Ski-Doo 550F Rev-XP/REV-XU Series

This manual may cover later years than listed above.

Some models may need supplemental manuals which have blue titles.

This manual is fully searchable, just hold down the control key and the F key to search on any word.

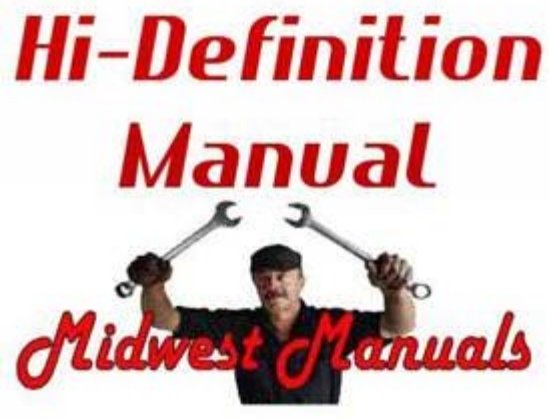
If you bought this manual from any other seller, they are reselling my work.

Please leave them negative feedback & email me at bestshopmanuals@gmail.com.

Our goal is to be one of the BEST sellers on eBay and the internet by providing you with the BEST customer service and the BEST manuals on the market.

Thank you for choosing us.





ski-doo®

BRP





Paperless Manuals
For a Better Tomorrow

If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

2012 Shop Manual

MX Z™, RENEGADE™, GTX 550F

SKANDIC TUNDRA/EXPEDITION 550F

219 100 599

2012
Shop Manual





Paperless Manuals
For a Better Tomorrow

If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

MX Z™, RENEGADE™, GTX† 550F

SKANDIC TUNDRA/EXPEDITION 550F

ski-doo® | BRP

TABLE OF CONTENTS

SAFETY NOTICE IX

INTRODUCTION X
VEHICLE INFORMATION XI
MANUAL INFORMATION XII
FASTENER INFORMATION XVII

01 MAINTENANCE
01 – BREAK-IN INSPECTION 5
02 – PERIODIC MAINTENANCE SCHEDULE 7
03 – PERIODIC MAINTENANCE PROCEDURES 9
GENERAL 9
PROCEDURES 9
ENGINE 9
ENGINE (EXHAUST SYSTEM) 9
ENGINE (LUBRICATION SYSTEM) 10
FUEL SYSTEM 10
ELECTRICAL SYSTEM (CHARGING) 11
ELECTRICAL SYSTEM (IGNITION) 11
ELECTRICAL SYSTEM (LIGHTS) 12
DRIVE SYSTEM (CLUTCHES) 12
DRIVE SYSTEM (CHAINCASE) 12
DRIVE SYSTEM (TRACK) 14
BRAKE 16
CHASSIS (SUSPENSION) 18
CHASSIS (STEERING) 20
04 – STORAGE PROCEDURE 21
05 – PRESEASON PREPARATION 23

02 ENGINE
01 – ENGINE REMOVAL AND INSTALLATION 25
PROCEDURES 27
ENGINE 27
ENGINE SUPPORT 32
ENGINE RUBBER MOUNT 32
02 – ENGINE LEAK TEST 35
PROCEDURES 36
ENGINE 36
03 – ENGINE MEASUREMENT 39
PROCEDURES 39
CYLINDER TAPER 39
CYLINDER OUT OF ROUND 39
CYLINDER/PISTON CLEARANCE 39
RING/PISTON GROOVE CLEARANCE 41
RING END GAP 41
CRANKSHAFT DEFLECTION 41
CONNECTING ROD BIG END AXIAL PLAY 42
CRANKSHAFT ALIGNMENT 43
COMBUSTION CHAMBER VOLUME MEASUREMENT 43
04 – AIR INTAKE SYSTEM 47
PROCEDURES 48
AIR FILTER 48
PRIMARY AIR INTAKE SILENCER 49
SECONDARY AIR INTAKE SILENCER 50

TABLE OF CONTENTS

02 ENGINE (cont'd)

05 – EXHAUST SYSTEM 55
- GENERAL 57
- PROCEDURES 57
  - MUFFLER 57
  - TUNED PIPE 58
  - MANIFOLD 59

06 – LUBRICATION SYSTEM 61
- GENERAL 64
  - SYSTEM DESCRIPTION 64
  - RECOMMENDED OIL 64
- INSPECTION 64
  - OIL SYSTEM LEAK TEST 64
- PROCEDURES 65
  - OIL INJECTION PUMP 65
  - OIL TANK 68
  - OIL LEVEL SENSOR 69
  - OIL FILTER 70
  - INJECTION NOZZLE 71

07 – REWIND STARTER 73
- INSPECTION 75
- PROCEDURES 75
  - REWIND STARTER HANDLE 75
  - REWIND STARTER 76

08 – AXIAL FAN 81
- PROCEDURES 85
  - UPPER AIR INLET DUCT 85
  - LOWER AIR INLET DUCT 85
  - AIR OUTLET DUCT 86
  - AXIAL FAN 86
  - AXIAL FAN BELT 88
  - AXIAL FAN BEARING 90

09 – MAGNETO SYSTEM 93
- GENERAL 95
- PROCEDURES 95
  - STATOR 95
  - MAGNETO FLYWHEEL 100
  - TRIGGER COILS 103

10 – TOP END 107
- GENERAL 109
  - ENGINE BREAK-IN 109
- INSPECTION 109
  - ENGINE COMPRESSION TEST 109
- PROCEDURES 109
  - REED VALVE 109
  - CYLINDER HEADS 110
  - CYLINDERS 111
  - CYLINDER BASE GASKET 112
  - PISTON 112

11 – BOTTOM END 117
- GENERAL 119
  - ENGINE BREAK-IN 119
- PROCEDURES 119
  - CRANKCASE 119
  - CRANKSHAFT 120

TABLE OF CONTENTS

02 ENGINE (cont'd)
11 – BOTTOM END (cont'd)
PROCEDURES (cont'd)
CRANKSHAFT BEARINGS 121

03 FUEL SYSTEM
01 – FUEL TANK AND FUEL PUMP 127
GENERAL 129
SYSTEM DESCRIPTION 129
INSPECTION 129
FUEL SYSTEM PRESSURIZATION 129
PROCEDURES 131
FUEL TANK 131
DIAPHRAGM FUEL PUMP 135
STEEL MESH FILTER 137
FUEL LEVEL SENSOR 138
FUEL HOSE AND OETIKER CLAMPS 142
02 – VM CARBURETORS, THROTTLE AND CHOKE CABLES 143
PROCEDURES 145
CARBURETOR 145
THROTTLE CABLE 152
CHOKE CABLE 154

04 ELECTRICAL SYSTEM
01 – POWER DISTRIBUTION AND GROUNDS 157
GENERAL 158
SYSTEM OVERVIEW 158
FUSE (ELECTRIC START MODELS) 158
GROUNDS 159
02 – CONTROLLER AREA NETWORK (CAN) 161
GENERAL 161
SYSTEM DESCRIPTION 161
03 – COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE 163
GENERAL 163
TROUBLESHOOTING 163
COMMUNICATION PROBLEMS 163
PROCEDURES 165
MULTI-PURPOSE INTERFACE-2 (MPI-2) 165
B.U.D.S. SOFTWARE 167
04 – IGNITION SYSTEM 171
GENERAL 171
SYSTEM DESCRIPTION 171
INSPECTION 171
IGNITION TIMING 171
TROUBLESHOOTING 175
IGNITION SYSTEM TESTING 175
PROCEDURES 175
ENGINE CUT-OFF SWITCH 175
EMERGENCY ENGINE STOP SWITCH 176
IGNITION SWITCH 176
ECM 177
IGNITION COIL 179
05 – CHARGING SYSTEM 181
GENERAL 181
SYSTEM DESCRIPTION 181

TABLE OF CONTENTS

04 ELECTRICAL SYSTEM (cont'd)

05 – CHARGING SYSTEM (cont'd)

INSPECTION 181
DC VOLTAGE OUTPUT TEST (ACCESSORIES) 181
DC VOLTAGE OUTPUT TEST (CHARGING SYSTEM) 182
TROUBLESHOOTING 182
TROUBLESHOOTING GUIDELINES 182
PROCEDURES 183
VOLTAGE REGULATOR/RECTIFIER 183
BATTERY (YTX20L-BS) 183

06 – STARTING SYSTEM 187
GENERAL 189
BASIC STARTING SYSTEM OPERATION 189
TROUBLESHOOTING 189
TROUBLESHOOTING TIPS 189
STARTING SYSTEM TESTING SEQUENCE 189
PROCEDURES 189
ELECTRIC STARTER 189
STARTER SOLENOID 194

07 – ROTAX ELECTRONIC REVERSE 197
GENERAL 197
SYSTEM DESCRIPTION 197
TROUBLESHOOTING 197
TROUBLESHOOTING GUIDELINES 197
PROCEDURES 197
RER SWITCH 197
RER TRIGGER COIL 198
BEEPER (REVERSE ALARM) 198

08 – LIGHTS, GAUGE AND ACCESSORIES 199
GENERAL 199
SYSTEM DESCRIPTION (GAUGE) 199
TROUBLESHOOTING 199
ELECTRICAL SYSTEM TESTING 199
PROCEDURES 201
HEADLIGHTS 201
TAILLIGHT 206
GAUGE 208
SPEED SENSOR 213
HEATED THROTTLE LEVER 216
HEATED GRIPS 217
HEATED THROTTLE LEVER AND GRIPS SWITCH (NO MULTIFUNCTION SWITCH) 223
HEATED THROTTLE LEVER AND GRIPS SWITCHES (WITH MULTIFUNCTION SWITCH) 224
VISOR OUTLET 224

05 DRIVE SYSTEM AND BRAKE

01 – DRIVE BELT 225
GENERAL 226
DRIVE BELT APPLICATION 226
TROUBLESHOOTING 226
PROCEDURES 226
DRIVE BELT GUARD 226
DRIVE BELT 227

02 – DRIVE PULLEY (eDRIVE) 229
GENERAL 231

05 DRIVE SYSTEM AND BRAKE (cont'd)
02 – DRIVE PULLEY (eDRIVE) (cont'd)
TROUBLESHOOTING 231
PROCEDURES 231
DRIVE PULLEY 231
03 – DRIVEN PULLEY AND COUNTERSHAFT (QRS SHORT SHAFT) 241
GENERAL 244
ADJUSTMENT 244
DRIVEN PULLEY ALIGNMENT 244
PROCEDURES 245
DRIVEN PULLEY 245
COUNTERSHAFT 250
COUNTERSHAFT BEARING 252
COUNTERSHAFT BEARING SUPPORT 253
04 – BRAKE 255
GENERAL 257
PROCEDURES 257
BRAKE PADS 257
CALIPER 258
BRAKE DISC 261
MASTER CYLINDER 262
BRAKE LEVER 263
BRAKE LIGHT SWITCH 263
05 – CHAINCASE 265
PROCEDURES 267
CHAINCASE 267
06 – DRIVE AXLE 273
PROCEDURES 275
DRIVE AXLE 275
MAGNETIC CAPS 276
07 – TRACK 277
PROCEDURES 277
TRACK 277
TRACTION ENHANCING PRODUCTS (STUDS) 278

06 CHASSIS
01 – FRONT SUSPENSION (XP-ESR) 281
ADJUSTMENT 283
SPRINGS 283
PROCEDURES 283
SHOCK ABSORBERS 283
SPRINGS 284
UPPER SUSPENSION ARMS 285
UPPER BALL JOINTS 286
LOWER SUSPENSION ARMS 287
LOWER BALL JOINTS 288
SKI LEGS 289
STABILIZER BAR 289
02 – FRONT SUSPENSION (XP-LTS) 291
GENERAL 293
PROCEDURES 293
SHOCK ABSORBER COVERS 293
SHOCK ABSORBERS 294
SPRINGS 295
SKI LEGS 296

TABLE OF CONTENTS

06 CHASSIS (cont'd)

02 – FRONT SUSPENSION (XP-LTS) (cont'd)

PROCEDURES (cont'd)

SEALS 296

03 – REAR SUSPENSION (SC-5) 299

ADJUSTMENT 305

REAR SUSPENSION ADJUSTMENTS 305

MAINTENANCE 307

PROCEDURES 308

SUSPENSION ASSEMBLY 308

REAR AXLE 309

SHOCK ABSORBERS 310

REAR SPRINGS 333

SLIDER SHOES 334

FRONT ARM 335

REAR ARM 336

PIVOT ARM 338

COUPLING BLOCKS 338

IDLER WHEELS AND SUPPORTS 339

STOPPER STRAP 339

04 – REAR SUSPENSION (SC-5M) 341

ADJUSTMENT 346

REAR SUSPENSION ADJUSTMENTS (SC-5M) 346

MAINTENANCE 348

PROCEDURES 348

SUSPENSION ASSEMBLY 348

REAR AXLE 349

SHOCK ABSORBERS 351

REAR SPRINGS 352

SLIDER SHOES 353

FRONT ARM 354

REAR ARM 355

PIVOT ARM 356

IDLER WHEELS AND SUPPORTS 357

STOPPER STRAP 357

05 – REAR SUSPENSION (SC-5U) 359

PROCEDURES 365

SUSPENSION ASSEMBLY 365

REAR AXLE 366

REAR EXTENSION 368

SHOCK ABSORBERS 369

REAR SPRINGS 372

SLIDER SHOES 373

FRONT ARM 374

REAR ARM 375

PIVOT ARM 376

IDLER WHEELS AND SUPPORTS 377

STOPPER STRAP 377

06 – STEERING SYSTEM 379

GENERAL 383

ADJUSTMENT 383

STEERING ALIGNMENT 383

PROCEDURES 384

SKI RUNNER 384

SKI 384

06 CHASSIS (cont'd)
06 – STEERING SYSTEM (cont'd)
PROCEDURES (cont'd)
SKI HANDLE 385
SKI LEG 385
STEERING ARM (TUNDRA MODELS) 385
HANDLEBAR GRIP 386
MULTIFUNCTION SWITCH 386
THROTTLE LEVER HOUSING 387
THROTTLE LEVER 387
HANDLEBAR 389
HANDLEBAR EXTENSION 390
TIE-ROD 390
STEERING COLUMN 392
07 – BODY 395
GENERAL 398
VEHICLE CARE 398
BODY PARTS MATERIAL 398
BODY PARTS REPAIR 398
PROCEDURES 398
DECALS 398
SIDE PANELS 399
REWIND STARTER HANDLE HOUSING 399
HOOD 400
BOTTOM PAN COVER 400
FRONT BUMPER 401
FRONT BOTTOM PAN 402
REAR BOTTOM PAN 403
WINDSHIELD 405
HEADLIGHT/GAUGE MODULE 405
CONSOLE 406
SEAT COVER 407
REAR RACK 407
TRIM PANELS 408
08 – FRAME 409
PROCEDURES 415
RIVETS 415
FRAME 416
REAR BUMPER 416
REAR FRAME MEMBER 416
FRONT FRAME MEMBER 417
SUSPENSION MODULE (XP-ESR) 418
SUSPENSION MODULE (XP-LTS) 420
ENGINE MODULE 422

07 TECHNICAL SPECIFICATIONS
01 – REV-XP 550F SERIES 425
02 – TUNDRA 550F SERIES 431

08 WIRING DIAGRAM
01 – WIRING DIAGRAM INFORMATION 435
GENERAL 435
WIRING DIAGRAM LOCATION 435
WIRING DIAGRAM CODES 435
SPLICES IN WIRING HARNESS 436

Midwest Manuals
Green Manuals
Paperless Manuals For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

TABLE OF CONTENTS

08 WIRING DIAGRAM (cont'd)
02 – CONNECTOR INFORMATION 437
GENERAL 437
SUMITOMO CONNECTOR 437
DEUTSCH CONNECTOR 437
PACKARD CONNECTOR 438
AMP CONNECTOR 439
BATTERY CABLE TERMINAL 441
03 – SPLICE INFORMATION 443
PROCEDURES 447
SPLICES REPAIR PROCEDURE 447

SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair 2012 Ski-Doo® snowmobiles described in the list in the *INTRODUCTION*.

This edition was primarily published to be used by technicians who are already familiar with service procedures relating to Bombardier Recreational Products Inc. (BRP) products. Mechanical technicians should attend continuous training courses given by B.R.P.T.I.

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

The contents of this manual depicts parts and procedures applicable to a particular product at the time of writing. Service and Warranty Bulletins may be published to update the content of this manual. Dealer modifications that were carried out after manufacturing of the product, whether or not authorized by BRP, are not included.

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 BRP 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.

It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

This manual emphasizes particular information which, is denoted by the following wording and symbols:

⚠ WARNING

Identifies a potential hazard that, if not avoided, could result in serious injury or death.

⚠ CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Denotes an instruction which, if not followed, could result in severe damage to vehicle components.

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

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

Always observe common shop safety practice.

Unless otherwise noted, the engine must be stopped and the tether cord must be removed prior to perform any services.

Torque wrench tightening specifications must be strictly adhered to. Use the torque values and service products as in the exploded views or in the procedures when noted.

Locking devices when removed must be replaced (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.).

Hoses, cables and locking ties removed during a procedure must be reinstalled as per factory standards.

When ordering parts always refer to the specific model *PARTS CATALOGS*.

We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic.

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

BRP disclaims liability for all damages and/or injuries resulting from the improper use of the contents of this publication.

INTRODUCTION

This Shop Manual covers the following BRP made 2012 snowmobiles:

MODEL	ENGINE	CHASSIS	MODEL NUMBER
GRAND TOURING SPORT	550F	REV-XP	ELCA / ELCB
RENEGADE SPORT	550F	REV-XP	MWCA / MWCB / MWCC
MX Z SPORT	550F	REV-XP	UBCA / UBCB
MX Z TNT	550F	REV-XP	BNCA / BNCB / BNCC
TUNDRA	550F	REV-XU	GACA
TUNDRA SPORT	550F	REV-XU	GKCA
TUNDRA LT	550F	REV-XU	GDCA / GDCB

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

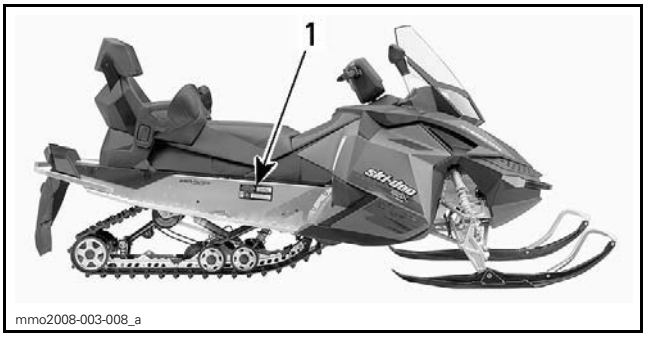
Due to late changes, there may be some differences between the manufactured product and the description or specifications provided in this document.

BRP reserves the right at any time to discontinue or change specifications, designs, features, models or equipment without incurring obligations.

VEHICLE INFORMATION

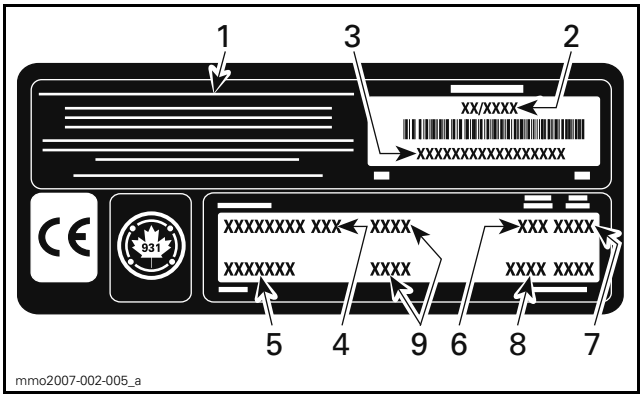
VEHICLE DESCRIPTION LABEL

Location of the Vehicle Description Label



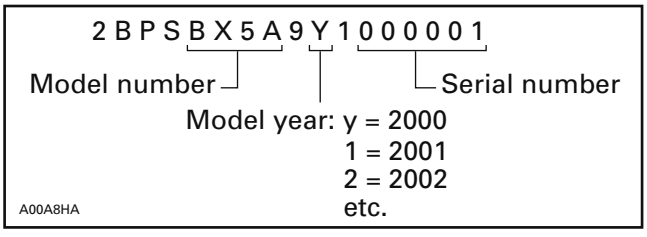
TYPICAL
1. Vehicle description label

Explanation of the Vehicle Description Label



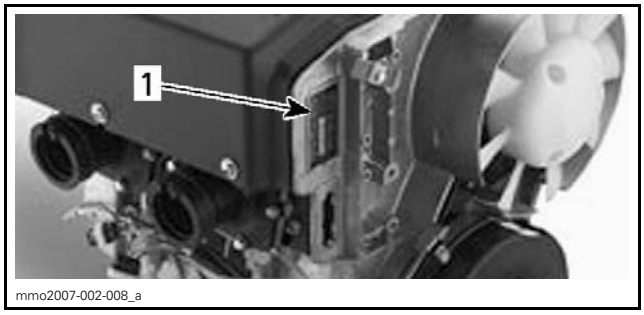
VEHICLE DESCRIPTION LABEL
1. Manufacturer name
2. Manufacturing date
3. Vehicle Identification Number (VIN)
4. Model name
5. Option package
6. Engine type
7. Model year
8. Color codes
9. Vehicle weight/engine power (European models)

Identification Number Meaning



ENGINE SERIAL NUMBER

Engine Serial Number Location



TYPICAL
1. Engine serial number

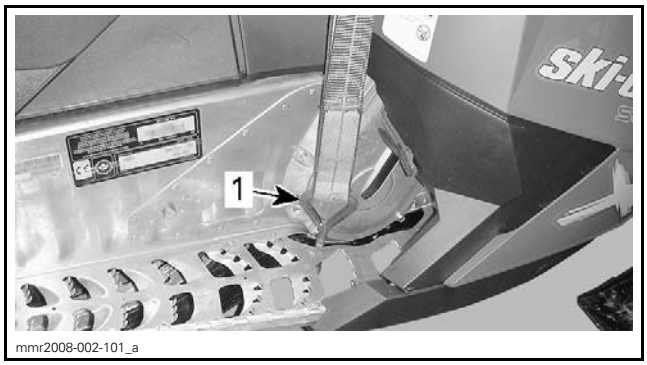
HOISTING THE SNOWMOBILE

To safely hoist a snowmobile, it is important to use the holes provided in the reinforced section of the footrest.



TYPICAL
1. Holes in footrest reinforcement

Insert the hooks on the ends of the lifting harness in the holes provided in the reinforcement as in the following illustration.



TYPICAL
1. Hook on end of lifting harness

NOTICE Do not use footrest cut outs or steering column to lift the snowmobile. Frame or steering system could be seriously damaged.

ENGINE EMISSIONS INFORMATION

Manufacturers Responsibility

Manufacturers of engines must determine the exhaust emission levels for each engine horsepower family and certify these engines with the United States of America *ENVIRONMENTAL PROTECTION AGENCY (EPA)*. An emissions control information label, showing emission levels and engine specifications, must be placed on each vehicle at the time of manufacture.

Dealer Responsibility

When servicing snowmobiles that carry an emissions control information label, adjustments must be kept within published factory specifications.

Replacement or repair of any emission related component must be executed in a manner that maintains emission levels within the prescribed certification standards.

Dealers are not to modify the engine in any manner that would alter the horsepower or allow emission levels to exceed their predetermined factory specifications.

Exceptions include manufacturers prescribed changes, such as altitude adjustments.

Owner Responsibility

The owner/operator is required to have engine maintenance performed to maintain emission levels within prescribed certification standards.

The owner/operator is not to, and should not allow anyone else to, modify the engine in any manner that would alter the horsepower or allow emissions levels to exceed their predetermined factory specifications.

EPA Emission Regulations

All Ski-Doo snowmobiles manufactured by BRP are certified to the EPA standards as conforming to the requirements of the regulations for the control of air pollution emitted from new snowmobile engines. This certification is contingent on certain adjustments being set to factory standards. For this reason, the factory procedure for servicing the product must be strictly followed, and whenever practicable, returned to the original intent of the design.

The responsibilities listed above are general and in no way a complete listing of the rules and regulations pertaining to the EPA requirements on exhaust emissions for snowmobiles products. For more detailed information on this subject, you may contact:

U.S. Environmental Protection Agency
Office of Transportation and Air Quality
1200 Pennsylvania Ave. NW
Mail Code 6403J
Washington D.C. 20460

INTERNET WEB SITE:

www.epa.gov/otaq

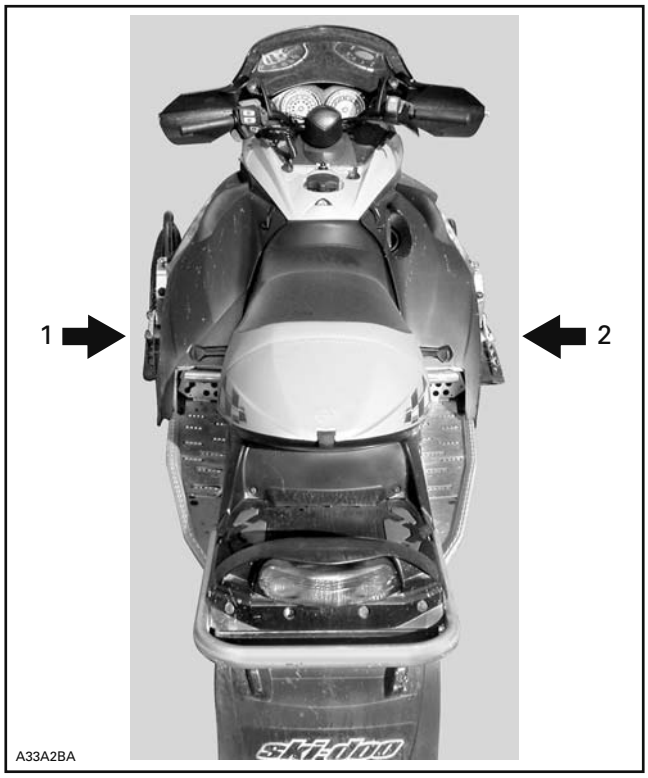
MANUAL INFORMATION

MANUAL PROCEDURES

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

This manual uses technical terms which may be different from the ones used in the *PARTS CATALOG*.

NOTICE Most fasteners are metric, and most components are built with parts dimensioned using the metric system. Consult the appropriate *PARTS CATALOG* to obtain and use the correct parts and fasteners. Mismatched or incorrect fasteners could cause damage to the vehicle.

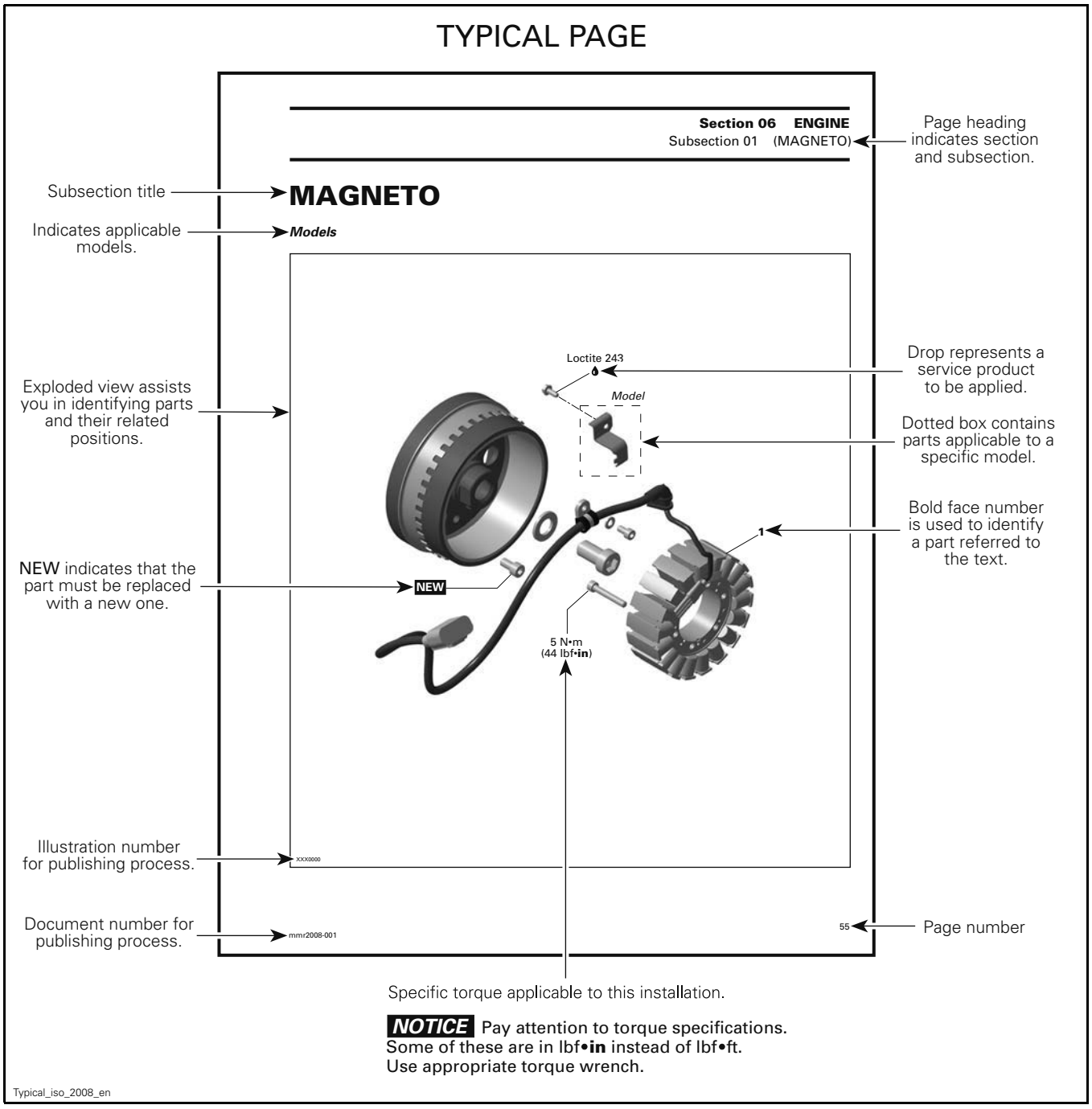
MANUAL LAYOUT

This manual is divided into many major sections as can be seen in the main table of contents at the beginning of the manual.

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

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

TYPICAL PAGE



TYPICAL PAGE

Tittle in bold indicates category of information to be carried out.

GENERAL

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

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

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

Reference to a specific section or subsection.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, etc.) must be replaced with new ones.

PROCEDURES

Indicates component procedures apply to.

MAGNETO FLYWHEEL

Magneto Flywheel Cleaning

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

CAUTION: Clean magneto flywheel using only a clean cloth.

Indicates specific procedure to be carried out.

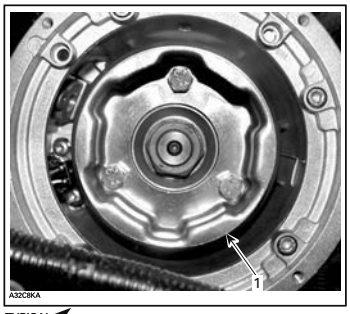
Magneto Flywheel Removal

Remove muffler, refer to the *EXHAUST SYSTEM* section.

Remove acoustic panel.

Remove rewind starter.

Remove starting pulley **no. 2**.

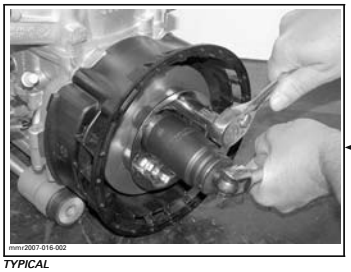


TYPICAL
1. Starting pulley

"TYPICAL" indicates a general view which may not represent exact details.

Call-outs pertaining to above illustration.

NOTE: To remove starting pulley bolts, hold magneto flywheel with a socket as shown.



TYPICAL

Illustration always follows text to which it applies.

Models

Remove the connecting flange retaining the rewind starter to the engine housing.

Italic bold face typesetting indicates a procedure applicable to a specific model(s).

mmr2008-001

57

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

typical_txt_2008_en

TIGHTENING TORQUE

Tighten fasteners to the torque specified in the exploded view(s) and/or in the written procedure. When a torque is not specified, the torque normally recommended for a specific fastener should be used. Refer to following table.

⚠ WARNING

Torque wrench tightening specifications must be strictly adhered to.
Locking devices when removed must be replaced (e.g.: locking tabs, elastic stop nuts, self-locking fasteners, cotter pins, etc.).

In order to avoid a poor assembling, tighten screws, bolts, or nuts in accordance with the following procedure:

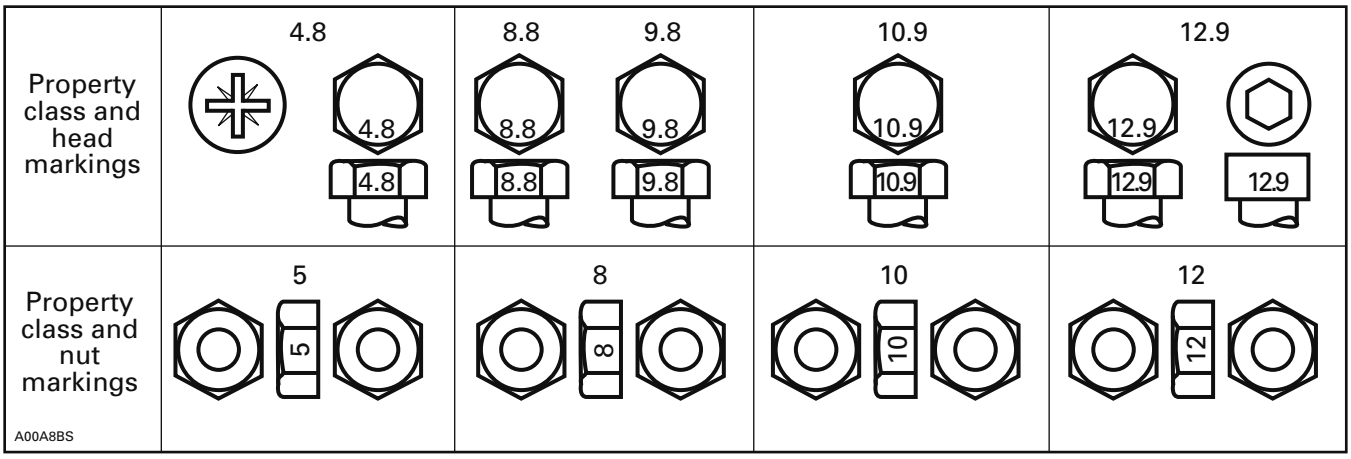
1. Manually screw all screws, bolts and/or nuts.
2. Apply half the recommended torque value.

NOTICE Be sure to use the recommended tightening torque for the specified fastener grade used.

NOTE: When possible, always apply torque on the nut.

3. Tighten fastener to the recommended torque value.

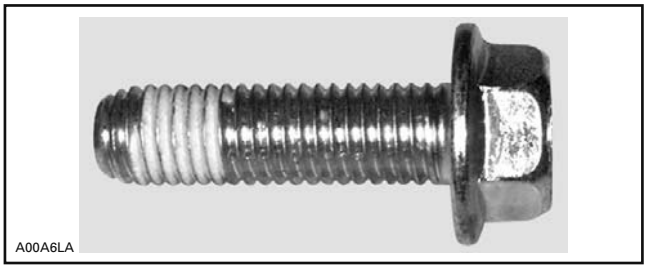
NOTE: Always torque screws, bolts and/or nuts using a criss-cross pattern when multiple fasteners are used to secure a part (eg. a cylinder head). Some parts must be torqued according to a specific sequence and torque pattern detailed in the installation procedure.



FASTENER SIZE	FASTENER GRADE/TORQUE			
	5.8 Grade	8.8 Grade	10.9 Grade	12.9 Grade
M4	1.5 – 2 N•m (13 – 18 lbf•**in**)	2.5 – 3 N•m (22 – 27 lbf•**in**)	3.5 – 4 N•m (31 – 35 lbf•**in**)	4 – 5 N•m (35 – 44 lbf•**in**)
M5	3 – 3.5 N•m (27 – 31 lbf•**in**)	4.5 – 5.5 N•m (40 – 47 lbf•**in**)	7 – 8.5 N•m (62 – 75 lbf•**in**)	8 – 10 N•m (71 – 89 lbf•**in**)
M6	6.5 – 8.5 N•m (58 – 75 lbf•**in**)	8 – 12 N•m (71 – 106 lbf•**in**)	10.5 – 15 N•m (93 – 133 lbf•**in**)	16 N•m (142 lbf•**in**)
M8	15 N•m (133 lbf•**in**)	24.5 N•m (18 lbf•ft)	31.5 N•m (23 lbf•ft)	40 N•m (30 lbf•ft)
M10	29 N•m (21 lbf•ft)	48 N•m (35 lbf•ft)	61 N•m (45 lbf•ft)	72.5 N•m (53 lbf•ft)
M12	52 N•m (38 lbf•ft)	85 N•m (63 lbf•ft)	105 N•m (77 lbf•ft)	127.5 N•m (94 lbf•ft)
M14	85 N•m (63 lbf•ft)	135 N•m (100 lbf•ft)	170 N•m (125 lbf•ft)	200 N•m (148 lbf•ft)

FASTENER INFORMATION

SELF-LOCKING FASTENER PROCEDURE



TYPICAL — SELF-LOCKING FASTENER

The following describes common procedures used when working with self-locking fasteners.

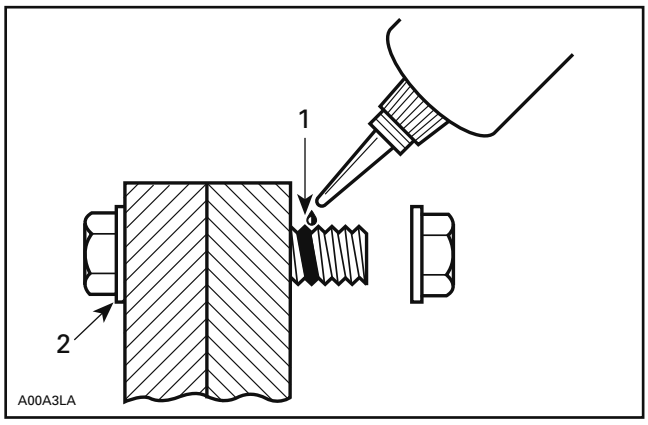
Use a metal brush or a tap to clean the hole properly, then use a solvent. Allow the solvent to act during 30 minutes, then wipe off. Solvent utilization is to ensure proper adhesion of the product used for locking the fastener.

LOCTITE APPLICATION PROCEDURE

The following describes common procedures used when working with Loctite products.

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

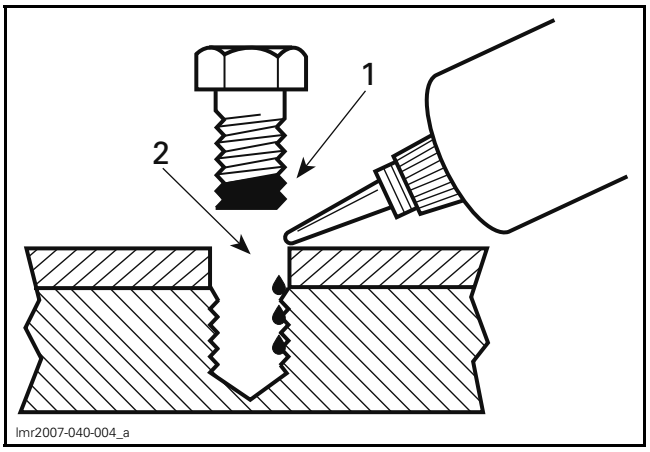
Threadlocker Application for Uncovered Holes (Bolts and Nuts)



1. Apply here
2. Do not apply

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

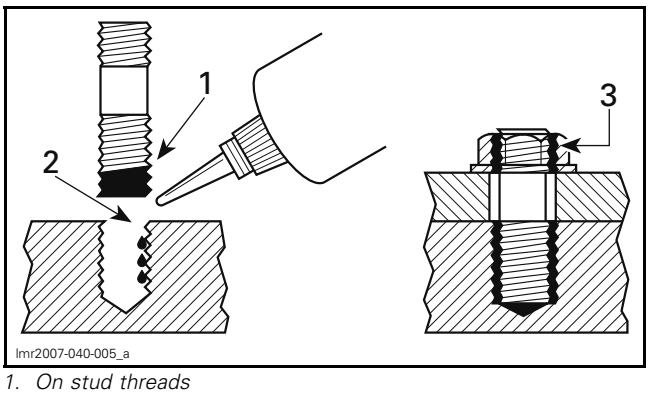
Threadlocker Application for Blind Holes



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

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

Threadlocker Application for Stud Installation in Blind Holes



1. On stud threads
2. On threads and in the hole
3. On retaining nut threads

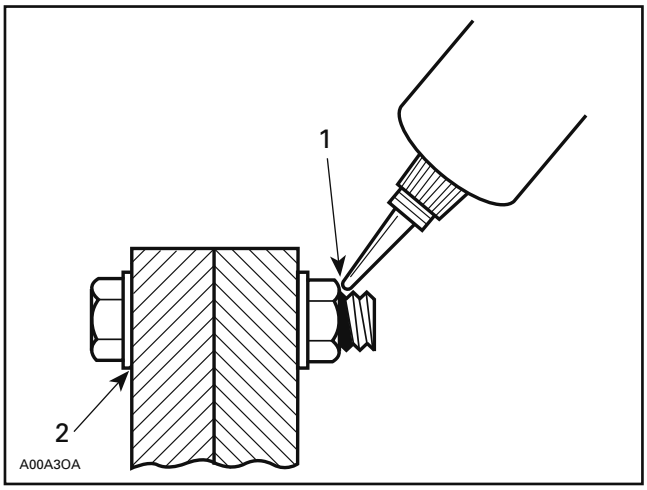
1. Clean threads (stud and hole) with solvent.

2. Apply LOCTITE PRIMER N (P/N 293 800 041) on threads and allow to dry.
3. Put 2 or 3 drops of proper strength Loctite threadlocker on female threads and in hole.

NOTE: To avoid a hydro lock situation, do not apply too much Loctite.

4. Apply several drops of proper strength Loctite on stud threads.
5. Install stud.
6. Install cover, part, etc.
7. Apply a few drops of proper strength Loctite on uncovered stud threads.
8. Install and tighten retaining nut(s) as required.

Threadlocker Application for Pre-Assembled Parts

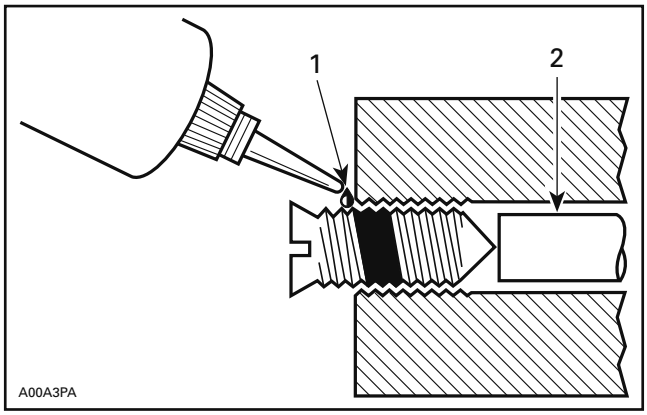


1. Apply here
2. Do not apply

1. Clean bolts and nuts with solvent.
2. Assemble components.
3. Tighten nuts.
4. Apply a few drops of proper strength Loctite on bolt/nut contact surfaces.
5. 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.

Threadlocker Application for an Adjustment Screw

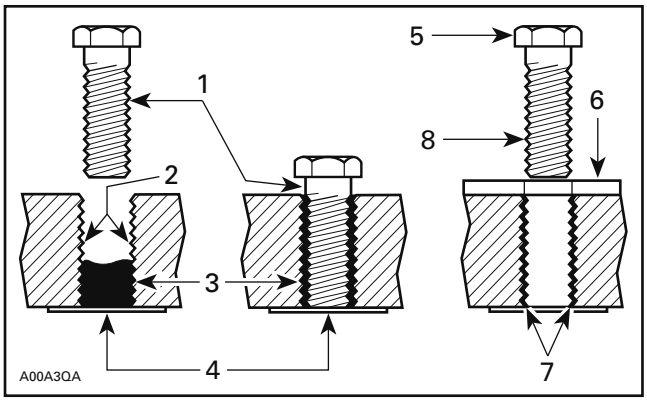


1. Apply here
2. Plunger

1. Adjust screw to proper setting.
2. Apply a few drops of proper strength Loctite threadlocker on screw/body contact surfaces.
3. Avoid touching metal with tip of flask.

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

Application for Stripped Thread Repair



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:

1. Apply release agent on mating surfaces.
2. Put waxed paper or similar film on the surfaces.

3. Twist bolt when inserting it to improve thread conformation.

NOTE: NOT intended for engine stud repairs.

Repair of Small Holes/Fine Threads

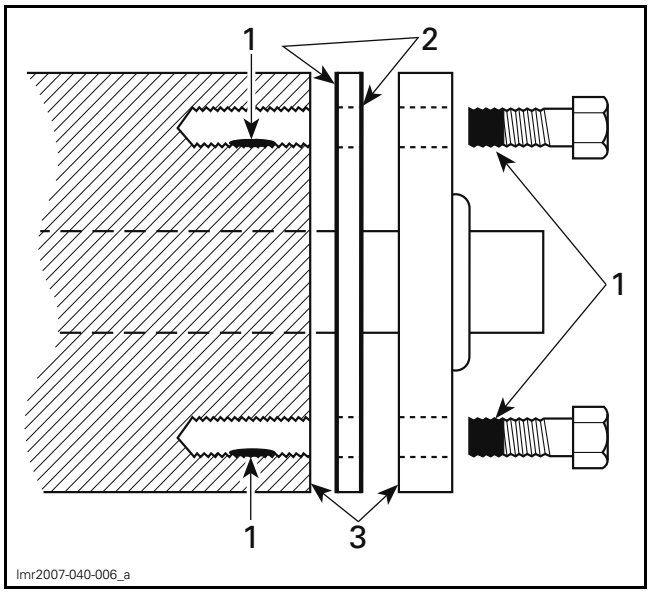
Option 1: Enlarge damaged hole, then follow *STANDARD THREAD REPAIR* procedure.

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

Permanent Stud Installation (Light Duty)

1. Use a stud of the desired thread length.
2. DO NOT apply release agent on stud.
3. Follow STANDARD THREAD REPAIR procedure.
4. Allow 30 minutes for Loctite FORM-A-THREAD to cure.
5. Complete part assembly.

Gasket Compound Application



1. Proper strength Loctite
2. Loctite Primer N (P/N 293 800 041) and Gasket Eliminator 518 (P/N 293 800 038) on both sides of gasket
3. Loctite Primer N only

1. Remove old gasket and other contaminants using LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500). Use a mechanical means only if necessary.

NOTE: Avoid grinding.

2. Clean both mating surfaces with solvent.
3. Spray Loctite Primer N on both mating surfaces and on both sides of gasket and allow to dry 1 or 2 minutes.
4. Apply LOCTITE 518 (P/N 293 800 038) on both sides of gasket using a clean applicator.
5. Place gasket on mating surfaces and assemble parts immediately.

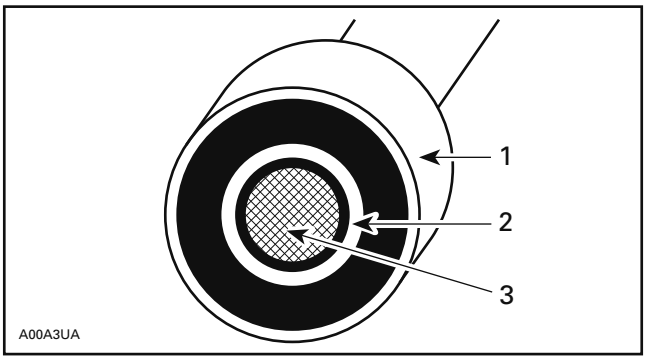
NOTE: If the cover is bolted to blind holes, apply proper strength Loctite in the hole and on threads. Tighten fastener.

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

6. Tighten as usual.

Threadlocker Application for Mounting on a Shaft

Mounting with a Press



1. Bearing
2. Proper strength Loctite
3. Shaft

1. Clean shaft external contact surface.
2. Clean internal contact surface of part to be installed on shaft.
3. Apply a strip of proper strength Loctite on circumference of shaft contact surface at insertion or engagement point.

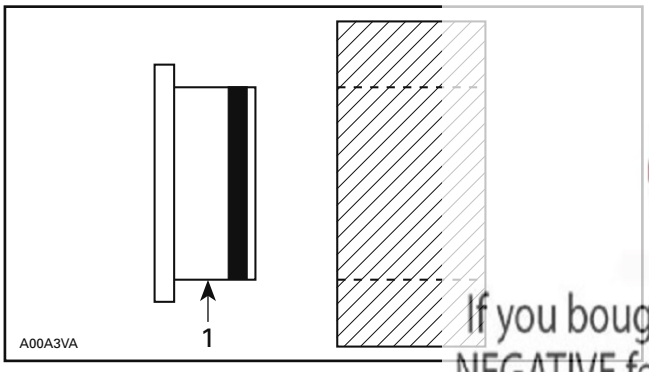
NOTE: Retaining compound is always forced out when applied on shaft.

4. DO NOT use antiseize Loctite or any similar product.
5. No curing period is required.

Mounting in Tandem

1. Apply retaining compound on internal contact surface (bore) of parts to be installed.
2. Continue parts assembly as per previous illustration.

Threadlocker Application for Case-In Components (Metallic Gaskets)



1. Proper strength Loctite

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

1. Clean inner housing diameter and outer gasket diameter.
2. Spray housing and gasket with LOCTITE PRIMER N (P/N 293 800 041).
3. 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.

4. Install according to standard procedure.
5. Wipe off excess product.
6. Allow 30 minutes for product to cure.

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

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

SERVICE TOOLS INDEX

12 V BATTERY SUPPLY CABLE
(P/N 529 035 997)



Page: 165, 167, 200

ALIGNMENT BAR
(P/N 529 036 157)



Page: 244

AMP DIE
(P/N 529 035 908)



Page: 440

BALL JOINT EXTRACTOR
(P/N 529 035 827)



Page: 286

BALL JOINT INSTALLER
(P/N 529 035 975)



Page: 33, 289

BALL JOINT REMOVER SUPPORT
(P/N 529 036 121)



Page: 288–289

BEARING HEATER
(P/N 529 035 969)



Page: 123

BEARING INSTALLER (PTO)
(P/N 529 035 990)



Page: 123

BEARING PULLER/PUSHER
(P/N 529 036 111)



Page: 269

BEARING PULLER/PUSHER
(P/N 529 036 112)



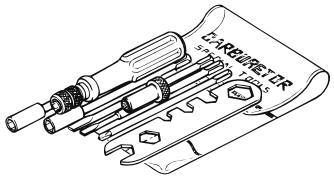
Page: 269

CALIPER PULLER
(P/N 529 036 145)



Page: 259

CARBURETOR TOOL KIT
(P/N 404 112 000)



Page: 146

CHOKE ADJUSTER TOOL
(P/N 529 036 163)



Page: 155

CLUTCH HOLDER
(P/N 529 036 235)



Page: 231, 239

CONSOLE NUT WRENCH
(P/N 529 036 183)



Page: 131, 406

CRANKSHAFT BEARING INSTALLER (MAG)
(P/N 529 035 980)



Page: 125

CRANKSHAFT BEARING PULLER
(P/N 529 036 004)



Page: 121

SERVICE TOOLS INDEX

CRANKSHAFT DISTANCE GAUGE
(P/N 529 035 965)



Page: 124

CRANKSHAFT PROTECTOR (MAG)
(P/N 420 876 557)



Page: 101, 122

CRANKSHAFT PROTECTOR (PTO)
(P/N 420 876 552)



Page: 121

CRIMPING TOOL (HEAVY GAUGE WIRE)
(P/N 529 035 730)



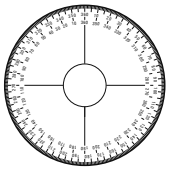
Page: 441

CRIMPING TOOL (KOSTAL)
(P/N 529 035 909)



Page: 440

DEGREE WHEEL
(P/N 529 035 607)



Page: 43

DIGITAL INDUCTION TACHOMETER
(P/N 529 014 500)



Page: 174

DOME GUIDE
(P/N 529 026 500)



Page: 314

DRIVE PULLEY PULLER
(P/N 529 000 064)



Page: 231

DRIVEN PULLEY OPENING TOOL
(P/N 529 017 200)



Page: 227

DRIVEN PULLEY SPRING COMPRESSOR
(P/N 529 036 182)



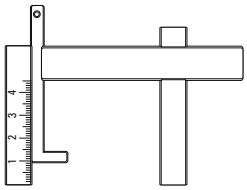
Page: 246

FAN HOLDER TOOL
(P/N 529 036 006)



Page: 87

FLOAT LEVEL GAUGE
(P/N 529 035 520)



Page: 148

FLOATING PISTON PULLER
(P/N 529 035 901)



Page: 314, 320, 322

FLUKE 115 MULTIMETER
(P/N 529 035 868)



Page: 69, 95–98, 103, 138–139, 175–176, 178, 180–182, 184, 189, 198, 202–205, 207–208, 210–211, 216–219, 223–224, 263

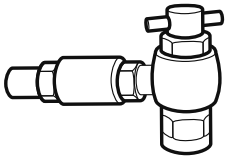
SERVICE TOOLS INDEX

GAS FILL TOOL KIT
(P/N 503 190 102)



Page: 314, 319, 322

GAS SHOCK VALVE TOOL (TIRE VALVE TYPE)
(P/N 529 035 570)



Page: 314, 319

HALF-RINGS
(P/N 420 977 475)



Page: 121

INTAKE PLUG
(P/N 529 036 128)



Page: 36

LEAK TEST KIT
(P/N 529 033 100)



Page: 64, 130

MAGNETO PULLER RING
(P/N 420 876 081)



Page: 101

MAGNETO PULLER
(P/N 529 035 547)



Page: 101

MANIFOLD PLUG 63 MM (2-1/2")
(P/N 529 035 961)



Page: 36

MPI-2 DIAGNOSTIC CABLE
(P/N 710 000 851)



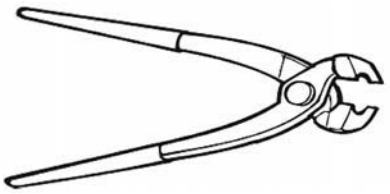
Page: 166

MPI-2 INTERFACE CARD
(P/N 529 036 018)



Page: 165–166

OETIKER PLIERS
(P/N 295 000 070)



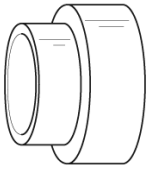
Page: 142

PISTON CIRCLIP INSTALLER
(P/N 529 035 686)



Page: 113

PISTON GUIDE
(P/N 529 026 600)



Page: 314

PISTON PIN PULLER
(P/N 529 035 503)



Page: 113

PROTECTIVE CAP
(P/N 529 036 150)



Page: 259

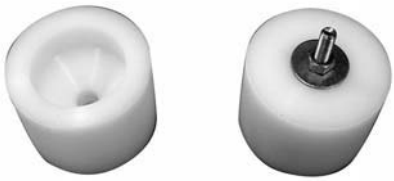
SERVICE TOOLS INDEX

PULLEY SPRING COMPRESSOR TOOL
(P/N 529 036 012)



Page: 233

SHOCK ABSORBER SUPPORTS
(P/N 529 036 186)



Page: 312, 370

SHOCK RETAINER TOOL
(P/N 529 035 769)



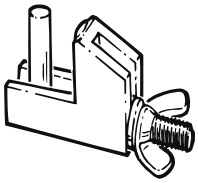
Page: 314

SLEEVE KIT 20 MM
(P/N 529 035 542)



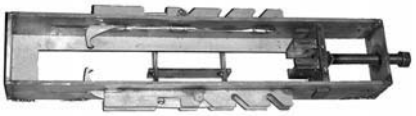
Page: 113

SMALL HOSE PINCHER
(P/N 295 000 076)



Page: 36, 64, 66, 75, 129–130, 133, 136

SPRING COMPRESSOR
(P/N 529 036 184)



Page: 284, 295

SPRING INSTALLER/REMOVER
(P/N 529 035 983)



Page: 57–58

SUCTION PUMP
(P/N 529 035 880)



Page: 68, 131, 135, 137, 140

SUPERTANIUM DRILL BIT 3/16"
(P/N 529 031 800)



Page: 402–405, 415

SUPPORT PLATE
(P/N 529 035 976)



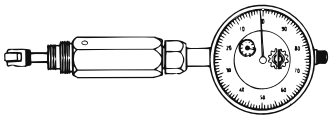
Page: 124

T-HARNESS
(P/N 529 035 869)



Page: 165, 200

TDC DIAL INDICATOR
(P/N 414 104 700)



Page: 43–44

TEMPERATURE INDICATOR STICK
(P/N 529 035 970)



Page: 123

TENSIOMETER
(P/N 414 348 200)



Page: 14

TRACK CLEAT INSTALLER
(P/N 529 036 044)



Page: 277

UPPER GEAR RETAINING TOOL
(P/N 529 036 110)



Page: 250

VACUUM/PRESSURE PUMP
(P/N 529 021 800)



Page: 36, 65, 71, 130–131, 135

BREAK-IN INSPECTION

Procedures are detailed in *PERIODIC MAINTENANCE PROCEDURES* subsection.

BREAK-IN INSPECTION (550F)
Inspect exhaust system and check for leaks
Inspect fuel lines and connections
Inspect throttle cable
Inspect drive belt
Visually inspect drive pulley
Tighten drive pulley retaining screw to specified torque
Inspect driven pulley
Adjust and align track
Change chaincase oil
Adjust drive chain
Check brake fluid level
Inspect brake hose, pads and disk
Inspect steering mechanism
Inspect skis and runners
Inspect front suspension
Inspect rear suspension and slider shoes
Adjust oil injection pump
Inspect spark plugs

PERIODIC MAINTENANCE SCHEDULE

Procedures are detailed in *PERIODIC MAINTENANCE PROCEDURES* subsection.

EVERY 1 500 KM (1,000 MI)
Adjust drive chain
Check chaincase oil level

EVERY 3 000 KM (2,000 MI) OR 1 YEAR (WHICHEVER COMES FIRST)
Inspect engine rubber mounts
Inspect exhaust system and check for leaks
Visually inspect and clean drive pulley
Tighten drive pulley retaining screw to specified torque
Clean driven pulley
Adjust and align track
Inspect brake hose, pads and disk
Inspect steering mechanism
Inspect front suspension
Inspect rear suspension and stopper strap
Lubricate rear suspension (lubricate whenever the vehicle is used in wet conditions (rain, puddles)

EVERY 6 000 KM (4,000 MI) OR 2 YEARS (WHICHEVER COMES FIRST)
Replace in-tank fuel strainer
Replace brake fluid
Inspect throttle cable
Clean and lubricate rewind starter

EVERY 10 000 KM (6,000 MI) OR 3 YEARS (WHICHEVER COMES FIRST)
Replace injection oil filter

PERIODIC MAINTENANCE PROCEDURES

SERVICE TOOLS

Description	Part Number	Page
TENSIOMETER	414 348 200	14

SERVICE PRODUCTS

Description	Part Number	Page
BRAKE FLUID	293 600 131	16
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	12
PULLEY FLANGE CLEANER	413 711 809	12
SUSPENSION GREASE	293 550 033	18–19
XPS FUEL STABILIZER	413 408 601	10
XPS STORAGE OIL (EXCEPT U.S. COUNTRY)	413 711 600	10
XPS STORAGE OIL (U.S. COUNTRY ONLY)	413 711 900	10
XPS SYNTHETIC CHAINCASE OIL	413 803 300	12
XPS SYNTHETIC GREASE	293 550 010	17

GENERAL

This subsection provides general maintenance instructions. Where detailed instructions for disassembly or reassembly is required, refer to the applicable subsection.

PROCEDURES

ENGINE

Axial Fan Belt Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
			✔

Check fan belt for:
– Evidence of slippage
– Excessive wear
– Cuts
– Cracks
– Fraying.

Replace fan belt as required.

Crankshaft PTO Seal Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
			✔

Check PTO seal for cracks, leaks or other damages.

Rewind Starter Cleaning and Lubrication

Break-In	Scheduled Maintenance	Storage	Preseason
	✔		

Refer to *REWIND STARTER ASSEMBLY* in *REWIND STARTER* subsection.

Engine Rubber Mount Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
	✔		✔

Check rubber mounts for cracks or other damages.

ENGINE (EXHAUST SYSTEM)

Exhaust System Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Check the following components for leaks, cracks, overheating or other damages:
– Springs and retainers

– Exhaust system mounts
– Muffler
– Tuned pipe
– Shields
– Manifold.

ENGINE (LUBRICATION SYSTEM)

Oil injection Pump Adjustment

Break-In	Scheduled Maintenance	Storage	Preseason
✔			✔

Refer to *OIL INJECTION PUMP* in *LUBRICATION SYSTEM* subsection.

Engine Lubrication

Break-In	Scheduled Maintenance	Storage	Preseason
		✔	

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

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

Proceed as follows:

1. Place the vehicle in a well ventilated area and start the engine.
2. Start the engine and let it run at idle speed until it reached its operating temperature.
3. Stop the engine.
4. Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* for the removal procedure.
5. Restart engine and run at idle speed.
6. Inject storage oil into each carburetor until the engine stalls, or until a sufficient quantity of oil has entered the engine (approximately half a can).
7. With the engine stopped, remove the spark plugs and spray recommended storage oil in each cylinder.

RECOMMENDED SERVICE PRODUCT	
Outside of the U.S.	XPS STORAGE OIL (EXCEPT U.S. COUNTRY) (P/N 413 711 600)
Within the U.S.	XPS STORAGE OIL (U.S. COUNTRY ONLY) (P/N 413 711 900)

8. Slowly crank engine 2 or 3 revolutions to lubricate cylinders.
9. Reinstall the spark plugs and primary air intake silencer.

Oil Injection Filter Replacement

Break-In	Scheduled Maintenance	Storage	Preseason
	✔		

Refer to *OIL FILTER* in *LUBRICATION SYSTEM* subsection.

FUEL SYSTEM

Fuel System Protection

Break-In	Scheduled Maintenance	Storage	Preseason
		✔	

With the new fuel additives used today, it is critical to add a fuel stabilizer to the fuel during storage to prevent fuel deterioration, gum formation and fuel system gumming. Follow manufacturers instructions for proper use.

RECOMMENDED PRODUCT
XPS FUEL STABILIZER (P/N 413 408 601)

NOTICE The fuel stabilizer should be added prior to engine lubrication, to ensure fuel system component protection against varnish deposits.

1. Pour fuel stabilizer in fuel tank.
2. Fill up fuel tank completely.
3. Run engine sufficiently for fuel with stabilizer to be distributed to entire fuel system.
4. Ensure there is no water inside fuel tank.

NOTICE Do not drain fuel system.

Carburetor Inspection, Cleaning and Adjustment

Break-In	Scheduled Maintenance	Storage	Preseason
			✔

Refer to *VM CARBURETORS, THROTTLE AND CHOKE CABLE* subsection.

Fuel Line and Connection Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔			✔

Visually inspect fuel lines and connections for cracks or leaks.

In-Tank Fuel Strainer Replacement

Break-In	Scheduled Maintenance	Storage	Preseason
	✔		

Refer to *STEEL MESH FILTER* in *FUEL TANK AND FUEL PUMP* subsection.

Throttle Cable Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Visually inspect cable sheath for kinks, wear or other damage.

Visually inspect cable at carburetor and at throttle lever for fraying or other damage.

Make sure the throttle cable operates smoothly.

ELECTRICAL SYSTEM (CHARGING)

Battery Charging

Break-In	Scheduled Maintenance	Storage	Preseason
		✔	✔

To charge battery, refer to *CHARGING SYSTEM* subsection.

ELECTRICAL SYSTEM (IGNITION)

Spark Plug Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔			

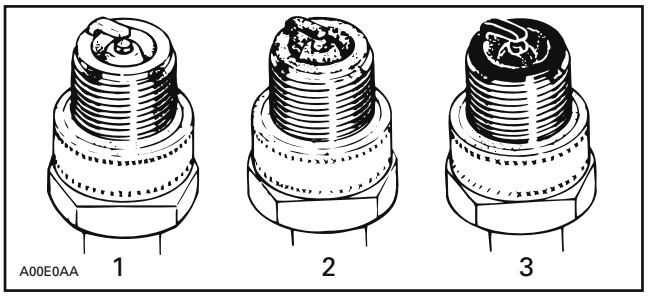
Troubleshooting a Fouled Spark Plug

Fouling of the spark plug is indicated by irregular running or misfiring of the engine, decreased engine speed due to misfiring, reduced performance, and increased fuel consumption.

Other possible causes are: a incorrect or bad fuel, defective ignition system, incorrect spark plug gap, loss of compression, or lubricating oil entering the combustion chamber.

The plug face of a fouled spark plug has either a wet or dry black carbon deposit. Such coatings form a conductive connection between the center electrode and the ground electrode.

Spark Plug Analysis



TYPICAL
1. *Overheated (light gray, white)*
2. *Normal (light brown, brown)*
3. *Fouled (black, wet or dry, dark deposits, gray, melted coating)*

The plug face reveals the condition of the engine, operating condition, method of driving and fuel mixture. For this reason it is advisable to inspect the spark plug at prescribed intervals, examining the plug face (i.e. the part of the plug projecting into the combustion chamber).

Spark Plug Replacement

Break-In	Scheduled Maintenance	Storage	Preseason
			✔

NOTE: Replace spark plugs only after excess engine storage oil has been burned off.

Spark Plug Removal

1. Remove LH side panel, refer to *BODY* subsection.
2. Remove air outlet duct, refer to *AXIAL FAN* subsection.
3. Disconnect spark plug wire by twisting and lifting up on cap.
4. Unscrew spark plug 1 turn.
5. Clean spark plug and cylinder head with pressurized air, then completely remove spark plug.

⚠ CAUTION Whenever using compressed air, always wear protective eye wear.

Spark Plug Installation

Installation is the reverse of the removal, however, pay attention to the following.

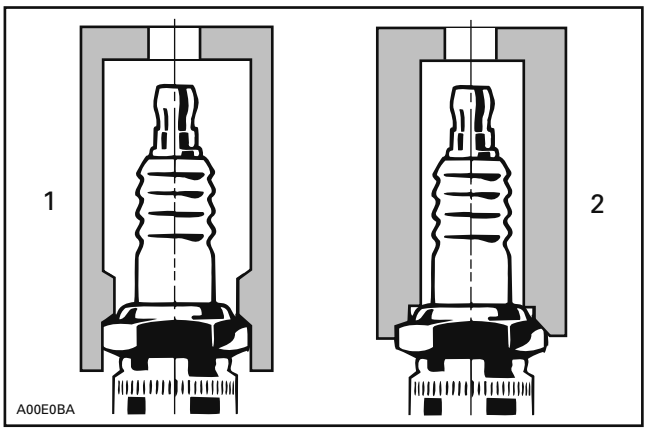
Prior to installation make sure that contact surfaces of the cylinder head and spark plug are free of grime.

Using a feeler gauge, measure spark plug gap.

ENGINE	SPARK PLUG	GAP
550F	NGK BR9ECS	0.4 mm to 0.5 mm (.016 in to .02 in)

NOTE: Replace spark plug if gap is out of specification.

Hand screw spark plug into cylinder head, then tighten to specified torque.



TYPICAL
1. *Proper socket*
2. *Improper socket*

PART	SERVICE PRODUCT	TORQUE
SPARK PLUG THREADS	LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070)	28 N•m (21 lbf•ft)

ELECTRICAL SYSTEM (LIGHTS)

Headlights Beam Aiming Adjustment

Break-In	Scheduled Maintenance	Storage	Preseason
			✔

Refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

DRIVE SYSTEM (CLUTCHES)

Drive Belt Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔			✔

Refer to *DRIVE BELT* subsection.

Drive Pulley Inspection and Cleaning

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Refer to *DRIVE PULLEY* subsection.

Drive Pulley Retaining Screw Tightening

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		

DRIVE PULLEY TORQUE	
All engines	120 N•m (89 lbf•ft)

Driven Pulley Inspection and Cleaning

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Inspect pulley sheave for dirt, marks or scratches.

Test sliding sheave operation.

Use the PULLEY FLANGE CLEANER (P/N 413 711 809) and a clean rag to clean pulley sheaves as necessary.

DRIVE SYSTEM (CHAINCASE)

Recommended Chaincase Oil

RECOMMENDED SERVICE PRODUCT
XPS SYNTHETIC CHAINCASE OIL (P/N 413 803 300)

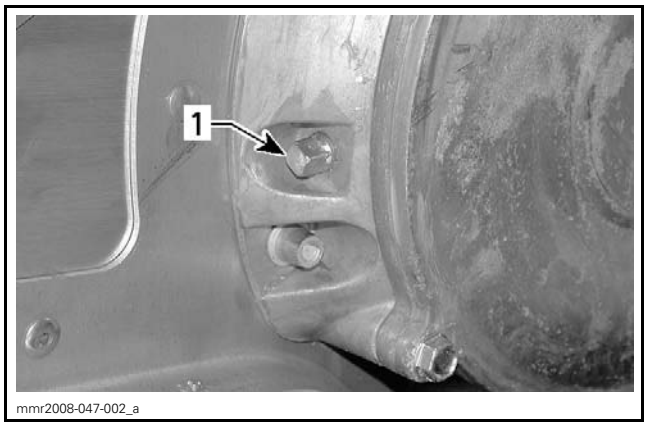
NOTICE Use only the recommended type oil when servicing. Do not mix synthetic oil with other types of oil.

