Shoe

Molding line is the wear limit indicator.



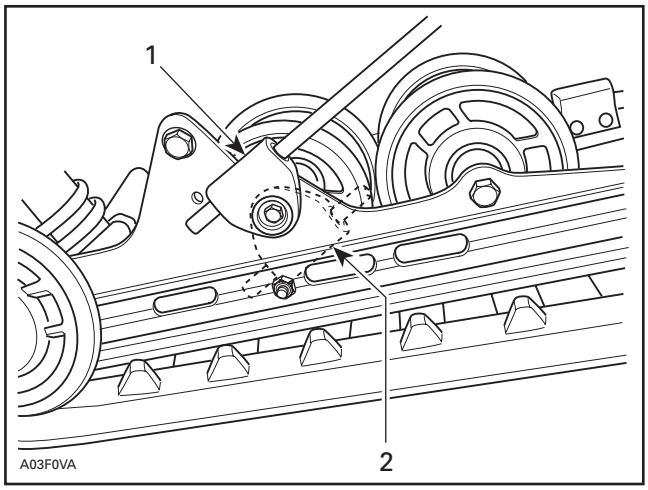
TYPICAL
1. Slider shoe
2. Molding line (wear limit indicator)

Replace slider shoes **no. 17** when wear limit is reached.

CAUTION: Slider shoes must always be replaced in pairs.

Spring Support

CAUTION: To avoid track damage, spring supports no. 18 must be mounted upward.



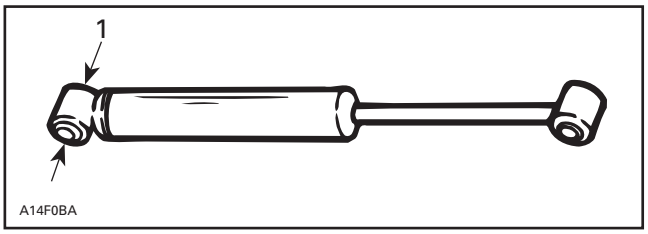
RIGHT SIDE SHOWN
1. Right position: upward
2. Wrong position

SHOCK ABSORBER INSPECTION

All Models Equipped with Hydraulic Shock

NOTE: Hydraulic shocks are painted black.

Secure the shock body end in a vise with its rod upward.



1. Clamp

CAUTION: Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

Pay attention to the following conditions which will denote a defective shock:

– A skip or a hang back when reversing stroke at mid travel.
– Seizing or binding condition except at extreme end of either stroke.
– Oil leakage.
– A gurgling noise, after completing one full compression and extension stroke.

Renew if any faults are present.

All Models Equipped with Gas Pressurized Shock

NOTE: Gas pressurized shocks are light gray or purple painted, or bare aluminum.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. Renew as required.

If suspecting an internal gas leak between oil chamber and gas chamber, check shock as follows:

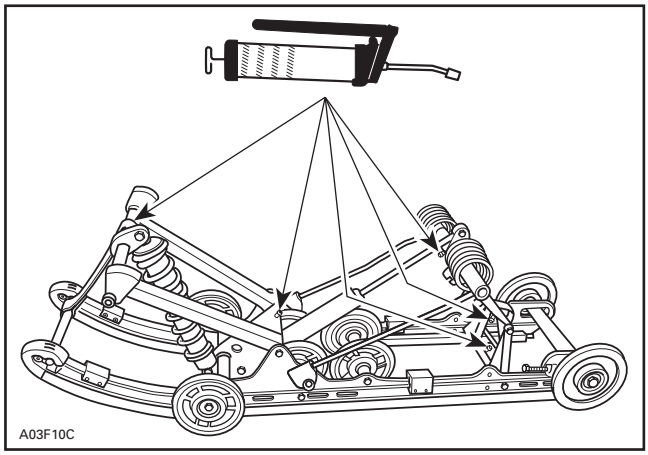
Install shock in a vise clamping on its bottom eyelet with its rod upward.

Let it stand for 5 minutes.

Completely push down the shock rod then release. Rod must come out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

All Types of Shocks

If suspecting a frozen shock proceed as follows: Place shock in a freezer (temperature below 0°C (32°F)) for 4 hours. Push down on rod and note its resistance, compare to a new shock. If shock is frozen it will be impossible to compress.



SC-10: 5 GREASE FITTINGS

INSTALLATION

Install assembled suspension into track with front portion first.

Insert rear section of suspension into track.

Bolt front arm, rear arm then center top idler wheel axle.

Adjust track tension.

RIDE ADJUSTMENT

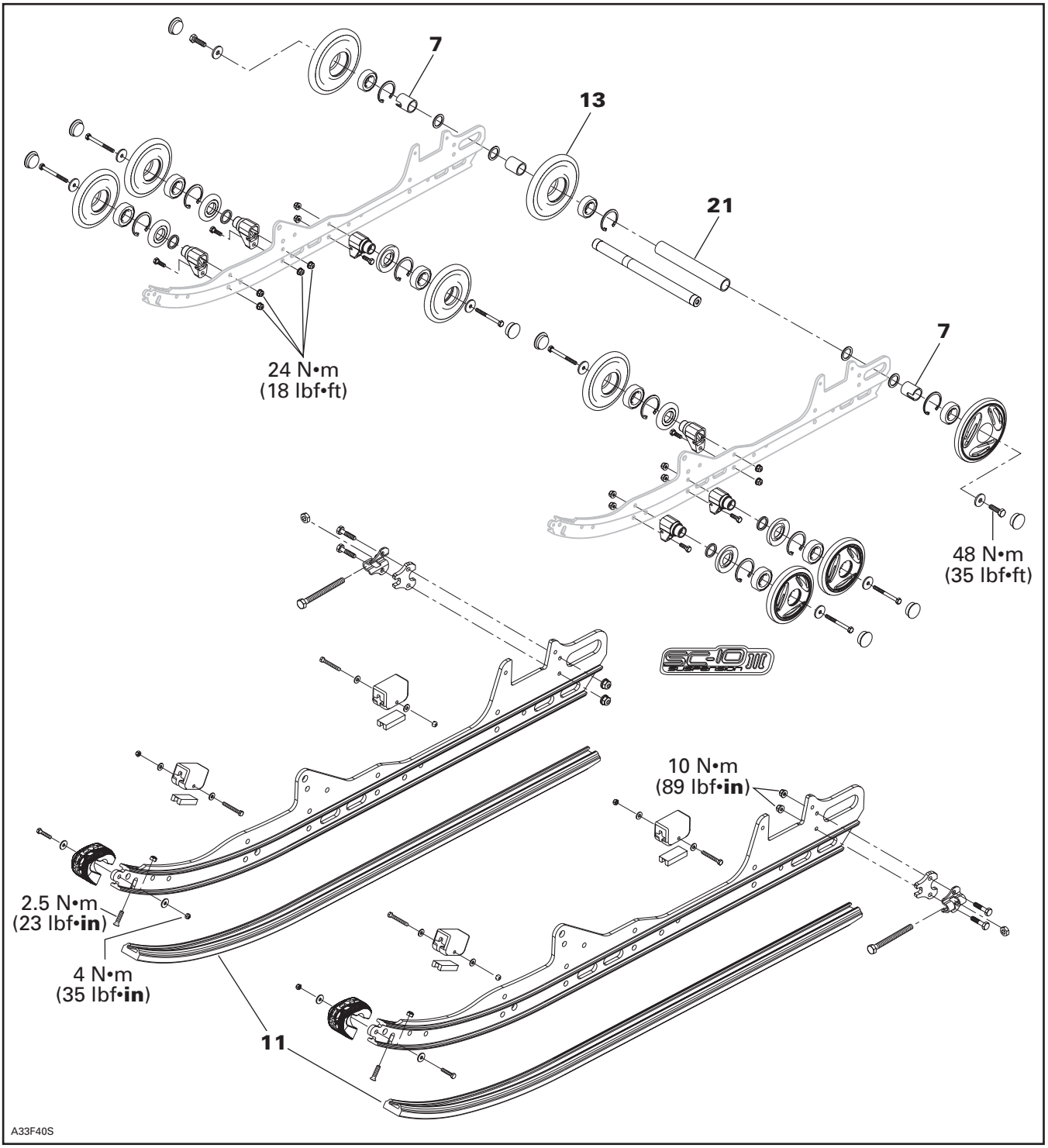
Refer to *Operator's Guide*.

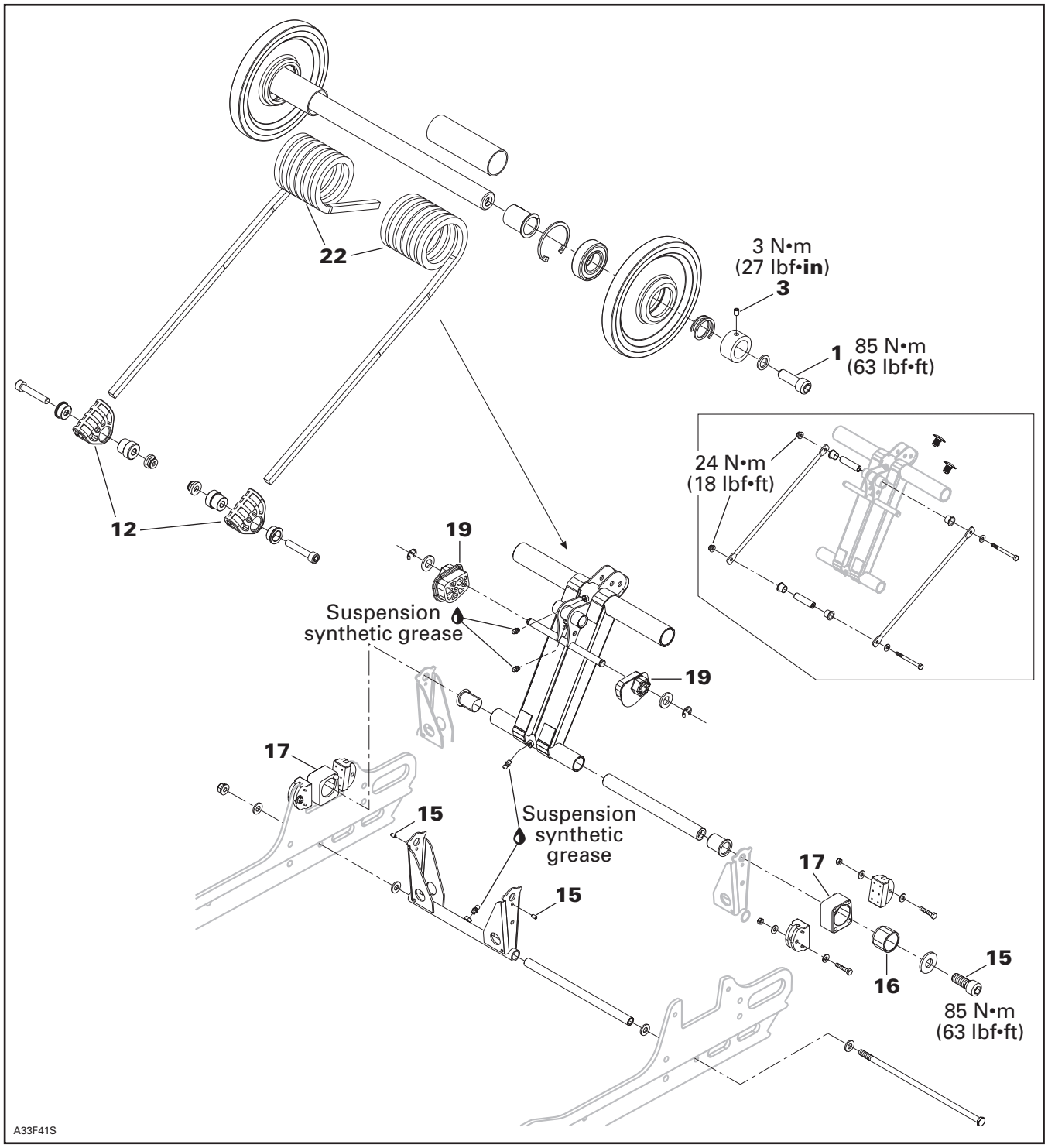
LUBRICATION

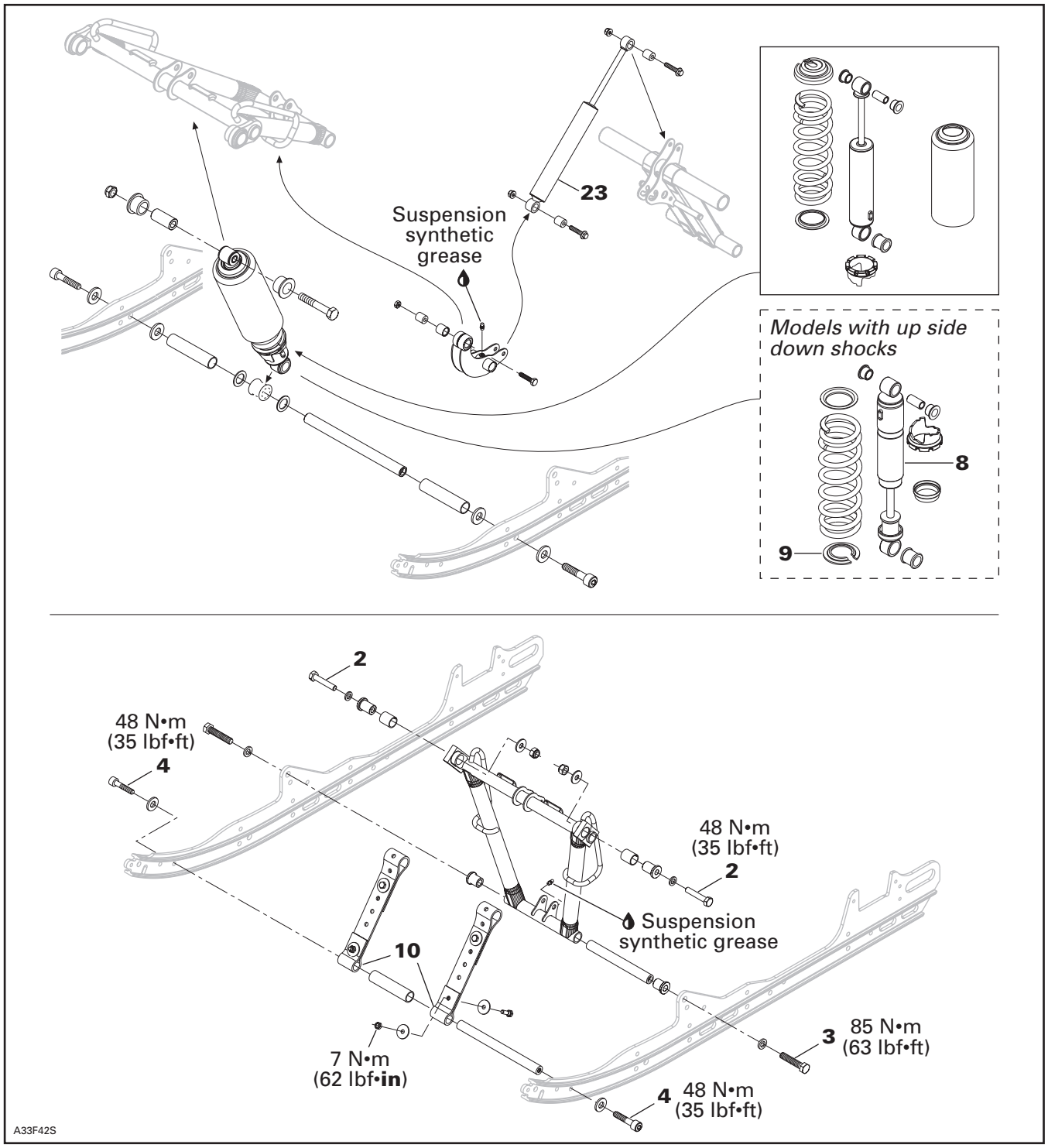
Lubricate front and rear arms at grease fittings using suspension synthetic grease (P/N 293 550 033).

SC-10 III SUSPENSION

SC-10 III




22
3 N•m
(27 lbf•in)
3
1
85 N•m
(63 lbf•ft)
24 N•m
(18 lbf•ft)
12
19
Suspension
synthetic grease
19
17
15
Suspension
synthetic
grease
15
17
16
15
85 N•m
(63 lbf•ft)
A33F41S


23
Suspension synthetic grease
Models with up side down shocks
8
9
2
48 N•m (35 lbf•ft)
4
48 N•m (35 lbf•ft)
2
Suspension synthetic grease
10
7 N•m (62 lbf•in)
3
85 N•m (63 lbf•ft)
4
48 N•m (35 lbf•ft)
A33F42S

COMPONENT REMOVAL AND INSTALLATION

Lift rear of vehicle and support it off the ground.

Rear Axle

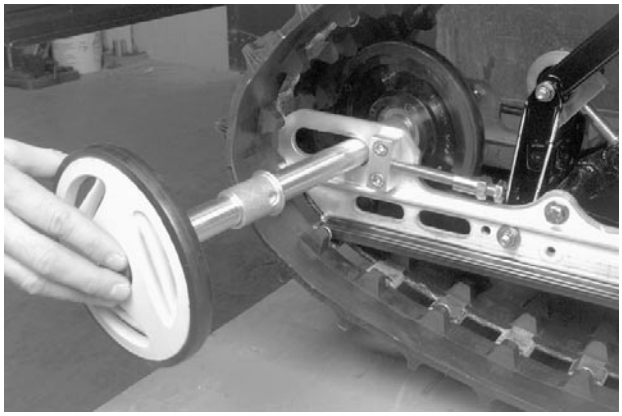
Remove screw on rear axle **no. 21** on side of offset wheel.

Completely loosen track tension.

Pull out rear axle from opposite side of offset inner wheel.

At assembly, align spacer hole with adjusting bolt.

Make sure to reinstall washer on each side of runner.



A03F1LA

TYPICAL

Rear Shock

Lift rear of vehicle.

A32F4BA

TYPICAL

Remove nut on top end of shock **no. 23**.

A33F44A

Remove nut on bottom end of shock.

Installation is reverse of removal procedure.

Front Shock

Unfasten one end of stopper strap(s).

Unbolt shock **no. 8** from the top.

Remove the front idler wheels to gain access to the axle retaining self-locking screws **no. 2** and **no. 3**. Follow the instructions provided in this section to unfasten these screws. Slide out the axle and remove the shock.

Rear Spring

Decrease spring preload by turning cams **no. 19** accordingly.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 005 000), remove both springs from adjusting cams.

Remove spring ends from adjusting cams.

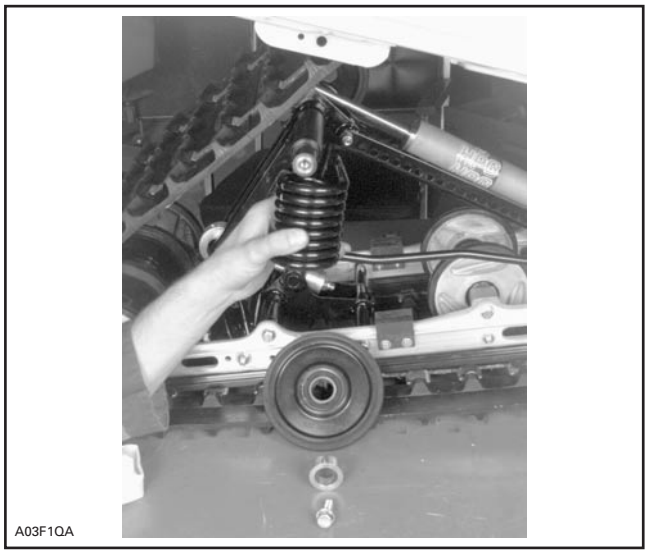
Unbolt rear arm top axle from chassis.

Unscrew set screws from locking ring at each end of top axle.


A33F45A

Remove spacers and top idler wheels.

Remove springs **no. 22**.


A03F1QA

TYPICAL

At reassembly, respect THIS SIDE OUT inscription on wheel.

SUSPENSION ASSEMBLY REMOVAL

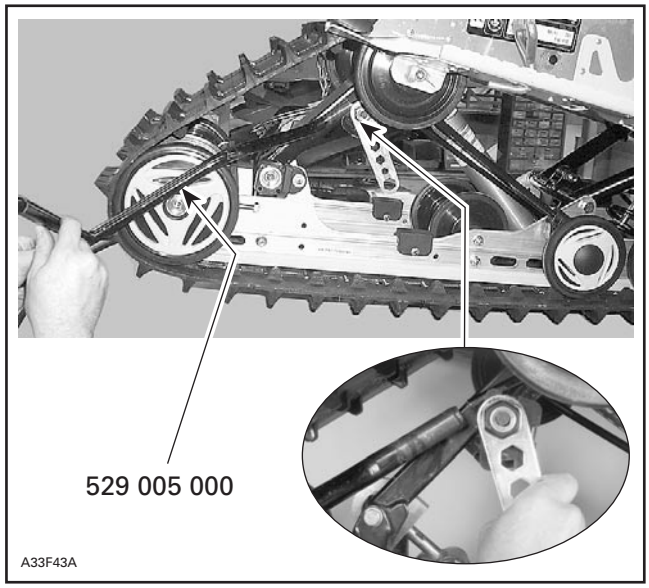
Cam

Lift rear of vehicle and support it off the ground.

Loosen track tension.

Decrease spring preload by turning cams **no. 19** accordingly.

Slightly turn adjusting cam to expose spring end. Using spring installer (P/N 529 005 000), remove both springs from adjusting cams.



A33F43A

Self-Locking Screws

CAUTION: These self-locking screws must always be replaced by new ones everytime they are removed.

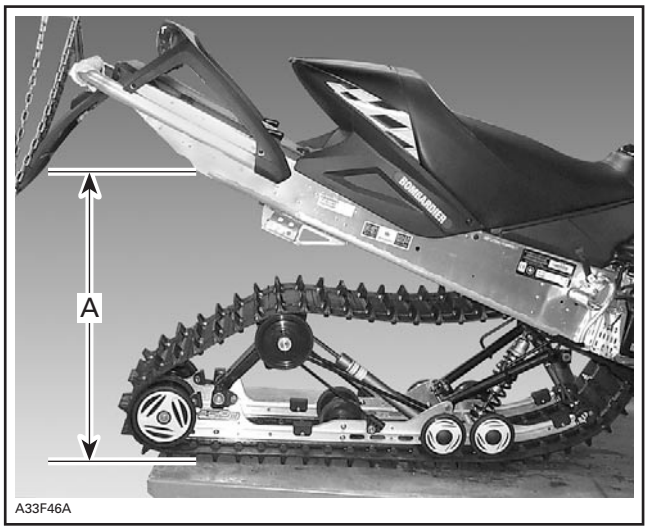
NOTE: To prevent axle from turning when unscrewing self-locking screws **no. 1**, **no. 2**, **no. 3**, **no. 4**, **no. 5**, **no. 6**, proceed as follows:

- Remove one self-locking screw then install a 10 mm shorter non-self-locking one in place. Torque as specified in exploded view.
- Remove the opposite self-locking screw.
- Remove the temporary installed non-self-locking screw.
- If it doesn't work, heat bolt head to melt threadlocker.

Remove rear arm top axle self-locking screws **no. 1** from chassis.


A33F45A

Lift rear of vehicle at least 1 m (3 ft).



A33F46A

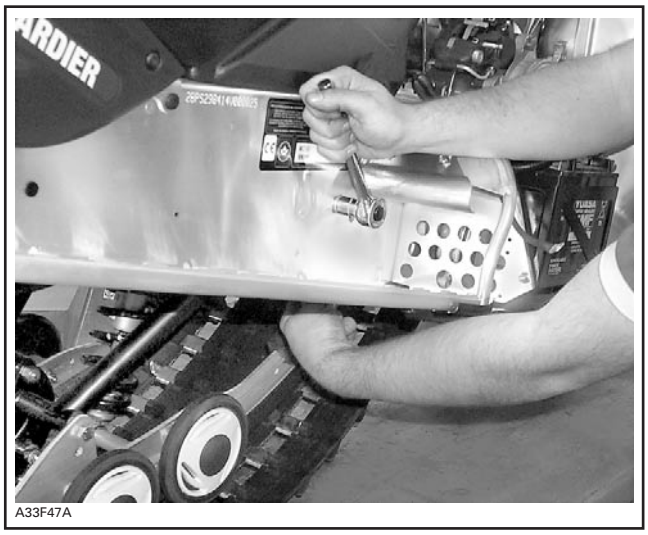
TYPICAL
A. At least 1 m (3 ft)

Models with SC-10 III 121 in Suspension

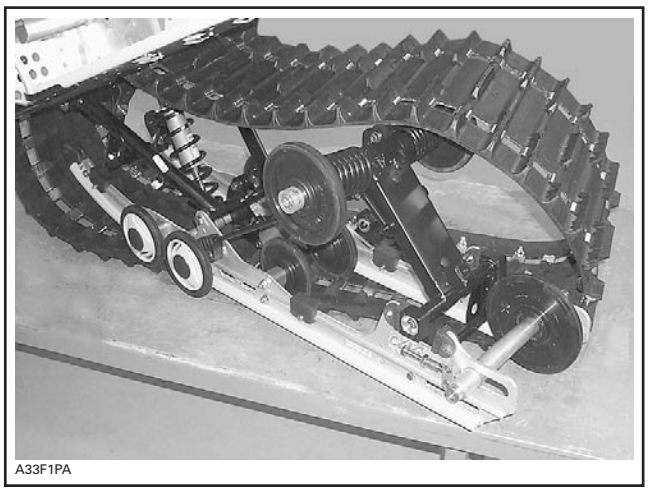
In case of gas pressure shocks, to facilitate the suspension removal, it is necessary to remove the rear shock **no. 23**.

All Models

Remove both self-locking screws **no. 2** retaining front arm to tunnel.


A33F47A

Remove suspension.

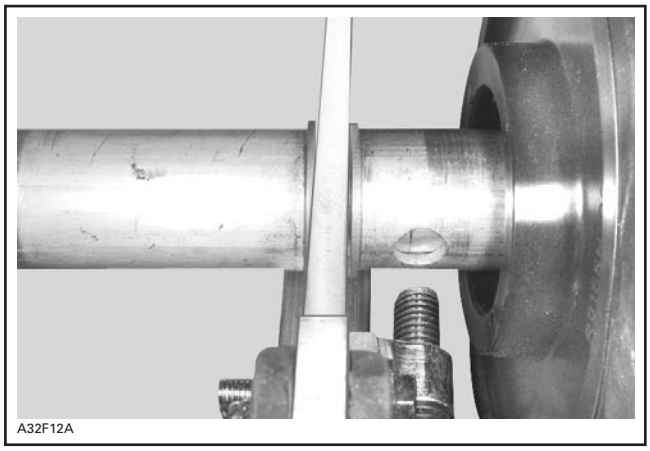

A33F1PA

DISASSEMBLY AND ASSEMBLY

Inspect track thoroughly before reinstalling suspension. Refer to TRACK.

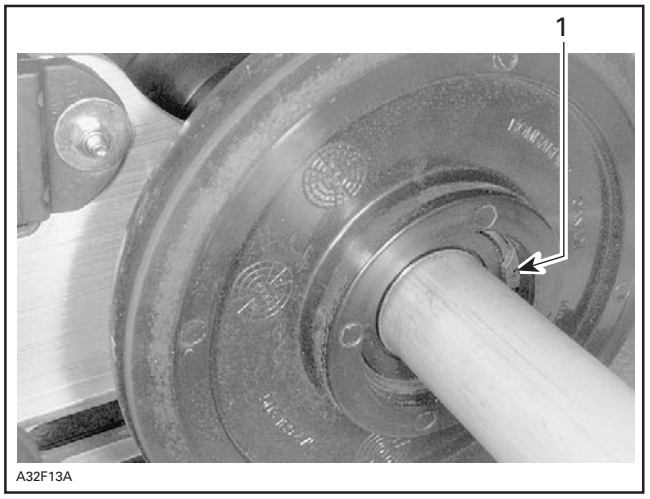
Outer Bushing

At installation, hole of outer bushing **no. 7** must face adjustment screw.


A32F12A

Center Rear Wheel and Top Idler Wheels

At installation on center rear wheel **no. 13** and top idler wheels **no. 14**, circlip must face inner side.



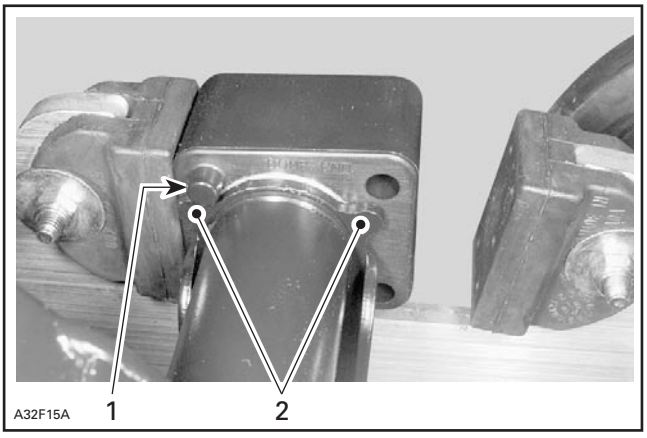
A32F13A

1. Circlip facing inner side

Block

Both blocks **no. 17** are identified R or L (right or left), see second following photo. At installation, make sure to install proper block on proper side.

Also, note that protrusion must be positioned above stoppers.



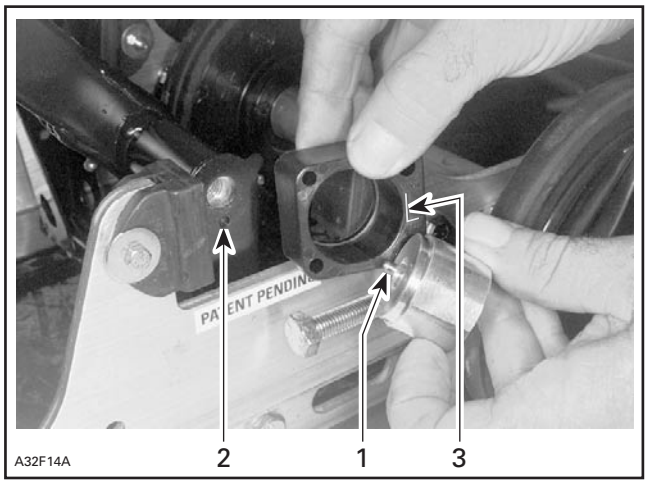
A32F15A

1. Protrusion
2. Stoppers

Dowel Pin and Block Guide

Dowel pin **no. 15** must exceed block guide **no. 16** by 2 to 2.3 mm (.079 to .091 in).

At installation, insert dowel pin into pivot arm hole.



A32F14A

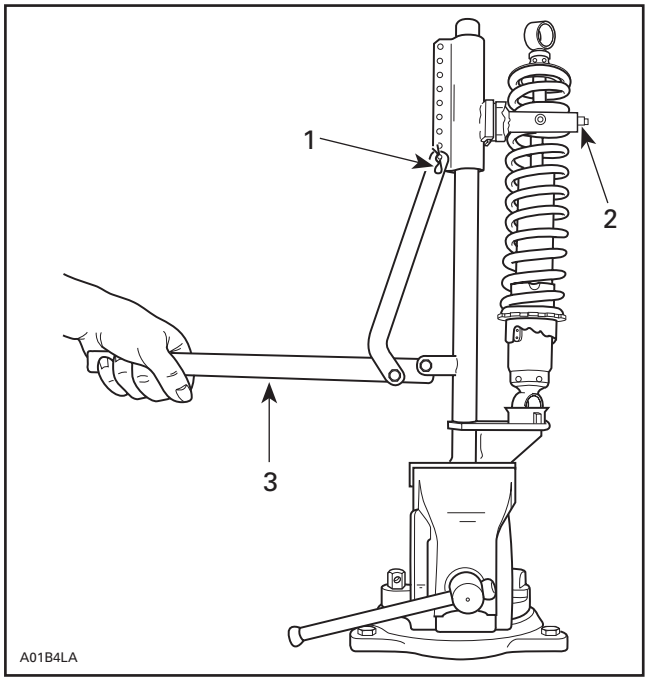
LEFT SIDE SHOWN
1. Dowel pin
2. Pivot arm hole
3. «L» identification for left side

Front Shock and Spring Stopper

Use shock spring remover (P/N 529 035 504) and put it in a vise. Mount shock **no. 8** in it and turn shock so that spring coils matched spring compressor.

Close and lock bar. Adjust handle horizontal by changing position of clevis pin.

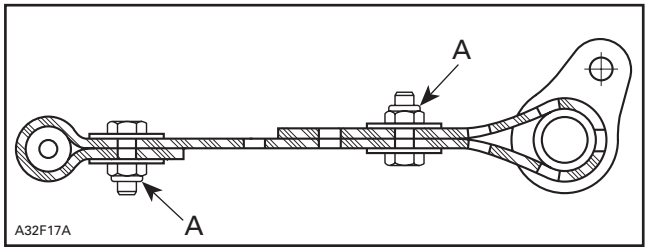
Push down on handle until it locks. Remove spring stopper **no. 9** then release handle.



1. Clevis pin
2. Bar
3. Handle horizontal

Stopper Strap

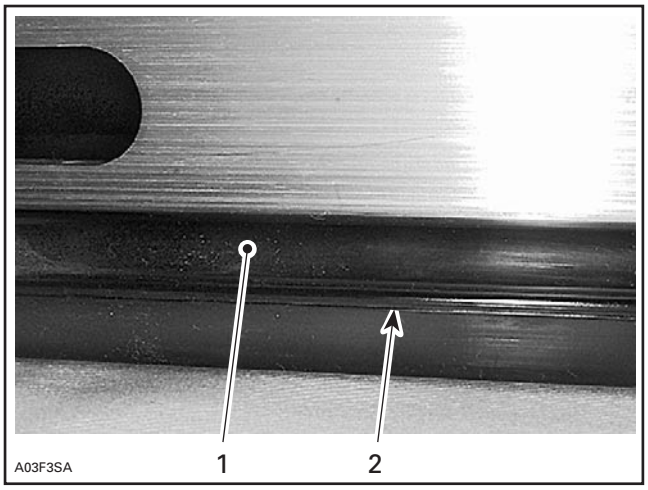
Inspect strap **no. 10** for wear or cracks, bolt and nut for tightness. If loose, inspect hole for deformation. Replace as required. Make sure it is attached through proper holes. Torque nut to 7 N•m (62 lbf•**in**).



*A. 7 N•m (62 lbf•**in**)*

Slider Shoe

Molding line is the wear limit indicator.



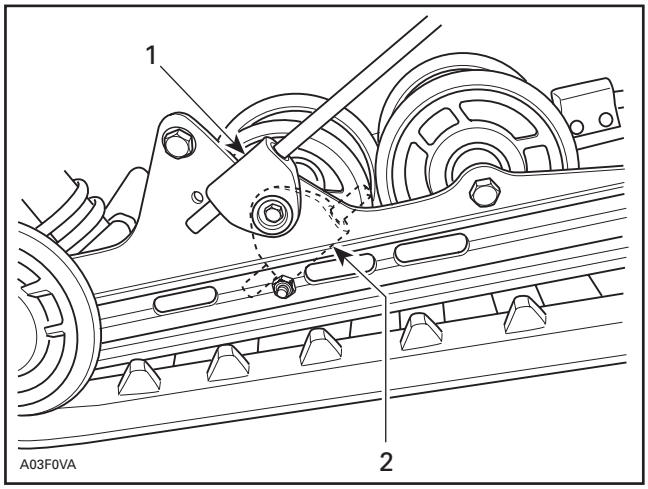
TYPICAL
1. Slider shoe
2. Molding line (wear limit indicator)

Replace slider shoes **no. 11** when wear limit is reached.

CAUTION: Slider shoes must always be replaced in pairs.

Spring Support

CAUTION: To avoid track damage, spring supports no. 12 must be mounted upward.



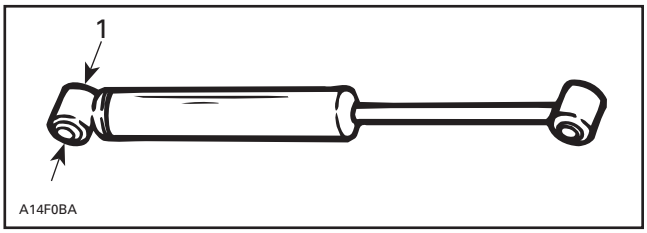
TYPICAL — RIGHT SIDE SHOWN
1. Right position: upward
2. Wrong position

SHOCK ABSORBER INSPECTION

All Models Equipped with Hydraulic Shock

NOTE: Hydraulic shocks are painted black or dark gray.

Secure the shock body end in a vise with its rod upward.



1. Clamp

CAUTION: Do not clamp directly on shock body.

Examine each shock for leaks. Extend and compress the piston several times over its entire stroke. Check that it moves smoothly and with uniform resistance with its rod upward.

After at least 5 complete strokes, 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.

MC VR Shock

For the verification of stroke, install shock in vise keeping the rod upward. Verify the stroke compression when the rod is fully extended.

The feeling will be stiff for around first 25 mm (1 in), soft up to 25 to 50 mm (1 to 2 in) and stiff after that. This stiff, soft and stiff phenomenon shows the normal operation of shock.

All Models Equipped with Gas Pressurized Shock

NOTE: Gas pressurized shocks are light gray or purple painted, or bare aluminum.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. Renew as required.

If suspecting an internal gas leak between oil chamber and gas chamber, check shock as follows:

Install shock in a vise clamping on its bottom eyelet with its rod upward.

Let it stand for 5 minutes.

Completely push down the shock rod then release.

Rod must come out at a steady speed. If speed suddenly increases particularly at end of extension, replace shock.

HPG VR Shock

NOTE: Gas pressurized shocks are light gray or purple painted, or bare aluminum.

Gas shock can be inspected as follows:

Because of gas pressure, strong resistance is felt when compressing shock. When released, the shock will extend unassisted. The rod speed coming out will go slow - faster and slow again due to the VR zone. Renew as required.

For the verification of stroke, install shock in vise keeping the rod upward. Verify the stroke compression when the rod is fully extended.

The feeling will be stiff for around first 25 mm (1 in), soft up to 25 to 50 mm (1 to 2 in) and stiff after that. This stiff, soft and stiff phenomenon shows the normal operation of shock.

All Types of Shock

If suspecting a frozen shock proceed as follows:

Place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.

Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than for the new one.

HPG T/A SHOCK SERVICING

Disassembly and Assembly

There are two types of high pressure gas take apart (HPG T/A) shock. One type has a tire valve and the other has a needle valve.

SHOCK TYPE	INFLATION TOOL
Tire valve type	529 035 570
Needle valve type	503 190 102

T/A shocks come in two sizes. C-36 shock is 36 mm (1.417 in) in diameter and C-46 shock is 46 mm (1.811 in).

SHOCK SIZE	SERVICING TOOL	(P/N)
C-36	Piston guide	529 026 600
	Seal guide	529 026 500
	Shock wrench	529 035 727
C-46	Piston guide	529 035 608
	Seal guide	529 035 728
	Shock wrench	529 035 727

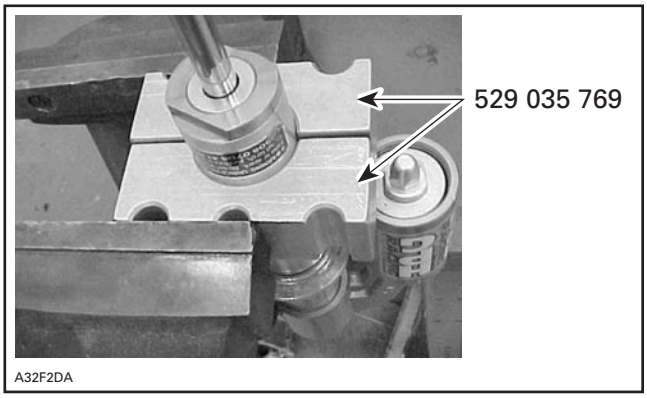
Release N (nitrogen) pressure on any HPG T/A shock with internal floating piston (IFP).

⚠ WARNING

Nitrogen gas is under extreme pressure. Use caution when releasing this gas volume. Protective eye wear should be used.

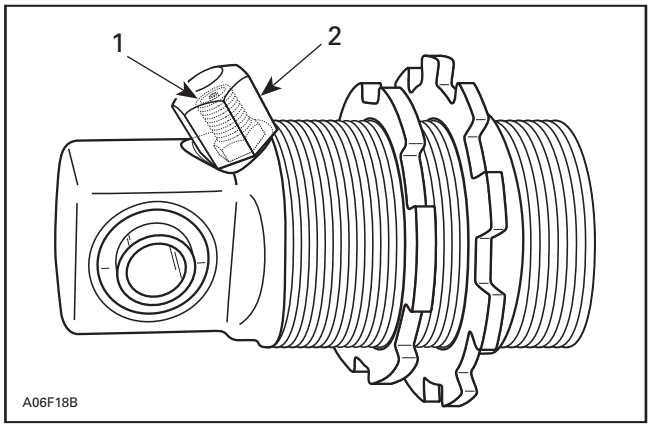
All T/A Shock Types

Mount shock in a vise with HPG shock holding tool (P/N 529 035 769).



Tire Valve Type Shock

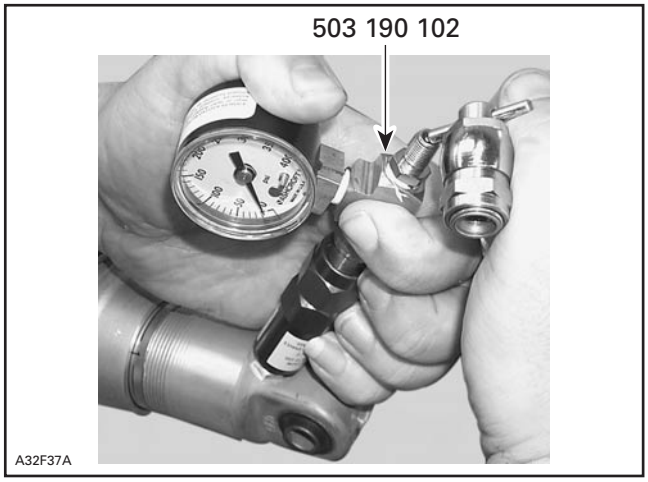
Remove tire valve cap and push on center rod of valve to release gas pressure.