Chaincase Oil Level Verification

Break-In	Scheduled Maintenance	Storage	Preseason
	✔		

1. Place vehicle on a level surface.

2. Remove magnetic check plug on the left side of chaincase. Oil level must be equal with the lower edge.

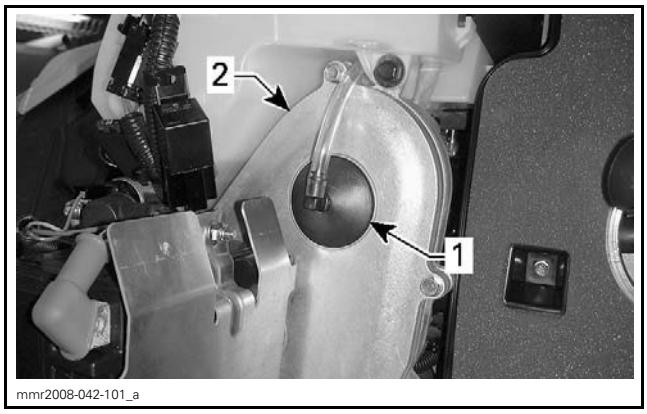


TYPICAL
1. Magnetic check plug

3. Remove metal particles from magnetic check plug.

NOTE: It is normal to find metallic particles stuck to magnetic check plug. If bigger pieces of metal are found, remove the chaincase cover and inspect the chaincase parts.

4. To add oil, remove the filler cap on top of chaincase cover.



TYPICAL
1. Filling plug
2. Chaincase cover

5. Pour recommended oil in chaincase by the filler hole until oil comes out by the magnetic check plug hole.
6. Reinstall magnetic check plug and torque to specification.

TIGHTENING TORQUE	
Magnetic check plug	6 N•m (53 lbf•**in**)

Chaincase Oil Replacement

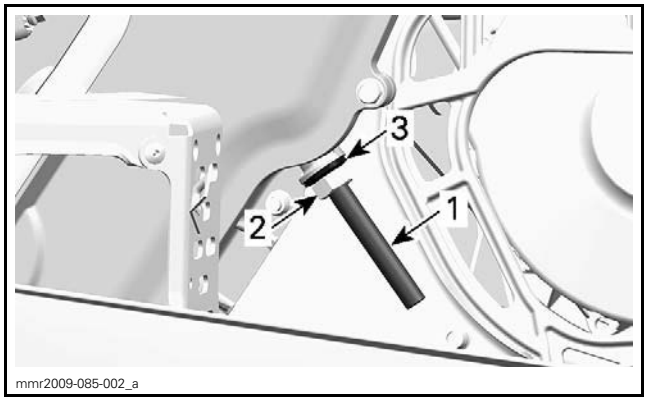
Break-In	Scheduled Maintenance	Storage	Preseason
✔			✔

1. Place vehicle on a level surface.
2. Proceed with *CHAINCASE COVER REMOVAL* to allow oil to flow out of chaincase. See procedure in *CHAINCASE* subsection.
3. Proceed with *CHAINCASE COVER INSTALLATION*, see procedure in *CHAINCASE* subsection.
4. Pour approximately 350 ml (12 U.S. oz) of recommended oil in chaincase through the filler hole until oil comes out by the magnetic check plug hole.
5. Proceed with *CHAINCASE OIL LEVEL VERIFICATION*, see procedure in this subsection.

Drive Chain Adjustment

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

1. Remove muffler. Refer to *EXHAUST SYSTEM* subsection.
2. Unscrew the lock nut on tensioner adjustment screw.



1. Tensioner adjustment screw
2. Lock nut
3. Washer with rubber surface

3. Push back washer with rubber surface.
4. Tighten tensioner adjustment screw BY HAND.

NOTE: Turn adjustment screw until resistance is strong enough that it can not be turned by hand.

5. Hold tensioner adjustment screw and tighten lock nut to 36 N•m (27 lbf•ft).

DRIVE SYSTEM (TRACK)

Track Adjustment and Alignment

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Track tension and alignment are interrelated. Do not adjust one without checking the other. Track tension procedure must be carried out prior to track alignment.

Track Tension Verification

1. Lift rear of vehicle and support it off the ground.
2. Allow rear suspension to fully extend.
3. Use the TENSIOMETER (P/N 414 348 200).

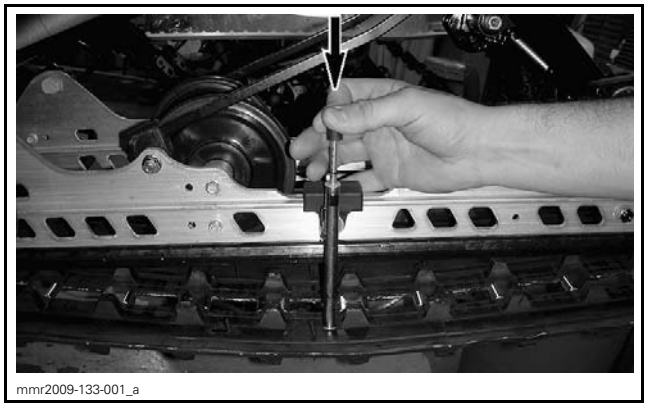


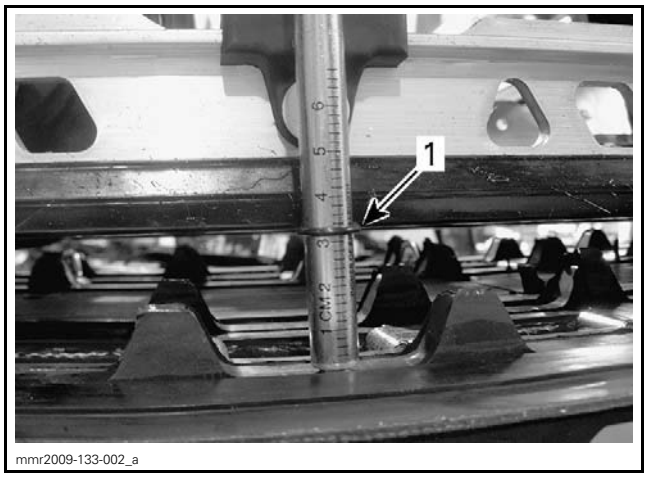
4. Set deflection to 3.2 cm (1.26 in) using bottom O-ring.



DEFLECTION SETTING
1. Bottom O-ring

5. Place upper O-ring to 0 kgf (0 lbf).
6. Position the tensiometer on track, halfway between front and rear idler wheels.
7. Push the tensiometer downwards until bottom O-ring (deflection) is aligned with the bottom of slider shoe.





1. Deflection O-ring aligned with slider shoe

8. Read load recorded by the upper O-ring on the tensiometer.



LOAD READING
1. Upper O-ring

Load reading must be as per the following table.

TRACK ADJUSTMENT SPECIFICATION	
Track deflection setting	3.2 cm (1.26 in)
Track load reading	6.0 kgf to 8.5 kgf (13 lbf to 19 lbf)

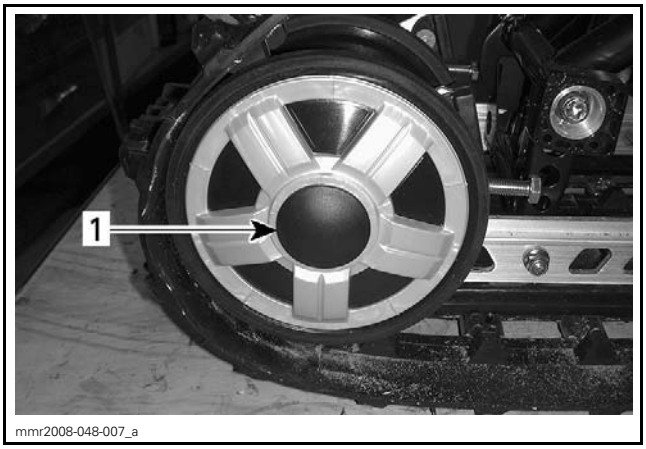
9. If load reading is not in accordance with the specification, adjust track tension. Refer to *TRACK TENSION ADJUSTMENT*.

NOTICE **Too much tension will result in power loss and excessive stresses on suspension components.**

Track Tension Adjustment

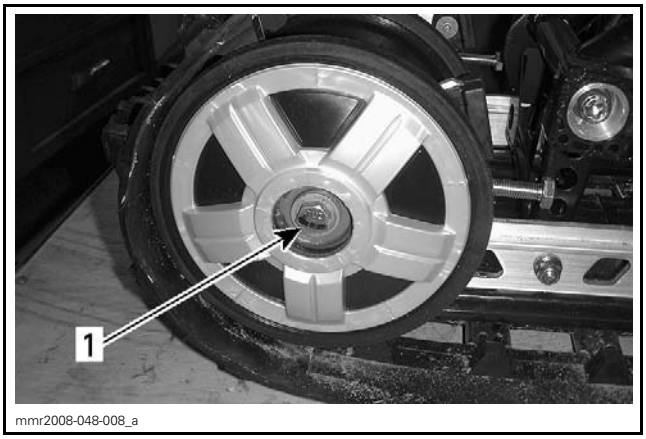
NOTE: After track tension adjustment, ride the snowmobile in snow about 15 to 20 minutes and recheck track tension.

1. Lift rear of vehicle and support it off the ground.
2. Remove rear idler wheel caps.



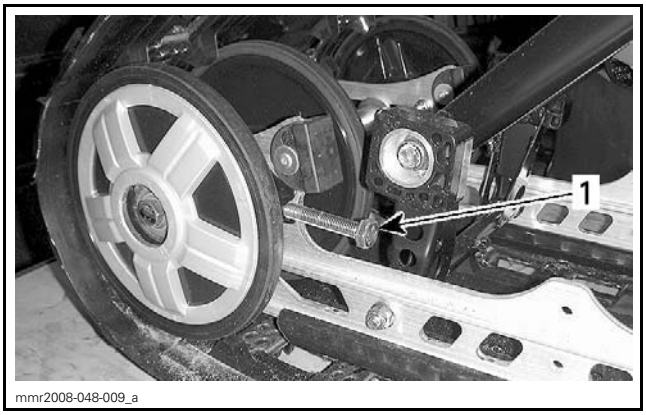
1. RH rear idler wheel cap

3. Loosen rear axle screws (one each side).



1. RH rear axle screw

4. Tighten or loosen both adjustment screws to increase or decrease track tension.



1. RH adjustment screw

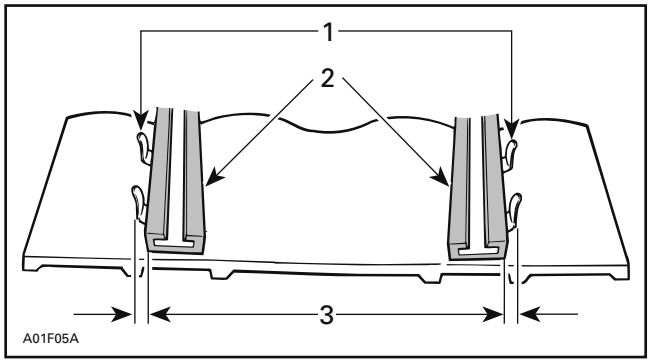
5. Verify track tension, refer to *TRACK TENSION VERIFICATION*.
6. Ensure track is properly aligned, refer to *TRACK ALIGNMENT*.

Track Alignment

⚠ WARNING

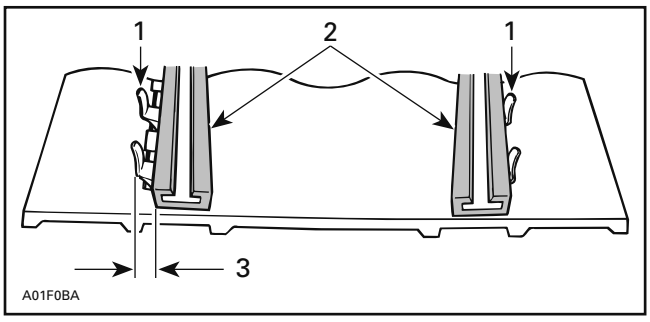
Before checking track alignment, ensure that the track is free of all particles which could be thrown out while track is rotating. Keep hands, tools, feet and clothing clear of track. Ensure no one is standing in close proximity to the vehicle. Never rotate at high speed.

1. Lift rear of vehicle and support it off the ground.
2. Start engine and accelerate slightly so that track barely turns. This must be done in a short period of time (1 to 2 minutes).
3. 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

4. To correct track alignment:
   - 4.1 Stop engine.
   - 4.2 Loosen rear wheel screws.
   - 4.3 Tighten 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

5. Restart engine.
6. Rotate track slowly and recheck alignment.

7. If satisfactory track alignment is achieved:
   7.1 Torque idler wheel retaining screws to specification.

TIGHTENING TORQUE	
Idler wheel retaining screws	48 N•m (35 lbf•ft)

   7.2 Reinstall wheel caps.

BRAKE

Recommended Brake Fluid

Always use brake fluid meeting the DOT 4 specification.

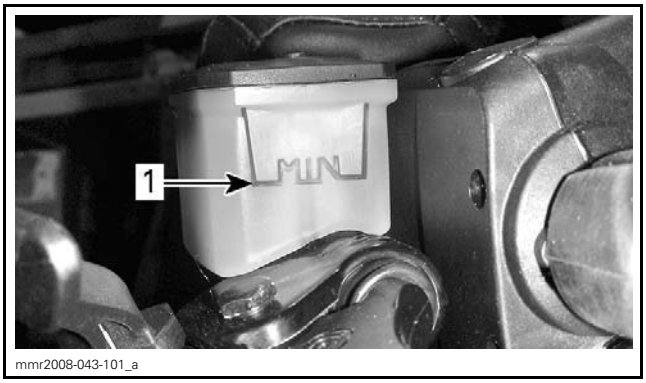
RECOMMENDED SERVICE PRODUCT
BRAKE FLUID (P/N 293 600 131) meeting DOT 4 specification

Brake Fluid Level Verification

Break-In	Scheduled Maintenance	Storage	Preseason
✔			✔

With the vehicle on a level surface, position steering in the straight-ahead position to ensure reservoir is level.

Brake fluid must always be above the MIN. line when brake lever is squeezed.



mmr2008-043-101_a

1. MINIMUM line

Add fluid as required. Do not overfill.

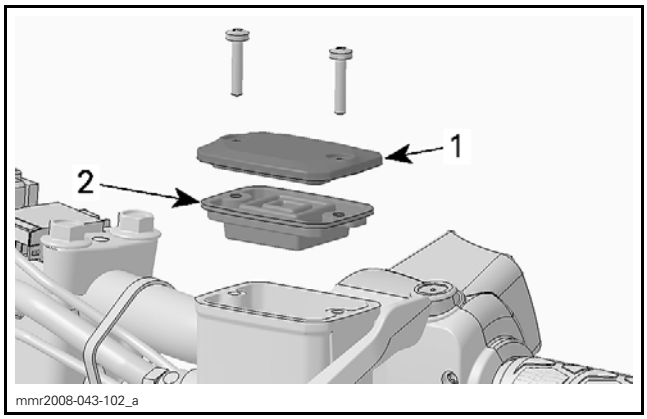
NOTE: A low level may indicate leaks or worn brake pads.

Brake Fluid Replacement

Break-In	Scheduled Maintenance	Storage	Preseason
	✔		

Brake Fluid Draining

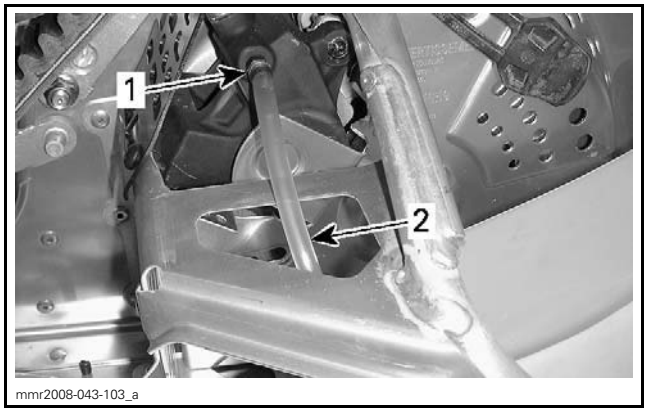
1. Place vehicle on a level surface.
2. Remove reservoir cover with its diaphragm.



mmr2008-043-102_a

1. Reservoir cover
2. Diaphragm

3. Connect a clear hose to caliper bleeder.
4. Place the other end of hose in a container.
5. Loosen bleeder and pump brake lever until no more fluid flows out of bleeder.



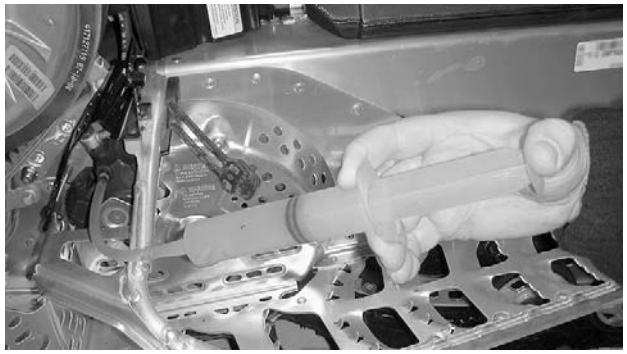
mmr2008-043-103_a

1. Bleeder
2. Clear hose to catch used brake fluid

Brake Fluid Filling

To fill brake circuit when it is empty do the following:

1. Ensure reservoir cover is removed.
2. Using a large syringe and a suitable tube, push brake fluid slowly into the caliper.


mmr2008-043-104

3. Continue to push brake fluid until master cylinder reservoir is half full.
4. Close bleeder.
5. Fill up reservoir and install cover.
6. Squeeze brake lever.
   6.1 If brake lever is firm, the brake system does not require bleeding. Torque bleeder as specified.

TIGHTENING TORQUE	
Brake caliper bleeder	9 N•m (80 lbf•**in**)

   6.2 If brake lever is spongy, bleed brake system as per following procedure.

Brake System Bleeding

1. Install a clear hose on bleeder.
2. Place the other end in a container partially filled with clean brake fluid.
3. Pump up circuit pressure with brake lever until lever resistance is felt.
4. Squeeze brake lever and open bleeder. When lever touches the handlebar, do not release lever and close bleeder.
5. Release brake lever slowly.
6. Repeat the procedure until no more air bubbles appear in hose.

NOTE: Check fluid level often to prevent air from being pumped into the circuit.

7. Install cover on reservoir.
8. Squeeze brake lever.
   8.1 If brake lever is firm, bleeding procedure is completed. Torque bleeder as specified.
   8.2 If brake lever is still spongy, go to step 9.
9. Push back brake pads with caliper in place and squeeze brake lever.
10. Repeat step 2 to step 5.
11. Torque bleeder as specified.

TIGHTENING TORQUE	
Brake caliper bleeder	9 N•m (80 lbf•**in**)

12. Refill reservoir.
13. Install diaphragm and cover on reservoir.

Brake Hose, Pads and Disc Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Break-In Inspection

Visually inspect the brake hose for leaks or any damage.

Visually inspect pads and disc for abnormal wear or any damage.

Scheduled Maintenance and Preseason

Visually inspect the brake hose for leaks or any damage.

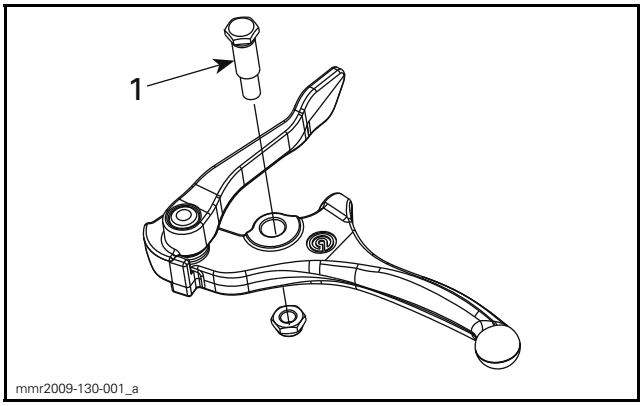
Refer to *BRAKE* subsection and carry out:
– *BRAKE PAD INSPECTION*
– *BRAKE DISC INSPECTION*.

Brake Lever Pivot Lubrication

Break-In	Scheduled Maintenance	Storage	Preseason
		✔	

1. Remove brake lever pivot.
2. Lubricate brake lever pivot using recommended product.

SERVICE PRODUCT	
Brake lever pivot	XPS SYNTHETIC GREASE (P/N 293 550 010)



mmr2009-130-001_a

1. Lubricate this surface

3. Install brake lever pivot.
4. Torque pivot nut of brake lever as specified.

TIGHTENING TORQUE	
Brake lever pivot nut	6 N•m (53 lbf•**in**)

CHASSIS (SUSPENSION)

Front Suspension Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Visually inspect front suspension for tightness of components:
– Arms
– Stabilizer bar
– Shock absorbers
– Ball joints.

Front Suspension Lubrication

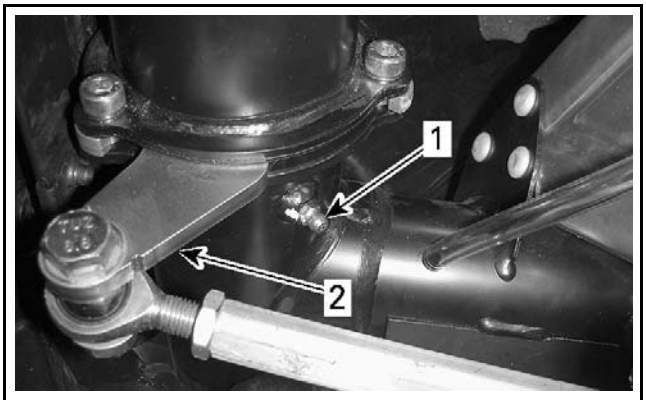
Break-In	Scheduled Maintenance	Storage	Preseason
		✔	

Lubricate front suspension at grease fittings using the SUSPENSION GREASE (P/N 293 550 033).

There is one grease fitting on each side. Each one is located on the LTS module post just below the steering arm.

Generally, 4 to 5 grease gun strokes is sufficient.

If too much grease is injected, the overflow will come out at steering levers and ski legs. Wipe off any excess of grease to avoid contact with other parts.



mmo2010-007-014_a

LH SIDE SHOWN
1. Grease fitting
2. Steering arm

Rear Suspension, Stopper Strap and Slider Shoes Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

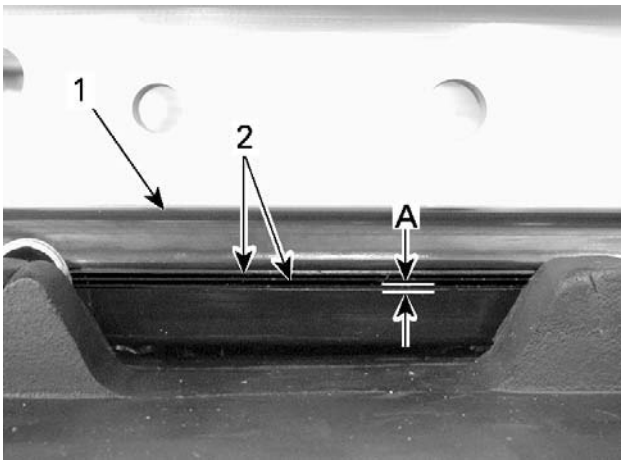
Rear Suspension Mechanism and Stopper Strap Inspection

1. Inspect rear suspension components for wear, deterioration or damage, replace defective parts if necessary.
2. Inspect stopper strap(s) for wear or cracks.
3. Check bolt and nut securing strap(s) for tightness. If loose, inspect strap holes for deformation. Replace strap if necessary.

Slider Shoe Inspection

Slider shoes are worn out and must be replaced when remaining material exceeding the 2 molding lines is as specified.

MINIMUM SLIDER SHOE THICKNESS
1 mm (.04 in) material remaining exceeding the 2 molding lines



mmr2012-005-003_a

1. Slider shoe
2. Molding lines
A. Minimum thickness: 1 mm (.04 in)

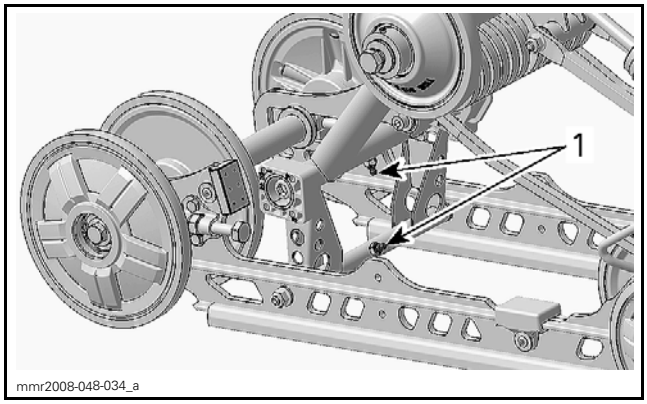
NOTICE Slider shoes must always be replaced in pairs.

Rear Suspension Lubrication

Break-In	Scheduled Maintenance	Storage	Preseason
	✔	✔	

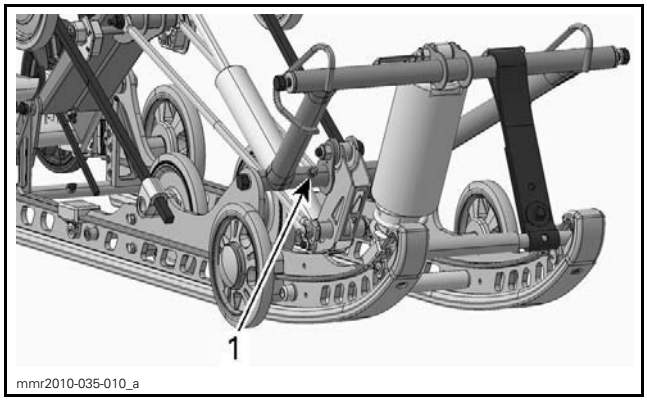
Lubricate the following suspension pivots at grease fittings using SUSPENSION GREASE (P/N 293 550 033).

Lubrication (SC™-5)

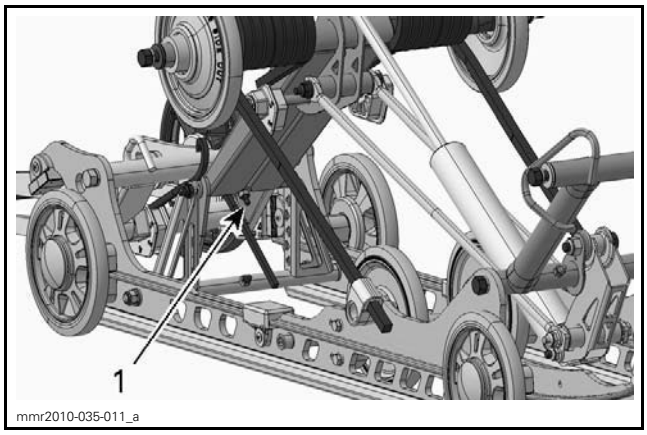


REAR ARM PIVOT AND PIVOT ARM
1. Grease fittings

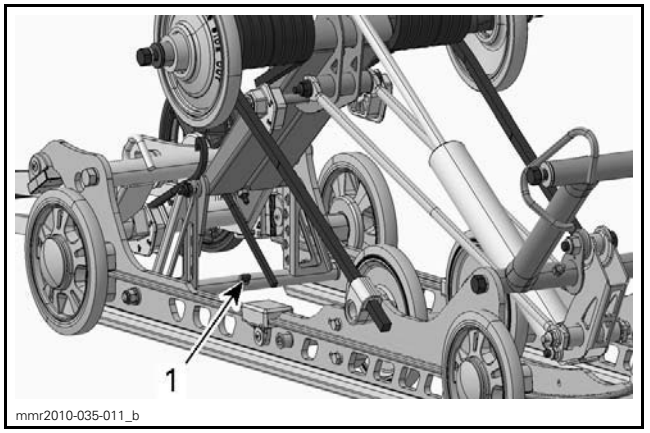
Lubrication (SC-5M)



FRONT ARM PIVOT
1. Grease fitting

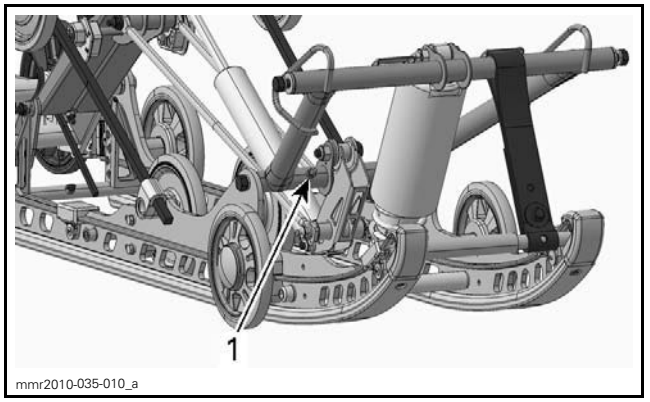


REAR ARM PIVOT
1. Grease fitting

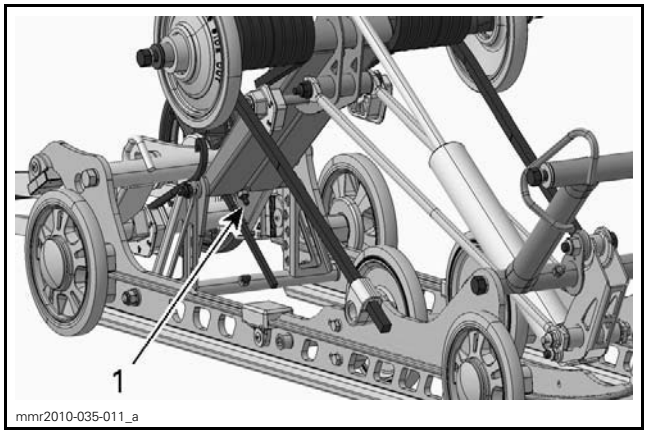


PIVOT ARM
1. Grease fitting

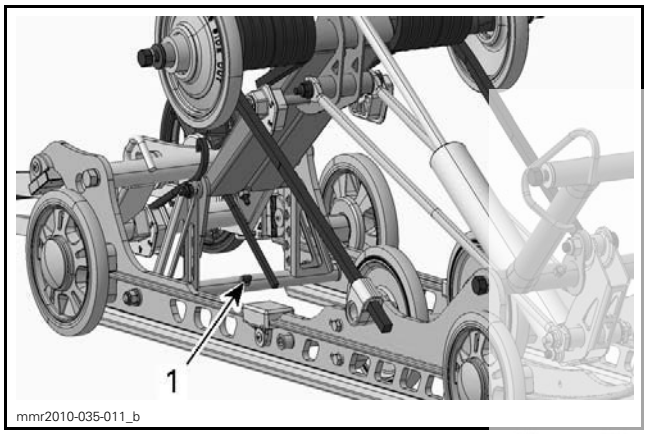
Lubrication (SC-5U)



FRONT ARM
1. Grease fitting

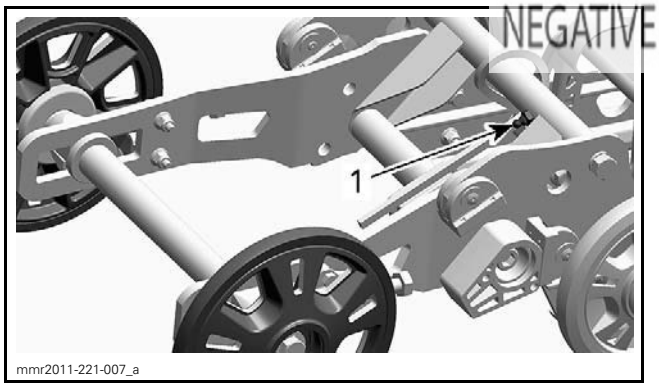


REAR ARM
1. Grease fitting



PIVOT ARM
1. Grease fitting

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



REAR EXTENSION
1. Grease fitting

CHASSIS (STEERING)

Ski and Runner Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Lift the front of vehicle and check ski runners for wear or damage (missing or broken carbide). Replace if necessary.

Inspect ski for excessive wear or other damage. Replace if necessary.

Steering Mechanism Inspection

Break-In	Scheduled Maintenance	Storage	Preseason
✔	✔		✔

Visually inspect steering mechanism for tightness of components (steering arms, tie rods, ski bolts, ski legs, etc.).

STORAGE PROCEDURE

During summer, or when a snowmobile is not in use for more than three months, proper storage is a necessity.

Procedures are detailed in *PERIODIC MAINTENANCE PROCEDURES* subsection.

STORAGE (550F)
Clean the vehicle
Add fuel stabilizer to fuel following the product manufacturer recommendations. Run the engine after adding the product to the fuel
Lubricate engine
Lubricate brake lever pivot
Lubricate front suspension (Tundra models)
Inspect and lubricate rear suspension
Charge battery monthly to keep it fully charged during storage
Block muffler outlet with rags
Lift rear of vehicle until track is clear of the ground. Do not release track tension

⚠ **CAUTION** Use appropriate lifting device or have assistance to share lifting stress. If a lifting device is not used, use proper lifting techniques, notably using your legs force. Do not attempt to lift the rear of vehicle if it is above your limits.

NOTICE 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.

PRESEASON PREPARATION

Proper vehicle preparation is required after the summer months or when a vehicle has not been used for more than three months.

Procedures are detailed in *PERIODIC MAINTENANCE PROCEDURES* subsection.

PRESEASON PREPARATION (550F)
Inspect engine rubber mounts
Inspect engine axial fan belt
Check exhaust system condition and check for leaks
Inspect crankshaft PTO seal
Inspect fuel lines and connections
Clean, inspect and adjust carburetors
Adjust oil injection pump
Inspect throttle cable
Replace spark plugs after starting the engine with the old spark plugs to burn the excess of storage oil
Inspect drive belt (adjust at every drive belt replacement)
Clean and visually inspect drive pulley
Clean and inspect driven pulley
Inspect, adjust and align track
Adjust drive chain
Change chaincase oil
Check brake fluid level
Inspect brake hose, pads and disk
Inspect steering mechanism
Inspect skis and runners
Inspect front suspension
Inspect rear suspension stopper strap
Charge battery (on models equipped with electric starter)
Adjust headlight beam aiming

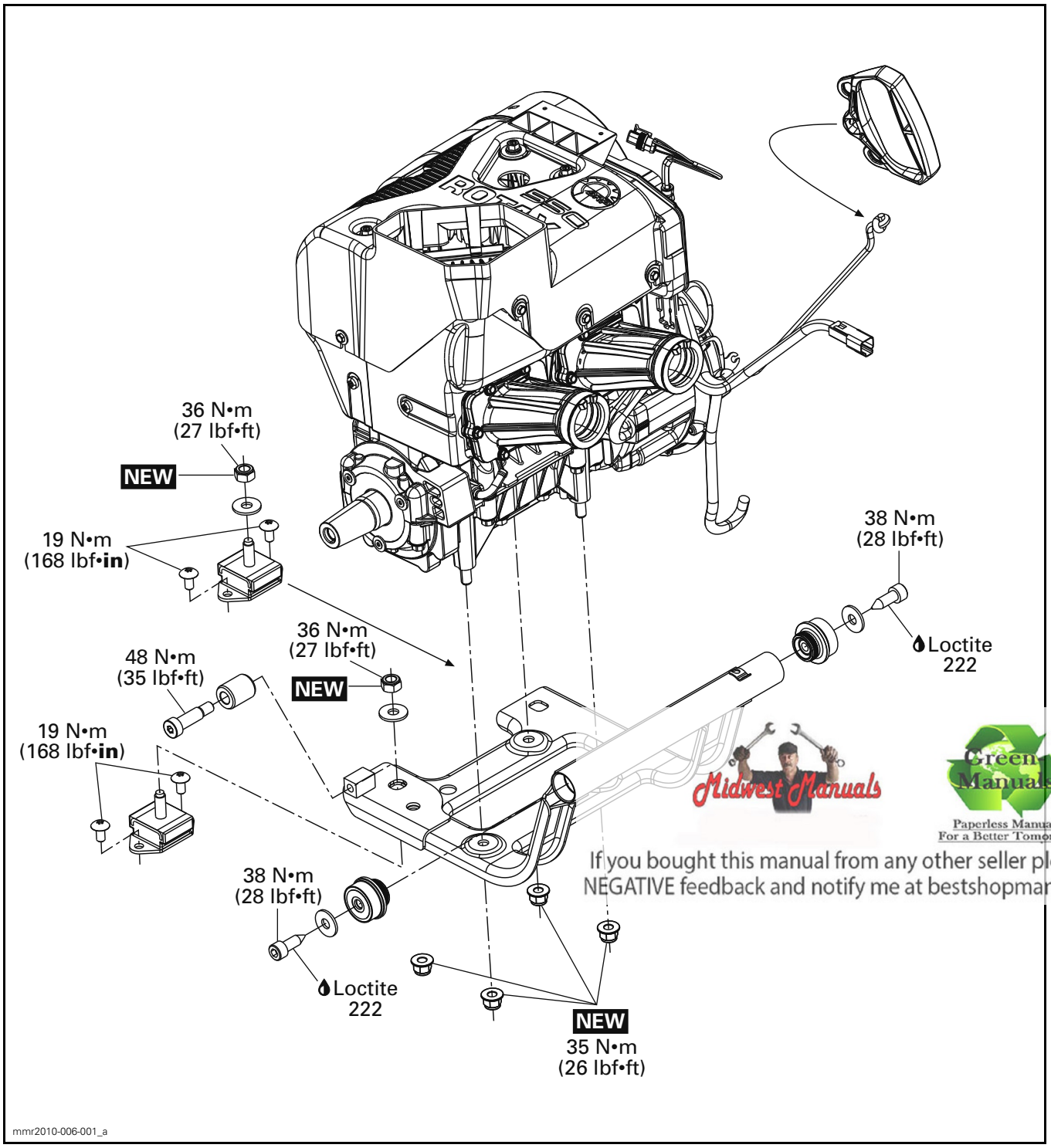
ENGINE REMOVAL AND INSTALLATION

SERVICE TOOLS

Description	Part Number	Page
BALL JOINT INSTALLER	529 035 975	33

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 222	413 703 400	31



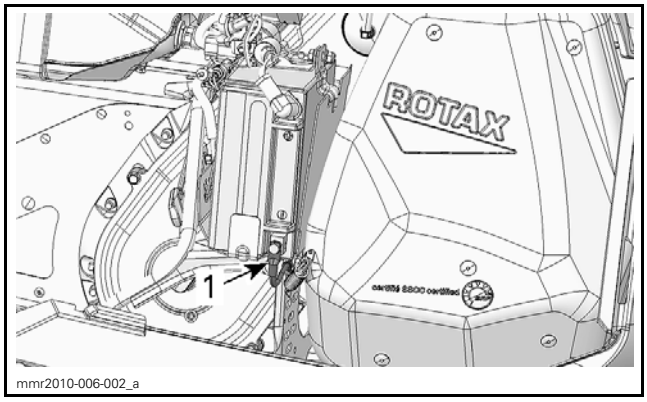
Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

PROCEDURES

ENGINE

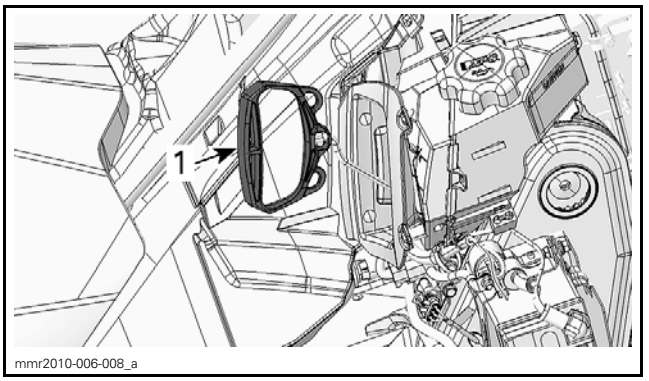
Engine Removal

1. Place vehicle at workstation that will have access to an engine-lifting hoist.
2. Refer to *BODY* subsection and remove the following:
   – Hood
   – Side panels
   – Console
   – Front bottom pan cover (except Tundra models).
3. On **vehicle with electric starter**, remove the negative cable (–) from battery.



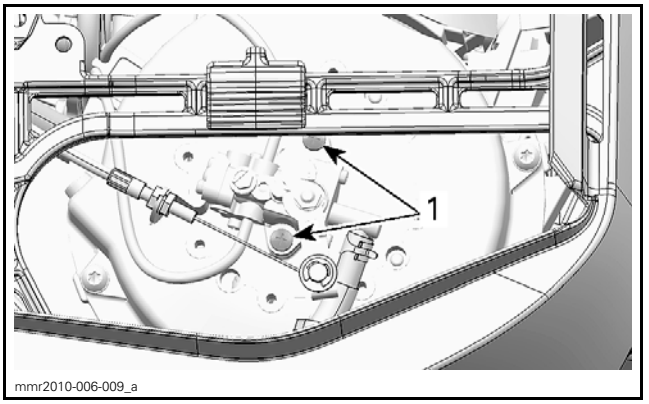
TYPICAL
1. Negative cable

4. Refer to *EXHAUST SYSTEM* subsection and remove:
   – Muffler
   – Tuned pipe
   – Exhaust manifold.
5. Refer to *AIR INTAKE SYSTEM* subsection and remove:
   – Primary air intake silencer
   – Secondary air intake silencer with headlight/gauge module as a unit.
6. Refer to *AXIAL FAN* subsection and remove the following:
   – Upper air inlet duct
   – Lower air inlet duct
   – Air outlet duct.
7. Refer to *DRIVE SYSTEM AND BRAKE* subsection and remove the following:
   – Drive belt
   – Drive pulley
   – Driven pulley
   – Countershaft and countershaft bearing support.
8. Remove the rewind starter handle.



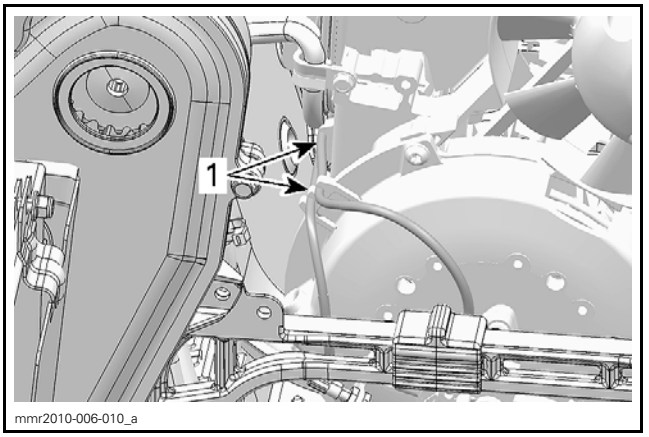
TYPICAL
1. Rewind starter handle

9. Remove screws securing oil pump to rewind starter housing.



TYPICAL
1. Oil pump retaining screws

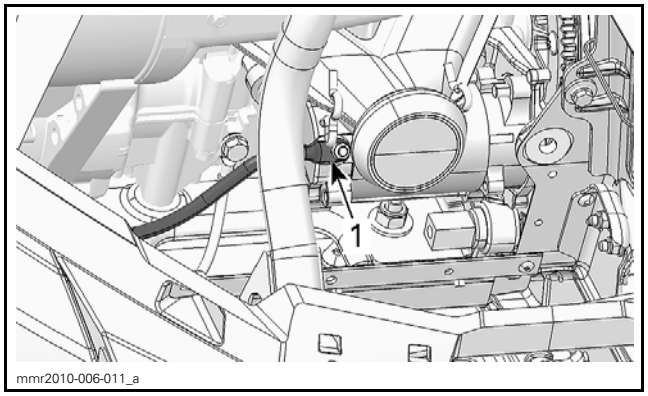
10. Detach oil injection hoses from rewind starter housing and crankcase housing.



TYPICAL
1. Detach oil injection hoses here

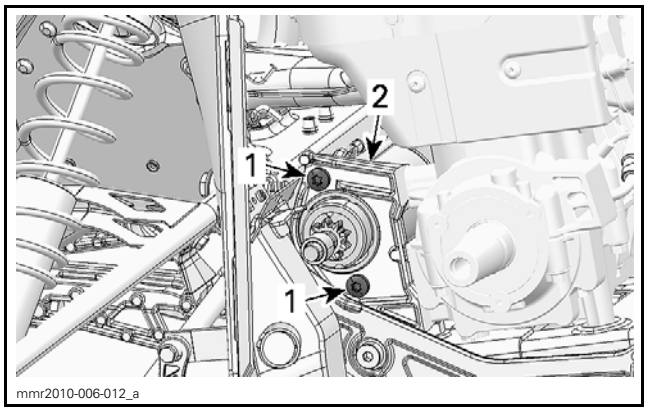
11. Remove the starter (if applicable).

11.1 Remove starter cable from starter post.



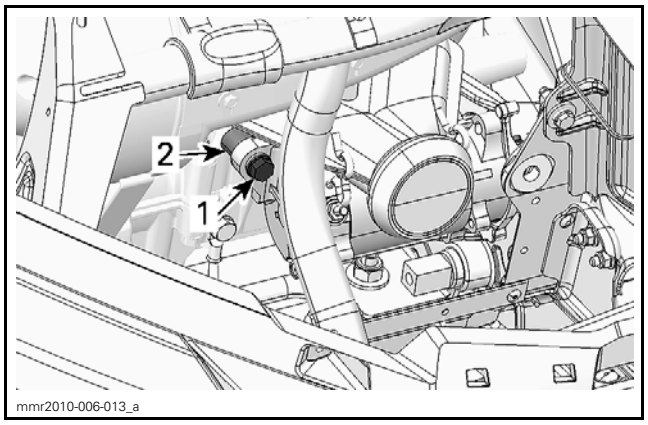
1. Starter cable

11.2 Remove both TORX screws securing starter to starter support.



1. Starter retaining TORX screws
2. Starter support

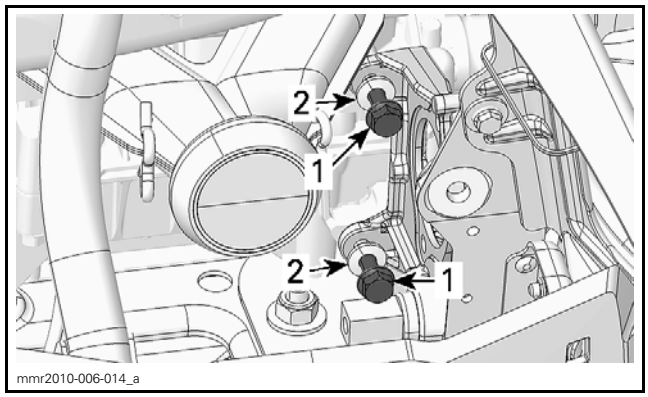
11.3 Remove the last retaining starter screw and the starter spacer.



1. Starter retaining screw
2. Starter spacer

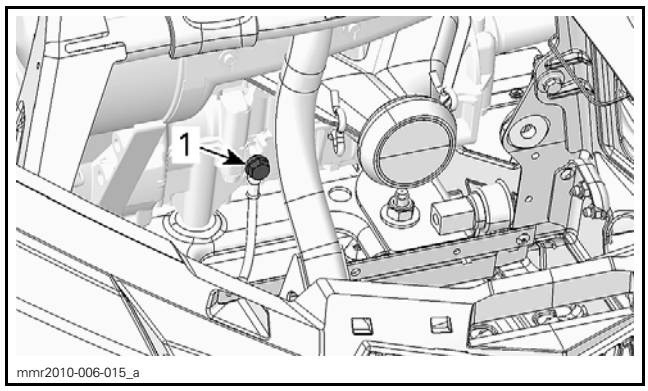
11.4 Remove starter from vehicle.

11.5 Remove starter support screws and Belleville washers.



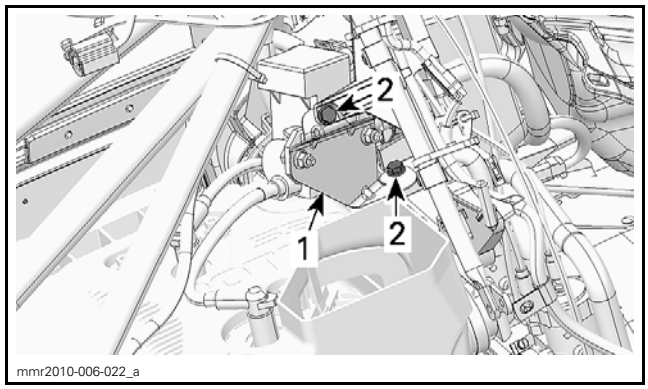
1. Starter support screws
2. Belleville washers

12. Remove engine ground cable screw from the engine.



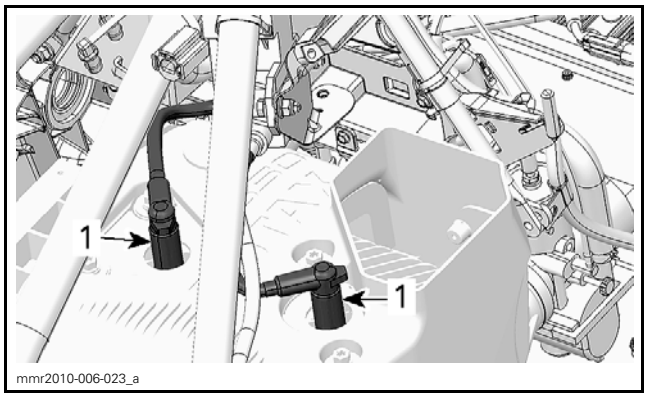
1. Engine ground cable screw

13. Remove screws securing the ECM support.



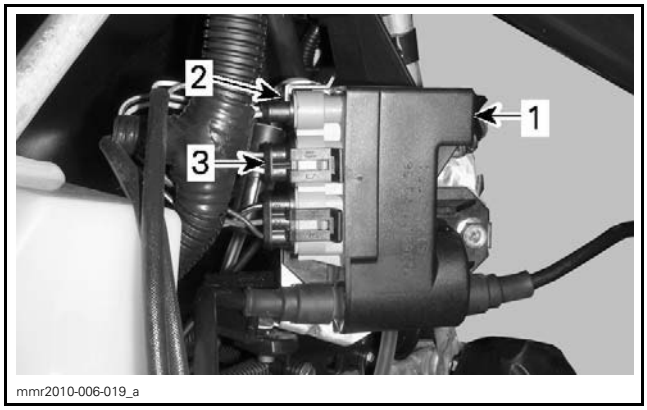
TYPICAL
1. ECM support
2. ECM support retaining screws

14. Disconnect spark plug cables.



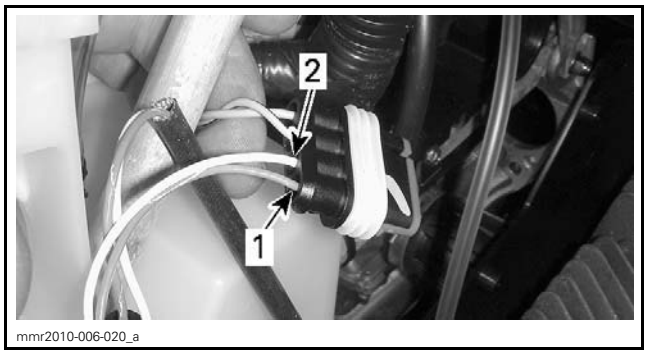
TYPICAL
1. *Spark plug cables*

15. From the ECM, disconnect the 4-pin connector and the 2-pin connector.



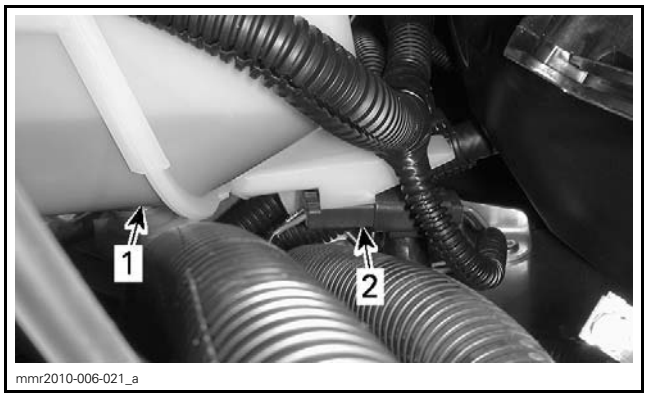
1. *ECM*
2. *4-pin connector*
3. *2-pin connector*

16. On 4-pin connector, disconnect the BLUE/YELLOW and the WHITE/YELLOW wires from the connector.
    16.1 Remove the RED lock.
    16.2 Using a small screwdriver, lift the terminal lock.
    16.3 Extract the wire from the connector.



1. *BLUE/YELLOW wire*
2. *WHITE/YELLOW wire*

17. Remove the magneto starting winding connector (MA) from the bottom of the oil tank.



TYPICAL
1. *Oil tank*
2. *Magneto starting winding connector (MA)*

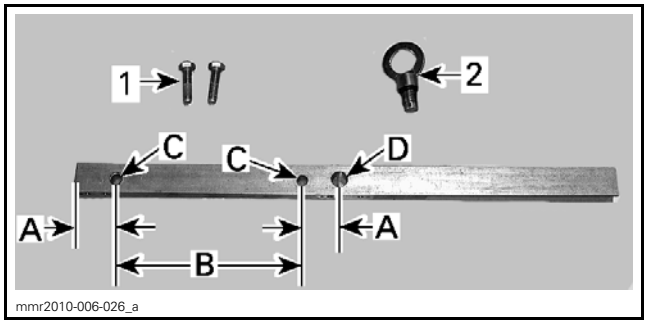
18. Remove the upper cylinder cowl. Refer to *AXIAL FAN* subsection.

19. Install the lifting bar on two cylinder cowl supports.



TYPICAL

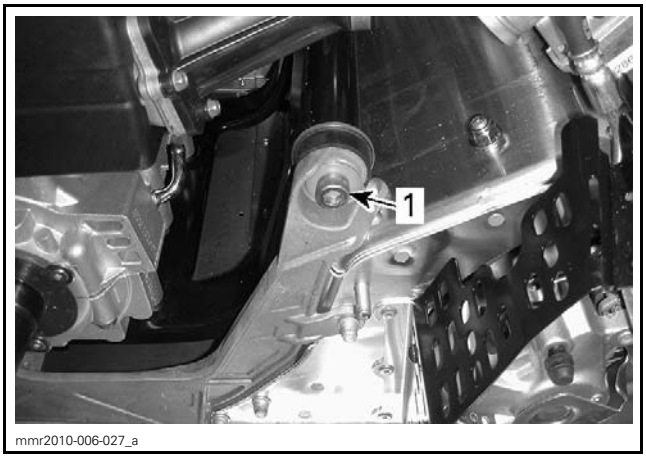
REQUIRED TOOLS
M8 x 30 hexagonal screws (QTY: 2)
Engine lifting ring (P/N 529 035 830)
Flat bar 152 x 25.4 x 13 mm (16 x 1 x 1/2 in)



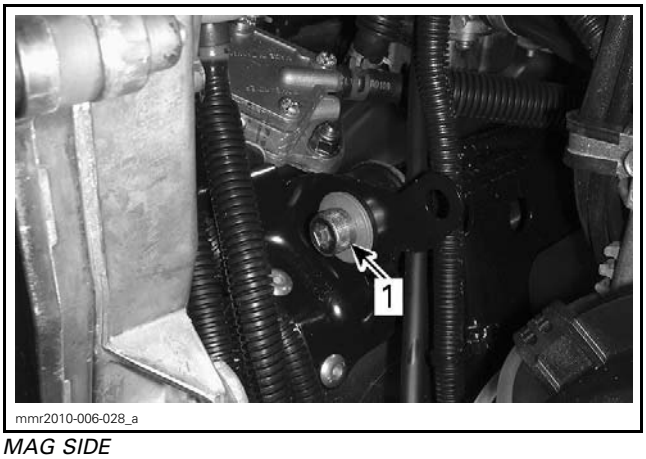
FLAT BAR 152 X 25.4 X 13 MM (16 X 1 X 1/2 IN)
1. *M8 x 30 hexagonal screws*
2. *Engine lifting ring (P/N 529 035 830)*

A. 30 mm (1.181 in)
B. 125 mm (4.921 in)
C. Diameter: 9.53 mm (3/8 in)
D. Diameter: 13 mm (1/2 in) and do threads using a M14 x 1.0 screw tap

20. Attach the engine-lifting hoist to lifting tool.
21. Remove the rear engine mounting screws.



PTO SIDE
1. LH rear engine mounting screw



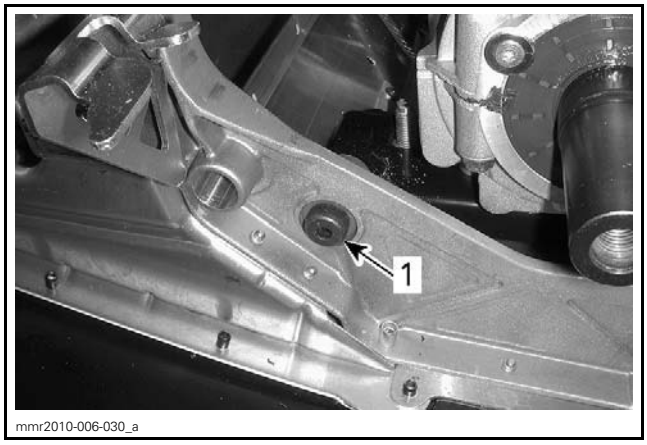
MAG SIDE
1. RH rear engine mounting screw

22. Remove and discard the front engine mounting nuts.



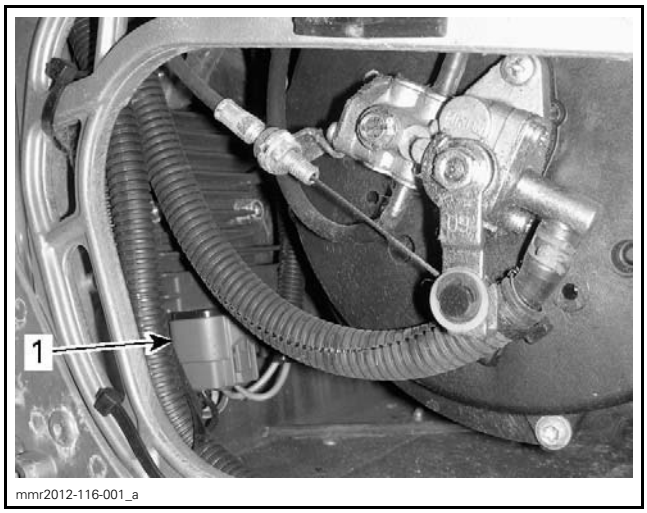
1. Front engine mounting nuts

23. Unscrew and remove the engine stopper.



1. Engine stopper screw

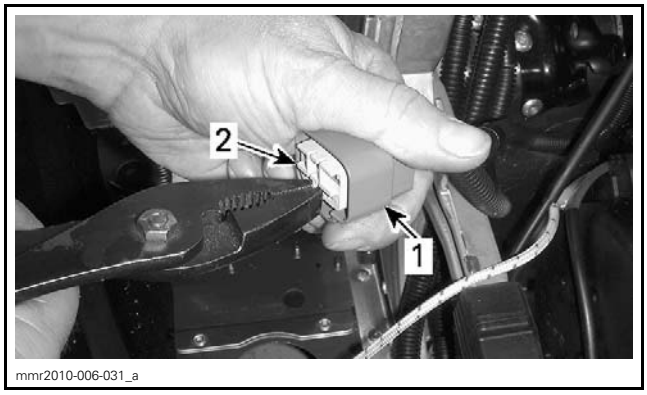
24. Slightly lift the engine.
25. Disconnect the voltage regulator/rectifier connector.



1. Voltage regulator/rectifier connector

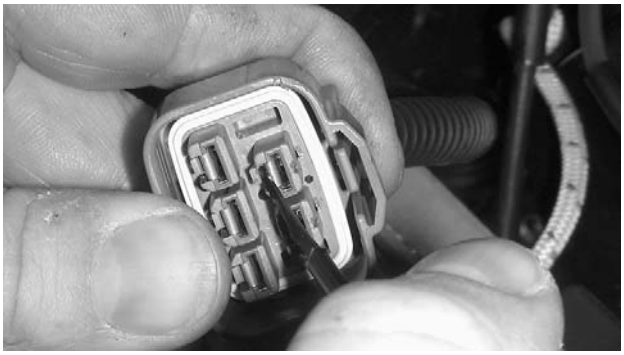
26. Remove the YELLOW and the YELLOW/BLACK wires from the connector.

    26.1 Remove the BLUE lock.



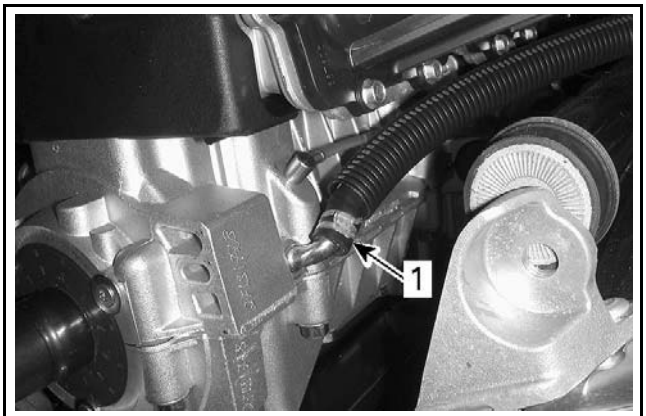
1. Voltage regulator/rectifier connector
2. Connector lock

    26.2 Using a small screwdriver, lift the terminal lock.


mmr2010-006-032

26.3 Extract the wire from the connector.

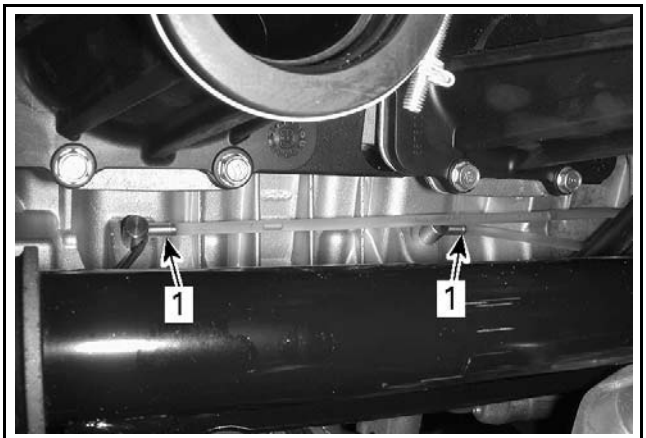
27. Unplug the fuel pump pulse line from crankcase.



mmr2010-006-033_a

1. Fuel pump pulse line

28. Unplug oil injection hoses from the crankcase fittings.



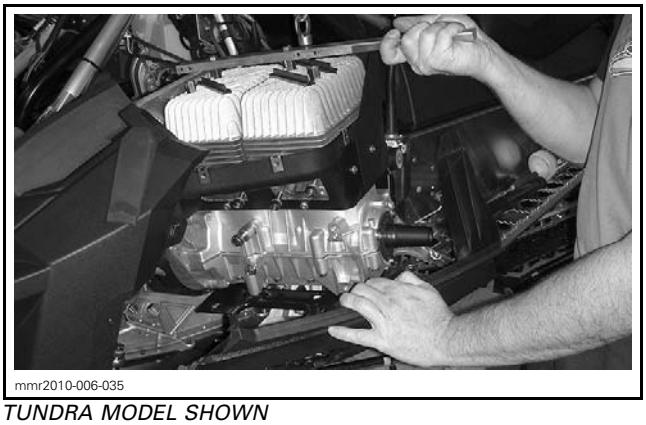
mmr2010-006-034_a

1. Oil injection hoses

29. Cut all necessary locking ties.

30. Lift and slide out engine.

NOTE: On Tundra models, slightly move rear bottom pan outward to make room.

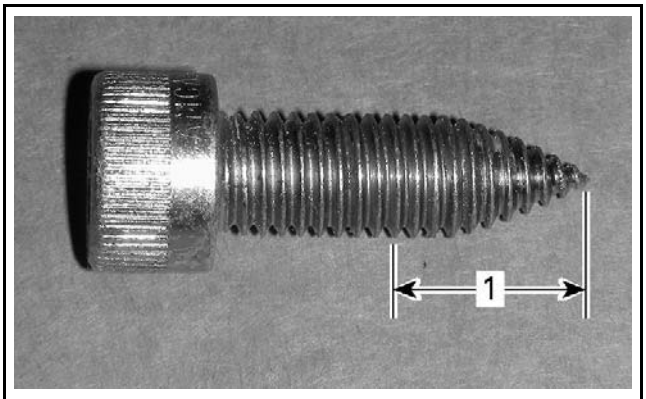

mmr2010-006-035

TUNDRA MODEL SHOWN

Engine Installation

Install **NEW** self-locking fasteners where required, see the exploded view at the beginning of this subsection.

Before installing engine mounting bolts, apply LOCTITE 222 (P/N 413 703 400) only on the first 10 threads.

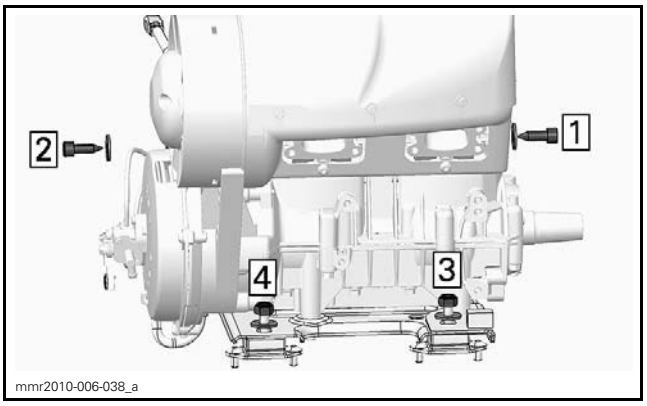


mmr2010-006-037_a

1. Apply Loctite 222 in this area

Install engine mounting bolts and engine mounting nuts. Refer to the following table and illustration for the tightening torque and sequence.

FASTENER	TORQUE
Engine mounting bolts	38 N•m (28 lbf•ft)
Engine mounting nuts	36 N•m (27 lbf•ft)



mmr2010-006-038_a

Refer to *STARTING SYSTEM* to install the starter properly.

When engine installation is completed, bleed oil system. Refer to *LUBRICATION SYSTEM* subsection for proper procedure.

Perform a driven pulley alignment. Refer to *DRIVEN PULLEY* subsection.

If a new engine is installed or the engine was repaired, premix the fuel with oil.

ENGINE SUPPORT

Engine Support Inspection

Check if engine supports are cracked, bent or damaged. Replace if necessary.

Engine Support Removal

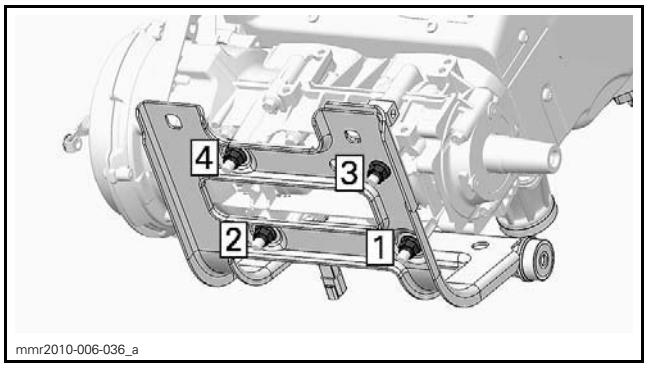
1. Remove engine from vehicle.
2. Remove and discard nuts retaining engine support to engine.
3. Remove engine support.

Engine Support Installation

The installation is the reverse of the removal procedure, however pay attention to the following.

Refer to the following table and illustration for the tightening torque and sequence.

FASTENER	TORQUE
Engine support nuts	35 N•m (26 lbf•ft)



mmr2010-006-036_a

ENGINE RUBBER MOUNT

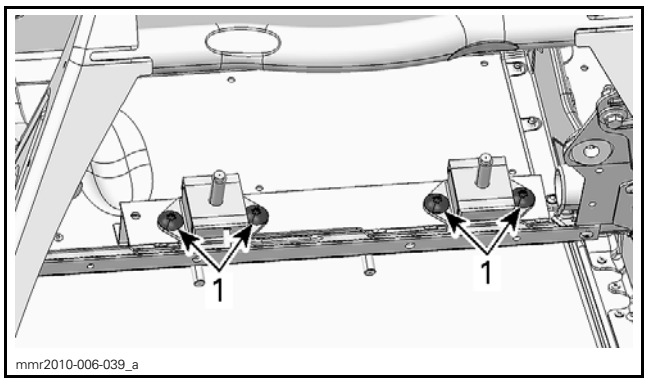
Engine Rubber Mount Inspection

Check rubber mounts. Replace them if brittle, cracked or damaged.

Engine Rubber Mount Replacement

Front Engine Rubber Mount

1. Remove engine from vehicle. See the procedure in this subsection.
2. Remove screw securing the front engine rubber mount to frame.



mmr2010-006-039_a

1. Front engine rubber mount screws

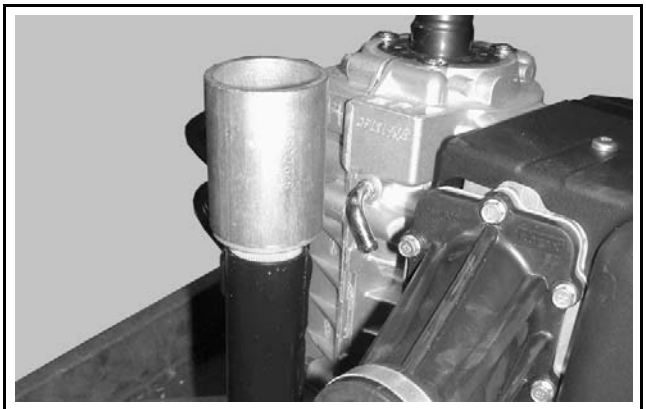
3. Remove the engine rubber mount.
4. Install the new rubber mount and tighten screws to 19 N•m (168 lbf•**in**).
5. Reinstall engine. See the procedure in this subsection.

Rear Engine Rubber Mount

1. Remove engine from vehicle. See the procedure in this subsection.
2. Using a punch, carefully drive the rear engine rubber mount out of the engine support.


mmr2010-006-040

3. Support the other side of the engine support and using the BALL JOINT INSTALLER (P/N 529 035 975), install the new rear engine rubber mount.


mmr2010-006-041

BALL JOINT INSTALLER OVER NEW ENGINE RUBBER MOUNT FOR INSTALLATION

4. Repeat steps 2 and 3 for the other side.
5. Reinstall engine. See the procedure in this subsection.

ENGINE LEAK TEST

SERVICE TOOLS

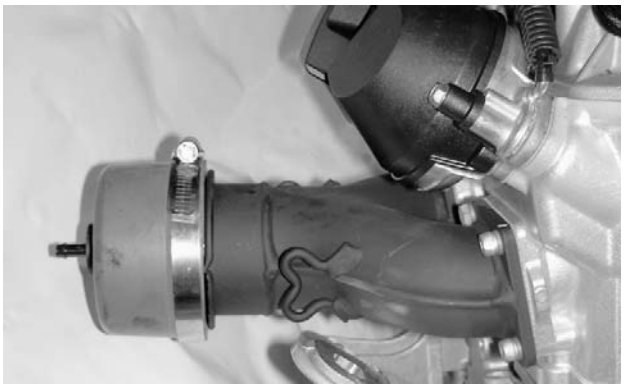
Description	Part Number	Page
INTAKE PLUG	529 036 128	36
MANIFOLD PLUG 63 MM (2-1/2")	529 035 961	36
SMALL HOSE PINCHER	295 000 076	36
VACUUM/PRESSURE PUMP	529 021 800	36

PROCEDURES

ENGINE

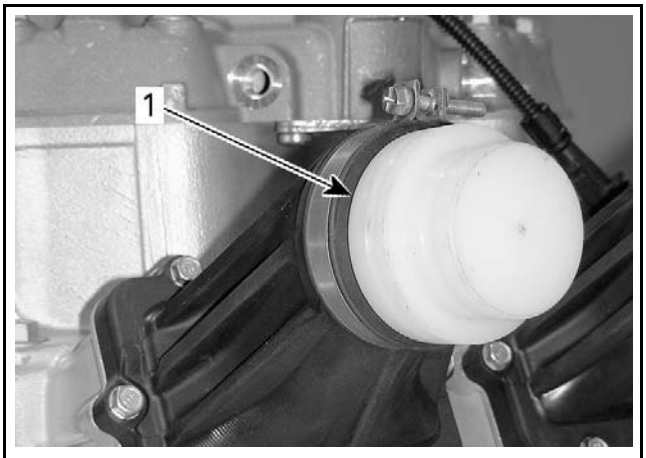
Prior to an engine disassembly, it is important to proceed with a leak test to diagnose engine problems. Whenever the engine is disassembled, a leak test should be performed after reassembly.

1. Remove engine. Do not remove the exhaust manifold. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.
2. Install MANIFOLD PLUG 63 MM (2-1/2") (P/N 529 035 961) over exhaust manifold and secure with a clamp.


mmr2009-009-001

TYPICAL

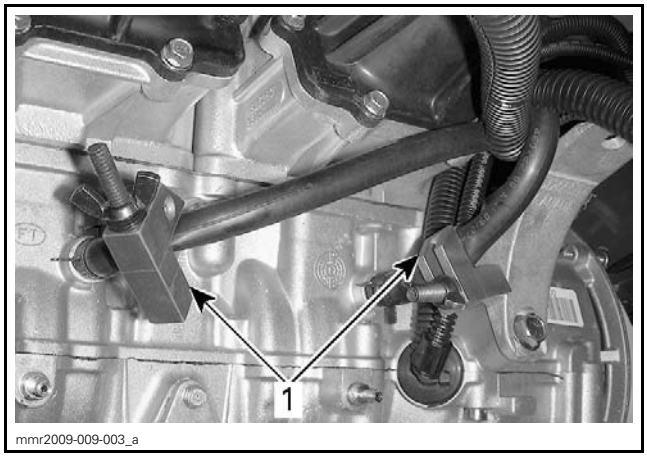
3. Insert an INTAKE PLUG (P/N 529 036 128) in each intake adaptor. Tighten with existing clamps.



mmr2008-009-001_a

TYPICAL
1. Intake plug

4. Using a SMALL HOSE PINCHER (P/N 295 000 076), block each impulse hose as applicable.

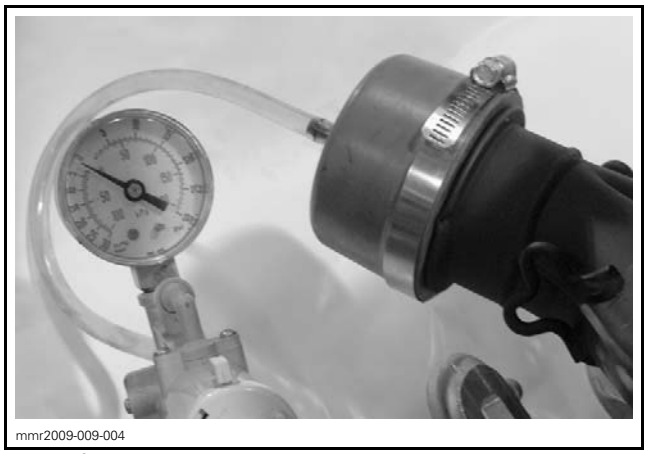


mmr2009-009-003_a

TYPICAL
1. Small hose pinchers

NOTICE Pay attention not to squeeze hose nipples.

5. Install VACUUM/PRESSURE PUMP (P/N 529 021 800) on manifold plug.


mmr2009-009-004

TYPICAL

6. Activate pump and pressurize engine.

ENGINE LEAK TEST	
PRESSURE	TIME (Without pressure drop)
34 kPa (5 PSI)	3 minutes

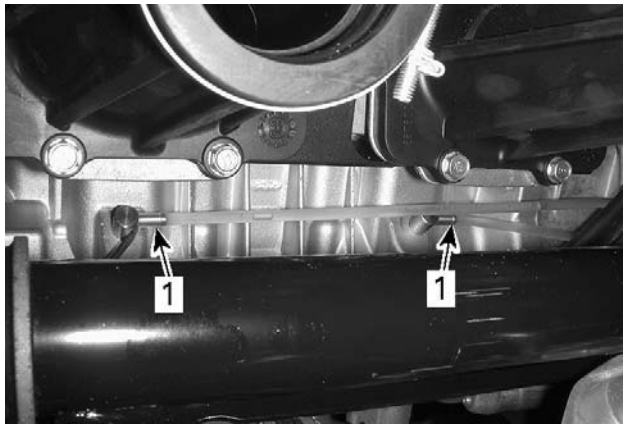
7. If pressure drops before 3 minutes, spray a soapy solution on tester kit (manifold and intake plugs, vacuum/pressure pump and its hose).
   - 7.1 If tester kit (manifold and intake plugs, hoses and pump) is leaking, bubbles will indicate the location of the leak.
   - 7.2 If tester kit is not leaking, check engine, see *ENGINE COMPONENTS TO BE VERIFIED*.

Engine Components to Be Verified

All mating surfaces requiring a proper seal including the following items, should be checked for leakage:

– Threaded holes for screws and/or studs
– Spark plug threads and insulator
– Cylinder head to cylinder
– Cylinder to crankcase
– Crankcase halves (joint)
– Crankshaft outer seals (PTO and MAG)
– Carburetor adaptors
– Exhaust manifolds
– Injection nozzles.

NOTE: Back-flow of oil or air bubbles moving towards oil injector pump in the small oil lines connected to the injectors which, may indicate a defective check valve in the injection nozzle.



1. Oil injection nozzles

ENGINE MEASUREMENT

SERVICE TOOLS

Description	Part Number	Page
DEGREE WHEEL	529 035 607	43
TDC DIAL INDICATOR	414 104 700	43–44

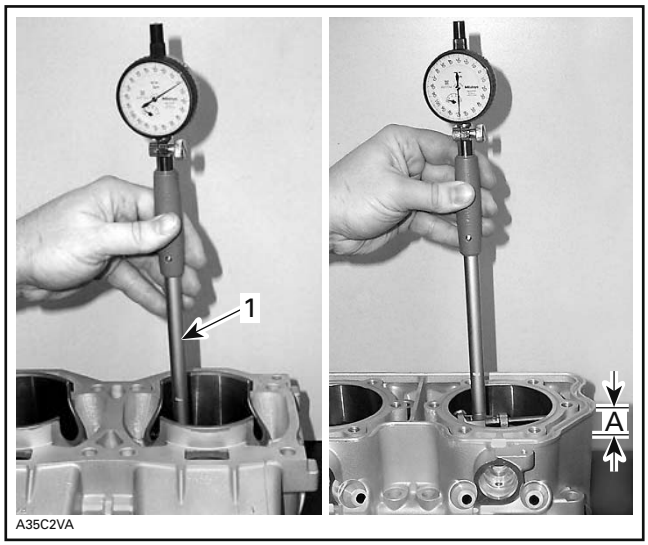
PROCEDURES

NOTE: This subsection explains the procedures to correctly measure engine components. For the engine technical specifications, refer to the appropriate *ENGINE* subsection, or to the *TECHNICAL SPECIFICATIONS* subsection.

CYLINDER TAPER

1. Measure cylinder diameter in the following locations:
   – Above exhaust port
   – Below intake port.
2. Compare cylinder diameters.
3. If the difference exceeds the specified dimension, the cylinder should be rebored and honed or should be replaced. Nikasil cylinders can be honed using a diamond hone, but they cannot be rebored.

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

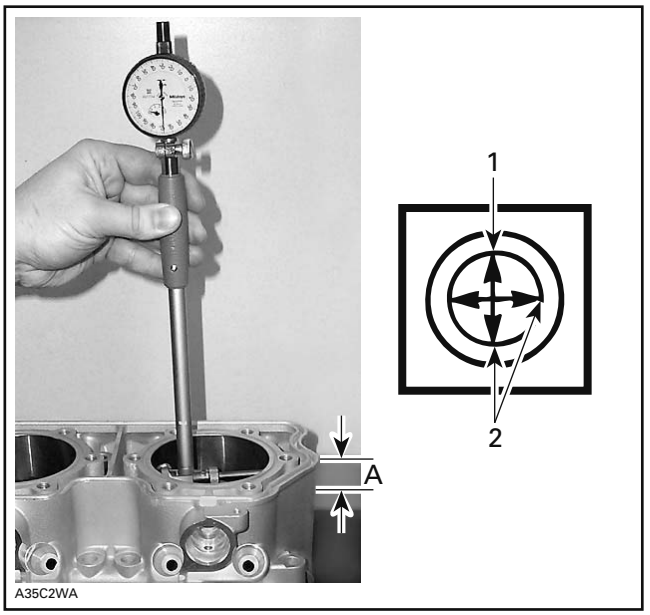


TYPICAL
1. Below the intake port
A. Above exhaust port

CYLINDER OUT OF ROUND

1. Measuring above exhaust port with a cylinder gauge, check if the cylinder out of round is greater than the specified dimension.
2. If larger, cylinder should be rebored and honed or should be replaced. Nikasil cylinders can be honed using a diamond hone but cannot be rebored.

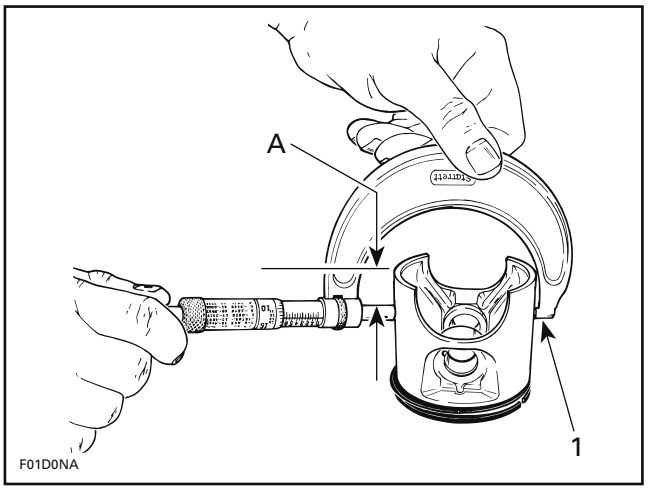
NOTE: Be sure to restore the chamfer around all cylinder sleeve port openings.



TYPICAL
1. Piston pin position
2. Measurements to be compared
A. Above exhaust port

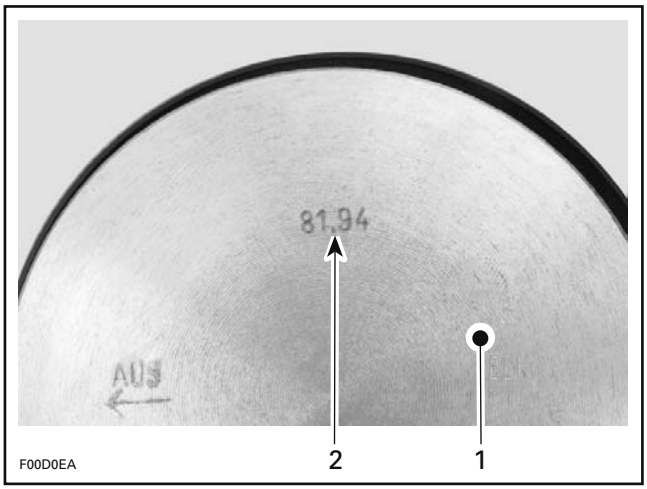
CYLINDER/PISTON CLEARANCE

1. Using a micrometer, measure piston diameter at point "A", perpendicularly (90°) to piston pin axis.



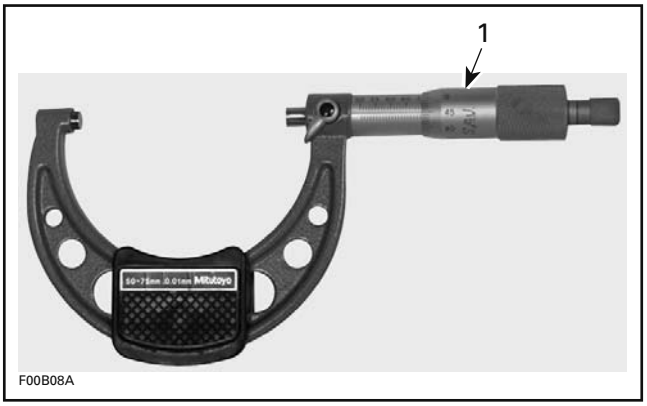
TYPICAL
1. Measuring diameter perpendicularly (90°) to piston pin axis
A. 15 mm (.591 in)

PISTON DIAMETER SPECIFICATION	
SERVICE LIMIT	Measured diameter must not be less than 0.15 mm (.006 in) of the diameter stamped on piston dome



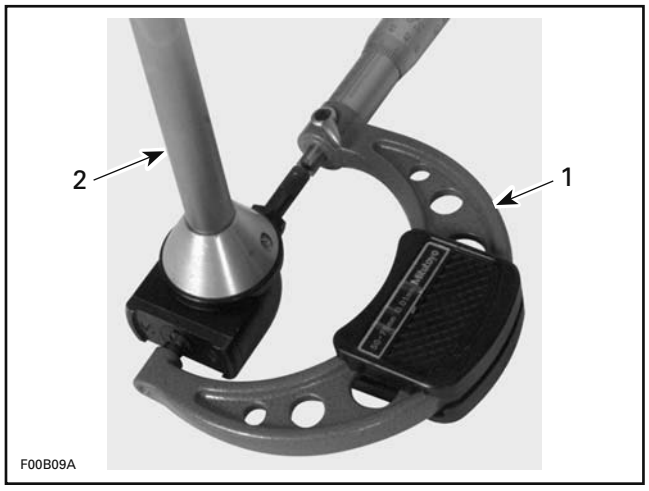
TYPICAL - FOR REFERENCE ONLY
1. Piston dome
2. Piston measurement diameter marking

2. If piston is out of tolerance, install a new piston.
3. If piston is within tolerance, adjust and lock a micrometer to the piston diameter.

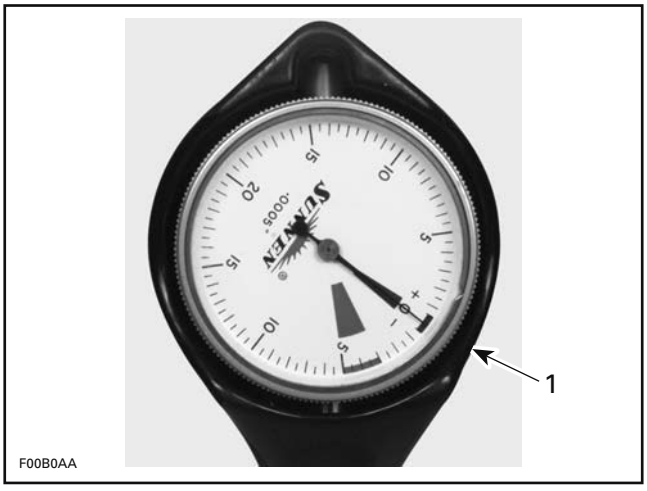


1. Micrometer set to the piston dimension

4. With the micrometer set to the piston diameter, adjust a cylinder bore gauge to the micrometer dimension and set the indicator to 0 (zero).



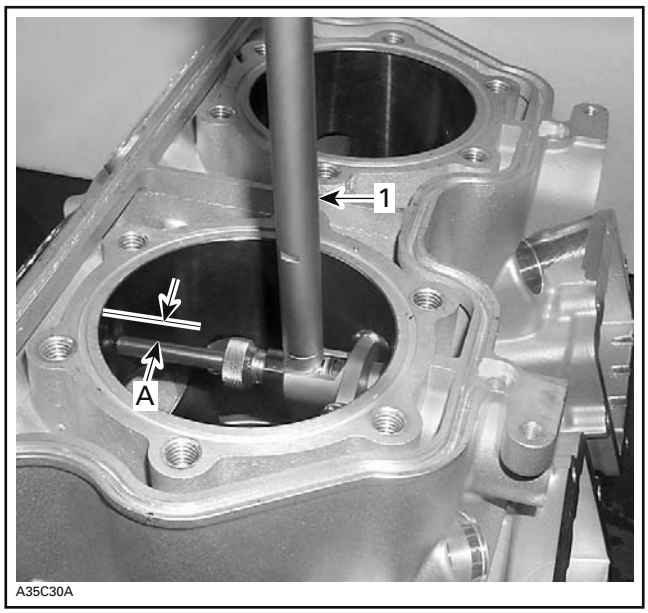
1. Use the micrometer to set the cylinder bore gauge
2. Dial bore gauge



1. Indicator set to 0 (zero)

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.

5. Position the dial bore gauge above the exhaust port.
6. IMPORTANT: Always remove cylinder-block from crankcase before measuring.



A35C30A

TYPICAL
1. Measuring perpendicularly (90°) to piston pin axis
A. Above exhaust port

7. Read the measurement on the cylinder bore gauge. The result is the exact piston/cylinder wall clearance.
8. If clearance exceeds specified tolerance, replace cylinder and piston.

NOTE: Oversize pistons may be used if engine does not have Nikasil cylinders.

RING/PISTON GROOVE CLEARANCE

1. Using a feeler gauge check clearance between rectangular ring and groove.
2. Replace piston if clearance exceeds specified tolerance.

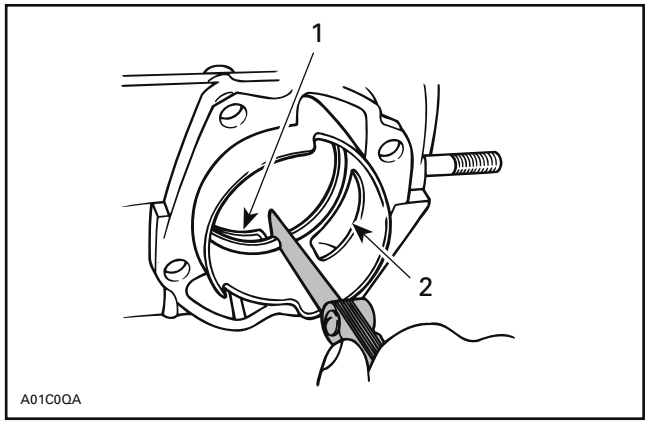

A35C31A

RING END GAP

1. Position ring halfway between transfer ports and intake port.

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

2. Using a feeler gauge, check the ring end gap. Replace ring if gap exceeds specified tolerance.



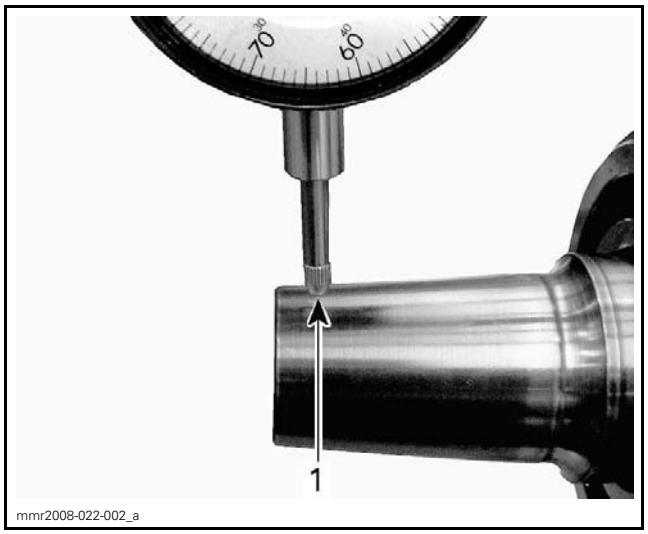
A01C0QA

TYPICAL
1. Transfer port
2. Intake port

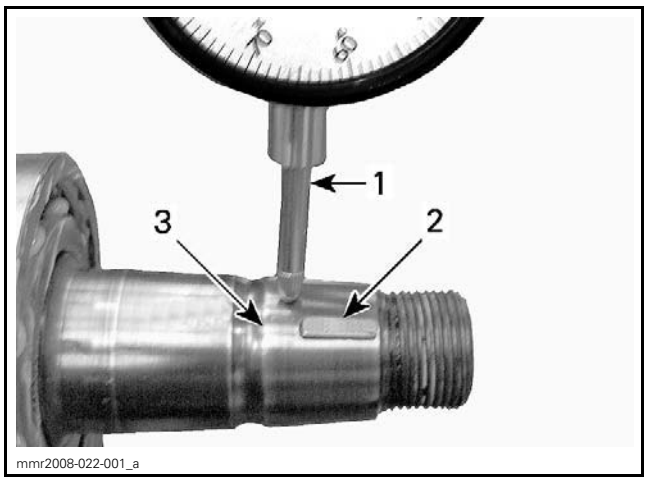
CRANKSHAFT DEFLECTION

Measuring in Crankcase

1. Using a dial indicator, check deflection with the crankshaft installed in the crankcase.



TYPICAL — PTO SIDE
1. *Measure deflection 3 mm (1/8 in) from crankshaft end*

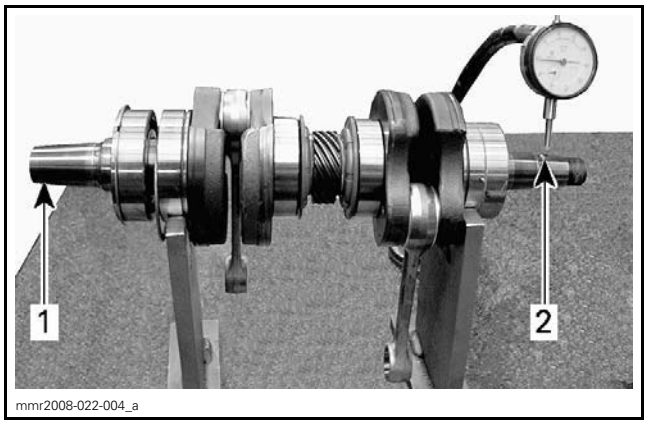


TYPICAL — MAG SIDE
1. *Measure deflection at mid point between key and groove*
2. *Key*
3. *Groove*

2. If deflection exceeds the specified tolerance, recheck deflection using V-shaped blocks to determine the defective part(s). See *MEASURING ON BENCH*.

Measuring on Bench

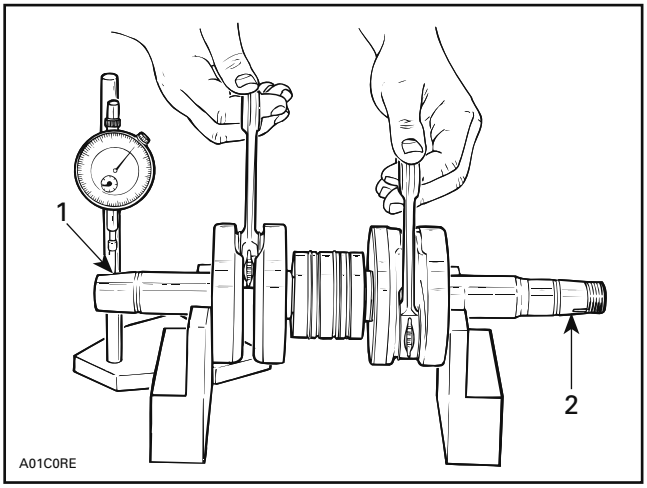
1. With the engine disassembled, check crankshaft deflection on V-shaped blocks.



TYPICAL — POSITION OF V-SHAPED BLOCKS, CRANKSHAFT WITH BEARINGS
1. *Measure deflection 3 mm (1/8 in) from crankshaft end*
2. *Measure deflection at mid point between key and groove*

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

2. If deflection exceeds the specified tolerance, it can be due to worn bearings or a bent crankshaft.
3. Remove crankshaft bearings and check deflection again on V-shaped blocks to determine the defective part(s).



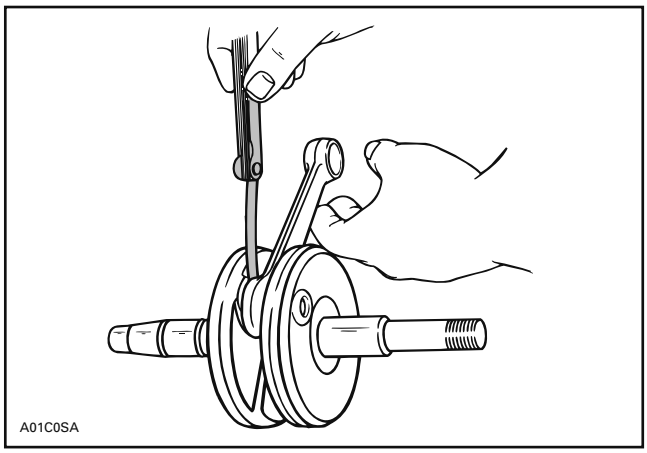
TYPICAL — POSITION OF V-SHAPED BLOCKS, CRANKSHAFT WITHOUT BEARINGS
1. *Measure deflection 3 mm (1/8 in) from crankshaft end*
2. *Measure deflection at mid point between key and groove*

4. If the deflection exceeds the specified tolerance, crankshaft should be repaired or replaced.

CONNECTING ROD BIG END AXIAL PLAY

1. Using a feeler gauge, measure distance between thrust washer and crankshaft counterweight.

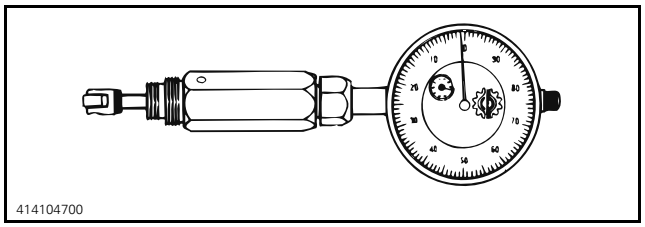
2. If the distance exceeds specified tolerance, repair or replace the crankshaft.



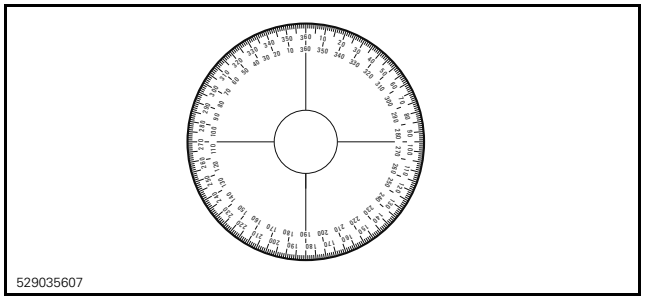
TYPICAL

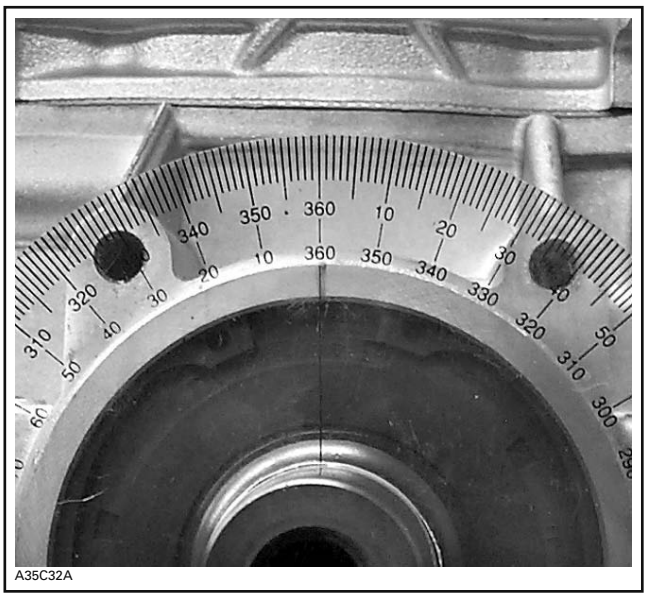
CRANKSHAFT ALIGNMENT

1. Remove both spark plugs.
2. Install the TDC DIAL INDICATOR (P/N 414 104 700) in spark plug hole on MAG side.



3. Rotate crankshaft until MAG piston is at TDC (top dead center).
4. Scribe a mark on crankcase.
5. Install DEGREE WHEEL (P/N 529 035 607) on crankshaft end so that 360° mark aligns with the scribed mark on crankcase. **Do not** rotate crankshaft.



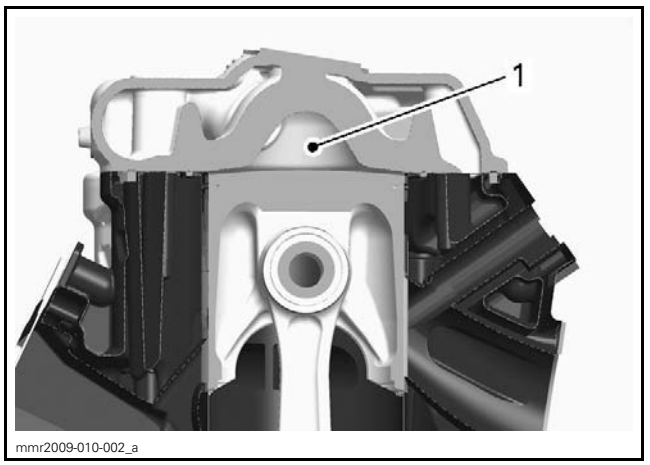


TYPICAL

6. Remove dial indicator and install it in spark plug hole on PTO side.
7. Bring PTO piston to top dead center. Degree wheel **must** rotate with crankshaft.
8. Interval between cylinders must be 180° ± 0.5.
9. Any other reading indicates a misaligned (twisted) crankshaft.

COMBUSTION CHAMBER VOLUME MEASUREMENT

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

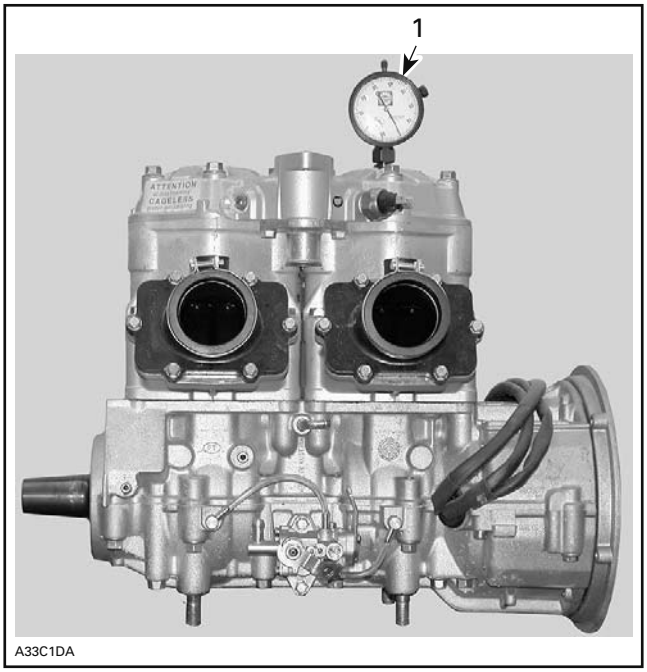


TYPICAL
1. Combustion chamber

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

Engine Preparation

1. Remove both spark plugs and bring one piston to TDC using the TDC DIAL INDICATOR (P/N 414 104 700).



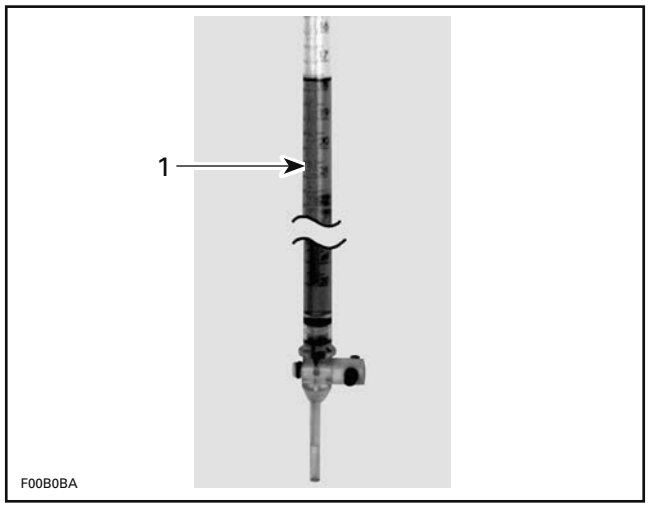
TYPICAL - L/C ENGINE SHOWN
1. Bring piston to TDC

2. Remove cylinder head. Refer to *TOP END* subsection.
3. Apply on piston ring end gap a dab of grease to seal it (piston to TDC). Wipe all excess with your finger.
4. Reinstall cylinder head.

Measurement

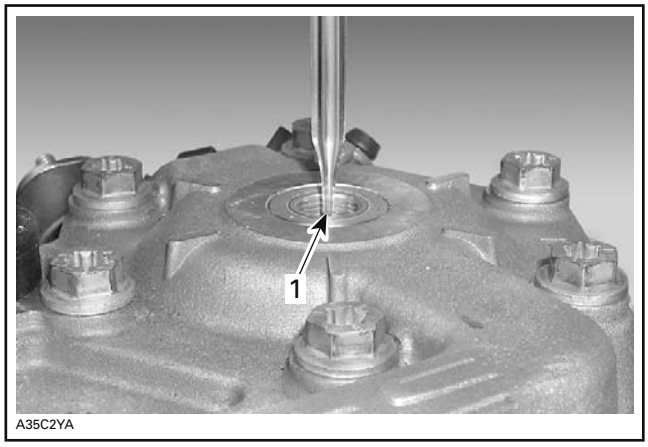
NOTE: When measuring, remember that 1 ml = 1 cc.

1. Obtain a graduated burette (capacity 0 - 50 ml) and fill with mineral injection oil.



1. Graduated burette (0 - 50 ml)

2. Open burette valve to fill its tip then close valve.
3. Let oil settle in burette, then add oil until level reaches 0 ml.
4. Inject the burette content in combustion chamber then close burette valve.
   4.1 Add burette content until oil touches the top of the spark plug hole, then close burette valve.

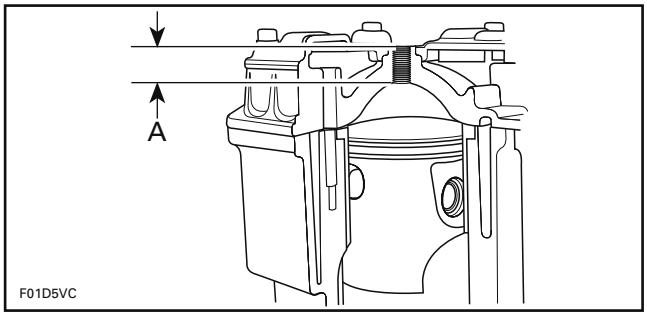


TYPICAL
1. Top of spark plug hole

NOTE: The oil 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. Repair engine then repeat procedure.

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

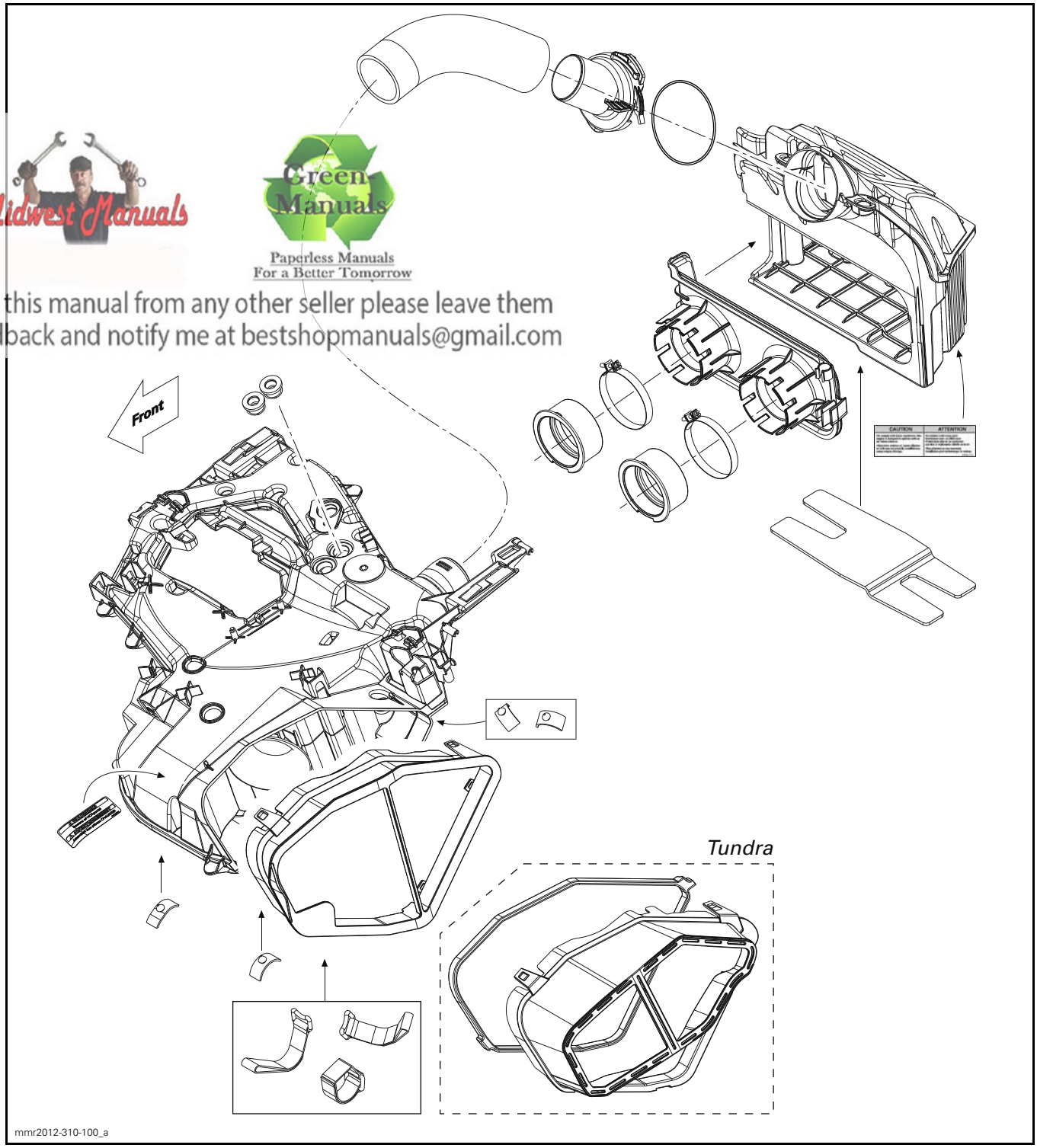
NOTE: Deduct 2.25 ml from the value obtained on the burette, this amount corresponds to the cylinder head spark plug well.



TYPICAL
A. Spark plug well

7. Repeat the complete procedure for the other cylinder.
8. When completed, compare cylinder measurements with specified tolerances.
9. If necessary, install a thicker or thinner gasket between cylinder and crankcase in order to obtain the specified combustion chamber volume.
10. Repeat procedure until specified tolerances are obtained.

AIR INTAKE SYSTEM



Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

PROCEDURES

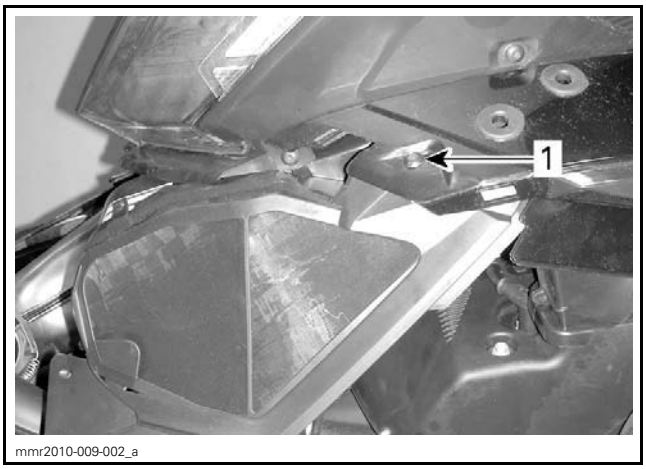
AIR FILTER

Air Filter Removal

REV-XP 550F Series

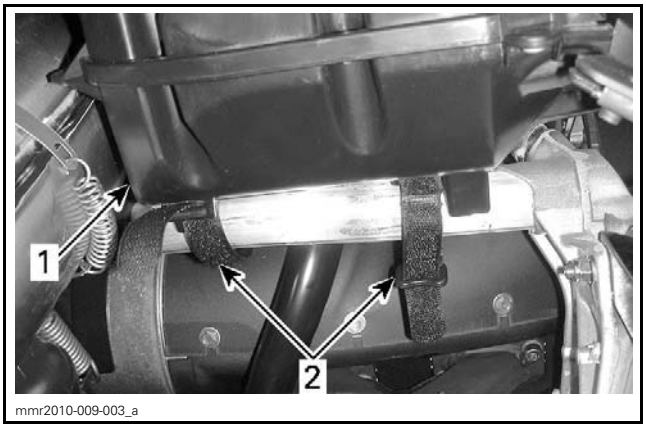
The air filter is located on left hand side of the secondary air intake silencer.

1. Refer to *BODY* subsection and remove the following body parts:
   – Hood
   – Bottom pan cover
   – LH side panel.
2. Remove forward LH console screw.



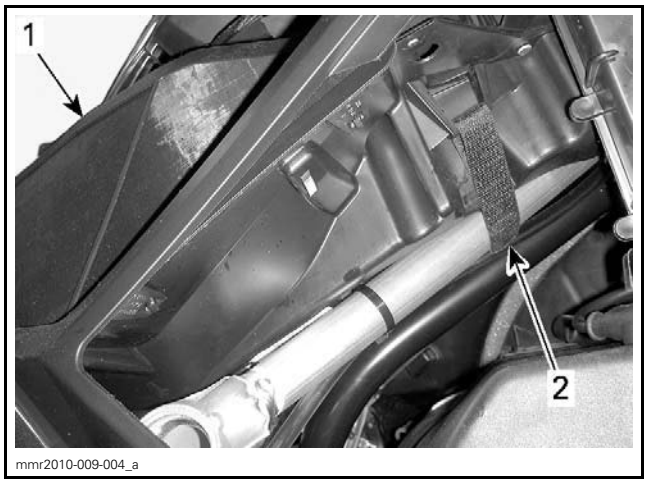
1. Screw to remove

3. Unfasten both Velcro straps retaining the front of the secondary air intake silencer.



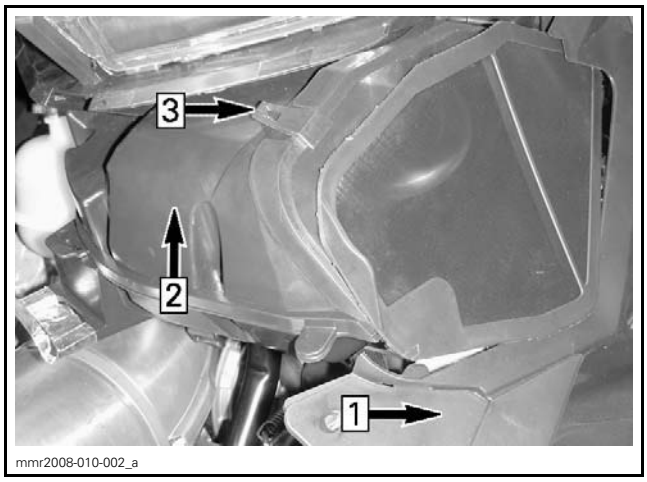
TYPICAL
1. Secondary air intake silencer
2. Velcro straps

4. Unfasten the Velcro strap retaining the aft portion of the secondary air intake silencer (LH side aft of air filter).



1. Air filter
2. Aft Velcro strap

5. Gently pull top section of bottom pan outwards and lift front of secondary air intake silencer.
6. Release the 5 air filter retaining tabs.

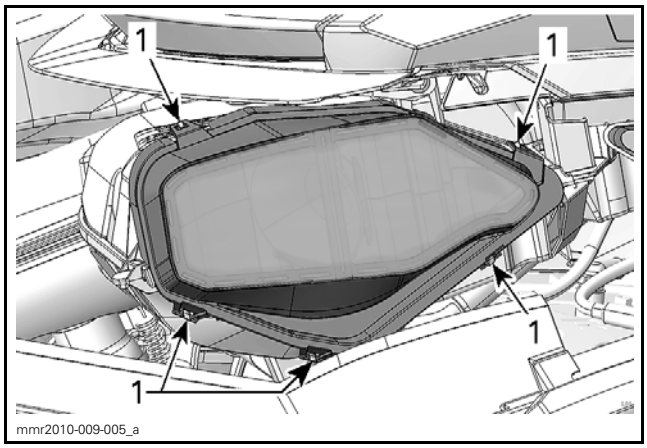


TYPICAL
Step 1: Pull top section of bottom pan
Step 2: Lift front of secondary air intake silencer
Step 3: Release air filter retaining tabs (5)

7. Pull air filter from secondary air intake silencer.

TUNDRA Series

1. The air filter is located on left hand side of secondary air intake silencer.
2. Refer to *BODY* subsection and remove the following body parts:
   – Hood
   – LH side panel.
3. Release the 5 tabs that retain the air filter to the secondary air intake silencer.



1. Retaining tabs

4. Pull the air filter off secondary silencer.

Air Filter Cleaning

Clean with fresh water and mild soap.

Replace air filter as required.

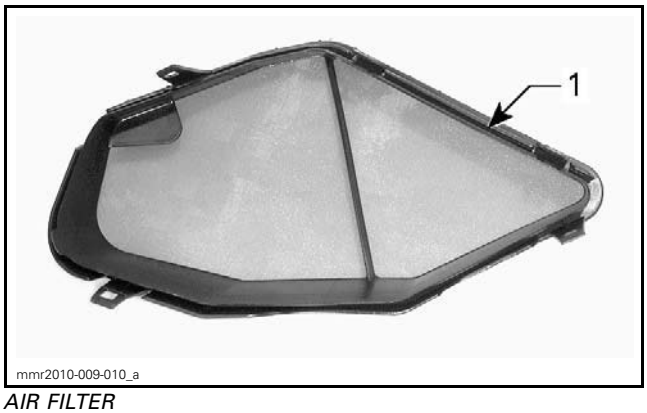
NOTE: If the filter is very dirty, clean the interior of secondary air intake silencer at the same time.

Air Filter Installation

Installation is the reverse of the removal procedure, however, pay attention to the following.

REV-XP 550F Series

The air filter has a groove around its perimeter. Be sure to install the filter so the inlet of the secondary air intake silencer fits into this groove. If not, it will be impossible to lock the filter retaining tabs.

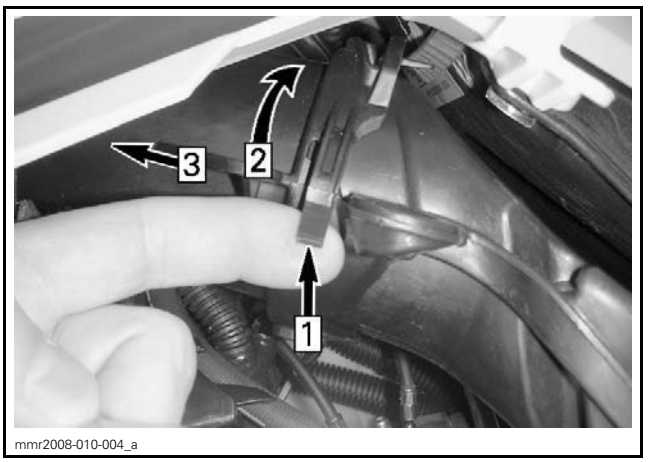


AIR FILTER
1. Groove around perimeter

PRIMARY AIR INTAKE SILENCER

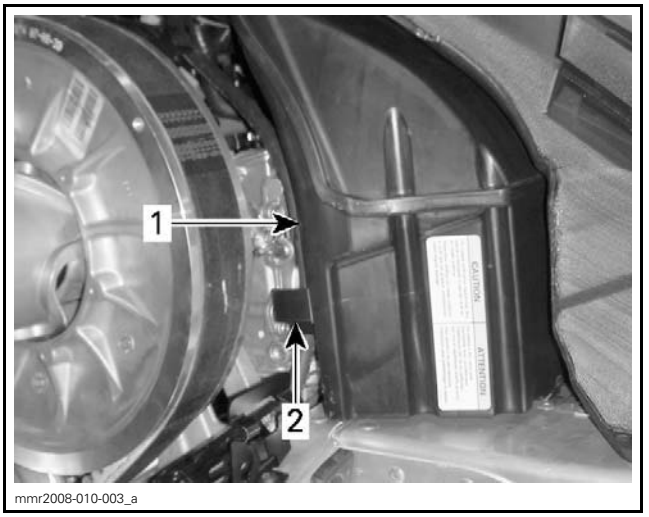
Primary Air Intake Silencer Removal

1. Remove LH side panel.
2. Remove drive belt guard, refer to *DRIVE BELT* subsection.
3. Disconnect the connector tube adapter from primary silencer as follows:
   - 3.1 Lift tab on rear section of connector tube.
   - 3.2 Twist tube adapter counterclockwise and pull it off the primary silencer slightly.



TYPICAL
Step 1: Lift tab
Step 2: Twist adapter counterclockwise
Step 3: Pull off

4. Press locking tab securing the primary air intake silencer and pull silencer out of adapter plate.



1. Primary air intake silencer
2. Primary intake silencer locking tab

Primary Air Intake Silencer Installation

Installation of the primary air intake silencer is the reverse of the removal procedure. However, pay attention to the following:

– Ensure the silencer is properly inserted into the adapter plates groove.
– Ensure the silencer is pushed completely in and that the locking tab is fully engaged.
– Ensure the silencer and connector tube adapter are properly engaged and locked together.

NOTICE Be careful not to damage foam during installation.

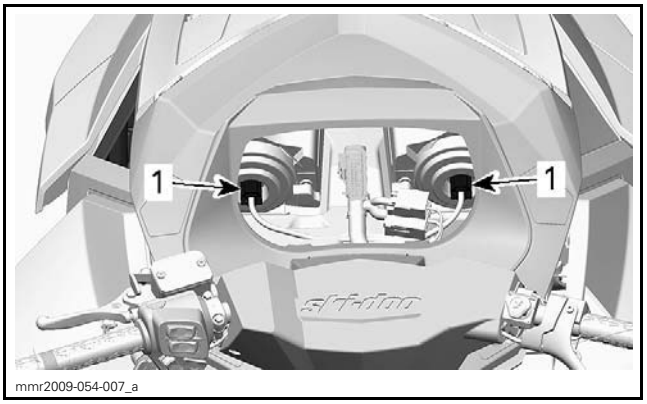
SECONDARY AIR INTAKE SILENCER

Secondary Air Intake Silencer Removal

NOTE: The secondary air intake silencer is removed as a unit with headlight/gauge module.

REV-XP 550F Series

1. Remove multifunction gauge, refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.
2. Refer to *BODY* subsection and remove the following body parts:
   – Hood
   – LH and RH side panels
   – Seat
   – Console
   – Bottom pan cover.
3. Disconnect both headlight connectors.



mmr2009-054-007_a

TYPICAL
1. Headlight connectors

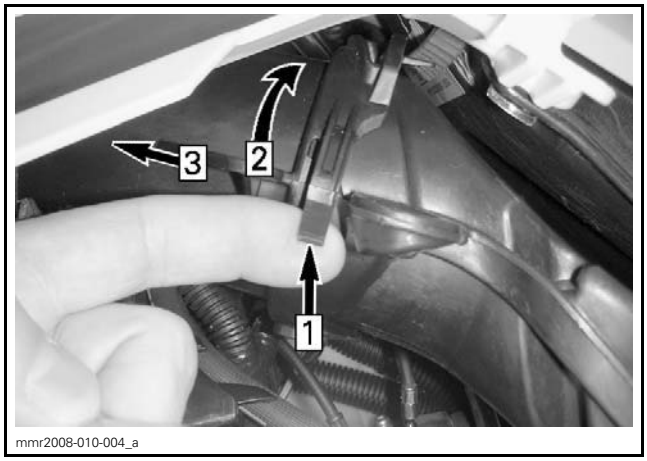
4. Disconnect the ignition switch connector.
5. Disconnect the carburetor vent tubes from the top of the secondary air intake silencer (visible through headlight/gauge module).



mmr2010-009-007_a

TYPICAL
1. Carburetor vent tubes

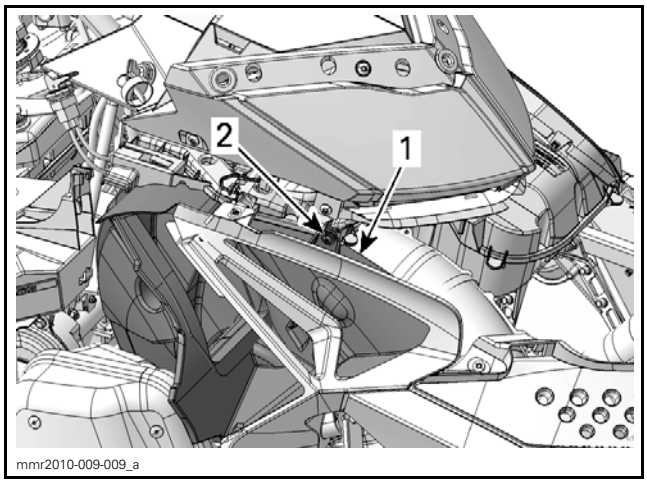
6. Disconnect the connector tube adapter from the primary air intake silencer as illustrated.



mmr2008-010-004_a

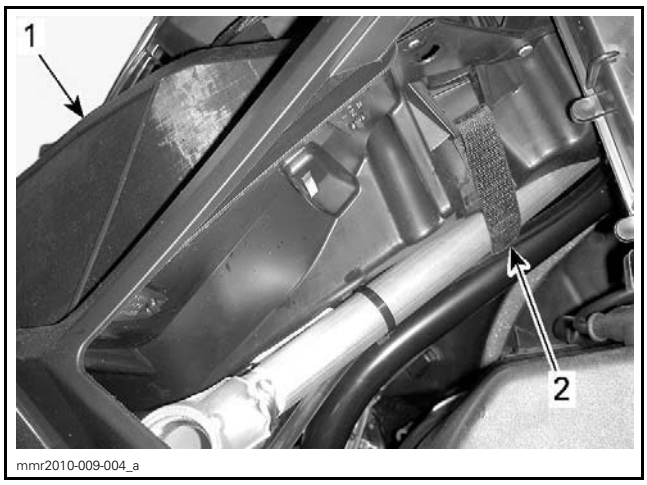
TYPICAL
Step 1: Lift tab
Step 2: Twist adapter counterclockwise
Step 3: Pull off

7. Remove the screw retaining the axial fan air inlet duct to the secondary air intake silencer, (RH side).



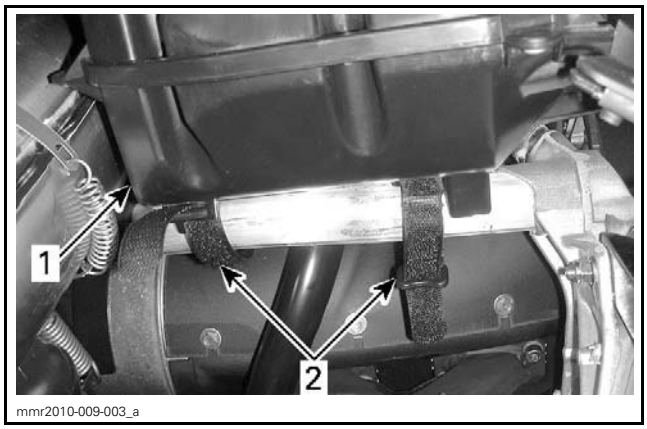
1. Air inlet duct, axial fan
2. Screw to remove

8. Unfasten the Velcro strap located on the LH rear portion of the secondary air intake silencer.



TYPICAL
1. Air filter
2. Aft Velcro strap

9. Unfasten the 2 Velcro straps located under the front portion of the secondary air intake silencer.



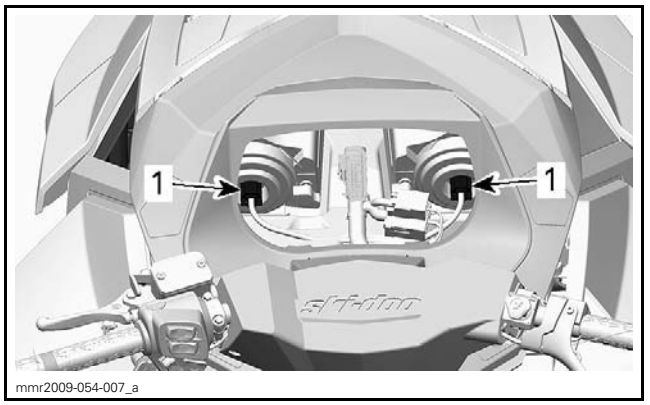
TYPICAL
1. Secondary air intake silencer
2. Velcro strap

10. Remove the air intake silencer and headlight/gauge module by feeding the harness backwards.

NOTE: Take note of the harness routing for reinstallation.

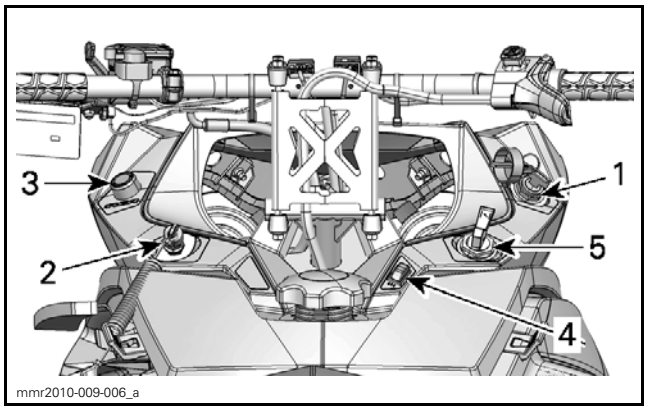
TUNDRA Series

1. Refer to *BODY* subsection and remove the following body parts:
   – Hood
   – LH and RH side panels
   – Seat
   – Console.
2. Remove the multifunction gauge. Refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.
3. Disconnect both headlight connectors.



TYPICAL
1. Headlight connectors

4. Electrically disconnect the following items on the headlight/gauge module, as applicable to model:
   – Ignition switch
   – Engine cutout switch
   – RER™ button (reverse)
   – Thumb and grip heat control switch.
5. Remove the choke lever retaining nut and push the lever under the headlight/gauge module.



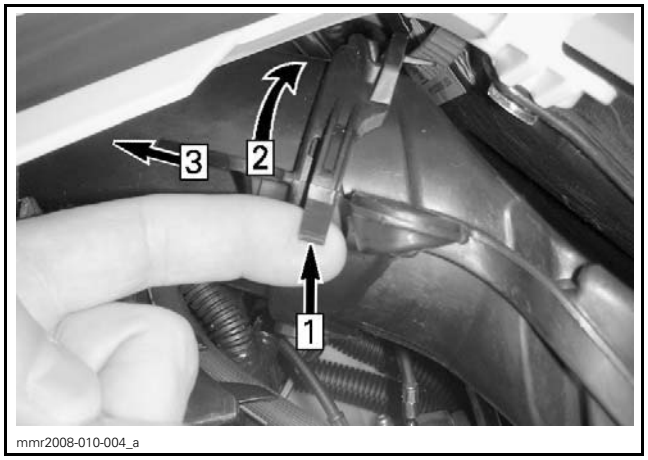
TYPICAL - AS APPLICABLE TO MODEL
1. *Ignition switch*
2. *Engine cutout switch*
3. *RER button*
4. *Thumb and grip heat control switch*
5. *Choke lever retaining nut*

6. Disconnect the carburetor vent tubes from the top of the secondary air intake silencer.



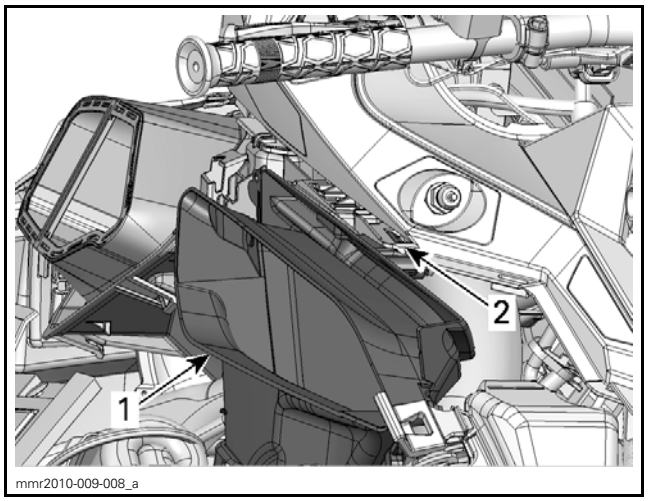
TYPICAL
1. *Carburetor vent tubes*

7. Disconnect the connector tube adapter from the primary air intake silencer as illustrated.



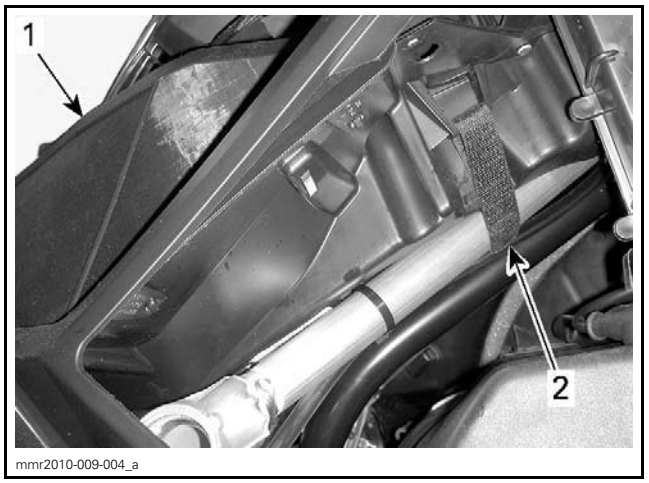
TYPICAL
Step 1: Lift tab
Step 2: Twist adapter counterclockwise
Step 3: Pull off

8. Remove the air outlet duct by releasing retaining tab.



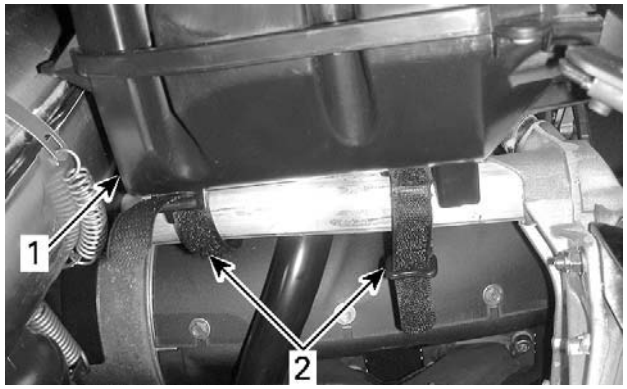
TYPICAL - LH SIDE OF HEADLIGHT/GAUGE MODULE
1. *Axial fan outlet duct*
2. *Retaining tab*

9. Unfasten the Velcro strap located on the LH rear portion of the secondary air intake silencer.



TYPICAL
1. *Air filter*
2. *Aft Velcro strap*

10. Unfasten the Velcro straps retaining the front lower portion of the secondary air intake silencer.



TYPICAL
1. Secondary air intake silencer
2. Velcro strap

11. Remove the air intake silencer and headlight/gauge module by feeding the harness backwards.

NOTE: Take note of the harness routing for reinstallation.

Secondary Air Intake Silencer Removal from Headlight/Gauge Module

To separate secondary air intake silencer from headlight/gauge module, refer to *HEADLIGHT/GAUGE MODULE* in *BODY* subsection.

Secondary Air Intake Silencer Installation

The installation is the reverse of the removal procedure. However, pay attention to the following items:

– Be sure to route the electrical harness as noted prior to removal.
– Correctly route and fasten the 3 Velcro straps retaining the silencer.
– Reconnect all electrical components disconnected from headlight/gauge module.
– Reconnect the carburetor vent tubes.

EXHAUST SYSTEM

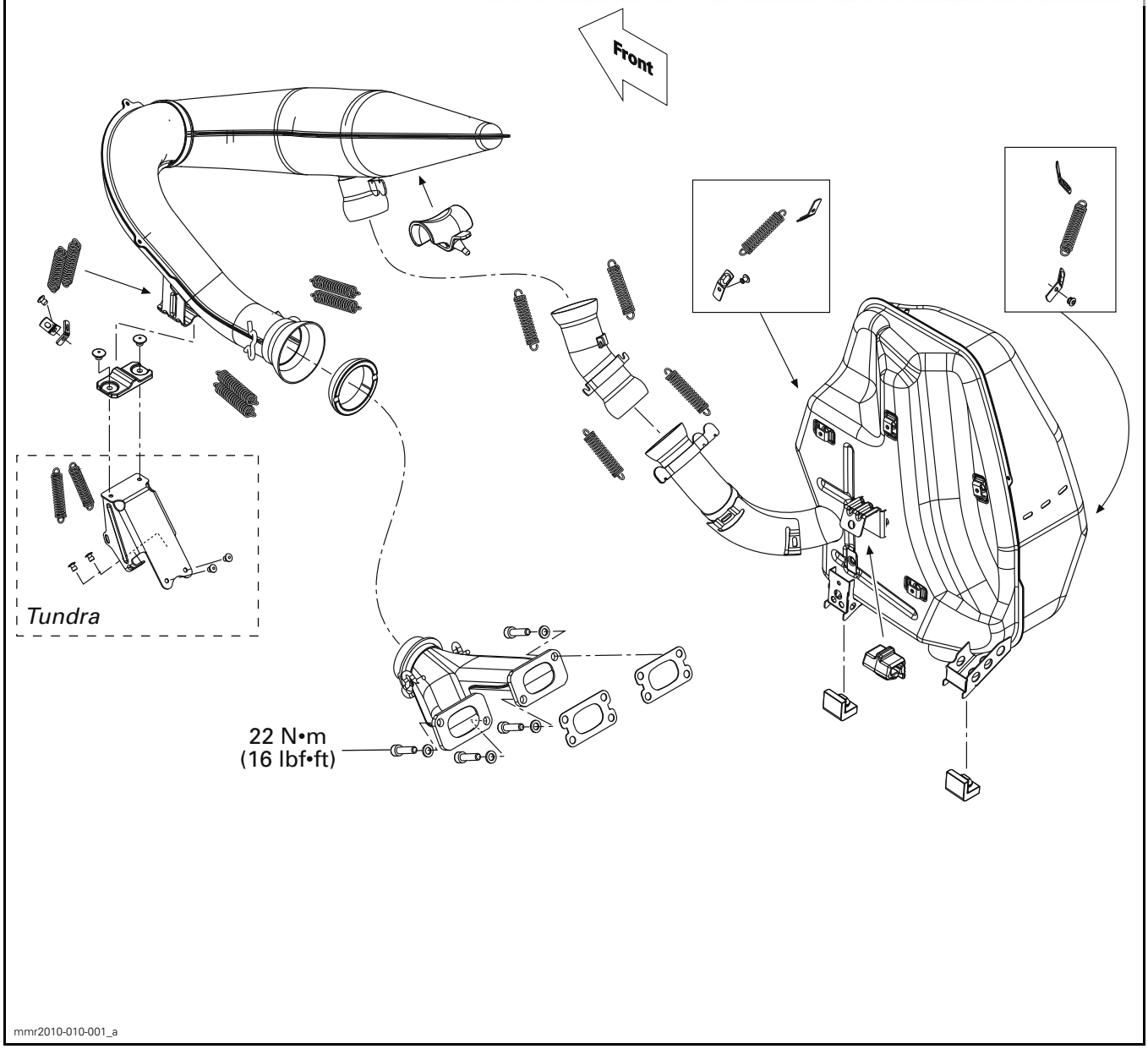
SERVICE TOOLS

Description	Part Number	Page
SPRING INSTALLER/REMOVER	529 035 983	57–58

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON 5 MM ALLEN SPHERICAL SOCKET	FABLM5E	59

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



mmr2010-010-001_a

GENERAL

⚠ CAUTION To avoid potential burns, never touch exhaust system components immediately after the engine has been running. Let engine and exhaust system cool down before performing any servicing.