1. Tire valve
2. Tire valve cap

Needle Valve Type Shock

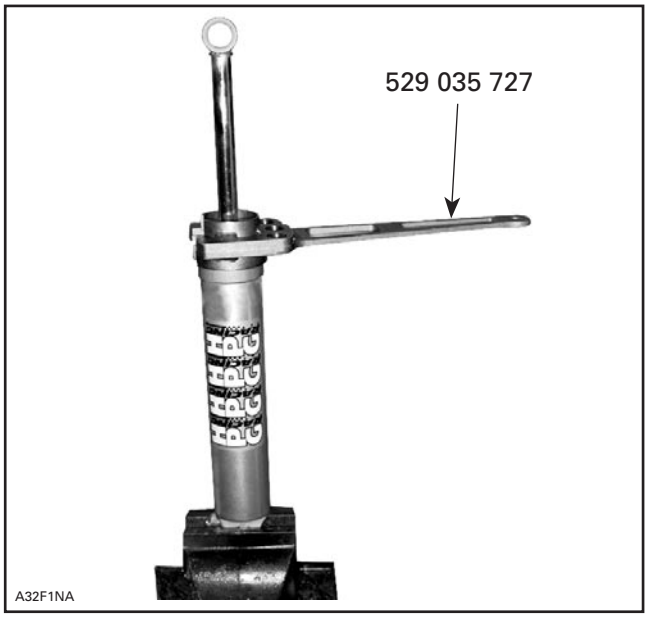
Remove screw on top of valve. Place the needle guide of gas refill needle type shock tool (P/N 503 190 102) on the shock valve. Press the detent pin and push forward the needle assembly very slowly towards rubber of needle valve. Push on shock tool valve center rod to release gas pressure.



Remove tool from shock.

Screw Cap Types of Shock

Using appropriate size of shock wrench (P/N 529 035 727) unscrew seal carrier.



TYPICAL

Snap Ring Cap Types of Shock

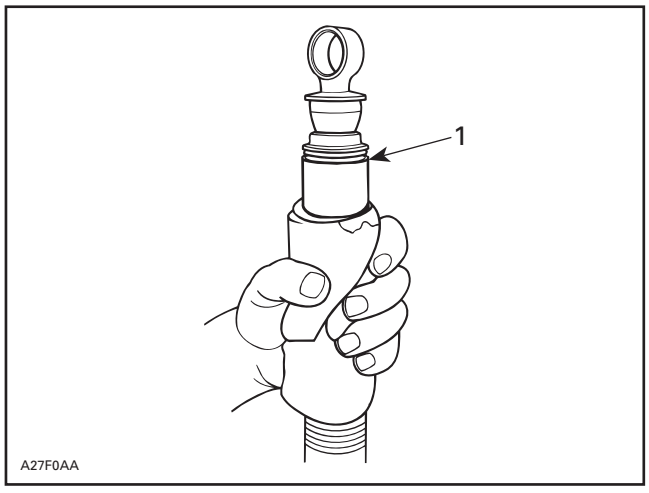
Using a flat tool, pop-out the cap.

Compress the carrier to access and remove the snap ring.

All Types of Shocks

With the seal carrier removed, slowly lift and remove damper rod assembly from the damper body.

NOTE: Remove damper rod assembly slowly to reduce oil spillage and prevent piston seal damage by damper body threads. Wrap the damper body with a shop cloth to capture possible overflow oil while removing the damper piston.

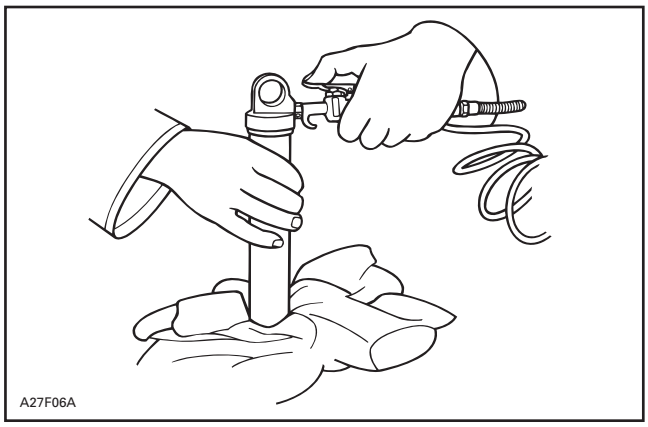


1. Oil flows

Discard old oil into storage container. Never reuse damper oil during shock rebuild.

All Types of Shocks except External Reservoir T/A Shocks

Remove valve core. Using compressed air pressure, carefully remove floating piston from damper body. Hold shop cloth over damper body opening to catch released floating piston. Allow room for floating piston to leave damper body.



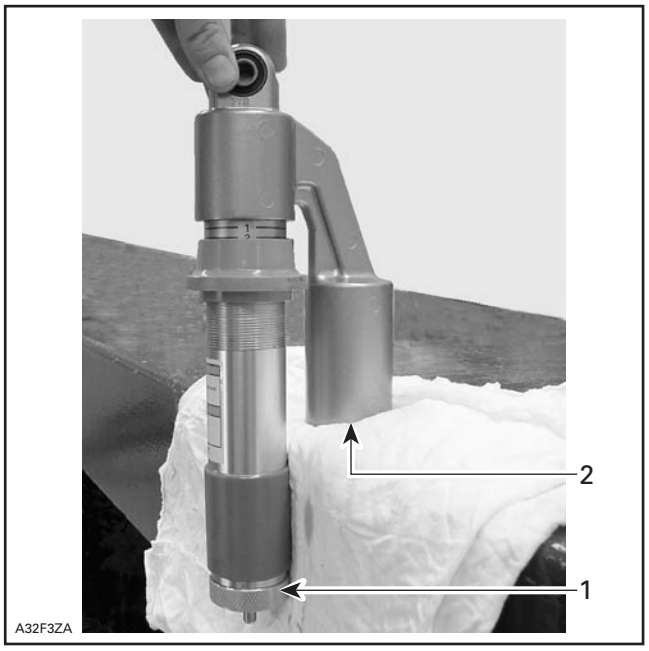
TYPICAL

External Reservoir T/A Shocks

Install floating piston remover tool (P/N 529 035 907) on shock absorber, as shown below.

1. Floating piston remover tool (P/N 529 035 907)

Place shock absorber in a position where external gas reservoir opened extremity is blocked. Refer to following photo.



1. Tool
2. Reservoir opened extremity blocked by leaning on work bench

With a low pressure hand pump, pressurize shock absorber until external reservoir piston pops-out.

NOTE: Use towels to prevent damaging external reservoir piston when it pops-out.

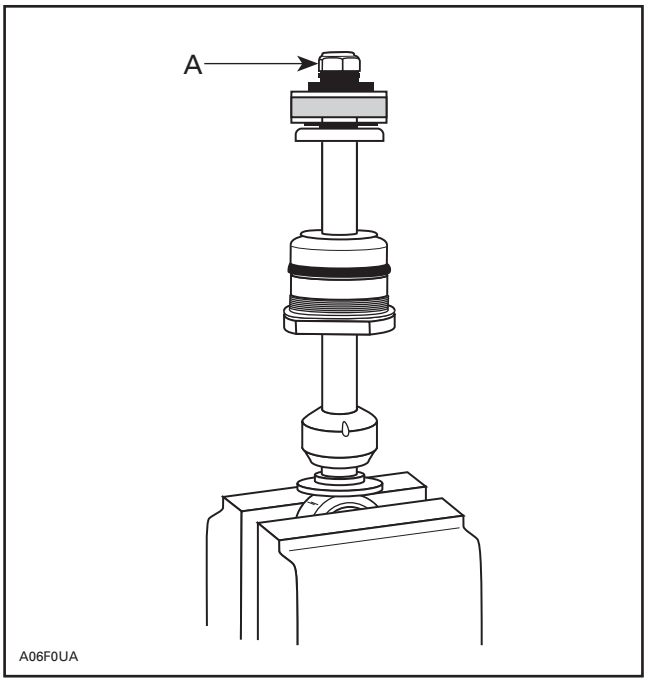
⚠ WARNING

Whenever using compressed air, use an O.S.H.A. approved air gun and wear protective eye wear.

Thoroughly clean, with a typical cleaning solution, and blow dry using low pressure air. Carefully inspect the damper body for any imperfections or signs of wear in the damper bore.

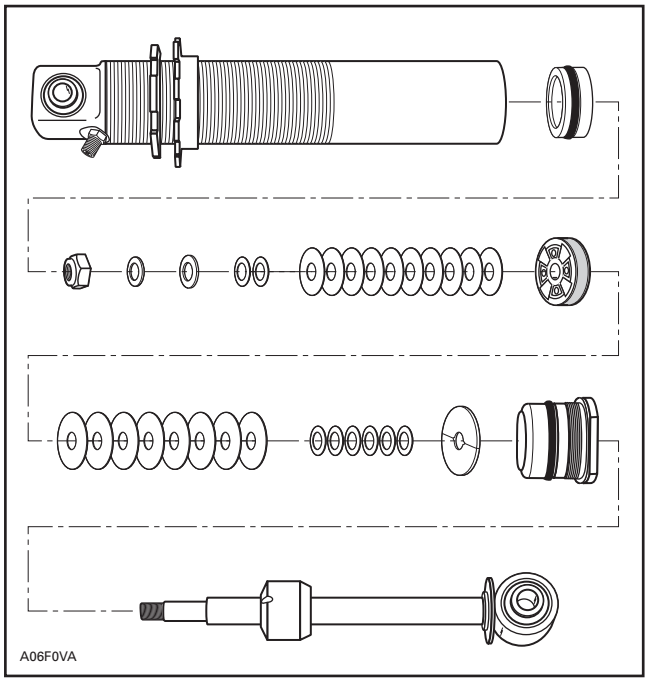
Replace damper body if wear is identified.

Holding the damper rod assembly in a bench vise, begin piston and valve removal.



A. Remove damper nut

Always arrange parts removed in the sequence of disassembly.



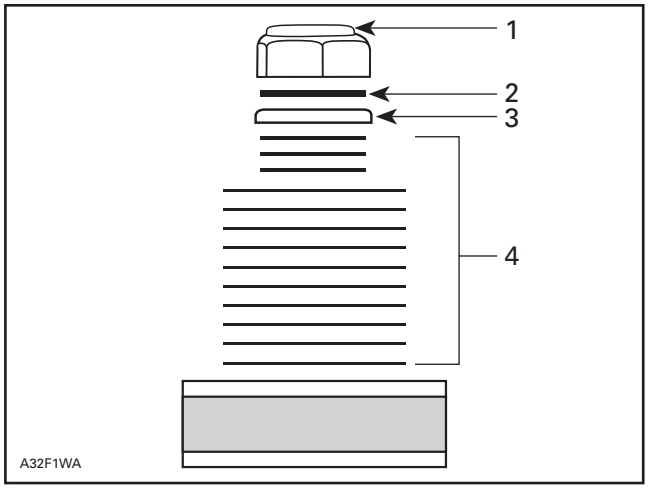
NOTE: As a general rule we suggest replacing the damper rod lock-nut after 4 rebuilds to ensure good locking friction and use Loctite 271 each time.

NOTE: If revalving is to be done, it is imperative that you identify the original shim pack (size and number of shims). The seal carrier need not be removed if only revalving is to be done.

Shims can be measured by using a vernier caliper or a micrometer.

NOTE: All shims should be carefully inspected and any bent or broken shims must be replaced for the shock to function properly.

After the new or replacement shim pack has been selected, reassemble in the reverse order of disassembly. Torque piston nut to 27 - 29 N•m (20 - 21 lbf•ft).



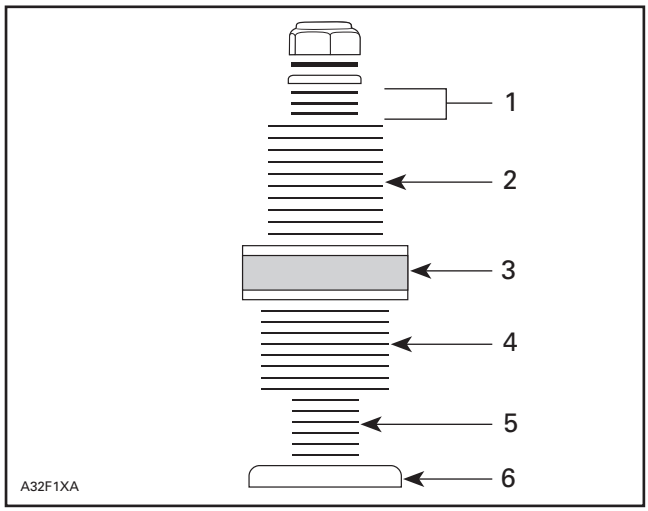
1. *Damper nut*
2. *Spacer*
3. *Stopper with its round edge facing nut*
4. *Shim pack*

CAUTION: The damper rod nut can only be reused 4 times, then, must be replaced. Do not substitute this part for non - O.E.M. use Loctite 271 on nut each time.

This (these) spacer washer(s) must be used as shown to ensure damper rod nut does not bottom out or contact shaft threads.

Rebound valve stopper with round edge facing nut.

NOTE: Rebound shim stack must not reach into threads of damper shaft. Spacer under damper shaft nut is used to prevent damper shaft nut from bottoming on threads.

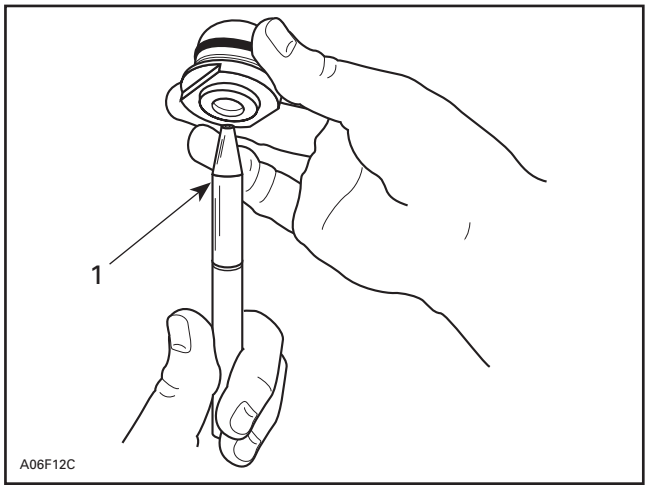


1. *Rebound dampening shim pack*
2. *Rebound dampening shim pack*
3. *Piston*
4. *Compression dampening shim pack*
5. *Compression dampening shim pack*
6. *Stopper*

If the seal carrier assembly is replaced, use seal pilot to guide seal over damper shaft. Lubricate seal carrier guide pilot before use.

CAUTION: Failure to use seal pilot will result in seal damage.

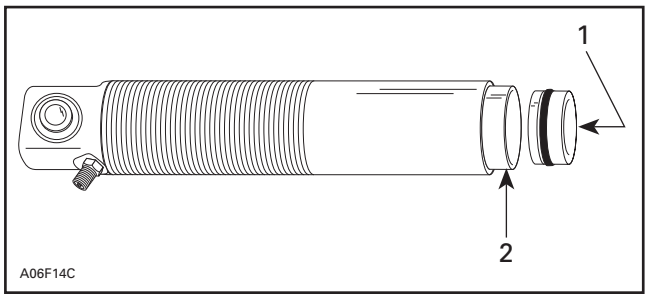
Reassemble damper rod assembly, taking care to properly assemble shim packs as required for your dampening needs. Ensure that the shaft piston is installed with the slits/larger intake holes facing the rebound shim stack.



1. *Seal guide*

If floating piston has been removed, reinstall floating piston into damper body (ensure that valve core has been removed). Use Molykote G-n paste (P/N 711 297 433) to ease O-ring past damper body threads with floating piston guide.

CAUTION: Failure to install IFP correctly could result in shock damage.

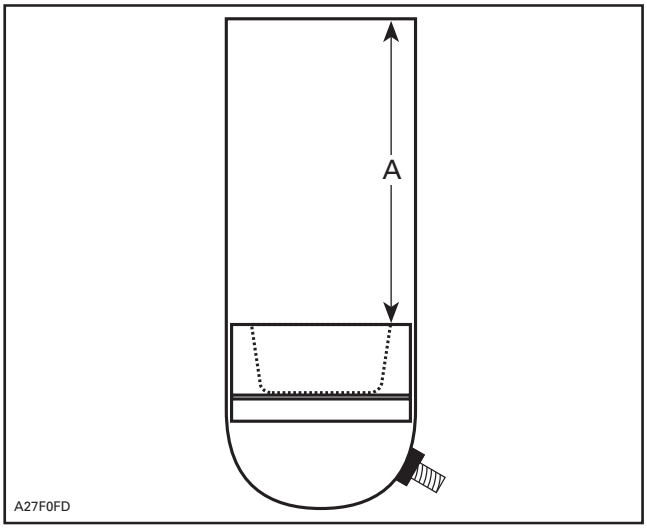


1. Push (slowly) by hand
2. Floating piston guide

NOTE: Lubricate inside of piston guide with Molykote G-n paste (P/N 711 297 433).

Install floating piston to the proper depth refer to following the table.

On all HPG take apart shocks, the floating piston is installed hollow side up.



A. Installation distance for floating piston installation

SHOCK P/N	INSTALLATION DISTANCE OF FLOATING PISTON mm
505 070 903	44.5
505 070 904	44.5
505 070 937	44.5
505 070 938	44.5
503 190 016	128
503 190 247	128
503 190 289	130
503 190 008	132
503 190 019	132
503 190 201	132
503 190 015	134
503 190 017	134
503 190 226	134
505 070 753	176
503 190 007	185
503 190 205	185
503 190 290	185
505 070 966	186
505 071 111	186
503 190 020	187
503 190 024	187
503 190 013	188
503 190 248	188

NOTE: If the floating piston is installed too far into the damper body, light air pressure through valve (with core removed) will move piston outward.

NOTE: Reinstall tire valve core after IFP has been installed at correct height and before adding oil.

⚠ WARNING

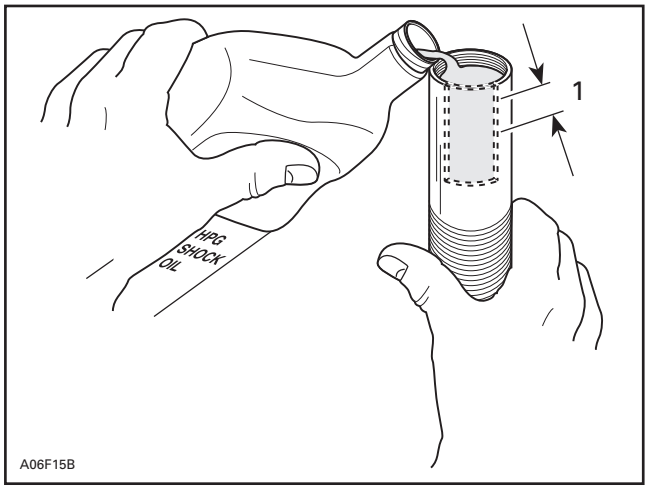
Whenever using compressed air exercise extreme caution, cover damper opening with shop cloth to reduce chance of possible injury.

CAUTION: Moisture laden compressed air will contaminate the gas chamber and rust floating piston.

⚠ WARNING

Always wear protective eye wear whenever using compressed air.

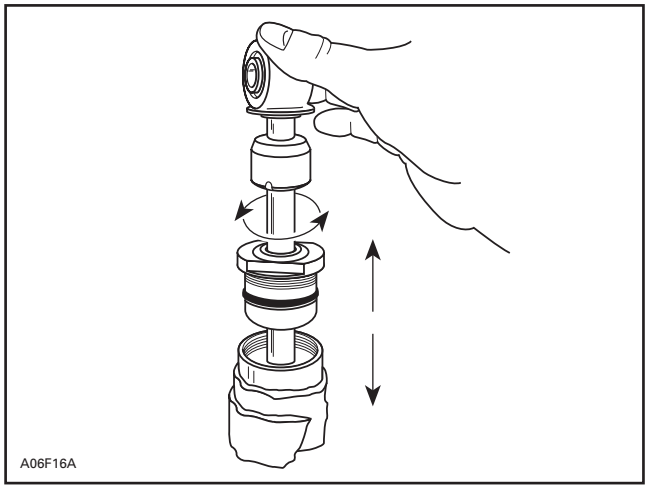
Fill the shock with Bombardier HPG shock oil (P/N 293 600 035) to approximately 10 mm (.393 in), from the base of seal carrier threads.



1. Fill to 10 mm (.393 in)

NOTE: Although we do not measure the exact amount of oil added to the damper, approximately 252 mL (8.52 oz. U.S.) will be used.

Carefully insert damper rod into the damper body. Lightly oil damper piston seal ring with shock oil to ease installation.



NOTE: Some shock oil will overflow when installing damper. Wrap damper with shop cloth to catch possible overflow oil.

CAUTION: Use care when passing piston into damper body at damper body threads.

Slight oscillation of damper rod may be required to allow piston to enter damper body bore.

Slowly push piston into damper body. Slight up and down movement may be required on short stroke to allow all air to pass through piston assembly. The gentle tapping of a small wrench, on the shock eye, may help dislodge air trapped in the submersed piston. Be careful not to drive the shaft any deeper into the oil than is necessary to just cover the shim stack.

NOTE: Fast installation of the damper rod may displace the floating piston from its original position. This must not occur if the damper is expected to perform as designed.

With damper rod piston into oil, TOP OFF damper oil volume. Oil level should be to damper body thread base.

Screw Cap Types of Shock

Seal carrier assembly can now be threaded into damper body. This should be done slowly to allow weapage of oil and to minimize IFP displacement. Torque seal carrier to 90 to 100 N•m (66 to 74 lbf•ft).

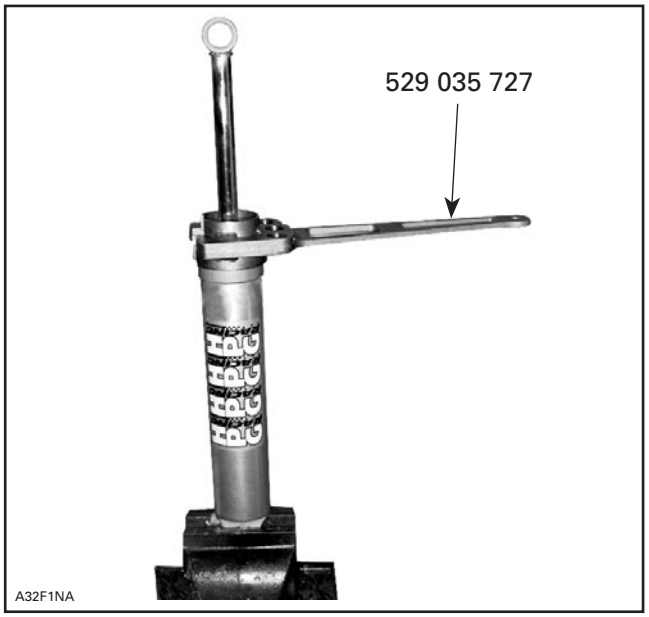
Snap Ring Cap Types of Shock

Seal carrier assembly can now be pushed into damper body to pass snap ring grove. Install snap ring into groove.

Tap the cap on the shock body.

All Types of Shocks

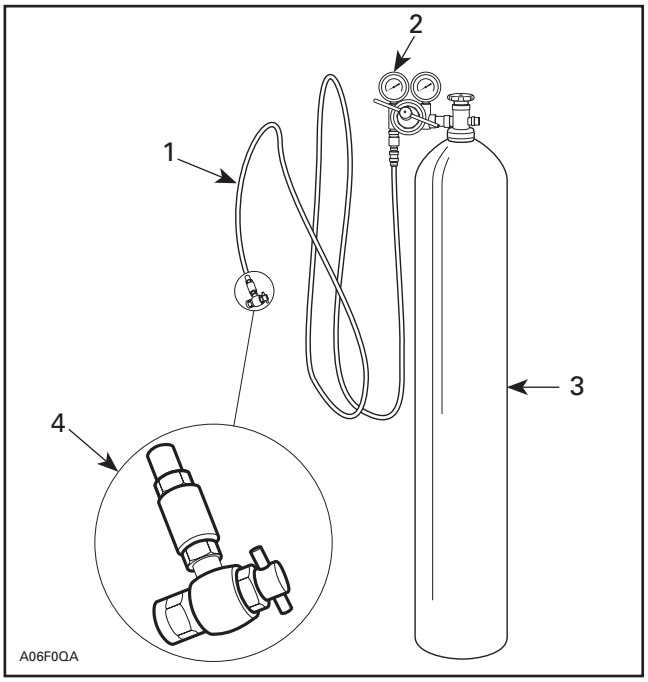
After the seal carrier is fully in place avoid pushing the shaft into the body until the nitrogen charge is added.



When removing and retightening the tire valve acorn nut use minimal torque. When the cap is over tightened and subsequently removed it may prematurely break the seal of the tire valve to the shock body and cause a loss of nitrogen charge without being noticed. If you suspect this has happened then recharge the shock as a precaution. Inspect the tire valve cap before installation to ensure that the internal rubber gasket is in its proper position.

Adding Gas Pressure

Nitrogen (N) can now be added to damper body.



1. High pressure hose
2. 2 stage regulator, delivery pressure range 2070 kPa (300 PSI)
3. High pressure cylinder filled with industrial grade nitrogen
4. Valve tip (P/N 529 035 570) permanently installed

NOTE: Never substitute another gas for nitrogen. Nitrogen has been selected for its inert qualities and will not contaminate the gas chamber of the shock.

Preset your pressure regulator to 2070 kPa (300 PSI) nitrogen (N), this gas pressure will restore the correct pressure for your damper.

CAUTION: Do not exceed the recommended pressure values.

⚠ WARNING

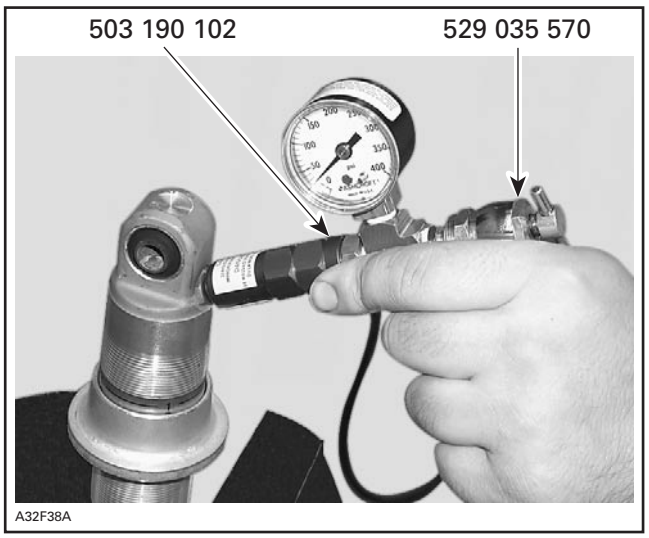
Whenever working with high pressure gas, use eye wear protection. Never direct gas pressure toward anybody.

Use appropriate inflation tool.

Needle Valve Type Shock

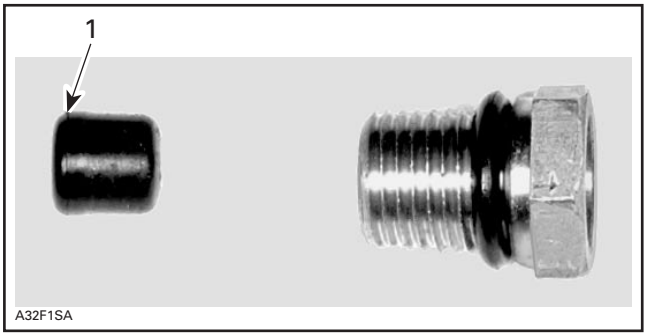
Install the gas refill needle type shock tool (P/N 503 190 102) on valve tip (P/N 529 035 570). Set the regulator pressure on the nitrogen cylinder as per the shock requirement.

Mount the shock on vise. Remove screw on top of valve. Place the needle guide of gas refill tool on the shock valve. While depressing the detent pin of the gas refill tool and pushing forward the needle assembly, insert the needle through the rubber core of the pressure valve assembly of the shock.



NOTE: For replacement of the needle or filling the shock, carefully follow the instructions provided with the gas refill needle type tool kit (P/N 503 190 102).

On some models, rubber may pop out of needle valve when inserting tool needle. If so, remove valve core and rubber then, reinstall rubber with its larger diameter last.



1. Larger diameter

When the shock is filled with gas, install back the screw on top of the valve.

All Shock Types

NOTE: Carefully inspect damper for gas or oil leaks. Any leaks must be corrected before continuing.

Damper gas pressure cannot be confirmed by using a pressure gauge. The volume of gas in the shock is very small, and the amount lost during gauge installation will lower the pressure too much and require refilling.

After recharging is complete the rebuilt shock should be bench-tested. Stroke the shock to ensure full travel and smooth compression and rebound action. If the shaft moves in or out erratically this could indicate too much air is trapped inside. If the shaft will not move or has partial travel then it may be hydraulically locked. In either event the shock must be rebuilt again. Pay particular attention to the placement of the IFP, quantity of oil and shim stack/piston assembly.

INSTALLATION

Install assembled suspension into track with front portion first.

Insert rear portion of suspension into track.

Bolt front arm and rear arm.

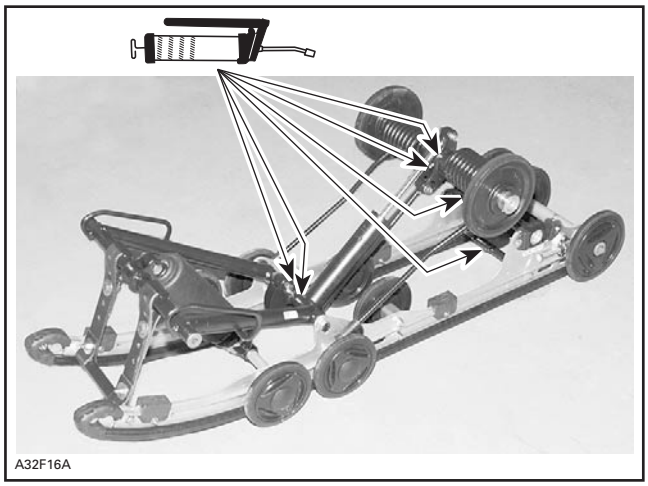
Adjust track tension.

RIDE ADJUSTMENT

Refer to *Operator's Guide*.

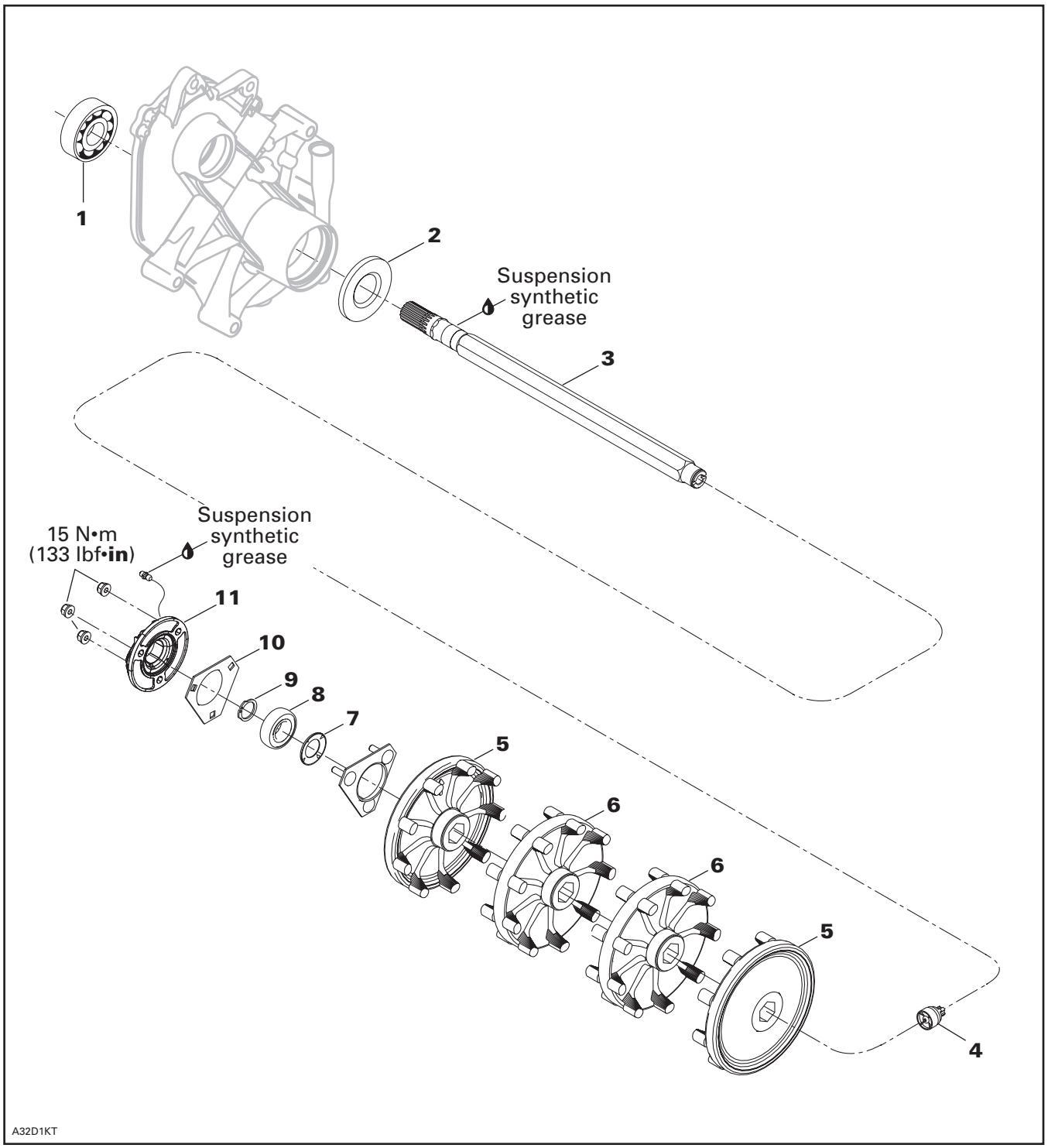
LUBRICATION

Lubricate front and rear arms at grease fittings using suspension synthetic grease (P/N 293 550 033).



SC-10 III: 6 GREASE FITTINGS

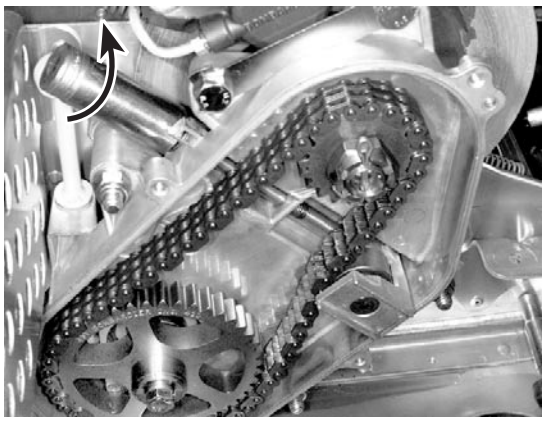
DRIVE AXLE


1
2
Suspension synthetic grease
3
15 N•m (133 lbf•in)
Suspension synthetic grease
11
10
9
8
7
5
6
6
5
4
A32D1KT

REMOVAL

Remove battery (if so equipped) to gain access, refer to BATTERY section.

Drain oil from chaincase. Remove chaincase cover. Release drive chain tension.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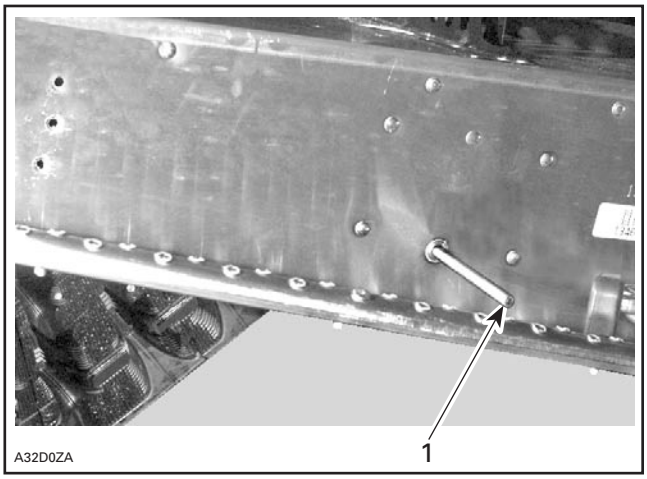
Raise and block rear of vehicle off the ground.

Remove suspension. Refer to proper subsection.

On some models, track can be held in tunnel using a rod in place of center idler wheel axle.



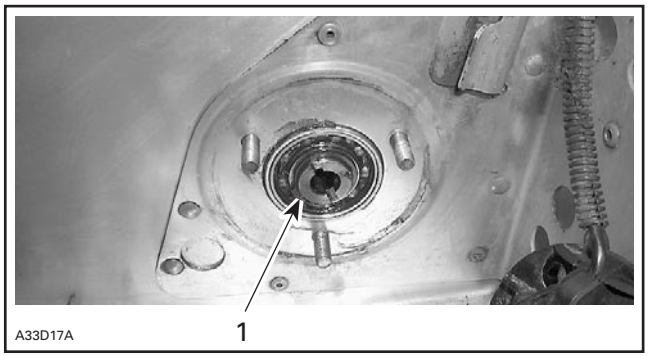
A32D0ZA

TYPICAL
1. Rod

Remove driven pulley. Refer to DRIVEN PULLEY.

Remove speedometer sensor **no. 11**, outer flange **no. 10** and circlip **no. 9** from left side.

Unscrew then pull speedometer magnetic adapter **no. 4** from drive axle.



A33D17A

1. Circlip

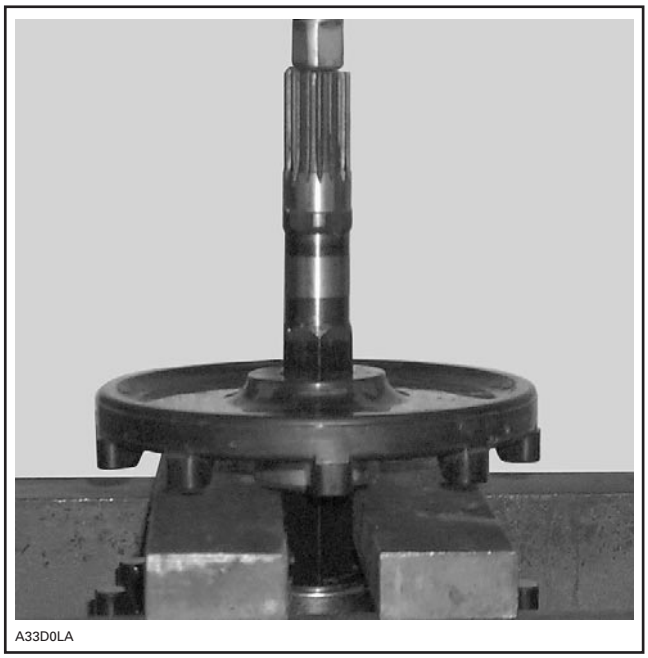
Apply parking brake.

Remove chain and sprockets then circlip from right side.

Release drive axle sprocket from track and at the same time, push the drive axle **no. 3** toward the right side. Drive axle bearing **no. 1** in chaincase will fall off.

Sprocket and Half-Sprocket

To remove press fit sprockets **no. 5, 6**, use a press and a suitable support as illustrated.

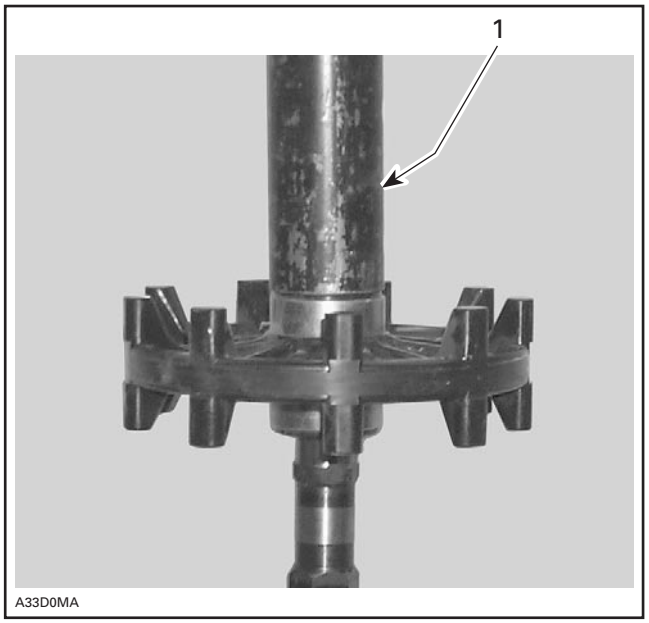

A33D0LA

1. Support sprocket near hub

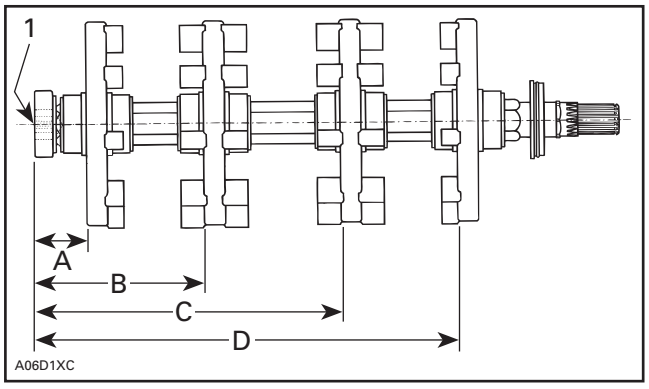
ASSEMBLY

Drive Axle and Sprocket

To assemble press fit sprockets **no. 5, 6**, use a press and a suitable pipe as illustrated. Sprockets must be assembled according to the following dimensions measured from drive axle end.

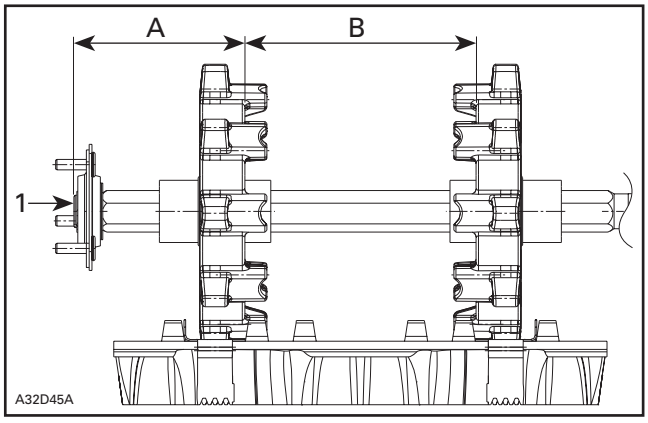


1. Pipe



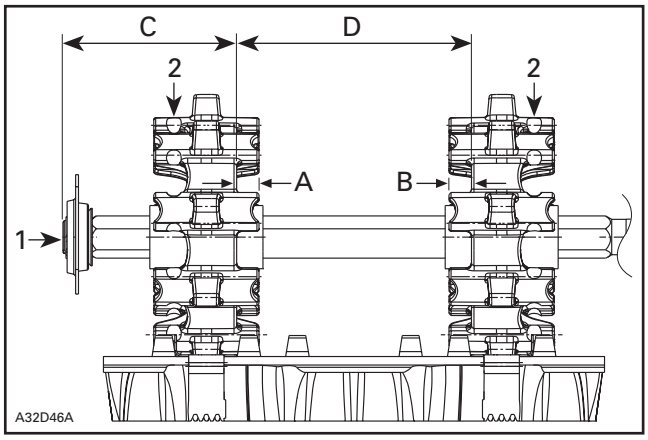
GSX AND MX Z SERIES
1. Measure from end of drive axle

A. 48.5 mm (1.909 in)
B. 151.0 mm (5.944 in)
C. 274.0 mm (10.787 in)
D. 376.5 mm (14.822 in)



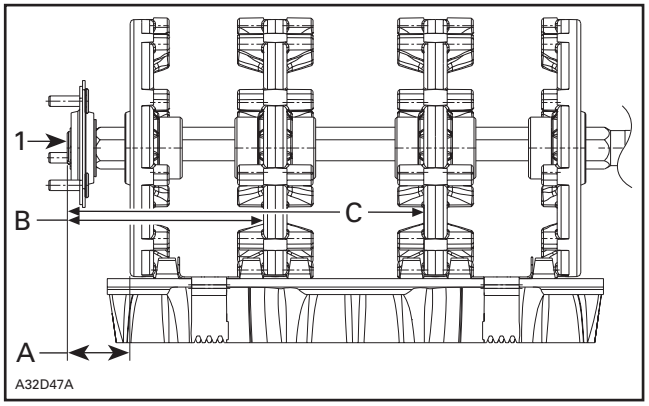
SUMMIT X AND HIGHMARK X
1. Measure from end of drive axle

A. 132.0 mm (5.2 in)
B. 178.5 mm (7.03 in)



SUMMIT HM XTREME
1. Measure from end of drive axle
2. Position machined teeth outward

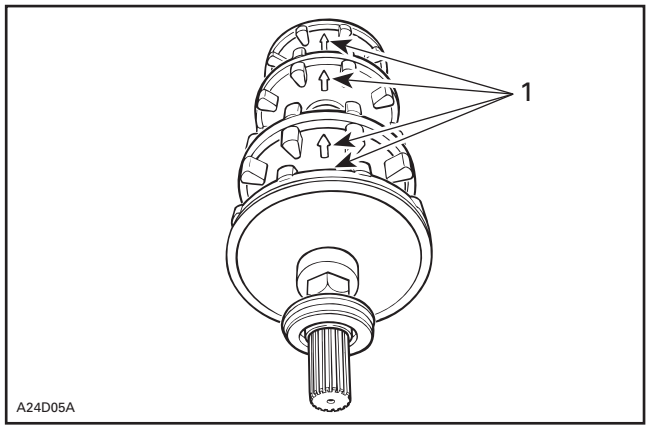
A. 17.0 mm (.67 in)
B. 17.0 mm (.67 in)
C. 132.0 mm (5.20 in)
D. 178.5 mm (7.03 in)



SUMMIT ADRENALINE/SPORT AND HIGHMARK
1. Measure from end of drive axle

A. 48.3 mm (1.90 in)
B. 150.8 mm (5.94 in)
C. 273.8 mm (10.78 in)

Ensure to align indexing marks of each sprocket when assembling.



TYPICAL
1. Indexing marks aligned

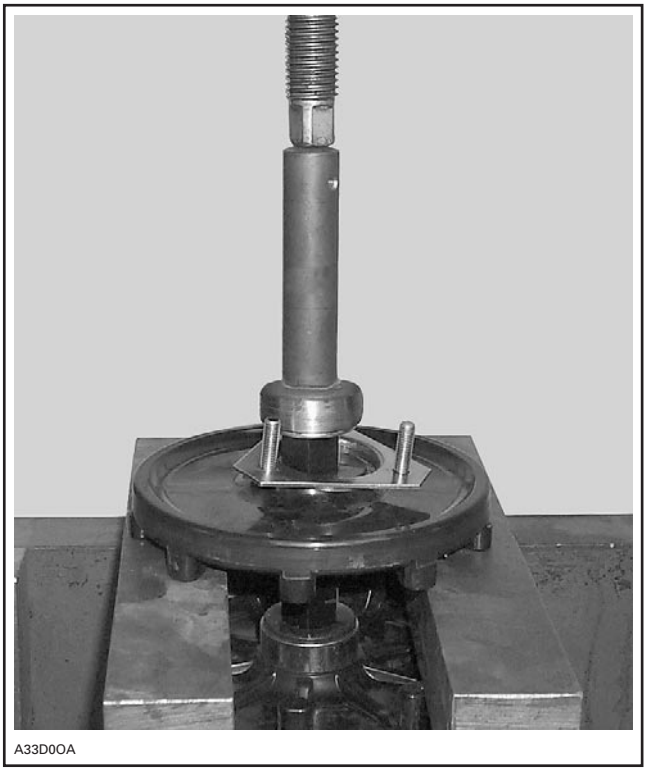
CAUTION: The same sprocket must not be pressed twice on the axle. When sprocket has been removed from drive axle, use a new sprocket at the installation.

Bearing Protector

At assembly, flat side of bearing protector **no. 7** must be against bearing.

Bearing

Always push bearing **no. 8** by inner race.



The bearing **no. 8** must have its shield facing the sprocket.

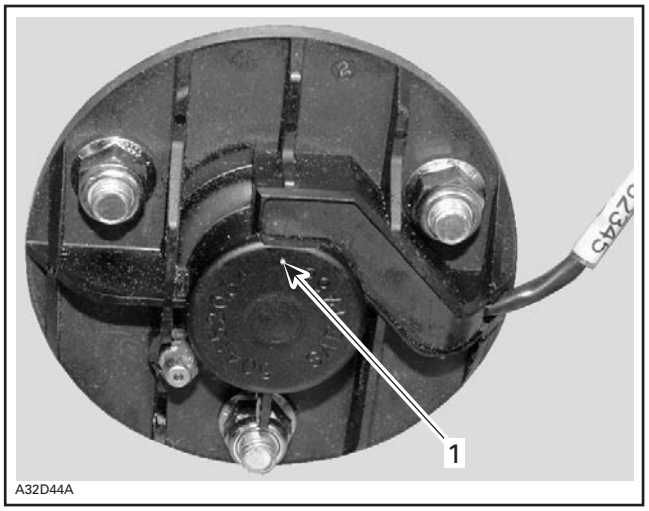
The bearing **no. 1** must have its shield facing right side (cover).

When installing seal **no. 2** ensure to position it as shown in the exploded view.

Index speedometer magnetic adapter **no. 4** in drive axle and push until it is completely inserted in its hole.

LUBRICATION

Lubricate end housing bearing with suspension synthetic grease (P/N 293 550 033). Continue lubricating until grease flows out of the pilot hole on speedometer sensor.



1. Lubricate until grease flows out here

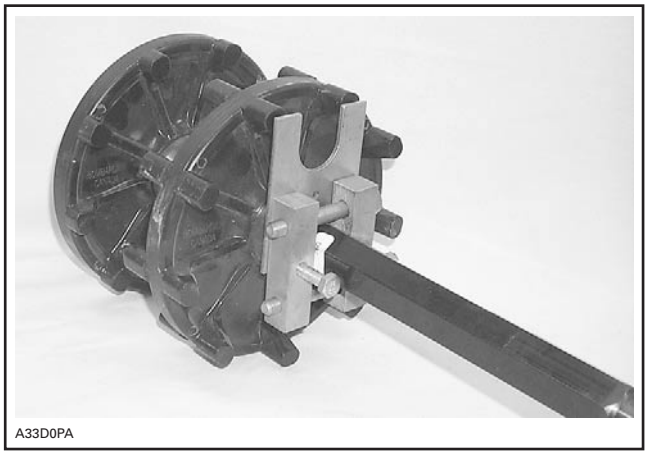
ADJUSTMENT

Sprocket/Track Alignment

CAUTION: Do not tamper with sprocket/track alignment if frame or suspension is damaged.

Sprockets may be repositioned to fit lugs without removing drive axle.

Use drive axle sprocket adjuster kit (P/N 861 725 700).



TRACK

TRACK TYPE APPLICATION

Refer to TECHNICAL DATA.

GENERAL

This section gives guidelines for track removal. Some components require more detailed disassembly procedures. In these particular cases, refer to the pertaining section in this manual.

INSPECTION

Visually inspect track for:

– cuts and abnormal wear
– broken rods
– broken or missing track cleats.

If track is damaged or rods are broken, replace track. For damaged or missing cleats, replace by new ones, using cleat remover (P/N 529 028 700). Use narrow-cleat installer (P/N 529 008 800).

⚠ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

REMOVAL

Remove the following parts:

– rear suspension (refer to proper subsection)
– drive axle (refer to DRIVE AXLE)
– track.

INSTALLATION

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.

ADJUSTMENT

Track Tension and Alignment

Track tension and alignment are inter-related. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

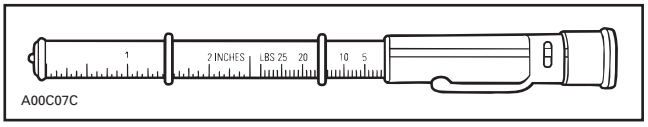
Tension

NOTE: Ride the snowmobile in snow about 15 to 20 minutes prior to adjusting track tension.

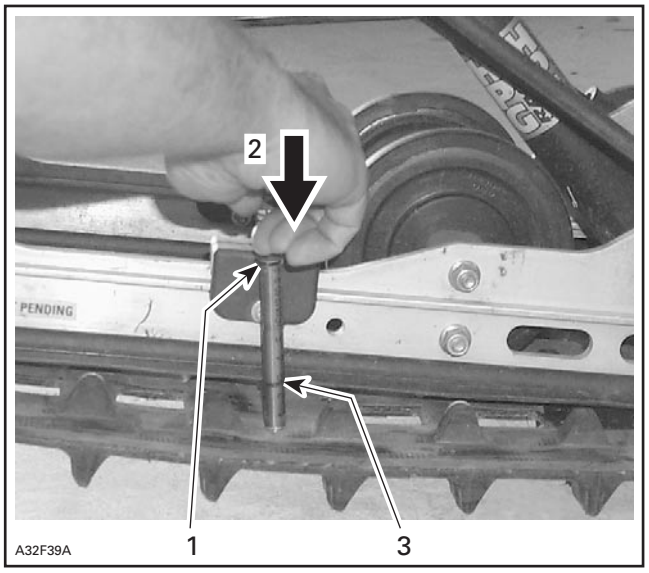
Lift snowmobile by a rope, chain or lift strap hooked to rear bumper.

Allow the rear suspension to fully extend and check gap half-way between front and rear idler wheels. Measure between slider shoe bottom and inside of track. The gap should be as given in SPECIFICATIONS. If the track tension is too loose, track will have a tendency to thump.

NOTE: A belt tension tester (P/N 414 348 200) may be used to measure deflection as well as force applied.



BELT TENSION TESTER

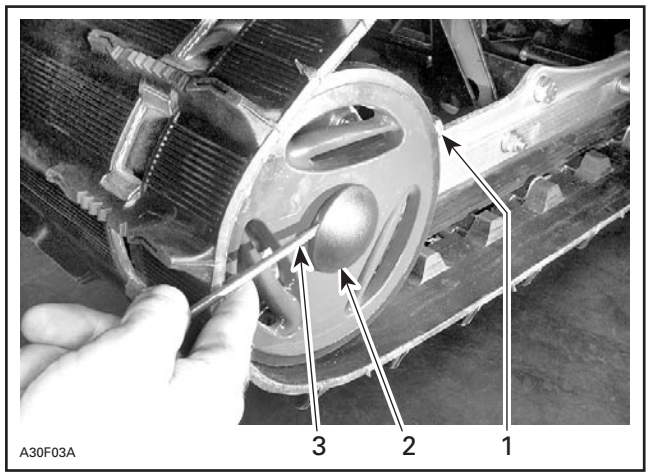


1. Top tool O-ring positioned at 7.3 kg (16 lb)
2. Push on top portion of tool until it contacts the top O-ring
3. Measured track deflection

CAUTION: Too much tension will result in power loss and excessive stresses on suspension components.

To Adjust Tension:

– Remove wheel caps.
– Loosen the rear idler wheel retaining screws.
– Turn adjustment screws to adjust.



TYPICAL
1. Adjustment screw
2. Retaining screw
3. Wheel cap removal

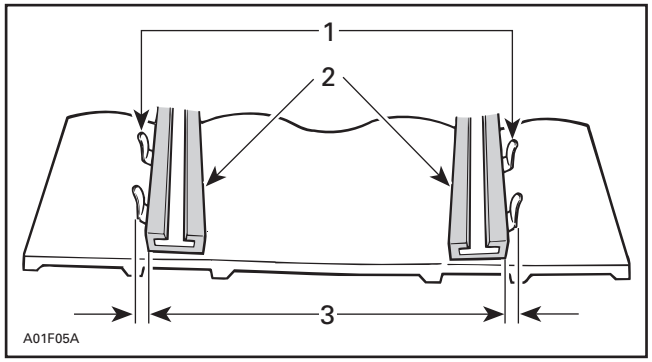
Alignment

⚠ WARNING

Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle. Never rotate at high speed.

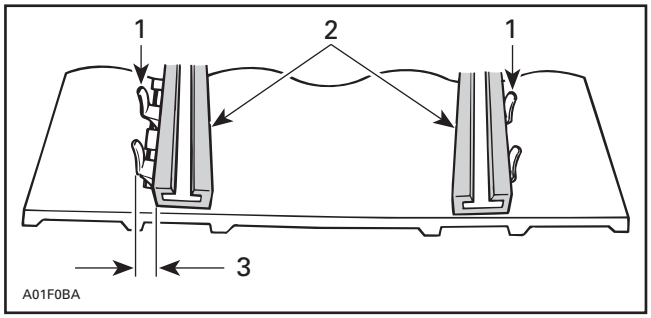
Start the engine and accelerate slightly so that track barely turns. This must be done in a short period of time (1 to 2 minutes).

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

To correct, stop engine, loosen rear wheel screws, then tighten the adjustment screw on side where the slider shoe is the farthest from the track insert guides.



1. Guides
2. Slider shoes
3. Tighten on this side

Restart engine, rotate track slowly and recheck alignment. If the satisfactory alignment is achieved, then tighten the idler wheel retaining screws to 48 N•m (35 lbf•ft). Reinstall the wheel caps.

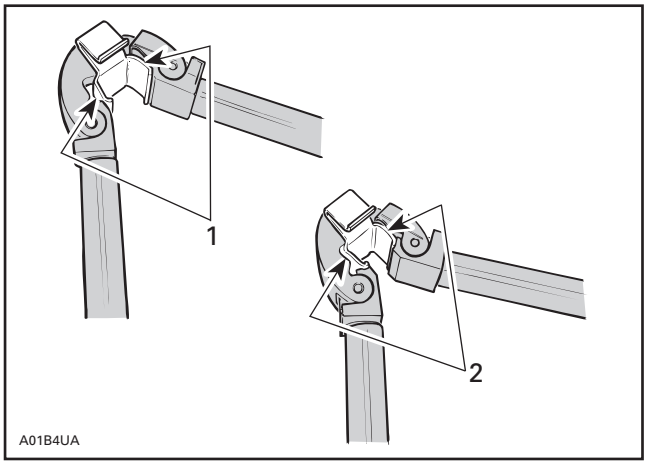
Track Cleat

Removal

– Raise rear of vehicle off the ground and lift snow guard then hand rotate track to expose a cleat to be replaced.
– Use track cleat remover (P/N 529 028 700) for all models.

Installation

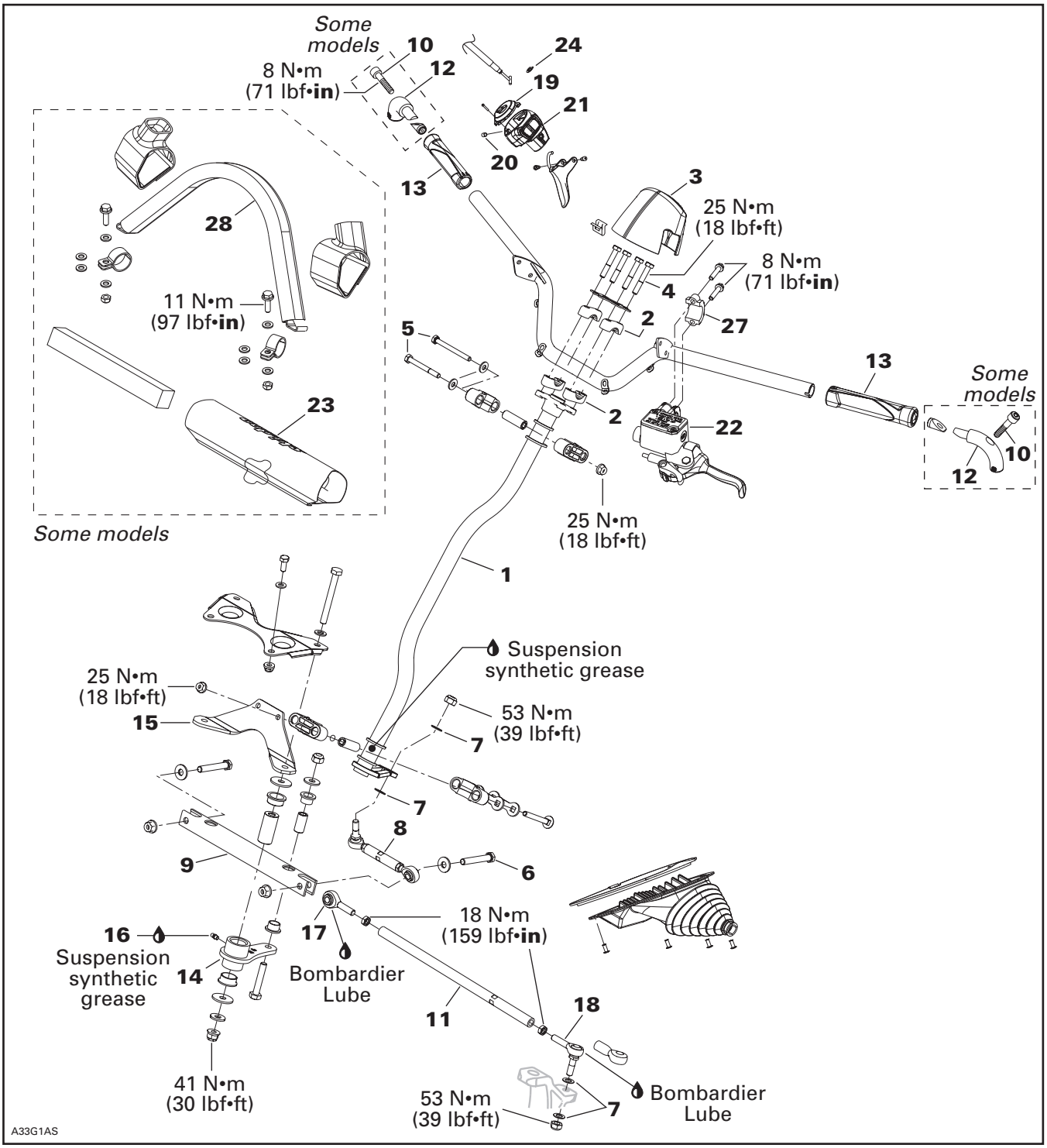
– Place new cleat in position on the track and using narrow track cleat installer (P/N 529 008 500) bend cleat then push tabs into rubber.
– Re-open installer, then position cleat tabs on open end of tool and squeeze tabs until they are indented in rubber.



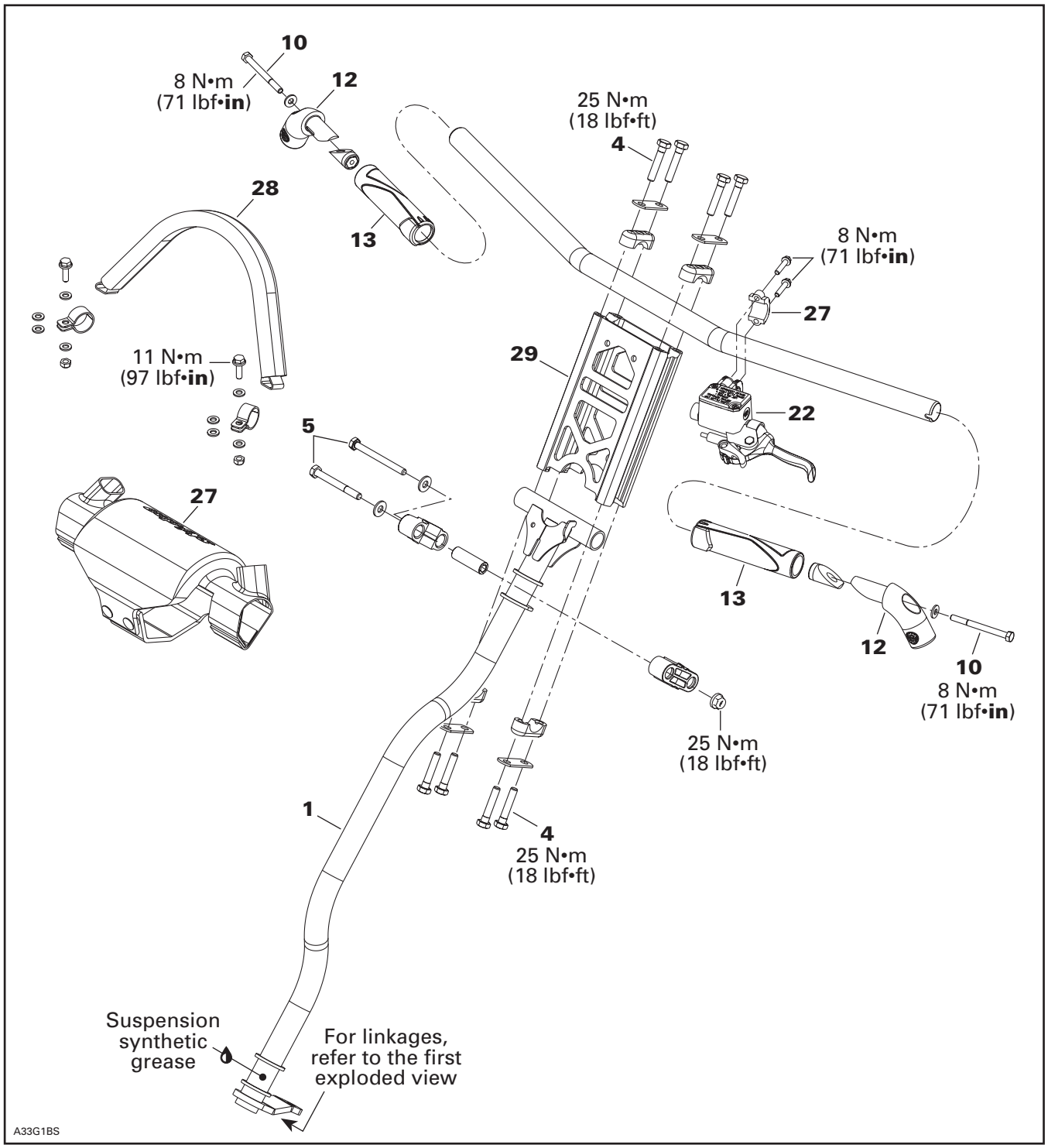
TYPICAL
1. *First step*
2. *Second step (to push tabs into rubber)*

STEERING SYSTEM

GSX Series, Summit Adrenaline/Sport/Highmark



MX Z 500 SS/600 HO/800 HO, Summit X/Highmark X/Highmark Xtreme



DISASSEMBLY AND ASSEMBLY

Grip

NOTE: These models feature an integrated heating element in the plastic sleeve of the grip **no. 13**.

CAUTION: Removing grip from handlebar might damage the heating element. Do not remove needlessly.

NOTE: If heating grip does not work and needs to be replaced, the grip can be cut with a knife for removal.

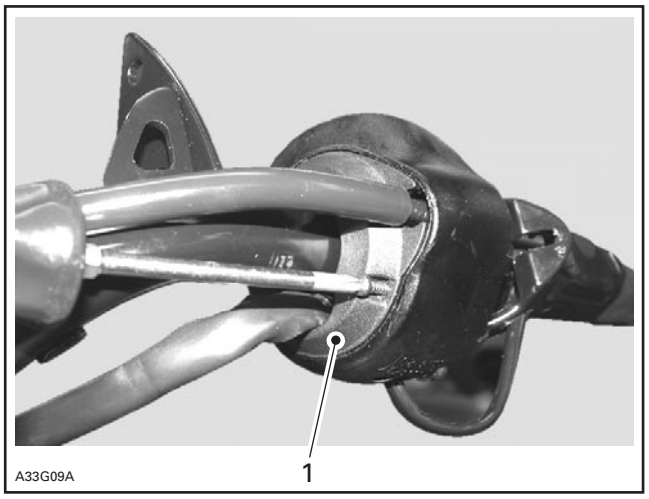
Throttle Side:

Unfasten windshield.

NOTE: Throttle lever housing **no. 21** must come off handlebar along with grip.

Remove cap **no. 3** or steering padding **no. 23** according to model. Unplug RH harness on top of steering column. Cut locking ties retaining RH harness to handlebar.

Remove throttle lever housing cover **no. 19**.



1. Throttle lever housing cover

Remove circlip **no. 24** from throttle cable housing. Unfasten throttle cable from throttle lever, then pull out throttle cable housing from throttle lever housing **no. 21**.

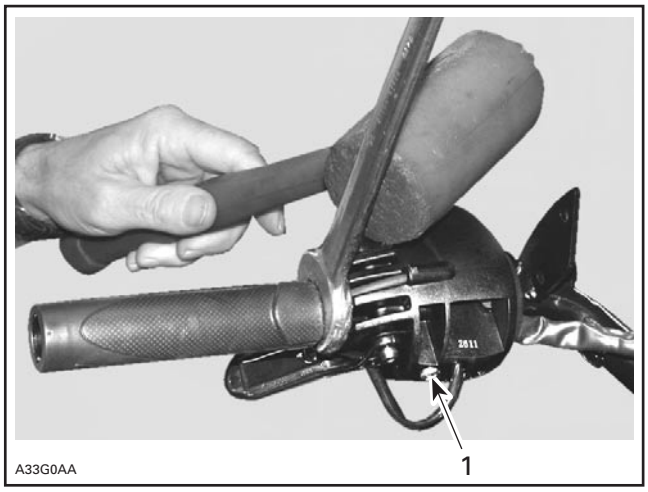
Unscrew screws **no. 10** and remove J-hook **no. 12** from end of grip on so equipped models.

Loosen screw **no. 20** retaining throttle lever housing to handlebar. See photo below.

Insert the open side of a 23 mm (7/8 in) wrench against the inner end of grip.

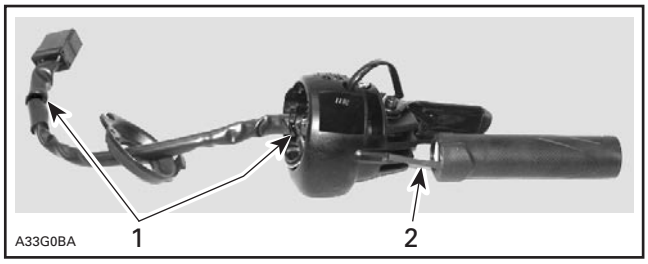
CAUTION: Pay attention not to damage wires with the wrench.

Using a plastic hammer, tap on the side of the wrench end to make the grip slide out.



1. Screw retaining throttle lever housing

Cut locking ties on harness. Using the multilock-terminal housing extraction tool AMP (P/N 755430-2), push the 3 wires of the heating grip harness out of connector housing. Note the position of the wires for reinstallation.



1. Locking ties
2. Heating grip harness

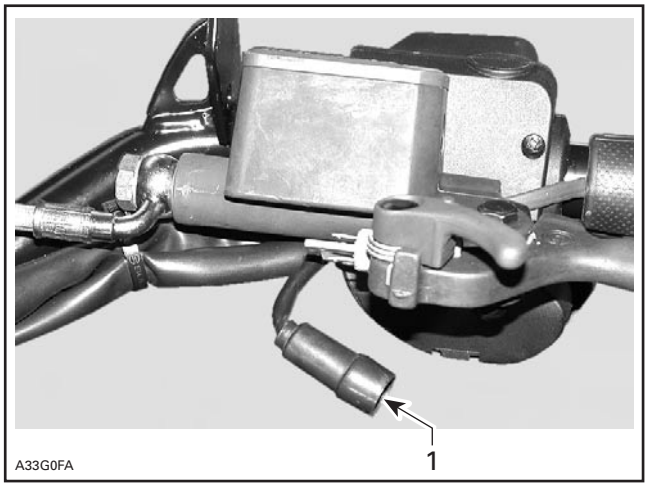
Pull heating grip harness out of throttle lever housing.

For installation refer to grip installation below.

Brake Side:

Unclip windshield.

Unplug connectors from brake light switch located on master cylinder **no. 22**.



1. Connectors unplugged

Unplug LH harness on top of steering column. Cut locking ties retaining brake light switch/heating grip harness to handlebar.

Using the multilock-terminal housing extraction tool AMP (P/N 755430-2), push the 3 wires of the heating grip harness out of connector housing. Note the position of the wires for reinstallation.

Pull heating grip wires out of brake light switch/heating grip harness.

Insert the open side of a 23 mm (7/8 in) wrench against the inner end of grip.

CAUTION: Pay attention not to damage wires with the wrench.

Using a plastic hammer, tap on the side of the wrench end to make the grip sliding out.

Grip Installation:

Installation is the opposite procedure of the removal but pay attention to the following.

Clean handlebar ends and inside of heating grip with isopropyl alcohol. Let dry before installation.

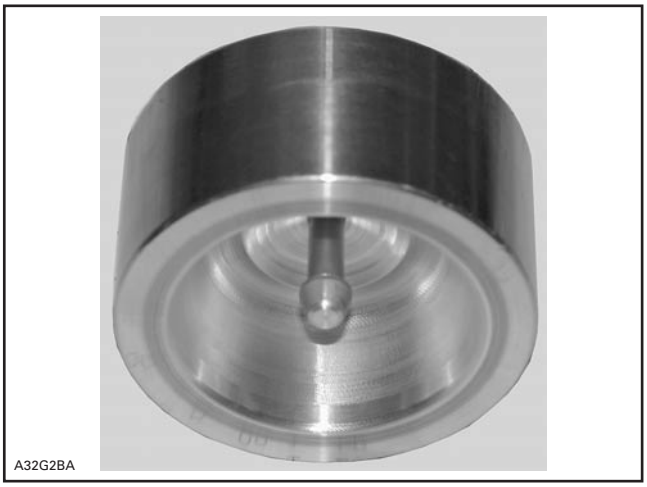
⚠ WARNING

Handlebar end and inside of heating grip must be clean and dry before installing heating grip to ensure proper adhesion.

Position grip on handlebar with its harness aligned with windshield bracket. See next photo.

Use the appropriate insertion tool to properly install grip.

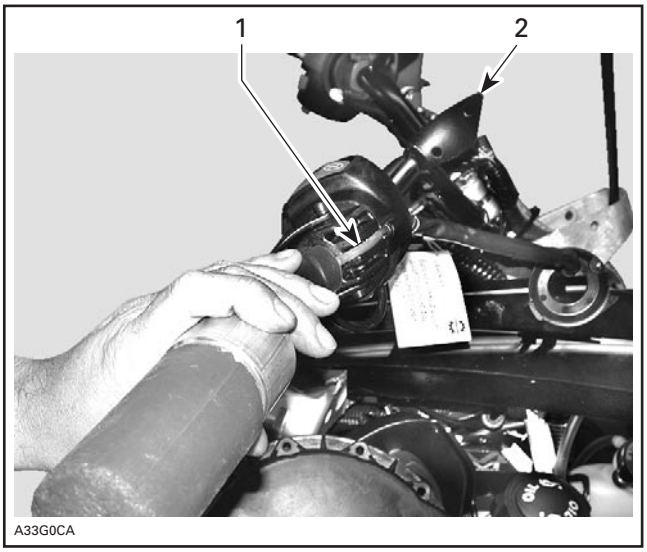
MODEL	TOOL PART NUMBER
Models with straight grips	529 035 897
Models with J-hooks	529 035 936



CAUTION: Installing grip without the insertion tool is likely to damage its heating element.

Position the insertion tool at the outside end of grip.

Using a plastic hammer, tap on tool to push grip on. Continue to tap until grip bottoms.



1. Harness
2. Windshield bracket

Properly route harness then reinstall removed parts.

Reinstall terminals and replug connectors. Test grips to ensure they heat properly.

Steering Column

Unfasten windshield. Remove cap **no. 3** or steering padding **no. 23** according to model.

Remove console. Refer to STEERING COLUMN POSITION ADJUSTMENT below.

Cut locking ties retaining harnesses to steering column **no. 1**.

Unbolt handlebar ass'y and move it aside.

Remove tuned pipe.

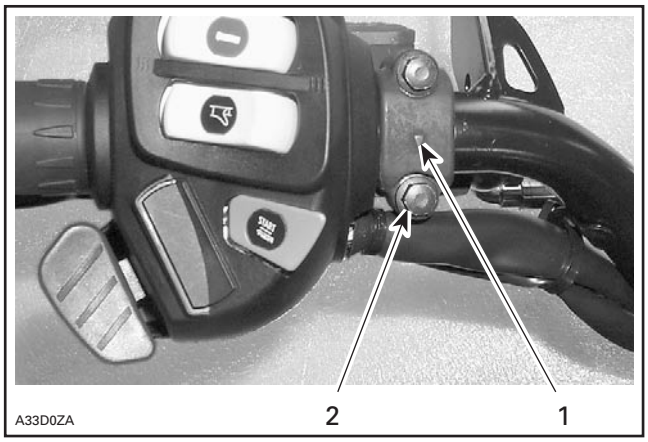
Detach the short tie rod **no. 8** from the steering column. Note that a hardened flat washer **no. 7** goes on each side of steering column lever.

Disengage carriage bolts **no. 6** from steering column support **no. 15**. Remove lower plastic U-clamps from steering column.

Disengage carriage bolts **no. 5** from steering support. Remove upper plastic U-clamps from steering column.

Pull steering column from top.

If, for any reason, the master cylinder has been removed from handlebar note that its clamp **no. 27** must be installed with the embossed arrow pointing downward. Torque screws to 8 N•m (71 lbf•**in**) beginning with the bottom screw.



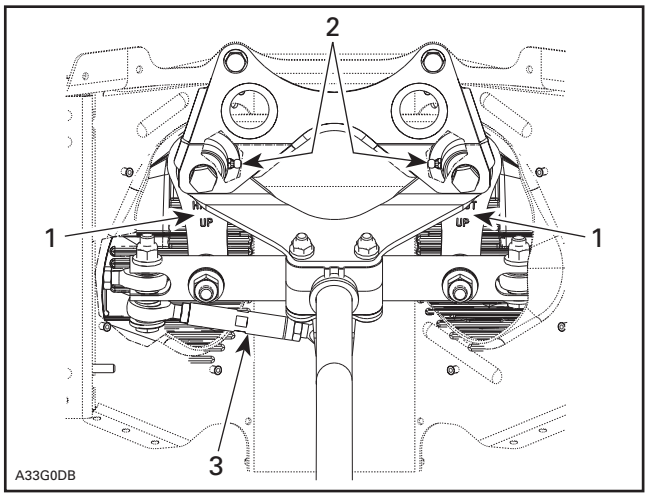
1. Arrow on clamp pointing downward
2. Tighten bottom screw first

Refer to HANDLEBAR POSITION ADJUSTMENT for handlebar reinstallation.

RH and LH Swivel Arm

At assembly respect UP mention.

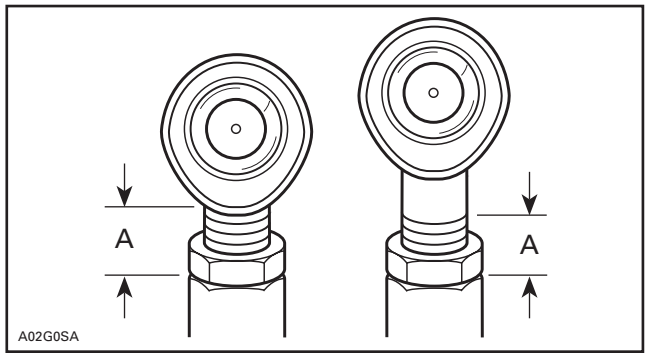
Grease fitting **no. 16** of swivel arms **no. 14** must face toward center of vehicle.



1. UP mention
2. Grease fittings
3. Small tie rod

Ball Joint (left hand and right hand threads)

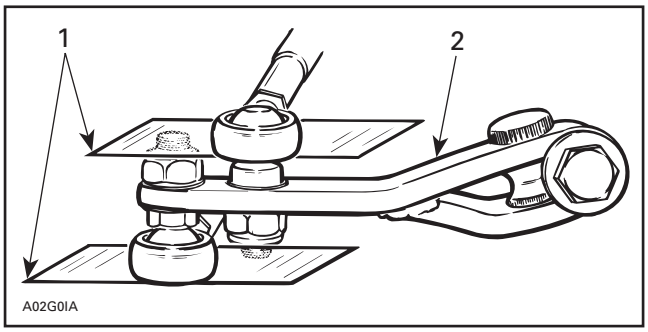
The maximum external threaded length not engaged in the tie rod must not exceed 20 mm (25/32 in).



TYPICAL
A. 20 mm (25/32 in) max.

The ball joint **no. 17** and **no. 18** should be restrained when tightening the tie rod end lock nut. Align it so the tie rod end is parallel to the steering arm when assembled on the vehicle, refer to the following illustration.

For proper torque specifications refer to the specific exploded view for the vehicle being serviced.



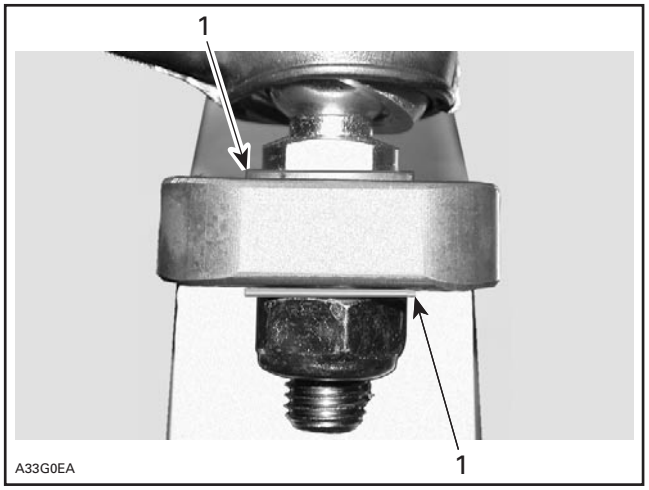
TYPICAL
1. Parallel with steering arm
2. Steering arm

⚠ WARNING

The cut off section of the ball joint must run parallel with the swivel bar no. 9. When tightening lock nuts, restrain ball joint with appropriate size wrench. The maximum external threaded length not engaged in the tie rod must not exceed 20 mm (25/32 in).

Hardened Washer

Install a hardened washer **no. 7** on each side of the ski leg and each side of the steering column lever.



TYPICAL
1. Hardened washers

INSPECTION

Check skis and runners for wear. Replace as necessary. Refer to FRONT SUSPENSION.

Check the general condition of the steering system components for wear. Replace if necessary.

Heating Grip Element

Refer to TESTING PROCEDURE for checking heating element **no. 13** of grip.

Ball Joint (left hand and right hand threads)

Inspect ball joint ends **no. 17** and **no. 18** and small tie rod ends for wear or looseness, if excessive, replace them.

ADJUSTMENT

Steering Column Position Adjustment

Some Models

⚠ WARNING

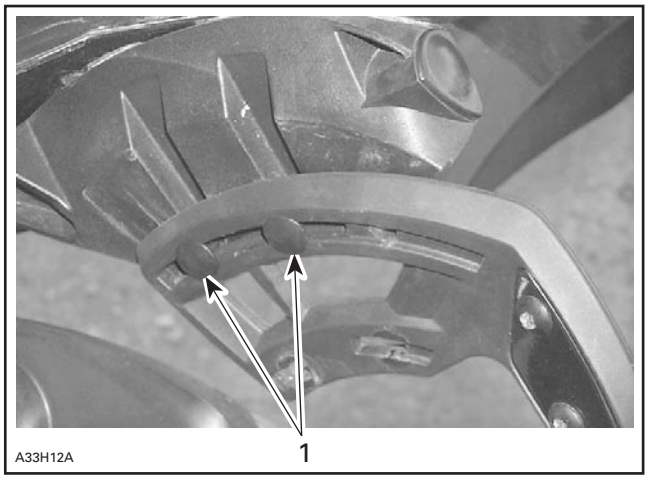
Do not drill additional holes to customize steering column position.

Steering column position is adjustable. Proceed as follows.

There are 2 positions.

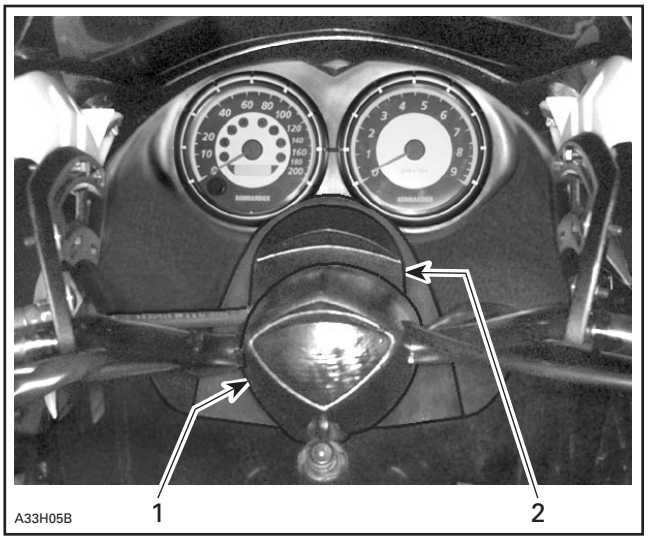
NOTE: Following procedure describes how to change steering column position from rearward to forward position.

Unscrew 4 bolts retaining windshield assembly to handlebar. Remove windshield assembly.