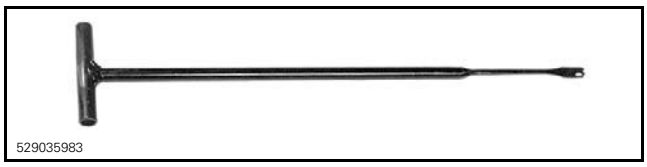
PROCEDURES

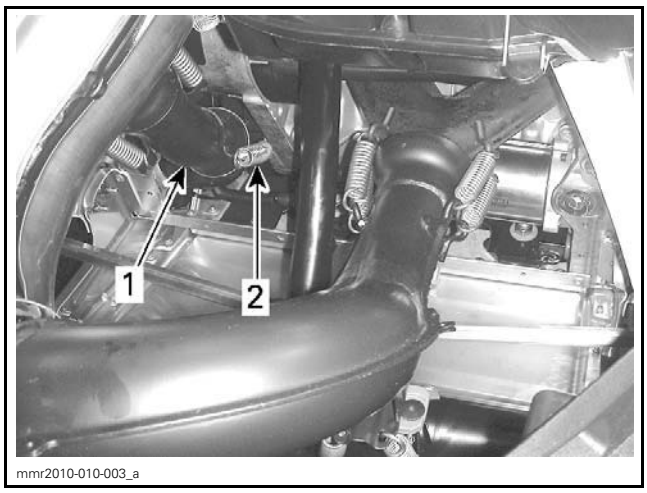
MUFFLER

Muffler Removal

1. Refer to *BODY* subsection and remove the following body parts:
   – Hood
   – RH side panel.
2. Reach in through the front of the vehicle and remove the two springs retaining the exhaust elbow pipe to the muffler using the following tool.

SPRING INSTALLER/REMOVER (P/N 529 035 983)

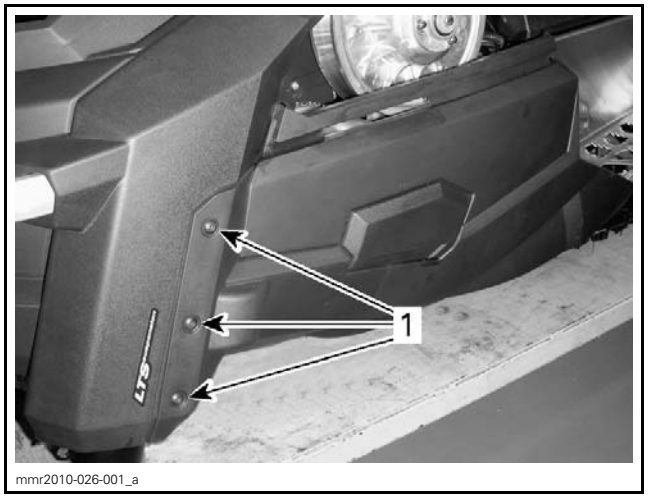




TYPICAL
1. *Exhaust elbow pipe*
2. *Elbow pipe to muffler retaining spring (2)*

Tundra Series

3. Remove screws retaining front of RH rear bottom pan.



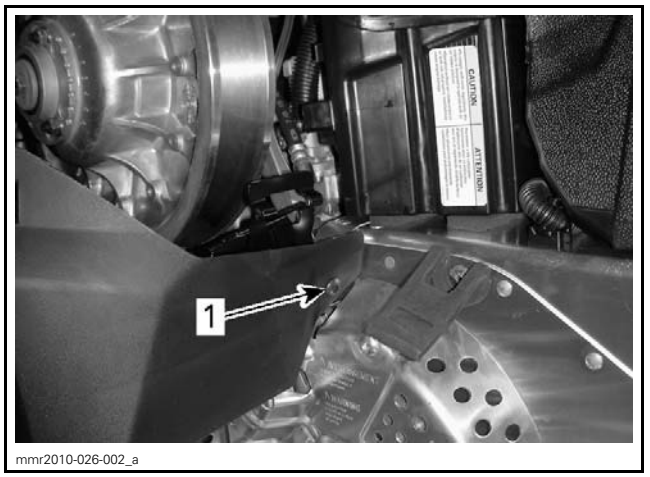
TYPICAL - LH SIDE ILLUSTRATED RH SIMILAR
1. *Front retaining screws (3)*

4. Detach upper tab retaining forward portion of RH rear bottom pan.



TYPICAL - LH SIDE ILLUSTRATED RH SIMILAR
1. *Upper tab*

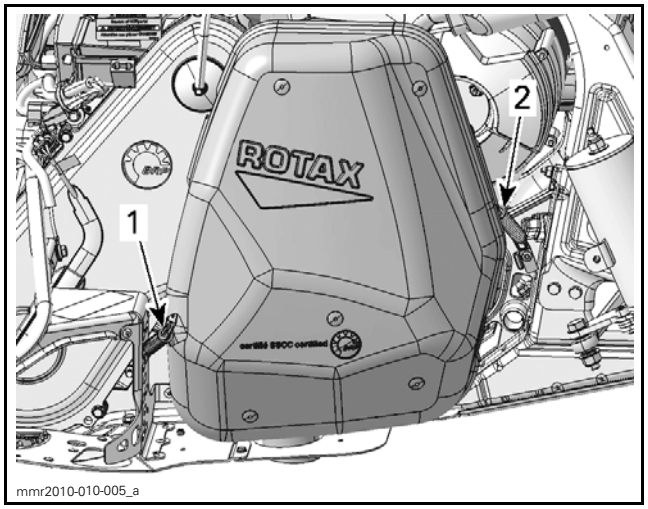
5. Remove screw retaining rear portion of RH rear bottom pan.



TYPICAL - LH SIDE ILLUSTRATED RH SIMILAR
1. *Rear retaining screw*

All Models

6. Remove the two muffler retaining springs.



mmr2010-010-005_a

TYPICAL
1. *Aft muffler retaining spring*
2. *Forward muffler retaining spring*

7. Remove the muffler.

Muffler Inspection

Check the muffler for:
- Cracks
- Abnormal exhaust system leaks
- Overheating
- Other damages.

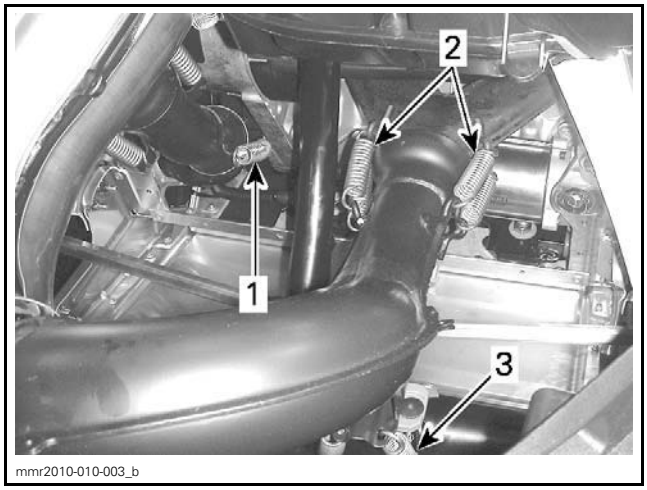
Muffler Installation

1. For installation, reverse the removal procedure.
2. Ensure the exhaust elbow pipe is properly connected to the muffler and the tuned pipe.
3. Check for abnormal exhaust system leaks.

TUNED PIPE

Tuned Pipe Removal

1. Refer to *BODY* subsection and remove the following body parts:
   - RH side panel
   - Hood
   - Bottom pan cover (XP models).
2. Remove exhaust system retaining springs in the following order:
   - Exhaust pipe elbow to muffler
   - Tune pipe to support bracket
   - Tune pipe to exhaust manifold.



mmr2010-010-003_b

TYPICAL
1. *Elbow pipe to muffler retaining spring (2)*
2. *Tune pipe to exhaust manifold (4)*
3. *Tune pipe to support bracket (2)*

Use the following tool to remove springs.

SPRING INSTALLER/REMOVER (P/N 529 035 983)


529035983

3. To remove the tuned pipe from the vehicle, carefully pull and lift up the forward end of the tuned pipe as you rotate it in a counterclockwise direction.


mmr2010-010-004

4. Remove doughnut shaped exhaust gaskets.

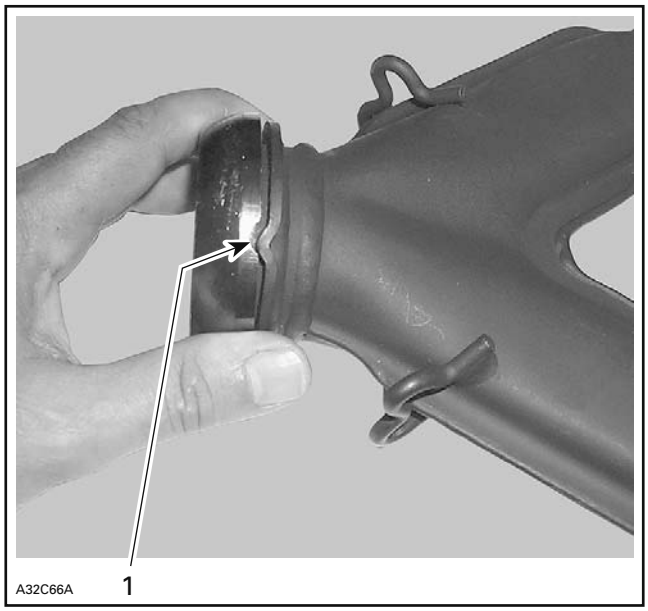
Tuned Pipe Inspection

1. Check tuned pipe and shields for:
   - Damages
   - Cracks
   - Signs of exhaust leaks.

2. Also inspect condition of doughnut shaped gasket. Replace as required.

Tuned Pipe Installation

1. Install doughnut shaped exhaust gasket with both of its notches aligned with Y-manifold protrusions.



TYPICAL
1. Align notches

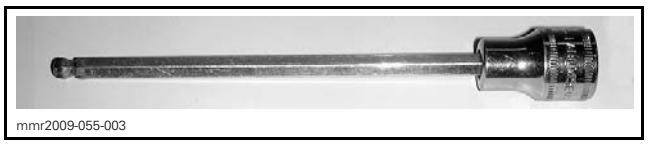
2. Install all exhaust system retaining springs.
3. Check for abnormal exhaust system leaks.

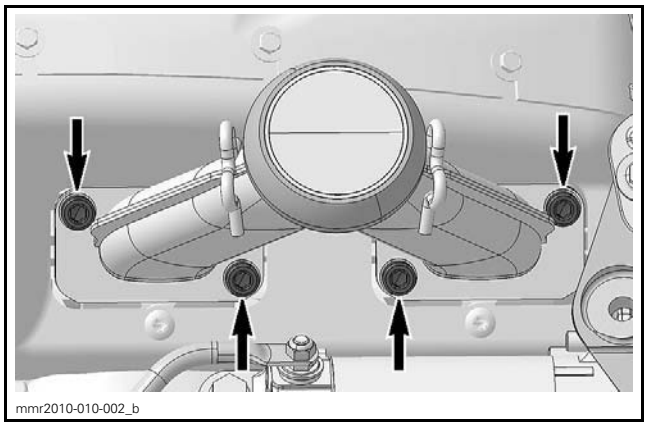
MANIFOLD

Manifold Removal

1. Remove tuned pipe. See *TUNED PIPE REMOVAL* in this subsection.
2. Remove manifold retaining screws using the following tool.

SNAP-ON 5 MM ALLEN SPHERICAL SOCKET (P/N FABLM5E)





MANIFOLD RETAINING SCREWS

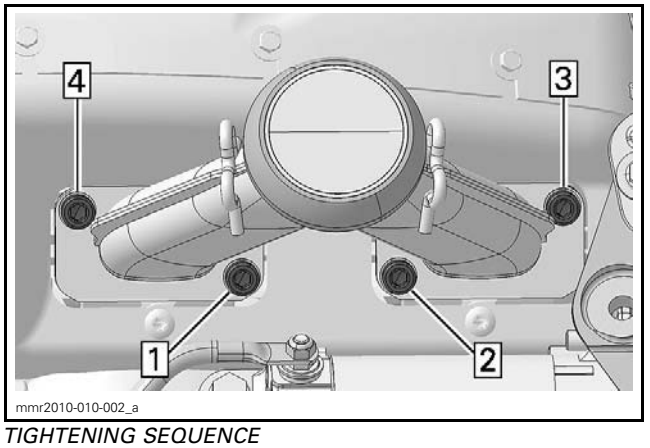
3. Remove manifold.
4. Remove manifold gaskets.

Manifold Inspection

1. Check if the manifold is cracked or damaged. Replace as required.
2. Check condition of manifold gaskets.

Manifold Installation

1. Install manifold gaskets, manifold and retaining screws.
2. Hand tighten manifold screws until they just bottom out.
3. Tighten manifold screws to specification as per the following sequence.



TIGHTENING SEQUENCE

ENGINE	TIGHTENING TORQUE
550F	22 N•m (16 lbf•ft)

4. Install tuned pipe. See *TUNED PIPE INSTALLATION* in this subsection.
5. Check for abnormal exhaust system leaks.

LUBRICATION SYSTEM

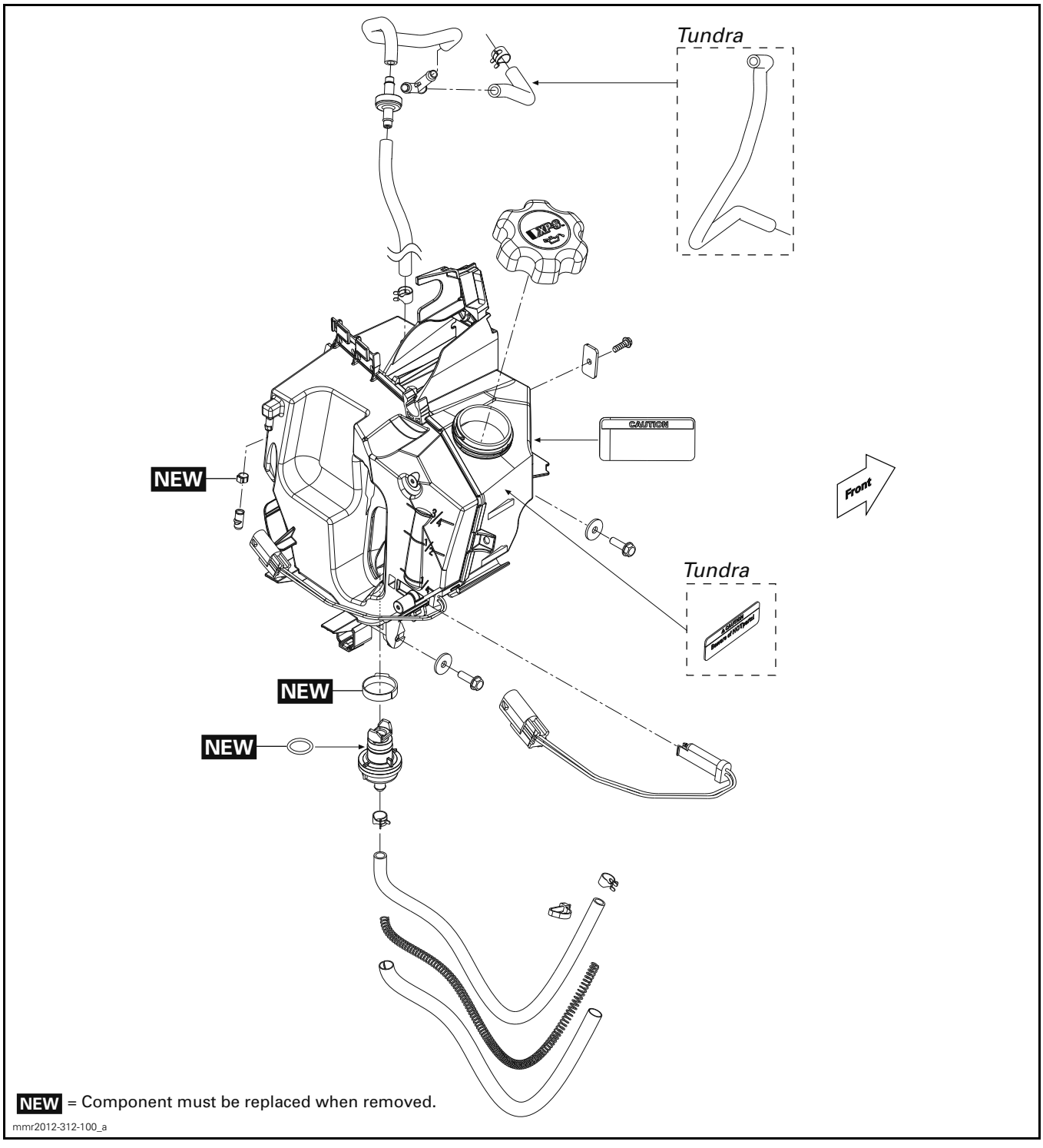
SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	69
LEAK TEST KIT	529 033 100	64
SMALL HOSE PINCHER	295 000 076	64, 66
SUCTION PUMP	529 035 880	68
VACUUM/PRESSURE PUMP	529 021 800	65, 71

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	66
LOCTITE 648 (GREEN)	413 711 400	72
PULLEY FLANGE CLEANER	413 711 809	72
XPS INJECTION OIL	293 600 117	64
XPS SYNTHETIC 2-STROKE OIL	293 600 132	64
XPS SYNTHETIC BLEND 2-STROKE OIL	293 600 100	64

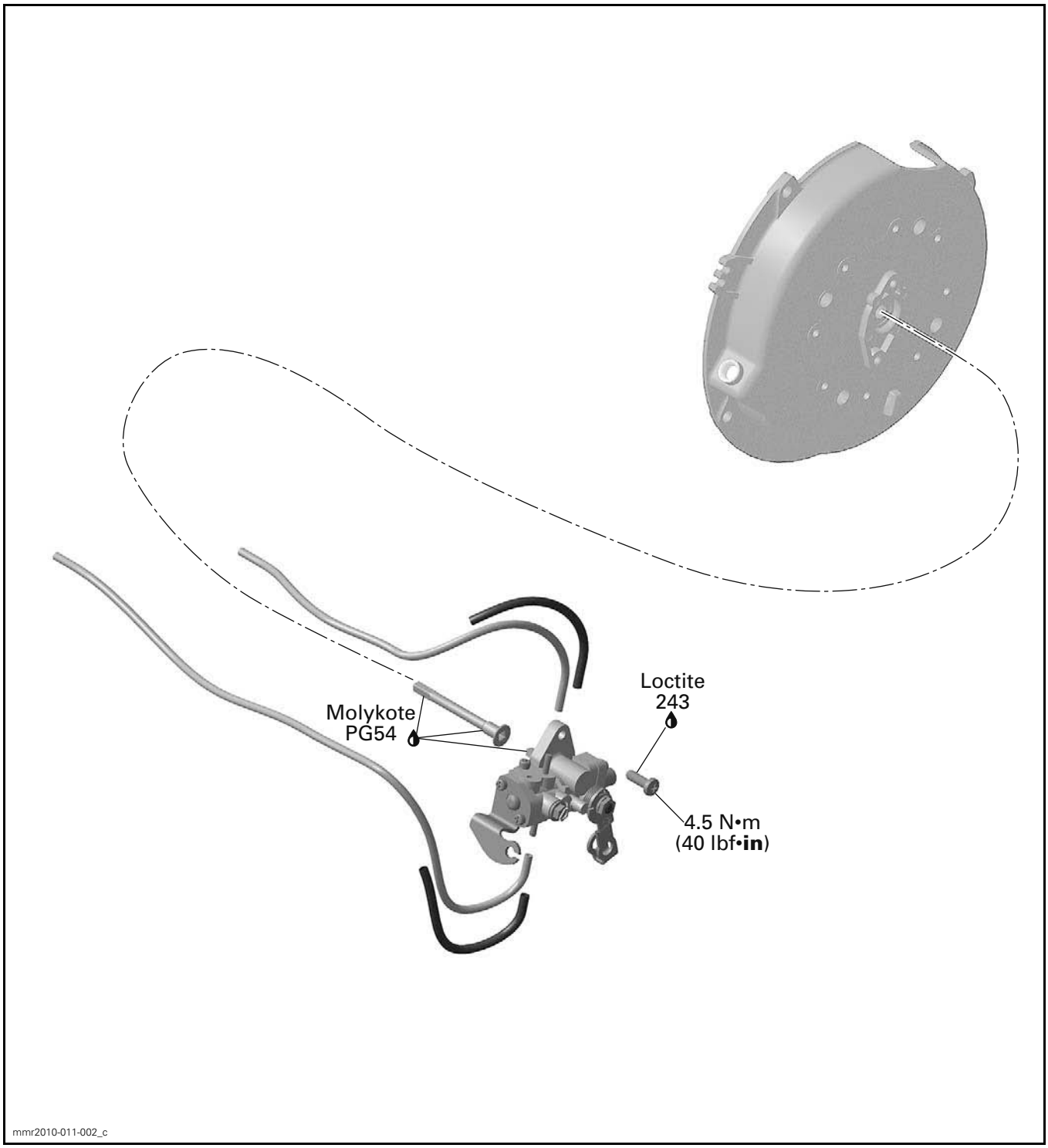
OIL INJECTION TANK



NEW = Component must be replaced when removed.

mmr2012-312-100_a

OIL INJECTION PUMP



GENERAL

⚠ WARNING

Wipe off any oil spills. Oil is highly flammable.

SYSTEM DESCRIPTION

These engines employ a variable-rate plunger-type oil injection pump.

This variable-rate mechanical oil injection pump is directly driven by the crankshaft.

This pump delivers the right amount of oil at all engine RPM and at all throttle opening positions.

The pump stroke is variable and controlled by a cam connected to the pump lever and cable, which is linked to the throttle cable. As the throttle is opened wider, the pump stroke changes which increases the amount of oil delivered to the engine.

This pump requires little or no maintenance.

RECOMMENDED OIL

Use one of the following XPS™ injection oils.

ENGINE	RECOMMENDED INJECTION OIL
550F	XPS INJECTION OIL (P/N 293 600 117)
	XPS SYNTHETIC BLEND 2-STROKE OIL (P/N 293 600 100)
	XPS SYNTHETIC 2-STROKE OIL (P/N 293 600 132)

If XPS Mineral Injection Oil is not available, API TC high-quality low ash two-stroke injection oil may be used.

NOTE: All XPS injection oils are compatible, they can be mixed together.

XPS mineral injection oil is a special blend of basic oil and additives especially selected to ensure unequalled lubrication, engine cleanliness and minimum spark plug fouling.

The XPS synthetic blend and synthetic injection oils **provide superior lubrication**, reduced engine component wear and oil deposit, thus maintaining maximum-level performance and antifriction properties. The synthetic blend and synthetic injection oils meet the latest ASTM and JASO standards by ensuring high biodegradability and low exhaust smoke.

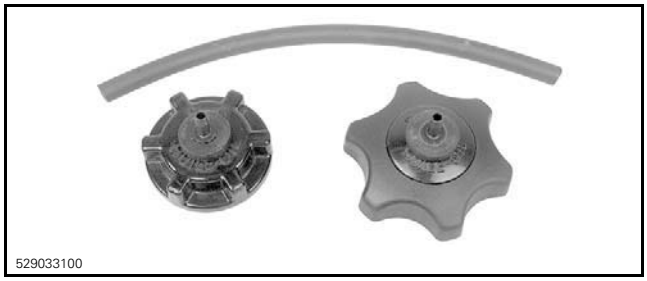


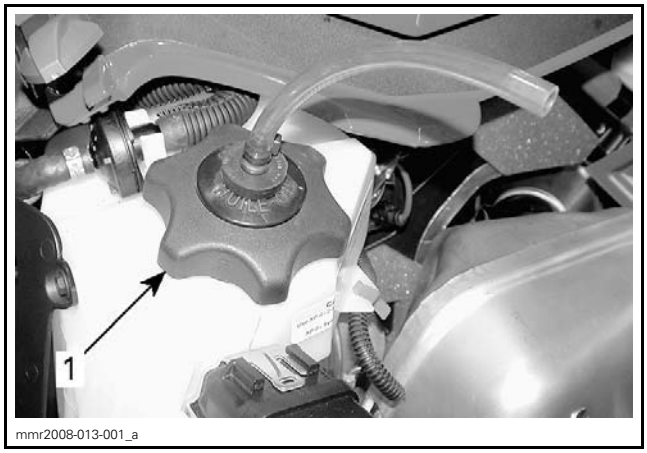
mmr2009-019-039

INSPECTION

OIL SYSTEM LEAK TEST

Install oil tank test cap from the LEAK TEST KIT (P/N 529 033 100).

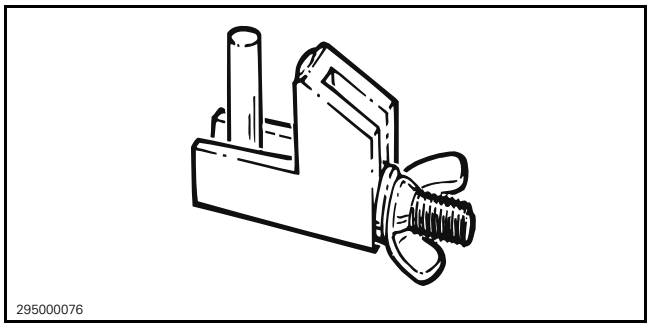

529033100



mmr2008-013-001_a

TYPICAL
1. Test cap on tank

Install a SMALL HOSE PINCHER (P/N 295 000 076) on the oil tank vent inlet hose.


295000076



mmr2012-312-001_a

TYPICAL
1. Oil tank vent inlet hose

1. Connect the VACUUM/PRESSURE PUMP (P/N 529 021 800) to test cap.


529021800

2. Pressurize oil system as follows.

PRESSURE	TIME TO HOLD PRESSURE
18 kPa (2.6 PSI)	3 minutes

NOTE: Do not exceed recommended pressure as the results may lead to a false conclusion.

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

If pressure does not drop, there is no leakage in the system.

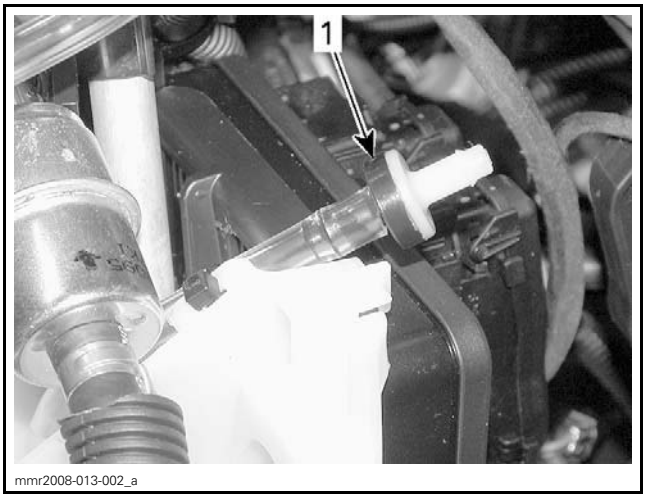
Check Valve Test

1. Use VACUUM/PRESSURE PUMP (P/N 529 021 800).
2. Pressurize check valve as follows.

CHECK VALVE TEST	
Air toward oil tank	Valve must let air to enter
Air toward outside	Valve must stop air to exit

NOTICE **If check valve does not allow air to enter, serious engine damage will occur.**

NOTE: When replacing one-way check valve, ensure that black side is positioned toward oil tank.



mmr2008-013-002_a

TYPICAL
1. Black side here

PROCEDURES

OIL INJECTION PUMP

Oil Injection Pump Operational Test

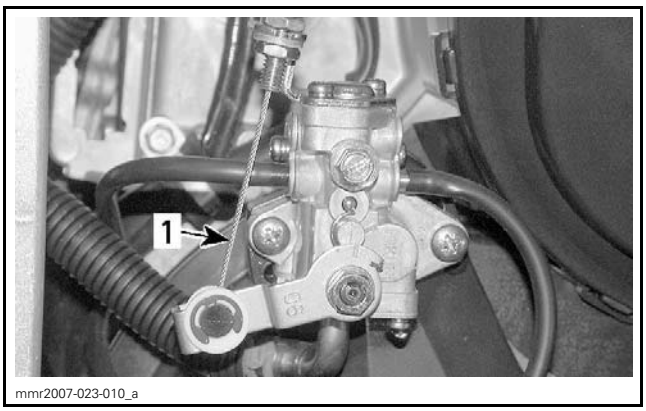
NOTE: Since the pump is a piston type, it functions when the engine rotates, in both forward and reverse.

1. Remove oil pump from engine. Refer to *OIL INJECTION PUMP REMOVAL* in this subsection.
2. Connect a hose filled with injection oil to the supply line fitting on the oil pump.
3. Insert the other ends of the other hoses in an injection oil container.

4. Using a clockwise rotating drill, rotate pump shaft as you hold the pump lever in the fully open position (clockwise when looking at lever end of pump).
5. Oil must drip from both small hoses. If not replace pump.

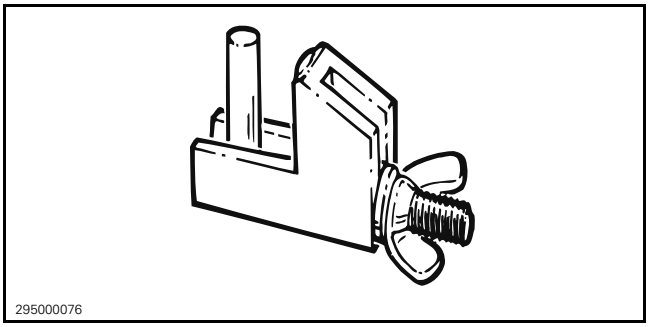
Oil Pump Removal

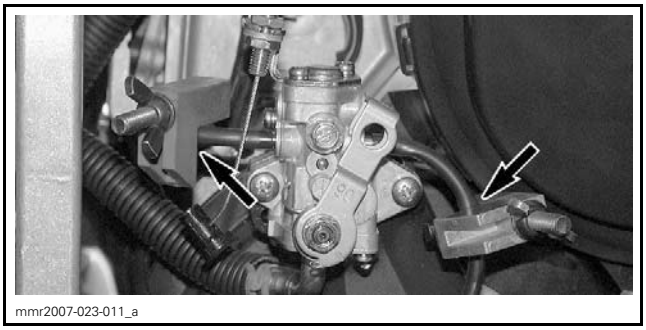
1. Remove oil tank cap and syphon injection oil from tank.
2. Remove the muffler, refer to *EXHAUST SYSTEM*.
3. Disconnect oil pump cable.



TYPICAL
1. Oil pump cable

4. Install a SMALL HOSE PINCHER (P/N 295 000 076) on each oil pump outlet hose, then disconnect the hoses from the pump.

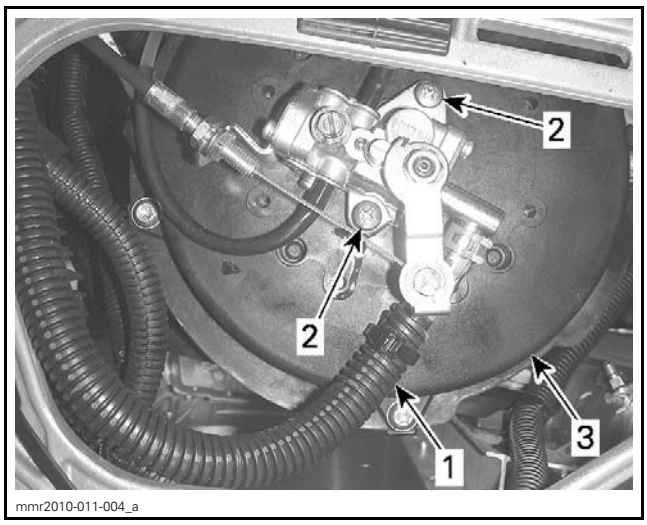




TYPICAL - HOSE PINCHERS ON PUMP OUTLET HOSES

NOTE: Mark hose locations for reinstallation on pump.

5. Remove the oil supply hose from the pump.
6. Remove the two screws that secure the oil pump to the rewind starter cover.



1. Oil supply hose
2. Oil pump retaining screws
3. Rewind starter

7. Remove oil pump.

Oil Injection Pump Cleaning

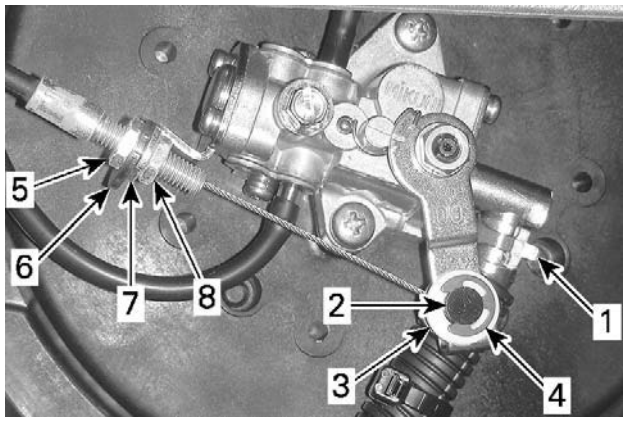
Clean all metal components in a non-ferrous metal cleaner.

Oil Pump Installation

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

NOTE: During installation, always check for spring clip tightness on pump inlet hose.

1. Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on threads of pump mounting screws and torque them to 4.5 N•m (40 lbf•**in**).
2. Make sure cable barrel end is well seated in oil pump lever.
3. Secure cable barrel end with plastic washer and circlip.
4. Ensure cable barrel end moves freely in pump lever.
5. Install cable lock washer on pump lever side of the cable support.



mmr2010-011-005_a

1. *Oil supply hose spring clip*
2. *Cable barrel end*
3. *Plastic washer*
4. *Circlip*
5. *Adjuster nut*
6. *Cable support*
7. *Lock washer*
8. *Lock nut*

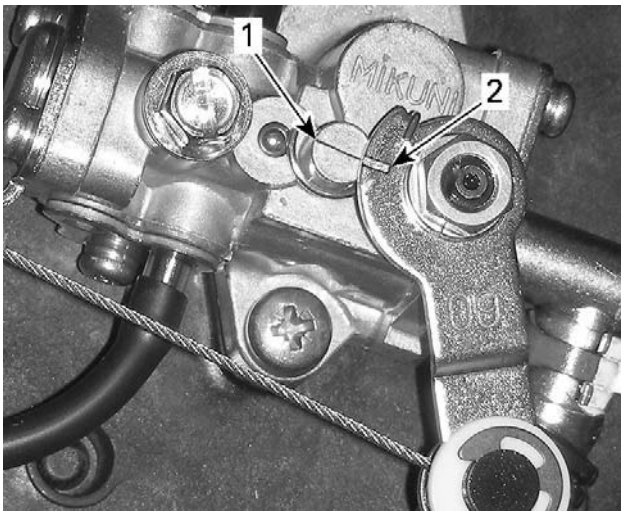
6. Verify cable and oil pump lever operation by pressing and releasing throttle lever.
7. Carry out the *OIL INJECTION PUMP ADJUSTMENT* procedure in this subsection.
8. Carry out the *OIL INJECTION PUMP BLEEDING* procedure further in this subsection.

NOTICE Always bleed oil pump whenever a component of the oil system has been removed.

Oil Injection Pump Adjustment

NOTICE Prior to adjusting the oil pump, make sure all carburetor adjustments are completed. Refer to *VM CARBURETORS, THROTTLE AND CHOKE CABLES* subsection.

1. Eliminate the throttle cable free-play by pressing lightly on the throttle lever until a light resistance is felt, then hold in place.
2. The index marks on the pump casting and on the lever must align perfectly centered (minimum adjustment), to 0.5 mm (.02 in) off the mark on the tight side (maximum adjustment).
3. Loosen the cable lock nut and turn the adjuster accordingly.
4. Retighten the cable lock nut to 4.5 N•m (40 lbf•**in**).



mmr2010-011-006_a

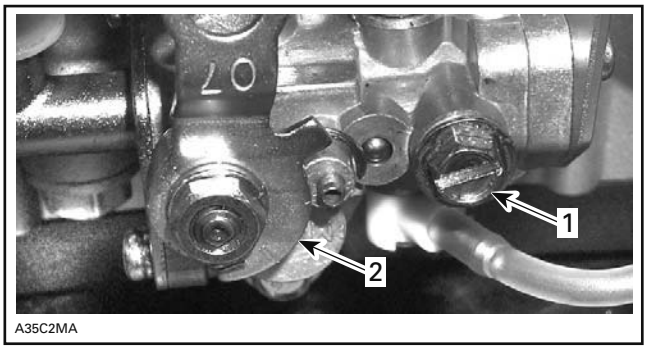
TYPICAL
1. *Index mark on pump casting*
2. *Index mark on pump lever*

5. Ensure adjustment is still within specifications after cable lock nut is tightened.

NOTICE Improper oil injection pump adjustment can result in serious engine damage.

Oil Injection Pump Bleeding

1. Loosen oil bleeder screw.
2. Fully depress and hold the throttle lever to the handlebar.
3. Bleed supply oil line (between tank and pump) until all the air has escaped from the line and only oil comes out of the bleeder screw.



A35C2MA

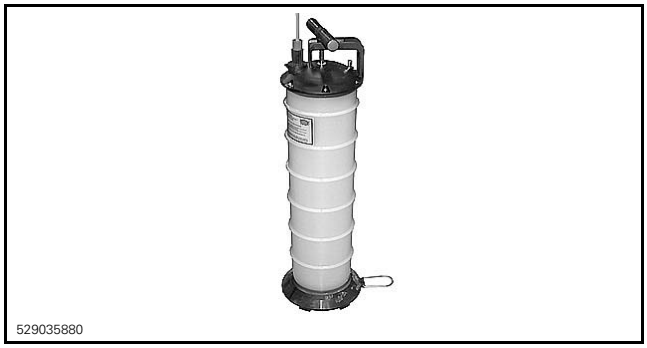
TYPICAL
1. *Bleeder screw*
2. *Oil pump lever*

4. Tighten bleeder screw.
5. Ensure there are no air bubbles in small oil lines between pump and engine. If so, inject oil using a syringe into lines before connecting them to the engine.

OIL TANK

Oil Tank Removal

1. Refer to *BODY* subsection and remove:
   – Both side panels
   – Console
   – Rewind starter handle housing.
2. Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
3. Drain oil tank using the SUCTION PUMP (P/N 529 035 880).



4. Remove the muffler, refer to *EXHAUST SYSTEM* subsection.
5. Disconnect the oil tank vent inlet hose from the top of the oil tank.



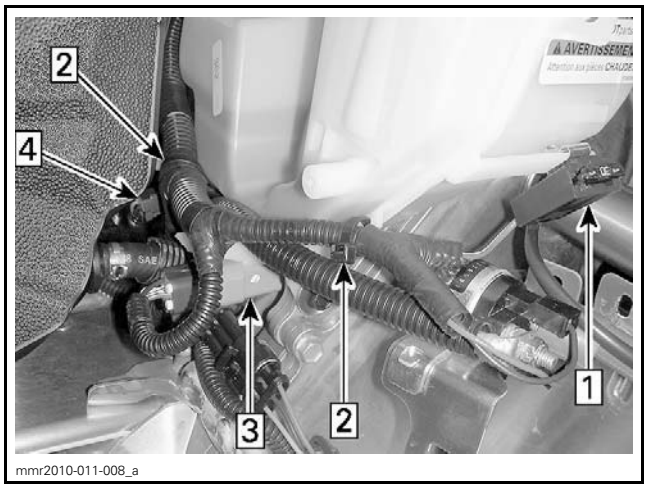
TYPICAL
1. Oil tank vent inlet hose

6. From the LH side of the vehicle, cut the locking tie securing main wiring harness to oil tank.



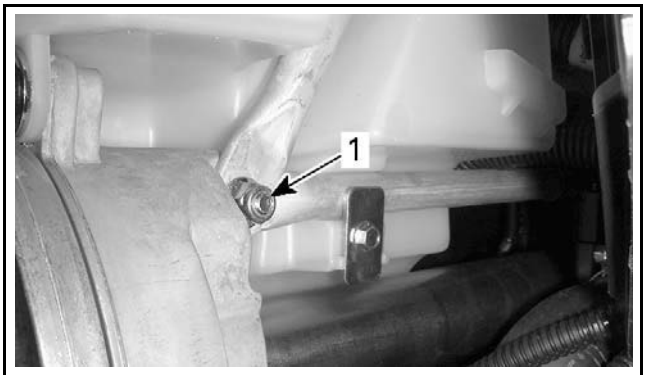
1. Cut this locking tie

7. Detach fuse holder(s) from oil tank.
8. Cut locking ties that secure wiring harness to aft portion of oil tank.
9. Detach the diagnostic connector housing from oil tank.
10. Detach the magneto starting winding connector (MA) from the oil tank.



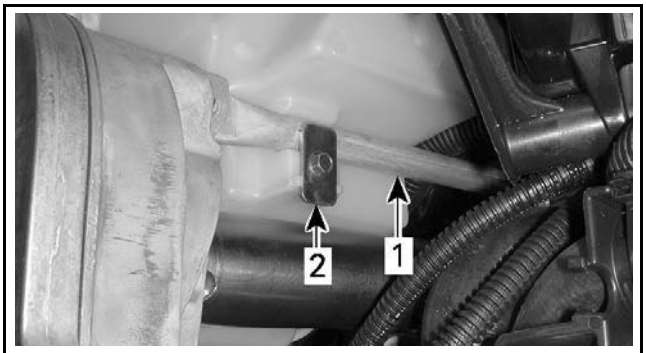
Step 1: Remove fuse holder
Step 2: Cut these locking ties
Step 3: Remove diagnostic connector housing
Step 4: Remove starting winding connector (MA)

11. Remove *OIL LEVEL SENSOR*, see procedure in this subsection.
12. Remove the lower retaining screw on the RH side frame member, and loosen the top screw. Then pull it out of the oil tank and rotate it upwards out of the way.



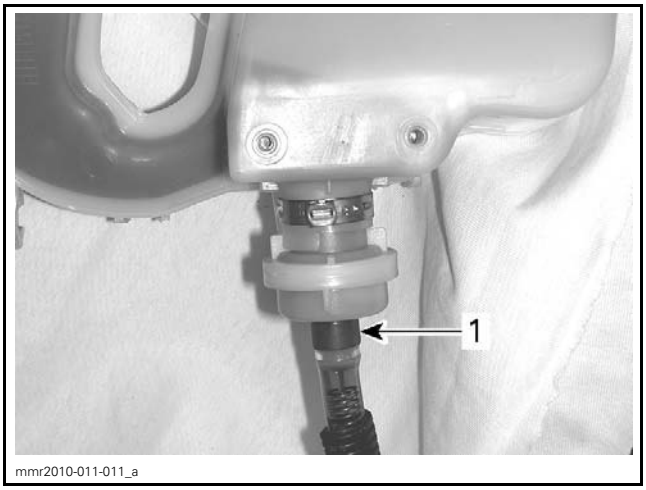
BEHIND THE TOP OF CHAINCASE
1. Lower bolt on side frame member

13. Remove holder retaining oil tank to side frame member brace.



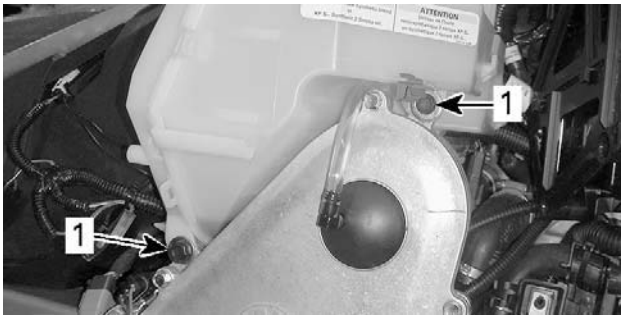
TYPICAL
1. Side frame member brace
2. Oil tank holder

14. Remove the oil pump supply hose from the oil filter at the bottom of the tank.



1. Disconnect oil pump supply hose here

15. Remove screws securing oil tank to chaincase.



TYPICAL
1. Oil tank screws

16. Remove oil tank from vehicle.

Oil Tank Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Fill up oil tank using recommended oil. See *RECOMMENDED INJECTION OIL* in this subsection.

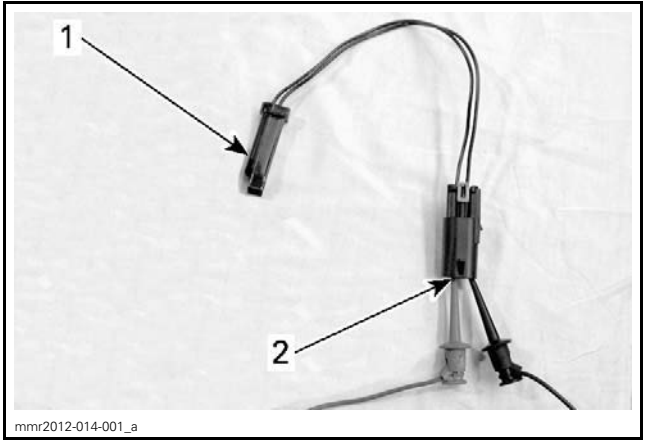
OIL LEVEL SENSOR

Oil Level Sensor Test

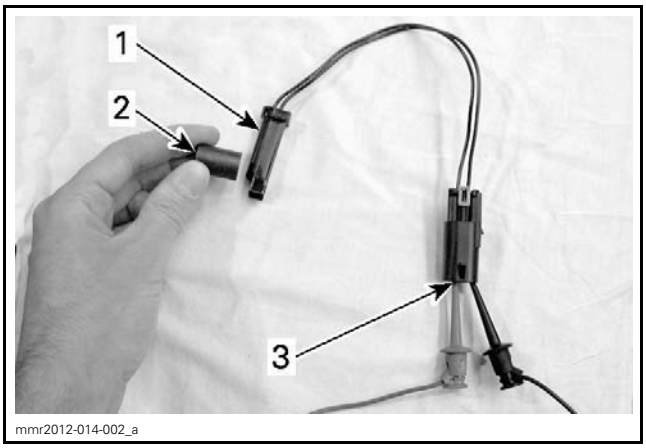
1. Remove sensor from oil tank. See procedure in this subsection.
2. Measure resistance by probing sensor connector.

REQUIRED TOOL
FLUKE 115 MULTIMETER (P/N 529 035 868)

SENSOR TEST CONDITION	RESISTANCE
Free sensor (no magnet)	Open circuit (infinite OL)
Magnet close to sensor	Closed circuit (close to 0 Ω)



1. Sensor
2. Probe here



1. *Sensor*
2. *Magnet*
3. *Probe here*

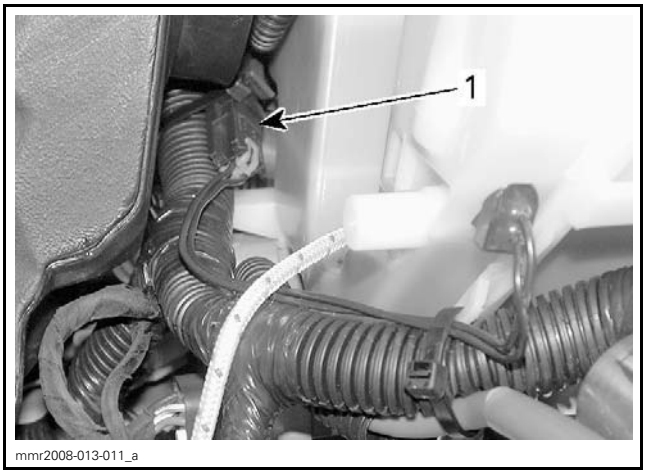
If test fails, replace sensor.

If test succeeds check float in oil tank:

– Float condition (damaged, jammed, fallen)
– Float magnet condition (strength and installation).

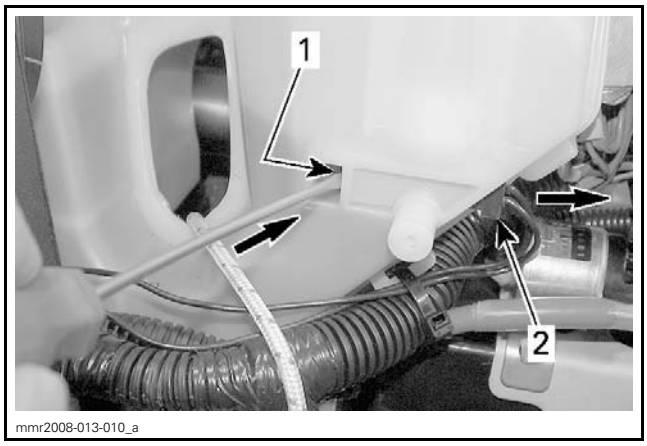
Oil Level Sensor Removal

1. Remove rewind starter handle housing. Refer to *BODY* subsection.
2. Disconnect oil level sensor connector.



TYPICAL
1. *Connector*

3. Using a small screwdriver, push and hold tab to release then pull on sensor to remove.



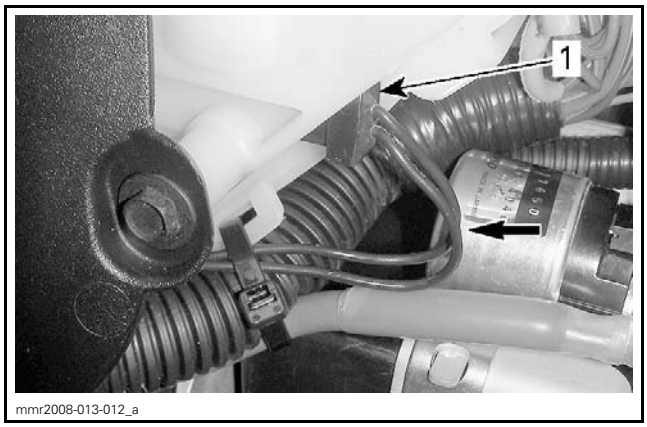
1. *Tab*
2. *Sensor*

Oil Level Sensor Installation

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

Ensure sensor wire is secured with a locking tie.

Ensure wire does not apply any tension on sensor. Wire must have a loop.

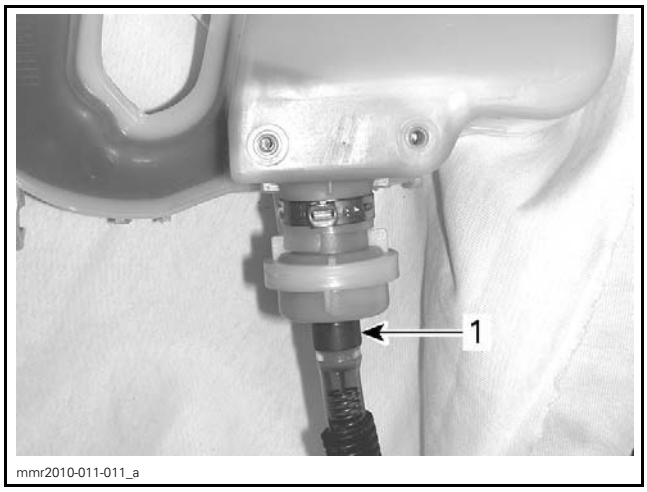


TYPICAL
1. *Sensor*

OIL FILTER

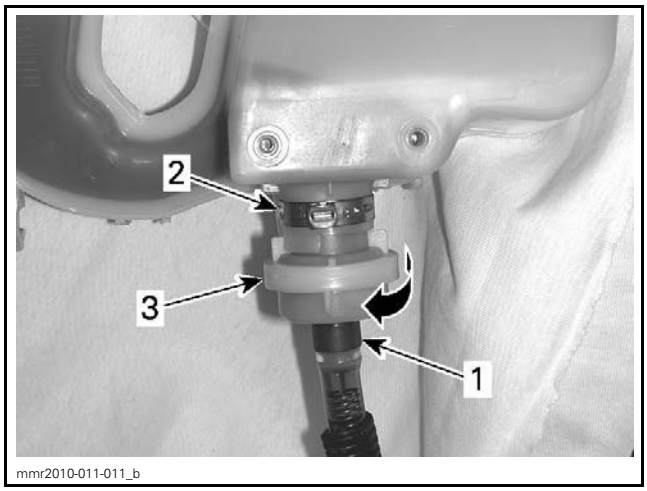
Oil Filter Removal

1. Remove RH side panel. Refer to *BODY* subsection.
2. Remove the oil pump supply hose from the oil filter at the bottom of the tank.



TYPICAL
1. Disconnect oil pump supply hose here

3. Remove the Oetiker clamp securing oil filter to tank.
4. Turn oil filter counterclockwise and pull.



TYPICAL
1. Oil pump supply hose
2. Oetiker clamp
3. Oil filter

NOTE: If the spring clip on the oil supply hose cannot be accessed at the oil filter, disconnect the oil supply hose at the oil injection pump.

Oil Filter Installation

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

Ensure the circlip retaining oil supply line is in good condition. Replace as required.

Ensure filter is properly inserted and locked in before installing a **new** Oetiker clamp.

Ensure Oetiker clamp makes contact with oil tank ribs.

If the oil supply hose was disconnected at the oil injection pump, bleed oil pump. See *OIL INJECTION PUMP BLEEDING* procedure in this subsection.

INJECTION NOZZLE

Injection Nozzle Inspection

Carry out the *OIL SYSTEM LEAK TEST* as described in this subsection.

If test is successful, repeat leak test but this time at 20.7 kPa (3 PSI).

– If the injector nozzle opens normally, it is in good condition.
– If the test is not successful, repeat test at injector nozzle as described in this topic.

Lift engine to access the injector nozzles.

Using the VACUUM/PRESSURE PUMP (P/N 529 021 800), test check valve of injection nozzle as follows.



PUMP SETTING	SET TO VACUUM	SET TO PRESSURE
TO DO	Activate pump several times	Slowly activate pump and listen to check valve
RESULT	Air must not flow through check valve	You should hear it release pressure at approximately 20.7 kPa (3 PSI)

If the injection nozzle does not pass the test, replace it.

Injection Nozzle Removal

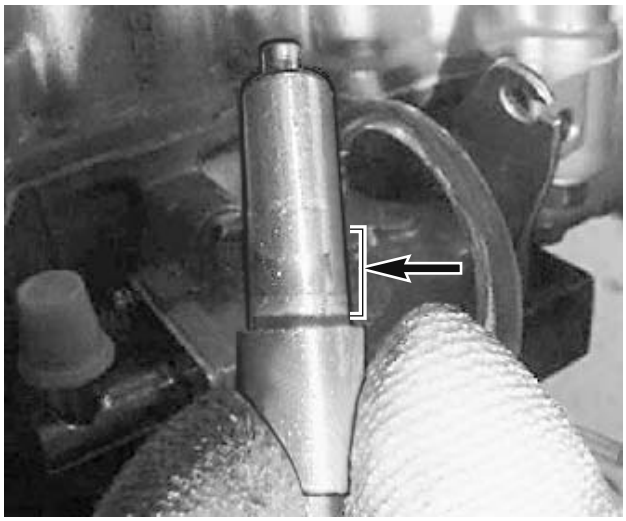
NOTICE **Do not remove injection nozzle needlessly. It is likely to be damaged.**

1. To gain access to the injector nozzles, engine must be lifted off its mounts. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.

2. Clean injection nozzle area to remove oil or dirt.
3. Carefully heat injection nozzle then pull it out of crankcase.

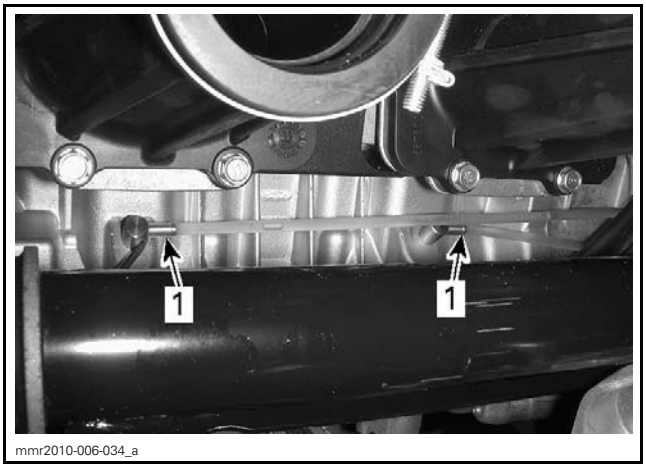
Injection Nozzle Installation

1. 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).
2. 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.



APPLY LOCTITE ON THIS AREA ONLY

3. Install the check valves so the hose fittings are horizontal facing the RH side of the engine.



TYPICAL
1. Injector nozzle fitting horizontal facing RH side

4. Carefully tap the injection nozzle into the lower crankcase using a plastic hammer.
5. Clean the crankcase from surplus of Loctite 648 with a rag.
6. Properly reposition engine in vehicle. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.

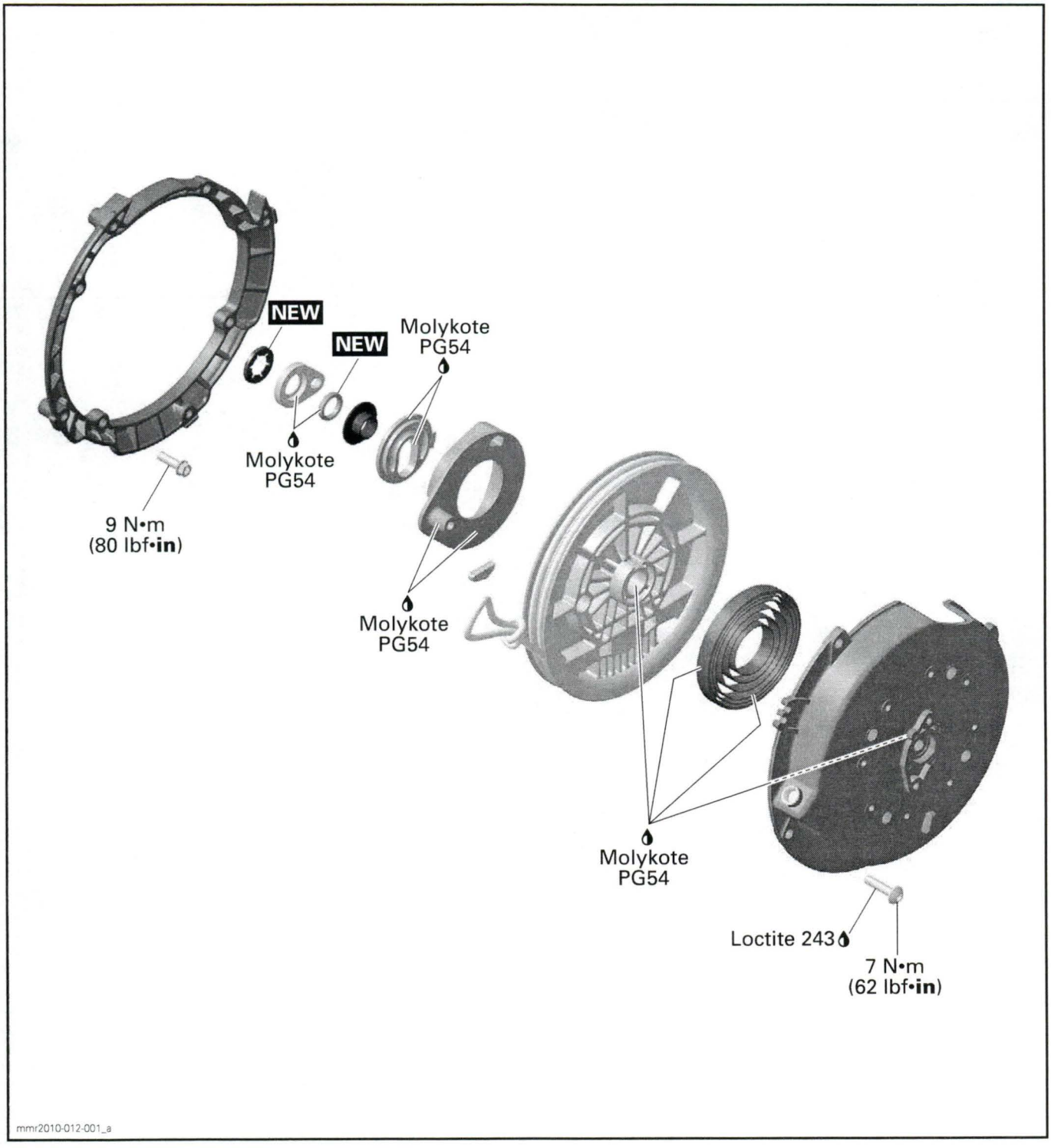
REWIND STARTER

SERVICE TOOLS

Description	Part Number	Page
SMALL HOSE PINCHER	295 000 076	75

SERVICE PRODUCTS

Description	Part Number	Page
MOLYKOTE PG 54	420 899 763	78–79


NEW
NEW
Molykote
PG54
Molykote
PG54
9 N•m
(80 lbf•in)
Molykote
PG54
Molykote
PG54
Loctite 243
7 N•m
(62 lbf•in)
mmr2010-012-001_a

INSPECTION

Due to dust accumulation, the rewind starter must be periodically cleaned, inspected and lubricated. Refer to *MAINTENANCE CHART.*

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

Inspect rope for fraying, replace as required.

When pulling starter grip, mechanism must engage within 30 cm (1 ft) of rope pull. If not, disassemble rewind starter, clean and check for damaged plastic parts. Replace parts as required, lubricate, reassemble and recheck operation.

When releasing starter grip, it must return to its stopper in the handle housing and stay against it. If not, check for proper spring preload or component damage. Readjust or replace as required.

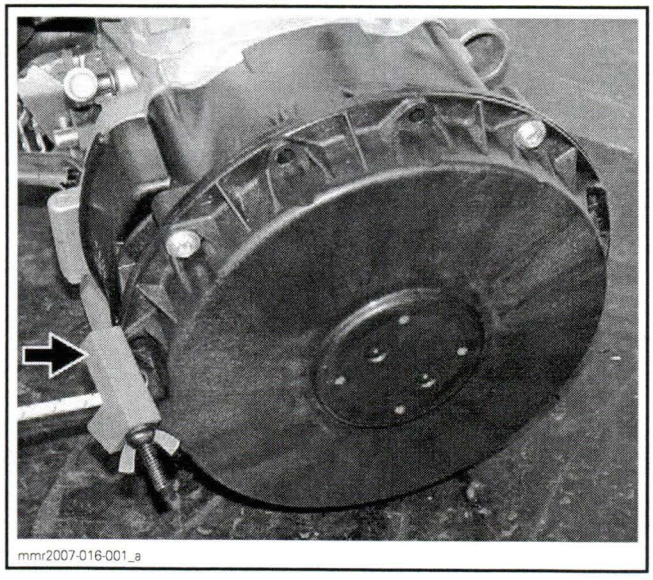
When pulling starter grip 10 times in a row, it must return freely. If not, check for damaged parts or lack of lubrication. Replace parts or lubricate accordingly.

PROCEDURES

REWIND STARTER HANDLE

Rewind Starter Handle Removal

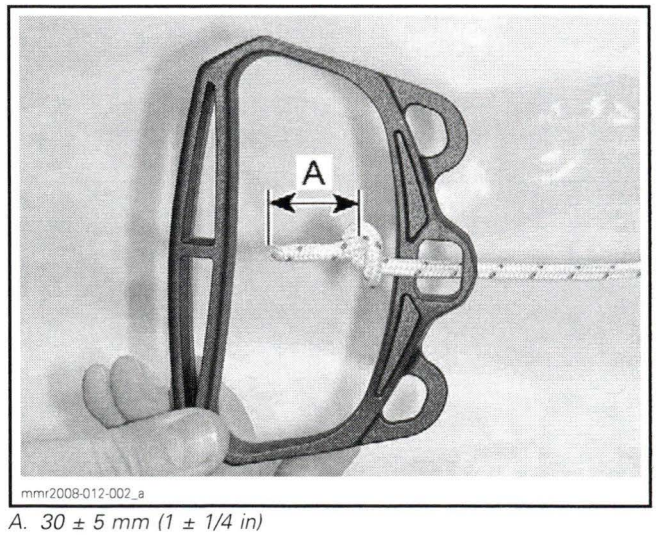
1. Pull rewind starter rope out approximately 50 cm (20 in).
2. Using a SMALL HOSE PINCHER (P/N 295 000 076), lock rope near rewind starter.


mmr2007-016-001_a

3. Using a small screwdriver, extract rope knot from stater handle.
4. Cut rope close to knot.

Rewind Starter Handle Installation

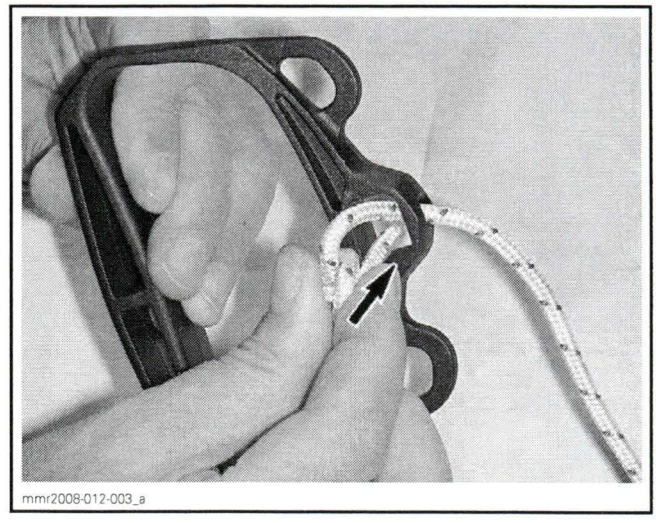
1. Before installing starter handle on the rope, fuse the end of the rope with a lit match.
2. Pass rope through starter handle and tie a knot on the rope end. See following illustration.



mmr2008-012-002_a

A. 30 ± 5 mm (1 ± 1/4 in)

3. Pull knot as tight as possible.
4. Fold rope end over and pull the starter handle over the knot as illustrated.

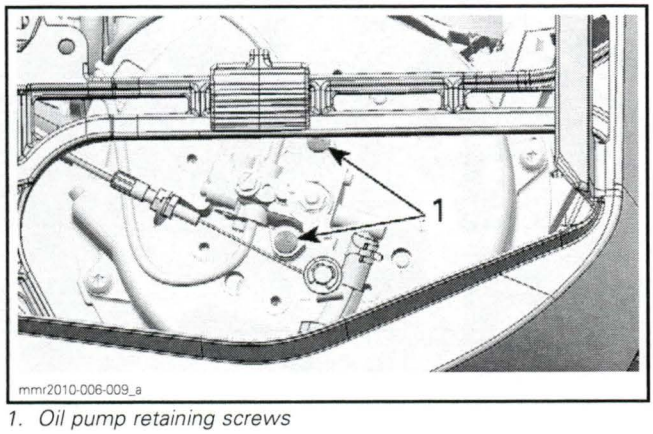

mmr2008-012-003_a

NOTE: The rope end and knot should not extend out from the handle when properly inserted.