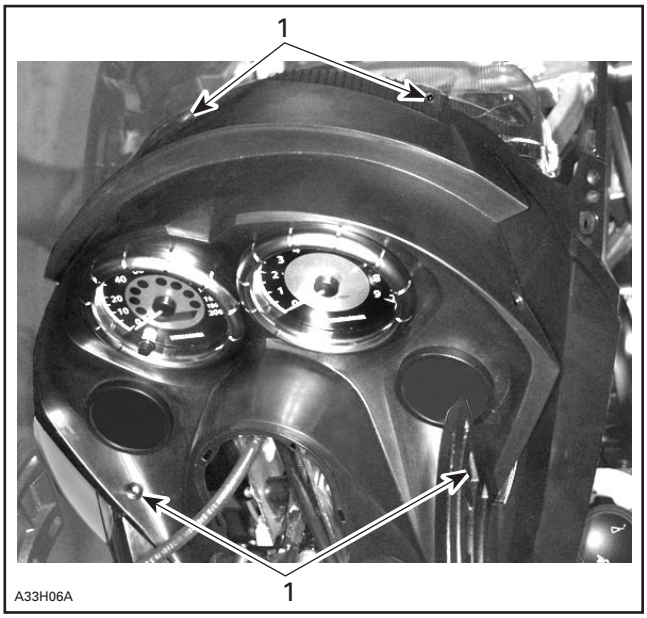
ONE SIDE SHOWN — REARWARD POSITION
1. Bolts retaining windshield assembly

Remove cap **no. 3** or steering padding **no. 23** according to model and remove console cap.



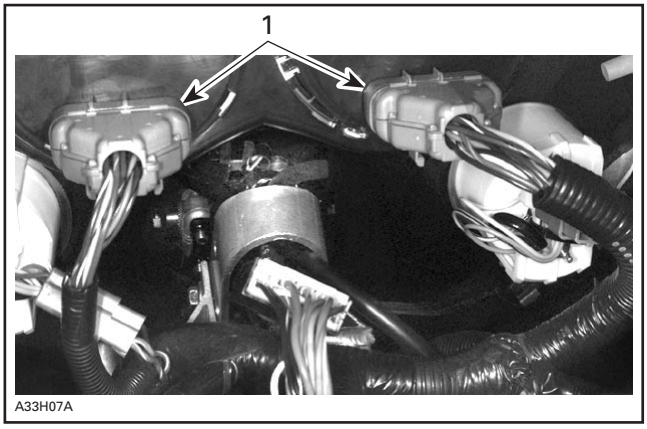
1. Cap
2. Console cap

Unscrew 4 bolts retaining console.



1. Bolts retaining console

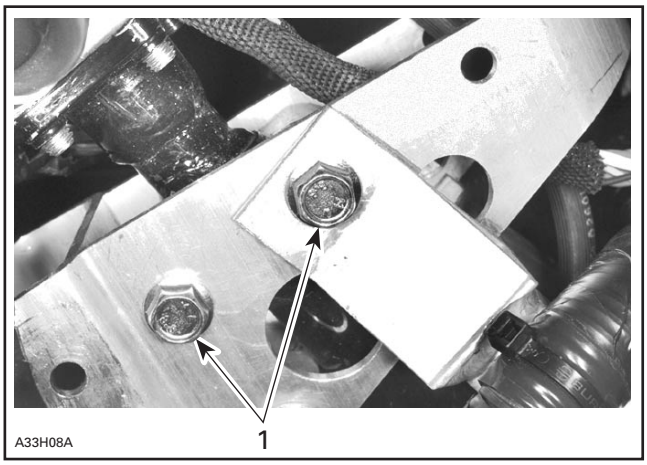
Slightly lift console to gain access to electrical connector housings. Unplug the 2 large connector housings and then separate 3-wire connector.



TYPICAL
1. Large connector housings

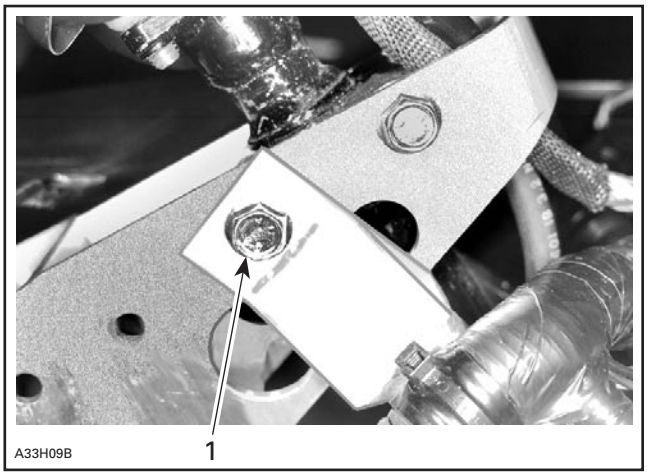
Remove console.

Remove 2 bolts **no. 5** retaining top of steering column.



STEERING COLUMN IN REARWARD POSITION
1. Two bolts retaining top of steering column

Move steering column to forward position.

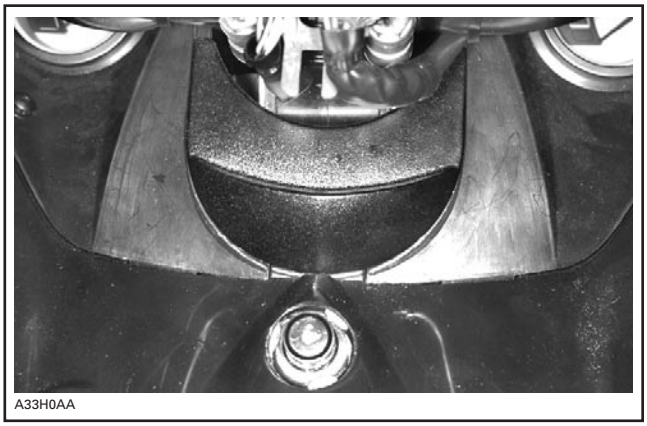


STEERING COLUMN IN FORWARD POSITION
1. Longer bolt

Reinstall the 2 bolts **no. 5**. Always install the longer bolt on thicker portion to be bolted. Use new lock nuts. Torque nuts to 25 N•m (18 lbf•ft).

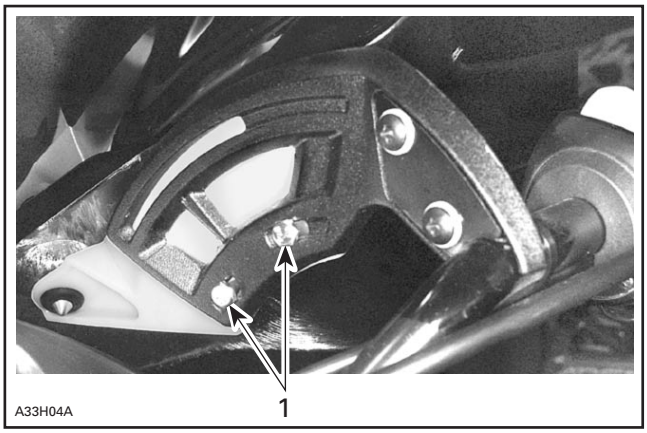
Reconnect the electrical connectors and reinstall all removed parts.

Position of console cap will be inverted. Instead of being above it will be beneath steering column.



CONSOLE CAP INSTALLED BENEATH STEERING COLUMN

Reinstall windshield assembly to handlebar. Refer to WINDSHIELD ADJUSTMENT below.



ONE SIDE SHOWN — FORWARD POSITION
1. Bolts retaining windshield assembly

Readjust throttle lever housing **no. 21** and switch housing accordingly to optimal angle so that you will not need to release your grip to operate levers.

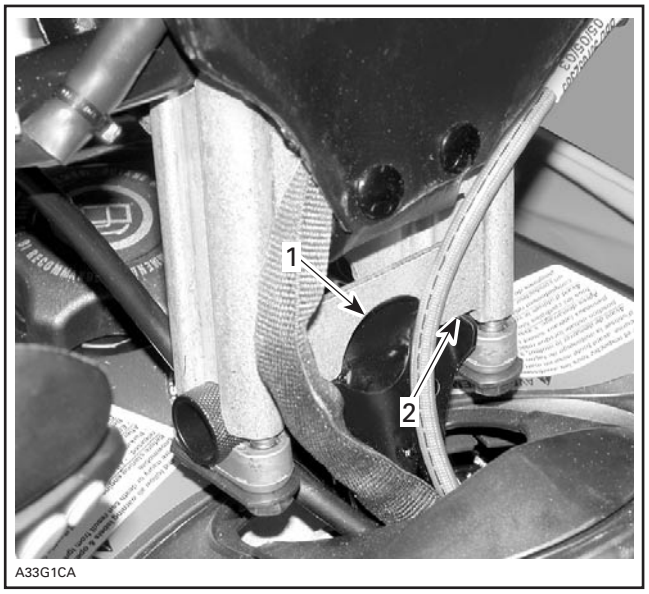
⚠ WARNING

Adjust with vehicle at rest in a safe place. Securely retighten all fasteners. Never rotate throttle lever to operate with fingers instead of thumb.

Handlebar Extension

Some Models

When installing handlebar extension **no. 29**, ensure to position the rounded opening at the bottom and to tilt the extension so that it rests against steering support stopper.

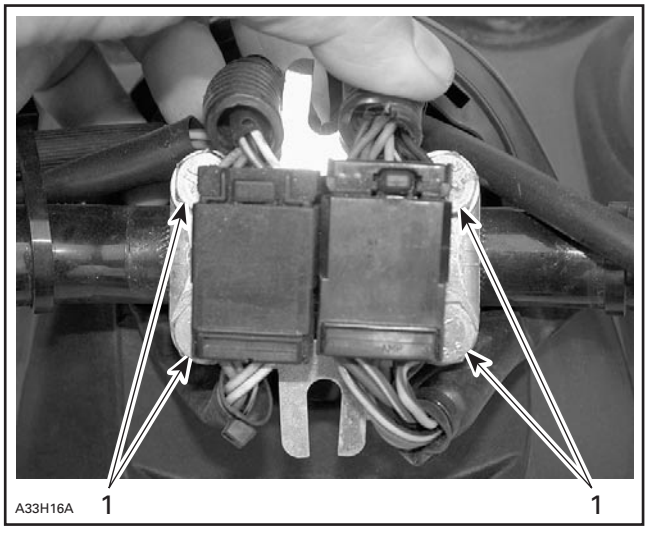


1. Opening here
2. Extension against stopper

Handlebar Position Adjustment

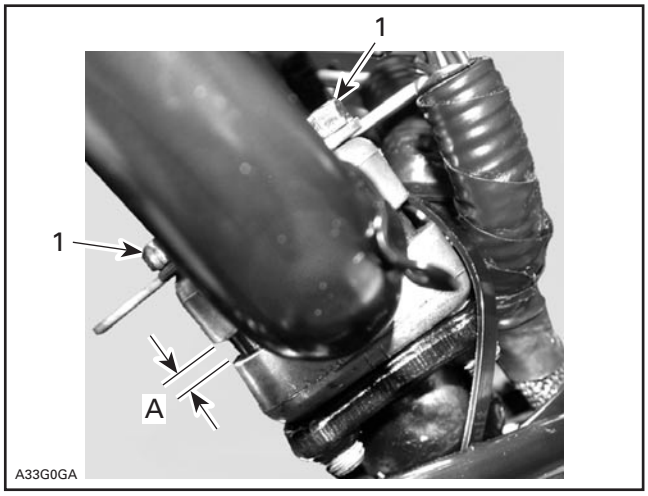
The handlebar position can be adjusted to suit driver's preferences.

Loosen all 4 bolts **no. 4** retaining handlebar to steering column.



1. Four bolts

Move handlebar to the desired position. Torque all 4 bolts **no. 4** to 25 N•m (18 lbf•ft).



1. Torque to 25 N•m (18 lbf•ft)
A. Equal gap all around

CAUTION: Tighten the bolts equally in a criss-cross sequence and ensure there is an equal gap on each side of the clamps no. 2.

⚠ WARNING

Avoid contact between the brake handle and the windshield by NOT adjusting the handlebar too high.

Readjust throttle lever housing **no. 21** and switch housing accordingly to optimal angle so that you will not need to release your grip to operate levers.

⚠ WARNING

Adjust with vehicle at rest in a safe place. Securely retighten all fasteners. Never rotate throttle lever to operate with fingers instead of thumb.

Readjust windshield for proper fit with console. Refer to WINDSHIELD ADJUSTMENT below.

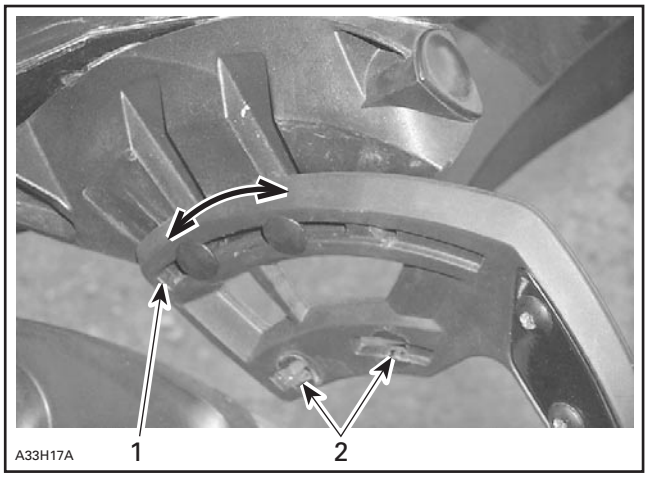
Windshield Adjustment

The windshield can be adjusted to properly fit with console.

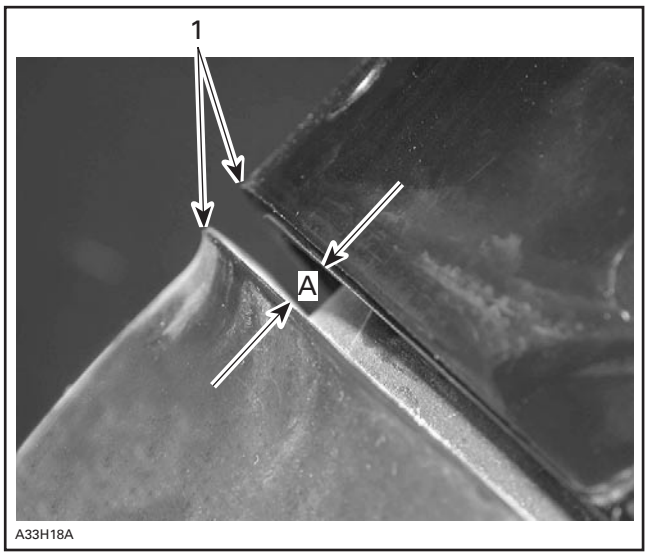
Before adjusting windshield, make sure it is installed on the proper bracket slots according to steering column position. See photos below.

Slots in brackets allow different windshield positions. Move windshield to fit with console. Retighten 4 nuts to 5 N•m (44 lbf•**in**).

Check that windshield does not touch console after adjustment.



1. *Slot when windshield is installed in rearward steering column position*
2. *Slots when windshield is installed in forward steering column position*



PROPER FIT OF WINDSHIELD VERSUS CONSOLE
1. *In line*

A. 8 to 12 mm (3/8 to 1/2 in)

Handlebar Strap

Some Models

Ensure to position strap **no. 28** symmetrically each side of steering support and so that its rubber band is on the inner side. Tilt strap 5° towards driver relative to steering column axis or relative to handlebar extension on so equipped models.

On Renegade X and Summit Series, position strap between rubber band and screw end to protect the rubber band.

Retaining clip and hardware must be installed in the same position on both strap ends.

J-Hook Adjustment

Some Models

Position J-hook so that its curved end is pointing downward and is roughly vertical. Ensure to adjust J-hooks at the same position each side.

Hand Guard Adjustment

Some Models

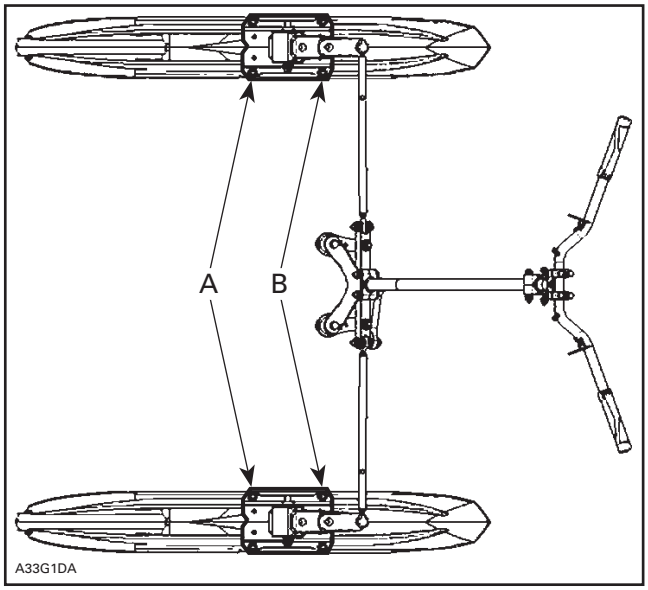
Position RH guard 8 mm (5/16 in) from throttle housing and LH guard 4 mm (5/32 in) from brake retaining clamp. Position hand guards so that their inner face is roughly vertical. Torque top screw first to 3.5 N•m (31 lbf•**in**) then torque bottom screw.

STEERING ADJUSTMENT (SKIS)

Definitions

TOE-OUT:

A difference measured between the front edge of the ski bridge «A» and rear edge of ski bridge «B» as viewed from the top.



Adjustments

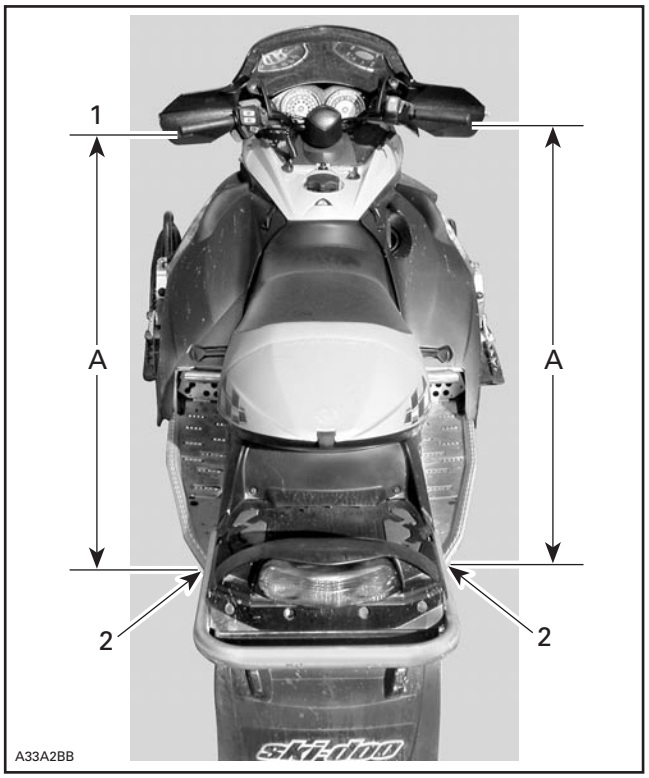
SKI ALIGNMENT AND TOE-OUT

Ski alignment and toe-out are performed by adjusting length of left and right tie rods **no. 11**.

Procedure:

– Position handlebar so that it is 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.

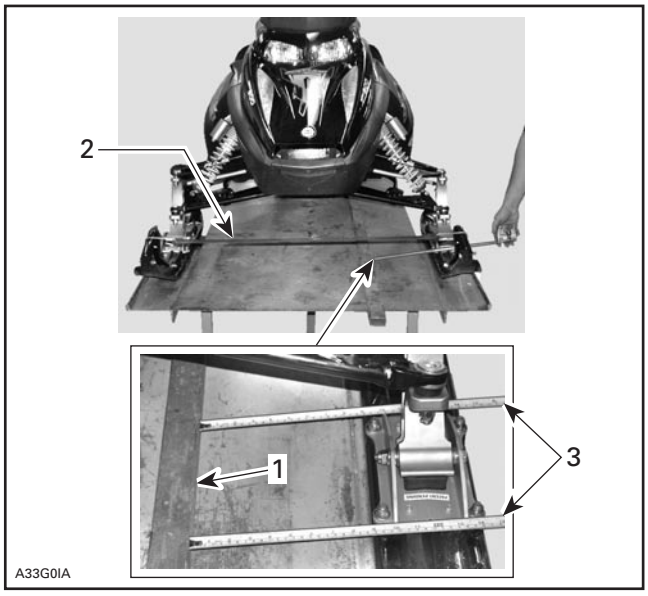


1. Equal distance «A» on each side
2. Same reference point

– Hook a rubber cord in front of skis to keep them closed and to take all slack from steering mechanism.
– Leave the vehicle on the ground on its own weight.
– Place a straight edge against pre-adjusted track and measure the distance between front and rear of ski bridge.

MODEL	TOTAL TOE-OUT ± 1 mm (± 3/64 in)
All REV Series	2 (5/64)

NOTE: To reduce tolerance when measuring, set one ski to proper toe-out (half the total toe-out) then measure from that ski to the opposite ski.



TYPICAL
1. Straight edge
2. Rubber cord
3. Measure at rear and front of ski bridge

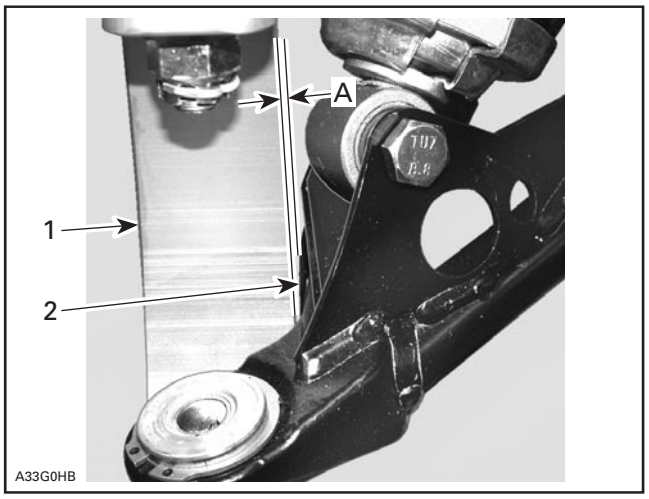
If adjustment is needed:

– Loosen jam nuts of both tie rods no. 11.
– Turn the tie rod to change its length.
– Retighten jam nuts.

⚠ WARNING

Never lengthen tie rod so that the external unengaged threaded portion of ball joint exceeds 20 mm (25/32 in).

Once ski alignment is done check that ski leg rests against lower arm or is not more than 2 mm (5/64 in) from lower arm when the handlebar is fully turned.



RIGHT HAND SIDE SHOWN
1. Ski leg
2. Lower arm
A. 2 mm (5/64 in)

If the distance is more than the specified distance on one side then check for bent parts.

LUBRICATION

⚠ WARNING

Do not lubricate throttle cable or housing.

Use suspension synthetic grease (P/N 293 550 033) on:

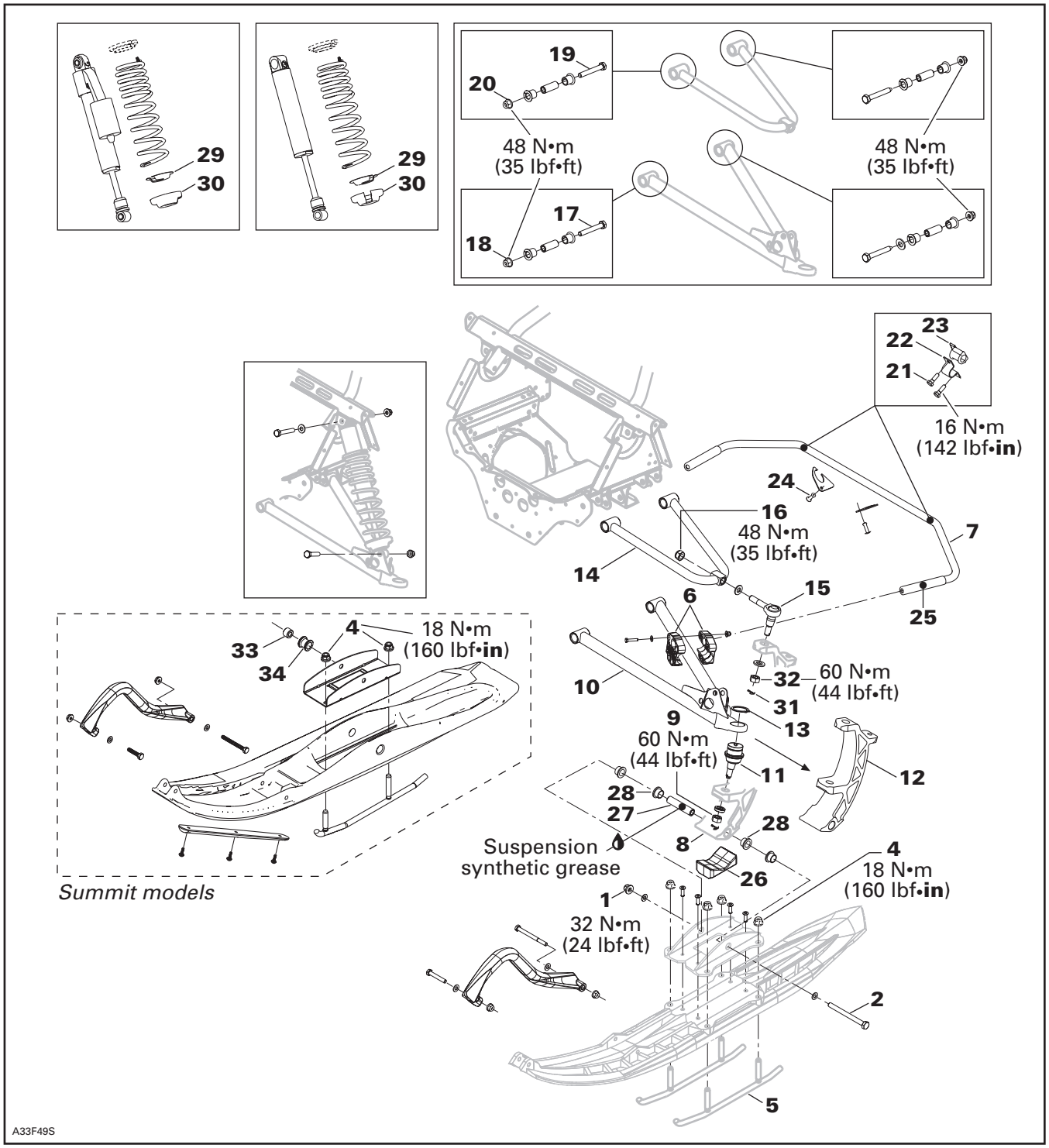
– Grease fitting **no. 16** of LH and RH swivel arms.
– Lower steering column bushing.

Use BOMBARDIER LUBE (P/N 293 600 016) on:

– Tie rod ball joints.

FRONT SUSPENSION

REV Series



NOTE: The same procedure applies on both sides.

GENERAL INSPECTION

Check for looseness, bent, worn out, rusted or other damage on components. Ensure cotter pins are in good condition and properly secured. Replace the faulty component.

To check upper arm bushings and ball joint:

– Let vehicle weight compress the suspension.
– Firmly grab upper part of ski leg and try to move sideways to feel the free-play.
– If excessive play is felt, replace the faulty component.

To check lower arm bushings and ball joint:

– Raise front of vehicle off the ground from the frame to release the suspension.
– Firmly grab lower part of ski leg and try to move sideways to feel the free-play.
– If excessive play is felt, replace the faulty component.

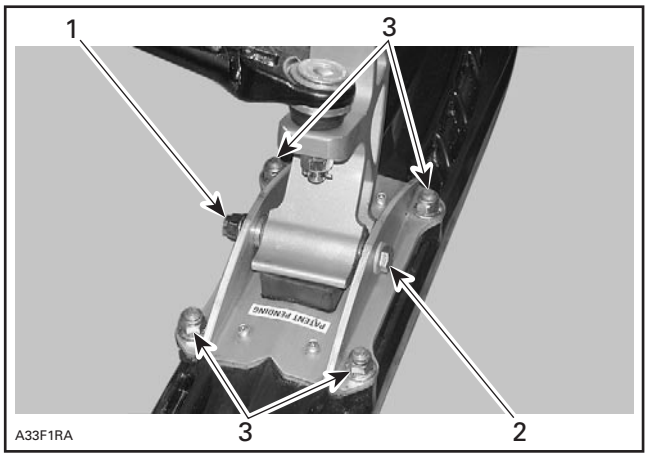
DISASSEMBLY

Ski

Lift front of vehicle and support it off the ground.

Unscrew nut **no. 1** then pull screw **no. 2** out. Remove ski **no. 3**.

Unscrew nuts **no. 4** and remove ski runners **no. 5**.

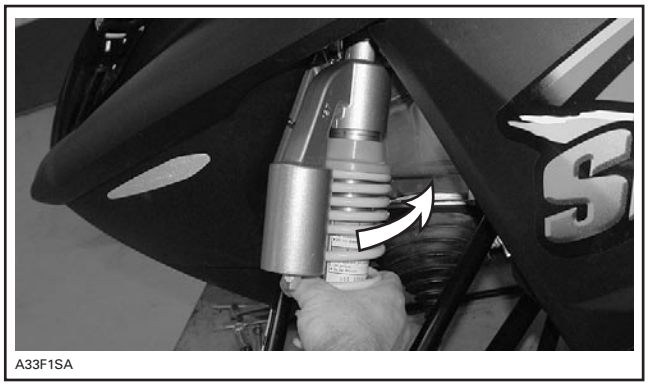


1. Unscrew nut
2. Remove screw
3. Ski runner nuts

Shock Absorber

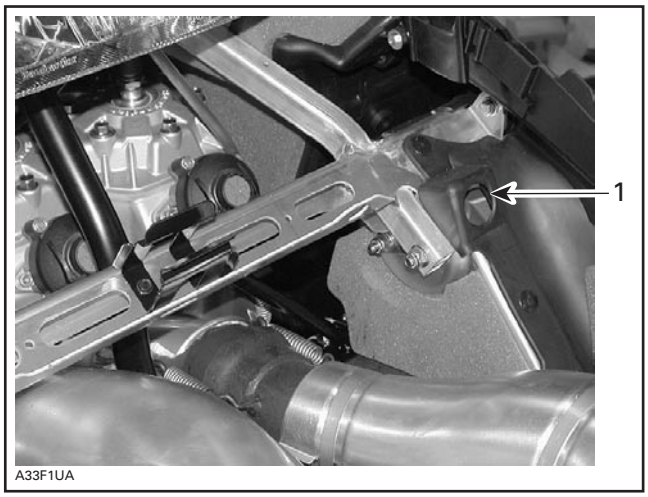
Open hood and remove side panels.

Reduce spring preload by turning adjusting ring towards position 1 and continue until it stops.



Remove lower screw then upper screw of shock absorber.

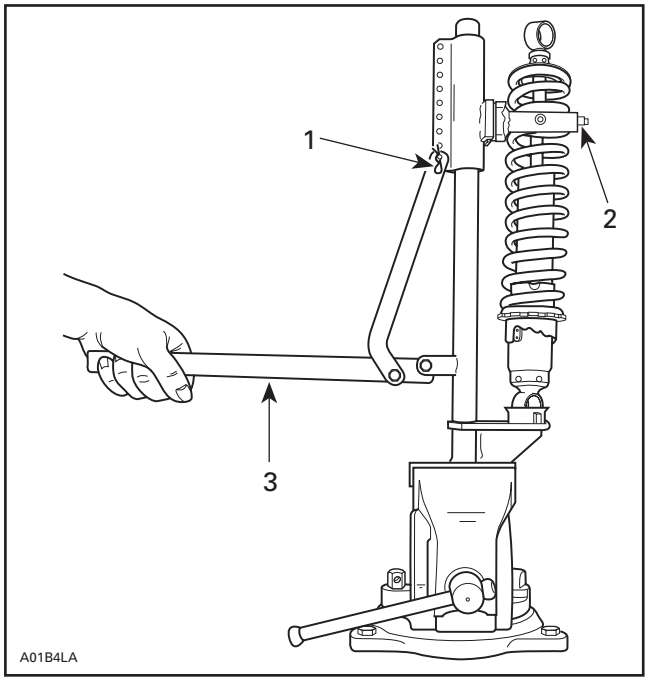
NOTE: To retain upper screw while unscrewing nut, remove access plug in engine compartment.



1. Access hole to reach upper screw

For shock absorber spring disassembly use shock absorber spring remover (P/N 529 035 504) in a vise. Mount shock absorber in it and turn shock absorber so that spring coils match spring compressor.

Close and lock the bar. Adjust the handle at horizontal position by changing the position of the clevis pin.

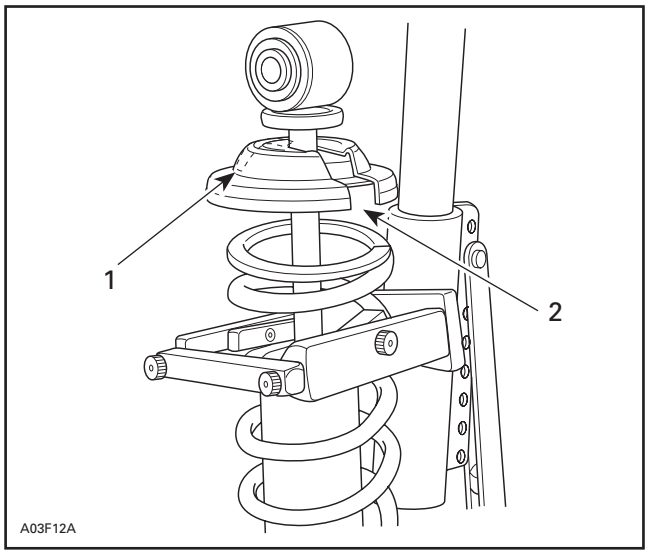


TYPICAL
1. Clevis pin
2. Bar
3. Handle horizontal

Push down on the handle until it locks. Remove spring stopper then release handle.

Some Models

At installation, cap opening **no. 30** must be 180° from spring stopper **no. 29** opening.



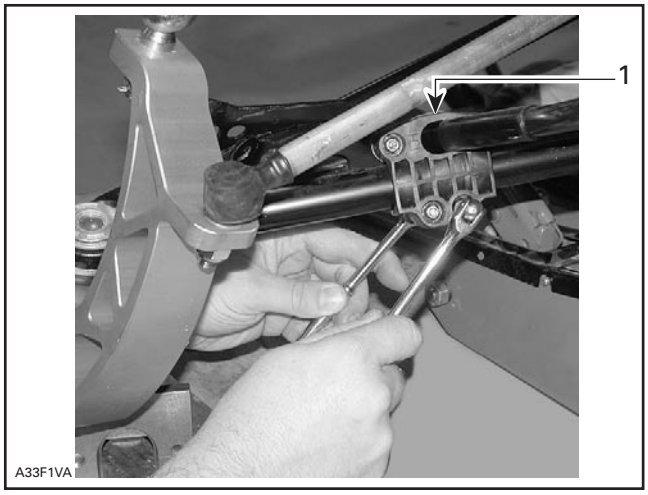
1. Cap opening
2. Spring stopper opening

Lower Arm

All Models

Remove shock absorber.

Remove sliding blocks **no. 6** of stabilizer bar **no. 7**.

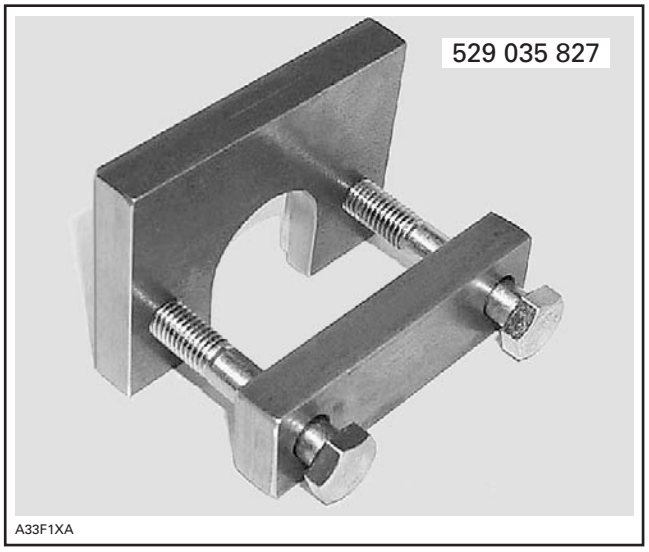


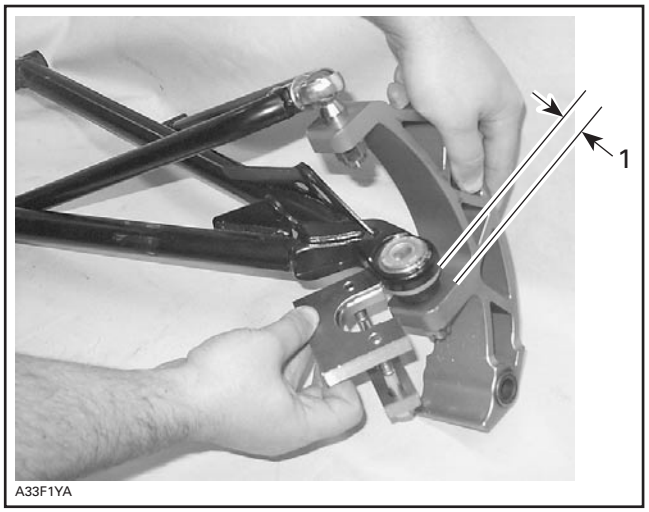
1. Sliding blocks

Remove cotter pin **no. 8** and unscrew ball joint nut **no. 9**.

Raise lower arm **no. 10** so that ball joint **no. 11** becomes parallel with ski leg **no. 12**.

Install ball joint remover (P/N 529 035 827) and detach ball joint from ski leg.



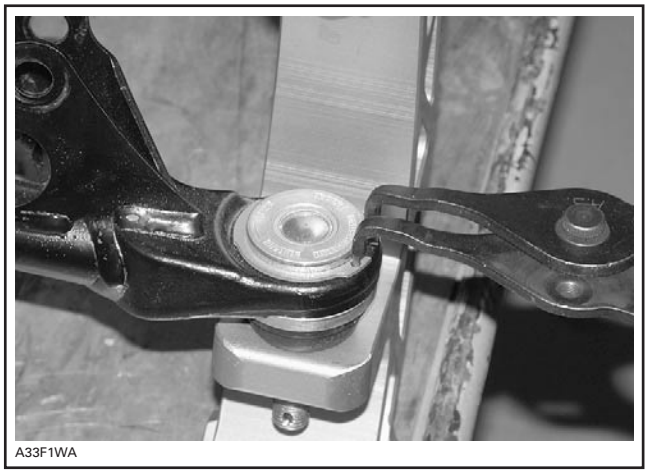


TYPICAL
1. Ball joint parallel with ski leg

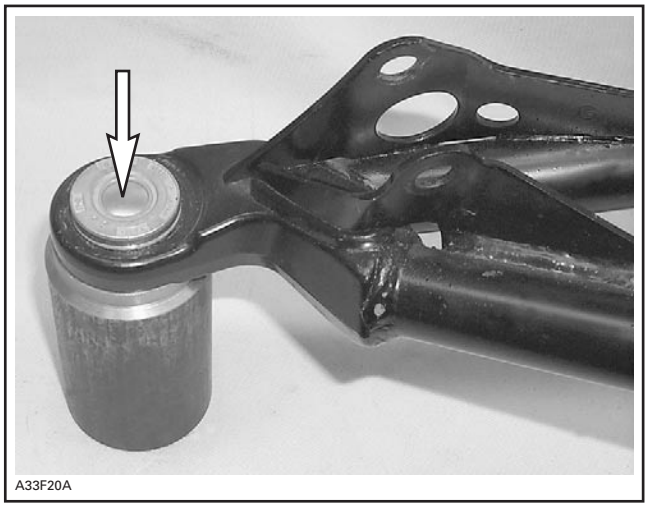
Remove lower arm **no. 14** from frame. For front screw **no. 17** removal, hold nut **no. 18** from engine compartment.

To remove ball joint, proceed as follows:

– Remove snap ring **no. 13**.
– Install ball joint remover support (P/N 529 035 873) under joint.
– Press joint out.



TYPICAL



TYPICAL

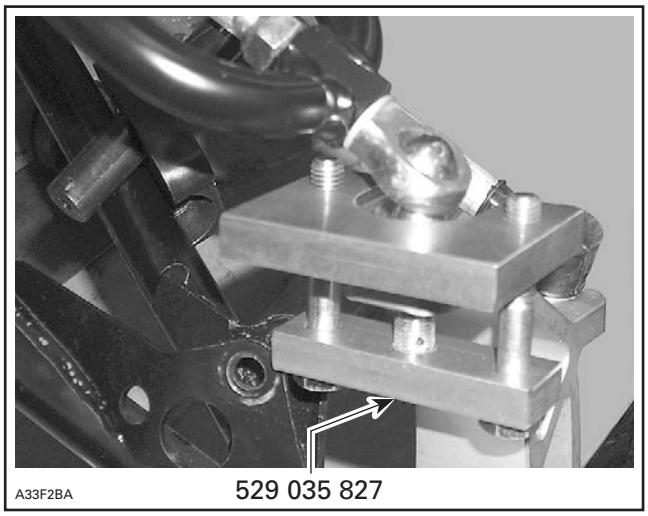
Tie Rod

Refer to STEERING SYSTEM section and remove tie rod from ski leg.

Upper Arm

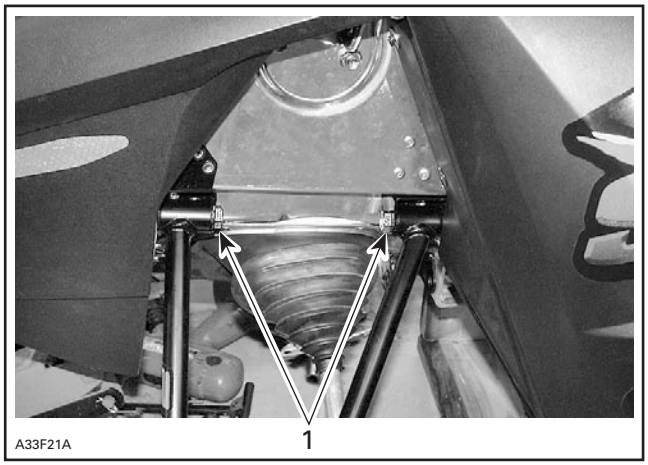
Remove cotter pin **no. 31** and unscrew ball joint nut **no. 32**.

Install ball joint remover (P/N 529 035 827) and detach ball joint **no. 15** from ski leg.



Use a 11 mm (7/16 in) open wrench to hold ball joint housing and unscrew nut **no. 16**, then remove ball joint from upper arm.

Remove upper arm **no. 14** from frame. For screws **no. 19** removal, hold nuts **no. 20** from engine compartment.