REWIND STARTER

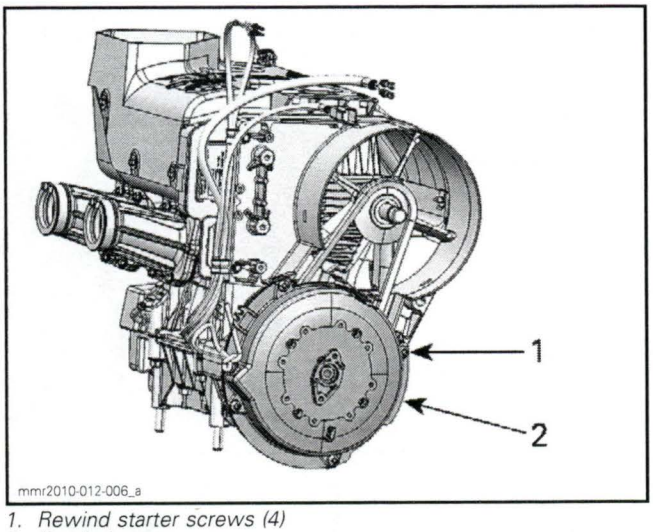
Rewind Starter Removal

1. Refer to *BODY* subsection and remove the following parts:
   - RH side panel
   - Hood.
2. Remove the muffler, refer to *EXHAUST SYSTEM* subsection.
3. Remove rewind starter handle, refer to *REWIND STARTER HANDLE REMOVAL* in this subsection.
4. Remove the 2 screws that secure the injector oil pump to the rewind starter housing.



1. Oil pump retaining screws

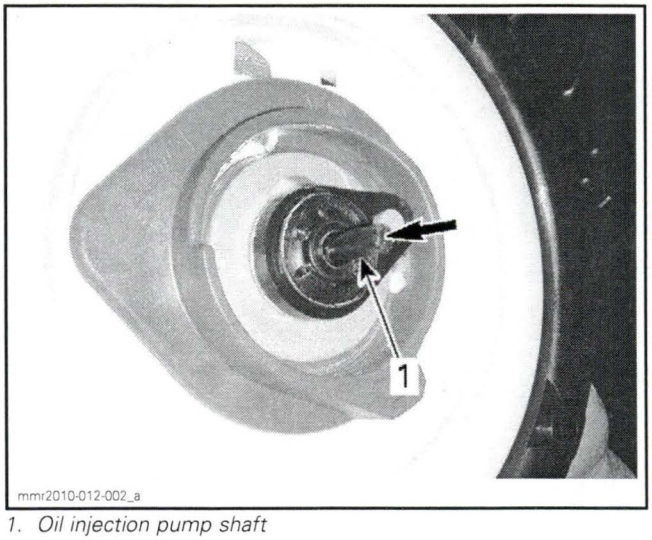
5. Remove the 4 screws that secure the rewind starter to the engine, then remove rewind starter.



1. Rewind starter screws (4)
2. Rewind starter

Rewind Starter Rope Replacement

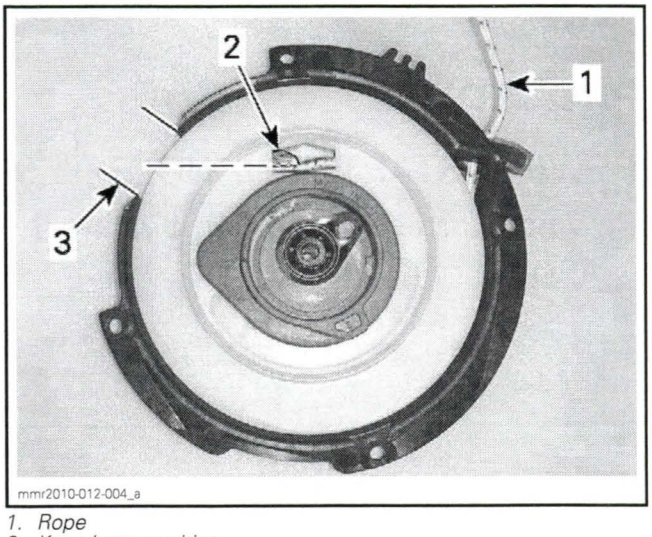
1. Remove rewind starter, see procedure in this subsection.
2. Push the oil pump shaft out of the rewind starter.



1. Oil injection pump shaft

3. Pull rope out of the rewind starter.
4. Position clamp in line with opening in the starter housing.

NOTE: Keep approximately 1 turn.

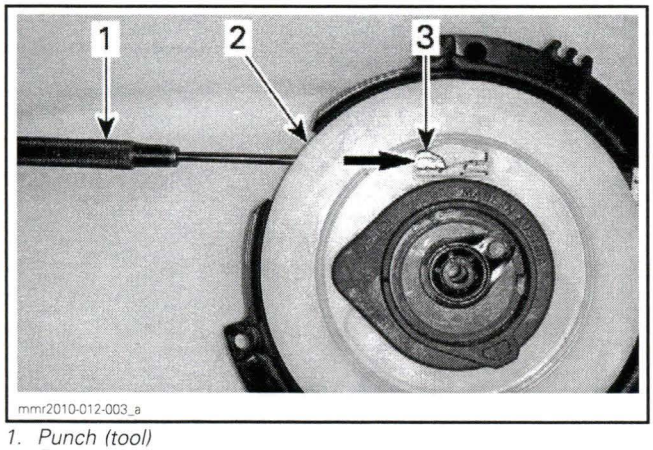


1. Rope
2. Key clamp position
3. Opening in starter housing

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

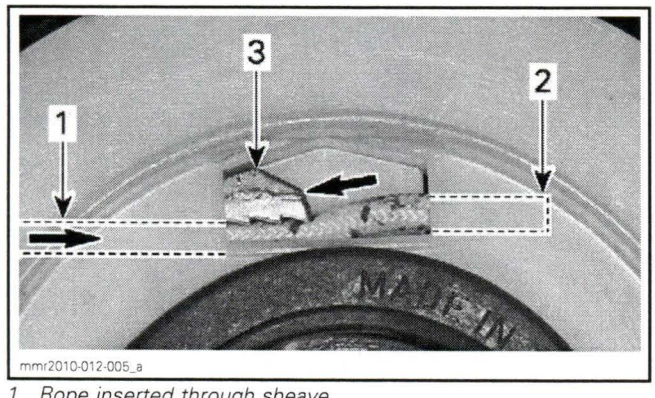
5. Carefully clamp the rewind starter in a vise to prevent it from rewinding.
6. Insert a long thin punch (or similar tool) into the rope sheave as per following illustration.

NOTE: In the following illustration, the rewind starter is not mounted in a vice for ease of illustration. Note the position of the rope and the key clamp with reference to the opening in the starter housing on the left side of the picture.



1. *Punch (tool)*
2. *Rope sheave*
3. *Key clamp retaining rope in sheave*

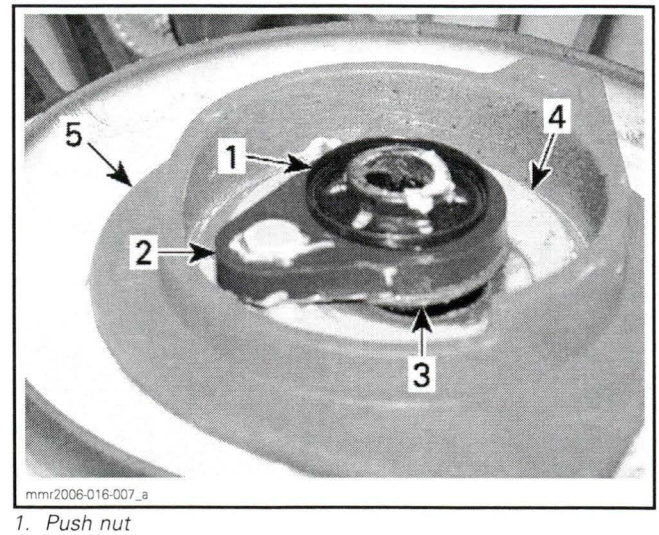
7. Push out the key clamp that retains the rope in the sheave.
8. Pull rope out of rope sheave.
9. Fuse ends of new rope using a lit match.
10. Insert one end of the rope through its opening in the starter housing, and feed it around the sheave until it comes out of the hole in the opposite side of the starter housing.
11. Insert the rope back into the sheave until it bottoms out in the hole
12. Insert the key clamp in the sheave over the rope and push the key in until the rope is firmly lock in.



1. *Rope inserted through sheave*
2. *Rope bottoms out in hole*
3. *Key clamp is pushed in to lock rope*

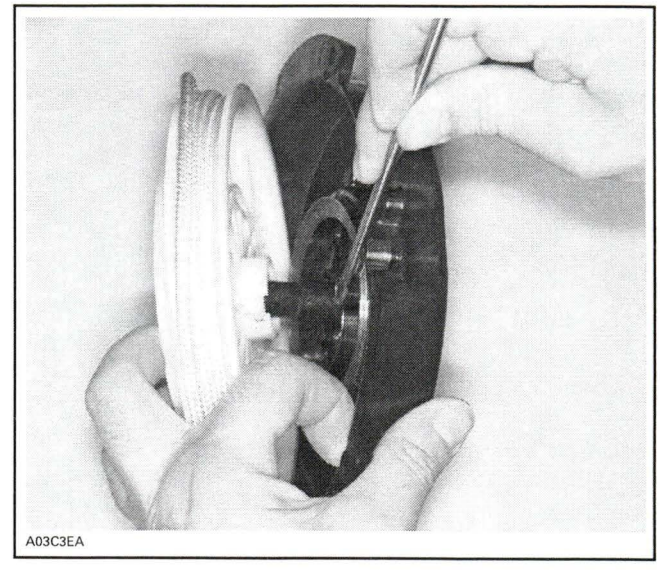
Rewind Starter Disassembly

1. Take hold of the rope and remove the hose pincher previously installed on the rope for the rewind starter removal procedure.
2. Slowly release the rope and allow the sheave to unwind and release spring preload.
3. Cut and discard the push nut that secures the rewind assembly.
4. Remove the following parts from the rewind:
   - Lock lever
   - O-ring
   - Step collar sleeve
   - Pawl lock
   - Pawl.



1. *Push nut*
2. *Lock lever*
3. *Step collar sleeve*
4. *Pawl lock*
5. *Pawl*

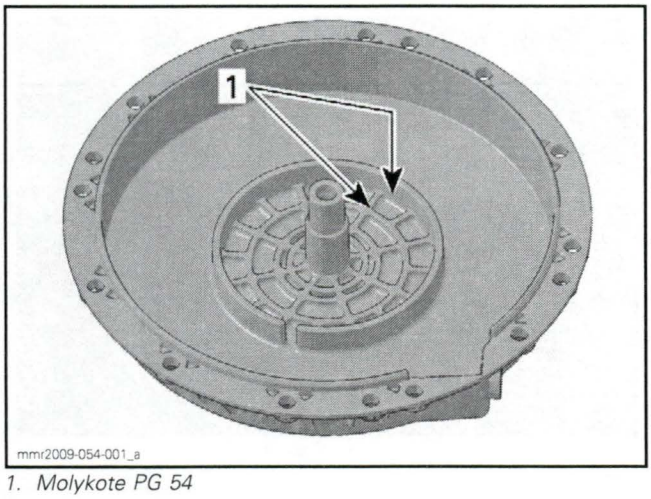
5. Partially separate sheave from starter housing and hold spring with a screwdriver.



6. Completely remove sheave from starter housing.
7. If necessary, remove the key clamp that retains the rope and remove the rope from the sheave.

Rewind Starter Assembly

1. Lubricate spring contact areas and spring guide inside housing using MOLYKOTE PG 54 (P/N 420 899 763).



1. Molykote PG 54

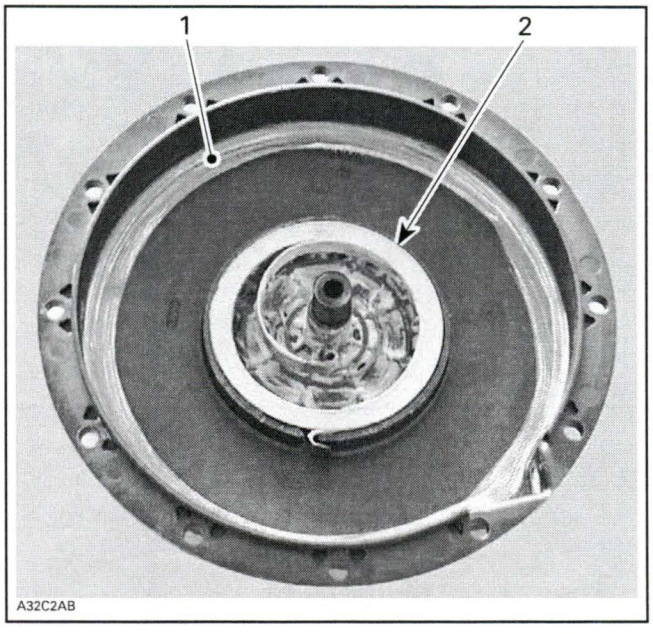
2. At assembly, position rewind spring outer end into the spring guide notch (in the starter housing), then wind the spring counterclockwise into the guide.

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



TYPICAL
1. Outer end into guide notch

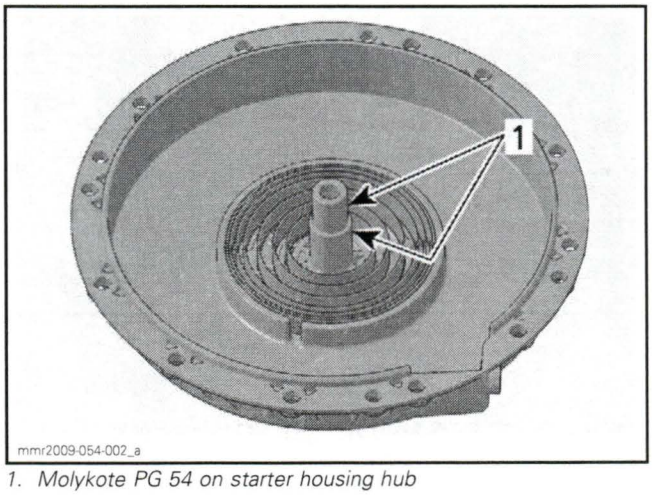
3. Lubricate spring assembly and a 1 cm (1/2 in) wide area on the perimeter of the starter housing using MOLYKOTE PG 54 (P/N 420 899 763).



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

NOTICE It is of the utmost importance that the rewind starter spring be lubricated periodically using MOLYKOTE PG 54 (P/N 420 899 763). The use of standard multipurpose grease could result in rewind starter malfunction under very cold temperatures and reduced component life.

4. Lubricate starter housing hub with MOLYKOTE PG 54 (P/N 420 899 763). Install sheave.



1. Molykote PG 54 on starter housing hub

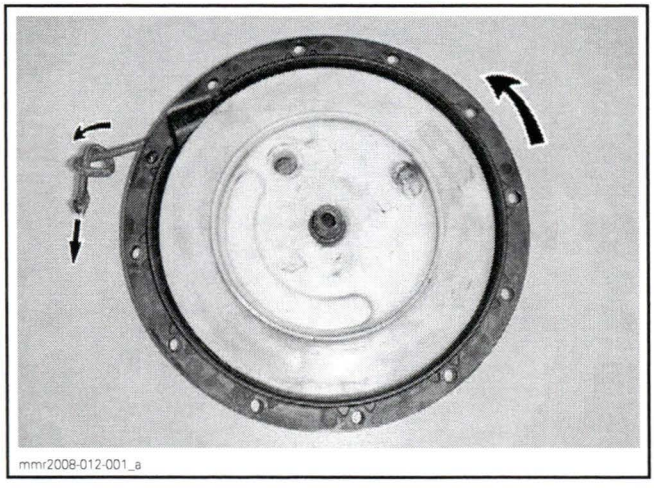
5. Adjust rewind spring tension in the following manner:

   5.1 Wind rope on sheave and place rope sheave in starter housing.

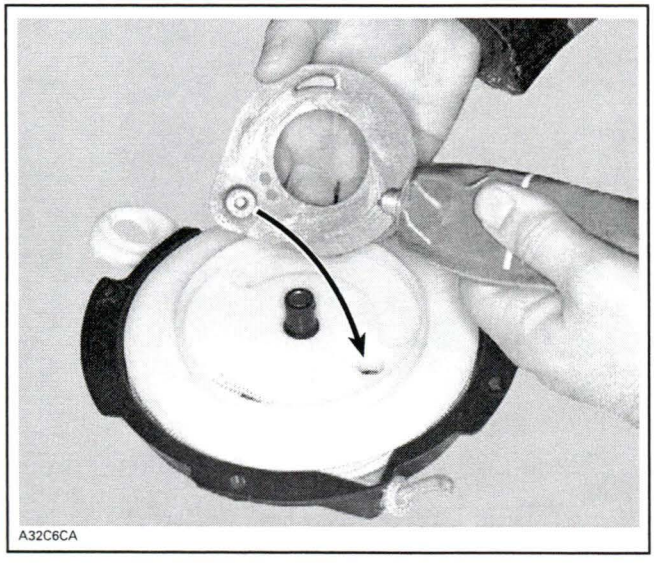
   NOTE: Be sure to engage the rewind spring hook in the notch provided in the sheave hub.

5.2 Rotate the sheave counterclockwise until rope end is accessible through rope exit hole in the starter housing. This will provide approximately 1/2 turn of preload.

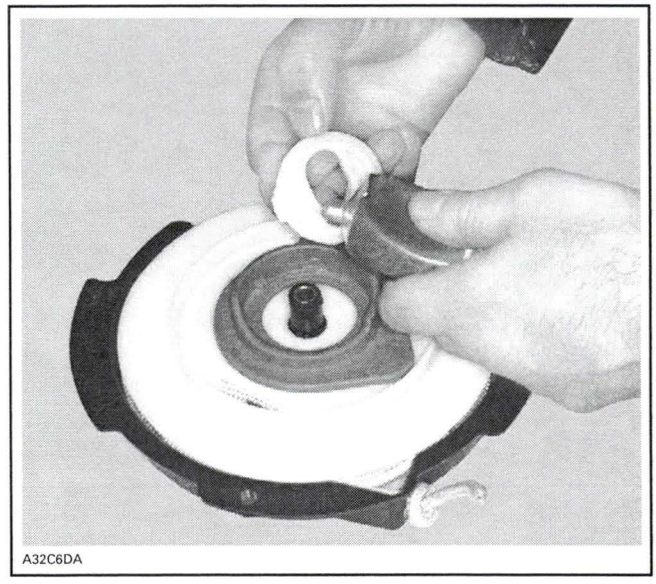
5.3 Pull the rope out of the starter housing and make a temporary knot to hold it.



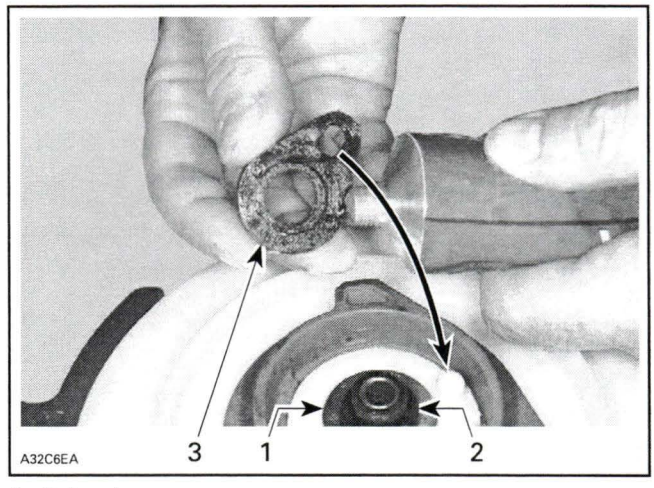
6. Lubricate pawl using MOLYKOTE PG 54 (P/N 420 899 763), then install over rope sheave as per following illustration.



7. Lubricate pawl lock using MOLYKOTE PG 54 (P/N 420 899 763). Install over pawl as per following illustration.



8. Install collar sleeve, inserting the sleeve portion into the pawl lock.
9. Lubricate a new O-ring and the lock lever using MOLYKOTE PG 54 (P/N 420 899 763).
10. Install over pawl lock as per following illustration.

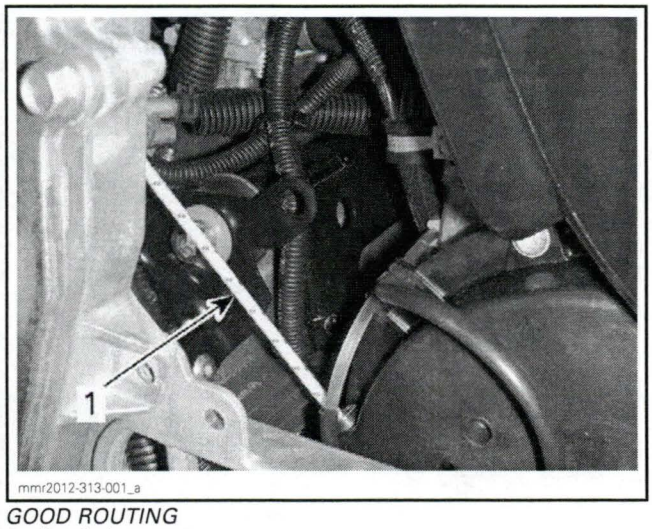


1. Collar sleeve
2. O-ring
3. Lock lever

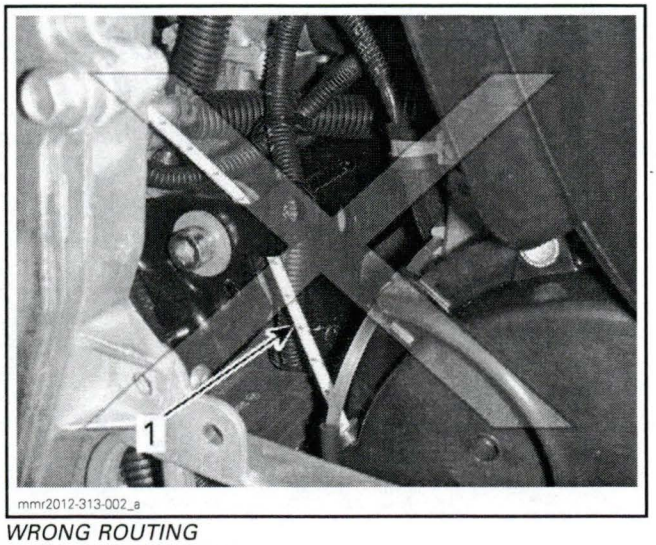
11. Secure assembly by installing a new push nut over the lock lever.

Rewind Starter Installation

1. Install rewind starter assembly on engine.
2. Route rewind starter rope as illustrated.



GOOD ROUTING
1. Rewind starter rope



WRONG ROUTING
1. Rewind starter rope

3. Install handle, refer to *STARTER HANDLE INSTALLATION*.
4. Install all remaining parts, refer to their applicable subsections.

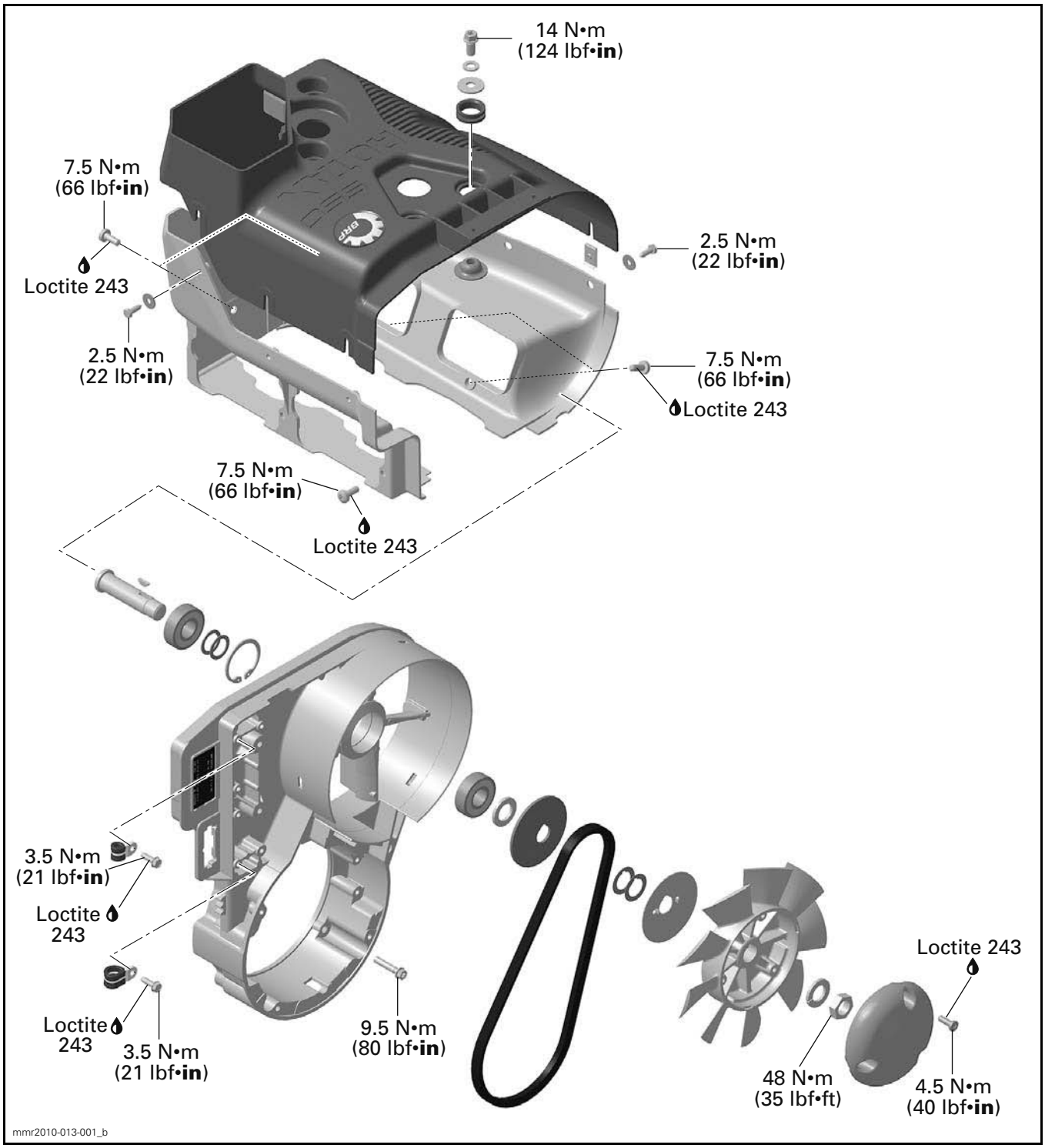
AXIAL FAN

SERVICE TOOLS

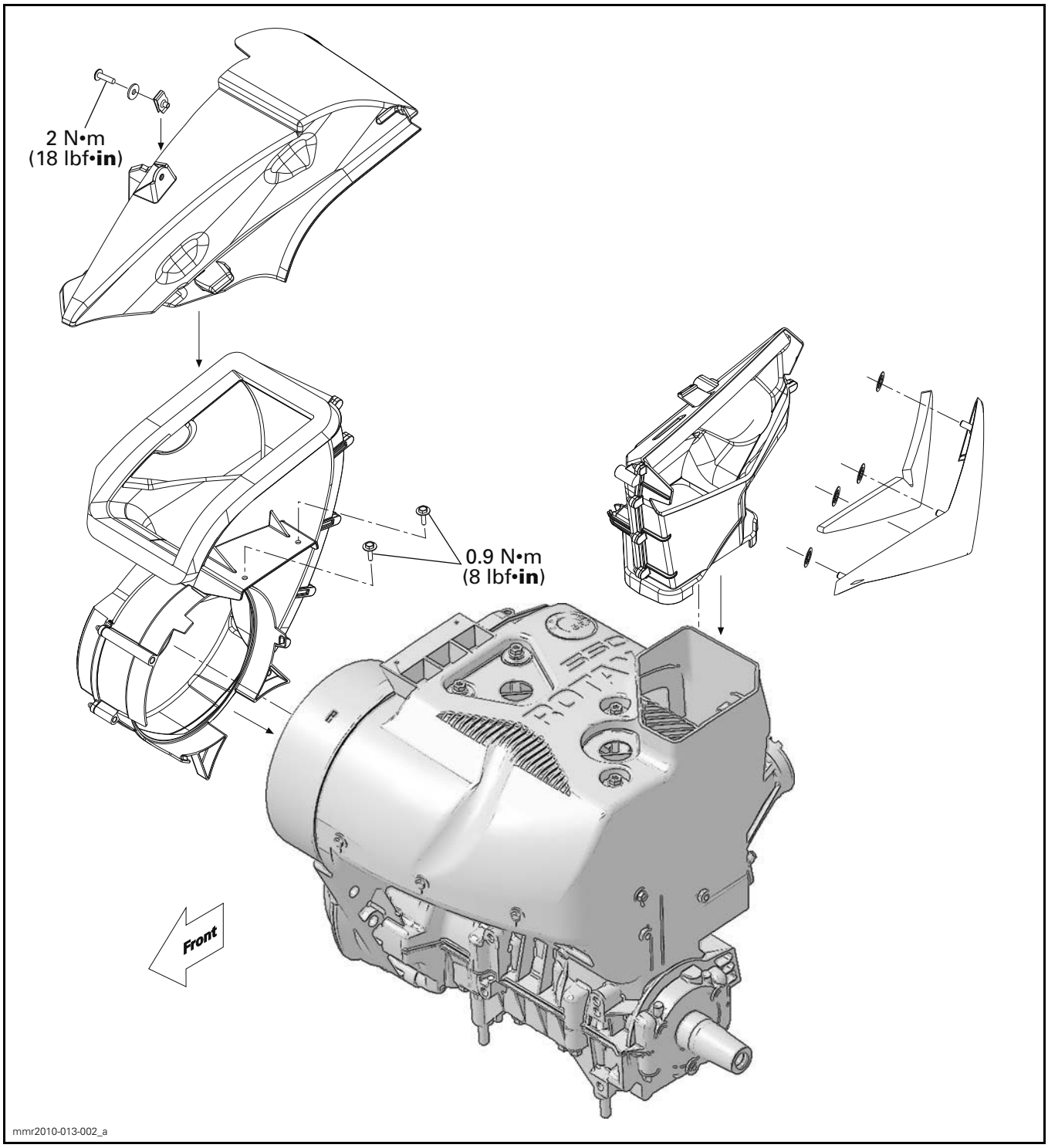
Description	Part Number	Page
FAN HOLDER TOOL	529 036 006	87

SERVICE PRODUCTS

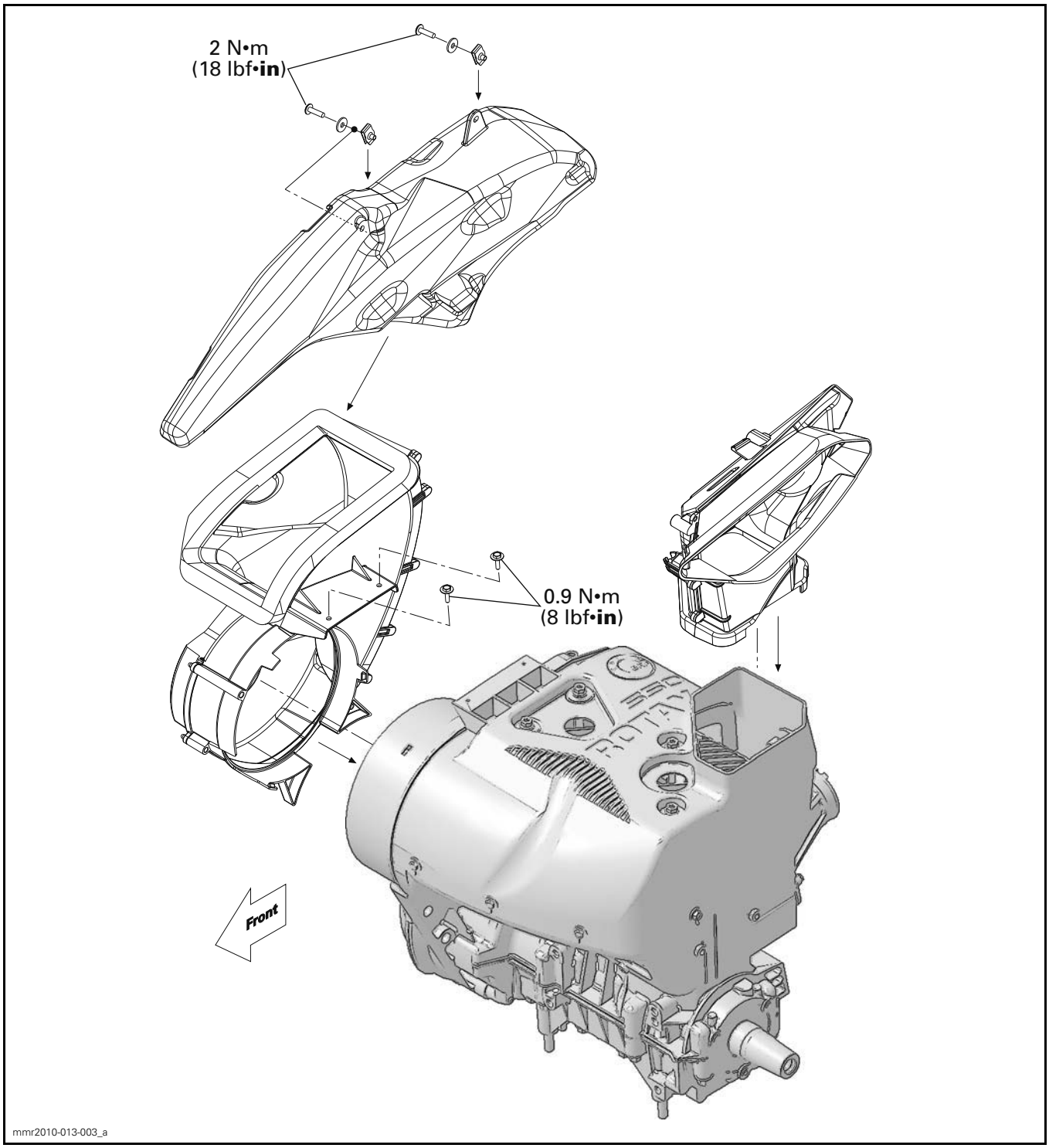
Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	88


14 N•m
(124 lbf•in)
7.5 N•m
(66 lbf•in)
Loctite 243
2.5 N•m
(22 lbf•in)
2.5 N•m
(22 lbf•in)
7.5 N•m
(66 lbf•in)
Loctite 243
7.5 N•m
(66 lbf•in)
Loctite 243
3.5 N•m
(21 lbf•in)
Loctite
243
Loctite
243
3.5 N•m
(21 lbf•in)
9.5 N•m
(80 lbf•in)
Loctite 243
48 N•m
(35 lbf•ft)
4.5 N•m
(40 lbf•in)
mmr2010-013-001_b

REV-XP 550F Series



Tundra Series

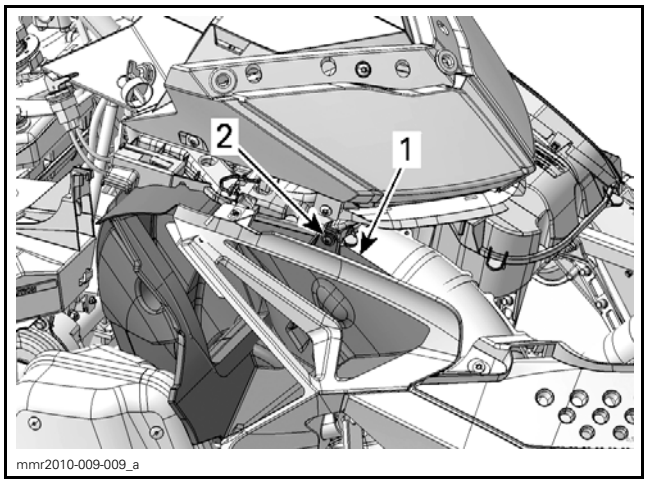


PROCEDURES

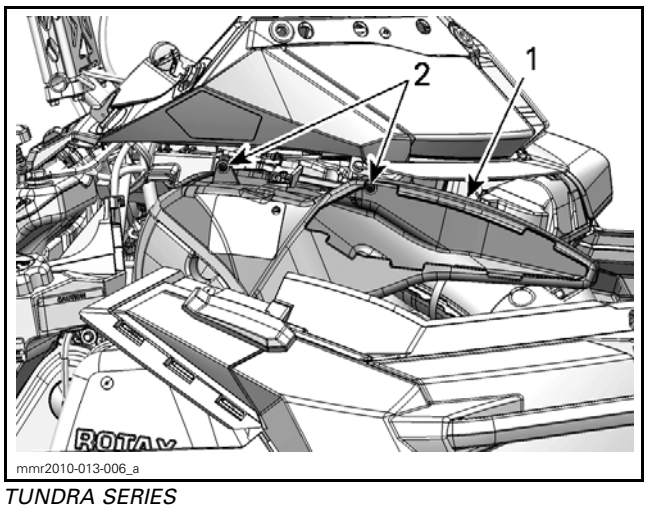
UPPER AIR INLET DUCT

Upper Inlet Duct Removal

1. Refer to *BODY* subsection and remove:
   - Seat
   - Console
   - Hood
   - RH side panel.
2. Remove the screw(s) retaining the upper air inlet duct to the secondary air intake silencer (RH side of the headlight/gauge module).



REV-XP 550F SERIES
1. *Air inlet duct*
2. *Screw (1) to remove*



TUNDRA SERIES
1. *Air inlet duct*
2. *Screws (2) to remove*

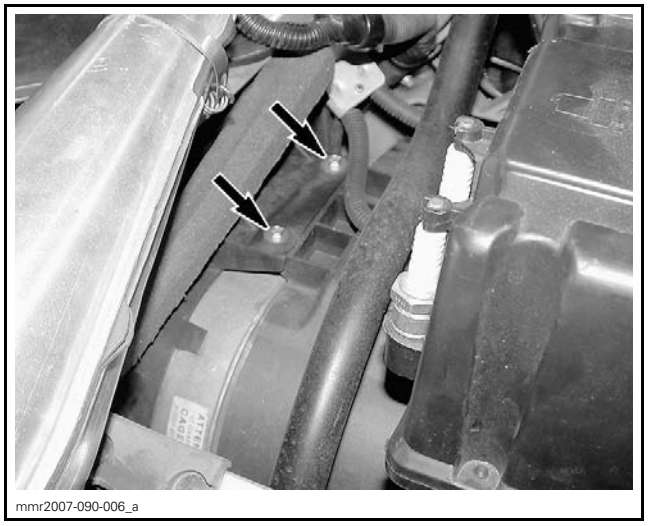
Upper Inlet Duct Installation

Installation is the reverse of removal.

LOWER AIR INLET DUCT

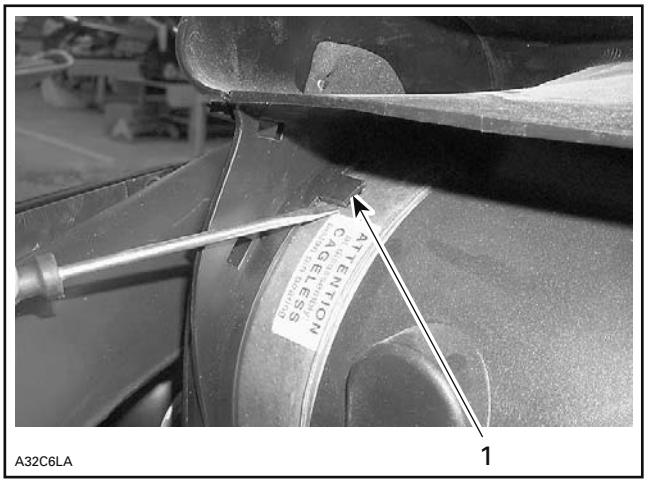
Lower Inlet Duct Removal

1. Remove *UPPER AIR INLET DUCT*.
2. Remove the two screws that secure the lower inlet duct to the engine cowl.



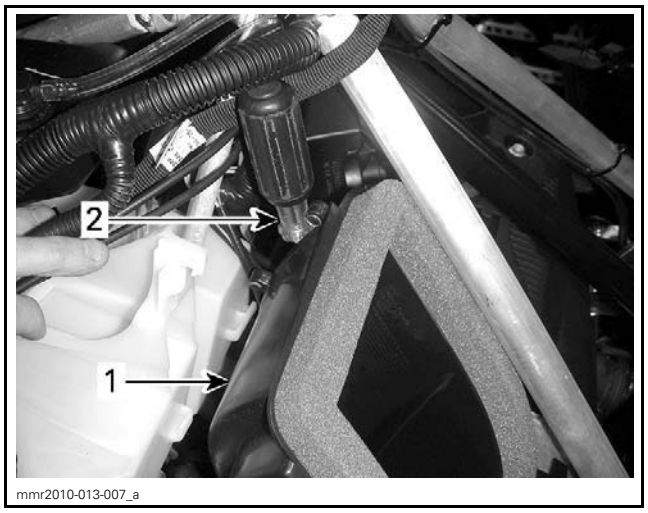
TYPICAL - LOWER INLET DUCT RETAINING SCREWS

3. Using a flat screwdriver, carefully lift the 3 tabs that retains the duct to the perimeter of the axial fan housing, and pull the duct out slightly.
4. Repeat previous step at each tab until the duct can be removed from the fan housing.

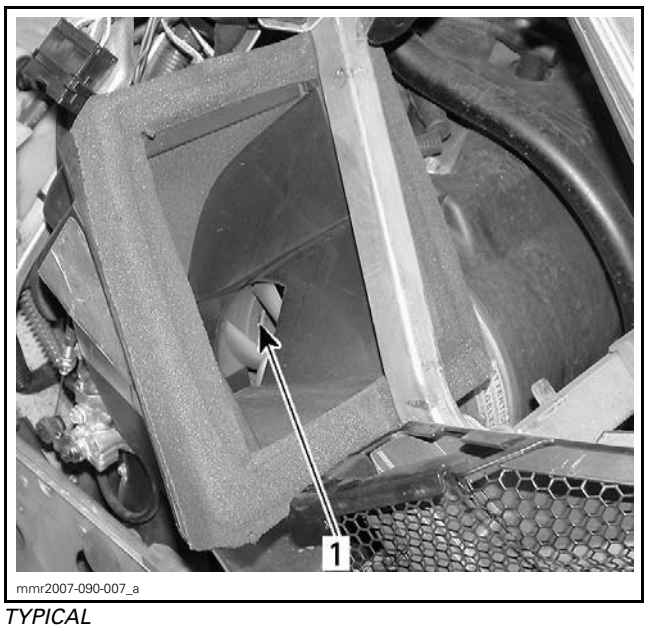


TYPICAL
1. *Tab*

NOTE: One of the retaining tabs is located behind the lower air inlet duct as can be seen by the position of the screwdriver in the following illustration. This tab may be released by pushing on it from inside the duct.



1. Lower air inlet duct
2. Screwdriver



TYPICAL
1. Push tab out here

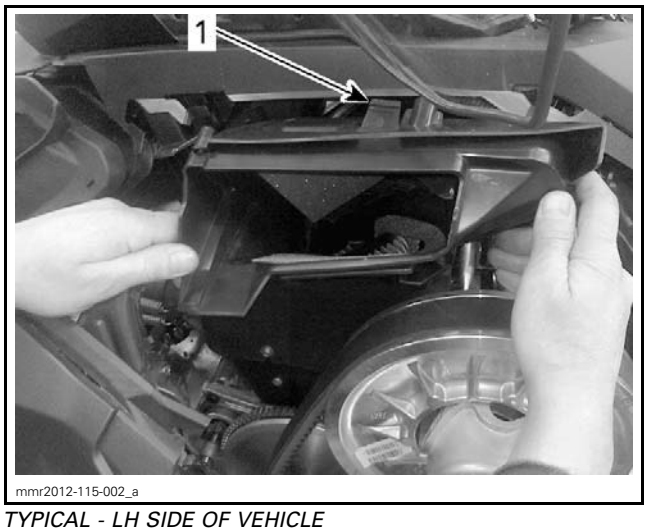
Lower Inlet Duct Installation

Installation is the reverse of removal.

AIR OUTLET DUCT

Air Outlet Duct Removal

1. Refer to *BODY* subsection and remove:
   – Hood
   – LH side panel.
2. Remove drive belt guard, refer to *DRIVE BELT* subsection.
3. Release retaining tab that secures air outlet duct to secondary air intake silencer.



TYPICAL - LH SIDE OF VEHICLE
1. Retaining tab

4. Pull the air outlet duct toward the outside to release it from the secondary air intake silencer.

Air Outlet Duct Installation

Installation is the reverse of the removal procedure however, be sure to:

– Correctly align the air outlet duct with the engine cowl and the secondary air intake silencer using the alignment pins provided on the back of the air outlet duct.
– Push the air outlet duct in position and ensure the retaining tab is secured.

AXIAL FAN

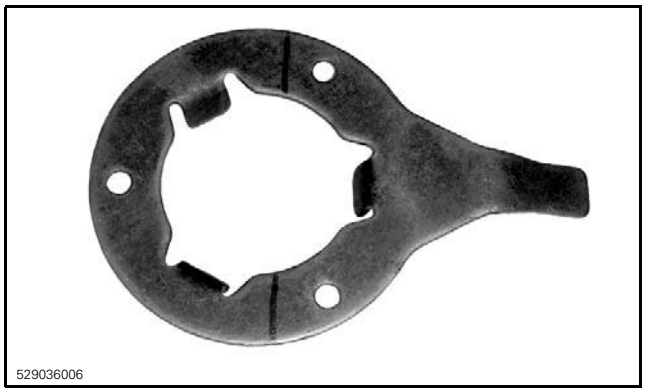
Axial Fan Removal

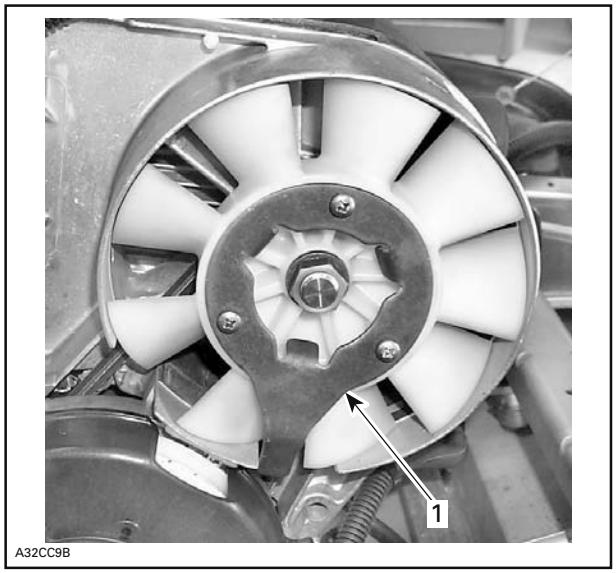
1. Remove the tuned pipe and muffler, refer to *EXHAUST SYSTEM* subsection.
2. Remove upper and lower air inlet ducts. See procedures in this subsection.
3. Remove the screws that secure the fan cover.



1. Fan cover screws
2. Cooling fan

4. Install FAN HOLDER TOOL (P/N 529 036 006) using the 3 fan cover screws.





1. Fan holder tool

5. Remove fan retaining nut and lock washer.
6. Remove fan from fan shaft.
7. Leave fan holder tool on fan for reinstallation of fan.

NOTE: When pulling the fan from the fan shaft, be careful not to dislodge and misplace the Woodruff key on the fan shaft.

Axial Fan Inspection

Check cooling fan for cracks or damaged fins.

Also check fan belt condition. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

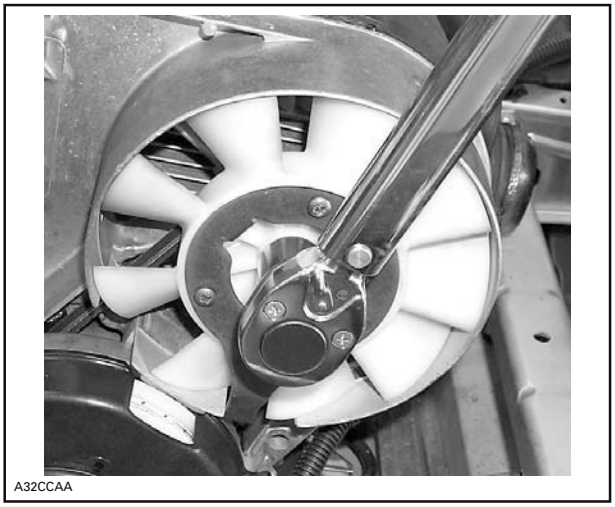
Axial Fan Installation

Installation is the reverse of the removal procedure however, pay attention to the following.

1. Ensure Woodruff key is properly installed on fan shaft.
2. Ensure the alignment pins on the outer pulley half are inserted in the holes provided on the back of the fan.
3. Align the keyway in the fan with the Woodruff key and insert the fan on the shaft.

NOTICE When reinstalling fan assembly, ensure the tabs on the outer pulley half are properly inserted in the holes provided in the fan. Also ensure the fan keyway is properly inserted over the fan shaft Woodruff key.

4. Install the lock washer and fan retaining nut.
5. If fan is being replaced, install FAN HOLDER TOOL (P/N 529 036 006) on new fan using the 3 fan cover screws.
6. Torque the fan retaining nut to 48 N•m (35 lbf•ft).



TYPICAL

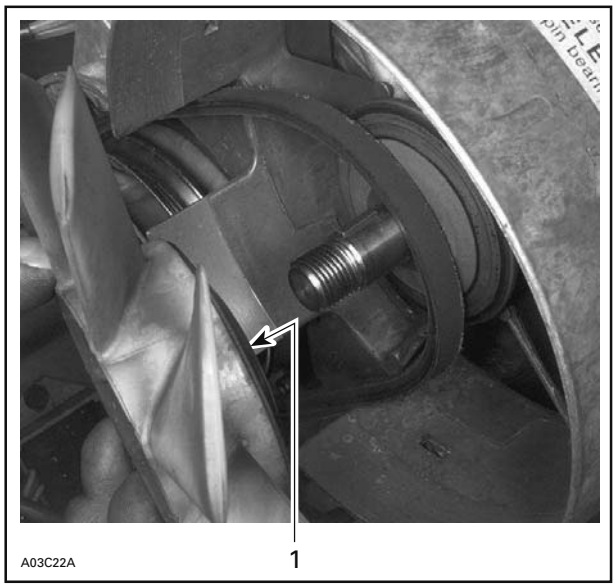
7. Crank the engine over once to properly seat the fan belt in the pulley.

8. Re-torque the fan retaining nut.
9. Check and adjust fan belt tension as required, refer to *AXIAL FAN BELT TENSION VERIFICATION* in this subsection.
10. Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on threads of fan cover screws.
11. Install fan cover.
12. Torque fan cover screws to 4.5 N•m (40 lbf•ft).

AXIAL FAN BELT

Axial Fan Belt Removal

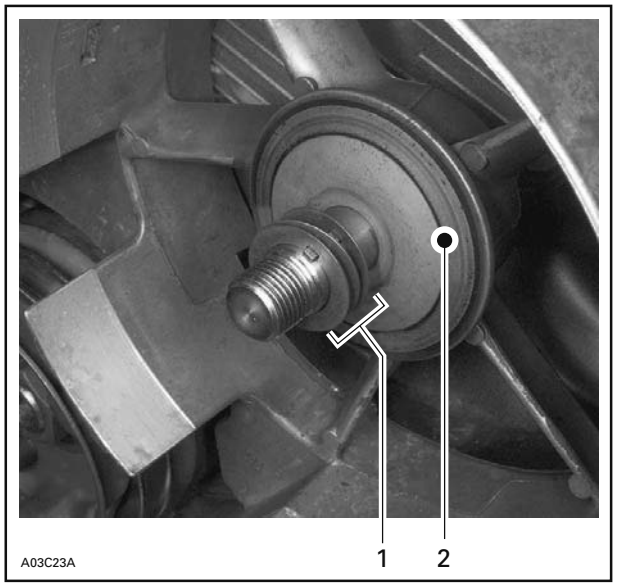
1. Remove tuned pipe and muffler. Refer to *EXHAUST SYSTEM* subsection.
2. Remove rewind starter. Refer to *REWIND STARTER* subsection.
3. Remove cooling fan as explained in this subsection.
4. Remove outer pulley half.



1. Fan with pulley half

5. Remove fan belt.

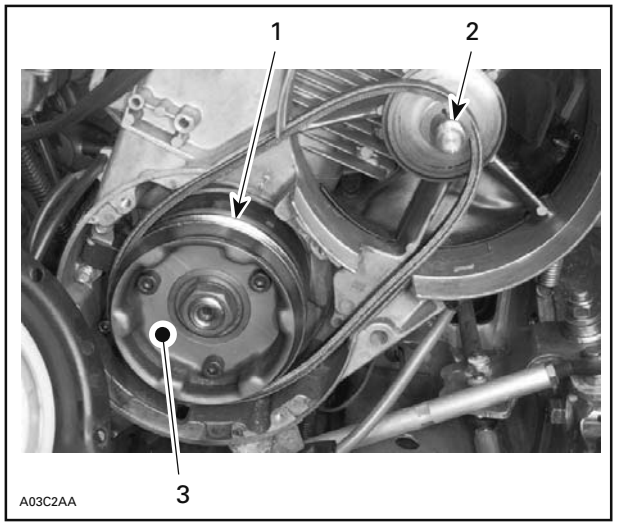
NOTE: Leave shims and second pulley half in place. See following illustration.



1. Shims
2. Second pulley half

Axial Fan Belt Installation

1. Install new fan belt on bottom pulley first, then position belt onto fan shaft as shown in following illustration.



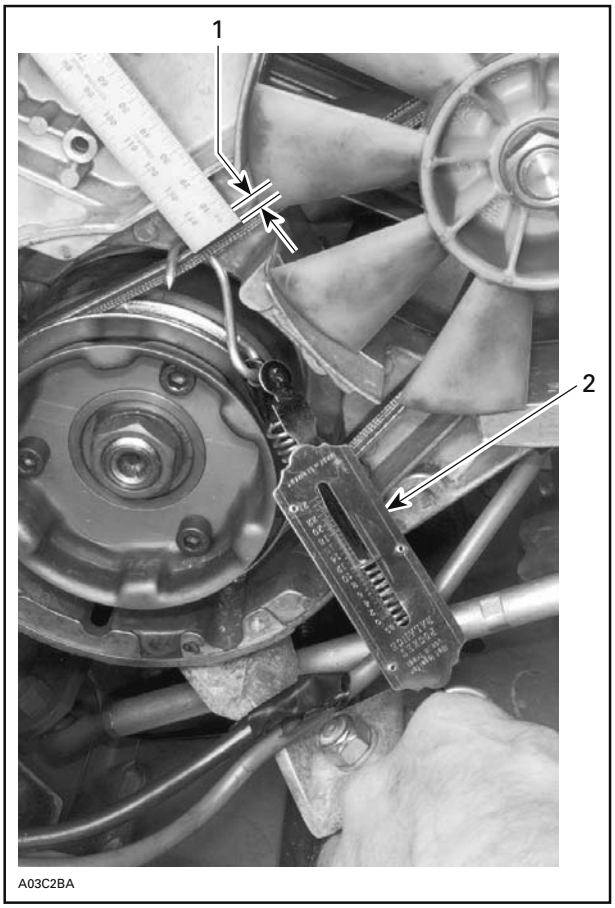
FAN BELT PROPERLY INSTALLED ON BOTTOM PULLEY AND FAN SHAFT
1. Bottom pulley
2. Fan shaft
3. Starting pulley

2. Temporarily reinstall fan assembly on fan shaft, refer to *AXIAL FAN INSTALLATION* in this subsection.
3. Check belt tension and adjust as required. Refer to *AXIAL FAN BELT TENSION VERIFICATION*.

Axial Fan Belt Tension Verification

Check fan belt tension by measuring the belt deflection.

REQUIRED TOOL
Ruler
Fisch scale



TYPICAL
1. *Measure deflection here*
2. *Fish scale*

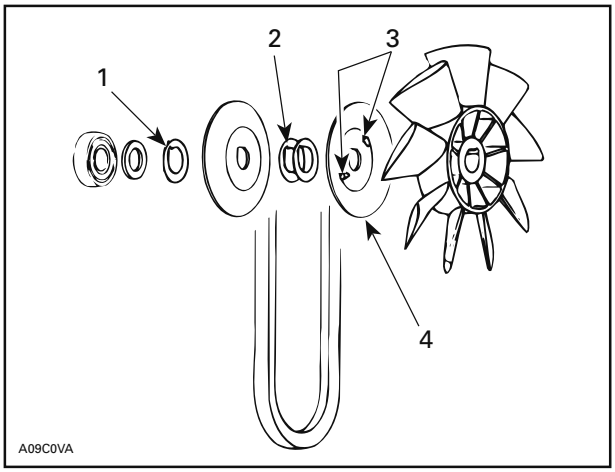
ENGINE	BELT DEFLECTION	FORCE APPLIED
550F	9.5 mm ± 1.5 mm (3/8 in ± 1/16 in)	5 kgf (11 lbf)

Adjust axial fan belt deflection if out of specification.

Fan Belt Deflection Adjustment

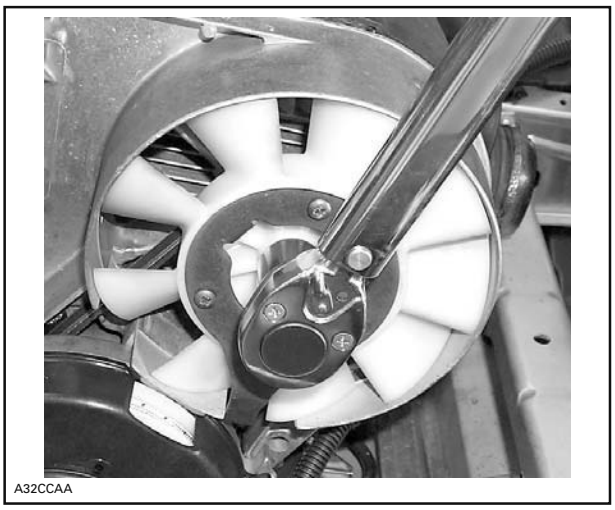
1. To adjust belt deflection, add or remove shim(s) between pulley halves.
   - 1.1 Remove axial fan and outer pulley half. See procedure in this subsection.
   - 1.2 If belt deflection is too great (loose belt), remove a shim from between the two pulley halves and install it between the inner pulley half and the distance sleeves.
   - 1.3 If belt deflection is too low (tight belt), remove a shim from between the inner pulley half and distance sleeve, and install it between the two pulley halves.

NOTE: Installation or removal of shims between pulley halves adjusts belt ride height between the pulley halves, therefore adjusting belt tension and deflection. Installation or removal of the shims between the distance sleeve and fan inner pulley half is used to maintain alignment between the pulley on the fan shaft, and the pulley on the crank shaft.



TYPICAL
1. *Unused shim(s) here*
2. *Adjust here*
3. *Alignment pins on outer pulley half*
4. *Some engines only*

2. Repeat removal and installation of axial fan as required to obtain proper belt tension.
3. Once the fan belt is properly adjusted, be sure to torque fan nut to 48 N•m (35 lbf•ft) using holder wrench, as shown in the following illustration.



TYPICAL

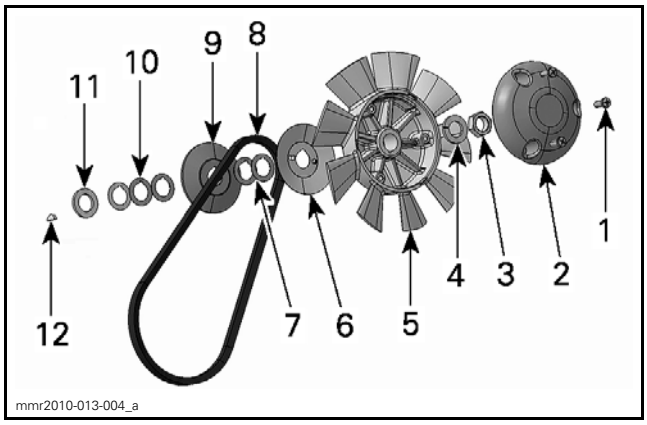
4. Install fan cover, refer to *AXIAL FAN INSTALLATION*.
5. Reinstall rewind starter. Refer to *REWIND STARTER*.
6. Install the air inlet ducts, refer to *UPPER INLET DUCT INSTALLATION* and *LOWER INLET DUCT INSTALLATION*.
7. Reinstall tuned pipe and muffler. Refer to *EXHAUST SYSTEM*.

AXIAL FAN BEARING

Axial Fan Bearing Removal

To replace the axial fan shaft bearings, the fan housing must be removed from the engine.

1. Remove the secondary air intake silencer, refer to *AIR INTAKE SYSTEM* subsection.
2. Remove rewind starter, refer to *REWIND STARTER* subsection.
3. Refer to *COOLING FAN* in this subsection and remove the:
   – Axial fan
   – Outer pulley half
   – Pulley shim(s).

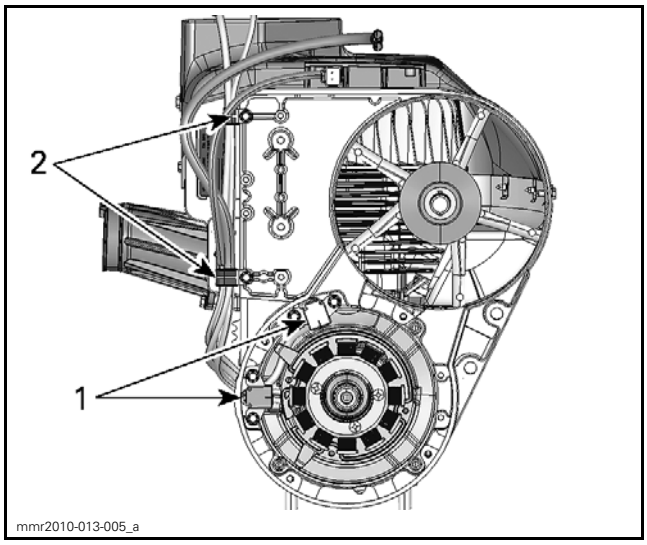


1. Axial fan cover screws (3)
2. Axial fan cover
3. Axial fan retaining nut
4. Lock washer
5. Axial fan
6. Outer pulley half
7. Shim(s)
8. Fan belt
9. Inner pulley half
10. Shim(s)
11. Distance sleeve
12. Woodruff key

4. Proceed with *AXIAL FAN BELT REMOVAL* in this subsection.
5. Remove the following parts from the axial fan pulley shaft;
   – Inner pulley half
   – Shim(s)
   – Distance sleeve.
6. Refer to the *MAGNETO SYSTEM* subsection and remove the following:
   – Magneto rotor
   – Stator
   – Trigger coils (2) retaining screws.

NOTICE **Mark the position of each trigger coil before removing their retaining screws.**

7. Remove the clamps that secure the trigger coil wiring to the fan housing.



1. Trigger coils
2. Clamps to remove

8. Remove the screws that secure the fan housing to the engine.

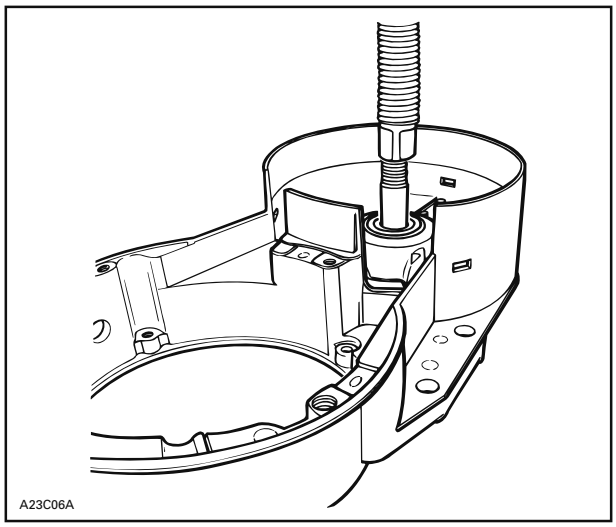
NOTE: On some models it may be necessary to remove the top engine cowl.

9. Pull the fan housing from the engine and extract it between the steering shaft and the front frame member.

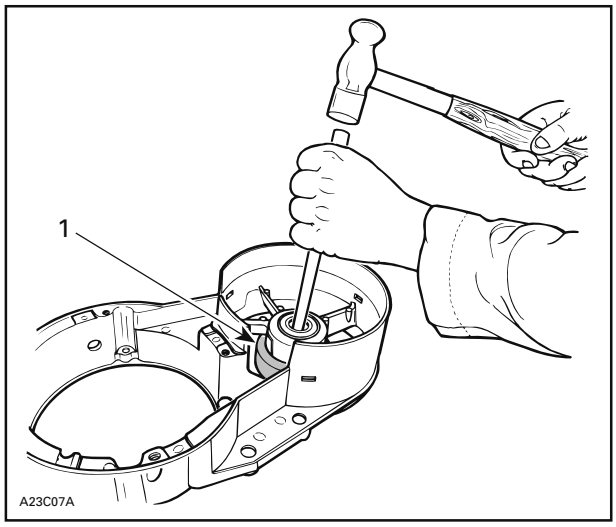
10. Remove the Woodruff key from the fan shaft.

NOTICE Install proper supports under the fan housing before using the press to avoid damaging the fan housing.

11. Using a press, drive the fan shaft out of the bearings.

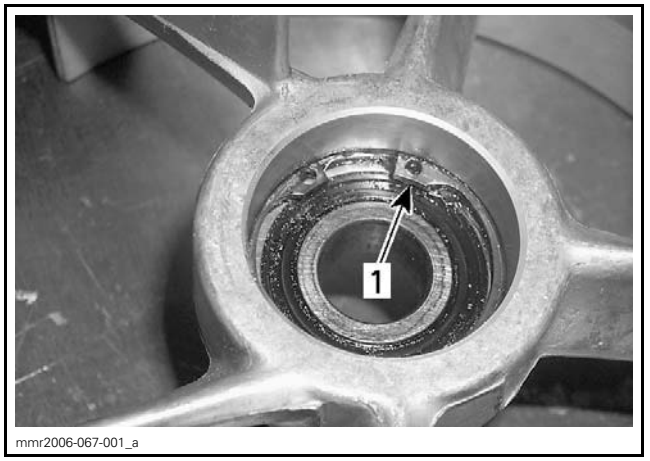


12. With the fan housing properly supported near the bearings using a support ring, use a punch to drive the bearing out of the fan housing, working all around bearing inner race. Keep shims for installation.



1. Ring supporting fan housing

13. Remove circlip then remaining bearing.



TYPICAL
1. Circlip

Axial Fan Bearing Installation

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

NOTE: The bearings are sealed, do not add grease at assembly.

4. Reinstall all removed parts on engine and vehicle. Refer to applicable subsections.

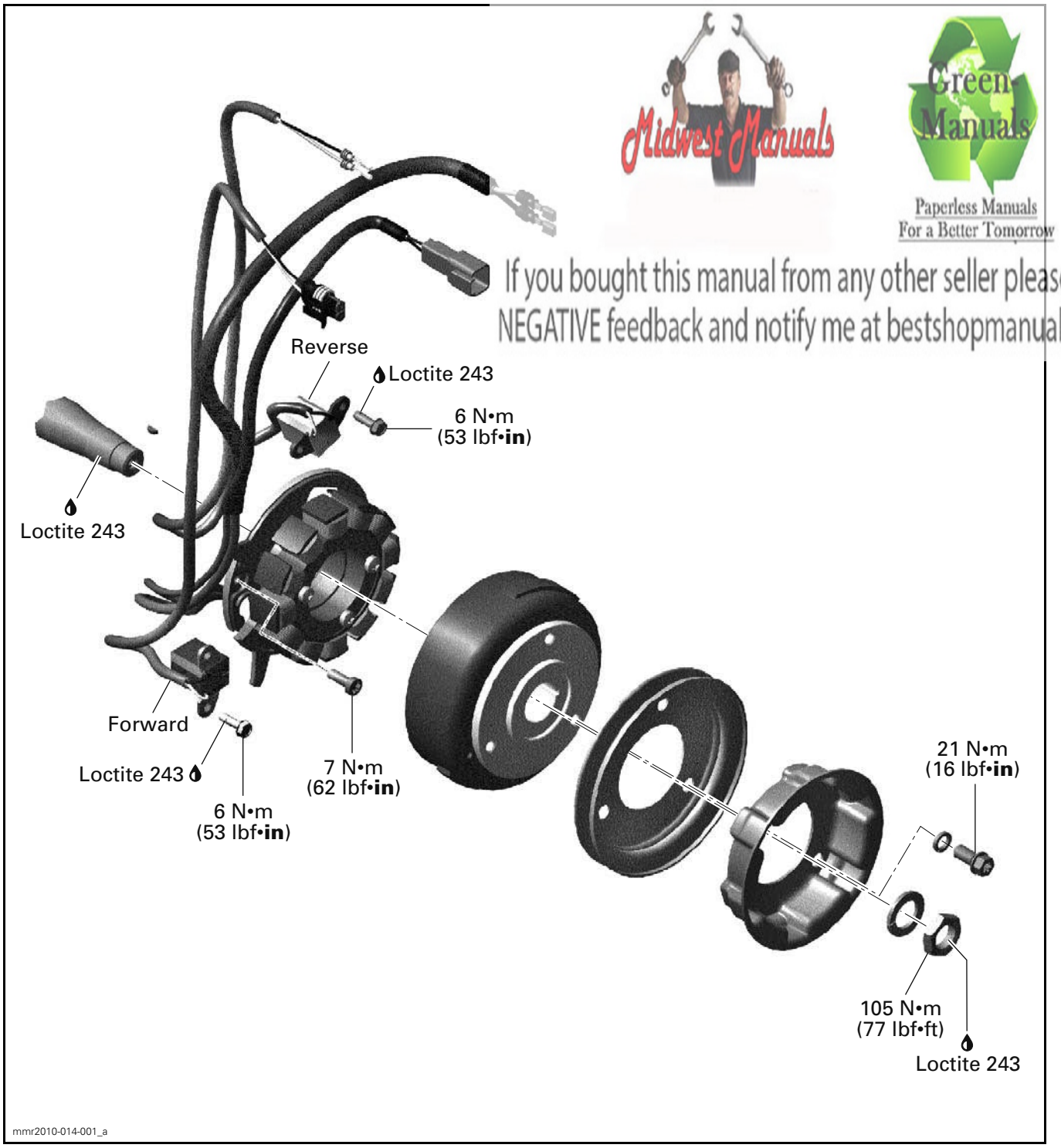
MAGNETO SYSTEM

SERVICE TOOLS

Description	Part Number	Page
CRANKSHAFT PROTECTOR (MAG)	420 876 557	101
FLUKE 115 MULTIMETER	529 035 868	95–98, 103
MAGNETO PULLER RING	420 876 081	101
MAGNETO PULLER	529 035 547	101

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	99, 102, 106



Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

GENERAL

NOTE: The following procedures can be carried out without removing the engine.