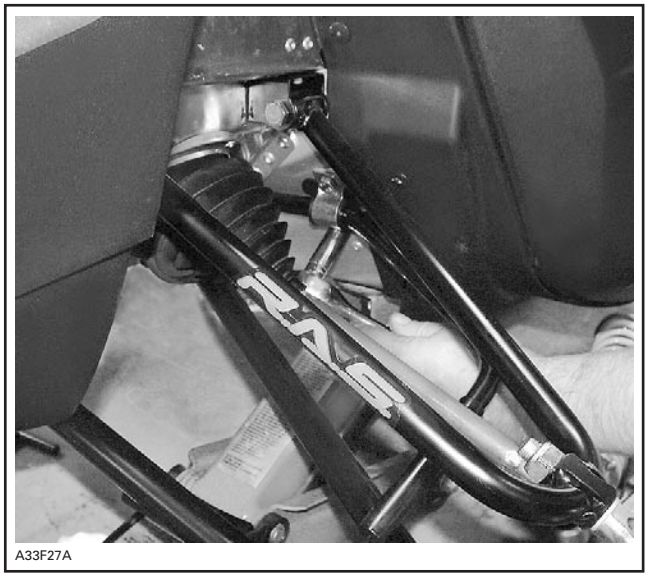


1. Remove screws while holding nuts from engine compartment

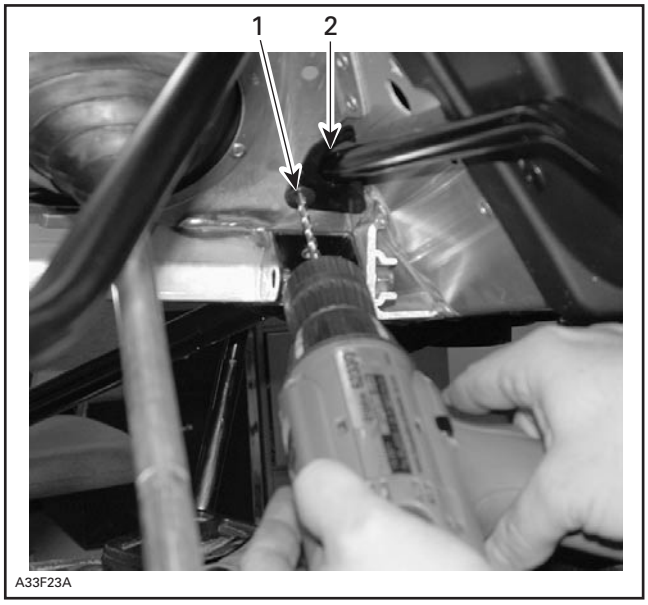
Stabilizer Bar

Remove shock absorbers, stabilizer bar slider blocks and unfasten lower ball joints from ski legs.

Remove screws **no. 21** from clamps **no. 22**.



Using a 4.8 mm (3/16 in) drill bit, drill rivet **no. 24** out. Remove cap.

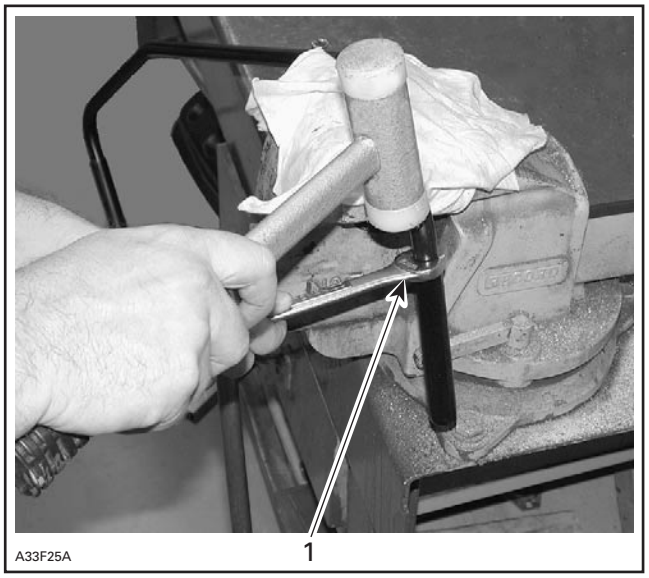


1. Drill rivet out with a 4.8 mm (3/16 in) drill bit
2. Cap

Lift front of vehicle enough so that stabilizer bar **no. 7** can be rotated downward to allow to slide it out.


A33F24A

To remove bushing **no. 25**, use a 13 mm (1/2 in) open wrench and tap bushing out as shown.



A33F25A

1. Use a 13 mm (1/2 in) open wrench to push bushing out

INSPECTION

Check all plastic bushings for wear. Replace as required.

Check condition of ski leg **no. 12**. Replace as required.

Check for straightness of lower and upper arms. Replace as required.

Check condition of ball joints. Replace as required.

Check skis and runners **no. 5** for wear, replace as necessary.

Check condition of ski stopper **no. 26**. Replace it when deteriorated.

To check condition of shock absorber, refer to SUSPENSION then look for SHOCK ABSORBER INSPECTION.

INSTALLATION

For assembly, reverse the disassembly procedure. However, pay attention to the following.

Tighten nuts and screws to proper torque as mentioned in exploded view.

Nuts with a cotter pin: After applying the proper torque, continue tightening as necessary to allow cotter pin insertion. Ensure to properly secure cotter pin.

⚠ WARNING

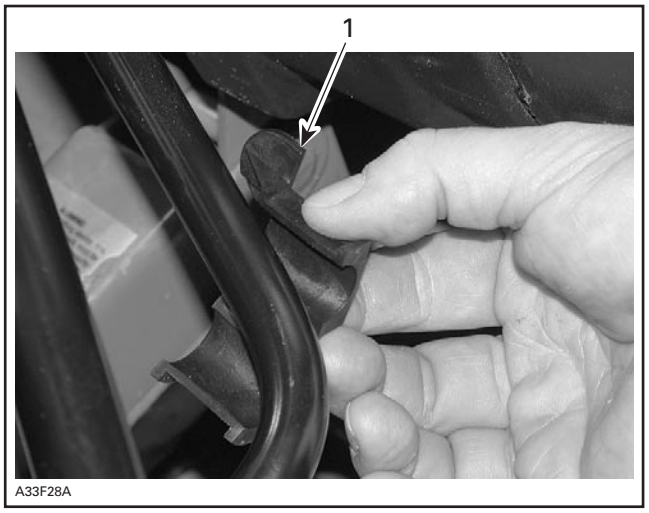
Always install new cotter pins at assembly and properly bend their ends.

Stabilizer Bar

Ensure to properly position stabilizer bar before insertion in frame.


A33F26A

Install the stabilizer bar bushing **no. 23** making sure to place its tab over the access hole located on the LH side.

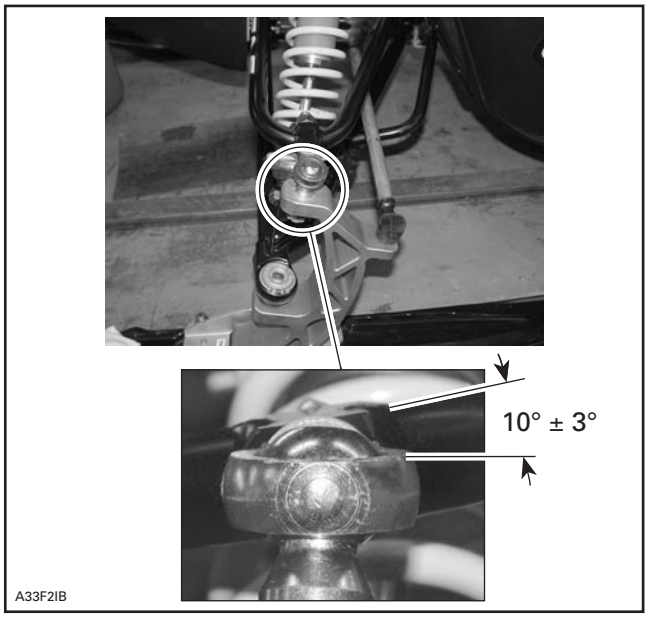


1. Install bushing as shown

1. Tab here to obstruct access hole

Upper Arm

When installing ball joint **no. 15** to upper arm, ensure to tilt it with the proper angle as shown. The ball joint housing must be parallel to ski leg tab. This mounting position corresponds to 10° ± 3° angle from upper arm.



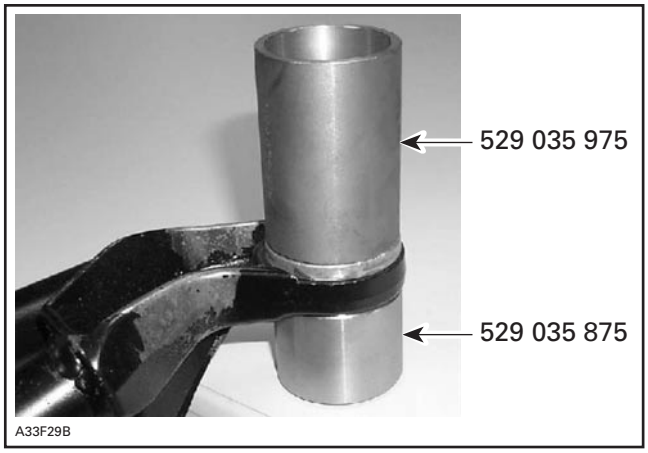
Lower Arm

Position lower arm below stabilizer bar.

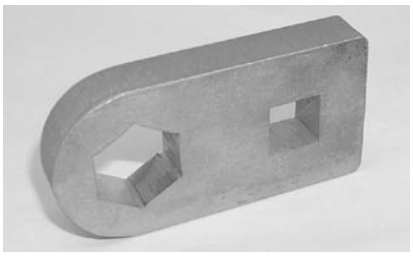
Prior to installing ball joint in lower arm, ensure to clean the tapered surfaces with the Pulley flange cleaner product (P/N 413 711 809). Surface contacts must be clean and free of dirt, oil and grease. Apply the cleaner on a rag then use the rag to clean the surfaces of ball joint and ski leg.

To install ball joint, proceed as follows:

– Install ball joint support (P/N 529 035 875) on top side of lower arm (operating position).
– Position ball joint installer (P/N 529 035 975) on bottom side of lower arm (operating position).
– Press joint in.
– Install snap ring **no. 13** with its opening toward front of vehicle.



To properly torque ball joint nut, use the A-arm nut wrench (P/N 529 035 876).



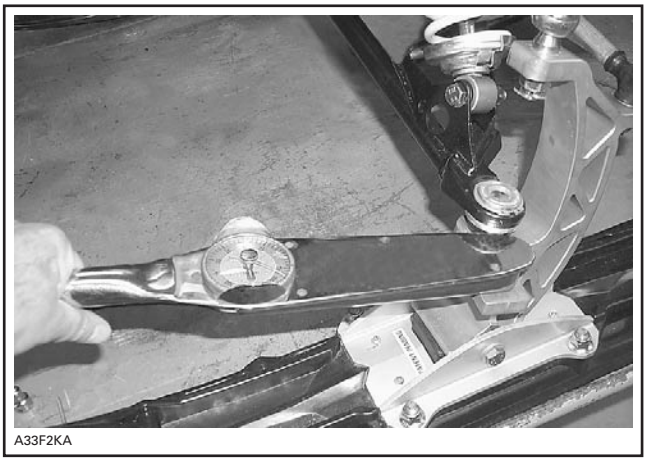
A33F2AA

529 035 876

Ensure to install the tool perpendicularly (90°) to torque wrench.

A33F22A

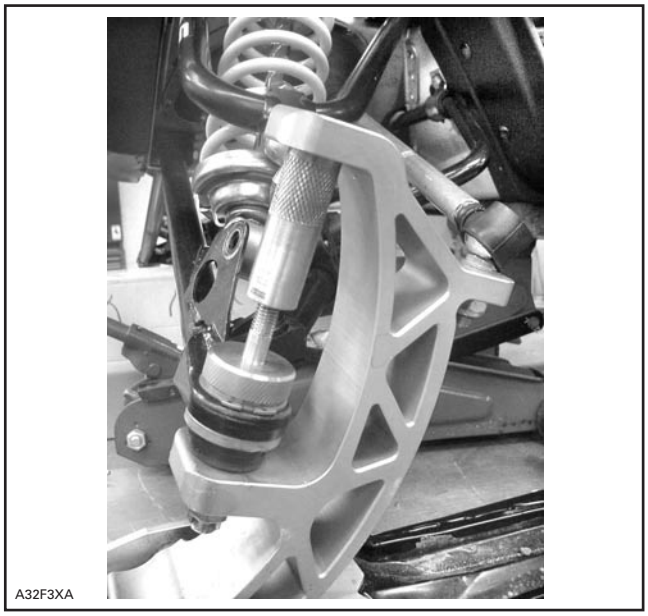
1. Tool perpendicular (90°) to torque wrench
A. 90°



A33F2KA

Use ball joint lock tool (P/N 529 035 945) to restrain ball joint during nut tightening.

NOTE: The upper arm ball joint has to be removed in order to use this tool. Also remove the small screw from top of ball joint to allow proper seating of tool.

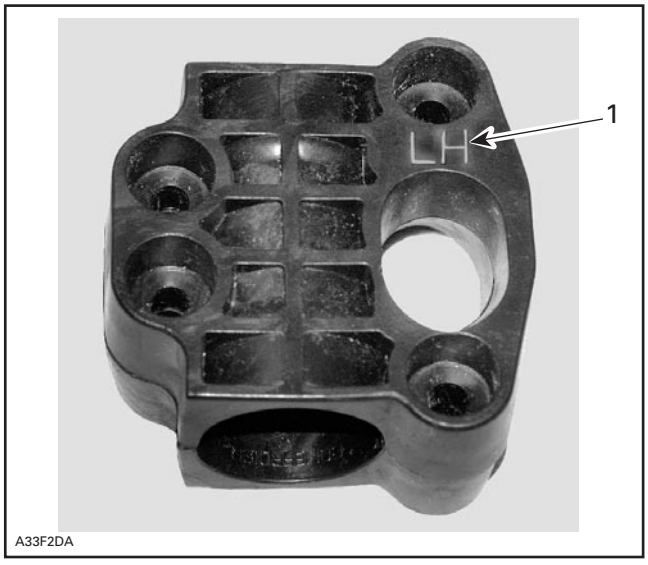


A32F3XA

TYPICAL

Stabilizer Bar

Notice that LH and RH sliding blocks are different. Look for their molded identification with LH or RH letters.



A33F2DA

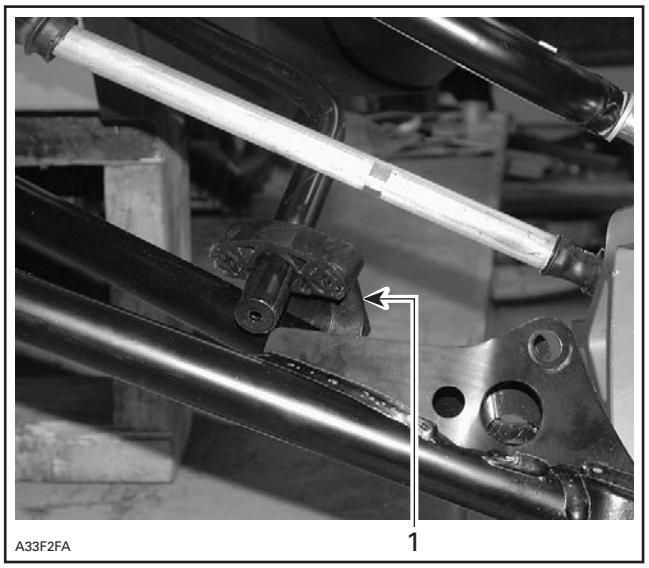
1. Molded identification for proper side installation

To install sliding blocks:

– Temporarily rotate the rear block by 180°.
– Insert on stabilizer bar end and push beyond the lower arm.
– Rotate block back by 180° to its normal position.
– Install the other block half.

– Install screws and nuts.
– Ensure blocks slide easily when compressing and releasing suspension.

1. Temporarily rotate block by 180° for its insertion

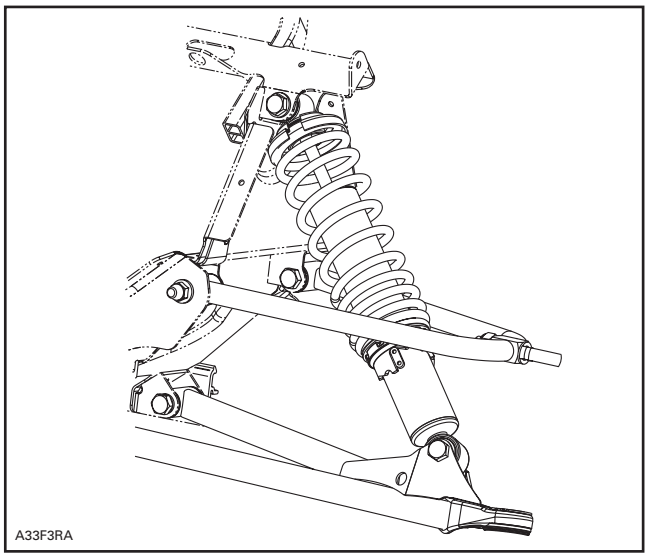


1. Push block on bar end beyong lower arm then rotate back to its normal position

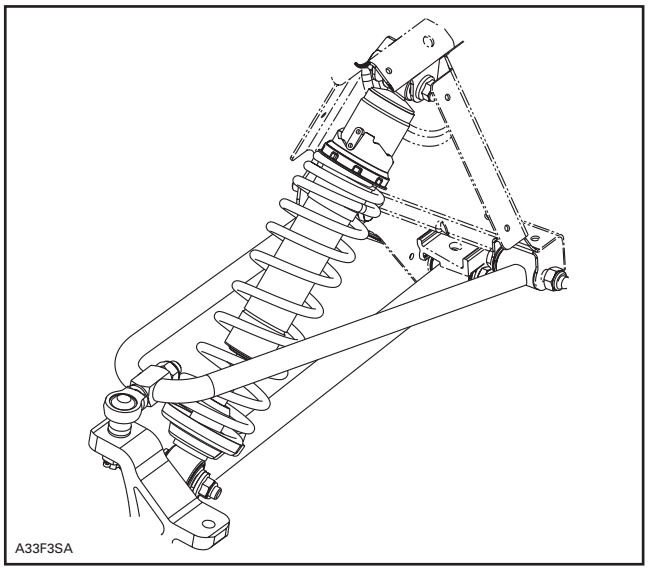
Shock Absorber

Ensure to reinstall shock absorber in the proper position according to model.

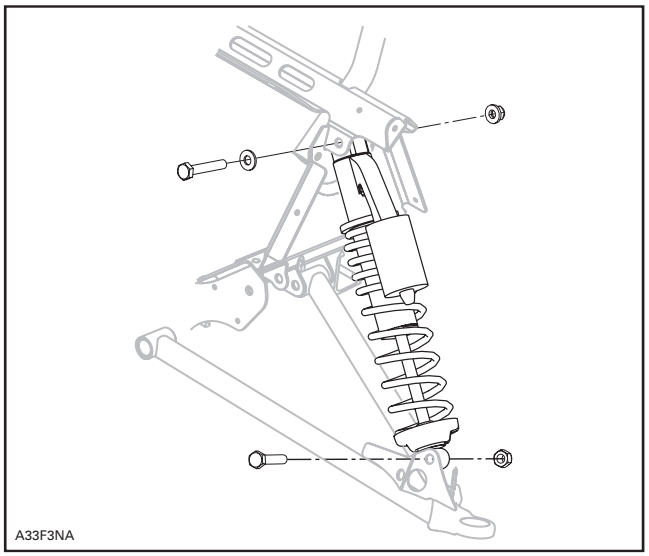
GSX and MX Z Trail



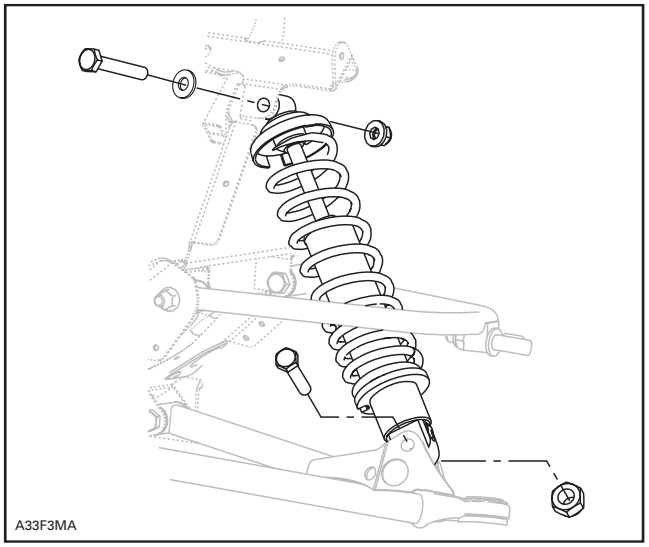
MX Z Adrenaline and Renegade



MX Z X/Renegade X/Trail — Europe



Summit



Readjust spring preload.

Ski

Apply suspension synthetic grease (P/N 293 550 033) between bushing no. 28 and spacer no. 27 and also on inner tube of ski leg.

Summit Only

Install bushing no. 29 and spacer no. 30 inward on each ski leg for the wide ski stance. Install outward for narrow ski stance.

⚠ WARNING

Install skis with proper side facing inward. Refer to warning on ski.

Adjustment

All Models

Proceed with ski alignment. Refer to STEERING SYSTEM.

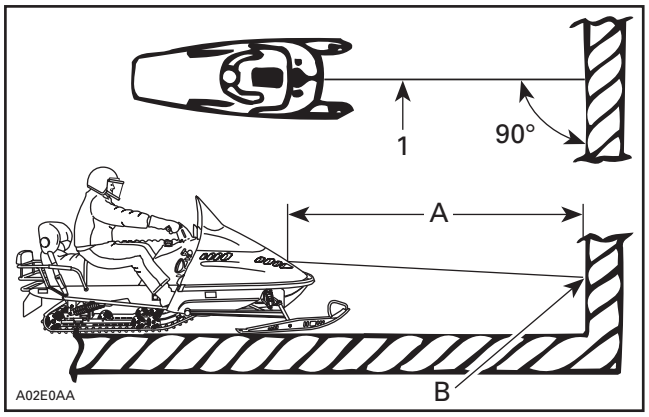
BODY

INSTALLATION AND ADJUSTMENT

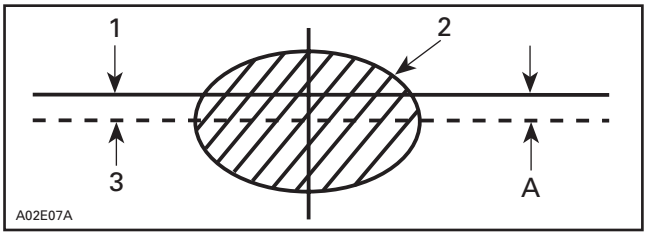
HEADLAMP BEAM AIMING

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.



TYPICAL
1. Headlamp center line
A. 381 cm (12 ft 6 in)
B. 25 mm (1 in) below center line



1. Headlamp horizontal
2. Light beam (high beam) (projected on the wall)
3. Light beam center
A. 25 mm (1 in)

Required Conditions

Place the vehicle on a flat surface perpendicular to test surface (wall or screen) and 381 cm (12 ft 6 in) away from it.

Rider or equivalent weight must be on the vehicle.

Select **high** beam.

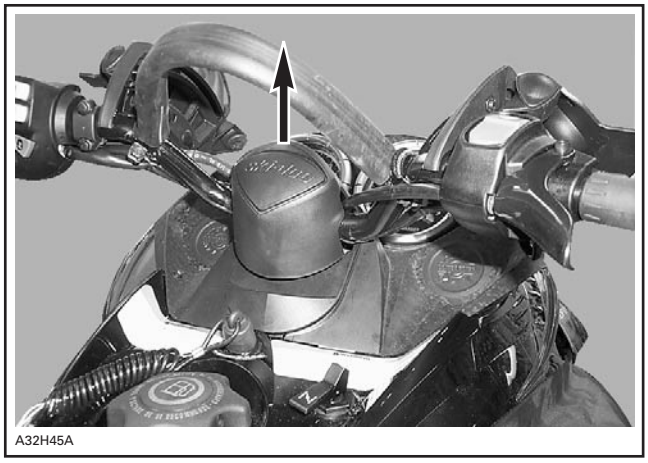
BULB REPLACEMENT

Headlamp

If any headlight bulb is burnt, proceed as follows.

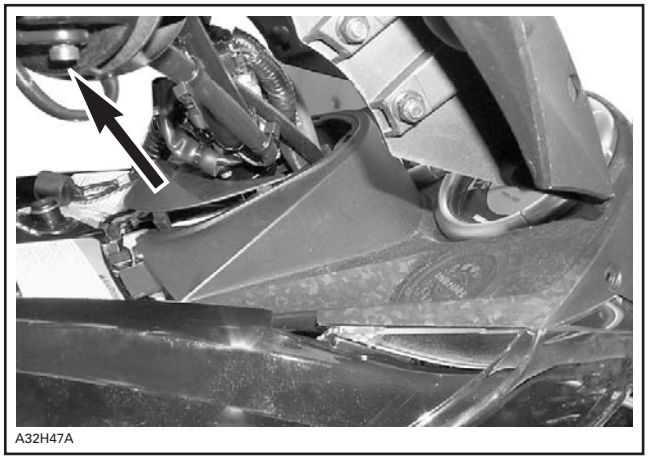
Remove windshield. See below.

Pull out steering support cap.

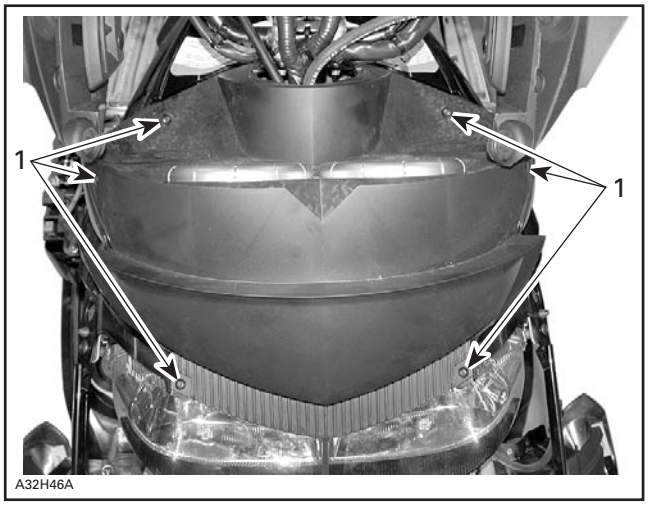


Lift hood.

Pull up front console end cap.



Remove retaining screws and slightly lift front console.



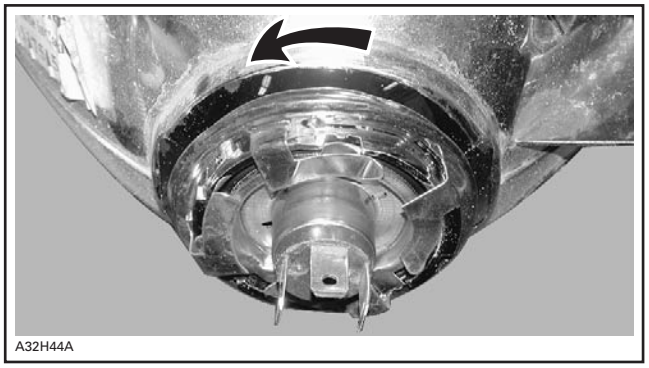
1. Remove screws

Unplug gauge connector(s).

Pull front console out.

Unplug burnt bulb connector. Remove the rubber boot.

Turn bulb retainer ring counterclockwise to unlock. Detach the bulb and replace.



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. After locking ring installation, ensure bulb is properly secured in place.

Properly reinstall removed parts.

Taillight

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.

DECAL

To remove a decal; heat old decal with a heat gun and peel off slowly.

Using isopropyl alcohol, clean the surface and dry thoroughly.

Apply liquid soap to new decal and carefully position the decal. Using a sponge or a squeegee, remove the air bubbles and surplus water working from the center toward the edges. Allow to air dry.

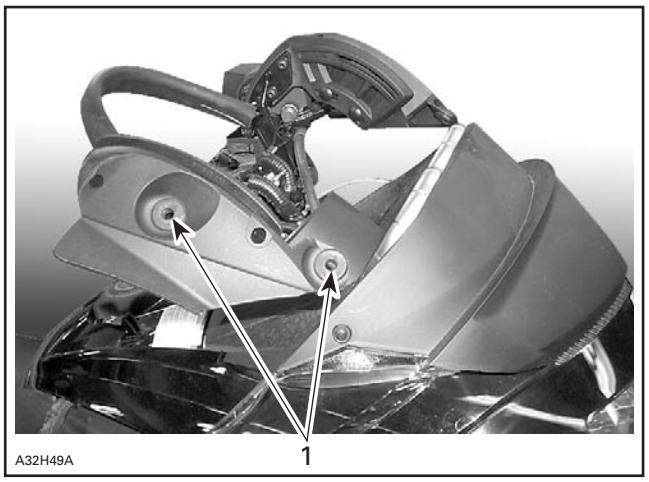
CAUTION: Do not apply isopropyl alcohol or solvent directly on decals. Use only in a well ventilated area.

WINDSHIELD

Pull windshield one side at a time as shown to remove it.

Remove protective film when installing a new windshield.

Apply liquid soap on grommets prior to installing windshield to ease pin insertion.



1. Grommets

Position the windshield on the windshield supports then push it down until the pins are fully inserted into the grommets.

GUARD

Disassembly and Assembly

NOTE: For additional information (ex.: exploded view) refer to the correspondent *Parts Catalog*.

⚠ WARNING

Engine should be running only with guard well secured in place.

Inspection

Check guard mounting bosses, clips and retainers for wear.

WIRING HARNESS

⚠ WARNING

Ensure all terminals are properly crimped on the wires and that all connector housings are properly fastened. Keep wires away from any rotating, moving, heating and vibrating parts. Use proper fastening devices as required.

CABLES

⚠ WARNING

Before installation, ensure that all cables are in perfect condition. Properly install the cable ends and secure them in place. Pay attention to route them properly, away from any rotating, moving, heating or vibrating parts.

TUBING

⚠ 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 MAINTENANCE AND REPAIR

MAINTENANCE

Clean the vehicle thoroughly, removing all dirt and grease accumulation.

To clean use a soft clean cloth and either soapy water or isopropyl alcohol.

To remove grease, oil or glue use isopropyl alcohol.

CAUTION: Do not apply isopropyl alcohol or acetone directly on decals.

CAUTION: The following products must not be used to clean or wax any of the plastic components used on the vehicles:

- gasoline
- brake fluid
- kerosene
- diesel fuel
- lighter fluid
- varsol
- naphtha
- acetone

– strong detergents
– abrasive cleaners
– waxes containing an abrasive or a cleaning agent in their formula.

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

CAUTION: If for some reason the snowmobile has to be stored outside, it is preferable to cover it with an opaque tarpaulin. This will prevent the sun rays from affecting the plastic components and the vehicle finish.

REPAIR

The very first step before repairing plastic materials is to find out exactly which type of material is involved.

CAUTION: Some repair products are not compatible with certain plastics.

⚠ WARNING

Polycarbonate windshields must never be repaired by welding or otherwise.

For hood repair, refer to a specialized shop.

The following company provides a complete line of products to repair plastic materials:

CREST INDUSTRIES, INC.Trenton, MI 48183	Phone: 734-479-4141 Toll Free: 1-800-822-4100 Fax: 1-800-344-4461 Fax: 734-479-4040 E-Mail: info@crestauto.com www.crestauto.com

FRAME

FRAME CLEANING

NOTE: For bare 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.

CAUTION: Never direct high-pressure water jet towards decals. They will peel off.

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

Aluminum Frame

– No welds should be done on aluminum frame except if mentioned or required on a Bombardier bulletin.
– Use ER-5356 rods for MIG or TIG welding.

CAUTION: Before performing electrical welding anywhere on the vehicle, unplug MPEM. 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.

A32E0WB

TYPICAL — MPEM UNPLUGGED

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

Drilling Procedure

When drilling self-piercing rivets, use Supertanium™ drill bit (P/N 529 031 800), 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.

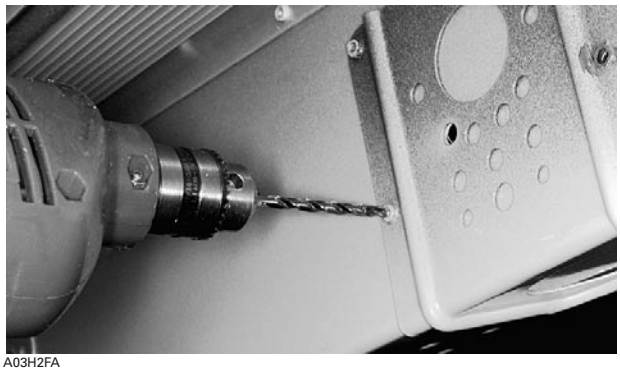
Always use a variable speed electric drill.

Partially drill rivet end — not the rivet head.

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 413 803 300) 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.


A03H2FA

TYPICAL

Cut rivet using a chisel.

Remove riveted part.

Drive out remaining rivet head using a punch.

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	1000
centi	c	one hundredth	0.01
milli	m	one thousandth	0.001
micro	µ	one millionth	0.000001

CONVERSION FACTORS

TO CONVERT	TO (1)	MULTIPLY BY
in	mm	25.4
in	cm	2.54
in²	cm²	6.45
in³	cm³	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	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 x 1.8) + 32
hp	kW	.75

A00A81

* The international system of units abbreviates SI in all languages.

(1) To obtain the inverse sequence, divide by the given factor. To convert **millimeters** to **inches**, divide by 25.4.

NOTE: Conversion factors are rounded off to 2 decimals for easier use.

ENGINES

GSX 500 SS Sport, GSX 600 HO Sport and GSX 600 HO SDI Sport			GSX Sport		
			500 SS	600 HO	600 HO SDI
Country			**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Engine Type			**593**	**593 HO**	**593 SDI**
ENGINE					
Number of cylinder			2		
Bore	Standard	mm (in)	76 (2.992)	72 (2.835)	
Stroke		mm (in)	65.80 (2.591)	73 (2.874)	
Displacement		cm^3 (in^3)	597.00 (36.431)	594.40 (36.273)	
Compression ratio			12.0 ± 0.5	12.25 ± 0.5	
Maximum power engine speed (1)			8000 ± 100 RPM		
Piston ring type	1st		Semi-trapezoidal		
	2nd		—		
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)		
	Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance	New	mm (in)	0.04 to 0.09 (.0016 to .0035)	0.05 to 0.1 (.0020 to .0039)	
	Wear limit	mm (in)	0.2 (.0079)		
Piston/cylinder wall clearance	New	mm (in)	0.120 ± 0.016 (.0047 ± .0006)	0.105 ± 0.013 (.0041 ± .0005)	
	Wear limit	mm (in)	0.2 (.0079)	0.18 (.0071)	
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)		
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)		
Connecting rod big end axial play	New	mm (in)	0.390 to 0.737 (.0154 to .0290)	0.310 to 0.677 (.0122 to .0267)	
	Wear limit	mm (in)	1.2 (.0472)		
ELECTRICAL					
Magneto generator output		W	360		480
Ignition type			CDI		Inductive
Spark plug	Make and type		NGK BR9ECS (8)		
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)		0.75 to 0.85 (.030 to .033)
Ignition timing BTDC (3)		mm (in)	2.49 (.098)	2.79 (.110)	5.390 (.2122) (12)
Trigger coil (4)		Ω	190 to 300		190 to 290
Generating coil (4)	Low speed	Ω	—		
	High speed	Ω	—		
Lighting coil (4)		Ω	0.1 to 1.0		0.145 to 0.185
High tension coil (4)	Primary		—		
	Secondary		—		

GSX 500 SS Sport, GSX 600 HO Sport and GSX 600 HO SDI Sport			GSX Sport		
			500 SS	600 HO	600 HO SDI
Country			**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Engine Type			**593**	**593 HO**	**593 SDI**
FUEL SYSTEM					
Carburetor/throttle body type	PTO/MAG		TM40 – B289	TM40 – B238	Dell'Orto without IACV
Main jet	PTO/MAG		360	380	—
Needle jet	PTO/MAG		P-0		—
Pilot jet	PTO/MAG		17.5		—
Needle identification	PTO/MAG		9DGM09–58	9DHI13–58	—
Clip position	PTO/MAG		—		—
Slide cut-away			2.0		—
Float adjustment		mm (in)	—		
Air or pilot screw adjustment	± 1/16 turn		1.5		—
Idle speed	± 200 RPM		1600		1500
Gas type			Unleaded		Super unleaded
Pump octane number			87 (R+M)/2 or higher		91 (R+M)/2 or higher
Gas/oil ratio			Injection		
COOLING SYSTEM					
Type			Liquid		
Axial fan belt adjustment	Deflection	mm (in)	—		
	Force	kg (lbf)	—		
Thermostat opening temperature		°C (°F)	42 (108)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		
TIGHTENING TORQUE (engine cold)					
Drive pulley retaining screw			(7)		
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)		
Magneto ring nut			125 N•m (92 lbf•ft)		
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)		
	M8		29 N•m (21 lbf•ft)		
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)		
Cylinder head screws			29 N•m (21 lbf•ft)		
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)		
Axial fan shaft nut			—		

GSX 600 HO SDI Limited and GSX 800 HO Limited				GSX Limited	
				600 HO SDI	800 HO
Country				**CAN/U.S.**	**CAN/U.S.**
Engine Type				**593 SDI**	**793 HO**
ENGINE					
Number of cylinder				2	
Bore		Standard	mm (in)	72 (2.835)	82 (3.228)
Stroke			mm (in)	73.00 (2.874)	75.70 (2.980)
Displacement			cm^3 (in^3)	594.40 (36.273)	799.20 (48.770)
Compression ratio				12.25 ± 0.5	12.00 ± 0.5
Maximum power engine speed (1)				8000 ± 100 RPM	7850 ± 100 RPM
Piston ring type		1st		Semi-trapezoidal	
		2nd		—	
Ring end gap		New	mm (in)	0.40 to 0.55 (.016 to .022)	
		Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance		New	mm (in)	0.05 to 0.10 (.0020 to .0039)	
		Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance		New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)	0.125 ± 0.013 (.0049 ± .0005)
		Wear limit	mm (in)	0.18 (.0071)	0.20 (.0079)
Maximum crankshaft end play (2)		New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO		Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play		New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
		Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL					
Magneto generator output			W	480	360
Ignition type				Inductive	CDI
Spark plug	Make and type			NGK BR9ECS (8)	
	Gap		mm (in)	0.75 to 0.85 (.030 to .033)	
Ignition timing BTDC (3)			mm (in)	5.390 (.2122) (12)	2.370 (.0933)
Trigger coil (4)			Ω	190 to 290	190 to 300
Generating coil (4)	Low speed		Ω	—	
	High speed		Ω	—	
Lighting coil (4)			Ω	0.145 to 0.185	0.1 to 1.0
High tension coil (4)	Primary			—	
	Secondary			—	

GSX 600 HO SDI Limited and GSX 800 HO Limited			GSX Limited	
			600 HO SDI	800 HO
Country			**CAN/U.S.**	**CAN/U.S.**
Engine Type			**593 SDI**	**793 HO**
FUEL SYSTEM				
Carburetor/throttle body type		PTO/MAG	Dell'Orto without IACV	TM40–B292
Main jet		PTO/MAG	—	400
Needle jet		PTO/MAG	—	P-0
Pilot jet		PTO/MAG	—	17.5
Needle identification		PTO/MAG	—	9DGI7–58
Clip position		PTO/MAG	—	
Slide cut-away			—	2.0
Float adjustment		mm (in)	—	—
Air or pilot screw adjustment		± 1/16 turn	—	1.5
Idle speed		± 200 RPM	1500	
Gas type			Super unleaded	
Pump octane number			91 (R+M)/2 or higher	
Gas/oil ratio			Injection	
COOLING SYSTEM				
Type			Liquid	
Axial fan belt adjustment	Deflection	mm (in)	—	
	Force	kg (lbf)	—	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(7)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws		M6	9 N•m (80 lbf•**in**)	
		M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

MXZ 500 SS Adrenaline and MXZ 500 SS Trail			MXZ		
			500 SS Adrenaline	500 SS Trail	500 SS Trail
Country			**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Engine Type			**593**		
ENGINE					
Number of cylinder			2		
Bore	Standard	mm (in)	76 (2.992)		
Stroke		mm (in)	65.80 (2.591)		
Displacement		cm^3 (in^3)	597.00 (36.431)		
Compression ratio			12.0 ± 0.5		
Maximum power engine speed (1)			8000 ± 100 RPM		
Piston ring type	1st		Semi-trapezoidal		
	2nd		—		
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)		
	Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance	New	mm (in)	0.04 to 0.09 (.0016 to .0035)		
	Wear limit	mm (in)	0.2 (.0079)		
Piston/cylinder wall clearance	New	mm (in)	0.120 ± 0.016 (.0047 ± .0006)		
	Wear limit	mm (in)	0.2 (.0079)		
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)		
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)		
Connecting rod big end axial play	New	mm (in)	0.390 to 0.737 (.0154 to .0290)		
	Wear limit	mm (in)	1.2 (.0472)		
ELECTRICAL					
Magneto generator output		W	360		
Ignition type			CDI		
Spark plug	Make and type		NGK BR9ECS (8)		
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)		
Ignition timing BTDC (3)		mm (in)	2.49 (.098)		
Trigger coil (4)		Ω	190 to 300		
Generating coil (4)	Low speed	Ω	—		
	High speed	Ω	—		
Lighting coil (4)		Ω	0.1 to 1.0		
High tension coil (4)	Primary		—		
	Secondary		—		

MXZ 500 SS Adrenaline and MXZ 500 SS Trail			MXZ		
			500 SS Adrenaline	500 SS Trail	500 SS Trail
Country			**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Engine Type			**593**		
FUEL SYSTEM					
Carburetor/throttle body type	PTO/MAG		TM40 – B289		
Main jet	PTO/MAG		360		
Needle jet	PTO/MAG		P-0		
Pilot jet	PTO/MAG		17.5		
Needle identification	PTO/MAG		9DGM09–58		
Clip position	PTO/MAG		—		
Slide cut-away			2.0		
Float adjustment		mm (in)	—		
Air or pilot screw adjustment	± 1/16 turn		1.5		
Idle speed	± 200 RPM		1600		
Gas type			Unleaded		
Pump octane number			87 (R+M)/2 or higher		
Gas/oil ratio			Injection		
COOLING SYSTEM					
Type			Liquid		
Axial fan belt adjustment	Deflection	mm (in)	—		
	Force	kg (lbf)	—		
Thermostat opening temperature		°C (°F)	42 (108)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		
TIGHTENING TORQUE (engine cold)					
Drive pulley retaining screw			(7)		
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)		
Magneto ring nut			125 N•m (92 lbf•ft)		
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)		
	M8		29 N•m (21 lbf•ft)		
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)		
Cylinder head screws			29 N•m (21 lbf•ft)		
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)		
Axial fan shaft nut			—		

MXZ 600 HO Adrenaline and MXZ 600 HO SDI Adrenaline				MXZ Adrenaline	
				600 HO	600 HO SDI
Country				**CAN/U.S.**	**CAN/U.S.**
Engine Type				**593 HO**	**593 SDI**
ENGINE					
Number of cylinder				2	
Bore		Standard	mm (in)	72 (2.835)	
Stroke			mm (in)	73.00 (2.874)	
Displacement			cm^3 (in^3)	594.40 (36.273)	
Compression ratio				12.25 ± 0.5	
Maximum power engine speed (1)				8000 ± 100 RPM	
Piston ring type		1st		Semi-trapezoidal	
		2nd		—	
Ring end gap		New	mm (in)	0.40 to 0.55 (.016 to .022)	
		Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance		New	mm (in)	0.05 to 0.10 (.0020 to .0039)	
		Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance		New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)	
		Wear limit	mm (in)	0.18 (.0071)	
Maximum crankshaft end play (2)		New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO		Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play		New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
		Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL					
Magneto generator output			W	360	480
Ignition type				CDI	Inductive
Spark plug	Make and type			NGK BR9ECS (8)	
	Gap		mm (in)	0.40 to 0.50 (.016 to .020)	0.75 to 0.85 (.030 to .033)
Ignition timing BTDC (3)			mm (in)	3.360 (.1323)	5.390 (.2122) (12)
Trigger coil (4)			Ω	190 to 300	190 to 290
Generating coil (4)	Low speed		Ω	—	
	High speed		Ω	—	
Lighting coil (4)			Ω	0.1 to 1.0	0.145 to 0.185
High tension coil (4)	Primary			—	
	Secondary			—	

MXZ 600 HO Adrenaline and MXZ 600 HO SDI Adrenaline			MXZ Adrenaline	
			600 HO	600 HO SDI
Country			**CAN/U.S.**	**CAN/U.S.**
Engine Type			**593 HO**	**593 SDI**
FUEL SYSTEM				
Carburetor/throttle body type	PTO/MAG		TM40–B292	Dell'Orto without IACV
Main jet	PTO/MAG		400	—
Needle jet	PTO/MAG		P-0	—
Pilot jet	PTO/MAG		17.5	—
Needle identification	PTO/MAG		9DGI7–58	—
Clip position	PTO/MAG		—	
Slide cut-away			2.0	—
Float adjustment		mm (in)	—	—
Air or pilot screw adjustment	± 1/16 turn		1.5	—
Idle speed	± 200 RPM		1500	
Gas type			Unleaded	Super unleaded
Pump octane number			87 (R+M)/2 or higher	91 (R+M)/2 or higher
Gas/oil ratio			Injection	
COOLING SYSTEM				
Type			Liquid	
Axial fan belt adjustment	Deflection	mm (in)	—	
	Force	kg (lbf)	—	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(7)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)	
	M8		29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

MXZ 600 HO Renegade				MXZ Renegade	
				600 HO	600 HO
Country				**CAN/U.S.**	**EUROPE**
Engine Type				**593 HO**	
ENGINE					
Number of cylinder				2	
Bore		Standard	mm (in)	72 (2.835)	
Stroke			mm (in)	73.00 (2.874)	
Displacement			cm^3 (in^3)	594.40 (36.273)	
Compression ratio				12.25 ± 0.5	
Maximum power engine speed (1)				8000 ± 100 RPM	
Piston ring type		1st		Semi-trapezoidal	
		2nd		—	
Ring end gap		New	mm (in)	0.40 to 0.55 (.016 to .022)	
		Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance		New	mm (in)	0.05 to 0.10 (.0020 to .0039)	
		Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance		New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)	
		Wear limit	mm (in)	0.18 (.0071)	
Maximum crankshaft end play (2)		New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO		Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play		New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
		Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL					
Magneto generator output			W	360	
Ignition type				CDI	
Spark plug	Make and type			NGK BR9ECS (8)	
	Gap		mm (in)	0.40 to 0.50 (.016 to .020)	
Ignition timing BTDC (3)			mm (in)	2.79 (.1098)	
Trigger coil (4)			Ω	190 to 300	
Generating coil (4)	Low speed		Ω	—	
	High speed		Ω	—	
Lighting coil (4)			Ω	0.1 to 1.0	
High tension coil (4)	Primary			—	
	Secondary			—	

MXZ 600 HO Renegade			MXZ Renegade	
			600 HO	600 HO
Country			**CAN/U.S.**	**EUROPE**
Engine Type			**593 HO**	
FUEL SYSTEM				
Carburetor/throttle body type	PTO/MAG		TM40–B238	
Main jet	PTO/MAG		380	
Needle jet	PTO/MAG		P-0	
Pilot jet	PTO/MAG		17.5	
Needle identification	PTO/MAG		9DHI13–58	
Clip position	PTO/MAG		—	
Slide cut-away			2.0	
Float adjustment		mm (in)	—	
Air or pilot screw adjustment	± 1/16 turn		1.5	
Idle speed	± 200 RPM		1600	
Gas type			Unleaded	
Pump octane number			87 (R+M)/2 or higher	
Gas/oil ratio			Injection	
COOLING SYSTEM				
Type			Liquid	
Axial fan belt adjustment	Deflection	mm (in)	—	
	Force	kg (lbf)	—	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(7)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)	
	M8		29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

MXZ 600 HO Renegade X and MXZ 600 HO SDI Renegade X				MXZ Renegade X	
				600 HO	600 HO SDI
Country				**CAN/U.S.**	**CAN/U.S.**
Engine Type				**593 HO**	**593 SDI**
ENGINE					
Number of cylinder				2	
Bore		Standard	mm (in)	72 (2.835)	
Stroke			mm (in)	73.00 (2.874)	
Displacement			cm^3 (in^3)	594.40 (36.273)	
Compression ratio				12.25 ± 0.5	
Maximum power engine speed [1]				8000 ± 100 RPM	
Piston ring type		1st		Semi-trapezoidal	
		2nd		—	
Ring end gap		New	mm (in)	0.40 to 0.55 (.016 to .022)	
		Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance		New	mm (in)	0.05 to 0.10 (.0020 to .0039)	
		Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance		New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)	
		Wear limit	mm (in)	0.18 (.0071)	
Maximum crankshaft end play [2]		New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO		Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play		New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
		Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL					
Magneto generator output			W	360	480
Ignition type				CDI	Inductive
Spark plug	Make and type			NGK BR9ECS [8]	
	Gap		mm (in)	0.40 to 0.50 (.016 to .020)	0.75 to 0.85 (.030 to .033)
Ignition timing BTDC [3]			mm (in)	2.79 (.1098)	5.390 (.2122) [12]
Trigger coil [4]			Ω	190 to 300	190 to 290
Generating coil [4]	Low speed		Ω	—	
	High speed		Ω	—	
Lighting coil [4]			Ω	0.1 to 1.0	0.145 to 0.185
High tension coil [4]	Primary			—	
	Secondary			—	

MXZ 600 HO Renegade X and MXZ 600 HO SDI Renegade X			MXZ Renegade X	
			600 HO	600 HO SDI
Country			**CAN/U.S.**	**CAN/U.S.**
Engine Type			**593 HO**	**593 SDI**
FUEL SYSTEM				
Carburetor/throttle body type		PTO/MAG	TM40–B238	Dell'Orto without IACV
Main jet		PTO/MAG	380	—
Needle jet		PTO/MAG	P-0	—
Pilot jet		PTO/MAG	17.5	—
Needle identification		PTO/MAG	9DHI13–58	—
Clip position		PTO/MAG	—	
Slide cut-away			2.0	—
Float adjustment		mm (in)	—	—
Air or pilot screw adjustment		± 1/16 turn	1.5	—
Idle speed		± 200 RPM	1600	1500
Gas type			Unleaded	Super unleaded
Pump octane number			87 (R+M)/2 or higher	91 (R+M)/2 or higher
Gas/oil ratio			Injection	
COOLING SYSTEM				
Type			Liquid	
Axial fan belt adjustment	Deflection	mm (in)	—	
	Force	kg (lbf)	—	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(7)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws		M6	9 N•m (80 lbf•**in**)	
		M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

MXZ 600 HO Trail, MXZ 600 HO X and MXZ 600 HO SDI X			MXZ		
			600 HO Trail	600 HO X	600 HO SDI X
Country			CAN/U.S.	CAN/U.S.	CAN/U.S.
Engine Type			593 HO		593 SDI
ENGINE					
Number of cylinder			2		
Bore	Standard	mm (in)	72 (2.835)		
Stroke		mm (in)	73 (2.874)		
Displacement		cm^3 (in^3)	594.40 (36.273)		
Compression ratio			12.25 ± 0.5		
Maximum power engine speed (1)			8000 ± 100 RPM		
Piston ring type	1st		Semi-trapezoidal		
	2nd		—		
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)		
	Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance	New	mm (in)	0.05 to 0.1 (.0020 to .0039)		
	Wear limit	mm (in)	0.2 (.0079)		
Piston/cylinder wall clearance	New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)		
	Wear limit	mm (in)	0.18 (.0071)		
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)		
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)		
Connecting rod big end axial play	New	mm (in)	0.310 to 0.677 (.0122 to .0267)		
	Wear limit	mm (in)	1.2 (.0472)		
ELECTRICAL					
Magneto generator output		W	360		480
Ignition type			CDI		Inductive
Spark plug	Make and type		NGK BR9ECS (8)		
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)		0.75 to 0.85 (.030 to .033)
Ignition timing BTDC (3)		mm (in)	2.79 (.110)		5.390 (.2122) (12)
Trigger coil (4)		Ω	190 to 300		190 to 290
Generating coil (4)	Low speed	Ω	—		
	High speed	Ω	—		
Lighting coil (4)		Ω	0.1 to 1.0		0.145 to 0.185
High tension coil (4)	Primary		—		
	Secondary		—		

MXZ 600 HO Trail, MXZ 600 HO X and MXZ 600 HO SDI X			MXZ		
			600 HO Trail	600 HO X	600 HO SDI X
Country			**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Engine Type			**593 HO**		**593 SDI**
FUEL SYSTEM					
Carburetor/throttle body type	PTO/MAG		TM40 – B238		Dell'Orto without IACV
Main jet	PTO/MAG		380		—
Needle jet	PTO/MAG		P-0		—
Pilot jet	PTO/MAG		17.5		—
Needle identification	PTO/MAG		9DHI13–58		—
Clip position	PTO/MAG		—		—
Slide cut-away			2.0		—
Float adjustment		mm (in)	—		
Air or pilot screw adjustment	± 1/16 turn		1.5		—
Idle speed	± 200 RPM		1600		1500
Gas type			Unleaded		Super unleaded
Pump octane number			87 (R+M)/2 or higher		91 (R+M)/2 or higher
Gas/oil ratio			Injection		
COOLING SYSTEM					
Type			Liquid		
Axial fan belt adjustment	Deflection	mm (in)	—		
	Force	kg (lbf)	—		
Thermostat opening temperature		°C (°F)	42 (108)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		
TIGHTENING TORQUE (engine cold)					
Drive pulley retaining screw			(7)		
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)		
Magneto ring nut			125 N•m (92 lbf•ft)		
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)		
	M8		29 N•m (21 lbf•ft)		
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)		
Cylinder head screws			29 N•m (21 lbf•ft)		
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)		
Axial fan shaft nut			—		

MXZ 600 HO X and MXZ 600 HO SDI X				MXZ X	
				600 HO	600 HO SDI
Country				**EUROPE**	**EUROPE**
Engine Type				**593 HO**	**593 SDI**
ENGINE					
Number of cylinder				2	
Bore	Standard		mm (in)	72 (2.835)	
Stroke			mm (in)	73.00 (2.874)	
Displacement			cm^3 (in^3)	594.40 (36.273)	
Compression ratio				12.25 ± 0.5	
Maximum power engine speed (1)				8000 ± 100 RPM	
Piston ring type	1st			Semi-trapezoidal	
	2nd			—	
Ring end gap	New		mm (in)	0.40 to 0.55 (.016 to .022)	
	Wear limit		mm (in)	1.0 (.039)	
Ring/piston groove clearance	New		mm (in)	0.05 to 0.10 (.0020 to .0039)	
	Wear limit		mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance	New		mm (in)	0.105 ± 0.013 (.0041 ± .0005)	
	Wear limit		mm (in)	0.18 (.0071)	
Maximum crankshaft end play (2)	New		mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO	Wear limit		mm (in)	0.06 (.0024)	
Connecting rod big end axial play	New		mm (in)	0.310 to 0.677 (.0122 to .0267)	
	Wear limit		mm (in)	1.2 (.0472)	
ELECTRICAL					
Magneto generator output			W	360	480
Ignition type				CDI	Inductive
Spark plug	Make and type			NGK BR9ECS (8)	
	Gap		mm (in)	0.40 to 0.50 (.016 to .020)	0.75 to 0.85 (.030 to .033)
Ignition timing BTDC (3)			mm (in)	2.79 (.1098)	5.390 (.2122) (12)
Trigger coil (4)			Ω	190 to 300	190 to 290
Generating coil (4)	Low speed		Ω	—	
	High speed		Ω	—	
Lighting coil (4)			Ω	0.1 to 1.0	0.145 to 0.185
High tension coil (4)	Primary			—	
	Secondary			—	

MXZ 600 HO X and MXZ 600 HO SDI X			MXZ X	
			600 HO	600 HO SDI
Country			**EUROPE**	**EUROPE**
Engine Type			**593 HO**	**593 SDI**
FUEL SYSTEM				
Carburetor/throttle body type		PTO/MAG	TM40–B238	Dell'Orto without IACV
Main jet		PTO/MAG	380	—
Needle jet		PTO/MAG	P-0	—
Pilot jet		PTO/MAG	17.5	—
Needle identification		PTO/MAG	9DHI13–58	—
Clip position		PTO/MAG	—	
Slide cut-away			2.0	—
Float adjustment		mm (in)	—	—
Air or pilot screw adjustment		± 1/16 turn	1.5	—
Idle speed		± 200 RPM	1600	1500
Gas type			Unleaded	Super unleaded
Pump octane number			87 (R+M)/2 or higher	91 (R+M)/2 or higher
Gas/oil ratio			Injection	
COOLING SYSTEM				
Type			Liquid	
Axial fan belt adjustment	Deflection	mm (in)	—	
	Force	kg (lbf)	—	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(7)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws		M6	9 N•m (80 lbf•**in**)	
		M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

MXZ 800 HO Adrenaline and MXZ 800 HO DPM Adrenaline				MXZ Adrenaline	
				800 HO	800 HO DPM
Country				**CAN/U.S.**	**CAN/U.S.**
Engine Type				**793 HO**	
ENGINE					
Number of cylinder				2	
Bore		Standard	mm (in)	82 (3.228)	
Stroke			mm (in)	75.70 (2.980)	
Displacement			cm^3 (in^3)	799.20 (48.770)	
Compression ratio				12.00 ± 0.5	
Maximum power engine speed (1)				7850 ± 100 RPM	
Piston ring type		1st		Semi-trapezoidal	
		2nd		—	
Ring end gap		New	mm (in)	0.40 to 0.55 (.016 to .022)	
		Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance		New	mm (in)	0.05 to 0.10 (.0020 to .0039)	
		Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance		New	mm (in)	0.125 ± 0.013 (.0049 ± .0005)	
		Wear limit	mm (in)	0.20 (.0079)	
Maximum crankshaft end play (2)		New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO		Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play		New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
		Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL					
Magneto generator output			W	360	
Ignition type				CDI	
Spark plug	Make and type			NGK BR9ECS (8)	
	Gap		mm (in)	0.40 to 0.50 (.016 to .020)	
Ignition timing BTDC (3)			mm (in)	2.37 (.0933)	
Trigger coil (4)			Ω	190 to 300	
Generating coil (4)	Low speed		Ω	—	
	High speed		Ω	—	
Lighting coil (4)			Ω	0.1 to 1.0	
High tension coil (4)	Primary			—	
	Secondary			—	

MXZ 800 HO Adrenaline and MXZ 800 HO DPM Adrenaline			MXZ Adrenaline	
			800 HO	800 HO DPM
Country			**CAN/U.S.**	**CAN/U.S.**
Engine Type			**793 HO**	
FUEL SYSTEM				
Carburetor/throttle body type		PTO/MAG	TM40–B292	
Main jet		PTO/MAG	400	
Needle jet		PTO/MAG	P-0	
Pilot jet		PTO/MAG	17.5	
Needle identification		PTO/MAG	9DGI7–58	
Clip position		PTO/MAG	—	
Slide cut-away			2.0	
Float adjustment		mm (in)	—	
Air or pilot screw adjustment		± 1/16 turn	1.5	
Idle speed		± 200 RPM	1500	
Gas type			Super unleaded	
Pump octane number			91 (R+M)/2 or higher	
Gas/oil ratio			Injection	
COOLING SYSTEM				
Type			Liquid	
Axial fan belt adjustment	Deflection	mm (in)	—	
	Force	kg (lbf)	—	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(7)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws		M6	9 N•m (80 lbf•**in**)	
		M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

MXZ 800 HO Renegade and MXZ 800 HO Renegade X				MXZ		
				800 HO Renegade	800 HO Renegade X	800 HO Renegade X
Country				**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Engine Type				**793 HO**		
ENGINE						
Number of cylinder				2		
Bore		Standard	mm (in)	82 (3.228)		
Stroke			mm (in)	75.70 (2.980)		
Displacement			cm^3 (in^3)	799.20 (48.770)		
Compression ratio				12.00 ± 0.5		
Maximum power engine speed (1)				7850 ± 100 RPM		
Piston ring type		1st		Semi-trapezoidal		
		2nd		—		
Ring end gap		New	mm (in)	0.40 to 0.55 (.016 to .022)		
		Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance		New	mm (in)	0.05 to 0.1 (.0020 to .0039)		
		Wear limit	mm (in)	0.2 (.0079)		
Piston/cylinder wall clearance		New	mm (in)	0.125 ± 0.013 (.0049 ± .0005)		
		Wear limit	mm (in)	0.20 (.0079)		
Maximum crankshaft end play (2)		New	mm (in)	0.3 (.012)		
Maximum crankshaft deflection at PTO		Wear limit	mm (in)	0.06 (.0024)		
Connecting rod big end axial play		New	mm (in)	0.310 to 0.677 (.0122 to .0267)		
		Wear limit	mm (in)	1.2 (.0472)		
ELECTRICAL						
Magneto generator output			W	360		
Ignition type				CDI		
Spark plug	Make and type			NGK BR9ECS (8)		
	Gap		mm (in)	0.40 to 0.50 (.016 to .020)		
Ignition timing BTDC (3)			mm (in)	2.37 (.0933)		
Trigger coil (4)			Ω	190 to 300		
Generating coil (4)	Low speed		Ω	—		
	High speed		Ω	—		
Lighting coil (4)			Ω	0.1 to 1.0		
High tension coil (4)	Primary			—		
	Secondary			—		

MXZ 800 HO Renegade and MXZ 800 HO Renegade X			MXZ		
			800 HO Renegade	800 HO Renegade X	800 HO Renegade X
Country			**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Engine Type			**793 HO**		
FUEL SYSTEM					
Carburetor/throttle body type	PTO/MAG		TM40 – B292		
Main jet	PTO/MAG		400		
Needle jet	PTO/MAG		P-0		
Pilot jet	PTO/MAG		17.5		
Needle identification	PTO/MAG		9DGI7–58		
Clip position	PTO/MAG		—		
Slide cut-away			2.0		
Float adjustment		mm (in)	—		
Air or pilot screw adjustment	± 1/16 turn		1.5		
Idle speed	± 200 RPM		1500		
Gas type			Super unleaded		
Pump octane number			91 (R+M)/2 or higher		
Gas/oil ratio			Injection		
COOLING SYSTEM					
Type			Liquid		
Axial fan belt adjustment	Deflection	mm (in)	—		
	Force	kg (lbf)	—		
Thermostat opening temperature		°C (°F)	42 (108)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		
TIGHTENING TORQUE (engine cold)					
Drive pulley retaining screw			(7)		
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)		
Magneto ring nut			125 N•m (92 lbf•ft)		
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)		
	M8		29 N•m (21 lbf•ft)		
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)		
Cylinder head screws			29 N•m (21 lbf•ft)		
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)		
Axial fan shaft nut			—		

MXZ 800 HO X				MXZ X	
				800 HO	800 HO
Country				**CAN/U.S.**	**EUROPE**
Engine Type				**793 HO**	
ENGINE					
Number of cylinder				2	
Bore		Standard	mm (in)	82 (3.228)	
Stroke			mm (in)	75.70 (2.980)	
Displacement			cm^3 (in^3)	799.20 (48.770)	
Compression ratio				12.00 ± 0.5	
Maximum power engine speed (1)				7850 ± 100 RPM	
Piston ring type		1st		Semi-trapezoidal	
		2nd		—	
Ring end gap		New	mm (in)	0.40 to 0.55 (.016 to .022)	
		Wear limit	mm (in)	1.0 (.039)	
Ring/piston groove clearance		New	mm (in)	0.05 to 0.10 (.0020 to .0039)	
		Wear limit	mm (in)	0.2 (.0079)	
Piston/cylinder wall clearance		New	mm (in)	0.125 ± 0.013 (.0049 ± .0005)	
		Wear limit	mm (in)	0.20 (.0079)	
Maximum crankshaft end play (2)		New	mm (in)	0.3 (.012)	
Maximum crankshaft deflection at PTO		Wear limit	mm (in)	0.06 (.0024)	
Connecting rod big end axial play		New	mm (in)	0.310 to 0.677 (.0122 to .0267)	
		Wear limit	mm (in)	1.2 (.0472)	
ELECTRICAL					
Magneto generator output			W	360	
Ignition type				CDI	
Spark plug	Make and type			NGK BR9ECS (8)	
	Gap		mm (in)	0.40 to 0.50 (.016 to .020)	
Ignition timing BTDC (3)			mm (in)	2.37 (.0933)	
Trigger coil (4)			Ω	190 to 300	
Generating coil (4)	Low speed		Ω	—	
	High speed		Ω	—	
Lighting coil (4)			Ω	0.1 to 1.0	
High tension coil (4)	Primary			—	
	Secondary			—	

MXZ 800 HO X			MXZ X	
			800 HO	800 HO
Country			**CAN/U.S.**	**EUROPE**
Engine Type			**793 HO**	
FUEL SYSTEM				
Carburetor/throttle body type		PTO/MAG	TM40–B292	
Main jet		PTO/MAG	400	
Needle jet		PTO/MAG	P-0	
Pilot jet		PTO/MAG	17.5	
Needle identification		PTO/MAG	9DGI7–58	
Clip position		PTO/MAG	—	
Slide cut-away			2.0	
Float adjustment		mm (in)	—	
Air or pilot screw adjustment		± 1/16 turn	1.5	
Idle speed		± 200 RPM	1500	
Gas type			Super unleaded	
Pump octane number			91 (R+M)/2 or higher	
Gas/oil ratio			Injection	
COOLING SYSTEM				
Type			Liquid	
Axial fan belt adjustment	Deflection	mm (in)	—	
	Force	kg (lbf)	—	
Thermostat opening temperature		°C (°F)	42 (108)	
Radiator cap opening pressure		kPa (PSI)	90 (13)	
TIGHTENING TORQUE (engine cold)				
Drive pulley retaining screw			(7)	
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)	
Magneto ring nut			125 N•m (92 lbf•ft)	
Crankcase nuts or screws		M6	9 N•m (80 lbf•**in**)	
		M8	29 N•m (21 lbf•ft)	
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)	
Cylinder head screws			29 N•m (21 lbf•ft)	
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)	
Axial fan shaft nut			—	

Summit 600 HO Adrenaline and Summit 600 HO X			Summit		
			600 HO Adrenaline	600 HO Adrenaline	600 HO X
Country			**CAN/U.S.**	**EUROPE**	**CAN/U.S.**
Engine Type			**593 HO**		
ENGINE					
Number of cylinder			2		
Bore	Standard	mm (in)	72 (2.835)		
Stroke		mm (in)	73.00 (2.874)		
Displacement		cm^3 (in^3)	594.40 (36.273)		
Compression ratio			12.25 ± 0.5		
Maximum power engine speed (1)			8000 ± 100 RPM		
Piston ring type	1st		Semi-trapezoidal		
	2nd		—		
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)		
	Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance	New	mm (in)	0.05 to 0.10 (.0020 to .0039)		
	Wear limit	mm (in)	0.20 (.0079)		
Piston/cylinder wall clearance	New	mm (in)	0.105 ± 0.013 (.0041 ± .0005)		
	Wear limit	mm (in)	0.18 (.0071)		
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)		
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)		
Connecting rod big end axial play	New	mm (in)	0.310 to 0.677 (.0122 to .0267)		
	Wear limit	mm (in)	1.2 (.0472)		
ELECTRICAL					
Magneto generator output		W	360		
Ignition type			CDI		
Spark plug	Make and type		NGK BR9ECS (8)		
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)		
Ignition timing BTDC (3)		mm (in)	2.79 (.1098)		
Trigger coil (4)		Ω	190 to 300		
Generating coil (4)	Low speed	Ω	—		
	High speed	Ω	—		
Lighting coil (4)		Ω	0.1 to 1.0		
High tension coil (4)	Primary		—		
	Secondary		—		

Summit 600 HO Adrenaline and Summit 600 HO X			Summit		
			600 HO Adrenaline	600 HO Adrenaline	600 HO X
Country			**CAN/U.S.**	**EUROPE**	**CAN/U.S.**
Engine Type			**593 HO**		
FUEL SYSTEM					
Carburetor/throttle body type	PTO/MAG		TM40 – B298		
Main jet	PTO/MAG		380		
Needle jet	PTO/MAG		P-0		
Pilot jet	PTO/MAG		17.5		
Needle identification	PTO/MAG		9DGk11–58		
Clip position	PTO/MAG		3		
Slide cut-away			2.0		
Float adjustment		mm (in)	—		
Air or pilot screw adjustment	± 1/16 turn		1.5		
Idle speed	± 200 RPM		1600		
Gas type			Unleaded		
Pump octane number			87 (R+M)/2 or higher		
Gas/oil ratio			Injection		
COOLING SYSTEM					
Type			Liquid		
Axial fan belt adjustment	Deflection	mm (in)	—		
	Force	kg (lbf)	—		
Thermostat opening temperature		°C (°F)	42 (108)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		
TIGHTENING TORQUE (engine cold)					
Drive pulley retaining screw			(7)		
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)		
Magneto ring nut			125 N•m (92 lbf•ft)		
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)		
	M8		29 N•m (21 lbf•ft)		
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)		
Cylinder head screws			29 N•m (21 lbf•ft)		
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)		
Axial fan shaft nut			—		

Summit 800 HO Adrenaline and Summit 800 HO X			Summit		
			800 HO Adrenaline	800 HO X	800 HO X
Country			**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Engine Type			**793 HO**		
ENGINE					
Number of cylinder			2		
Bore	Standard	mm (in)	82 (3.228)		
Stroke		mm (in)	75.70 (2.980)		
Displacement		cm^3 (in^3)	799.20 (48.770)		
Compression ratio			13.25 ± 0.25		12.00 ± 0.5
Maximum power engine speed (1)			7850 ± 100 RPM		
Piston ring type	1st		Semi-trapezoidal		
	2nd		—		
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)		
	Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance	New	mm (in)	0.05 to 0.10 (.0020 to .0039)		
	Wear limit	mm (in)	0.20 (.0079)		
Piston/cylinder wall clearance	New	mm (in)	0.125 ± 0.013 (.0049 ± .0005)		
	Wear limit	mm (in)	0.20 (.0079)		
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)		
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)		
Connecting rod big end axial play	New	mm (in)	0.310 to 0.677 (.0122 to .0267)		
	Wear limit	mm (in)	1.2 (.0472)		
ELECTRICAL					
Magneto generator output		W	360		
Ignition type			CDI		
Spark plug	Make and type		NGK BR9ECS (8)		
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)		
Ignition timing BTDC (3)		mm (in)	2.37 (.0933)		
Trigger coil (4)		Ω	190 to 300		
Generating coil (4)	Low speed	Ω	—		
	High speed	Ω	—		
Lighting coil (4)		Ω	0.1 to 1.0		
High tension coil (4)	Primary		—		
	Secondary		—		

Summit 800 HO Adrenaline and Summit 800 HO X			Summit		
			800 HO Adrenaline	800 HO X	800 HO X
Country			**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Engine Type			**793 HO**		
FUEL SYSTEM					
Carburetor/throttle body type	PTO/MAG		TM40 – B295		
Main jet	PTO/MAG		400		
Needle jet	PTO/MAG		P-0		
Pilot jet	PTO/MAG		17.5		
Needle identification	PTO/MAG		9EGY2–58		
Clip position	PTO/MAG		3		
Slide cut-away			2.0		
Float adjustment		mm (in)	—		
Air or pilot screw adjustment	± 1/16 turn		1.5		
Idle speed	± 200 RPM		1500		
Gas type			Super unleaded		
Pump octane number			91 (R+M)/2 or higher		
Gas/oil ratio			Injection		
COOLING SYSTEM					
Type			Liquid		
Axial fan belt adjustment	Deflection	mm (in)	—		
	Force	kg (lbf)	—		
Thermostat opening temperature		°C (°F)	42 (108)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		
TIGHTENING TORQUE (engine cold)					
Drive pulley retaining screw			(7)		
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)		
Magneto ring nut			125 N•m (92 lbf•ft)		
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)		
	M8		29 N•m (21 lbf•ft)		
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)		
Cylinder head screws			29 N•m (21 lbf•ft)		
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)		
Axial fan shaft nut			—		

Summit 800 HO Highmark, Summit 800 HO Highmark X and Summit 800 HO Highmark Xtrem			Summit 800 HO		
			Highmark	Highmark X	Highmark Xtreme
Country			**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Engine Type			**793 HO**		
ENGINE					
Number of cylinder			2		
Bore	Standard	mm (in)	82 (3.228)		
Stroke		mm (in)	75.70 (2.980)		
Displacement		cm^3 (in^3)	799.20 (48.770)		
Compression ratio			13.25 ± 0.25		
Maximum power engine speed (1)			7850 ± 100 RPM		
Piston ring type	1st		Semi-trapezoidal		
	2nd		—		
Ring end gap	New	mm (in)	0.40 to 0.55 (.016 to .022)		
	Wear limit	mm (in)	1.0 (.039)		
Ring/piston groove clearance	New	mm (in)	0.05 to 0.10 (.0020 to .0039)		
	Wear limit	mm (in)	0.20 (.0079)		
Piston/cylinder wall clearance	New	mm (in)	0.125 ± 0.013 (.0049 ± .0005)		
	Wear limit	mm (in)	0.20 (.0079)		
Maximum crankshaft end play (2)	New	mm (in)	0.3 (.012)		
Maximum crankshaft deflection at PTO	Wear limit	mm (in)	0.06 (.0024)		
Connecting rod big end axial play	New	mm (in)	0.310 to 0.677 (.0122 to .0267)		
	Wear limit	mm (in)	1.2 (.0472)		
ELECTRICAL					
Magneto generator output		W	360		
Ignition type			CDI		
Spark plug	Make and type		NGK BR9ECS (8)		
	Gap	mm (in)	0.40 to 0.50 (.016 to .020)		
Ignition timing BTDC (3)		mm (in)	2.37 (.0933)		
Trigger coil (4)		Ω	190 to 300		
Generating coil (4)	Low speed	Ω	—		
	High speed	Ω	—		
Lighting coil (4)		Ω	0.1 to 1.0		
High tension coil (4)	Primary		—		
	Secondary		—		

Summit 800 HO Highmark, Summit 800 HO Highmark X and Summit 800 HO Highmark Xtrem			Summit 800 HO		
			Highmark	Highmark X	Highmark Xtreme
Country			**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Engine Type			**793 HO**		
FUEL SYSTEM					
Carburetor/throttle body type	PTO/MAG		TM40 – B295		
Main jet	PTO/MAG		400		
Needle jet	PTO/MAG		P-0		
Pilot jet	PTO/MAG		17.5		
Needle identification	PTO/MAG		9EGY2–58		
Clip position	PTO/MAG		3		
Slide cut-away			2.0		
Float adjustment		mm (in)	—		
Air or pilot screw adjustment	± 1/16 turn		1.5		
Idle speed	± 200 RPM		1500		
Gas type			Super unleaded		
Pump octane number			91 (R+M)/2 or higher		
Gas/oil ratio			Injection		
COOLING SYSTEM					
Type			Liquid		
Axial fan belt adjustment	Deflection	mm (in)	—		
	Force	kg (lbf)	—		
Thermostat opening temperature		°C(°F)	42 (108)		
Radiator cap opening pressure		kPa (PSI)	90 (13)		
TIGHTENING TORQUE (engine cold)					
Drive pulley retaining screw			(7)		
Exhaust manifold nuts or bolts			22 N•m (16 lbf•ft)		
Magneto ring nut			125 N•m (92 lbf•ft)		
Crankcase nuts or screws	M6		9 N•m (80 lbf•**in**)		
	M8		29 N•m (21 lbf•ft)		
Crankcase/engine support nuts or screws			35 N•m (26 lbf•ft)		
Cylinder head screws			29 N•m (21 lbf•ft)		
Crankcase/cylinder nuts or screws			40 N•m (30 lbf•ft)		
Axial fan shaft nut			—		

VEHICLES

GSX 500 SS Sport, GSX 600 HO Sport and GSX 600 HO SDI Sport					GSX Sport		
					500 SS	600 HO	600 HO SDI
Country					**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
DRIVE							
Chain drive ratio					22/43		
Chain	Pitch			in	3/8		
	Type/links qty/plate qty				Silent 74/13		
Drive pulley	Type				TRA III		
	Calibration	Clutch engagement		RPM	3800 ± 100		
		Spring color			Green/white	Violet/Blue	
		Spring length		mm (in)	110.7 (4.358)	114.6 (4.5)	
		Weight			—		
		Block			—		
		Cap			—		
		Pin			Solid (P/N 417 004 308)		
		Ramp			412	410	
		Screw position			3		
Driven pulley	Type				Formula VSA-R	HPV VSA	
	Spring preload				0		
	Cam angle				44°	47/44°	
Pulley distance	Z			mm (in)	19.0 ± 0.5 (.748 ± .02)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)		
	Y – X	MIN.-MAX.		mm (in)	0.82 ± 0.75 (.0032 ± .0030)		
Drive belt part number (P/N)					417 300 197		
Drive belt width [5]		Wear limit		mm (in)	33.35 (1.313)		
Drive belt adjustment		Deflection		mm (in)	32 ± 5 (1.260 ± .197)		
		Force [1]		kg (lbf)	11.34 (25)		
Track	Width			mm (in)	381 (15)		
	Length			mm (in)	3074 (121)		
	Adjustment	Deflection		mm (in)	30 to 35 (1.181 to 1.378)		
		Force [2]		kg (lbf)	7.3 (16)		
Suspension type		Track			SC–10 III		
		Ski			R.A.S. A-arm		
ELECTRICAL							
Battery					12 V, 18 A•h		
Headlamp				W	60/55 (H4)		
Taillight and stoplight				W	8/27		
Tachometer and speedometer bulbs				W	2 x 3		
Fuel and temperature gauge bulbs				W	—		

GSX 500 SS Sport, GSX 600 HO Sport and GSX 600 HO SDI Sport			GSX Sport		
			500 SS	600 HO	600 HO SDI
Country			**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Fuse	Starter solenoid	A	30		
	Fuel level sensor	A	.25		
CAPACITIES					
Fuel tank		L (U.S. gal)	36 (9.5)		
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)		
Cooling system [3]		L (U.S. oz)	4.7 (159)		
Injection oil reservoir		L (U.S. oz)	3.5 (118)		
VEHICLE INFORMATIONS					
Mass (dry)		kg (lb)	222 (488)	225(495)	
			229 (504) [6]	231 (508) [6]	
Length		mm (in)	2787 (109.724)		
Width		mm (in)	1217 (48)		
Height		mm (in)	1280 (50.394)	1232 (48.5)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)		
Toe-out			0		
Camber			0°		
Ground contact area		cm^2 (in^2)	6910.2 (1071)		
Ground contact pressure		kPa (PSI)	3.15 (.457)	3.19 (.463)	
			3.25 (.471) [6]	3.28 (.476) [6]	
Frame material			Aluminum		
Bottom pan material			Impact resistant copolymer		
Hood material			Surlyn		

GSX 600 HO SDI Limited and GSX 800 HO Limited					GSX Limited	
					600 HO SDI	800 HO
Country					**CAN/U.S.**	**CAN/U.S.**
DRIVE						
Chain drive ratio					22/43	26/45
Chain	Pitch			in	3/8	
	Type/links qty/plate qty				Silent 74/13	Silent 76/13
Drive pulley	Type				TRA III	
	Calibration	Clutch engagement		RPM	3800 ± 100	3600 ± 100
		Spring color			Violet/Blue	Blue/Green
		Spring length		mm (in)	114.6 (4.5)	105.7 (4.161)
		Weight			—	
		Block			—	
		Cap			—	
		Pin			Solid (P/N 417 004 308)	Solid (P/N 417 222 594)
		Ramp			410	414
		Screw position			3	
Driven pulley	Type				HPV VSA	
	Spring preload				0	
	Cam angle				47/44°	50/40°
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.032 ± .030)	
Drive belt part number (P/N)					417 300 197	417 300 166
Drive belt width [5]			Wear limit	mm (in)	33.35 (1.313)	34.7 (1.366)
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
			Force [1]	kg (lbf)	11.34 (25)	11.30 (24.912)
Track	Width			mm (in)	381 (15)	
	Length			mm (in)	3074 (121)	
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
			Force [2]	kg (lbf)	7.3 (16)	
Suspension type			Track		SC–10 III	
			Ski		R.A.S. A-arm	

GSX 600 HO SDI Limited and GSX 800 HO Limited			GSX Limited	
			600 HO SDI	800 HO
Country			**CAN/U.S.**	**CAN/U.S.**
ELECTRICAL				
Battery			12 V, 18 A•h	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	
Fuse	Starter solenoid	A	30	
	Fuel level sensor	A	.25	
CAPACITIES				
Fuel tank		L (U.S. gal)	36 (9.5)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system (3)		L (U.S. oz)	4.7 (159)	
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	225 (495)	
			231 (508) (6)	
Length		mm (in)	2787 (110)	
Width		mm (in)	1217 (48)	
Height		mm (in)	1232 (48.5)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out			0	
Camber			0°	
Ground contact area		cm^2 (in^2)	6910 (1071)	7596 (1177)
Ground contact pressure		kPa (PSI)	3.19 (.463)	
			3.28 (.476) (6)	
Frame material			Aluminum	
Bottom pan material			Impact copolymer	
Hood material			Surlyn	

MXZ 500 SS Adrenaline and MXZ 500 SS Trail					MXZ		
					500 SS Adrenaline	500 SS Trail	500 SS Trail
Country					**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
DRIVE							
Chain drive ratio					22/43		
Chain	Pitch			in	3/8		
	Type/links qty/plate qty				Silent 74/13		
Drive pulley	Type				TRA III		
	Calibration	Clutch engagement		RPM	3800 ± 100		
		Spring color			Green/white		
		Spring length		mm (in)	110.7 (4.358)		
		Weight			—		
		Block			—		
		Cap			—		
		Pin			Solid (P/N 417 004 308)		
		Ramp			412		
		Screw position			3		
Driven pulley	Type				Formula VSA-R		
	Spring preload			kg (lbf)	0	8 ± 0.7 (17.6 ± 1.5) [8] 0	0
	Cam angle				44°		
Pulley distance	Z			mm (in)	19.0 ± 0.5 (.748 ± .02)		
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)		
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.0032 ± .0030)		
Drive belt part number (P/N)					417 300 197		
Drive belt width [5]			Wear limit	mm (in)	33.35 (1.313)		
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)		
			Force [1]	kg (lbf)	11.34 (25)		
Track	Width			mm (in)	381 (15)		
	Length			mm (in)	3074 (121)		
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)		
			Force [2]	kg (lbf)	7.3 (16)		
Suspension type			Track		SC–10 III		
			Ski		R.A.S. A-arm		
ELECTRICAL							
Battery (if so equipped)					12 V, 18 A•h		—
Headlamp				W	60/55 (H4)		
Taillight and stoplight				W	8/27		
Tachometer and speedometer bulbs				W	2 x 3		
Fuel and temperature gauge bulbs				W	—		

MXZ 500 SS Adrenaline and MXZ 500 SS Trail			MXZ		
			500 SS Adrenaline	500 SS Trail	500 SS Trail
Country			**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Fuse	Starter solenoid (with electric starter)	A	30		—
	Fuel level sensor	A	.25		—
CAPACITIES					
Fuel tank		L (U.S. gal)	36 (9.5)		
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)		
Cooling system (3)		L (U.S. oz)	4.7 (159)		
Injection oil reservoir		L (U.S. oz)	3.5 (118)		
VEHICLE INFORMATIONS					
Mass (dry)		kg (lb)	209 (460)		
			220 (484) (7)		—
Length		mm (in)	2787 (109.724)		
Width		mm (in)	1217 (48)		
Height		mm (in)	1280 (50.394)		
Ski stance (carbide to carbide)		mm (in)	1195 (47)		
Toe-out			0		
Camber			0°		
Ground contact area		cm^2 (in^2)	6910.2 (1071)		
Ground contact pressure		kPa (PSI)	2.97 (.431)		
			3.12 (.452) (7)		—
Frame material			Aluminum		
Bottom pan material			Impact resistant copolymer		
Hood material			Surlyn		

MZX 600 HO Adrenaline and MXZ 600 HO SDI Adrenaline					MXZ Adrenaline	
					600 HO	600 HO SDI
Country					**CAN/U.S.**	**CAN/U.S.**
DRIVE						
Chain drive ratio					22/43	
Chain	Pitch			in	3/8	
	Type/links qty/plate qty				Silent 74/13	
Drive pulley	Type				TRA III	
	Calibration	Clutch engagement		RPM	3800 ± 100	
		Spring color			Violet/Blue	
		Spring length		mm (in)	114.6 (4.5)	
		Weight			—	
		Block			—	
		Cap			—	
		Pin			Solid (P/N 417 004 308)	
		Ramp			410	
		Screw position			3	
Driven pulley	Type				HPV VSA	
	Spring preload				0	
	Cam angle				47/44°	
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.032 ± .030)	
Drive belt part number (P/N)					417 300 197	
Drive belt width [5]			Wear limit	mm (in)	33.35 (1.313)	
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
			Force [1]	kg (lbf)	11.34 (25)	
Track	Width			mm (in)	381 (15)	
	Length			mm (in)	3074 (121)	
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
			Force [2]	kg (lbf)	7.3 (16)	
Suspension type			Track		SC–10 III	
			Ski		R.A.S. A-arm	