PROCEDURES

STATOR

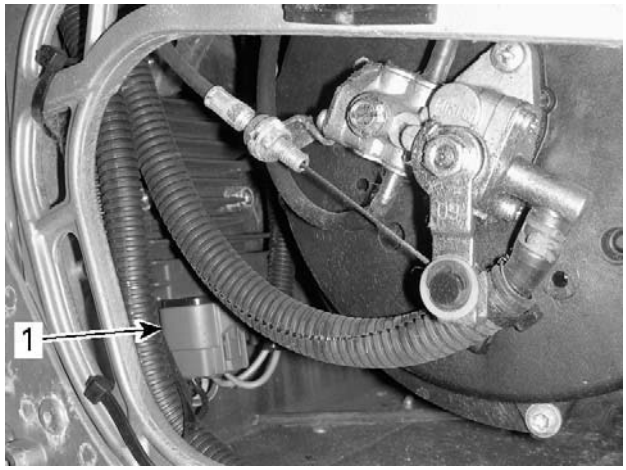
Stator Description

The magneto stator is comprised of 12 windings.

One winding supplies power to the ignition system, the other 11 windings supply power to the charging system, lights and accessories.

Stator Continuity Test (Charging/Lighting Windings)

1. Remove RH side panel, refer to *BODY* subsection.
2. Remove muffler, refer to *EXHAUST SYSTEM* subsection.
3. Disconnect the voltage regulator/rectifier connector.



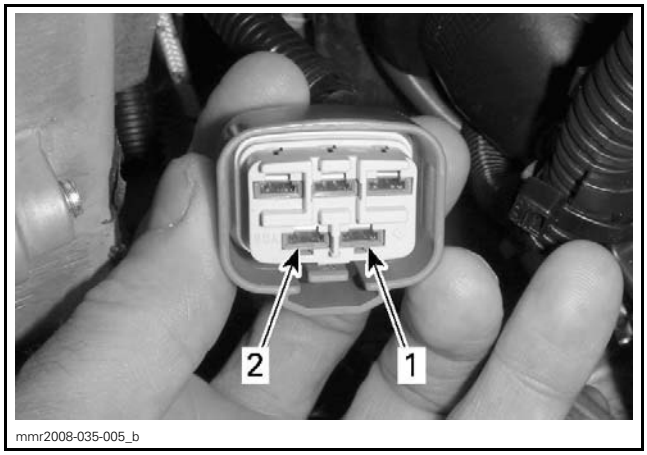
TYPICAL
1. Voltage regulator/rectifier connector

4. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Ω.



5. Read the resistance through the stator charging/lighting windings as follows.

STATOR CONTINUITY TEST (CHARGING/LIGHTING WINDINGS)		
TEST PROBES		RESISTANCE @ 20°C (69°F)
YELLOW wire (pin 1)	YELLOW wire (pin 2)	0 - 0.6 Ω



VOLTAGE REGULATOR CONNECTOR
1. Pin 1 (YELLOW wire)
2. Pin 2 (YELLOW wire)

6. If resistance is out of specification, replace stator.
7. Install the connector and other removed parts in the reverse order of removal. Refer to applicable subsections for details.

Stator Continuity Test (Ignition Winding from Ignition Switch)

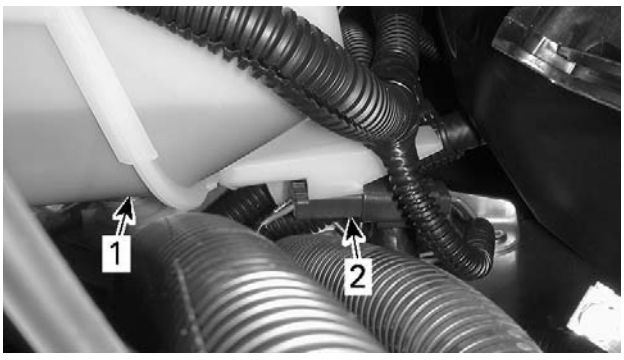
Read the resistance through the ignition winding of the magneto stator ignition from the ignition switch harness connector as follows.

STATOR CONTINUITY TEST (IGNITION WINDING FROM IGNITION SWITCH)		
TEST PROBES		RESISTANCE @ 20°C (69°F)
Ignition switch connector (pin B)	Chassis ground	Approximately 6.5 to 8.5 Ω

RESULT	SERVICE ACTION
Resistance as specified	– Refer to *STATOR INSULATION TEST (IGNITION WINDING)*.
Resistance NOT as specified	– Check MA connector (2 pin magneto connector). – Check continuity between ignition switch connector (pin B) and MA connector. – Carry out a *STATOR CONTINUITY TEST (IGNITION WINDING AT MA CONNECTOR)*.

Stator Continuity Test (Ignition Winding at MA Connector)

1. Remove LH side panel, refer to *BODY* subsection.
2. Remove the drive belt guard, refer to *DRIVE BELT* subsection.
3. Remove the primary intake silencer, refer to *AIR INTAKE SYSTEM* subsection.
4. Disconnect the magneto ignition winding connector (MA).



TYPICAL
1. Oil tank
2. Magneto ignition winding connector (MA)

5. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to "Ω" selection.
6. Read the resistance through the stator ignition winding as follows.

STATOR CONTINUITY TEST (IGNITION WINDING AT MA CONNECTOR)		
TEST PROBES		RESISTANCE @ 20°C (69°F)
BLACK wire (pin 1)	RED wire (pin 2)	6.5 to 8.5 Ω

7. If resistance is out of specification, replace stator.
8. Install the connector and other removed parts in the reverse order of removal. Refer to applicable subsections.

Stator Insulation Test (Charging/Lighting Winding)

1. Refer to *STATOR CONTINUITY TEST (CHARGING/LIGHTING WINDINGS)* for instructions on how to access stator connector on voltage regulator.
2. Set multimeter to "Ω".
3. Read resistance through stator as follows.

STATOR INSULATION TEST (CHARGING/LIGHTING WINDINGS)		
TEST PROBES		RESISTANCE @ 20°C (69°F)
YELLOW wire (pin 1)	To engine ground	OL (open circuit)
YELLOW wire (pin 2)		

If results are out of specification, the stator and/or the wiring need to be repaired/replaced.

Stator Insulation Test (Ignition Winding)

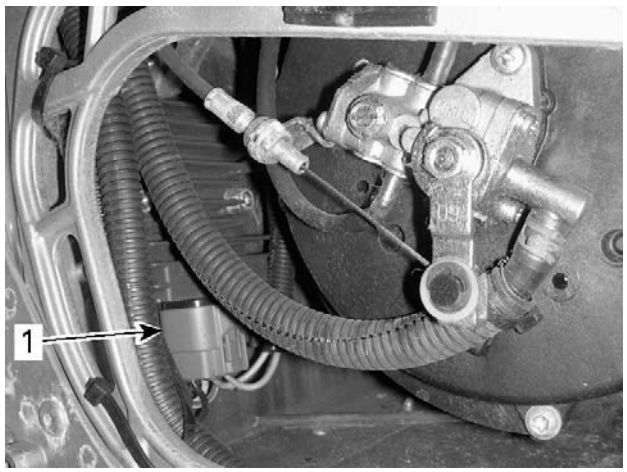
1. Refer to *STATOR CONTINUITY TEST (IGNITION WINDING)* for instructions on how to access the magneto ignition winding connector (MA).
2. Set multimeter to Ω.
3. Read resistance through stator as follows.

STATOR INSULATION TEST (IGNITION WINDING)		
TEST PROBES		RESISTANCE @ 20°C (69°F)
BLACK wire (pin 1)	To engine ground	OL (open circuit)
RED wire (pin 2)		

If results are out of specification, the stator and/or the wiring need to be repaired/replaced.

Stator Output AC Voltage Test (Charging/Lighting Windings)

1. Remove RH side panel, refer to *BODY* subsection.
2. Remove muffler, refer to *EXHAUST SYSTEM* subsection.
3. Disconnect the voltage regulator/rectifier connector.



mmr2012-116-001_a

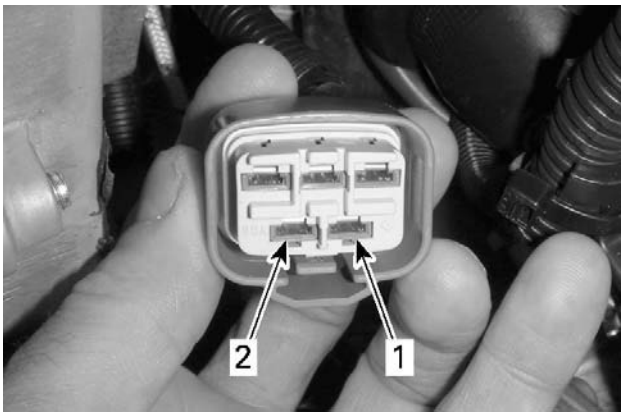
TYPICAL
1. *Voltage regulator/rectifier connector*

4. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vac scale, then press the MIN/MAX button to select the MAX function.


529035868

5. Manually crank engine and read the stator voltage output as follows. Repeat the test 3 times.

STATOR AC VOLTAGE OUTPUT TEST		
TEST PROBES		VOLTAGE
YELLOW wire (pin 1)	YELLOW wire (pin 2)	3 - 7 Vac



mmr2008-035-005_b

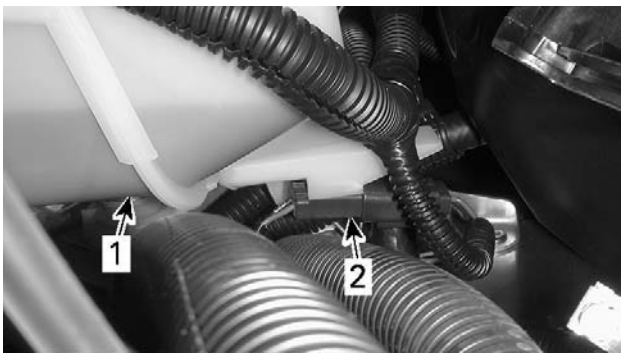
VOLTAGE REGULATOR CONNECTOR
1. *Pin 1 (YELLOW wire)*
2. *Pin 2 (YELLOW wire)*

If voltage is lower than specification, replace stator.

Install all removed parts in the reverse order of removal. Refer to applicable subsections.

Stator Output AC Voltage Test (Ignition Winding)

1. Remove LH side panel, refer to *BODY* subsection.
2. Remove the primary intake silencer, refer to *AIR INTAKE SYSTEM* subsection.
3. Disconnect the magneto ignition winding connector (MA).



mmr2010-006-021_a

TYPICAL
1. *Oil tank*
2. *Magneto ignition winding connector (MA)*

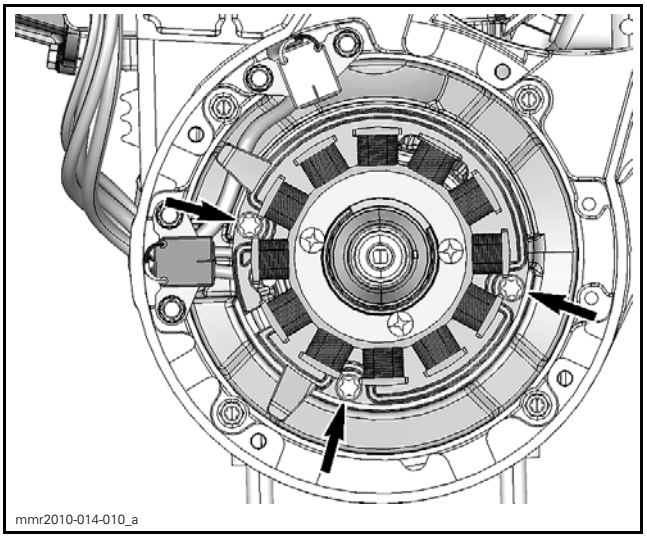
4. Set the FLUKE 115 MULTIMETER (P/N 529 035 868) to Vac scale, then press the MIN/MAX button to select the MAX function.
5. Manually crank engine and read the stator output voltage output as follows. Repeat the test 3 times.

STATOR OUTPUT AC VOLTAGE (IGNITION WINDING)		
TEST PROBES		RESISTANCE @ 20°C (69°F)
BLACK wire (pin 1)	RED wire (pin 2)	7 to 15 Vac

6. If voltage is out of specification, replace stator.
7. Install the connector and other removed parts in the reverse order of removal. Refer to applicable subsections.

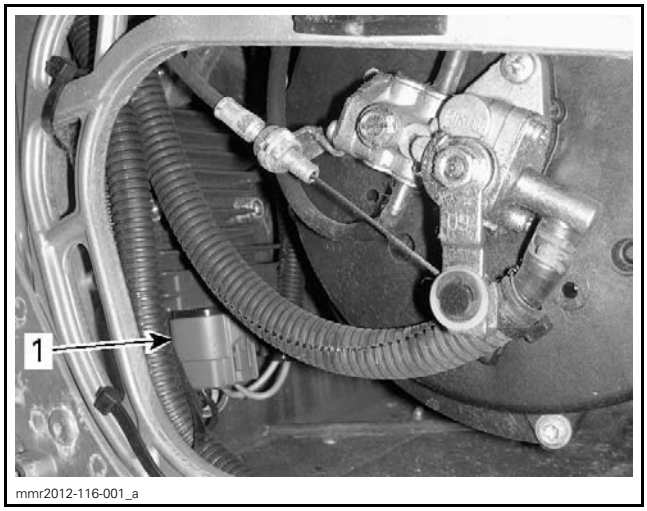
Stator Removal

1. Remove magneto flywheel, see *MAGNETO FLYWHEEL REMOVAL* in this subsection.
2. Remove the three socket screws that retain the stator plate to the crankcase.


mmr2010-014-010_a

STATOR PLATE RETAINING SCREWS

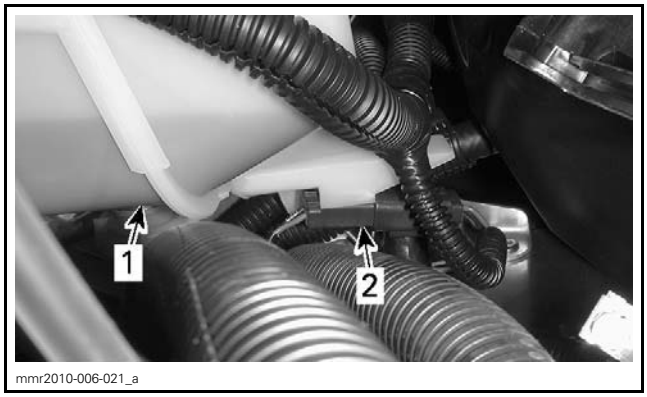
3. Disconnect the voltage regulator/rectifier connector.



mmr2012-116-001_a

TYPICAL
1. Voltage regulator/rectifier connector

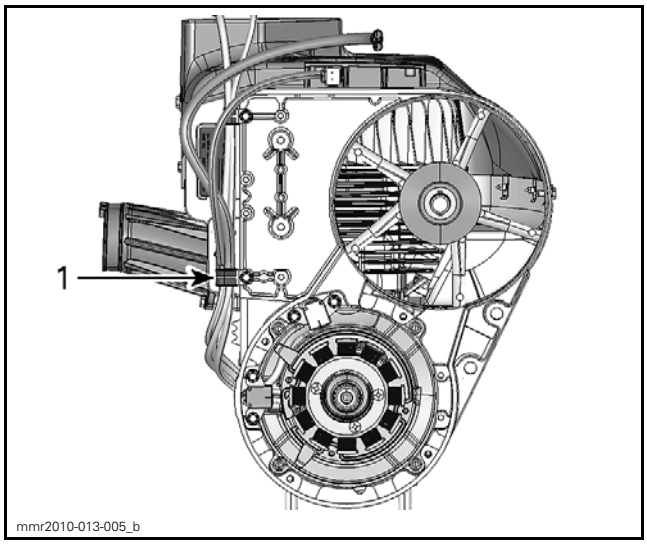
4. Remove both YELLOW stator wires from the voltage regulator connector using the appropriate terminal removal tool.
5. Disconnect the magneto ignition winding connector (MA).



mmr2010-006-021_a

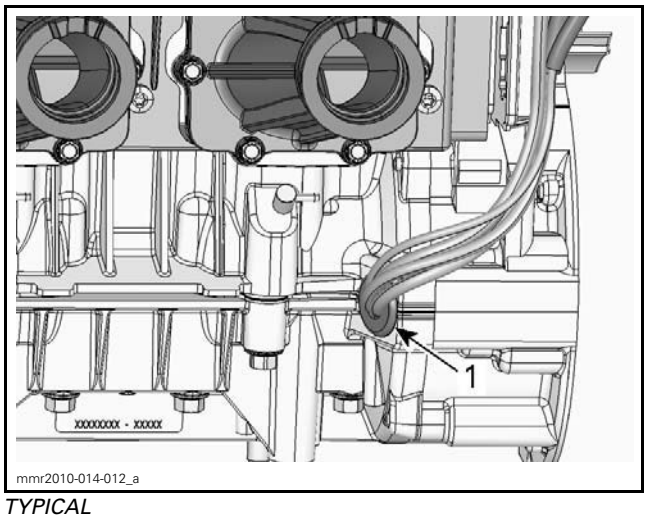
TYPICAL
1. Oil tank
2. Magneto ignition winding connector (MA)

6. Tie a string of adequate length to each pair of the stator wires and secure the loose end so that it cannot be pulled through the harness and grommet.
7. Remove the clamp that secures the stator wiring to the engine.



TYPICAL
1. Clamp to remove

8. Remove grommet from crankcase where trigger coil wiring passes through the crankcase.



TYPICAL
1. Grommet in crankcase

9. Carefully pull wires through crankcase opening as you remove the stator.
10. Untie the string from the stator wires, it will be used to pull the wires back through the grommet on installation.

Stator Cleaning

NOTICE **Clean stator using only a clean cloth.**

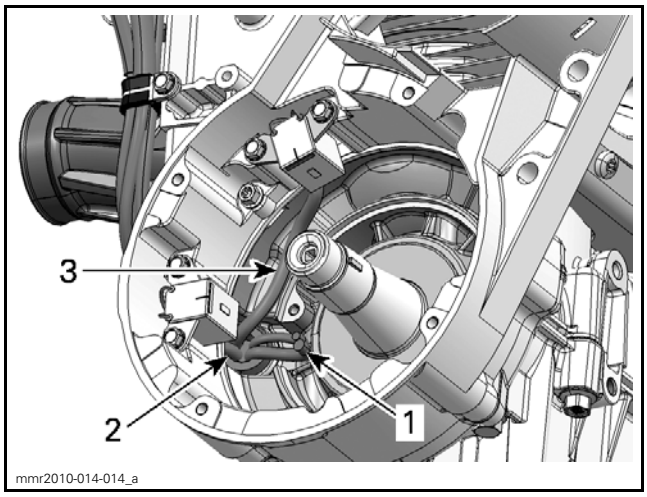
Stator Installation

1. Insert the stator wires through the crankcase grommet and pull them up to the voltage regulator connector and to the magneto ignition winding connector (MA) located under the injection oil tank.

NOTE: Use the string and a piece of tape to secure the ends of the wires to ease pulling them through the crankcase, grommet and flexible conduits.

2. Position stator so that its wire protectors are positioned over the recessed area in the crankcase.

NOTE: The magneto stator is removed in following illustration to facilitate viewing of wiring layout.



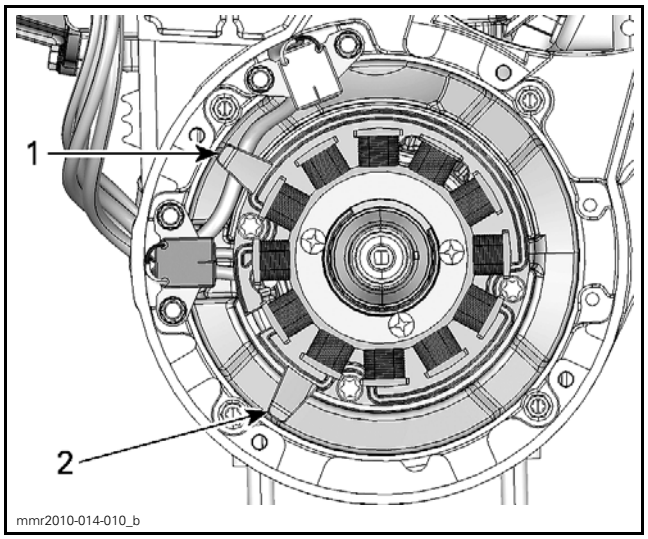
1. Magneto stator wiring in recessed area
2. Forward trigger coil wiring
3. Reverse trigger coil wiring

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

3. Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on threads of stator plate retaining screws, then torque them to 7 N•m (62 lbf•**in**).

STATOR PLATE RETAINING SCREW TORQUE
7 N•m (62 lbf•**in**)

Note the position of the tabs on the stator plate. The upper stator plate tabs holds the reverse trigger coil wiring in its proper position.



TYPICAL
1. *Upper stator plate tab*
2. *Lower stator plate tab*

4. Ensure grommet is properly installed in crankcase as prior to stator removal.
5. Insert the stator wires in the voltage regulator/rectifier connector, and the magneto ignition winding connector (MA) as per following table.

MAGNETO IGNITION WINDING CONNECTOR (MA)	
Pin 1	YELLOW
Pin 2	YELLOW
VOLTAGE REGULATOR/RECTIFIER CONNECTOR	
Pin 1	BLACK
Pin 2	RED

6. Pull on the wires with enough force to ensure they are properly locked in.
7. Install magneto flywheel as per *MAGNETO FLYWHEEL INSTALLATION* in this subsection.
8. Reinstall all other removed parts, refer to applicable subsections for details.

NOTICE **Do not apply silicone dielectric grease or any other product on Deutsch waterproof connector housings as housing seal may be damaged.**

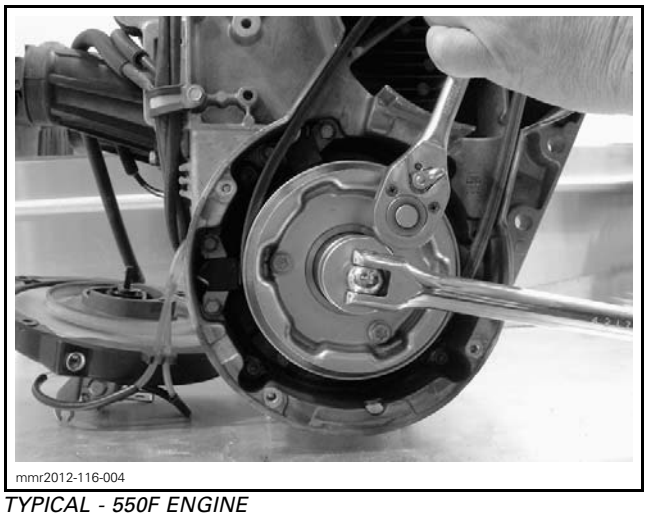
MAGNETO FLYWHEEL

Magneto Flywheel Access

1. Refer to *BODY* subsection and remove:
   – Hood
   – RH side panel
   – Seat
   – Console.
2. Remove muffler, refer to *EXHAUST SYSTEM* subsection.
3. Refer to *AXIAL FAN* subsection and remove:
   – Upper air inlet duct
   – Lower air inlet duct.

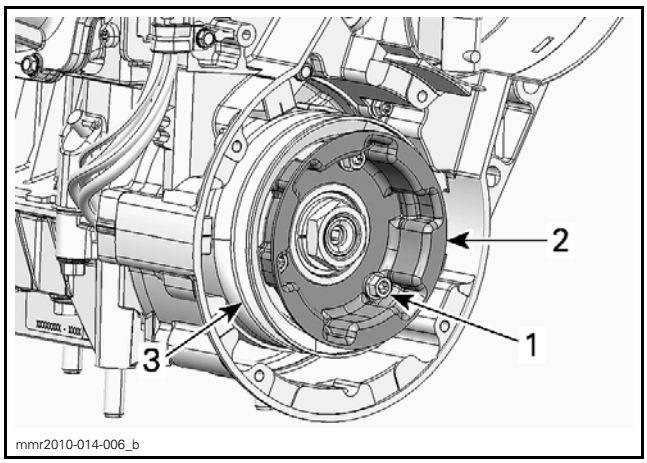
Magneto Flywheel Removal

1. Refer to *REWIND STARTER* subsection and remove:
   – Rewind starter
   – Rewind starter flange.
2. Refer to *AXIAL FAN* subsection and remove:
   – Axial fan
   – Fan belt.
3. Hold magneto flywheel with a socket then remove starting pulley retaining screws.



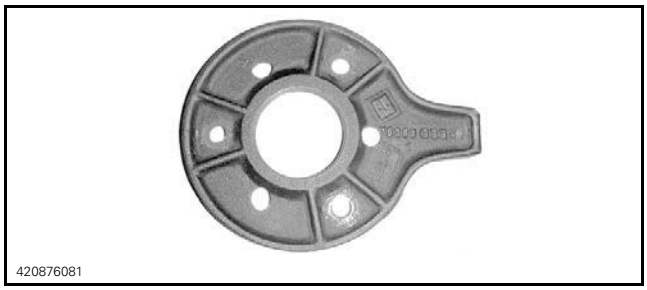
TYPICAL - 550F ENGINE

4. Remove starting pulley and fan belt pulley.



TYPICAL - 550F ENGINE
1. *Retaining screws and lock washers (3 each)*
2. *Starting pulley*
3. *Fan belt pulley*

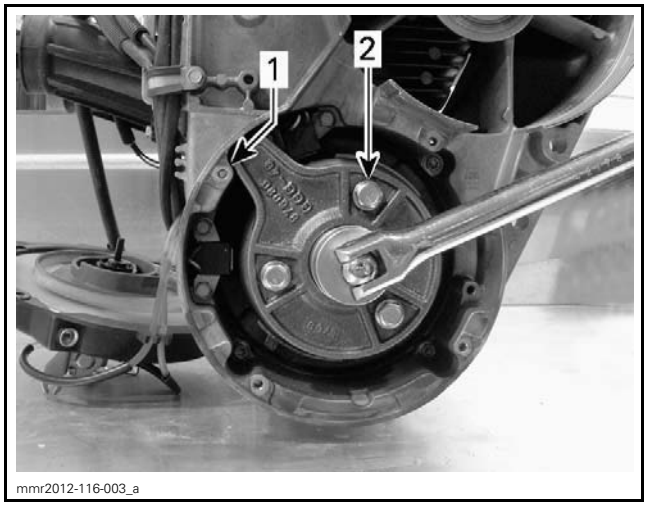
5. Install the MAGNETO PULLER RING (P/N 420 876 081) on the magneto flywheel.



MAGNETO PULLER RING

NOTICE Use only the following screw lengths to fasten puller ring to magneto flywheel. If other screw lengths are used, the stator located behind the magneto flywheel may be damaged.

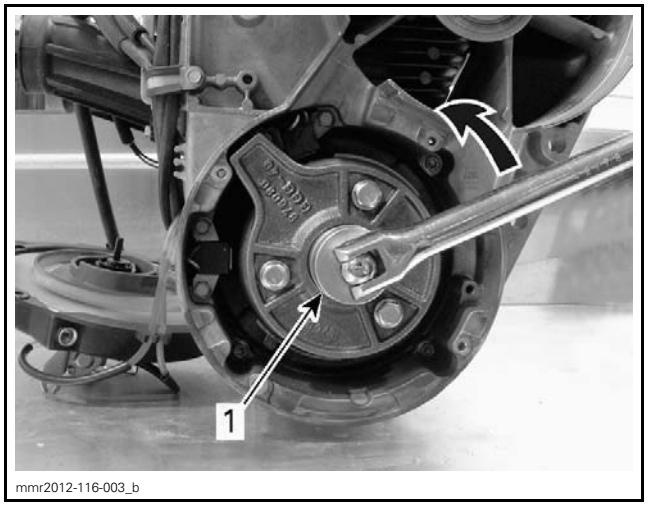
ENGINE	SCREW LENGTH
550F	M8 x 20 mm



TYPICAL - 550F ENGINE
1. *Tab in fan housing opening*
2. *M8 screws of appropriate length (x3)*

6. Remove magneto flywheel retaining nut, using an appropriate socket.

MAGNETO FLYWHEEL REMOVAL
30 mm socket with the outside diameter machined to 40 mm (1.575 in)



TYPICAL - 550F ENGINE
1. *Machined 30 mm socket*

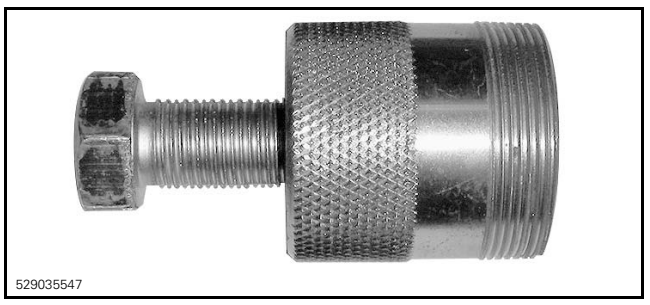
NOTE: To correctly remove a fastener with threadlocker, first tap on the fastener to break threadlocker bond. This will prevent the thread from breaking.

7. Install the CRANKSHAFT PROTECTOR (MAG) (P/N 420 876 557) on crankshaft end.

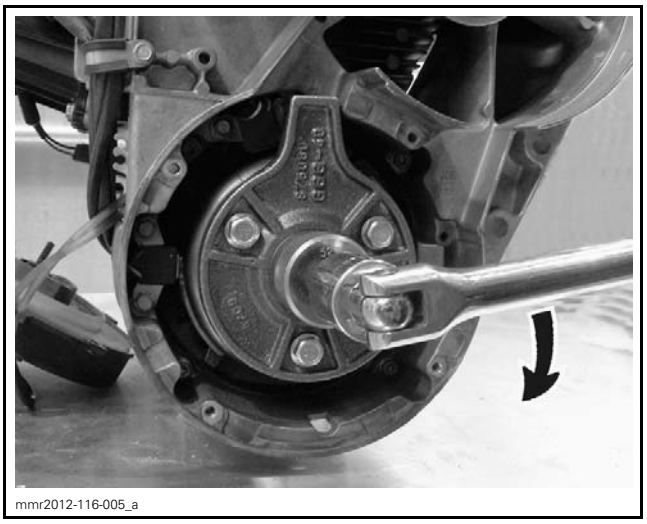


NOTE: Apply a small amount of grease on the end of the crankshaft to hold crankshaft protector in place.

8. Install the MAGNETO PULLER (P/N 529 035 547) into the magneto puller ring.



9. Tighten puller bolt, while tapping on puller bolt head with a hammer to release magneto flywheel from crankshaft.


mmr2012-116-005_a

TYPICAL - 550F ENGINE

Magneto Flywheel Cleaning

NOTICE **Clean magneto flywheel using only a clean cloth.**

Magneto Flywheel Inspection

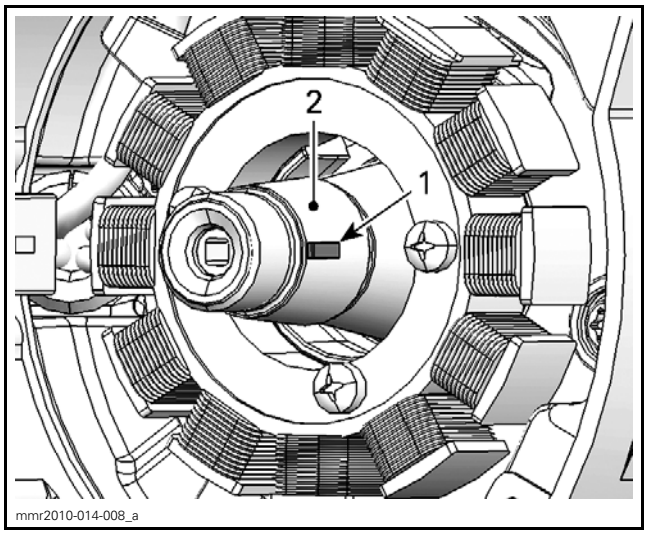
Inspect magneto flywheel for abnormal coloration (brown or blue) that would indicate an overheating condition.

If overheating condition is suspected, carry out the following:

– Check flywheel magnetic field using a piece of metal. If magnetic field is not felt or weak, replace flywheel.
– Inspect flywheel for cracks, pay particular attention to the inside circumference (magnets), and the tapered center portion.
– Check stator for signs of overheating.
– Test stator, see procedures in this subsection.

Magneto Flywheel Installation

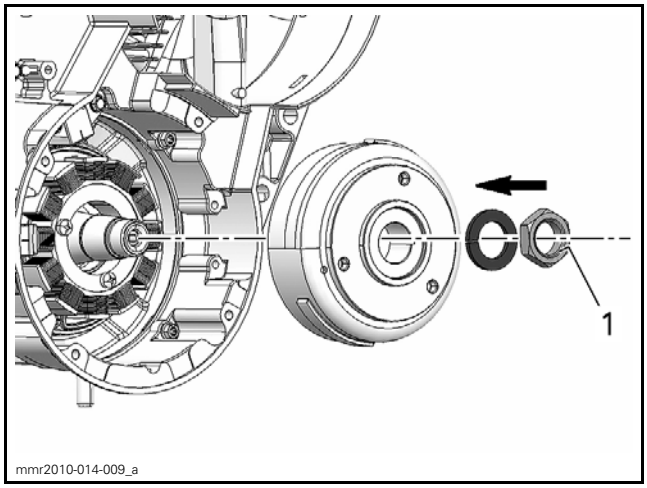
1. Clean crankshaft extension (taper) and apply LOCTITE 243 (BLUE) (P/N 293 800 060) on tapered surface.
2. Ensure Woodruff key is properly installed on crankshaft.



mmr2010-014-008_a

1. *Woodruff key on crankshaft*
2. *Clean and apply Loctite 243 (BLUE) on this crankshaft taper*

3. Position magneto flywheel and lock washer on crankshaft.
4. Clean the threads in the magneto flywheel nut and apply LOCTITE 243 (BLUE) (P/N 293 800 060).



mmr2010-014-009_a

MAGNETO FLYWHEEL INSTALLATION
1. *Loctite 243 (BLUE) on threads*

5. Install nut on crankshaft and tighten to specified torque, see following table.

ENGINE	MAGNETO FLYWHEEL TORQUE
550F	105 N•m (77 lbf•ft)

6. Install starting pulley, torque screws to specification.

ENGINE	STARTING PULLEY TORQUE
550F	21 N•m (15 lbf•ft)

7. Install all other removed parts in the reverse order of removal, refer to applicable subsections.

TRIGGER COILS

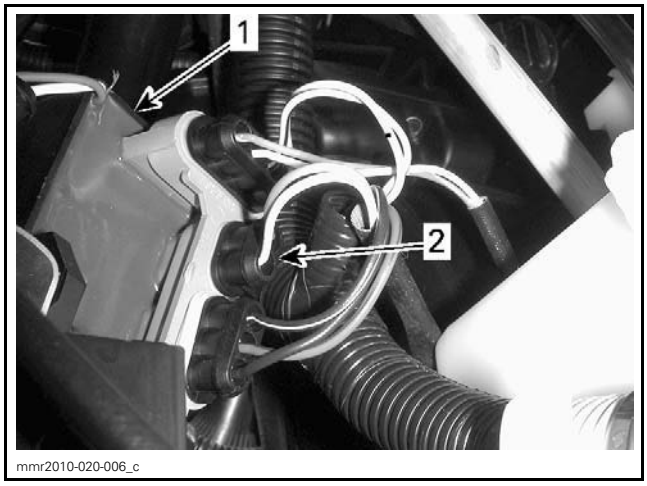
Trigger Coil Resistance Test

Refer to *BODY* subsection and remove LH side panel.

Refer to *AIR INTAKE SYSTEM* subsection and remove primary intake silencer.

Forward Operation Trigger Coil

Disconnect the 2 pin (DB) connector from the ECM.



1. ECM
2. 2-pin (DB) connector

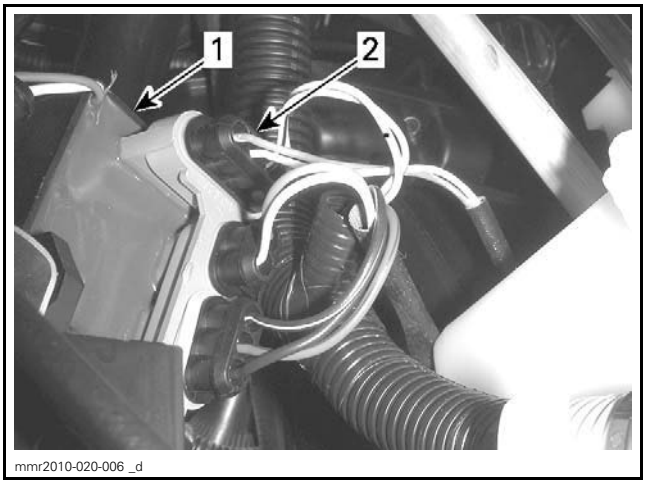
Measure resistance as per following table.

TRIGGER COILS	TEST PROBES		RESISTANCE @ 20°C (68°F)
ECM 2-pin connector (DB)	Pin 1	Pin 2	160 to 180 Ω

If resistance is not as specified, replace trigger coil.

Reverse Operation Trigger Coil

Disconnect the 4 pin (DA) connector from the ECM.



1. ECM
2. 4-pin DA connector

Measure resistance as per following table.

TRIGGER COILS	TEST PROBES		RESISTANCE @20°C (68°F)
ECM 4-pin connector (DA)	Pin 3	Pin 4	160 to 180 Ω

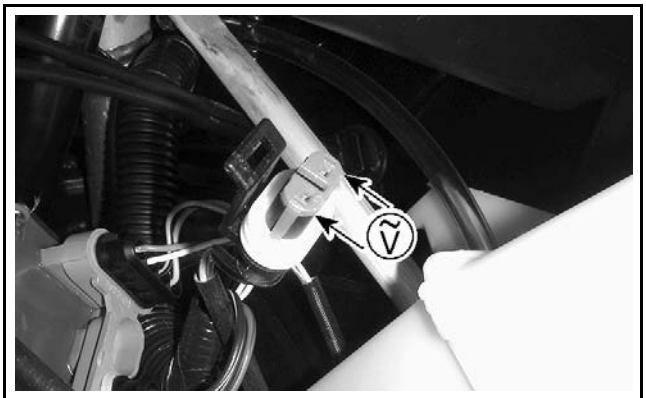
If resistance is not as specified, replace trigger coil.

Trigger Coil Output Voltage Test

1. Set FLUKE 115 MULTIMETER (P/N 529 035 868) to Vac, then press the MIN/MAX button to select the MAX function.



2. Disconnect trigger coil connector. Refer to *TRIGGER COIL RESISTANCE TEST* for connector access.
3. Measure voltage as follows.



mmr2010-020-013_b

TRIGGER COILS	TEST PROBES		VOLTAGE OUTPUT WHILE CRANKING
Forward, ECM 2-pin connector (DB)	Pin 1	Pin 2	0.15 to 0.4 Vac
Reverse, ECM 4-pin connector (DA)	Pin 3	Pin 4	

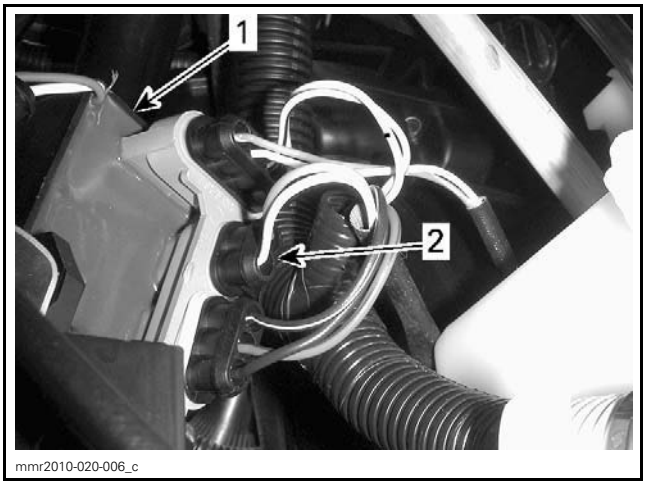
NOTE: Repeat test 3 times. Readings vary according to cranking force.

If voltage is not as specified, replace trigger coil.

Trigger Coil Removal

Forward Operation Trigger Coil

Disconnect the 2 pin (DB) connector from the ECM.

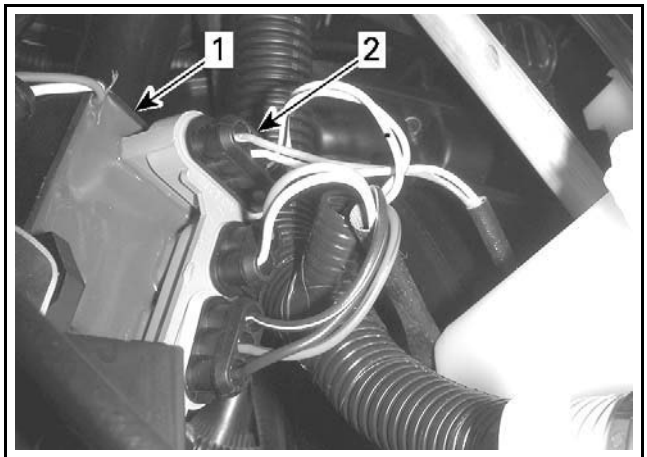


mmr2010-020-006_c

1. ECM
2. 2-pin (DB) connector

Reverse Operation Trigger Coil

Disconnect the 4 pin (DA) connector from the ECM.



mmr2010-020-006 _d

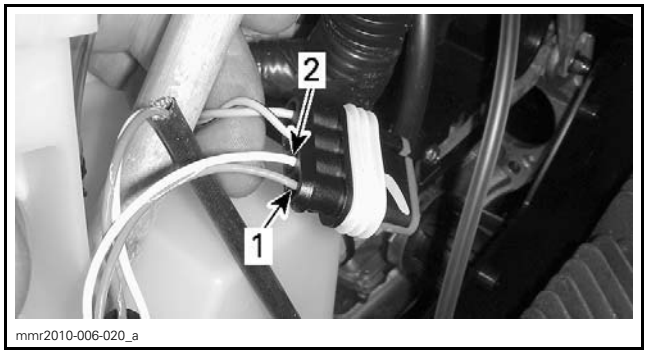
1. ECM
2. 4-pin DA connector

Remove the BLUE/YELLOW and the WHITE/YELLOW wires from the ECM DA connector.

Remove the RED plastic lock from the connector.

Through the front of the connector, lift the terminal lock using a small screwdriver to release the wire terminal.

Extract the wire out the back of the connector.



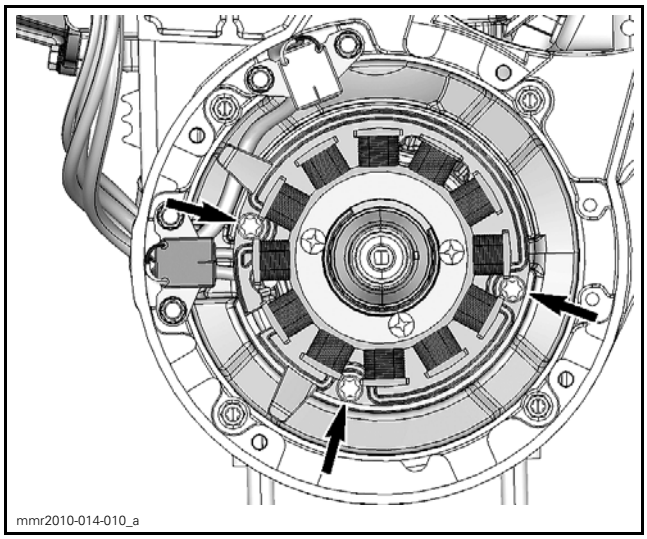
mmr2010-006-020_a

1. BLUE/YELLOW wire
2. WHITE/YELLOW wire

Forward and Reverse Operation Trigger Coils

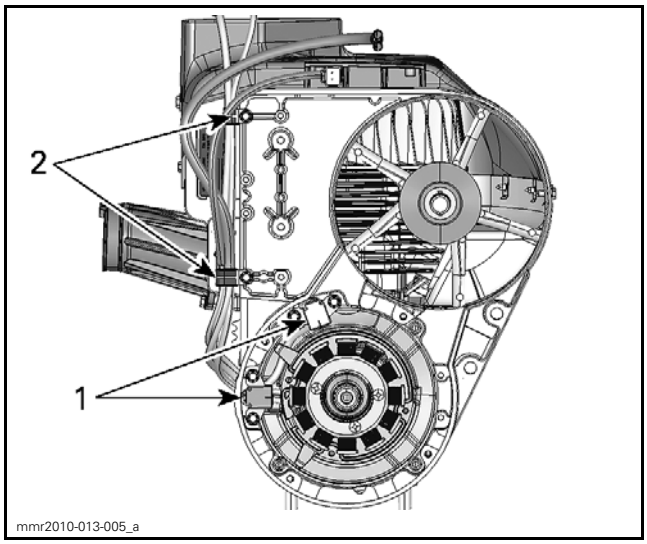
Remove magneto flywheel, refer to *MAGNETO FLYWHEEL REMOVAL* in this subsection.

Remove the 3 screws that retain the magneto stator plate to the crankcase and pull the stator slightly forward.



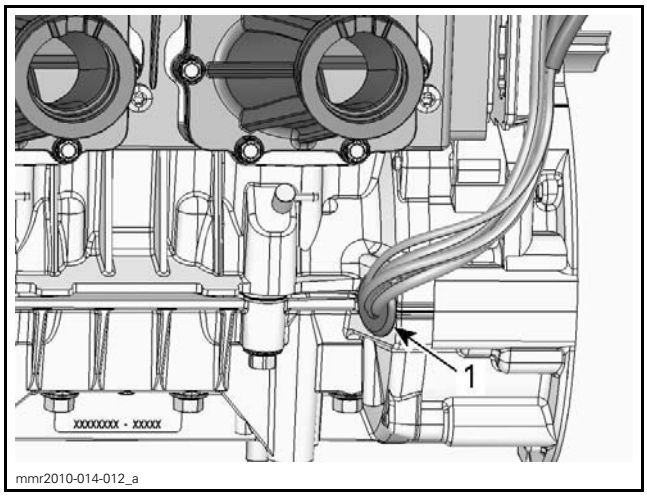
STATOR PLATE RETAINING SCREWS

Remove the clamps that secure the trigger coil wiring to the engine.



TYPICAL
1. *Trigger coils*
2. *Clamps to remove*

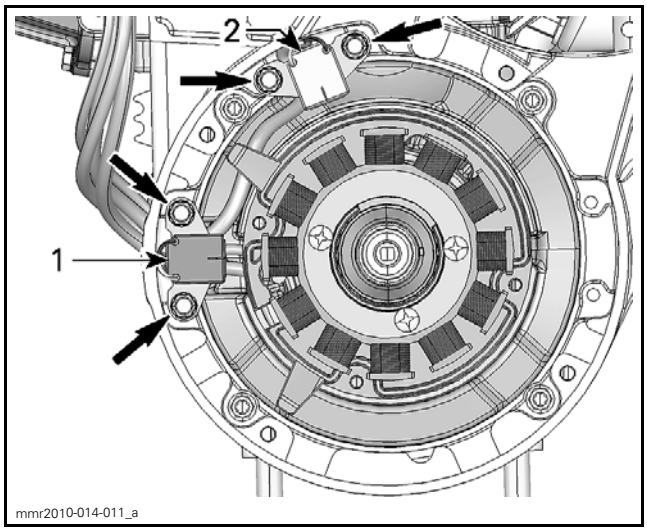
Remove grommet from crankcase where trigger coil wiring passes through the crankcase.



TYPICAL
1. *Grommet in crankcase*

Remove trigger coil(s) retaining screws.

NOTICE **Mark the position of each trigger coil before removing their retaining screws.**



TRIGGER COIL RETAINING SCREWS
1. *Forward trigger coil*
2. *Reverse trigger coil*

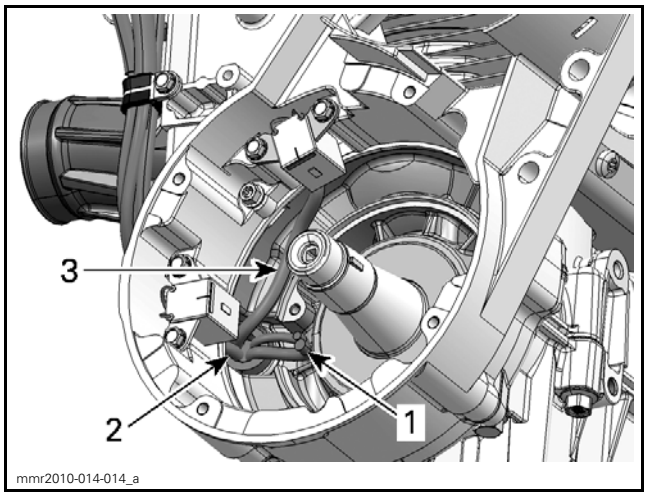
Remove trigger coil(s) and carefully pull wires through grommet and crankcase.

Trigger Coil Installation

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

1. Ensure trigger coil and magneto stator wiring are properly positioned as per following illustration.

NOTE: The magneto stator is removed in following illustration to facilitate viewing of wiring layout.



1. Magneto stator wiring in recessed area
2. Forward trigger coil wiring
3. Reverse trigger coil wiring

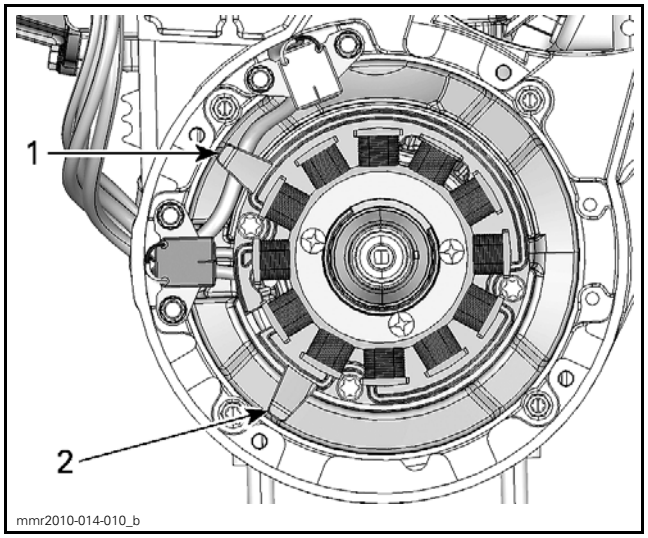
2. Apply LOCTITE 243 (BLUE) (P/N 293 800 060) to the trigger coil and stator plate retaining screws.
3. Install trigger coil, torque retaining screws as per following table.

TRIGGER COIL RETAINING SCREW TORQUE
6 N•m (53 lbf•**in**)

4. Install magneto stator, torque retaining screws as per following table.

STATOR PLATE RETAINING SCREW TORQUE
7 N•m (62 lbf•**in**)

Note the position of the tabs on the stator plate. The upper stator plate tabs holds the reverse trigger coil wiring in its proper position.



1. Upper stator plate tab
2. Lower stator plate tab

5. Install magneto flywheel as per *MAGNETO FLYWHEEL INSTALLATION* in this subsection.
6. Install trigger coil wires in their respective connectors as per following table.

FORWARD TRIGGER COIL		
ECM CONNECTOR (DB)	Pin 1	WHITE/YELLOW
	Pin 2	BLUE/YELLOW
REVERSE TRIGGER COIL		
ECM CONNECTOR (DA)	Pin 3	WHITE/YELLOW
	Pin 4	BLUE/YELLOW

7. Install all other removed parts, refer to their applicable subsections.

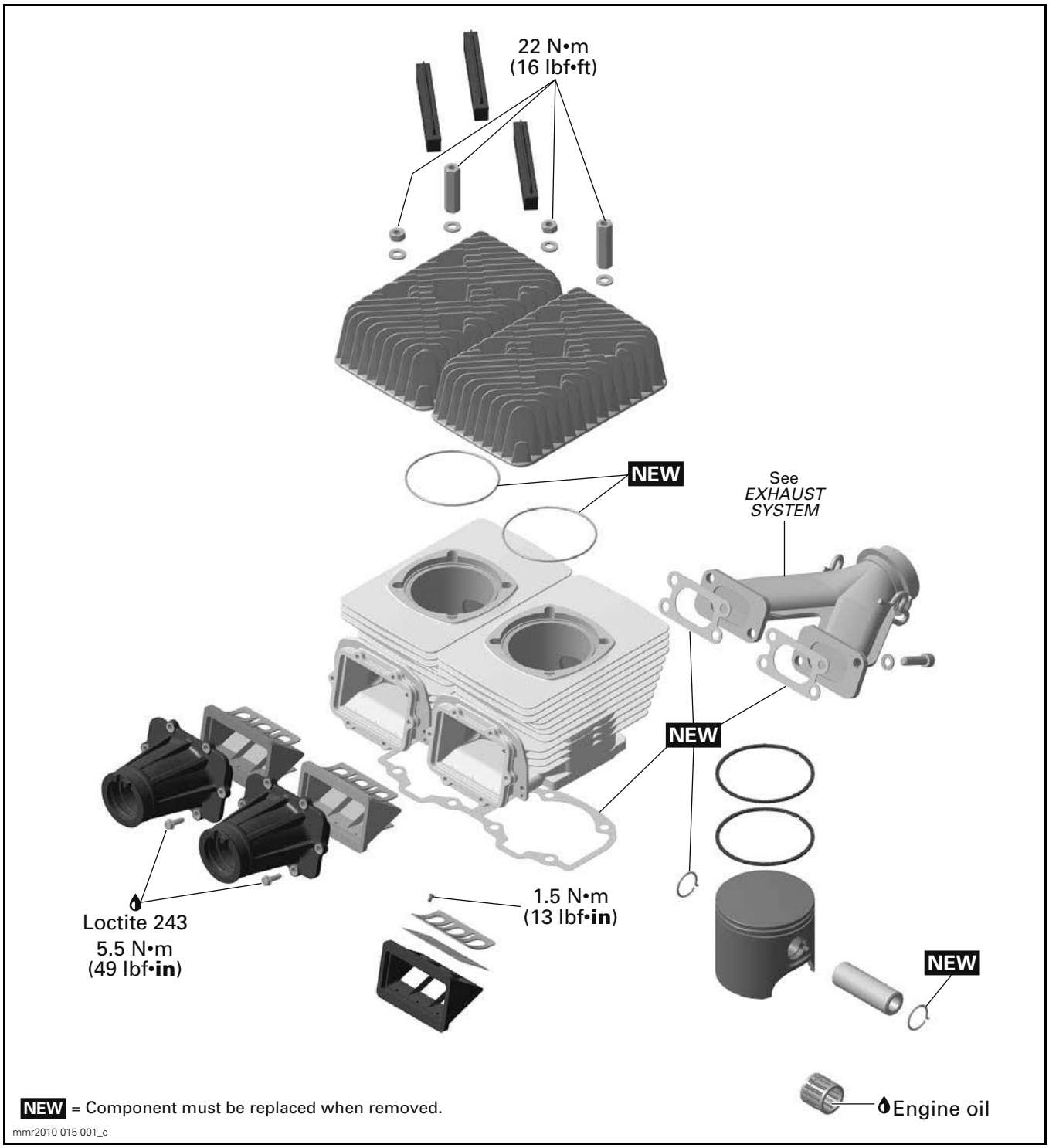
TOP END

SERVICE TOOLS

Description	Part Number	Page
PISTON CIRCLIP INSTALLER	529 035 686	113
PISTON PIN PULLER	529 035 503	113
SLEEVE KIT 20 MM	529 035 542	113

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 518	293 800 038	112
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	110–111


22 N•m
(16 lbf•ft)
NEW
See
EXHAUST
SYSTEM
NEW
Loctite 243
5.5 N•m
(49 lbf•in)
1.5 N•m
(13 lbf•in)
NEW
Engine oil
NEW = Component must be replaced when removed.
mmr2010-015-001_c

GENERAL

Before disassembling the engine, check airtightness. Refer to *ENGINE LEAK TEST* subsection.

To measure internal parts, refer to *ENGINE MEASUREMENT* subsection.

ENGINE BREAK-IN

NOTICE **After a repair involving major parts replacement, a break-in period must be observed.**

1. Follow *OPERATOR'S GUIDE* recommendation relating to break-in.
2. Add 500 ml (17 U.S. oz) of recommended injection oil into a full fuel tank.

INSPECTION

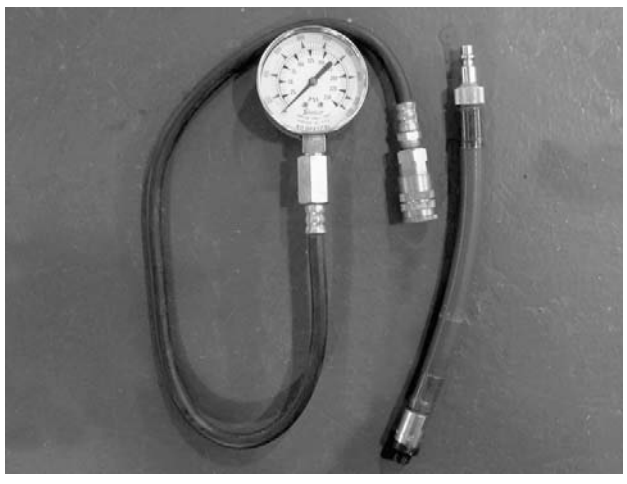
ENGINE COMPRESSION TEST

1. Remove body parts as required to access to the spark plugs.
2. Lift rear of vehicle to clear track from the ground. Support it with a wide base stand.

⚠ WARNING

Prior to measuring engine compression, ensure vehicle is properly lifted with the track off the ground.

3. Safely warm up engine.
4. Remove both spark plugs.
5. Install an appropriate ENGINE COMPRESSION TOOL on engine.



ENGINE COMPRESSION TOOL

Depress throttle lever to wide open position.

Press start button for a few seconds.

Check if engine compression is according to specification.

ENGINE COMPRESSION SPECIFICATION	
SERVICE LIMIT	7.5 bar (110 PSI)

PROCEDURES

NOTE: To reach any internal parts, the engine removal is necessary.

REED VALVE

Reed Valve Removal

Remove intake adapters by removing carburetors and retaining screws.

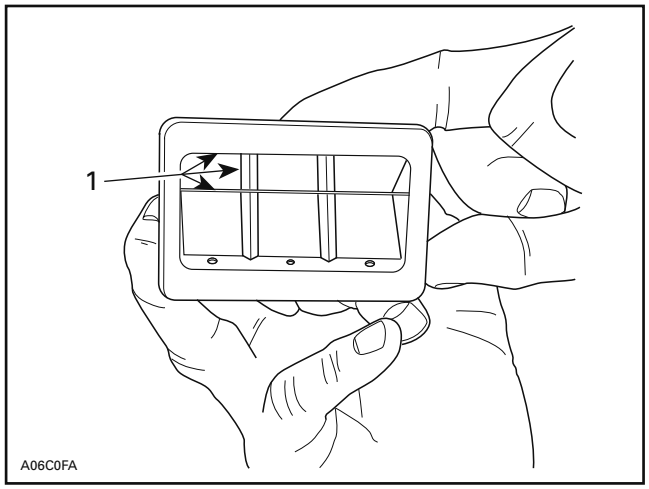
Remove reed valves from engine.

Reed Valve Inspection

Remove blade stopper.

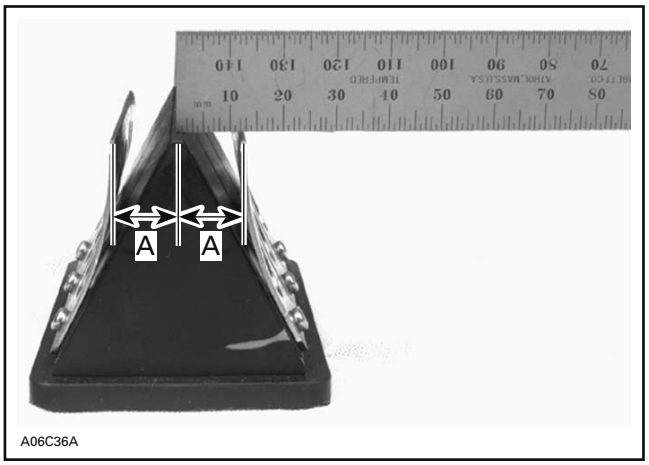
Check reed valve for proper tightness. There must be no play between blade and valve body when exerting a finger pressure on blade at blade stopper location.

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



1. No play

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



TYPICAL
A. 14.75 mm ± 0.75 mm (.58 in ± .03 in)

BLADE STOPPER DISTANCE	
550F	14.75 mm ± 0.75 mm (.581 in ± .03 in)

Bend blade stopper as required to obtain the proper distance.

Reed Valve Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

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

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

CYLINDER HEADS

Cylinder Head Removal

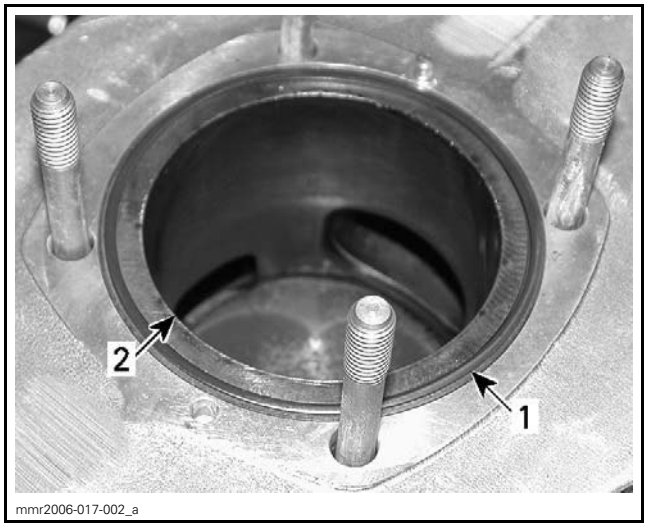
Remove cylinder head nuts, distance nuts and flat washers.

Lift cylinder head over cylinder studs.

Cylinder Head Inspection

Check cylinder heads for cracks, broken fins, warp or other damages. Replace if necessary.

Check O-rings between cylinder heads and cylinders.



TYPICAL
1. O-ring
2. Cylinder

Cylinder Head Warpage

ENGINE	MAXIMUM
550F	0.05 mm (.002 in) as per 50 mm (2 in)
	0.5 mm (.02 in) for total length of cylinder head

NOTE: Refer to *ENGINE MEASUREMENT* for the measurement procedures.

Cylinder Head Cleaning

Scrape off carbon formation from cylinder head.

Discard gasket and O-ring. Use LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500) to clean mating surfaces.

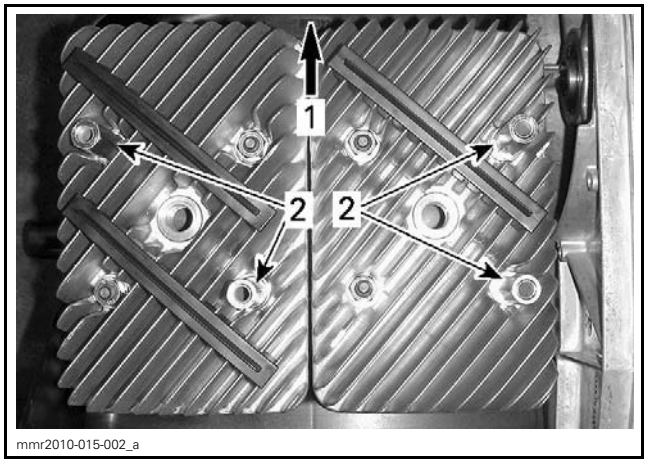
Clean metal components in a non-ferrous metal cleaner.

Cylinder Head Installation

The installation is the reverse of removal procedure, however pay attention to the following.

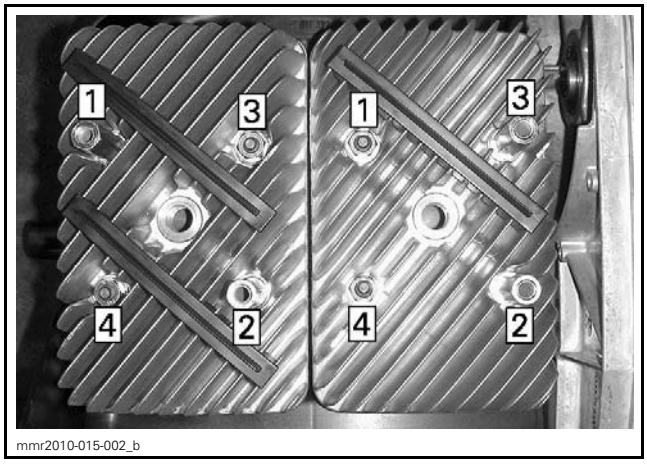
Install a new O-ring.

Position cylinder head nuts and distance nuts as shown.



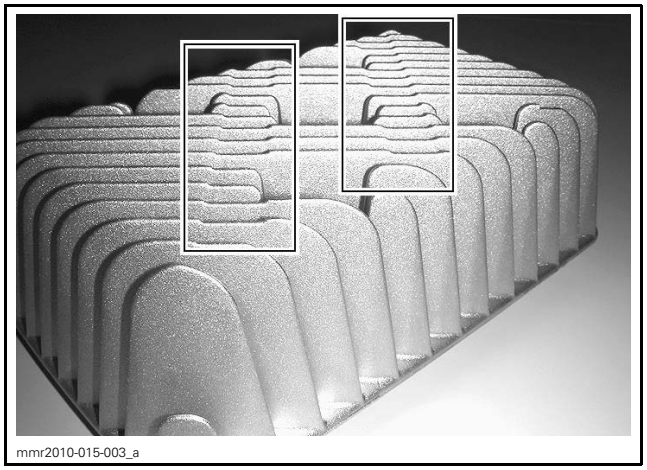
1. Exhaust
2. Distance nuts

Tighten cylinder head nuts to 22 N•m (16 lbf•ft) in two steps following illustrated sequence.

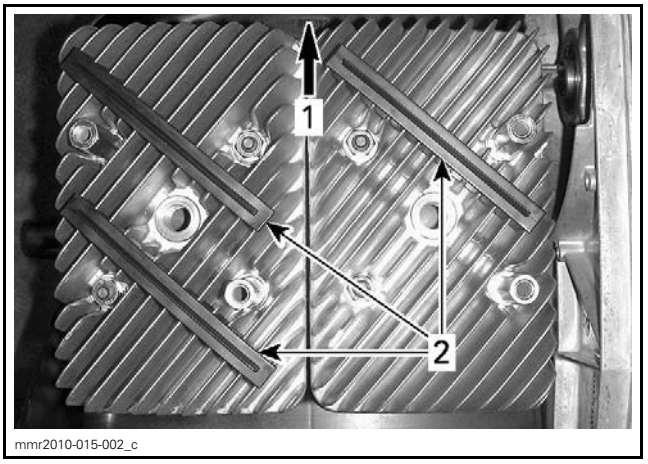


TIGHTENING SEQUENCE

If noise dampers were removed, install as shown. Use the recesses in the fins to guide noise damper installation.



RECESSES



1. Exhaust
2. Noise dampers

CYLINDERS

Cylinder Removal

Remove intake adapters and reed valves.

Remove front and rear cylinder cowls, refer to *AXIAL FAN* subsection.

Remove *CYLINDER HEADS*, see procedure in this subsection.

Lift cylinders.

Discard the cylinder gasket.

Cylinder Inspection

Check cylinders for cracks and scoring on the top and bottom of cylinders. Replace if necessary.

NOTE: Refer to tables below to find cylinder specifications. For dimension measurement procedures, refer to *ENGINE MEASUREMENT*.

Cylinder Taper

ENGINE	MAXIMUM
550F	0.10 mm (.004 in)

Cylinder Out of Round

ENGINE	MAXIMUM
550F	0.08 mm (.003 in)

Cylinder Cleaning

Scrape off carbon formation from exhaust ports.