MZX 600 HO Adrenaline and MXZ 600 HO SDI Adrenaline			MXZ Adrenaline	
			600 HO	600 HO SDI
Country			**CAN/U.S.**	**CAN/U.S.**
ELECTRICAL				
Battery (if so equipped)			12 V, 18 A•h	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	
Fuse	Starter solenoid (with electric starter)	A	30	
	Fuel level sensor	A	.25	
CAPACITIES				
Fuel tank		L (U.S. gal)	36 (9.5)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system [3]		L (U.S. oz)	4.7 (159)	
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	211 (464)	
			223 (491) [6]	
Length		mm (in)	2787 (110)	
Width		mm (in)	1217 (48)	
Height		mm (in)	1280 (50.4)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out			0	
Camber			0°	
Ground contact area		cm^2 (in^2)	6910 (1071)	
Ground contact pressure		kPa (PSI)	3.00 (.435)	
			3.17 (.460) [6]	
Frame material			Aluminum	
Bottom pan material			Impact copolymer	
Hood material			Surlyn	

MZX 600 HO Renegade					MXZ Renegade	
					600 HO	600 HO
Country					**CAN/U.S.**	**EUROPE**
DRIVE						
Chain drive ratio					22/43 [9]	21/43
					19/43 [10]	—
Chain	Pitch			in	3/8	
	Type/links qty/plate qty				Silent 74/13 [9]	
					Silent 72/13 [10]	—
Drive pulley	Type				TRA III	
	Calibration	Clutch engagement		RPM	3800 ± 100	
		Spring color			Violet/Blue	
		Spring length		mm (in)	114.6 (4.5)	
		Weight			—	
		Block			—	
		Cap			—	
		Pin			Solid (P/N 417 004 308)	
		Ramp			412	
		Screw position			3	
Driven pulley	Type				HPV VSA	
	Spring preload				0	
	Cam angle				47/40°	
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.032 ± .030)	
Drive belt part number (P/N)					417 300 197	
Drive belt width [5]			Wear limit	mm (in)	33.35 (1.313)	
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
			Force [1]	kg (lbf)	11.34 (25)	
Track	Width			mm (in)	381 (15)	
	Length			mm (in)	3455 (136)	
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
			Force [2]	kg (lbf)	7.3 (16)	
Suspension type			Track		SC–10 III	
			Ski		R.A.S. A-arm	

MZX 600 HO Renegade			MXZ Renegade	
			600 HO	600 HO
Country			**CAN/U.S.**	**EUROPE**
ELECTRICAL				
Battery			12 V, 18 A•h	—
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	
Fuse	Starter solenoid	A	30	—
	Fuel level sensor	A	.25	—
CAPACITIES				
Fuel tank		L (U.S. gal)	36 (9.5)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system [3]		L (U.S. oz)	4.8 (162)	
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	230 (506)	218 (480)
Length		mm (in)	3005 (118)	
Width		mm (in)	1172 (46)	
Height		mm (in)	1130 (44.5)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out			0	
Camber			0°	
Ground contact area		cm^2 (in^2)	7596 (1177)	
Ground contact pressure		kPa (PSI)	2.97 (.431)	2.82 (.409)
Frame material			Aluminum	
Bottom pan material			Impact copolymer	
Hood material			Surlyn	

MZX 600 HO Renegage X and MXZ 600 HO SDI Renegade X					MXZ Renegade X	
					600 HO	600 HO SDI
Country					**CAN/U.S.**	**CAN/U.S.**
DRIVE						
Chain drive ratio					22/43 (9)	21/43 (9)
					19/43 (10)	
Chain	Pitch			in	3/8	
	Type/links qty/plate qty				Silent 74/13 (9)	
					Silent 72/13 (10)	
Drive pulley	Type				TRA III	
	Calibration	Clutch engagement		RPM	3800 ± 100	
		Spring color			Violet/Blue	
		Spring length		mm (in)	114.6 (4.5)	
		Weight			—	
		Block			—	
		Cap			—	
		Pin			Solid (P/N 417 004 308)	
		Ramp			410 (9)	
					410 (10)	412 (10)
		Screw position			3	
Driven pulley	Type				HPV VSA	
	Spring preload				0	
	Cam angle				47/40° (9)	
					47/40° (10)	44° (10)
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X	MIN.-MAX.		mm (in)	0.82 ± 0.75 (.032 ± .030)	
Drive belt part number (P/N)					417 300 197	
Drive belt width (5)		Wear limit		mm (in)	33.35 (1.313)	
Drive belt adjustment		Deflection		mm (in)	32 ± 5 (1.260 ± .197)	
		Force (1)		kg (lbf)	11.34 (25)	
Track	Width			mm (in)	381 (15)	
	Length			mm (in)	3455 (136)	
	Adjustment	Deflection		mm (in)	30 to 35 (1.181 to 1.378)	
		Force (2)		kg (lbf)	7.3 (16)	
Suspension type		Track			SC–10 III	
		Ski			R.A.S. A-arm	

MZX 600 HO Renegage X and MXZ 600 HO SDI Renegade X			MXZ Renegade X	
			600 HO	600 HO SDI
Country			**CAN/U.S.**	**CAN/U.S.**
ELECTRICAL				
Battery (if so equipped)			12 V, 18 A•h	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	
Fuse	Starter solenoid (with electric starter)	A	30	
	Fuel level sensor	A	.25	
CAPACITIES				
Fuel tank		L (U.S. gal)	36 (9.5)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system [3]		L (U.S. oz)	4.8 (162)	
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	218 (480) [8]	
			230 (506)	
Length		mm (in)	3005 (118)	
Width		mm (in)	1172 (46)	
Height		mm (in)	1130 (44.5)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out			0	
Camber			0°	
Ground contact area		cm^2 (in^2)	7596 (1177)	
Ground contact pressure		kPa (PSI)	2.82 (.409) [8]	
			2.97 (.431)	
Frame material			Aluminum	
Bottom pan material			Impact copolymer	
Hood material			Surlyn	

MXZ 600 HO Trail, MXZ 600 HO X and MXZ 600 HO SDI X					MXZ		
					600 HO Trail	600 HO X	600 HO SDI X
Country					CAN/U.S.	CAN/U.S.	CAN/U.S.
DRIVE							
Chain drive ratio					22/43		
Chain	Pitch			in	3/8		
	Type/links qty/plate qty				Silent 74/13		
Drive pulley	Type				TRA III		
	Calibration	Clutch engagement		RPM	3800 ± 100		
		Spring color			Violet/Blue		
		Spring length		mm (in)	114.6 (4.512)		
		Weight			—		
		Block			—		
		Cap			—		
		Pin			Solid (P/N 417 004 308)		
		Ramp			410		
		Screw position			3		
Driven pulley	Type				Formula VSA [8] HPV VSA	HPV VSA	
	Spring preload			kg (lbf)	8 ± 0.7 (17.6 ± 1.5) [8] 0	0	
	Cam angle				48°/44° [8] 47°/44°	47°/44°	
Pulley distance	Z			mm (in)	19.0 ± 0.5 (.748 ± .02) [8] 20.0 ± 0.5 (.787 ± .02)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)		
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.0032 ± .0030)		
Drive belt part number (P/N)					417 300 197		
Drive belt width [5]			Wear limit	mm (in)	33.35 (1.313)		
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)		
			Force [1]	kg (lbf)	11.34 (25)		
Track	Width			mm (in)	381 (15)		
	Length			mm (in)	3074 (121)		
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)		
			Force [2]	kg (lbf)	7.3 (16)		
Suspension type			Track		SC–10 III		
			Ski		R.A.S. A-arm		
ELECTRICAL							
Battery (if so equipped)					12 V, 18 A•h		
Headlamp				W	60/55 (H4)		
Taillight and stoplight				W	8/27		

MXZ 600 HO Trail, MXZ 600 HO X and MXZ 600 HO SDI X			MXZ		
			600 HO Trail	600 HO X	600 HO SDI X
Country			**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Tachometer and speedometer bulbs		W	2 x 3		
Fuel and temperature gauge bulbs		W	—		
Fuse	Starter solenoid (with electric starter)	A	30		
	Fuel level sensor	A	.25		
CAPACITIES					
Fuel tank		L (U.S. gal)	36 (9.5)		
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)		
Cooling system (3)		L (U.S. oz)	4.7 (159)		
Injection oil reservoir		L (U.S. oz)	3.5 (118)		
VEHICLE INFORMATIONS					
Mass (dry)		kg (lb)	211 (464)		
			223 (491) (7)		
Length		mm (in)	2787 (109.724)		
Width		mm (in)	1217 (48)		
Height		mm (in)	1280 (50.394)		
Ski stance (carbide to carbide)		mm (in)	1195 (47)		
Toe-out			0		
Camber			0°		
Ground contact area		cm^2 (in^2)	6910.2 (1071)		
Ground contact pressure		kPa (PSI)	3.00 (.435)		
			3.17 (.460) (7)		
Frame material			Aluminum		
Bottom pan material			Impact resistant copolymer		
Hood material			Surlyn		

MZX 600 HO X and MXZ 600 HO SDI X					MXZ X	
					600 HO	600 HO SDI
Country					**EUROPE**	**EUROPE**
DRIVE						
Chain drive ratio					22/43	
Chain	Pitch			in	3/8	
	Type/links qty/plate qty				Silent 74/13	
Drive pulley	Type				TRA III	
	Calibration	Clutch engagement		RPM	3800 ± 100	
		Spring color			Violet/Blue	
		Spring length		mm (in)	114.6 (4.5)	
		Weight			—	
		Block			—	
		Cap			—	
		Pin			Solid (P/N 417 004 308)	
		Ramp			410	
		Screw position			3	
Driven pulley	Type				HPV VSA	
	Spring preload				0	
	Cam angle				47/44°	
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.032 ± .030)	
Drive belt part number (P/N)					417 300 197	
Drive belt width [5]			Wear limit	mm (in)	33.35 (1.313)	
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
			Force [1]	kg (lbf)	11.34 (25)	
Track	Width			mm (in)	381 (15)	
	Length			mm (in)	3074 (121)	
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
			Force [2]	kg (lbf)	7.3 (16)	
Suspension type			Track		SC–10 III	
			Ski		R.A.S. A-arm	

MZX 600 HO X and MXZ 600 HO SDI X			MXZ X	
			600 HO	600 HO SDI
Country			**EUROPE**	**EUROPE**
ELECTRICAL				
Battery			—	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	
Fuse	Starter solenoid (with electric starter)	A	30	
	Fuel level sensor	A	.25	
CAPACITIES				
Fuel tank		L (U.S. gal)	36 (9.5)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system [3]		L (U.S. oz)	4.7 (159)	
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	211 (464)	
Length		mm (in)	2787 (110)	
Width		mm (in)	1217 (48)	
Height		mm (in)	1280 (50.4)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out			0	
Camber			0°	
Ground contact area		cm^2 (in^2)	6910 (1071)	
Ground contact pressure		kPa (PSI)	3.00 (.435)	
Frame material			Aluminum	
Bottom pan material			Impact copolymer	
Hood material			Surlyn	

MZX 800 HO Adrenaline and MXZ 800 HO DPM Adrenaline					MXZ Adrenaline	
					800 HO	800 HO DPM
Country					**CAN/U.S.**	**CAN/U.S.**
DRIVE						
Chain drive ratio					26/45	
Chain	Pitch			in	3/8	
	Type/links qty/plate qty				Silent 76/13	
Drive pulley	Type				TRA III	
	Calibration	Clutch engagement		RPM	3800 ± 100	
		Spring color			Violet/Green	
		Spring length		mm (in)	133.5 (5.256)	
		Weight			—	
		Block			—	
		Cap			—	
		Pin			Solid (P/N 417 222 594)	
		Ramp			414	
		Screw position			3	
Driven pulley	Type				HPV VSA	
	Spring preload				0	
	Cam angle				50/40°	
					47/44° (7)	
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.032 ± .030)	
Drive belt part number (P/N)					417 300 166	
Drive belt width (5)			Wear limit	mm (in)	34.70 (1.366)	
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
			Force (1)	kg (lbf)	11.30 (25)	
Track	Width			mm (in)	381 (15)	
	Length			mm (in)	3074 (121)	
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
			Force (2)	kg (lbf)	7.3 (16)	
Suspension type			Track		SC–10 III	
			Ski		R.A.S. A-arm	

MZX 800 HO Adrenaline and MXZ 800 HO DPM Adrenaline			MXZ Adrenaline	
			800 HO	800 HO DPM
Country			**CAN/U.S.**	**CAN/U.S.**
ELECTRICAL				
Battery (if so equipped)			12 V, 18 A•h	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	
Fuse	Starter solenoid (with electric starter)	A	30	
	Fuel level sensor	A	.25	
CAPACITIES				
Fuel tank		L (U.S. gal)	36 (9.5)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system [3]		L (U.S. oz)	4.7 (159)	
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	211 (464)	
			223 (491) [7]	
Length		mm (in)	2787 (110)	
Width		mm (in)	1217 (48)	
Height		mm (in)	1280 (50.4)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out			0	
Camber			0°	
Ground contact area		cm^2 (in^2)	6910 (1071)	
Ground contact pressure		kPa (PSI)	3.00 (.435)	
			3.17 (.460) [7]	
Frame material			Aluminum	
Bottom pan material			Impact copolymer	
Hood material			Surlyn	

MXZ 800 HO Renegade and MXZ 800 HO Renegade X				MXZ		
				800 HO Renegade	800 HO Renegade X	800 HO Renegade X
Country				**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
DRIVE						
Chain drive ratio				23/43		—
				22/43 (10)		
Chain	Pitch		in	3/8		
	Type/links qty/plate qty			Silent 74/13		
Drive pulley	Type			TRA III		
	Calibration	Clutch engagement	RPM	3800 ± 100		
		Spring color		Violet/Green		
		Spring length	mm (in)	133.5 (5.256)		
		Weight		—		
		Block		—		
		Cap		—		
		Pin		Solid (P/N 417 222 594)		—
				Solid (P/N 417 004 308) (7)		
		Ramp		415		
		Screw position		3		
Driven pulley	Type			HPV VSA		
	Spring preload		kg (lbf)	0		
	Cam angle			47°/40°		
Pulley distance	Z		mm (in)	20.0 ± 0.5 (.787 ± .02)		
Offset	X		mm (in)	37.0 ± 0.5 (1.457 ± 0.2)		
	Y – X	MIN.-MAX.	mm (in)	0.82 ± 0.75 (.0032 ± .0030)		
Drive belt part number (P/N)				417 300 166		
Drive belt width (5)		Wear limit	mm (in)	34.70 (1.366)		
Drive belt adjustment		Deflection	mm (in)	32 ± 5 (1.260 ± .197)		
		Force (1)	kg (lbf)	11.3 (25)		
Track	Width		mm (in)	381 (15)		
	Length		mm (in)	3455 (136)		
	Adjustment	Deflection	mm (in)	30 to 35 (1.181 to 1.378)		
		Force (2)	kg (lbf)	7.3 (16)		
Suspension type		Track		SC–10 III		
		Ski		R.A.S. A-arm		
ELECTRICAL						
Battery (if so equipped)				12 V, 18 A•h		
Headlamp			W	60/55 (H4)		
Taillight and stoplight			W	8/27		
Tachometer and speedometer bulbs			W	2 x 3		
Fuel and temperature gauge bulbs			W	—		

MXZ 800 HO Renegade and MXZ 800 HO Renegade X			MXZ		
			800 HO Renegade	800 HO Renegade X	800 HO Renegade X
Country			**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
Fuse	Starter solenoid (with electric starter)	A	30		
	Fuel level sensor	A	.25		
CAPACITIES					
Fuel tank		L (U.S. gal)	36 (9.5)		
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)		
Cooling system [3]		L (U.S. oz)	4.8 (159)		
Injection oil reservoir		L (U.S. oz)	3.5 (118)		
VEHICLE INFORMATIONS					
Mass (dry)		kg (lb)	218 (480)		
			230 (506) [7]	—	
Length		mm (in)	3005 (118)		
Width		mm (in)	1172 (46)		
Height		mm (in)	1130 (44.5)		
Ski stance (carbide to carbide)		mm (in)	1195 (47)		
Toe-out			0		
Camber			0°		
Ground contact area		cm^2 (in^2)	7596 (1177)		
Ground contact pressure		kPa (PSI)	2.82 (.409)		
			2.97 (.431) [7]	—	
Frame material			Aluminum		
Bottom pan material			Impact resistant copolymer		
Hood material			Surlyn		

MZX 800 HO X					MXZ X	
					800 HO	800 HO
Country					**CAN/U.S.**	**EUROPE**
DRIVE						
Chain drive ratio					26/45	
Chain	Pitch			in	3/8	
	Type/links qty/plate qty				Silent 76/13	
Drive pulley	Type				TRA III	
	Calibration	Clutch engagement		RPM	3800 ± 100	
		Spring color			Violet/Green	
		Spring length		mm (in)	133.5 (5.256)	
		Weight			—	
		Block			—	
		Cap			—	
		Pin			Solid (P/N 417 222 594)	
		Ramp			414	
		Screw position			3	
Driven pulley	Type				HPV VSA	
	Spring preload				0	
	Cam angle				50/40°	
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)	
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)	
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.032 ± .030)	
Drive belt part number (P/N)					417 300 166	
Drive belt width [5]			Wear limit	mm (in)	34.70 (1.366)	
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)	
			Force [1]	kg (lbf)	11.30 (25)	
Track	Width			mm (in)	381 (15)	
	Length			mm (in)	3074 (121)	
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)	
			Force [2]	kg (lbf)	7.3 (16)	
Suspension type			Track		SC–10 III	
			Ski		R.A.S. A-arm	

MZX 800 HO X			MXZ X	
			800 HO	800 HO
Country			**CAN/U.S.**	**EUROPE**
ELECTRICAL				
Battery (if so equipped)			12 V, 18 A•h	
Headlamp		W	60/55 (H4)	
Taillight and stoplight		W	8/27	
Tachometer and speedometer bulbs		W	2 x 3	
Fuel and temperature gauge bulbs		W	—	
Fuse	Starter solenoid (with electric starter)	A	30	
	Fuel level sensor	A	.25	
CAPACITIES				
Fuel tank		L (U.S. gal)	36 (9.5)	
Chaincase/gearbox		mL (U.S. oz)	250 (8.5)	
Cooling system [3]		L (U.S. oz)	4.7 (159)	
Injection oil reservoir		L (U.S. oz)	3.5 (118)	
VEHICLE INFORMATIONS				
Mass (dry)		kg (lb)	211 (464)	
			223 (491) [7]	—
Length		mm (in)	2787 (110)	
Width		mm (in)	1217 (48)	
Height		mm (in)	1280 (50.4)	
Ski stance (carbide to carbide)		mm (in)	1195 (47)	
Toe-out			0	
Camber			0°	
Ground contact area		cm^2 (in^2)	6910 (1071)	
Ground contact pressure		kPa (PSI)	3.00 (.435)	
			3.17 (.460) [7]	—
Frame material			Aluminum	
Bottom pan material			Impact copolymer	
Hood material			Surlyn	

Summit 600 HO Adrenaline and Summit 600 HO X					Summit		
					600 HO Adrenaline	600 HO Adrenaline	600 HO X
Country					**CAN/U.S.**	**EUROPE**	**CAN/U.S.**
DRIVE							
Chain drive ratio					19/45	19/43	19/45
Chain	Pitch			in	3/8		
	Type/links qty/plate qty				Silent 74/13	Silent 72/13	Silent 74/13
Drive pulley	Type				TRA III		
	Calibration	Clutch engagement		RPM	3600 ± 100		
		Spring color			Violet/Green	Green/White	Violet/Green
		Spring length		mm (in)	98.5 (3.878)	110.7 (4.358)	98.5 (3.878)
		Weight			—		
		Block			—		
		Cap			—		
		Pin			Thread Pin (P/N 417 222 478)		
		Ramp			415	412	415
		Screw position			1	3	1
Driven pulley	Type				HPV VSA		
	Spring preload			kg (lbf)	0		
	Cam angle				47°/44°	47°/40°	47°/44°
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)		
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)		
	Y – X	MIN.-MAX.		mm (in)	0.82 ± 0.75 (.0032 ± .0030)		
Drive belt part number (P/N)					417 300 197		
Drive belt width [5]		Wear limit		mm (in)	33.35 (1.313)		
Drive belt adjustment		Deflection		mm (in)	32 ± 5 (1.260 ± .197)		
		Force [1]		kg (lbf)	11.3 (25)		
Track	Width			mm (in)	406 (16)		
	Length			mm (in)	3648 (144)		
	Adjustment	Deflection		mm (in)	30 to 35 (1.181 to 1.378)		
		Force [2]		kg (lbf)	7.3 (16)		
Suspension type		Track			SC–10		
		Ski			R.A.S. A-arm		
ELECTRICAL							
Battery					—		
Headlamp				W	60/55 (H4)		
Taillight and stoplight				W	8/27		
Tachometer and speedometer bulbs				W	2 x 3		
Fuel and temperature gauge bulbs				W	—		
Fuse	Starter solenoid (with electric starter)			A	—		
	Fuel level sensor			A	—		

Summit 600 HO Adrenaline and Summit 600 HO X		Summit		
		600 HO Adrenaline	600 HO Adrenaline	600 HO X
Country		**CAN/U.S.**	**EUROPE**	**CAN/U.S.**
CAPACITIES				
Fuel tank	L (U.S. gal)	36 (9.5)		
Chaincase/gearbox	mL (U.S. oz)	250 (8.5)		
Cooling system [3]	L (U.S. oz)	4.9 (166)		
Injection oil reservoir	L (U.S. oz)	3.5 (118)		
VEHICLE INFORMATIONS				
Mass (dry)	kg (lb)	220 (484)		218 (480)
Length	mm (in)	3134 (123)		
Width	mm (in)	1139 (45)		
Height	mm (in)	1130 (44.5)		
Ski stance (carbide to carbide)	mm (in)	1029 (40.5)		
Toe-out		0		
Camber		0°		
Ground contact area	cm^2 (in^2)	9044 (1402)		
Ground contact pressure	kPa (PSI)	2.39 (.347)		2.36 (.342)
Frame material		Aluminum		
Bottom pan material		Impact resistant copolymer		
Hood material		Surlyn		

Summit 800 HO Adrenaline and Summit 800 HO X					Summit		
					800 HO Adrenaline	800 HO X	800 HO X
Country					**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
DRIVE							
Chain drive ratio					19/45		21/45
Chain	Pitch			in	3/8		
	Type/links qty/plate qty				Silent 74/13		
Drive pulley	Type				TRA III		
	Calibration	Clutch engagement		RPM	3800 ± 100		
		Spring color			Violet/Yellow		
		Spring length		mm (in)	157.9 (6.217)		
		Weight			—		
		Block			—		
		Cap			—		
		Pin			Thread Pin (P/N 417 222 478)		Solid (P/N 417 222 594)
		Ramp			415		413
		Screw position			1		3
Driven pulley	Type				HPV VSA		
	Spring preload			kg (lbf)	0		
	Cam angle				44°		44°/40°
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)		
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)		
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.0032 ± .0030)		
Drive belt part number (P/N)					417 300 166		
Drive belt width [5]			Wear limit	mm (in)	34.70 (1.366)		
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)		
			Force [1]	kg (lbf)	11.3 (25)		
Track	Width			mm (in)	406 (16)		
	Length			mm (in)	3648 (144)		
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)		
			Force [2]	kg (lbf)	7.3 (16)		
Suspension type			Track		SC–10		
			Ski		R.A.S. A-arm		
ELECTRICAL							
Battery					—		
Headlamp				W	60/55 (H4)		
Taillight and stoplight				W	8/27		
Tachometer and speedometer bulbs				W	2 x 3		
Fuel and temperature gauge bulbs				W	—		
Fuse	Starter solenoid (with electric starter)			A	—		
	Fuel level sensor			A	—		

Summit 800 HO Adrenaline and Summit 800 HO X		Summit		
		800 HO Adrenaline	800 HO X	800 HO X
Country		**CAN/U.S.**	**CAN/U.S.**	**EUROPE**
CAPACITIES				
Fuel tank	L (U.S. gal)	36 (9.5)		
Chaincase/gearbox	mL (U.S. oz)	250 (8.5)		
Cooling system (3)	L (U.S. oz)	4.9 (166)		
Injection oil reservoir	L (U.S. oz)	3.5 (118)		
VEHICLE INFORMATIONS				
Mass (dry)	kg (lb)	220 (484)	218 (480)	
Length	mm (in)	3134 (123)		
Width	mm (in)	1139 (45)		
Height	mm (in)	1130 (44.5)		
Ski stance (carbide to carbide)	mm (in)	1029 (40.5)		
Toe-out		0		
Camber		0°		
Ground contact area	cm^2 (in^2)	9044 (1402)		
Ground contact pressure	kPa (PSI)	2.39 (.347)	2.36 (.342)	
Frame material		Aluminum		
Bottom pan material		Impact resistant copolymer		
Hood material		Surlyn		

Summit 800 HO Highmark, Summit 800 HO Highmark X and Summit 800 HO Highmark Xtrem					Summit 800 HO		
					Highmark	Highmark X	Highmark Xtrem
Country					**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
DRIVE							
Chain drive ratio					19/45		19/43
Chain	Pitch			in	3/8		
	Type/links qty/plate qty				Silent 74/13		Silent 72/13
Drive pulley	Type				TRA III		
	Calibration	Clutch engagement		RPM	3800 ± 100		
		Spring color			Violet/Yellow		
		Spring length		mm (in)	157.9 (6.217)		
		Weight			—		
		Block			—		
		Cap			—		
		Pin			Thread Pin (P/N 417 222 707)		
		Ramp			415		
		Screw position			1		
Driven pulley	Type				HPV VSA		
	Spring preload			kg (lbf)	0		
	Cam angle				44°		44°/40°
Pulley distance	Z			mm (in)	20.0 ± 0.5 (.787 ± .02)		
Offset	X			mm (in)	37.0 ± 0.5 (1.457 ± 0.2)		
	Y – X		MIN.-MAX.	mm (in)	0.82 ± 0.75 (.0032 ± .0030)		
Drive belt part number (P/N)					417 300 166		
Drive belt width [5]			Wear limit	mm (in)	34.70 (1.366)		
Drive belt adjustment			Deflection	mm (in)	32 ± 5 (1.260 ± .197)		
			Force [1]	kg (lbf)	11.3 (25)		
Track	Width			mm (in)	406 (16)		
	Length			mm (in)	3648 (144)		4038 (159)
	Adjustment		Deflection	mm (in)	30 to 35 (1.181 to 1.378)		
			Force [2]	kg (lbf)	7.3 (16)		
Suspension type			Track		SC–10		
			Ski		R.A.S. A-arm		
ELECTRICAL							
Battery					—		
Headlamp				W	60/55 (H4)		
Taillight and stoplight				W	8/27		
Tachometer and speedometer bulbs				W	2 x 3		
Fuel and temperature gauge bulbs				W	—		
Fuse	Starter solenoid (with electric starter)			A	—		
	Fuel level sensor			A	—		
CAPACITIES							

Summit 800 HO Highmark, Summit 800 HO Highmark X and Summit 800 HO Highmark Xtrem		Summit 800 HO		
		Highmark	Highmark X	Highmark Xtrem
Country		**CAN/U.S.**	**CAN/U.S.**	**CAN/U.S.**
Fuel tank	L (U.S. gal)	36 (9.5)		
Chaincase/gearbox	mL (U.S. oz)	250 (8.5)		
Cooling system [3]	L (U.S. oz)	5.0 (169)		5.2 (176)
Injection oil reservoir	L (U.S. oz)	3.5 (118)		
VEHICLE INFORMATIONS				
Mass (dry)	kg (lb)	223 (491)	220 (484)	222 (488)
Length	mm (in)	3216 (127)		3314 (130.5)
Width	mm (in)	1139 (45)		
Height	mm (in)	1130 (44.5)		
Ski stance (carbide to carbide)	mm (in)	1029 (40.5)		
Toe-out		0		
Camber		0°		
Ground contact area	cm^2 (in^2)	9531 (1477)		10018 (1553)
Ground contact pressure	kPa (PSI)	2.30 (.334)	2.26 (.328)	2.17(.315)
Frame material		Aluminum		
Bottom pan material		Impact resistant copolymer		
Hood material		Surlyn		

TECHNICAL DATA LEGENDS

ENGINE LEGEND

ABDC:	After Bottom Dead Center
ATDC:	After Top Dead Center
BBDC:	Before Bottom Dead Center
BTDC:	Before Top Dead Center
CDI:	Capacitor Discharge Ignition
IACV:	Idle Air Control Valve
K:	Kilo (x 1000)
MAG:	Magneto
N.A.:	Not Applicable
PTO:	Power Take Off
SDI:	Semi-Direct Injection
W:	Watt

(1) The maximum horsepower RPM applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER reserves the right to modify it without obligation.

(2) Crankshaft end-play is not adjustable on these models. Specification is given for verification purposes only.

(3) At 3500 RPM with headlamp turned on.

(4) All resistance measurements must be performed with parts at room temperature (approx. 20°C (68°F)). Temperature greatly affects resistance measurements.

(5) Press fit type, not replaceable.

(6) Needle with one groove, not adjustable.

(7) Drive pulley retaining screw: torque to 80 to 100 N•m (59 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. Retorque screw to 90 to 100 N•m (66 to 74 lbf•ft).

(8) **CAUTION: Do not attempt to adjust gap on spark plug BR 9 ECS. The specification is given for verification purpose only. If found out of specification, replace with a new one.**

(9) The engine speed for transmission calibration applicable on the vehicle. It may be different under certain circumstances and BOMBARDIER reserves the right to modify it without obligation.

(10) Use Bombardier premixed coolant (P/N 293 600 038) or a solution of ethylene glycol antifreeze for aluminum engines with distilled water (50% antifreeze, 50% distilled water).

(11) Drive pulley retaining screw: torque to 125 to 135 N•m (92 to 100 lbf•ft), install drive belt, accelerate the vehicle at low speed (maximum 30 km/h (20 MPH)) and apply the brake; repeat 5 times. Retorque screw to 125 to 135 N•m (92 to 100 lbf•ft).

(12) At 4000 (600 HO SDI models) or 3500 (800 HO SDI models) RPM with APS disconnected.

VEHICLE LEGEND

N.A.:	Not Applicable
R.A.S.	Response Angle Suspension
RER:	Rotax Electronic Reverse
RRIM:	Reinforced Reaction Injection Molding
TRA:	Total Range Adjustable
VSA:	Variable Sheave Angle

(1) Force applied midway between pulleys to obtain specified tension deflection.

(2) Force or downward pull applied to track to obtain specified tension deflection.

(3) Coolant mixture: 50% antifreeze/50% distilled water.

(4) From factory TRA IV drive pulley adjustment screws are set to **position 3**. This position allows the best compromise between acceleration, top speed and fuel economy.
Position 1 or 2 would provide the best fuel economy. Top speed would be reduce.
Position 4 would give the best acceleration. Fuel economy would be reduced.

(5) Minimum allowable width may not be less than 3 mm (1/8 in) of new drive belt.

(6) This information is only for 1 + 1 models.

(7) Models with electric starter.

(8) Models without starter and electronic reverse.

(9) Models with 1.25" profile track.

(10) Models with 1.75" profile track.

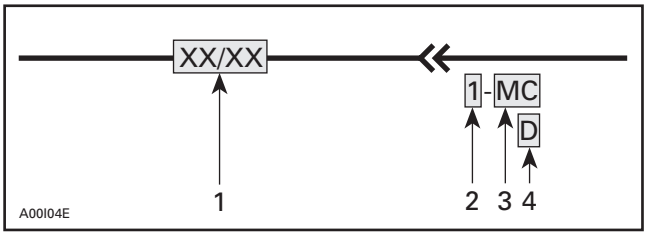
WIRING DIAGRAMS

Wiring diagrams can be found at the end of this subsection.

WIRING DIAGRAM LEGEND

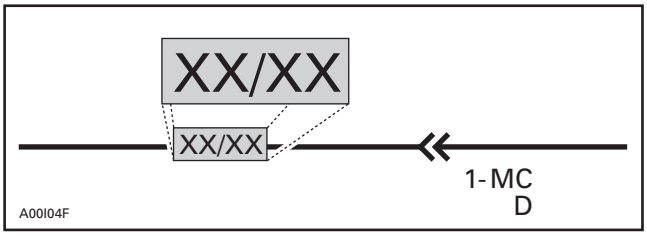
⚠ WARNING

Ensure all terminals are properly crimped on the wires and all connector housings are properly fastened.



1. *Wire colors*
2. *Connector housing area*
3. *Housing code per area*
4. *Wire connector location in housing*

WIRE COLORS



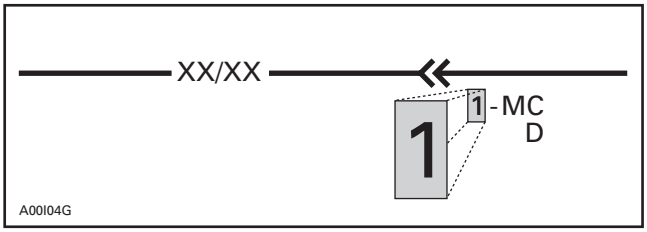
The first color of a wire is the main color, second color is the stripe.

Example: YL / BK is a YELLOW wire with a BLACK stripe.

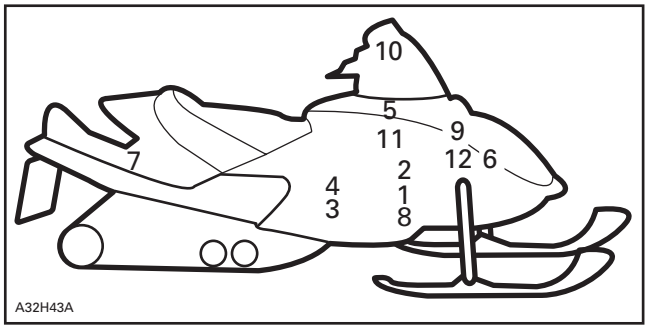
COLOR CODE	
BE — BEIGE	OR — ORANGE
BK — BLACK	RD — RED
BU — BLUE	VI — VIOLET
BR — BROWN	WH — WHITE
GN — GREEN	YL — YELLOW
GY — GREY	

CONNECTOR HOUSING AREA

The first digit of the connector identification number presents the location of the connector on the vehicle.



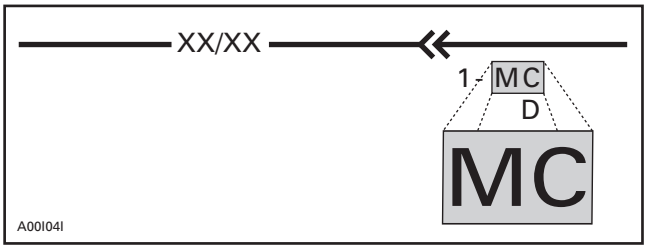
The following illustration shows the snowmobile with number on it. These numbers will correspond with the locations of the connector on the vehicle along with a brief description.



AREA	LOCATION
1	Right hand side of engine
2	Engine
3	Near right hand side footrest
4	Near driven pulley
5	Under console
6	Under hood
7	Near fuel tank
8	Under engine
9	Near steering column or on primary air intake silencer
10	On handlebar
11	Injection oil tank
12	Secondary air intake silencer

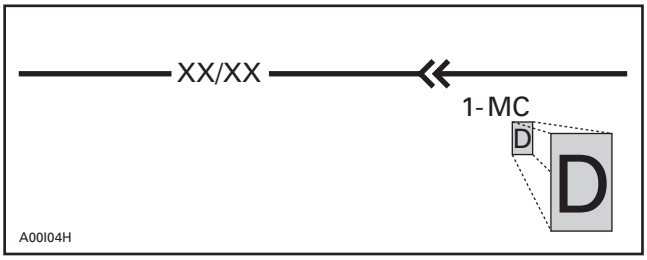
HOUSING REFERENCE PER AREA

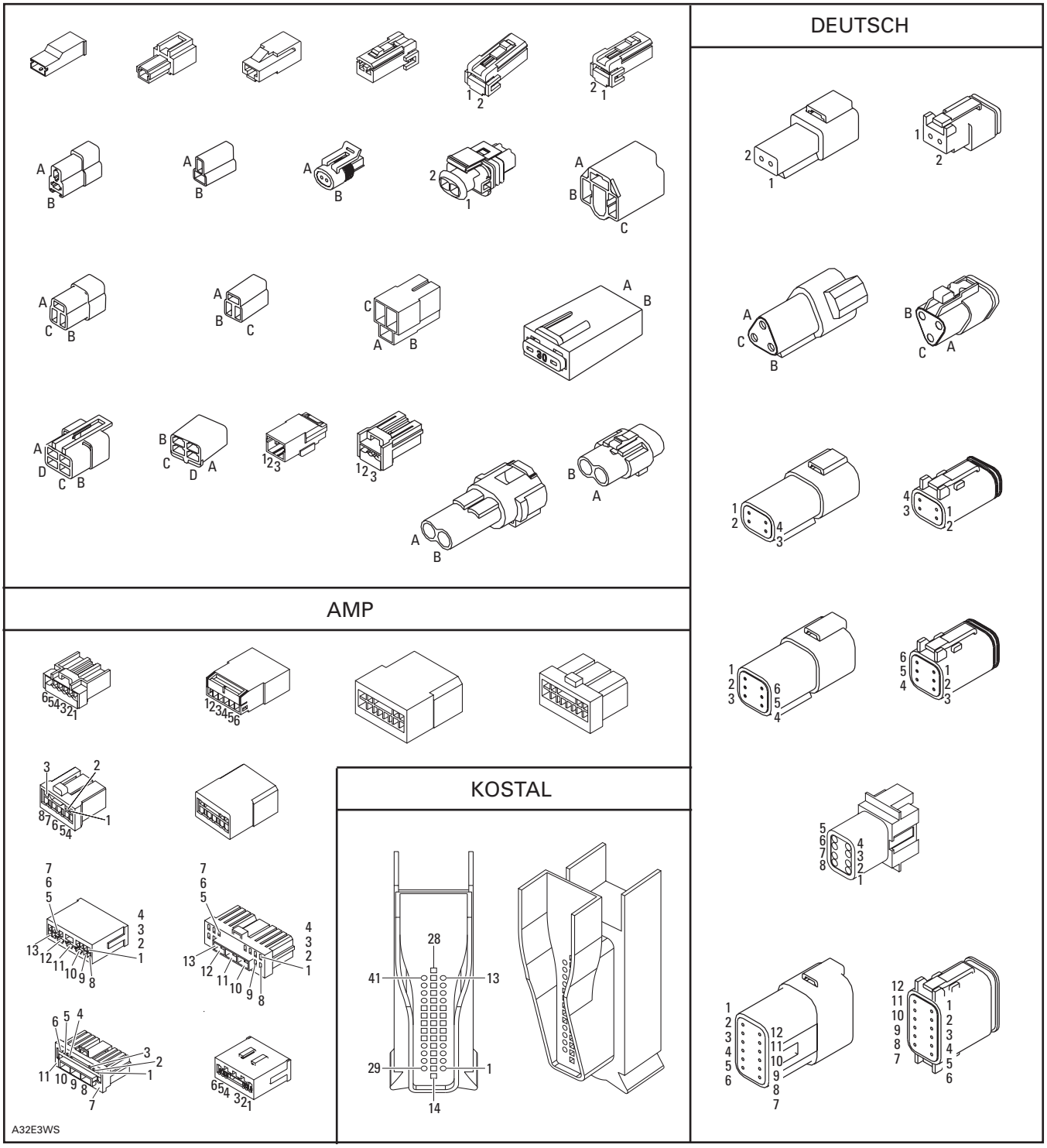
The next two letters of the connector identification number represents a connector reference. If there are many connectors in the same area this helps identify which wire is in which connector.



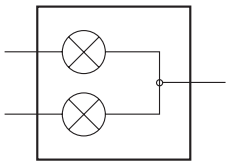
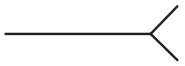
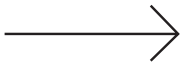
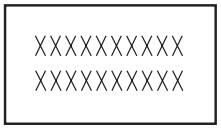
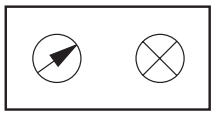
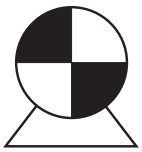
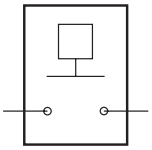
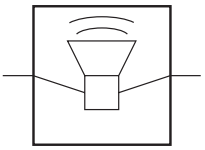
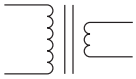
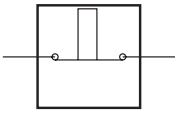
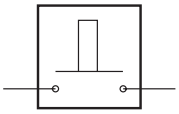
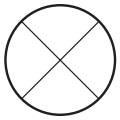
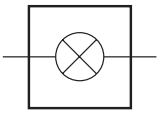
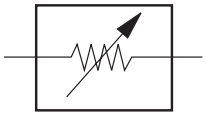
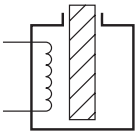
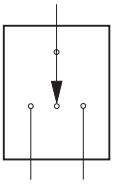
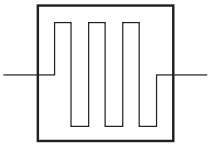
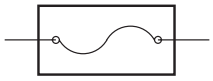
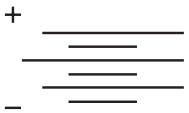
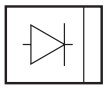
WIRE LOCATION IN CONNECTOR HOUSING

The third portion of the connector identification number represents the location of the wire in the connector housing. This could be identified by either a number such as 1, 2, 3 or by a letter such as A, B, C depending on the type of connector used.