Discard all gasket. Use LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500) to clean mating surfaces.

Clean metal components in a non-ferrous metal cleaner.

Cylinder Installation

The installation is the reverse of removal procedure, however pay attention to the following.

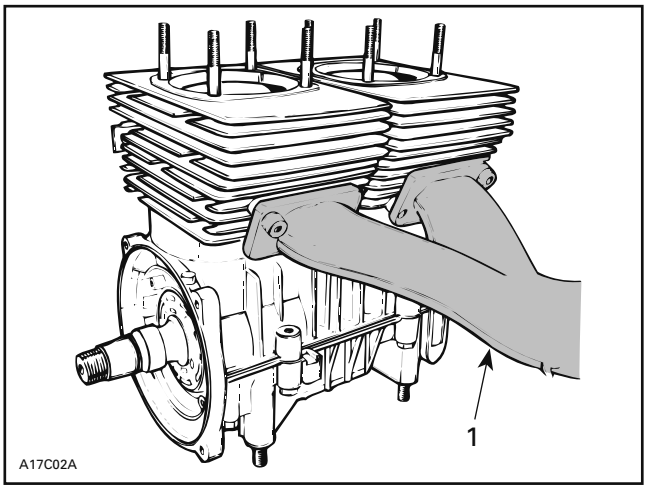
Install a NEW base gasket of the same thickness as the old one. Refer to *CYLINDER BASE GASKET* in this subsection.

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

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

Using fingers or an appropriate piston ring compressor, slide piston into cylinder.

Use exhaust manifold to align cylinders.



TYPICAL
1. Use exhaust manifold to align cylinders

Install *CYLINDER HEADS*, see procedure in this subsection.

Install intake adapter, tighten screws to 5 N•m (44 lbf•**in**).

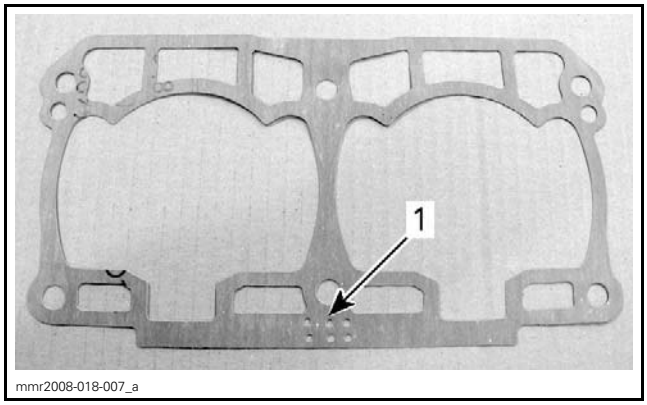
Install all other removed parts.

CYLINDER BASE GASKET

Cylinder Base Gasket Replacement

The cylinder base gasket is available in different thicknesses.

CYLINDER BASE GASKET	
THICKNESS	DOTS QUANTITY
1.2	2
1.1	1
1.0	No dot
0.9	9
0.8	8
0.7	7
0.6	6
0.5	5



TYPICAL
1. Gasket thickness identification dots

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

1. Ensure top surface of crankcase is clean.
2. Apply a thin layer of LOCTITE 518 (P/N 293 800 038) to crankcase mating surface.
3. Install a NEW cylinder base gasket of the same thickness as the one that was installed at factory. In doubt, measure the combustion chamber volume, refer to *ENGINE MEASUREMENT* subsection.
4. Apply a thin layer of LOCTITE 518 (P/N 293 800 038) to gasket surface.

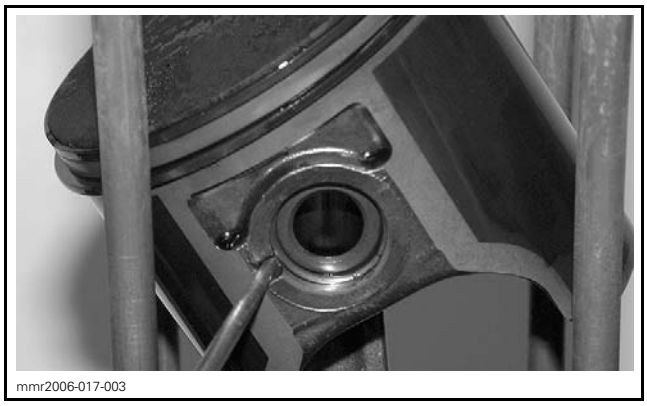
PISTON

Piston Removal

Remove *CYLINDERS*, see procedure in this subsection.

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

Place a clean rag over crankcase to prevent circlips from falling into crankcase. Then with a pointed tool inserted in piston notch, remove both circlips from piston.


mmr2006-017-003

Use the PISTON PIN PULLER (P/N 529 035 503) along with the SLEEVE KIT 20 MM (P/N 529 035 542) to remove piston pin. Use the following procedure.

1. When inserting piston pin puller, make sure it sits squarely against piston.



TYPICAL
1. Properly seated all around

2. On the other side, slide the sleeve on the puller stem, then install the cap on the puller stem.
3. Pull piston pin out.
4. Remove piston from connecting rod.
5. Remove needle bearing.

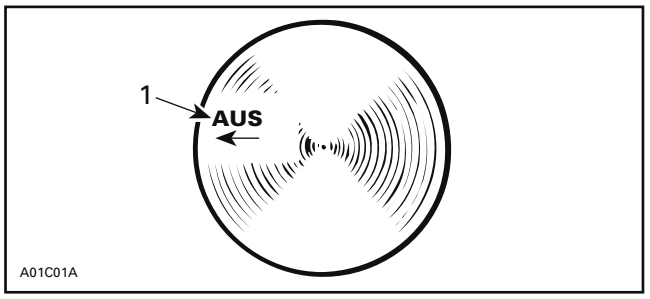
Piston, Pin and Needle Bearing Inspection

Inspect parts for scoring, cracking, chipping, corrosion, pitting, wear or other damages. Replace piston and piston rings if necessary. Refer to *ENGINE MEASUREMENT* to complete inspection.

Piston Cleaning

Scrape off carbon formation from piston dome.

NOTE: The arrow on the piston dome must be visible after cleaning.



1. Arrow and "AUS" marks

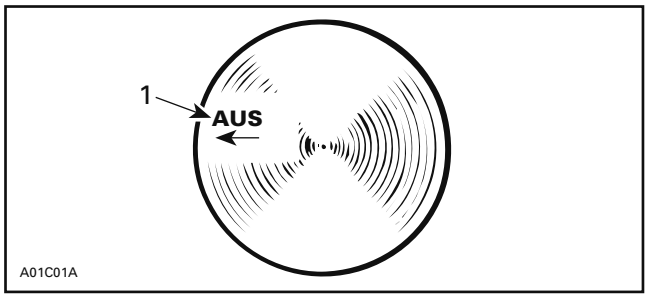
Clean the piston ring groove with a groove cleaner tool or with a piece of broken ring.

Clean piston in a non-ferrous metal cleaner.

Piston Installation

Lubricate needle bearing with injection oil.

Place piston over connecting rod with the letters "AUS" and arrow towards exhaust port.



1. Exhaust

Install piston pin puller and sleeve, then pull piston pin in until it clears the circlip groove.


mmr2006-017-004

TYPICAL

Remove piston pin puller and sleeve kit.

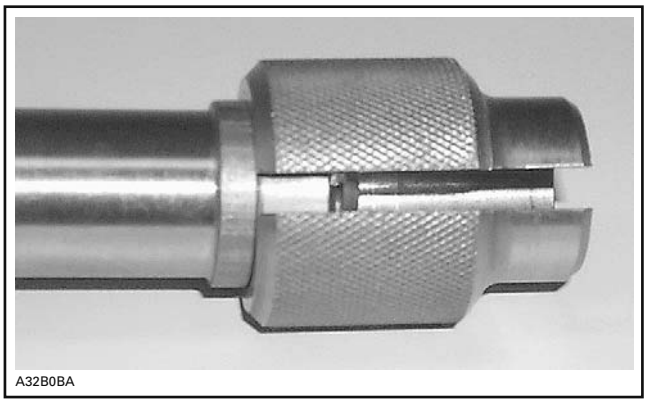
Use PISTON CIRCLIP INSTALLER (P/N 529 035 686) to install mono-hook circlips.

NOTICE Always install new circlips.

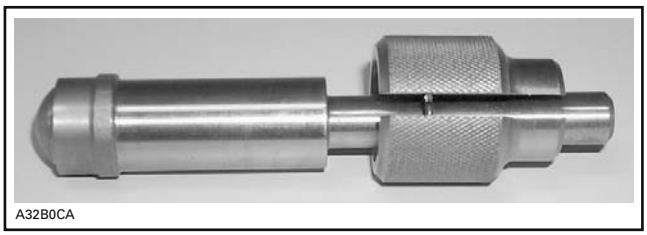
Insert circlip into support in such a way that when installed in piston groove, the tab will face upward.

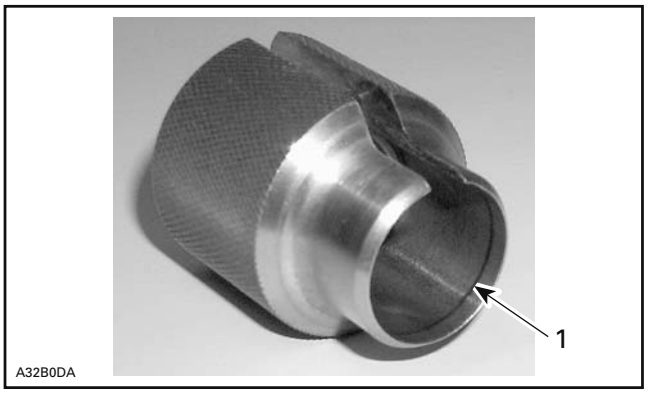

A32B0AA

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


A32B0BA

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


A32B0CA



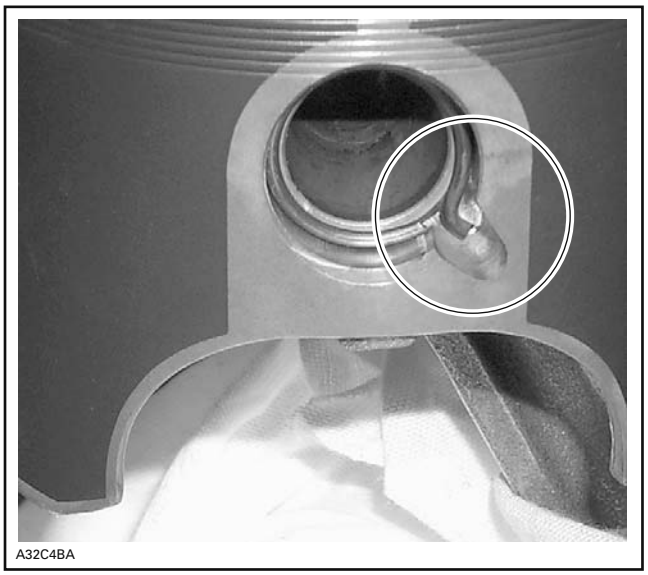
A32B0DA

1. Groove


A32B0EA

CIRCLIP READY TO BE INSTALLED ON PISTON

Using a plastic hammer, tap pusher to insert circlip in place. Take care to install new circlips with tab toward top as per following illustration.


A32C4BA

TAB TOWARD TOP

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

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

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

BOTTOM END

SERVICE TOOLS

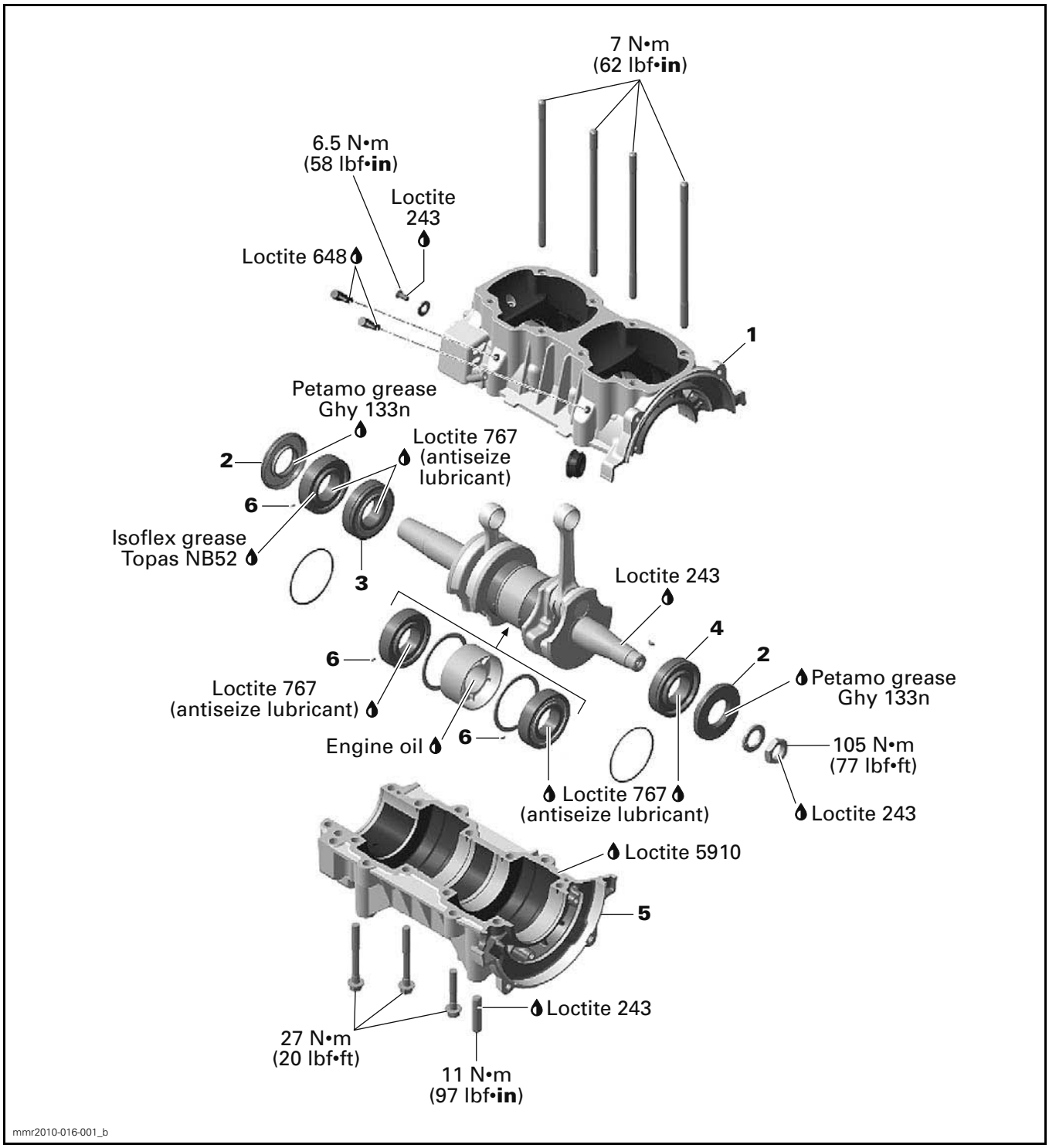
Description	Part Number	Page
BEARING HEATER	529 035 969	123
BEARING INSTALLER (PTO)	529 035 990	123
CRANKSHAFT BEARING INSTALLER (MAG)	529 035 980	125
CRANKSHAFT BEARING PULLER	529 036 004	121
CRANKSHAFT DISTANCE GAUGE	529 035 965	124
CRANKSHAFT PROTECTOR (MAG)	420 876 557	122
CRANKSHAFT PROTECTOR (PTO)	420 876 552	121
HALF-RINGS	420 977 475	121
SUPPORT PLATE	529 035 976	124
TEMPERATURE INDICATOR STICK	529 035 970	123

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON BEARING SEPARATOR	CJ951	122
SPX/OTC BEARING SEPARATOR	1124	122

SERVICE PRODUCTS

Description	Part Number	Page
ISOFLEX GREASE TOPAS NB 52	293 550 021	121
LOCTITE 5910	293 800 081	119
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	122
LOCTITE CHISEL (GASKET REMOVER)	413 708 500	119
PETAMO GREASE GHY 133N	420 899 271	121
PULLEY FLANGE CLEANER	413 711 809	120, 122
XPS SYNTHETIC GREASE	293 550 010	121


7 N•m
(62 lbf•in)
6.5 N•m
(58 lbf•in)
Loctite
243
Loctite 648
1
Petamo grease
Ghy 133n
2
Loctite 767
(antiseize
lubricant)
6
Isoflex grease
Topas NB52
3
Loctite 243
4
6
2
Petamo grease
Ghy 133n
Loctite 767
(antiseize lubricant)
Engine oil
6
105 N•m
(77 lbf•ft)
Loctite 767
(antiseize lubricant)
Loctite 243
Loctite 5910
5
Loctite 243
27 N•m
(20 lbf•ft)
11 N•m
(97 lbf•in)
mmr2010-016-001_b

GENERAL

Before completely disassembling the engine, check airtightness. Refer to *ENGINE LEAK TEST* subsection.

All oil seals and gaskets must be discarded and replaced with new ones when crankcase is split.

ENGINE BREAK-IN

NOTICE **After a repair involving major parts replacement, a break-in period must be observed.**

1. Follow *OPERATOR'S GUIDE* recommendation relating to break-in.
2. Add 500 ml (17 U.S. oz) of recommended injection oil into a full fuel tank.

PROCEDURES

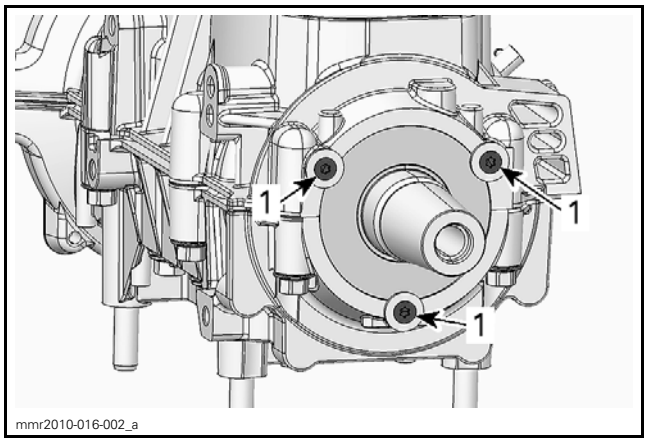
CRANKCASE

Crankcase Disassembly

Carry out the following operations. Refer to table.

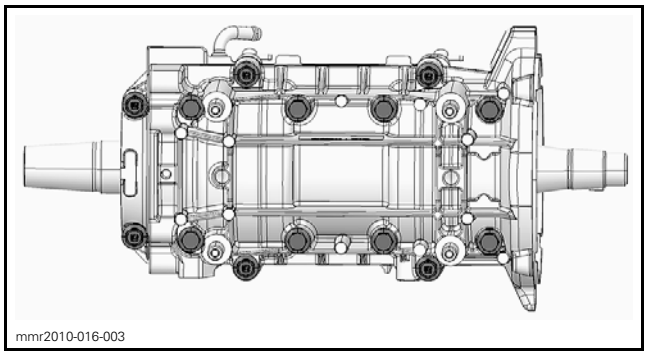
OPERATIONS	REFERENCES (SUBSECTION)
Remove engine	*ENGINE REMOVAL AND INSTALLATION*
Remove cylinder heads	*TOP END*
Remove cylinders	
Remove rewind starter	*REWIND STARTER*
Remove fan belt pulley	*MAGNETO SYSTEM*
Remove trigger coils	
Remove magneto flywheel	
Remove stator	

Remove screws and washers retaining PTO seal.



1. PTO seal retaining screws

Remove all screws that retain both housings together.



Split crankcase and remove internal components.

Clean all metal components and remove old sealant from crankcase mating surfaces with LOCTITE CHISEL (GASKET REMOVER) (P/N 413 708 500).

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

Crankcase Inspection

Check crankcase for cracks or other damages. Replace if necessary.

Crankcase Assembly

NOTE: Crankcase halves **no. 1** and **no. 5** are factory matched and therefore, are not interchangeable as single halves.

Install the crankshaft in the lower crankcase. Refer to *CRANKSHAFT* in this subsection.

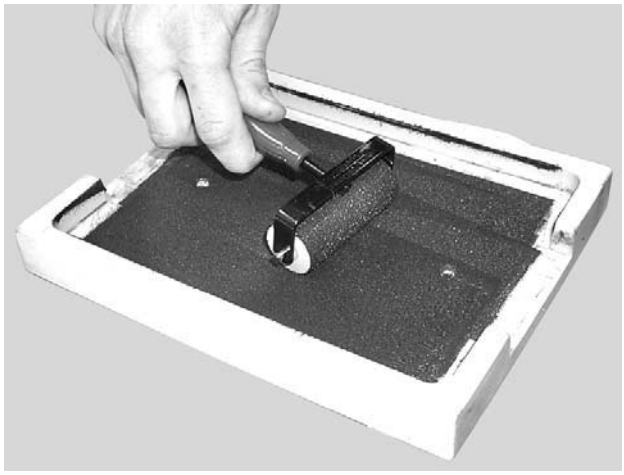
Apply LOCTITE 5910 (P/N 293 800 081) on crankcase halves. Proceed as follows.

IMPORTANT: The total assembly sequence, including sealing compound application, crankcase screw installation and torquing, must be performed within 10 minutes.

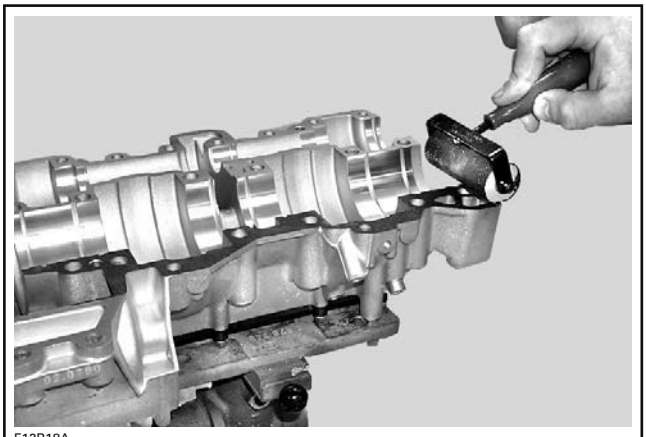
NOTE: It is recommended to apply this specific sealant as described here to get an uniform application without lumps.

Use a plexiglass plate and apply some sealant on it. Use a 50 mm - 75 mm (2 in - 3 in) soft rubber roller and spread the sealant to get a thin uniform coat on the plate (spread as necessary).

When ready, apply the sealant on crankcase mating surfaces.



F12R17A



F12R18A

TYPICAL

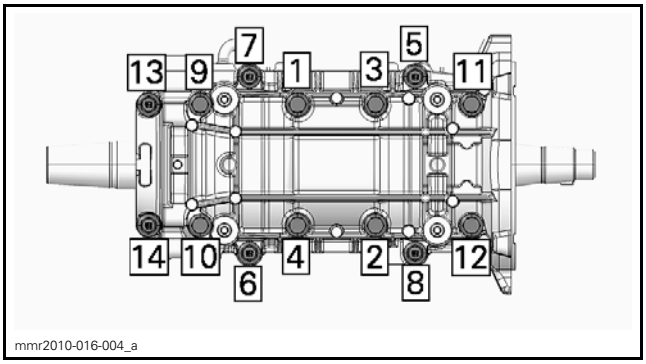
NOTE: If you do not use the roller method, you may use your finger to uniformly distribute the sealant.

Assemble both crankcase halves.

Install M8 screws (14x) in crankcase.

Tighten M8 screws to specification as per illustrated sequence.

CRANKCASE M8 SCREWS TORQUE	
FIRST STEP	16 N•m (142 lbf•**in**)
FINAL STEP	27 N•m (20 lbf•ft)



mmr2010-016-004_a

TIGHTENING SEQUENCE - M8 SCREWS

CRANKSHAFT

Crankshaft Removal

To remove crankshaft, use the crankcase disassembly procedure.

Crankshaft Inspection

Check crankshaft bearings. They must turn smoothly and without noise. Replace as required.

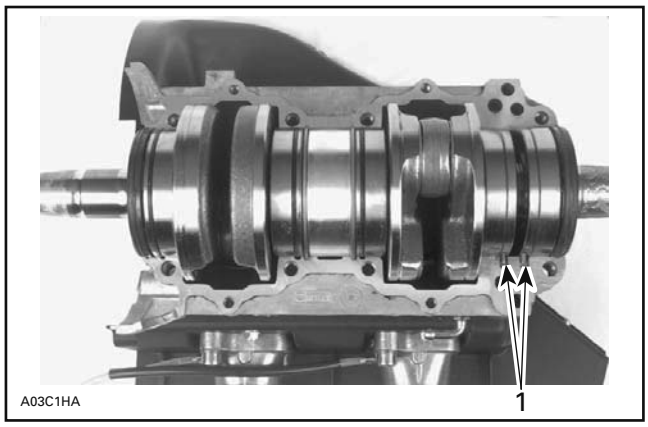
Refer to the following table to find bottom end engine dimension specifications. For dimension measurement procedures, refer to *ENGINE MEASUREMENT* subsection.

ENGINE MEASUREMENT	TOLERANCES		
	NEW PARTS		WEAR LIMIT
	Min.	Max.	
Crankshaft deflection on PTO side	–	0.06 mm (.0024 in)	–
Crankshaft deflection on MAG side	–	0.03 mm (.0012 in)	–
Crankshaft deflection in center of crankshaft	–	0.08 mm (.0031 in)	–
Connecting rod big end axial play	0.17 mm (.0067 in)	0.53 mm (.0209 in)	1.20 mm (.0472 in)
Crankshaft end-play	0.10 mm (.0039 in)	0.30 mm (.0118 in)	–

Crankshaft Installation

Using PULLEY FLANGE CLEANER (P/N 413 711 809), remove all trace of Loctite 243 from crankshaft taper.

When installing crankshaft, position drive pins **no. 6** as illustrated.



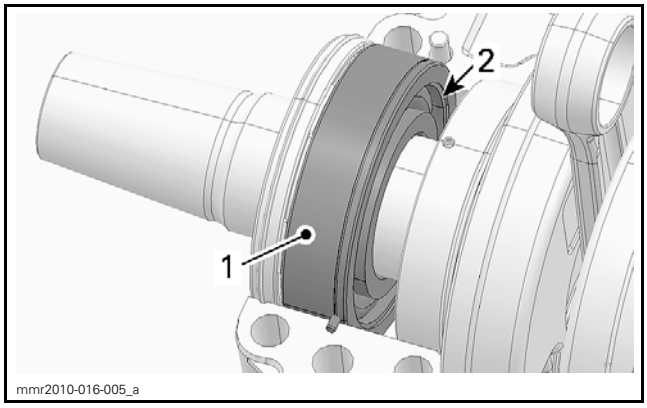
TYPICAL
1. Drive pins

At seal **no. 2** assembly, apply a light coat of PETAMO GREASE GHY 133N (P/N 420 899 271) on seal lip.

Put 5 + 1 mL of ISOFLEX GREASE TOPAS NB 52 (P/N 293 550 021) in a syringe.

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

With the syringe, fill in the PTO outer ball bearing as shown below.



1. PTO outer ball bearing
2. Put grease in this cavity

NOTICE **Use only the recommended grease. Make sure not to push grease between outside bearing race and half crankcase.**

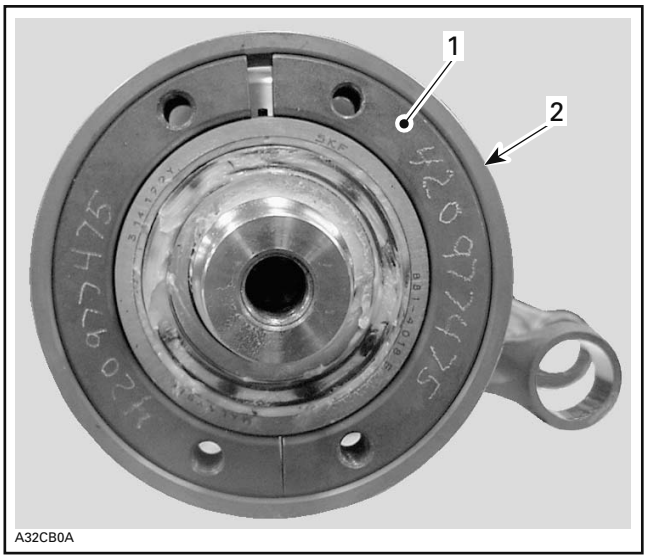
Close crankcase and install all removed parts.

CRANKSHAFT BEARINGS

Crankshaft Bearing Removal

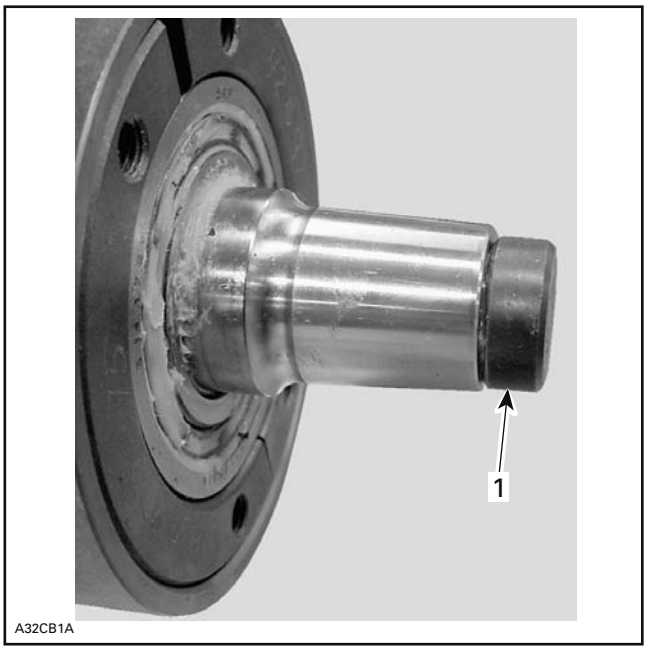
NOTE: Normally it takes approximately 10 minutes to heat up a bearing so in the event of replacing bearing, it's recommended to start the bearing heating process prior to removal operation. See procedure further.

To remove PTO side bearings **no. 3** from crankshaft, install HALF-RINGS (P/N 420 977 475) and the CRANKSHAFT BEARING PULLER (P/N 529 036 004) on the bearing.



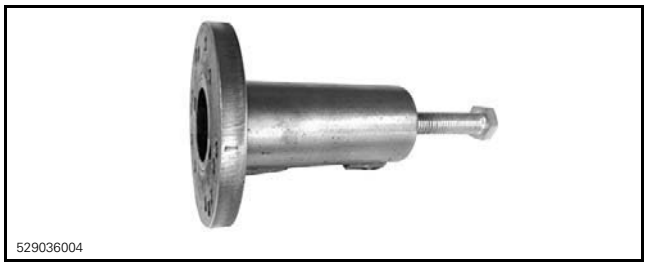
1. Half ring
2. Puller ring

Apply XPS SYNTHETIC GREASE (P/N 293 550 010) on the crankshaft end and install the CRANKSHAFT PROTECTOR (PTO) (P/N 420 876 552).

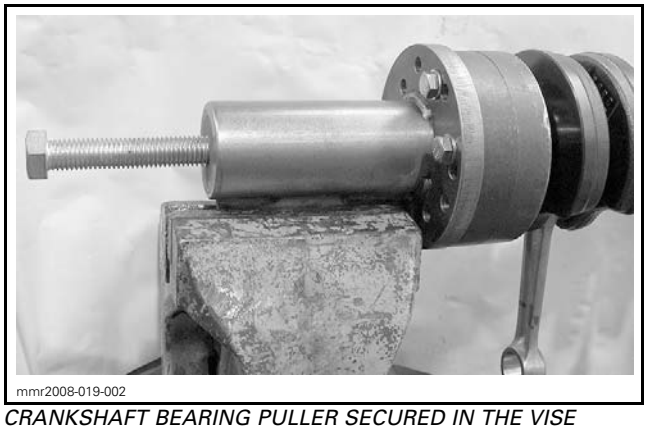


1. Crankshaft protector

Install the CRANKSHAFT BEARING PULLER (P/N 529 036 004) and secure to half rings using M8 x 40 screws.


529036004

Secure the bearing puller in a vise by its rib.


mmr2008-019-002

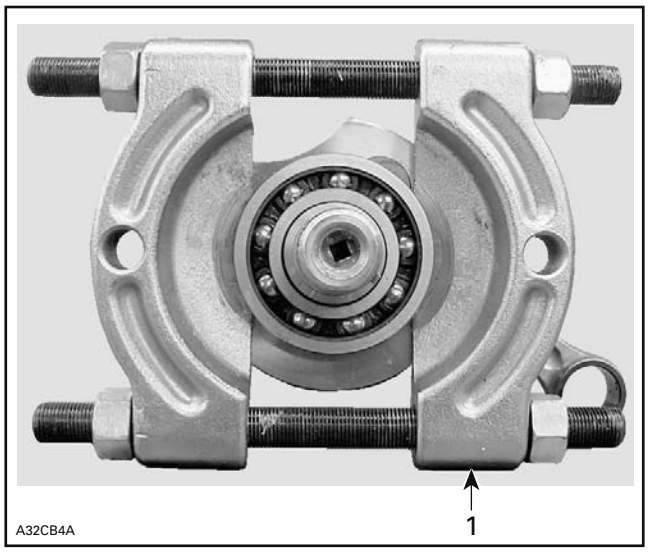
CRANKSHAFT BEARING PULLER SECURED IN THE VISE

NOTICE Never use any air impact tool for tightening the puller bolt.

Lubricate the puller bolt and then proceed with tightening 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 SNAP-ON BEARING SEPARATOR (P/N CJ951) or a SPX/OTC BEARING SEPARATOR (P/N 1124) to facilitate the removal.



A32CB4A

1. Bearing separator

Procedure for MAG side bearings no. 4 is same as of PTO side with the exception of the CRANKSHAFT PROTECTOR (MAG) (P/N 420 876 557).

Crankshaft Bearing Installation

NOTICE Never reinstall an old bearing even if it seem in good condition. Always discard it and install a new one.

NOTE: Before crankshaft bearings installation, check crankshaft end for damage.

Clean crankshaft end with sand paper no. 180 and remove all residue using PULLEY FLANGE CLEANER (P/N 413 711 809).


A32CB5A

Smear LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070) on part of crankshaft where bearing fits.


A32CB6A

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 (if applicable) with the heating surface.


A32CB7A

NOTICE **Bearing should not be heated to more than 80°C (176°F). Do not heat bearing with direct flame or heat gun or heated oil. Inappropriate heating procedure(s) may cause inner seal failure.**

For even heat distribution, turn bearing several times during heating process.

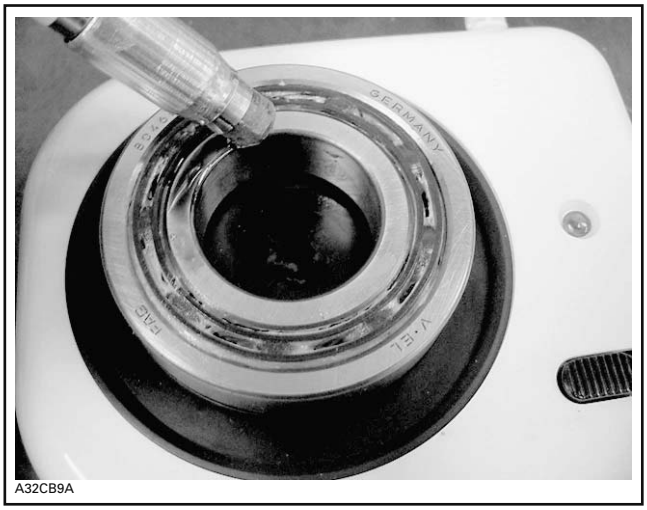
NOTE: Two bearings can be heated at the same time on one bearing heater.



A32CB8A

1. Bearings

Touch 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.

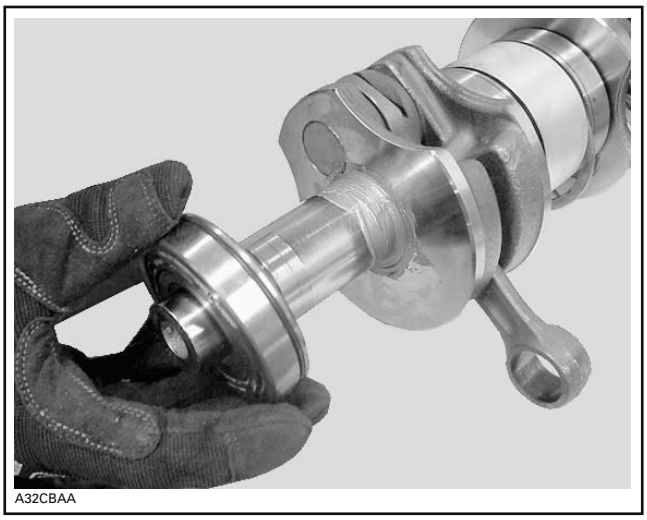

A32CB9A

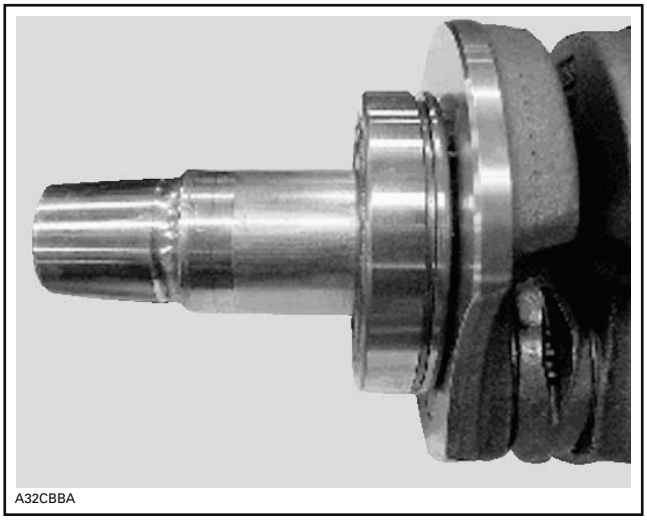
⚠ WARNING

Do not touch heated bearing with bare hands. 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: The heated bearing should slide easily on the crankshaft. If required, push with the BEARING INSTALLER (PTO) (P/N 529 035 990) on the inner race of bearing.

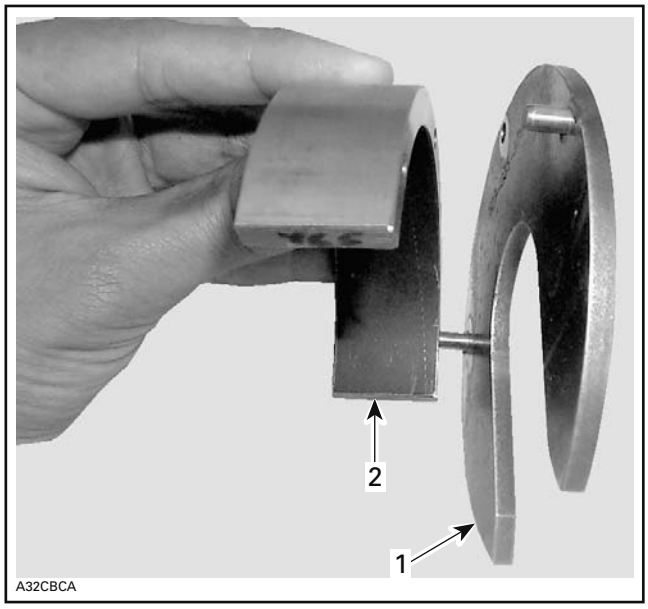

A32CBAA


A32CBBA

BEARING TO END POSITION

Install the O-ring.

Install the SUPPORT PLATE (P/N 529 035 976) and the CRANKSHAFT DISTANCE GAUGE (P/N 529 035 965).



A32CBCA

1. Support plate
2. Distance gauge

Install bearing locator tool.


A32CBDA

Slide in the heated outer PTO bearing onto the crankshaft.

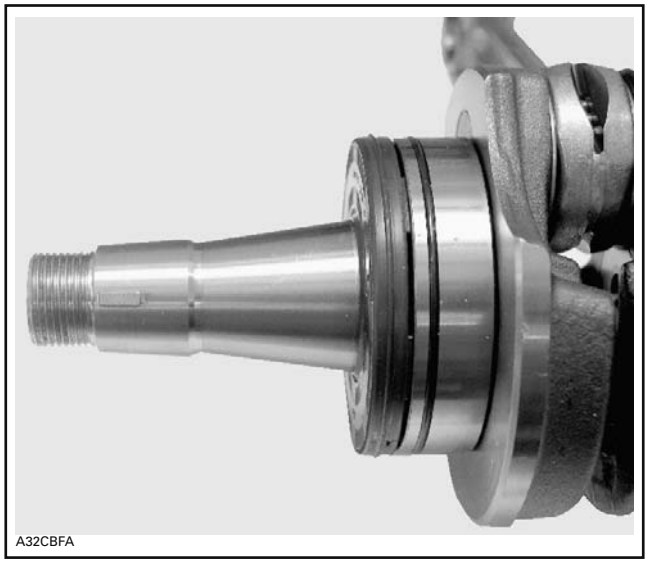


Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

Install the heated MAG side bearing.

NOTE: The heated bearing should slide easily on the crankshaft. If required, push with the CRANKSHAFT BEARING INSTALLER (MAG) (P/N 529 035 980) on the inner race of the bearing.

Install new oil seals.



TYPICAL

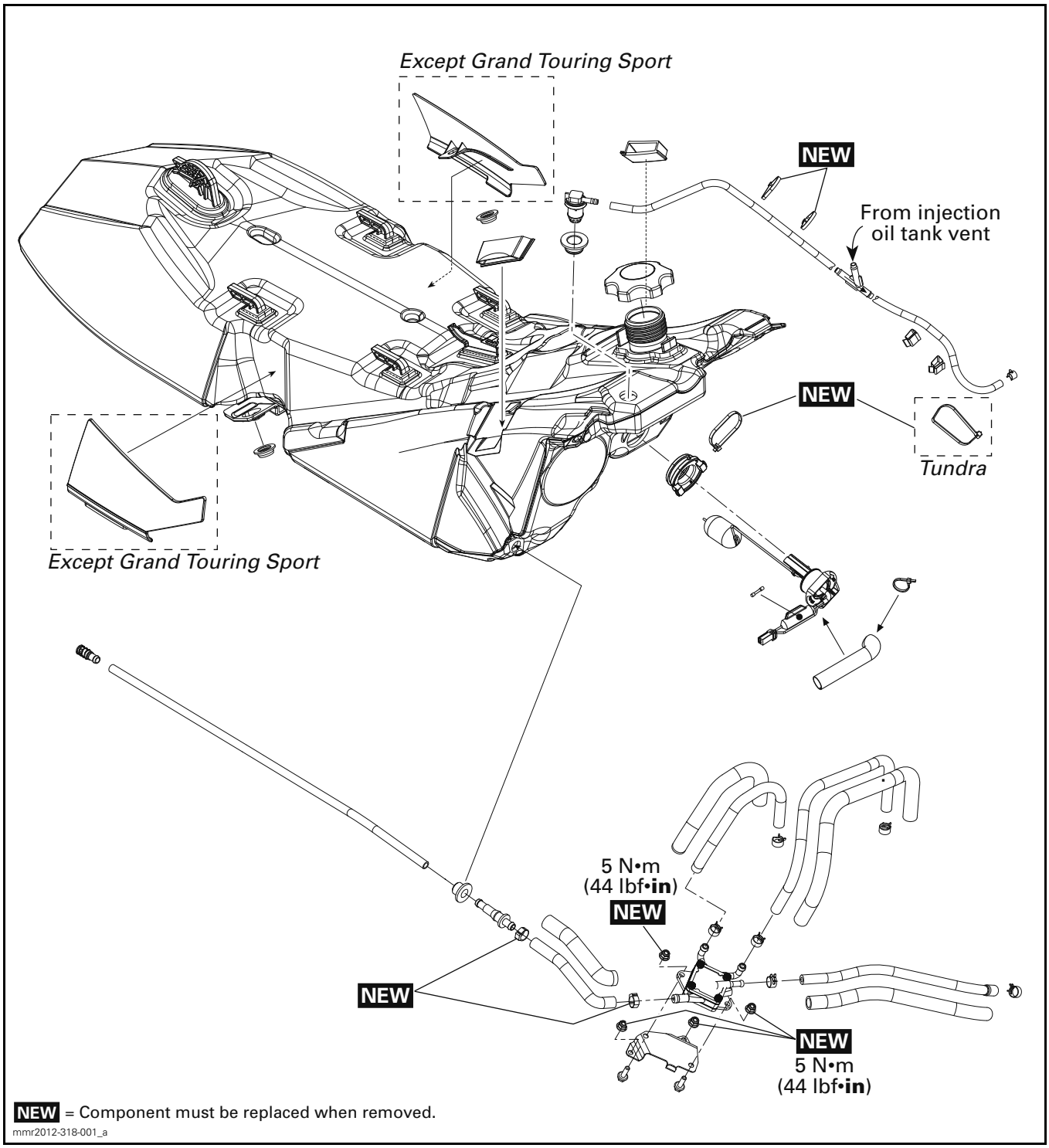
FUEL TANK AND FUEL PUMP

SERVICE TOOLS

Description	Part Number	Page
CONSOLE NUT WRENCH	529 036 183	131
FLUKE 115 MULTIMETER	529 035 868	138–139
LEAK TEST KIT	529 033 100	130
OETIKER PLIERS	295 000 070	142
SMALL HOSE PINCHER	295 000 076	129–130, 133, 136
SUCTION PUMP	529 035 880	131, 135, 137, 140
VACUUM/PRESSURE PUMP	529 021 800	130–131, 135

SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	142
XPS BRAKES AND PARTS CLEANER	219 701 705	137


Except Grand Touring Sport
NEW
From injection oil tank vent
NEW
Tundra
Except Grand Touring Sport
5 N•m (44 lbf•in)
NEW
NEW
NEW
5 N•m (44 lbf•in)
NEW = Component must be replaced when removed.
mmr2012-318-001_a

GENERAL

⚠ WARNING

Always disconnect battery prior to working on the fuel system.

Cover the fuel line connection with an absorbent shop rag and slowly disconnect the fuel hose to minimize spilling.

⚠ WARNING

Do not allow fuel to spill on hot engine parts and/or on electrical connectors. Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions.

⚠ WARNING

After working on the fuel system, carry out a fuel system pressurization test to check for leaks. Failure to carry out a fuel system leak test may result in severe injury or a life threatening situation should a leak occur.

SYSTEM DESCRIPTION

Fuel Pump

The fuel system on these models uses a diaphragm type fuel pump. Engine vacuum pulses are used to activate the diaphragm in the fuel pump when the engine is running.

The pump draws in fuel from the fuel tank outlet and pushes it to the carburetors.

Fuel Tank Vent

A simple fuel tank vent system comprised of a vent check valve is used to protect the fuel system.

The check valve, mounted on the fuel tank vent outlet, is a combination type valve. It acts as both a check valve and a pressure relief valve.

Ambient air pressure can enter the fuel tank at all times through the check valve.

As fuel is consumed by the engine, a negative press would occur in the fuel tank. This could eventually prevent the engine from receiving proper fuel press. The **negative pressure relieve function** of the valve allows the higher outside air pressure in.

If pressure in the fuel tank builds up and exceeds 2.0 kPa to 4.8 kPa (.3 PSI to .7 PSI), the **positive pressure relief function** opens the valve and lets excess pressure out of the fuel tank.

Fuel Filter

The system has one level of filtering, a fuel strainer (steel mesh filter) at the fuel pick-up within the fuel tank.

Fuel Level Gauge

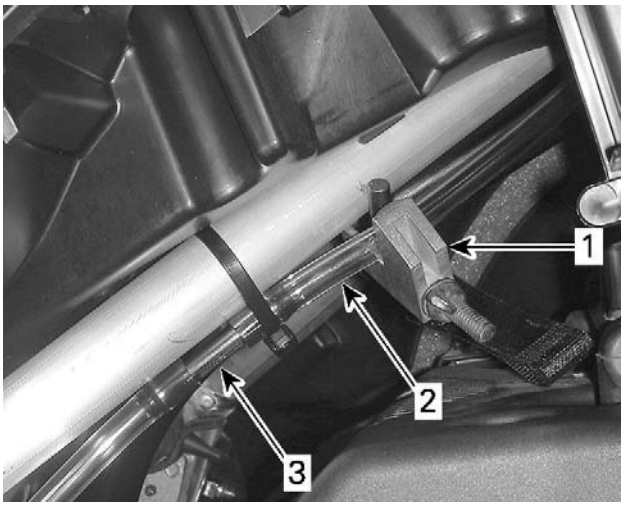
An electric float type fuel level sensor is used with the gauge for fuel level indication.

INSPECTION

FUEL SYSTEM PRESSURIZATION

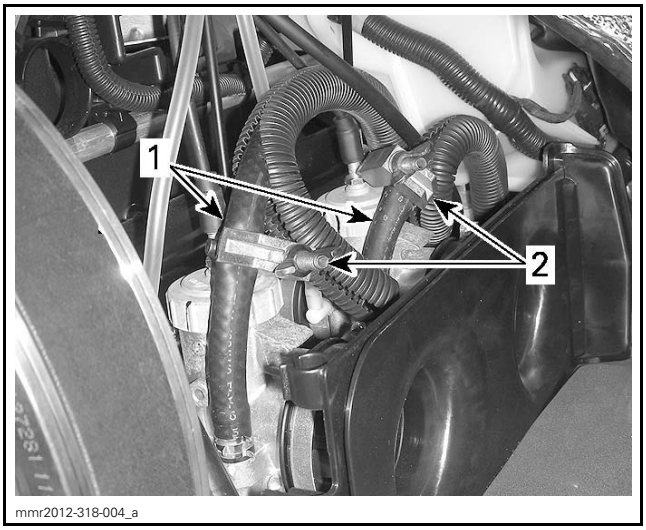
1. Fill up fuel tank.
2. Open the left side panel.
3. Install a hose pincher on the fuel tank vent line between "Y" fitting and fuel tank.

REQUIRED TOOL	
SMALL HOSE PINCHER (P/N 295 000 076)	



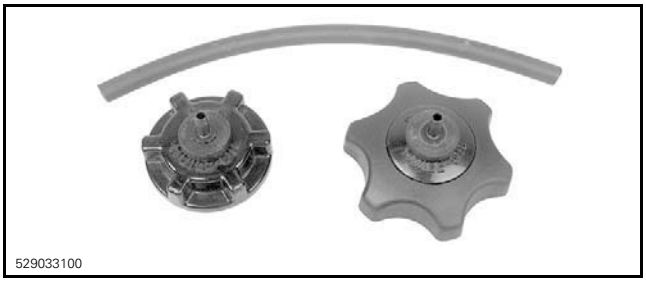
TYPICAL - HOSE PINCHER ON FUEL TANK VENT LINE
1. *Hose pincher*
2. *Fuel tank vent line*
3. *Vent "Y" fitting*

4. Remove primary air intake silencer, refer to *AIR INTAKE SYSTEM* subsection.
5. Install a hose pincher on the fuel feed line of each carburetor.



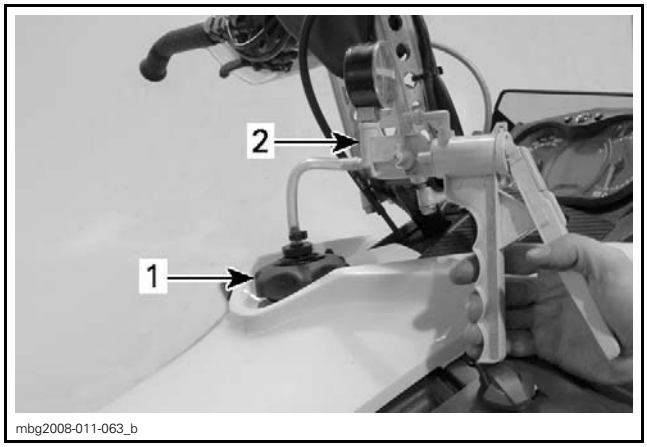
1. Carburetor fuel feed hoses
2. Hose pinchers

6. Remove the fuel tank cap and install the appropriate test cap from the LEAK TEST KIT (P/N 529 033 100) on fuel tank inlet.



7. Install VACUUM/PRESSURE PUMP (P/N 529 021 800) on pressure test fuel cap.





TYPICAL
1. Pressure test fuel cap
2. Vacuum/pressure pump

8. Set pump selector to pressure.
9. Pressurize fuel tank as follows.

PRESSURE	TIME WITHOUT PRESSURE DROP
21 kPa (3 PSI)	3 minutes

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

To ease locating leak(s), spray soapy water on components; bubbles will indicate leak location(s).

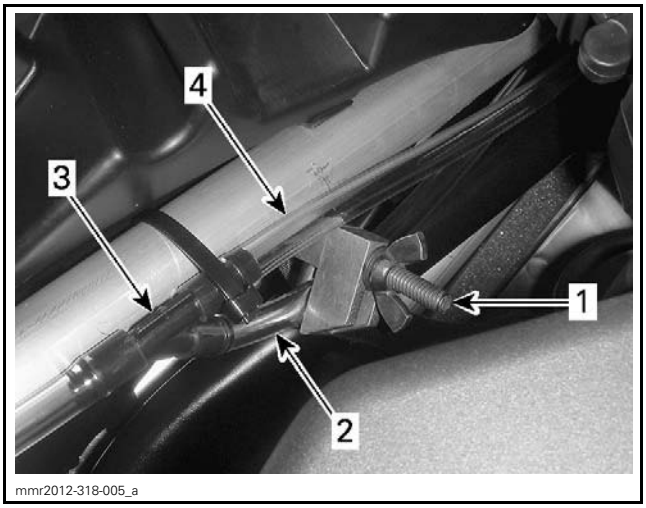
10. Remove hose pincher from vent hose outlet. You should hear pressurized air flowing out indicating the pressure relief valve function is working.
11. Release any remaining pressure in the fuel tank by slowly unscrewing fuel tank cap.
12. Remove the pressure test fuel cap and install the normal fuel tank cap.

Fuel Tank Check Valve Test

1. Remove the fuel tank vent line from its fitting on the lower left front body panel.
2. Remove the fuel tank cap.

REQUIRED TOOL	
SMALL HOSE PINCHER (P/N 295 000 076)	

3. Install a hose pincher on the injection oil tank vent line, between the "Y" fitting and injection oil tank.

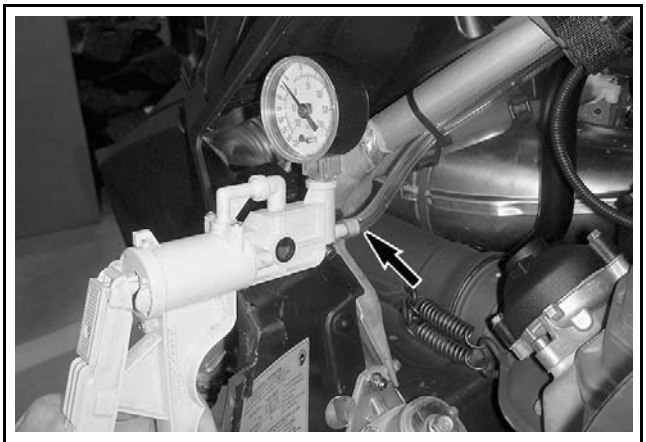


mmr2012-318-005_a

1. *Small hose pincher*
2. *Injection oil tank vent line*
3. *Vent "Y" fitting*
4. *Fuel tank vent line*

REQUIRED TOOL	
VACUUM/PRESSURE PUMP (P/N 529 021 800)	

4. Install the vacuum/pressure pump on the vent line.


mmr2008-030-002_a

TYPICAL - VACUUM/PRESSURE PUMP ON VENT LINE

5. Apply vacuum through check valve.

NOTE: There should not be a noticeable change on the vacuum/pressure pump indicator as air is drawn through the check valve.

6. Apply air pressure through check valve.

NOTE: There should not be a noticeable pressure increase on the vacuum/pressure pump indicator as air must flow freely into the fuel tank.

7. Install the fuel tank cap.

8. Activate the vacuum/pressure pump at least 12 times to apply air pressure through check valve and into the fuel tank.
9. Remove the vacuum/pressure pump from the vent line.
10. As you slowly unscrew the fuel tank cap, listen for a small air pressure release at the cap.

NOTE: Although air must flow freely into the fuel tank through the check valve, it is normal for the check valve to maintain a small pressure within the fuel tank. See following specification.

VENT CHECK VALVE SPECIFICATION	
Pressure release	2.0 kPa to 4.8 kPa (.3 PSI to .7 PSI)

NOTE: If the fuel vent check valve does not function as indicated in test, replace check valve.

11. Remove small hose pincher.
12. Remove vacuum/pressure pump.
13. Install vent line on its fitting.
14. Install fuel tank cap.

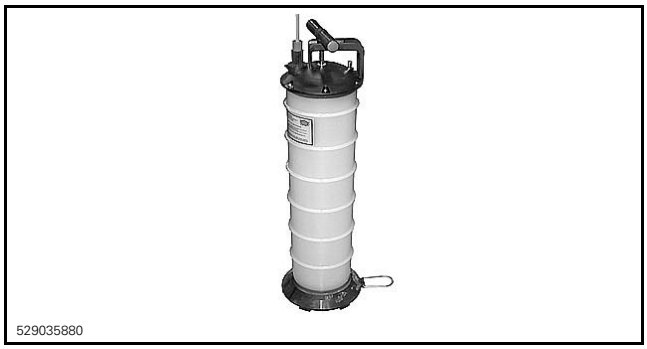
PROCEDURES

FUEL TANK

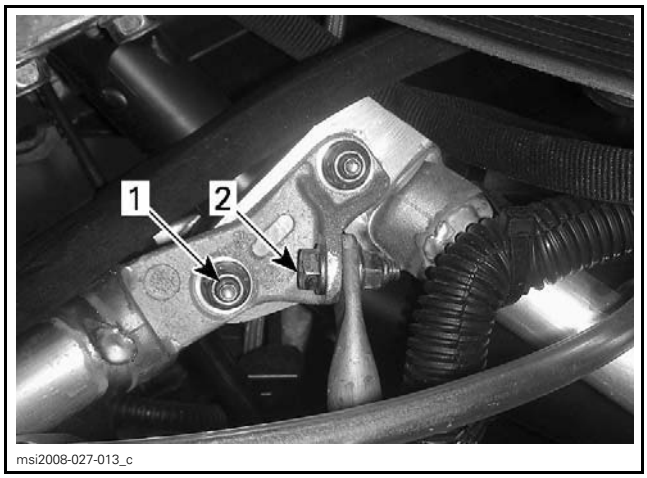
Fuel Tank Removal

REQUIRED TOOL	
CONSOLE NUT WRENCH (P/N 529 036 183)	

1. Remove the following items, refer to *BODY* subsection:
   - Seat
   - Both side panels
   - Hood
   - Console.
2. Refer to *AIR INTAKE SYSTEM* subsection and remove the following:
   - Primary air intake silencer
   - Secondary air intake silencer.
3. Drain fuel tank as much as possible using the SUCTION PUMP (P/N 529 035 880).

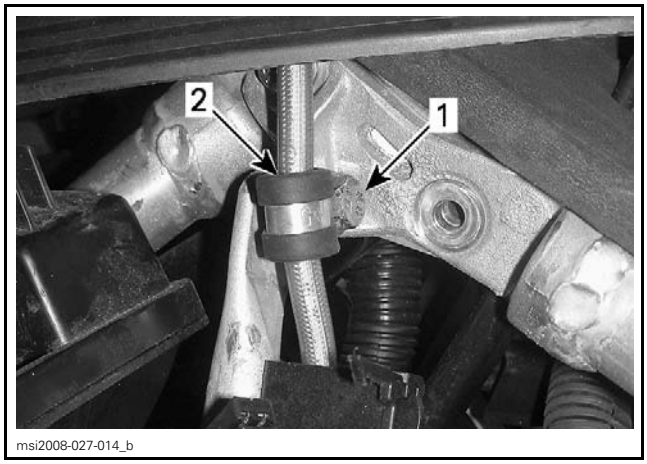

529035880

4. Remove the aft mounting bolt from the rear frame member forward mount.
5. Remove top mounting bolts from upper column support as indicated on the illustration. Discard the elastic nuts.



msi2008-027-013_c

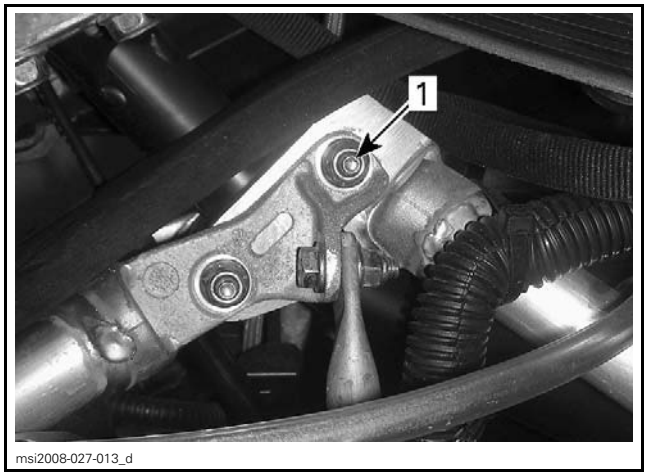
TYPICAL - RIGHT SIDE SHOWN
1. At mounting bolt on rear frame member forward mount
2. RH top mounting bolt on upper column support



msi2008-027-014_b

TYPICAL - LEFT SIDE SHOWN
1. Top mounting bolt on LH upper column support
2. Brake hose retaining clamp

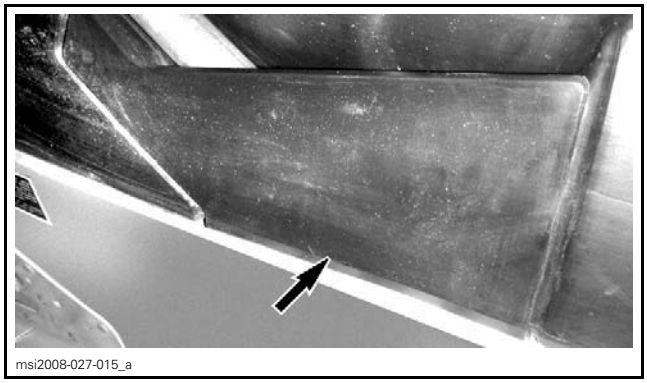
6. Release the torque applied to the mounting bolt on the front frame member, however, do not remove bolt and elastic nut.



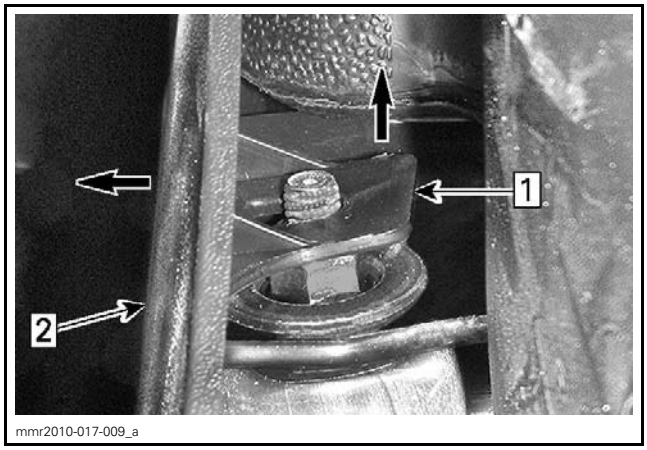
msi2008-027-013_d

TYPICAL
1. Mounting bolt, front frame member

7. Remove the 2 trim panels covering the aft end of the rear frame members.
   7.1 Pull panel retaining tab upwards so that it comes off the side frame member mounting stud.
   7.2 Pull panel out (one each side).


msi2008-027-015_a

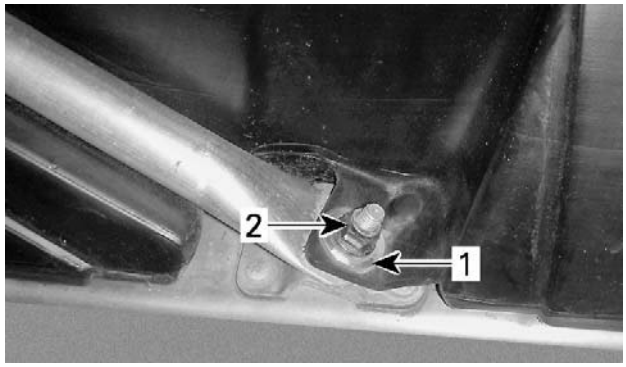
TYPICAL - REAR FRAME MEMBER TRIM PANEL



mmr2010-017-009_a

TYPICAL
Step 1: Lift retaining tab
Step 2: Pull trim panel out

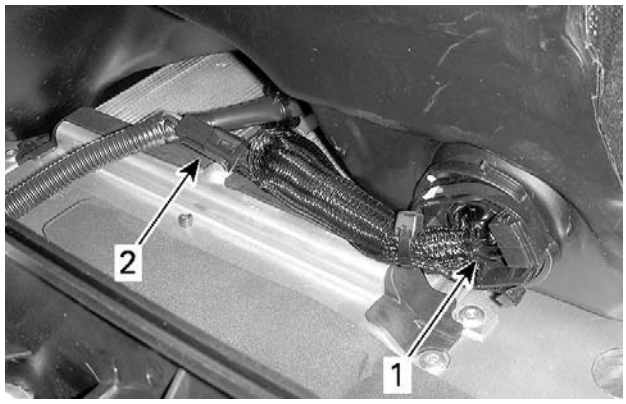
8. Remove elastic nut and shoulder bushing retaining the rear frame members to the tunnel (one each side). Discard retaining nuts, keep shoulder bushings.



msi2008-027-012_a

TYPICAL
1. *Shoulder bushing*
2. *Elastic nut*

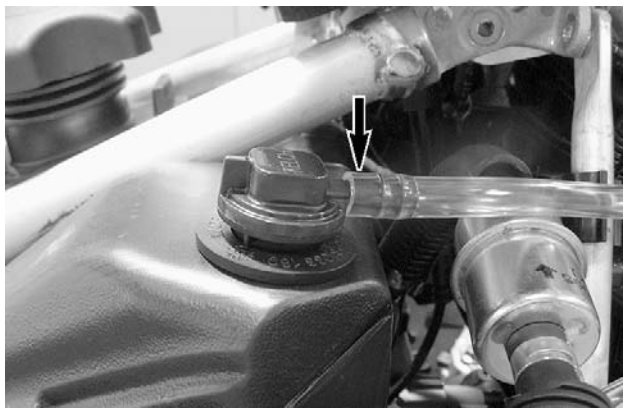
9. Disconnect the fuel level sensor connector.



mmr2012-318-006_a

TYPICAL
1. *Fuel level sensor*
2. *Fuel level sensor connector to disconnect*

10. Disconnect the fuel tank vent line at the check valve.


mmr2008-030-008_a

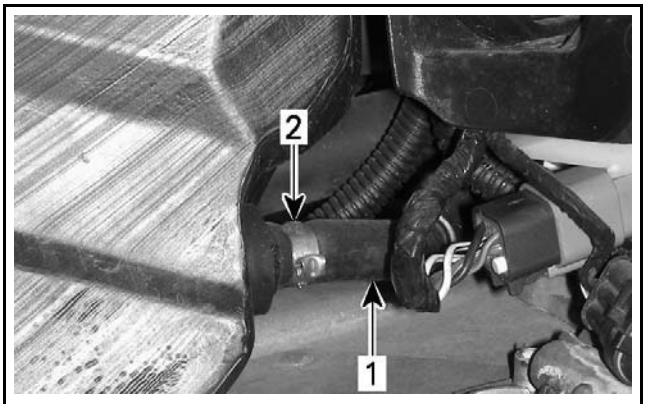
TYPICAL - DISCONNECT FUEL VENT LINE

11. Carefully and slowly lift the aft end of the fuel tank from the side frame mounting studs and move it back sufficiently to access the fuel tank outlet hose.
12. Install a small hose pincher on the fuel tank outlet hose.
13. Disconnect the fuel hose by cutting the Oetiker clamp and pulling the hose off the fitting.

⚠ WARNING

Work in a well ventilated area. Use a shop rag to absorb the residual fuel that will drain from the hose as it is disconnected.

REQUIRED TOOL	
SMALL HOSE PINCHER (P/N 295 000 076)	



mbg2008-005-006_b

FUEL TANK OUTLET HOSE DISCONNECT
1. *Install small hose pincher here*
2. *Remove this Oetiker clamp*

14. Remove the fuel tank from the vehicle.

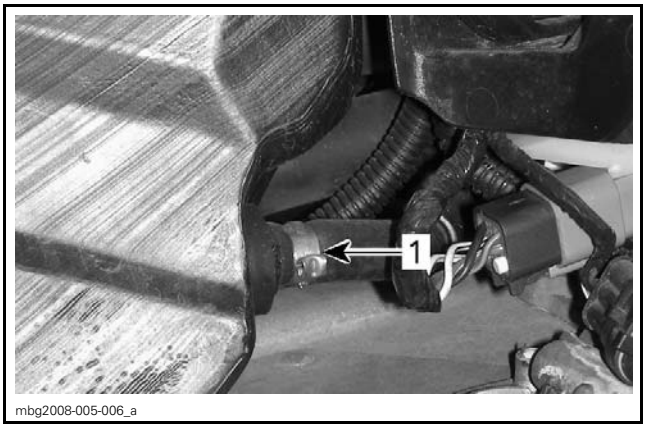
Fuel Tank Installation

Installation procedures are the reverse of the removal procedures however, pay attention to the following.