DEUTSCH
AMP
KOSTAL
A32E3WS

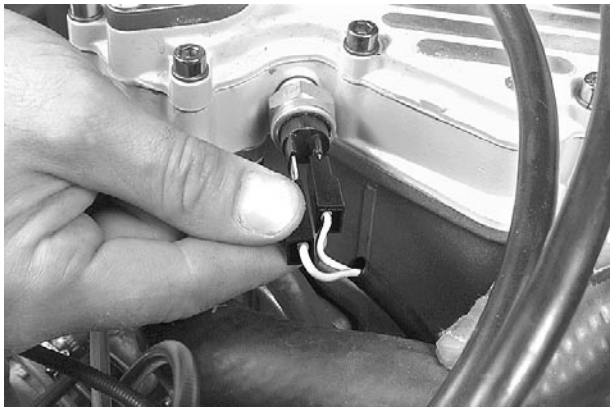
SYMBOLS DESCRIPTION

Beam and tail light 	Female terminal 	Male terminal 	Electronic module 
Meter 	Electric motor 	Low level sensor 	Buzzer 
Ignition coil 	Normally close switch 	Normally open switch 	Male terminal on instrument 
Engine ground 	Frame ground  Frame	Spark plug 	Meter movement 
Bulb 	Pilot 	Analog sensor 	Solenoid valve 
Magneto (Delta) 	3 position switch 	Heating element 	Fuse 
Trigger coil 	Battery 	Diode 	Partially illustrated component 

A00E9PS

UNPLUGING CONNECTORS

Always unplug connectors by pulling on housing not on wire.

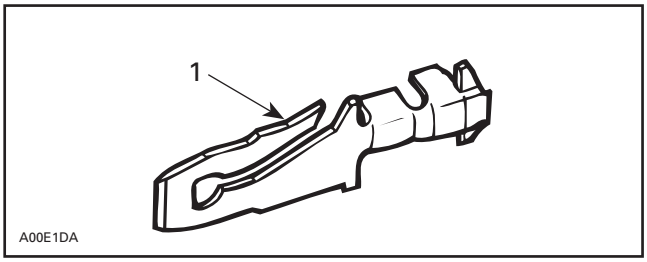

A06E1PA

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.

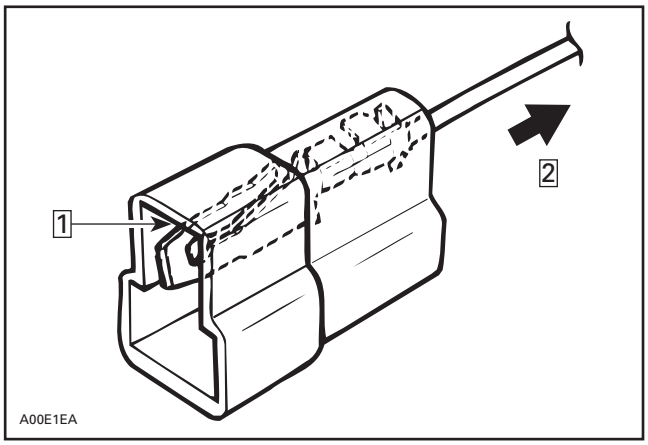


A00E1DA

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.



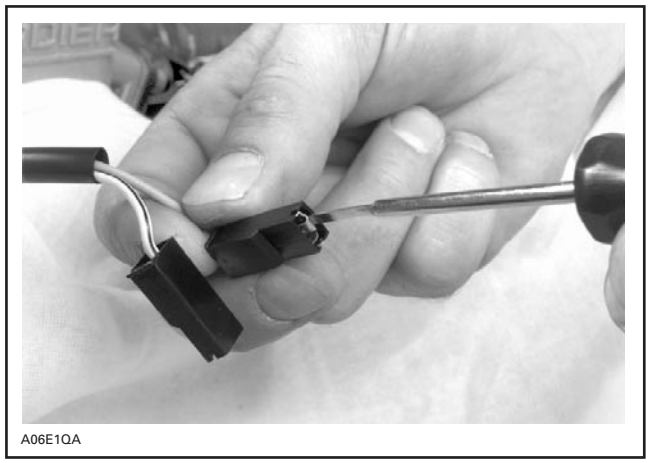
A00E1EA

1. Insert screwdriver here
2. Pull this side

Locking Receptacle Connector

To remove:

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

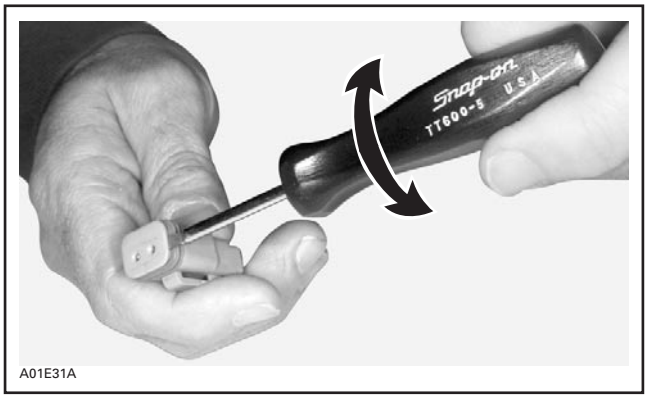

A06E1QA

Waterproof Connector Housing

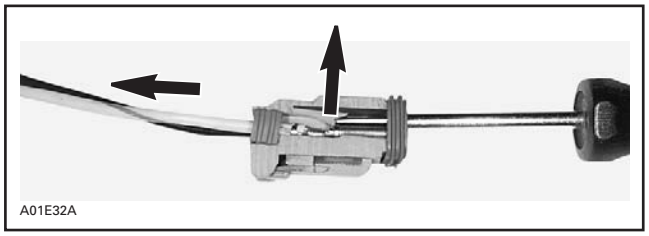
Female Connector Housing

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.

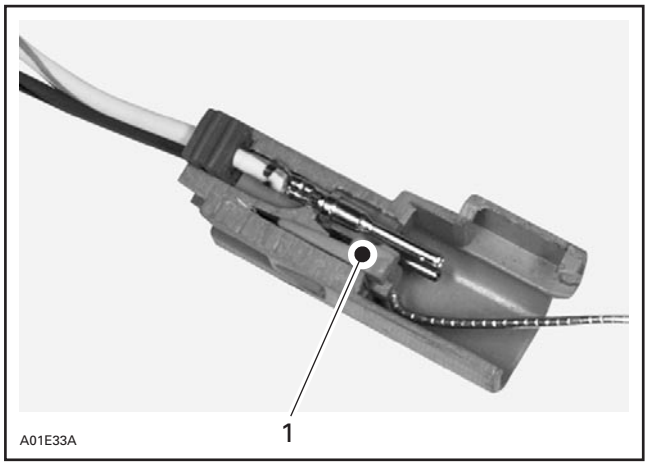


FEMALE CONNECTOR HOUSING — CUT-AWAY

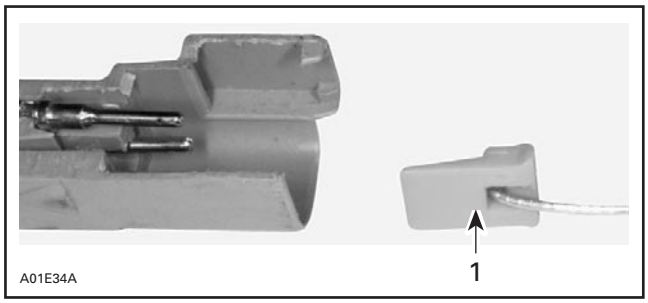
Male Connector Housing

To remove:

– Using a small hook, pull out the lock.

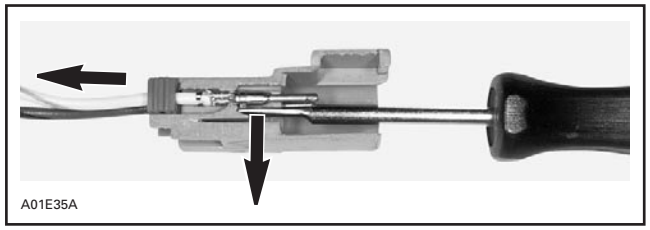


1. Lock



1. Lock

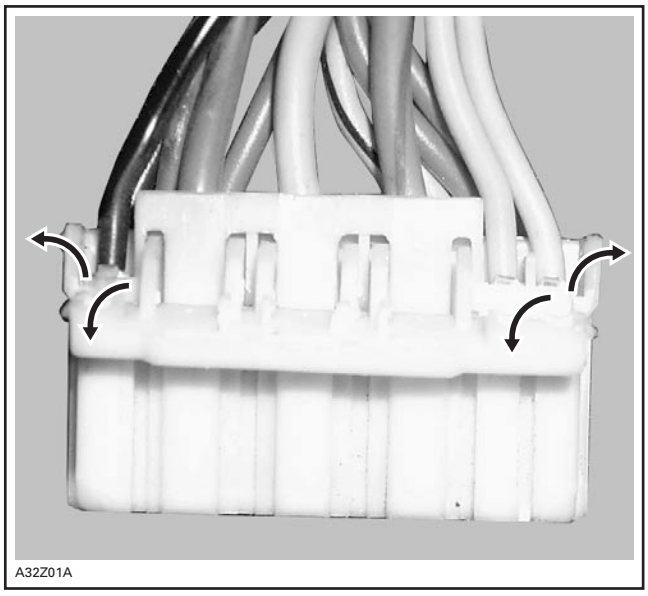
– Pry tab to free connector then pull wire out of housing.



MALE CONNECTOR HOUSING — CUT-AWAY

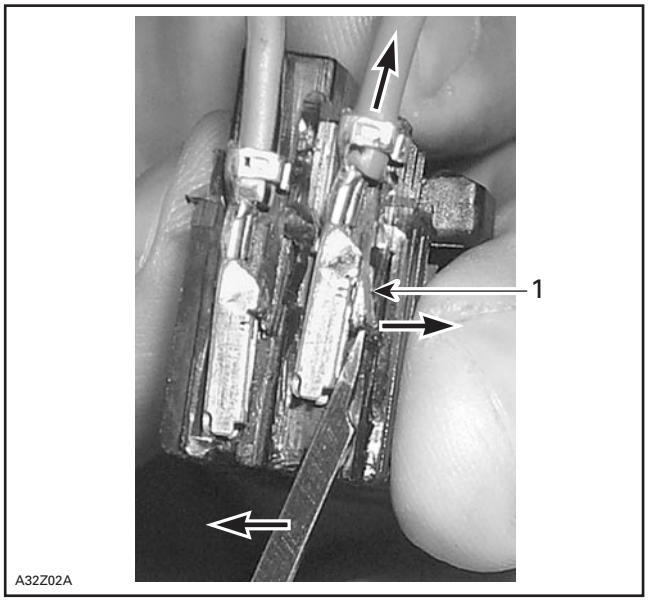
Multilock Connector Housing

Female Connector Housing



To remove:

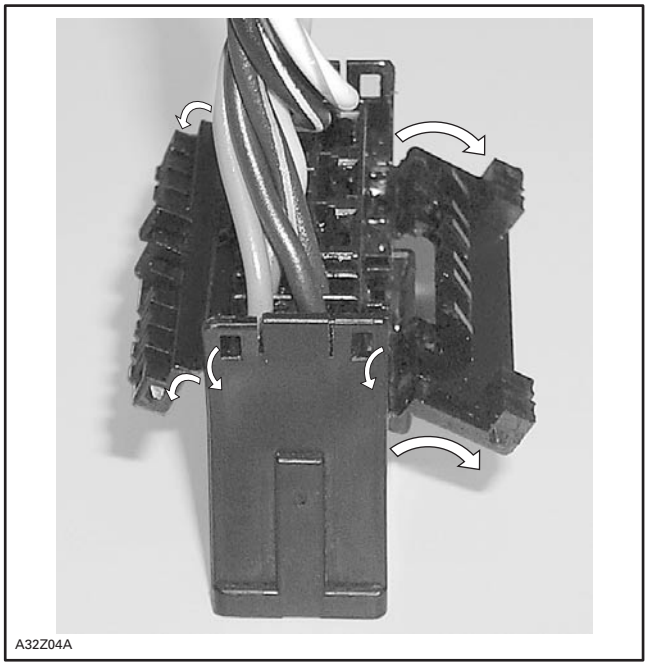
– Insert tool AMP- 755430-2 under lock and twist to lift it.



FEMALE CONNECTOR HOUSING — CUT-AWAY
1. Lock

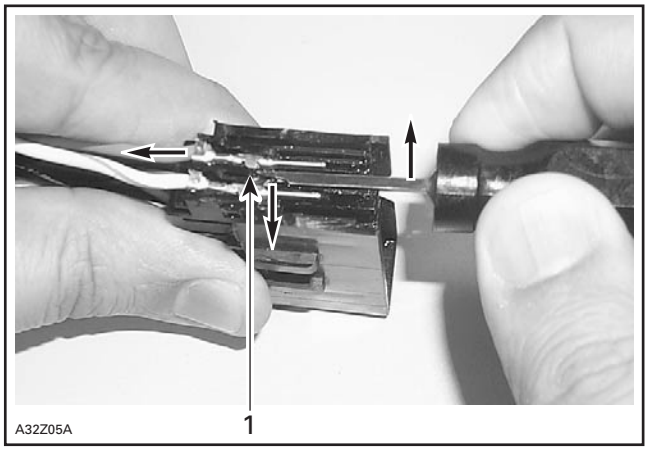
Receptacle connectors can be removed from female housing with sharp head pin.

Male Connector Housing



To remove:

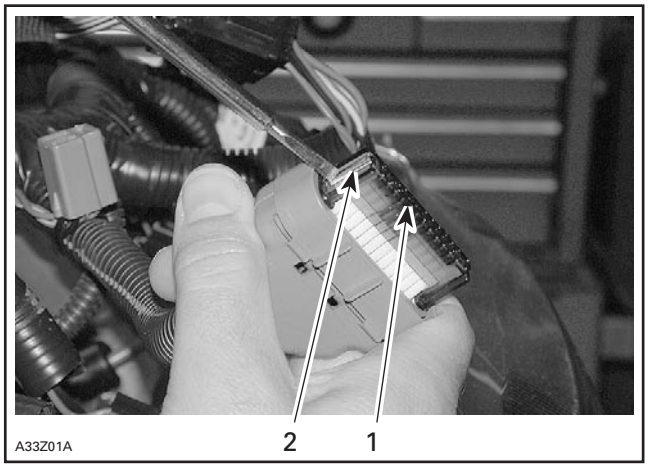
– Insert tool AMP-755430-2 under lock and twist to lift it.



MALE CONNECTOR HOUSING — CUT-AWAY
1. Lock

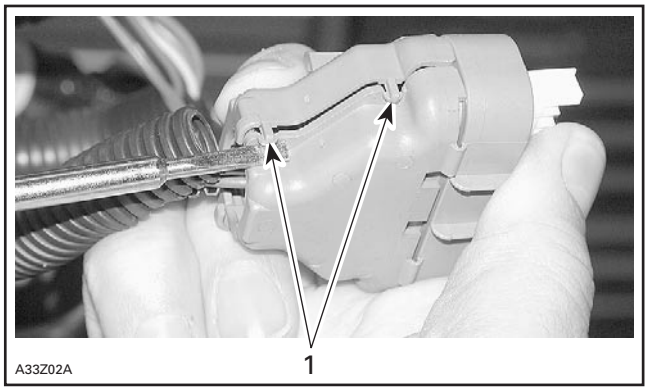
24-Circuit Connector Housing

Push on both tabs to remove retainer.



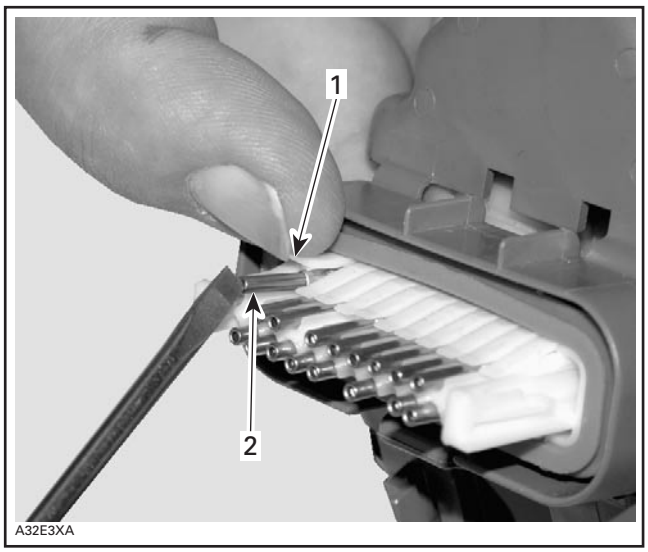
1. Retainer
2. Tab (one on each side)

Open housing by lifting 4 tabs.



1. Tabs (2 on each side)

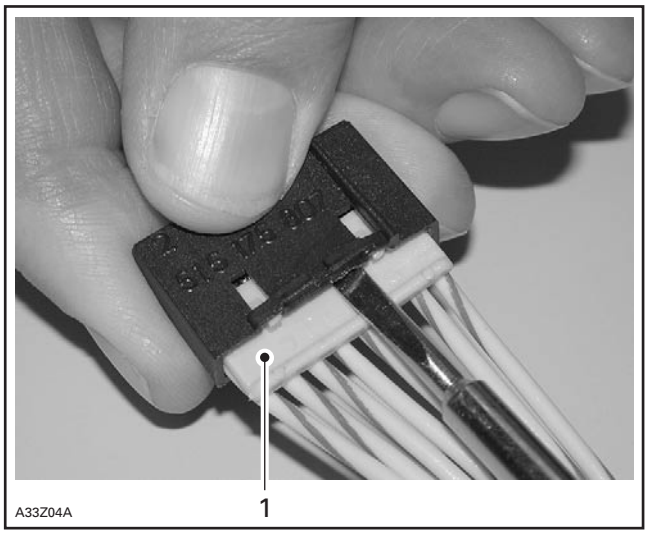
Lift the top plastic lock of the female terminal to be removed and hold in position. Lift the female terminal to unlock from the housing and push out of housing.



1. Lift and hold plastic lock
2. Lift to unlock and push out

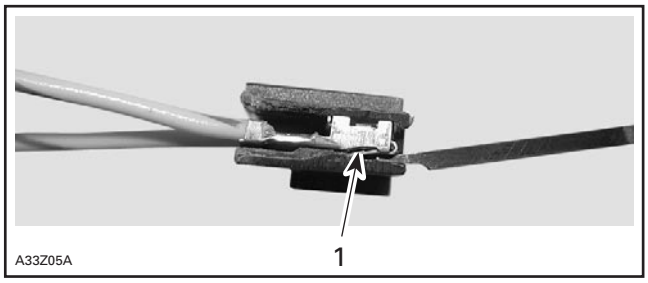
8-Circuit Connector Housing

Pry housing to release lock.



1. Lock

Insert tool AMP-755430-2 under tab and pry it to free connector. Pull on the female terminal wire to remove female terminal from housing.

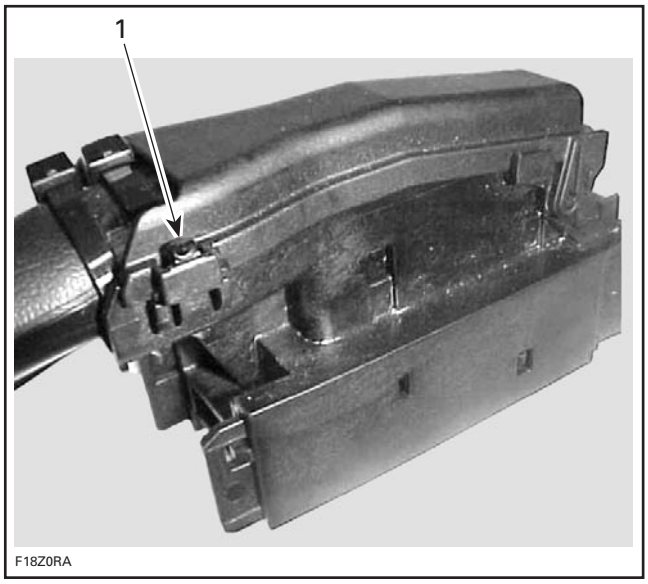


8-CIRCUIT CONNECTOR HOUSING — CUT-AWAY
1. Tab

Connector housing A and B on ECM

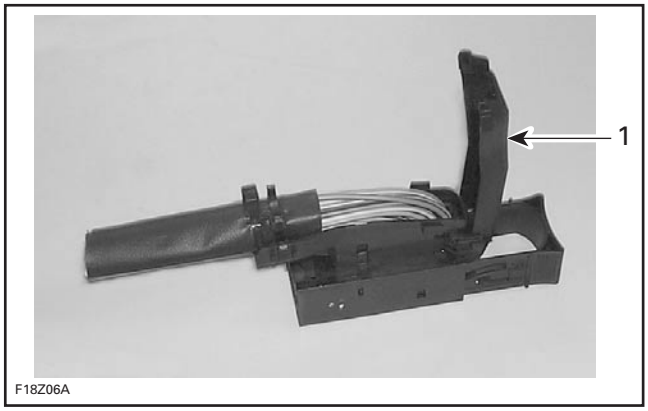
Terminal Removal

Unlock the connector housing cover by pushing in the tabs on top of the housing with a flat screwdriver to be able to flip the top cover up.



1. Push in tab

Lift the cover by pushing it forward.

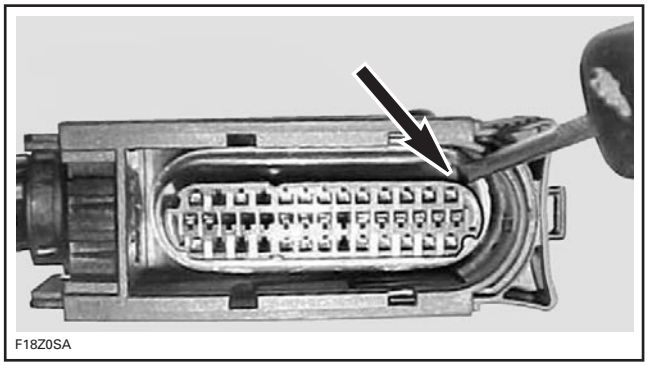


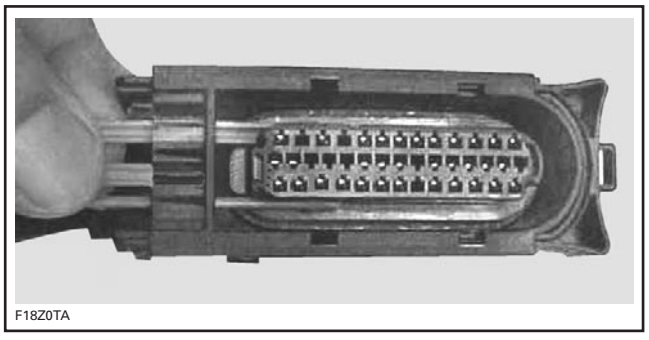
1. Cover

Cut both locking ties that secure the harness to the housing.

1. Locking ties

Turn the housing over and remove the lock by pushing and then pulling toward the wire harness.

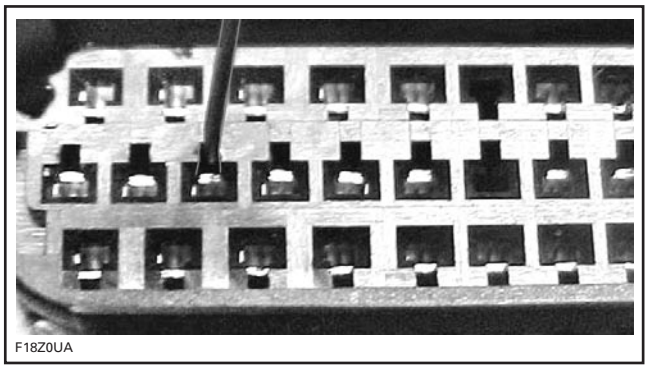


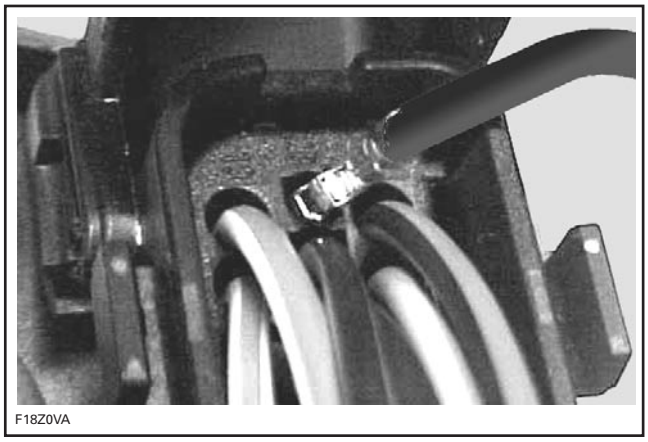


Use a 0.76 mm (.030 in) oxyacetylene torch tip cleaner or a no. 68 drill bit inserted down into the housing to release the locking tab on the connector.

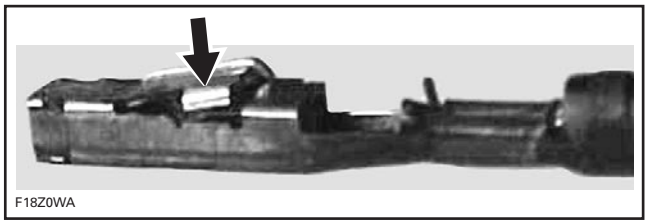
CAUTION: Using a probe larger than 0.76 mm (.030 in) may damage the terminal.

Insert the probe into the housing as shown, and locate the appropriate wire in the back of the housing. You may have to slightly cam the probe against the locking tab to release it, then remove the terminal from the housing.





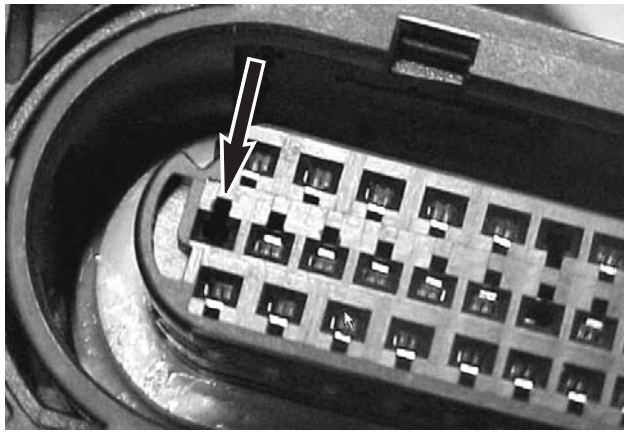
The locking tab on the connector may have to be bent out a little so it will lock in the housing when it's re-inserted.



If the wire is in good condition but the terminal is rusted or corroded, remove defective terminal and crimp a new one. If wire and terminal are defective, acquire a new genuine wire and new terminal and crimp them together as explained below.

IMPORTANT: Use genuine wires only. Otherwise wires will not fit properly.

When re-inserting the connector, the locking tab must be installed facing the smaller cutout of the connector cavity.

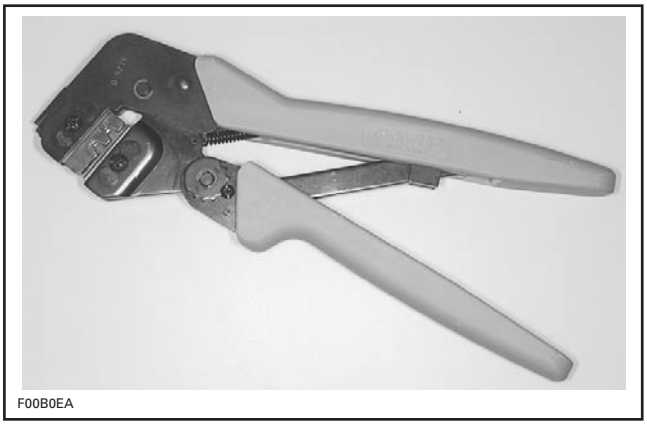

F18Z0XA

Insert the connector, ensuring the locking tab snaps into the housing.

Re-install the lock, attach the 2 tie raps, and close the housing cover.

Terminal Crimping (Kostal and AMP multilock)

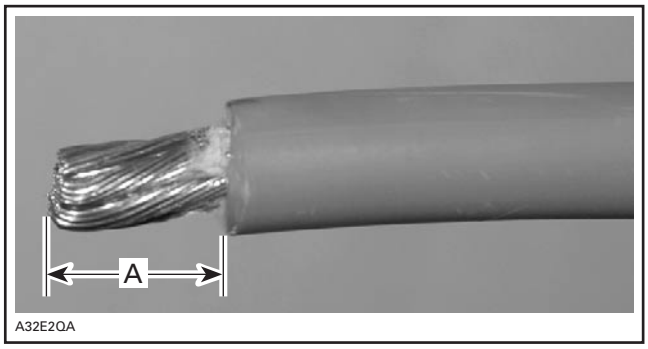
To crimp a new connector terminal, use the connector crimping tool (P/N 529 035 909) and the crimper die (P/N 529 035 906).


F00B0EA

CRIMPING TOOL

To properly crimp the wires, strictly follow this procedure.

Strip the wire to a maximum of 3 mm (1/8 in).

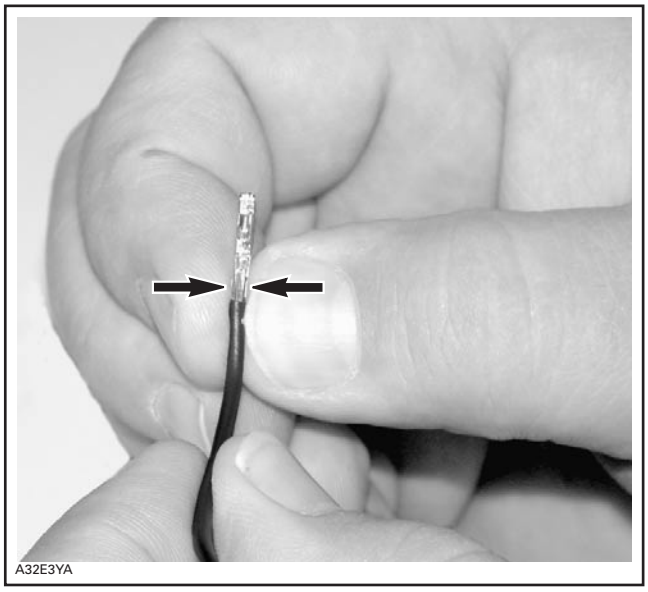


A32E2QA

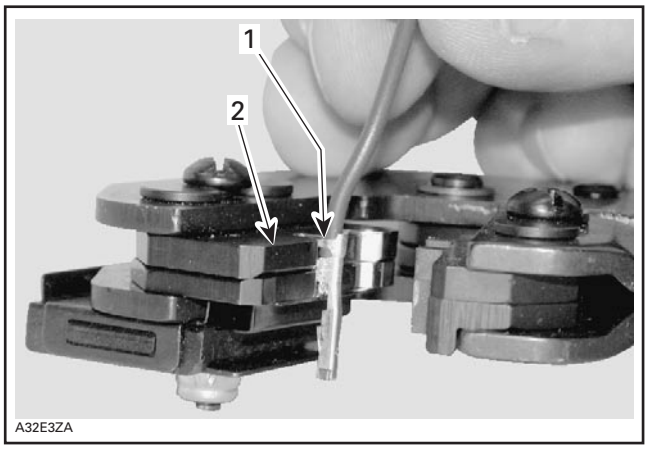
TYPICAL
A. 3 mm (1/8 in) max.

Position wire in terminal.

Squeeze the terminal tabs with your fingers to temporarily retain terminal in place.


A32E3YA

Insert terminal with wire in crimping pliers and position so that top of terminal tabs are flush with pliers edge or a little bit lower as shown.



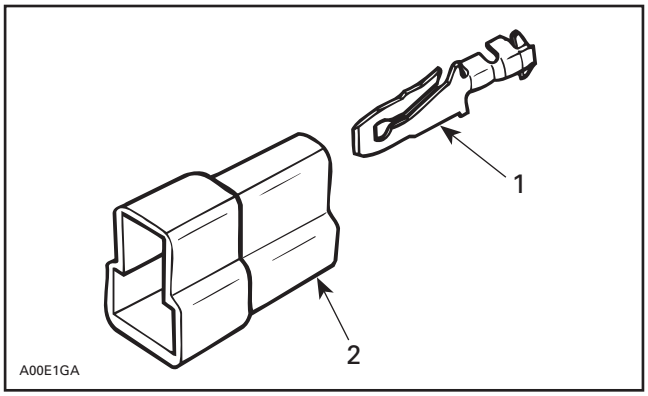
1. Top of terminal tabs
2. Align tabs with pliers edge

Crimp terminal. Ensure no tiny wire goes out of terminal. This might cause strange problems of the electrical system.

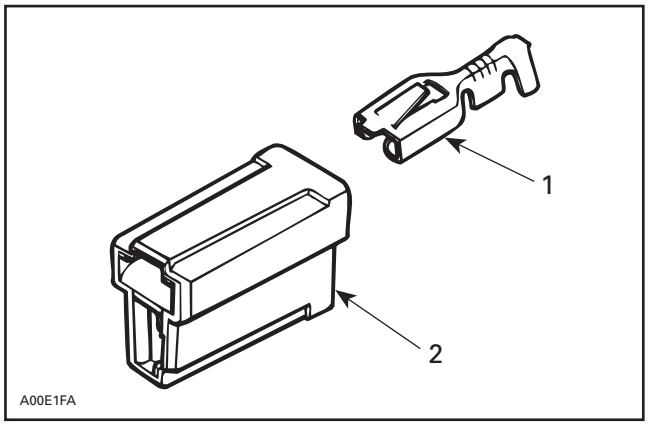
TAB AND RECEPTACLE CONNECTORS INSTALLATION

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.



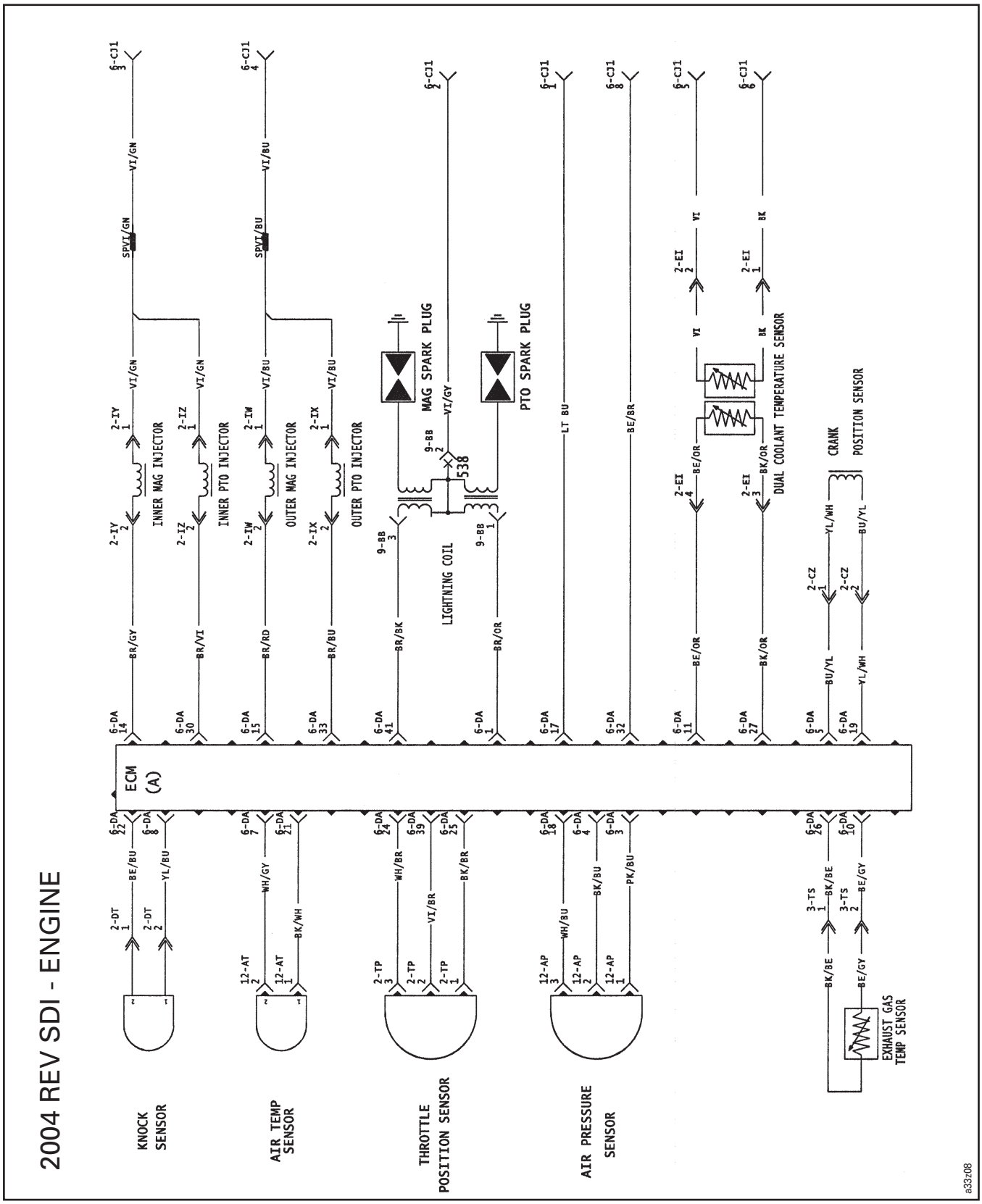
1. Tab
2. Housing



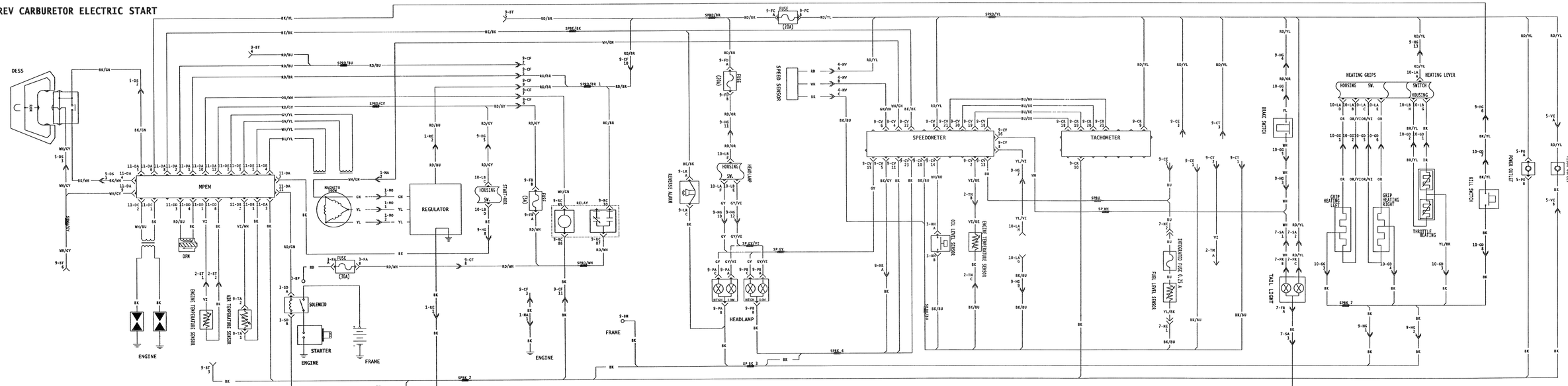
TYPICAL
1. Receptacle
2. Housing

⚠ WARNING

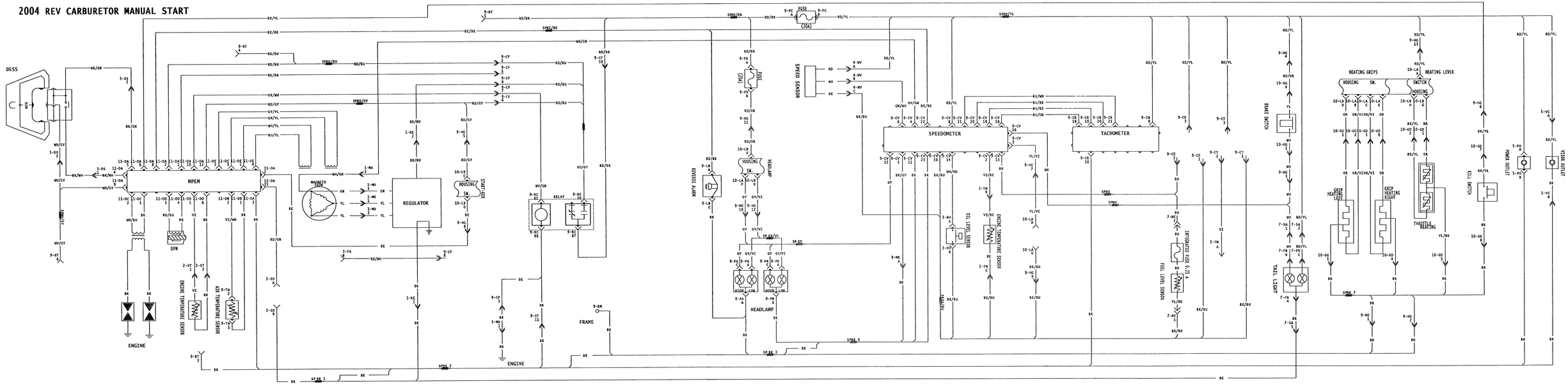
Keep wires away from any rotating, moving, heating, vibrating or sharp edge. Use proper fastening devices as required.


2004 REV SDI - ENGINE
ECM (A)
INNER MAG INJECTOR
INNER PTO INJECTOR
OUTER MAG INJECTOR
OUTER PTO INJECTOR
MAG SPARK PLUG
PTO SPARK PLUG
LIGHTNING COIL
DUAL COOLANT TEMPERATURE SENSOR
CRANK POSITION SENSOR
KNOCK SENSOR
AIR TEMP SENSOR
THROTTLE POSITION SENSOR
AIR PRESSURE SENSOR
EXHAUST GAS TEMP SENSOR
a33c08

2004 REV CARBURETOR ELECTRIC START



2004 REV CARBURETOR MANUAL START



2004 REV SDI

MAGNETO
REGULATOR
RELAY
FUSE
(20A)
E-RAVE HEATER
E-RAVE SOLENOID
FUEL PUMP
SOLENOID
STARTER
CAPACITOR
FRAME
ECM
DIAG/COMM
DESS
SPEED SENSOR
REVERSE ALARM
RPM SIGNAL
ENGINE PILOT LIGHT
DESS PILOT LIGHT
TEMPERATURE PILOT LIGHT
OIL LEVEL PILOT LIGHT
BATTERY PILOT LIGHT
SPEEDOMETER
TACHOMETER
FUEL GAUGE
TEMPERATURE GAUGE
FUEL SENSOR
OIL LEVEL SENSOR
HEADLAMP
BRAKE SWITCH
TAIL LAMP
START-RER
HEATING GRIPS
HEATING LEVER
KILL SWITCH
VISOR HEATING
POWER OUTLET
LEFT
RIGHT
HEATING
GRIPS
* ELECTRIC START MODELS.
** MANUAL MODELS.

2004 MX Z, GSX, SUMMIT 500/600/700/800