1. Position fuel tank on vehicle.
2. Connect fuel tank outlet hose to fuel tank fitting using a **NEW** Oetiker clamp.
3. Remove hose pincher.

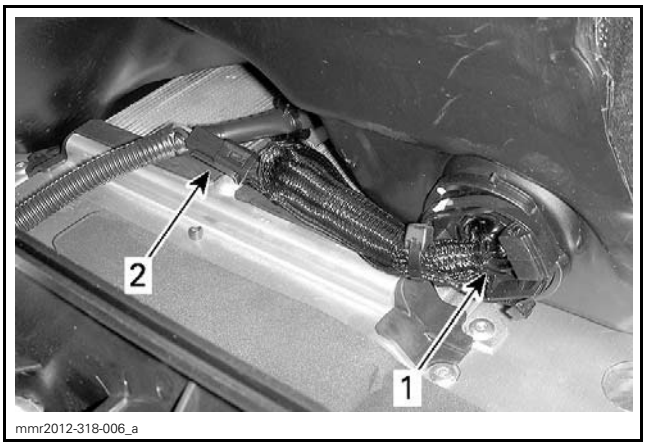
⚠ WARNING

Ensure hose clamp is tight and that hose cannot turn on the fitting.



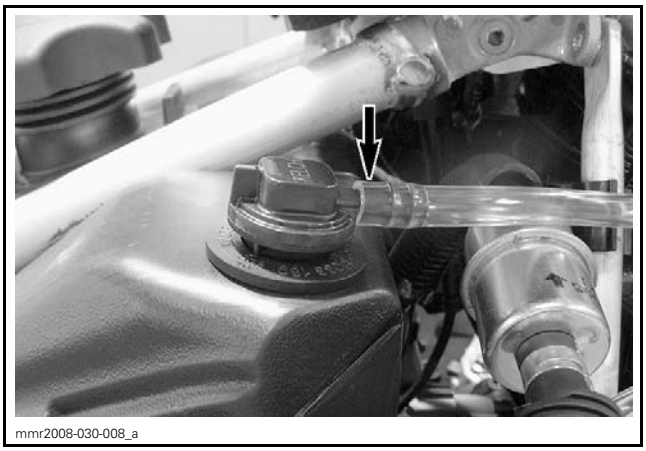
1. New Oetiker clamp on fuel tank outlet hose

4. Move tank forward onto the mounting studs.
5. Connect the fuel level sensor connector and install the wiring harness locking tie.



TYPICAL - FUEL LEVEL SENSOR RECONNECTED
1. Fuel level sensor
2. Sensor connector

6. Install vent tube on vent check valve.



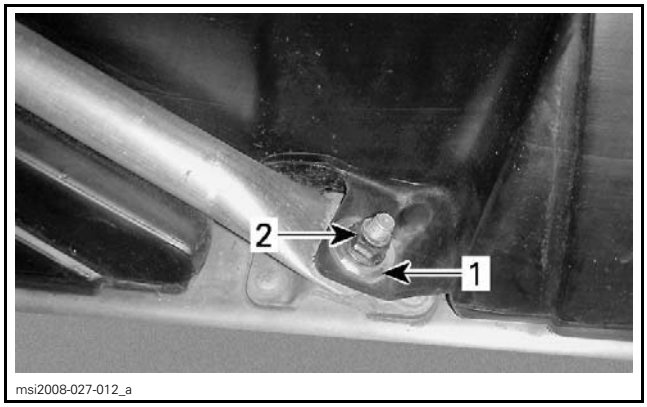
TYPICAL - FUEL VENT LINE CONNECTED

⚠ WARNING

Ensure vent tube is not kinked or pinched.

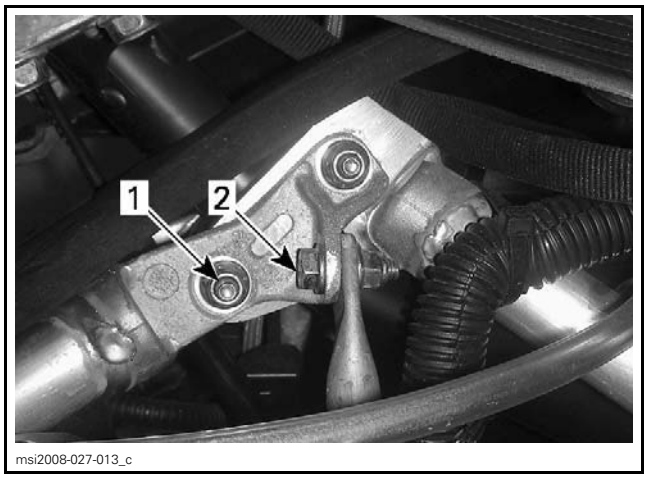
7. Install shoulder bushings and NEW elastic nuts on the rear frame members (one each side).
8. Tighten nuts securing aft end of rear frame members to specification.

TIGHTENING TORQUE	
Rear frame member, aft elastic nut	33 N•m (24 lbf•ft)



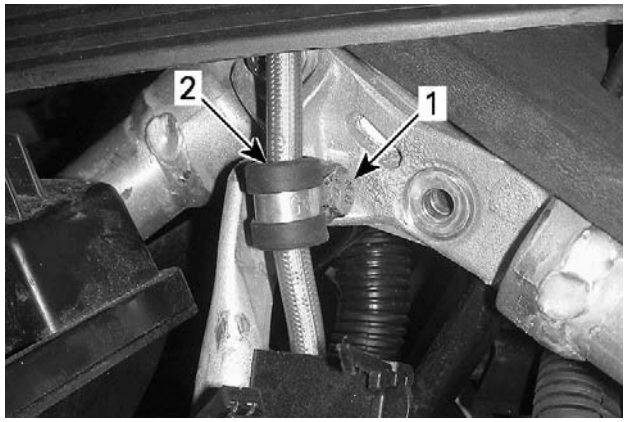
1. Shoulder bushing
2. NEW elastic nut

9. Insert the retaining bolt in the forward mount of the rear frame members, and the two upper mounting bolts on the upper column supports. Secure with NEW elastic nuts.



RIGHT SIDE SHOWN
1. Rear frame member mounting bolt
2. Mounting bolts on upper column supports (one each side)

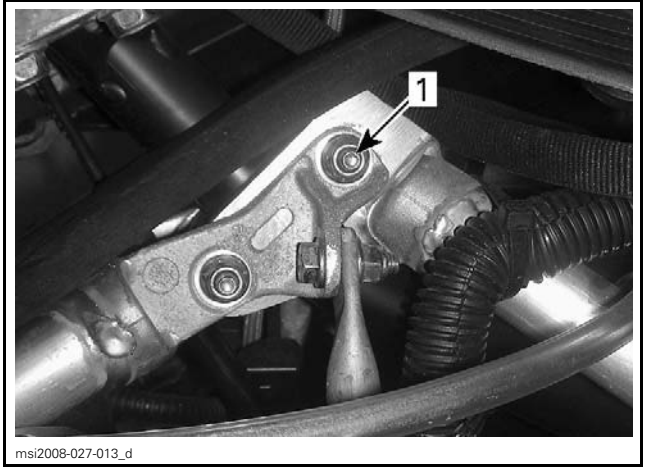
NOTE: Be sure to install the brake hose clamp on the LH upper column support mounting bolt.



LEFT SIDE SHOWN
1. *LH upper column support mounting bolt*
2. *Brake hose retaining clamp*

10. Tighten nut on rear frame member mounting bolt and front frame member mounting bolt to specification.
11. Tighten the top elastic nuts on the upper column supports to specification.

TIGHTENING TORQUE		
ELASTIC NUTS	– Rear frame member mounting bolt – Front frame member mounting bolt	18 N•m (159 lbf•**in**)
	– Top upper column supports	14 N•m (124 lbf•**in**)



1. *Mounting bolt, front frame member*

12. Install all remaining parts in reverse order of removal. Refer to applicable subsection.
13. Tighten the fuel tank filler neck nut to specification.

TIGHTENING TORQUE	
Fuel tank filler neck nut	6 N•m (53 lbf•**in**)

14. Carry out a fuel system leak test, refer to *FUEL SYSTEM PRESSURIZATION* in this subsection.

⚠ WARNING

After working on the fuel system, carry out a fuel system pressurization test to check for leaks. Failure to carry out a fuel system leak test could result in severe injury or a life threatening situation should a leak occur.

15. Refuel tank.

DIAPHRAGM FUEL PUMP

Fuel Pump Test

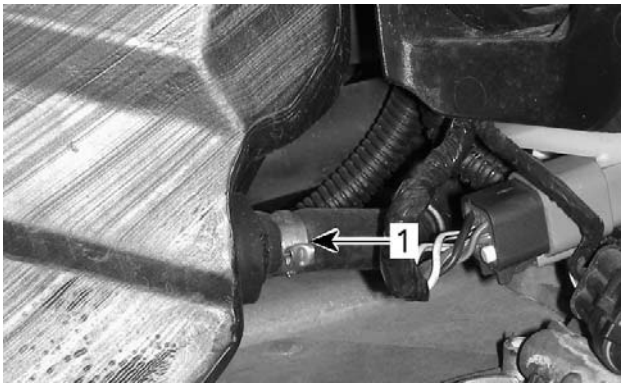
Check operation of fuel pump valves as follows:

1. Empty fuel tank.

REQUIRED TOOL	
SUCTION PUMP (P/N 529 035 880)	

NOTE: For the following test, ensure hoses have a tight fit.

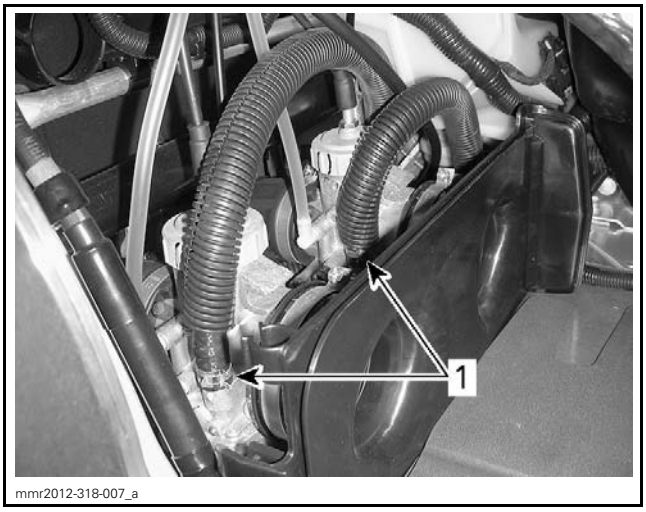
2. Disconnect outlet hose from fuel tank.



FUEL TANK OUTLET HOSE DISCONNECT
1. *Remove this Oetiker clamp*

REQUIRED TOOL	
VACUUM/PRESSURE PUMP (P/N 529 021 800)	

3. Alternately apply pressure and vacuum with pump from leak test kit to disconnected hose. The inlet valve should release with pressure and hold under vacuum.
4. Disconnect inlet hose from carburetors.



1. Carburetor inlet hose disconnect here

5. Repeat the same procedure to disconnected hoses. This time the outlet valve should hold with pressure and release under vacuum.

If fuel pump valves fail this test, replace the fuel pump.

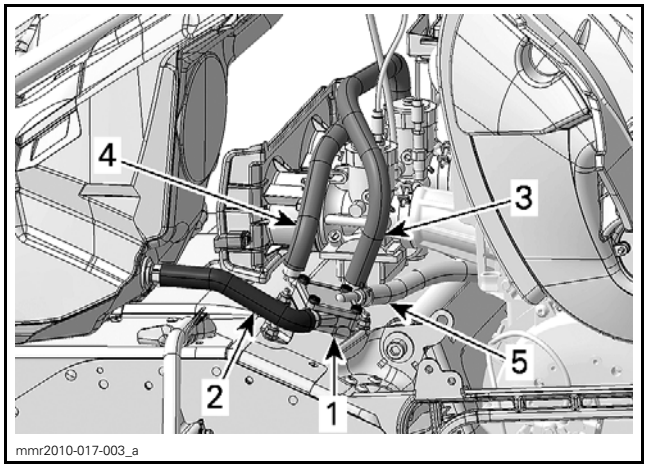
Fuel Pump Removal

1. Remove the primary air intake silencer, refer to *AIR INTAKE SYSTEM* subsection.
2. Disconnect carburetors from engine and move them aside for access to the fuel pump.

NOTE: Do not disconnect throttle cables from carburetors.

3. Install a small hose pincher on the fuel tank outlet hose **close to the pump inlet fitting**.

REQUIRED TOOL	
SMALL HOSE PINCHER (P/N 295 000 076)	



1. Diaphragm fuel pump
2. Fuel tank outlet hose
3. LH carburetor fuel supply line
4. RH carburetor fuel supply line
5. Vacuum impulse line

4. Remove the Norma spring clamps and disconnect the carburetor (2) fuel supply lines at the fuel pump outlets.

NOTE: Use a rag and a container to recover the fuel flowing from the disconnected hoses.

5. Remove Norma spring clamp and disconnect the impulse (vacuum) line at the fuel pump.
6. Remove screws securing fuel pump to chassis.

Fuel Pump Installation

1. Reverse the removal procedure.
2. Tighten fuel pump mounting nuts to specification.
3. Tighten carburetor mounting clamps to specification.

TIGHTENING TORQUES	
Fuel pump mounting nuts	5 N•m (44 lbf•**in**)
Carburetor mounting clamps	0.6 N•m (5 lbf•**in**)

4. Carry out a *FUEL SYSTEM PRESSURIZATION* test to check for leaks in the fuel system.

⚠ WARNING

After working on the fuel system, carry out a fuel system pressurization test to check for leaks. Failure to carry out a fuel system leak test could result in severe injury or a life threatening situation should a leak occur.

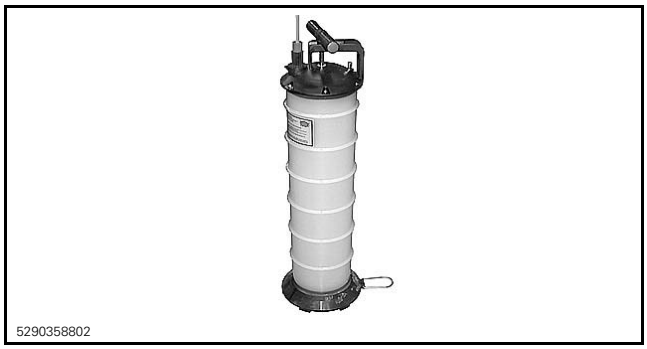
STEEL MESH FILTER

Steel Mesh Filter Location

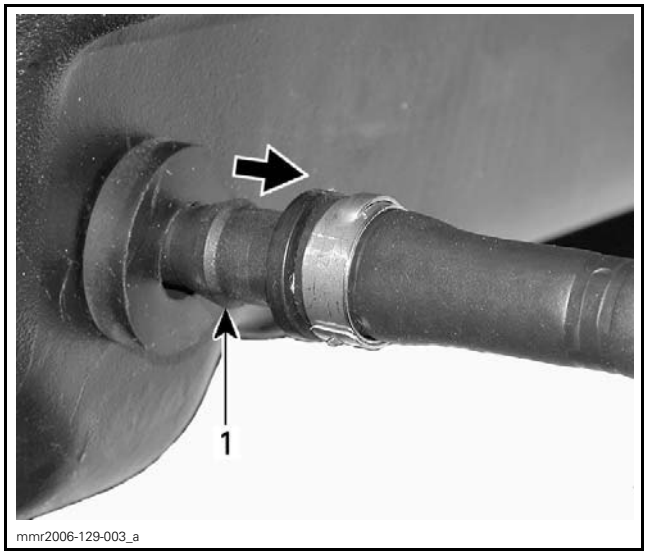
The steel mesh fuel filter is located at the end of the fuel supply hose, within the fuel tank.

Steel Mesh Filter Removal

1. Drain fuel tank as much as possible using the SUCTION PUMP (P/N 529 035 880).

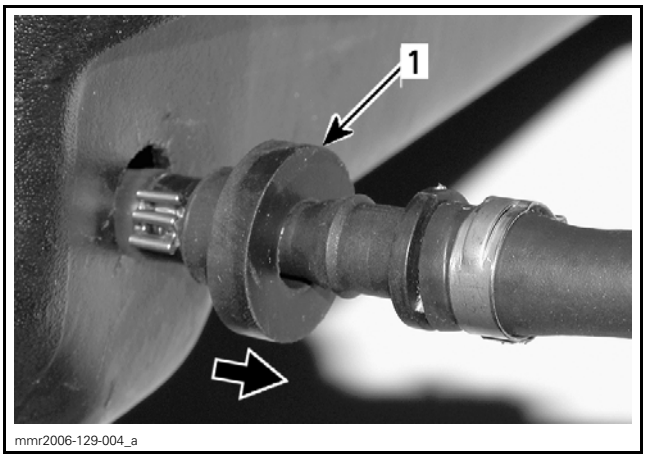


2. Slightly pull out fuel tank outlet fitting from grommet to small part of fitting so that it is loose in the grommet.



TYPICAL
1. Fuel tank outlet fitting

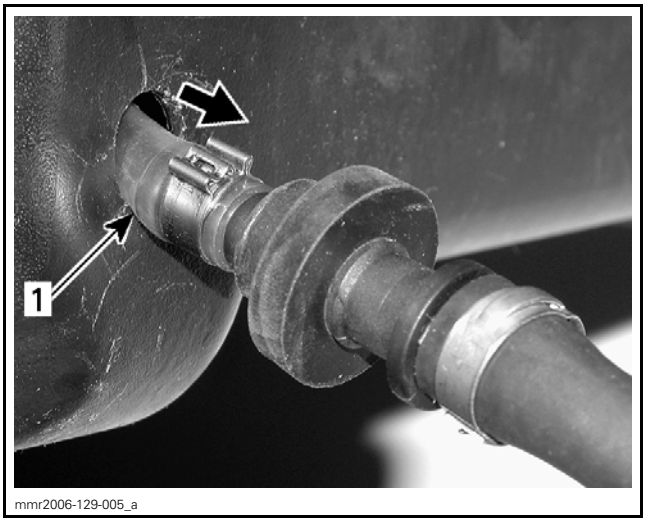
3. Carefully remove grommet from fuel tank.



TYPICAL
1. Grommet

NOTE: Although the fuel hose is shown attached to the fitting in the illustrations, it should be removed for the procedure.

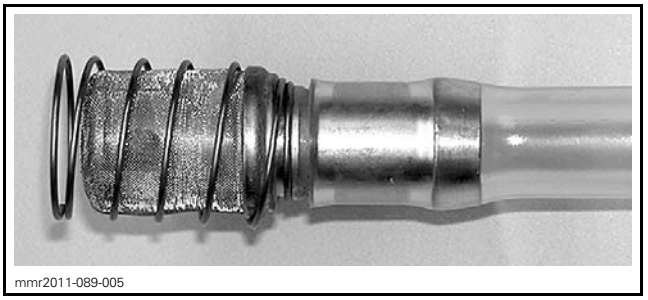
4. Pull fuel pick-up hose out of fuel tank with strainer.



TYPICAL
1. Fuel pick-up hose

Steel Mesh Filter Cleaning

1. Clean steel mesh filter using low pressure filtered air and XPS BRAKES AND PARTS CLEANER (P/N 219 701 705).



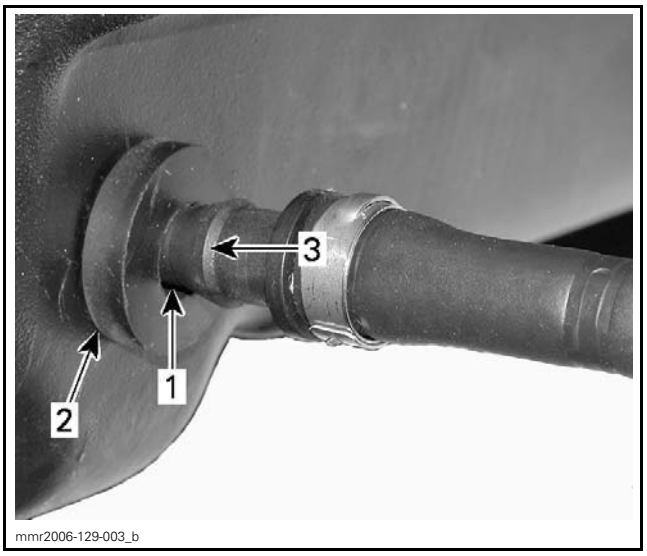
STEEL MESH FILTER, FUEL SUPPLY HOSE PICK-UP

Steel Mesh Filter Installation

Installation is the reverse of the removal procedure. Pay attention to the following details.

Install grommet on fuel tank then push fuel tank fitting through grommet.

NOTE: To facilitate installation of the grommet in the fuel tank, it should be on the smaller portion of the fuel tank fitting.



mmr2006-129-003_b

TYPICAL
1. *Small portion of fuel tank fitting*
2. *Grommet inserted in fuel tank*
3. *Push fitting in grommet*

Install grommet in fuel tank.

Push fitting in grommet.

Install and reconnect fuel supply hose using a NEW Oetiker clamp.

Carry out a *FUEL SYSTEM PRESSURIZATION AND LEAK TEST* as detailed in this subsection.

Install remaining parts in the reverse order of removal, refer to *FUEL TANK INSTALLATION* in this subsection.

FUEL LEVEL SENSOR

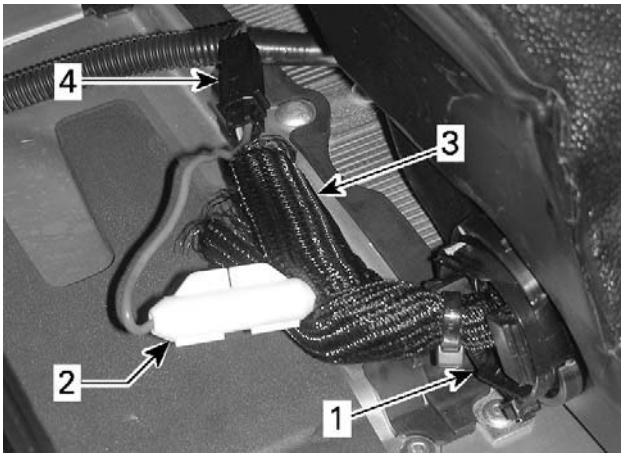
Fuel Level Sensor Troubleshooting

When troubleshooting a fuel level indication, carry out the following:

– *FUEL LEVEL SENSOR FUSE INSPECTION*
– *FUEL LEVEL SENSOR INPUT VOLTAGE TEST*
– *FUEL LEVEL SENSOR RESISTANCE TEST*
– Test continuity of the fuel level sensor circuit wiring.

Fuel Level Sensor Fuse Inspection

1. The fuel level sensor circuit is protected by an in line 0.25 A fuse located near the sensor. Check fuse to see if it is open circuit.
2. To access the fuel level sensor fuse, remove the primary air intake silencer.



mmr2012-318-008_a

TYPICAL
1. *Fuel level sensor*
2. *In-line fuse holder*
3. *Protective sheath (opened for illustration of fuse)*
4. *Fuel level sensor connector*

3. Ensure fuse is properly installed and making good contact with the fuse holder.
4. Remove fuse from in-line fuse holder and visually inspect it.
5. Using a multimeter set to "Ω" selection, test fuse continuity.

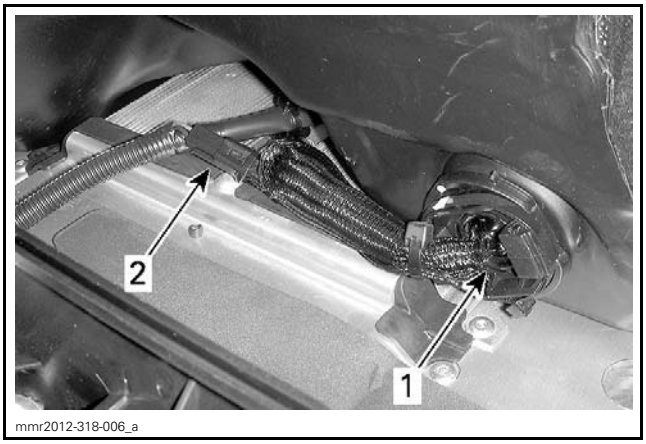
REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

CONTINUITY TEST	
PROBE	RESISTANCE
Fuel level sensor fuse	Close to 0 Ω

6. Replace fuse as required.

Fuel Level Sensor Input Voltage Test

1. Disconnect fuel level sensor connector.



TYPICAL - FUEL LEVEL SENSOR RECONNECTED
1. *Fuel level sensor*
2. *Disconnect this connector*

2. Energize the vehicle electrical system, refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Measure fuel level sensor input voltage on the vehicle harness side as per following table.

FUEL LEVEL SENSOR INPUT VOLTAGE TEST	
PROBES	READING
Pin 1 to pin 2	Battery voltage (over 12 Vdc)
Pin 1 to engine ground	

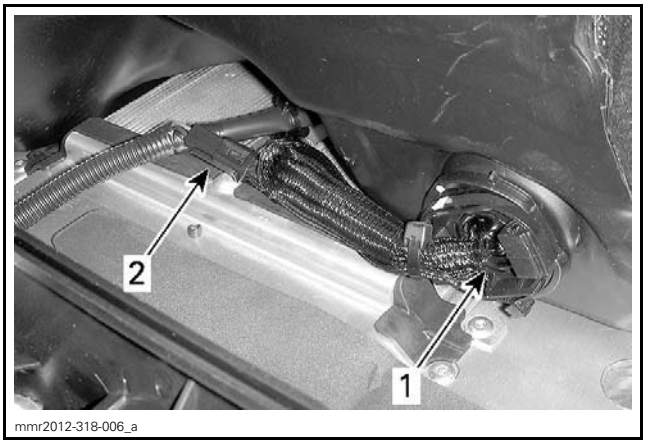
If the gauge is energized but no voltage is measured at the fuel sensor connector, test for continuity of the wiring between the gauge connector 5-CV pin 12 and fuel level sensor connector pin 1 (BK/GN wire). If the wiring is good, replace the gauge.

If voltage is measured to engine ground but not to pin 2 of the sensor connector, test for continuity between the gauge connector 5-CV pin 15 and fuel level sensor connector pin 2 (BU wire).

If the BU wire is good, carry out a *FUEL LEVEL SENSOR RESISTANCE TEST* as described in this section.

Fuel Level Sensor Resistance Test

1. Obtain access to fuel level sensor connector, refer to *FUEL TANK REMOVAL* in this subsection.
2. Disconnect fuel level sensor.



1. *Fuel level sensor*
2. *Disconnect this connector*

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Test resistance between the two pins in the of sensor connector as follows.

FUEL LEVEL SENSOR RESISTANCE TEST	
Full level resistance value	8 Ω ± 2 Ω
Empty level resistance value	95 Ω ± 5 Ω

If the sensor resistance value is not as specified in table, first check for a proper contact at the fuse holder before assuming the sensor is at fault.

If the sensor resistance cannot be measured (OL), test the fuse.

If the fuse is good, check for continuity of the RED wire between the fuse and the sensor connector.

If the RED wire is good, recheck sensor resistance from the RED wire of the fuse holder, through the sensor, to the YELLOW/WHITE wire on the sensor connector. Replace the sensor as required.

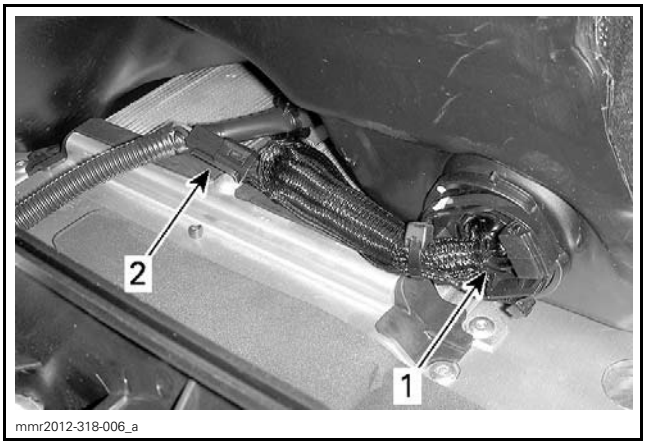
If the sensor resistance reading is high even with a full tank of fuel, remove the fuel sensor from the fuel tank and ensure the fuel pick up hose is not draped of the fuel level sensor float. Refer to *FUEL LEVEL SENSOR REMOVAL* in this subsection.

Fuel Level Sensor Removal

1. Drain fuel tank.

REQUIRED TOOL	
SUCTION PUMP (P/N 529 035 880)	

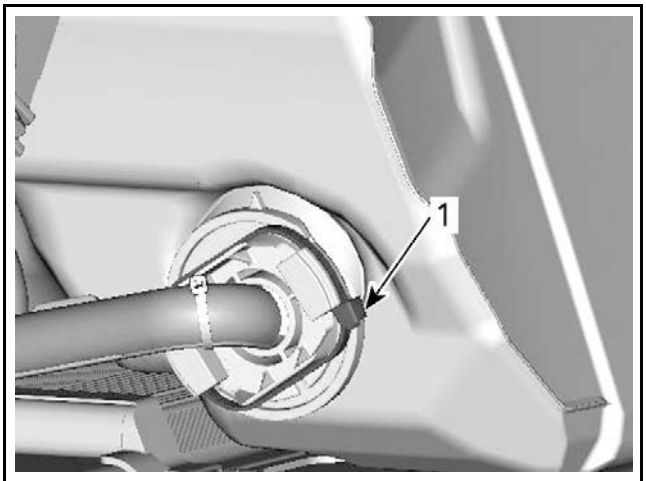
2. Lift front of vehicle and safely support it.
3. Disconnect fuel sensor connector.



mmr2012-318-006_a

1. Fuel level sensor
2. Connector to disconnect

4. Cut locking tie securing grommet.

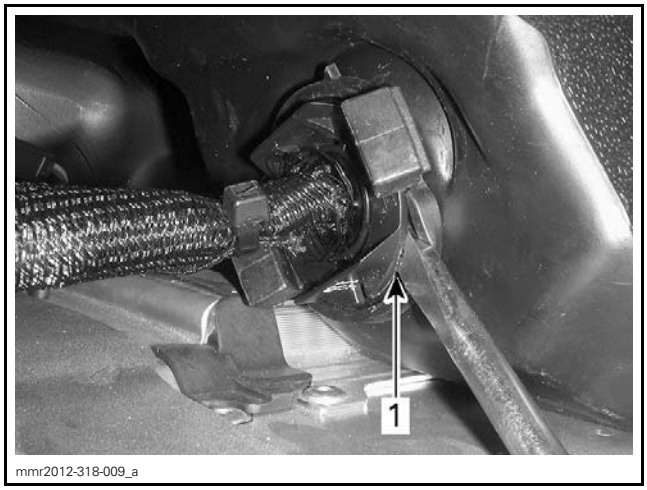


mmr2012-030-002_b

TYPICAL
1. Locking tie

5. Insert a screwdriver between grommet and sensor face plate. Carefully pry sensor loose in grommet.

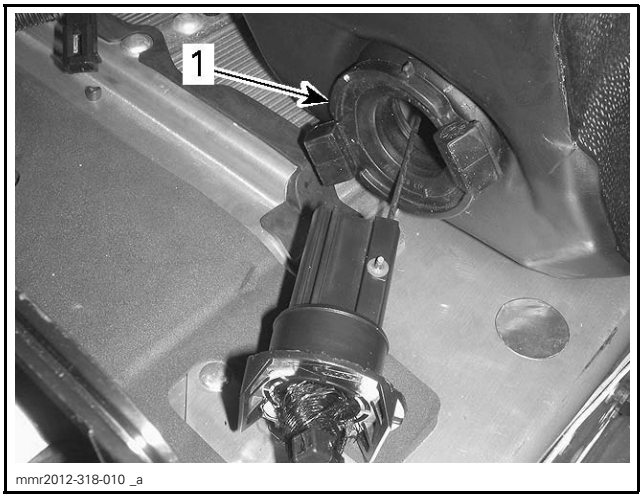
NOTE: Do not try to completely remove sensor from grommet at this time.



mmr2012-318-009_a

TYPICAL
1. Screwdriver inserted between grommet and face of sensor

6. Remove grommet from fuel tank.



mmr2012-318-010 _a

TYPICAL
1. Remove grommet from tank

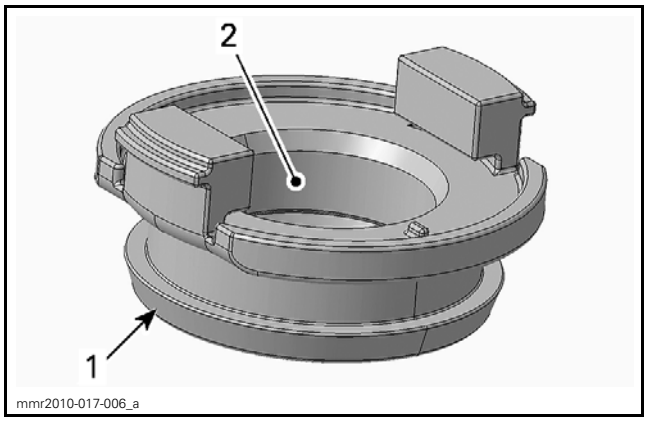
7. Carefully rotate sensor as you pull it out of fuel tank.

NOTICE **Float arm is precisely bent and must not be altered on removal or installation.**

Fuel Level Sensor Installation

Fuel level sensor installation is the reverse of removal procedure. Pay attention to the following.

1. Carry out a resistance test of sensor before installation, refer to *FUEL LEVEL SENSOR RESISTANCE TEST* in this subsection.
2. To ease grommet and fuel level sensor installation, spray a fine mist of plain water (NO SOAP) on outer beveled surface and inner surface of grommet.

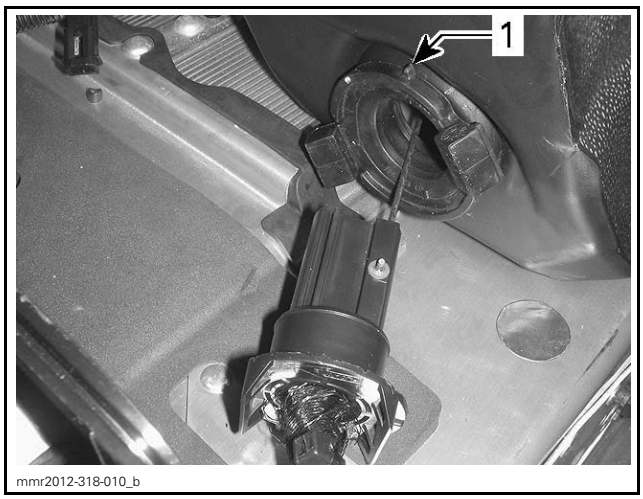


1. Spray water on beveled surface
2. Spray water on inner diameter of grommet

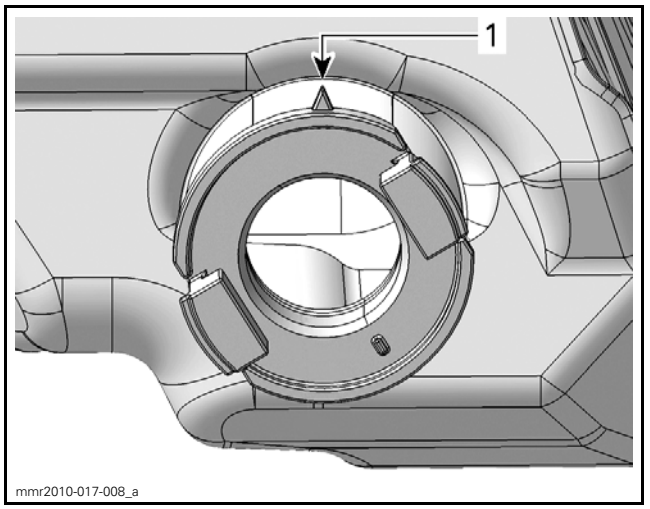
3. Carefully insert float sensor through hole in grommet gently rotating it in position.



4. Insert grommet in fuel tank ensuring it fully locks in position with the grommet alignment indicator at the **twelve o'clock position**.

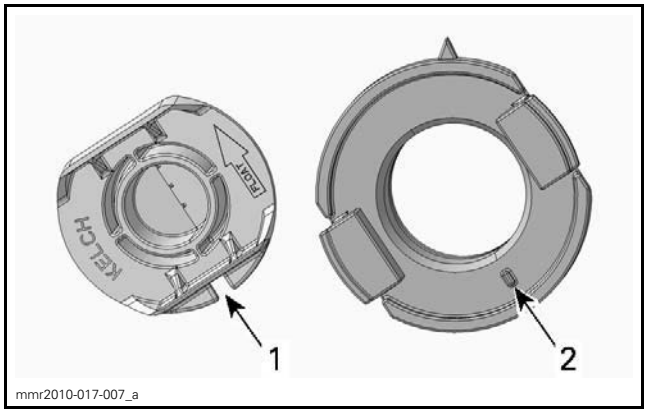


TYPICAL
1. Grommet alignment index facing up at 12 o'clock position



TYPICAL
1. Grommet alignment indicator at twelve o'clock position

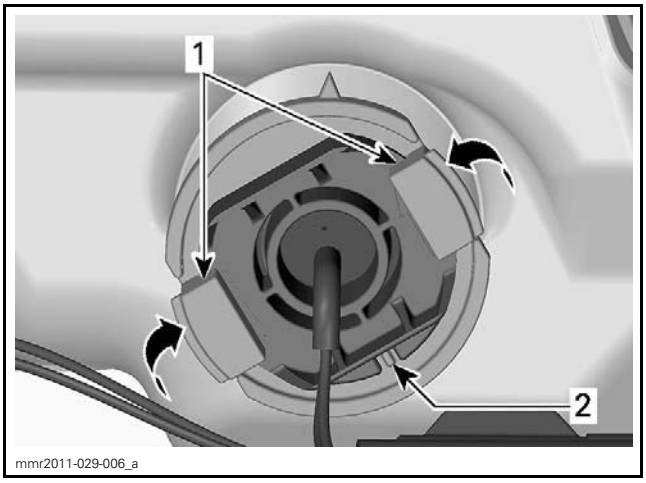
5. Align notch in sensor flange with alignment boss on grommet and push it in until it bottoms out.



1. Alignment notch in sensor flange
2. Alignment boss on grommet

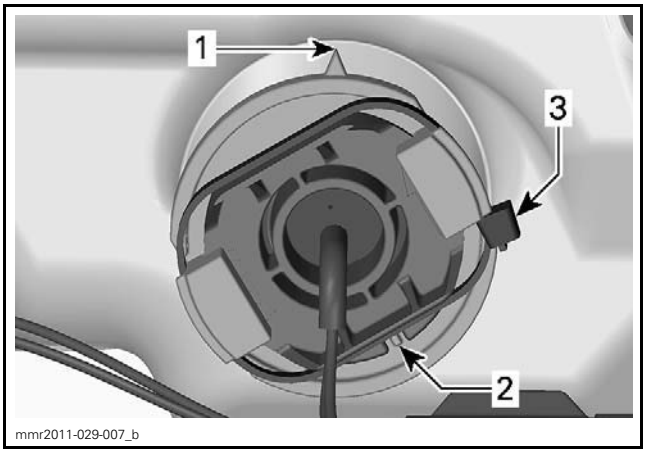
NOTE: The notch in the sensor **must be** aligned with the alignment boss on the grommet.

6. Fold the grommet retaining blocks over the sensor flange.



FOLD RETAINING BLOCKS
1. *Retaining blocks*
2. *Sensor notch and grommet tab matched*

7. Install locking tie to secure grommet on fuel level sensor as in following illustration. The locking tie should be secured with minimal tension applied.



TYPICAL
1. *Grommet alignment index must be at twelve o'clock*
2. *Sensor notch on grommet alignment boss*
3. *Locking tie secured with minimal tension*

8. Use DIELECTRIC GREASE (P/N 293 550 004) in connector to prevent corrosion.
9. Carry out a fuel system leak test, refer to *FUEL SYSTEM PRESSURIZATION* in this subsection.
10. Test fuel level indication as you fill fuel tank before completing reassembly of vehicle.

FUEL HOSE AND OETIKER CLAMPS

Fuel Hose Replacement

When replacing fuel hoses, be sure to use hoses as available from BRP parts department. This will ensure continued proper and safe operation.

⚠ WARNING

Use of fuel lines other than those recommended by BRP may compromise fuel system integrity.

⚠ WARNING

- Never change the routing of a fuel hose.
- Always reinstall the corrugated protective tubing on fuel hoses.
- Secure fuel hoses using the appropriate locking tie or fastener to prevent contact with sharp edges or hot, rotating and moving parts.
- After connecting a hose or a quick connect fitting, pull on the hose near the fitting to make sure it is securely locked.
- Always validate fuel system tightness by performing a *FUEL SYSTEM PRESSURIZATION AND LEAK TEST*.

Oetiker Clamp Replacement

REQUIRED TOOL	
OETIKER PLIERS (P/N 295 000 070)	

⚠ WARNING

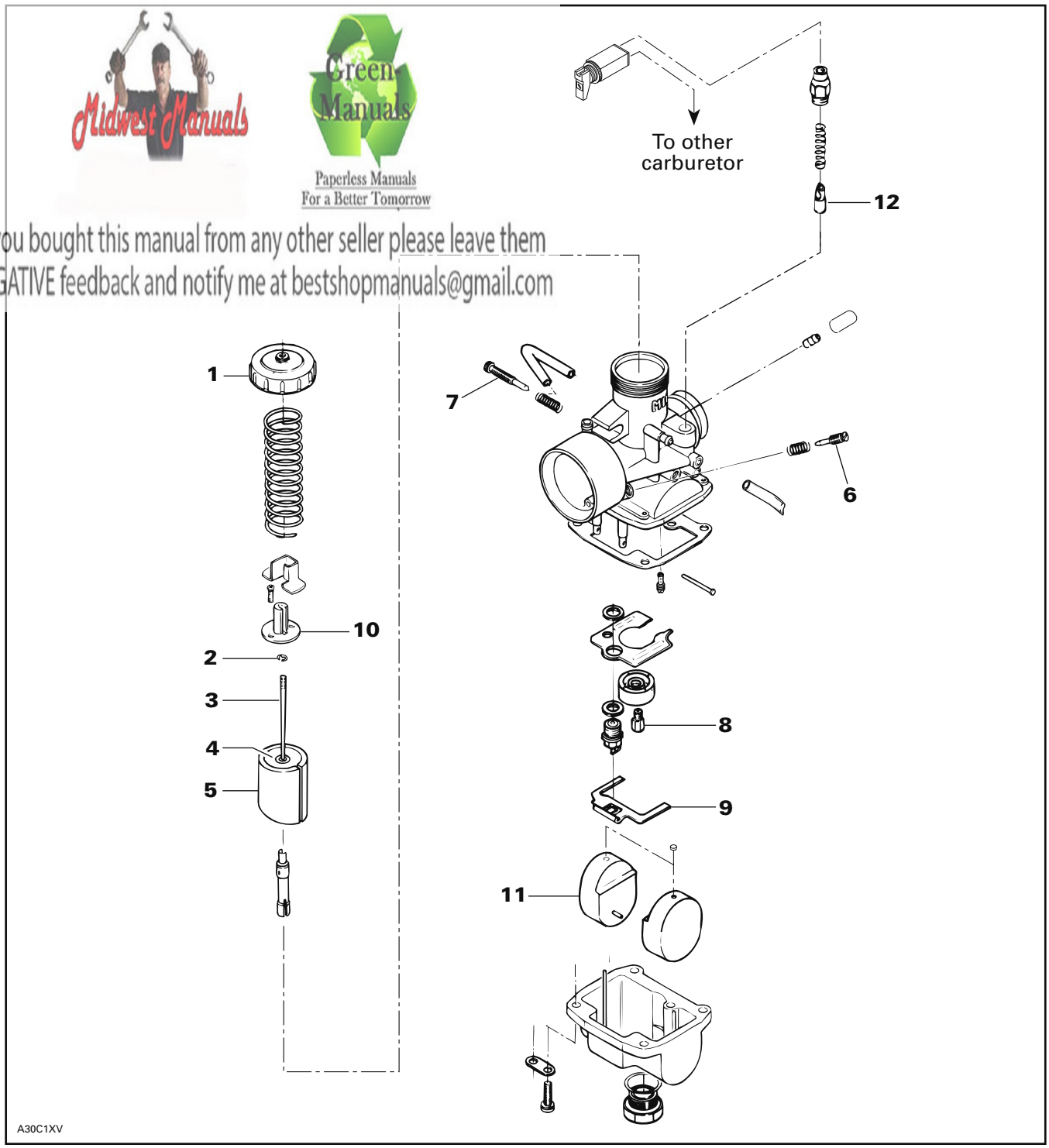
Whenever removing a hose in the fuel system, always use new Oetiker clamps at assembly.

VM CARBURETORS, THROTTLE AND CHOKE CABLES

SERVICE TOOLS

Description	Part Number	Page
CARBURETOR TOOL KIT	404 112 000	146
CHOKE ADJUSTER TOOL	529 036 163	155
FLOAT LEVEL GAUGE	529 035 520	148

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

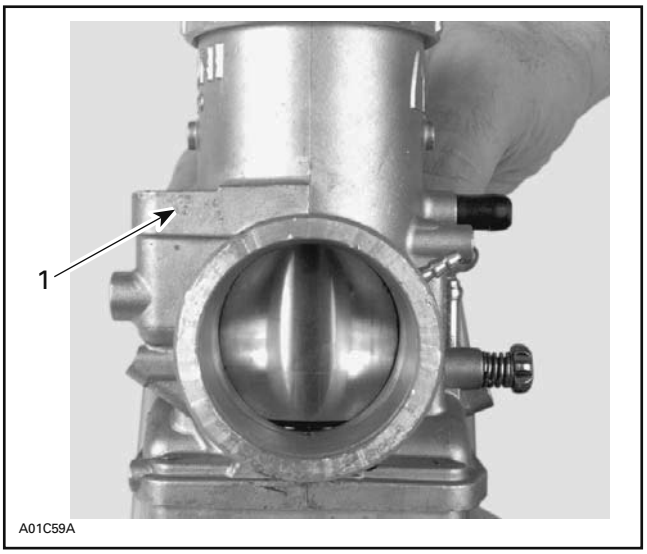


PROCEDURES

CARBURETOR

Carburetor Identification

All carburetors are identified on their body.



TYPICAL
1. Identification number

CARBURETOR MODEL		
MAG	VM30-218	Green dot
PTO	VM30-219	Blue dot

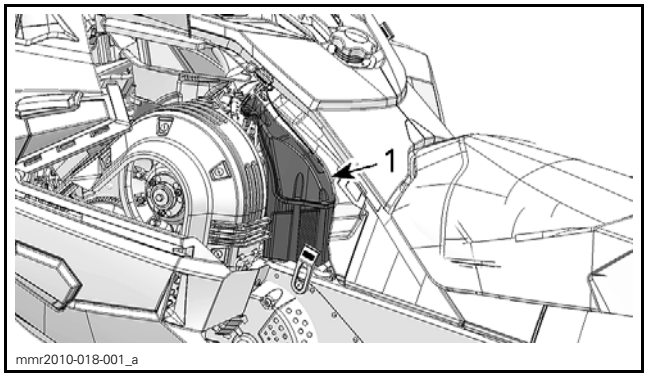
Carburetor Factory Calibration

SPECIFICATIONS		
	MAG	PTO
Main jet	190	200
Jet Needle Identification	6BFY46	
Jet Needle clip position	3	4
Needle jet	P-8 (159)	
Pilot jet	35	
Float level	23.9 mm ± 1 mm (.941 in ± .039 in)	
Slide cutaway	2.5	
Air screw adjustment	1.25 (reference only)	1.00 (reference only)
Preliminary idle speed adjustment	1.6 mm ± 0.1 mm (.063 in ± .004 in)	
Idle speed	1650 ± 200 RPM	

Carburetor Removal

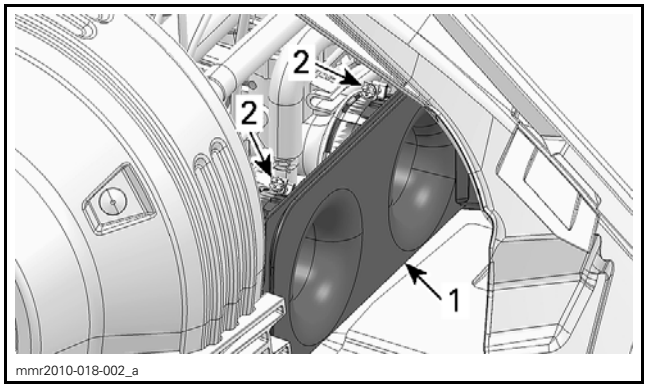
Remove the LH side panel.

Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.



TYPICAL - TUNDRA MODEL SHOWN
1. Primary air intake silencer

Loosen clamps retaining the adapter plate to carburetors.



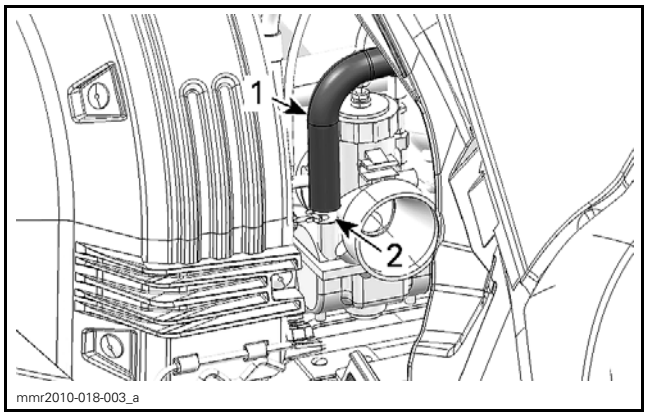
1. Adapter plate
2. Retaining clamps

Remove the adapter plate.

NOTE: The following procedure applies to both carburetors. Carburetors can be removed individually.

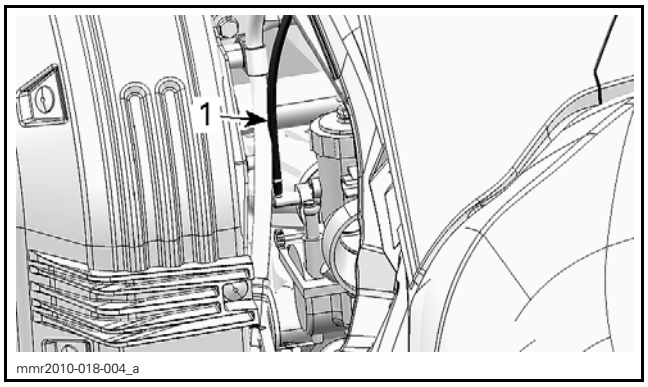
Loosen clamp retaining carburetor to intake adapter.

Disconnect fuel inlet line.



1. Fuel inlet line
2. Spring clamp

Disconnect the carburetor vent hose.

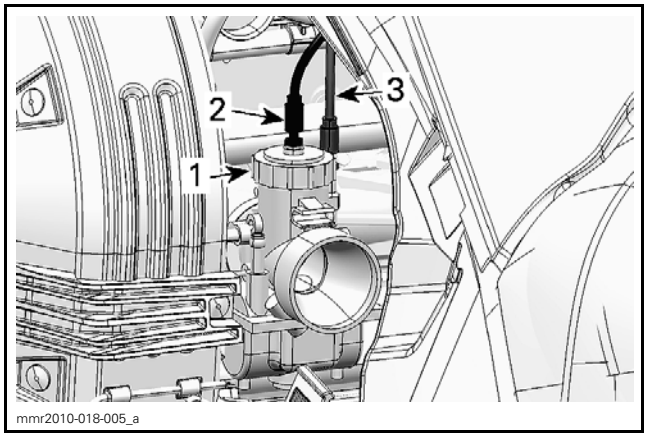


1. Carburetor vent hose

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

Disconnect throttle cable from throttle slide.

Unscrew choke plunger from carburetor.

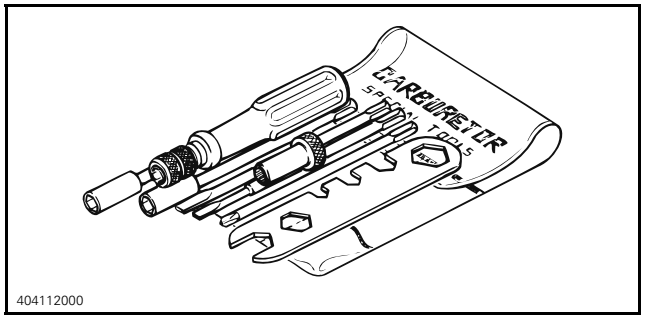


1. Carburetor cover
2. Throttle cable
3. Choke cable

Remove carburetor from engine.

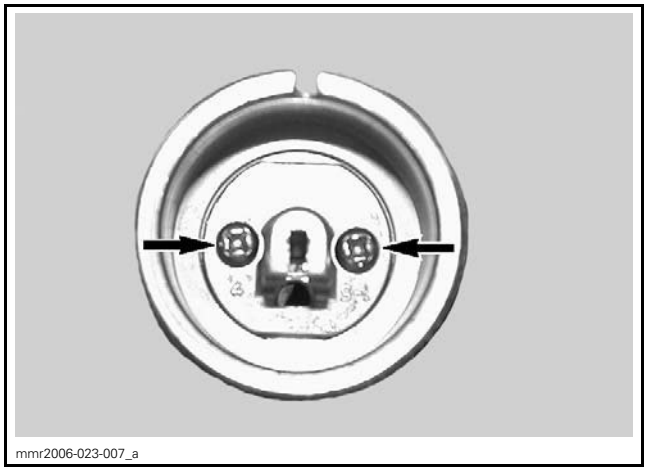
Carburetor Disassembly

NOTE: To ease the carburetor disassembly and assembly procedures it is recommended to use CARBURETOR TOOL KIT (P/N 404 112 000).



E-Clip and Jet Needle Removal

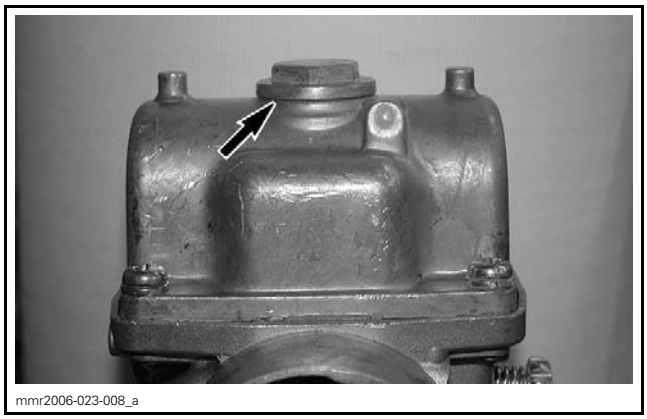
Remove screws from needle retaining plate **no. 10** to remove the jet needle **no. 3**.



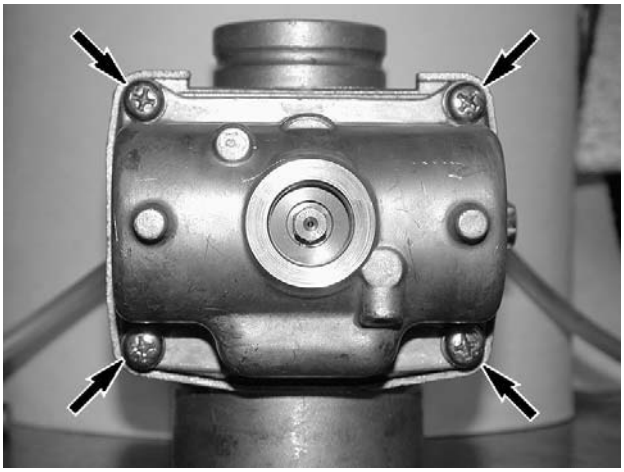
Remove jet needle with its E-clip.

Float Bowl Removal

Unscrew drain plug of float bowl. Recover the remaining fuel in a container.



Unscrew the 4 screws retaining the float bowl to the carburetor body.


mmr2006-023-009_a

Remove float bowl.

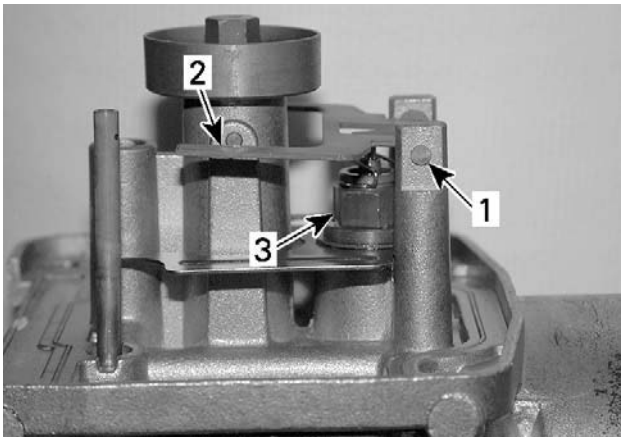
NOTE: Upon float bowl removal, make sure not to drop carburetor floats.

Needle Valve Removal

Remove float bowl as explained above.

Pull out pin retaining float arm to carburetor body. Remove float arm **no. 9**.

Unscrew needle valve.



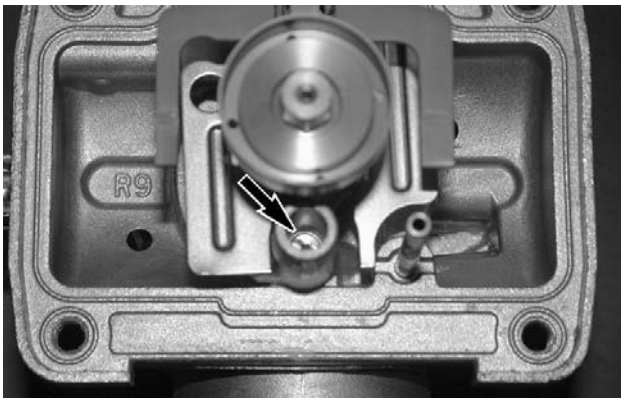
mmr2006-023-010_a

1. Float arm pin
2. Float arm
3. Needle valve

Pilot Jet Removal

Remove float bowl as explained above.

Unscrew pilot jet **no. 8** using a narrow screwdriver.



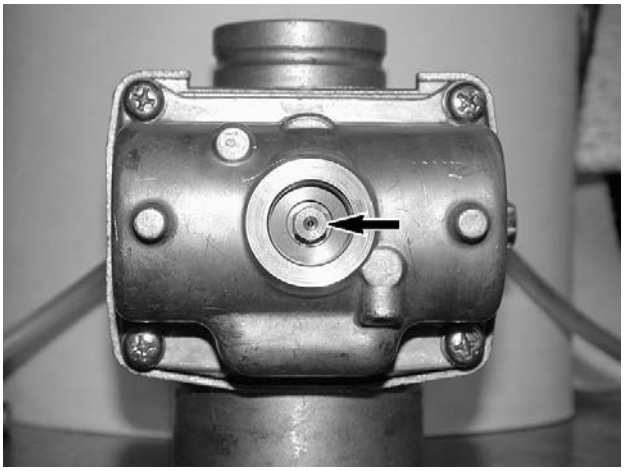
mmr2006-023-011_a

Main Jet Removal

Remove float bowl as explained above.

Unscrew main jet from carburetor body.

NOTE: To replace main jet by a different size, main jet is accessible through the drain plug without removing float bowl.


mmr2006-023-009_b

Carburetor Cleaning

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

NOTICE **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, pilot jet and main jet should be cleaned in a carburetor cleaner following manufacturer's instructions.

⚠ WARNING

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

Carburetor Inspection

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

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

Check throttle slide **no. 5** for wear. Replace as necessary.


mmr2006-023-012

Check idle speed screw straightness. Replace as necessary.

Check for fuel soaked into float **no. 11**; replace as necessary.

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

Carburetor Assembly

The assembly is the reverse of the disassembly procedure. Pay attention to the following.

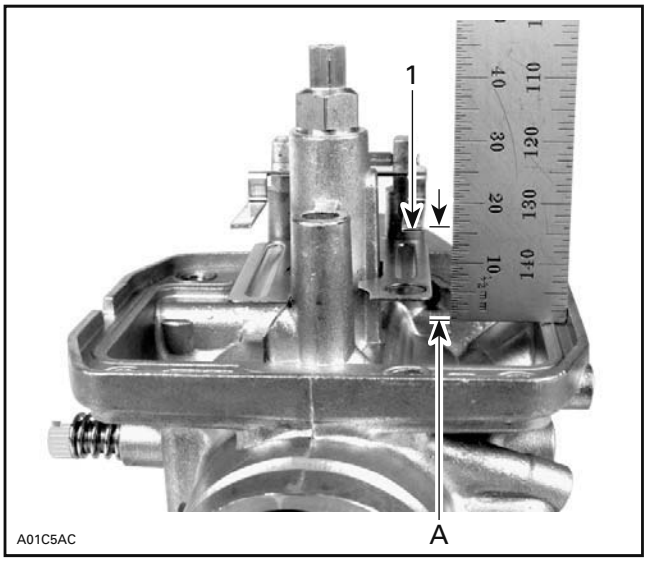
Float Installation

Verify float adjustment after installation.

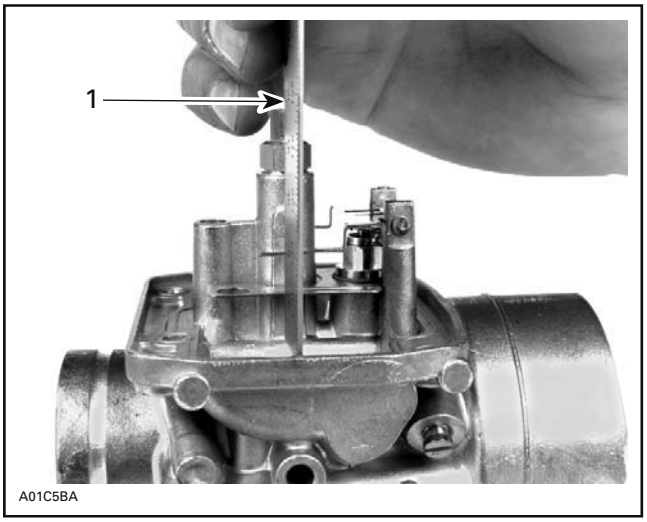
NOTICE **Spark plugs will foul if float is adjusted too low. Engine may be damaged if float is adjusted too high.**

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

– Make sure that float arm **no. 9** is symmetrical — not distorted.
– With carburetor chamber upside down on a level surface, measure height between bowl seat and top edge of float arm. Keep ruler perfectly vertical and in line with main jet hole.

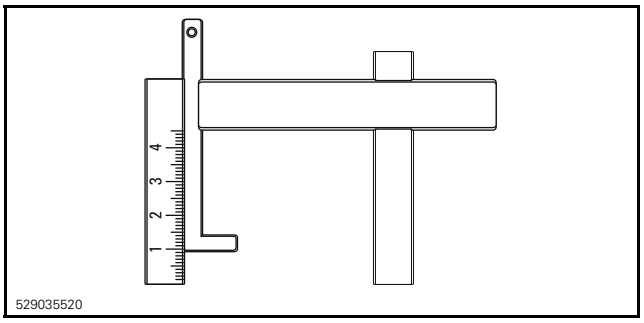


TYPICAL — VM TYPE
1. Measure from top of float arm
A. Float height (including float arm thickness)



TYPICAL — VM TYPE
1. Ruler vertical and in line with main jet

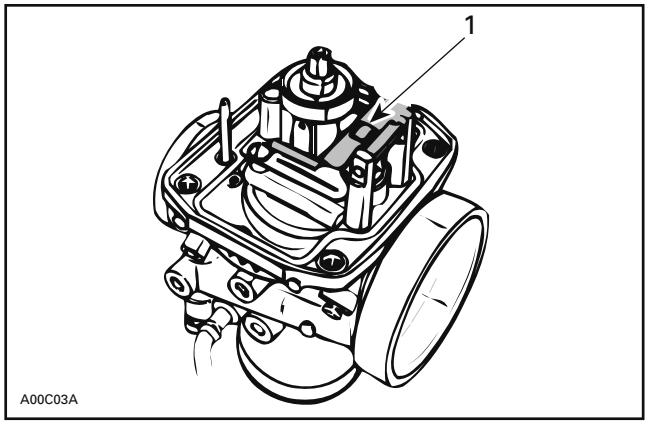
Float level height can be checked using the FLOAT LEVEL GAUGE (P/N 529 035 520). Keep tool in line with main jet as explained above.



To Adjust Height

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

FLOAT LEVEL
23.9 mm ± 1 mm (.941 in ± .039 in)



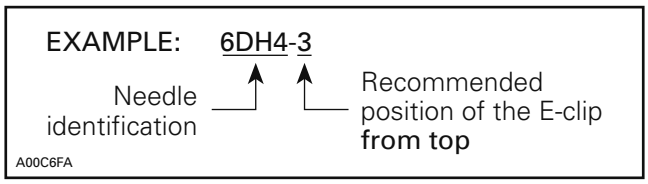
TYPICAL
1. Contact tab

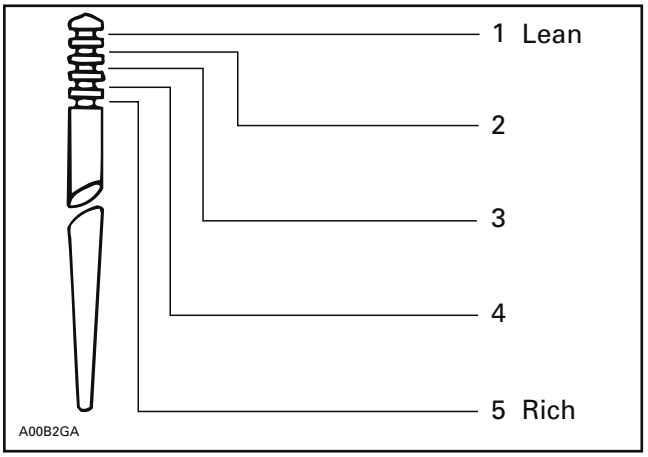
E-Clip and Jet Needle Installation

Make sure E-clip is installed in the proper groove of jet needle.

The position of the needle in the throttle slide is adjustable by means of an E-clip **no. 2** inserted into 1 of 5 grooves located on the upper part of the needle. Position 1 (at top) is the leanest, 5 (at bottom) the richest.

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



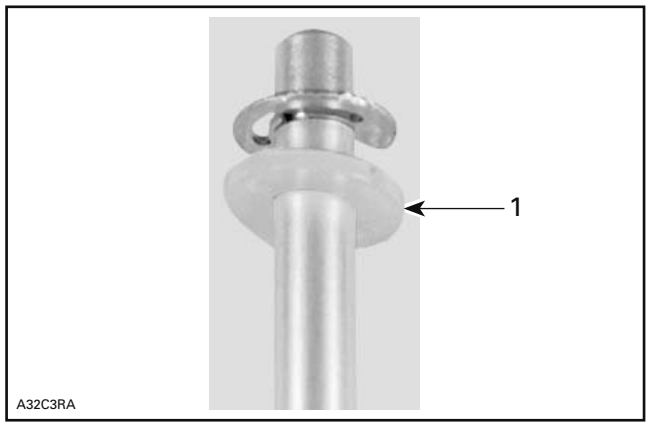


CLIP POSITIONS

JET NEEDLE CLIP POSITION	
MAG: 3	PTO: 4

Install the nylon packing **no. 4** underneath jet needle E-clip on all applicable throttle slides.

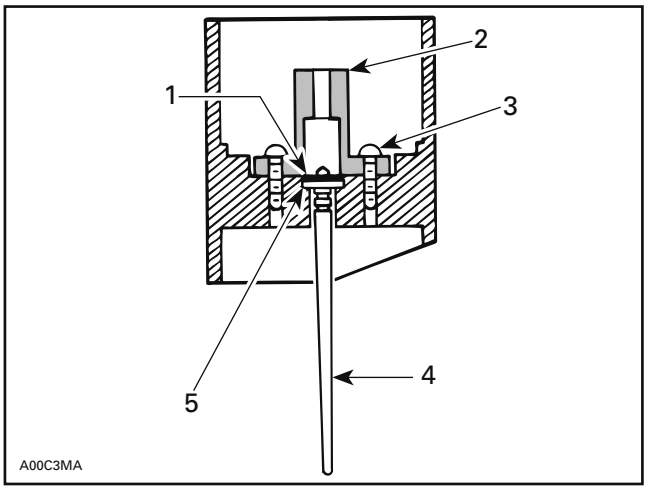
NOTICE Serious engine damage can occur if this part is not installed.



TYPICAL
1. Nylon packing

Install jet needle in throttle slide.

When installing jet needle plate, do not obstruct hole in throttle slide.



1. Clip
2. Jet needle plate
3. Screw
4. Jet needle
5. Nylon packing

Carburetor Installation

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

Prior to installing carburetor, adjust air screw and preliminary idle speed as described in *CARBURETOR ADJUSTMENTS*.

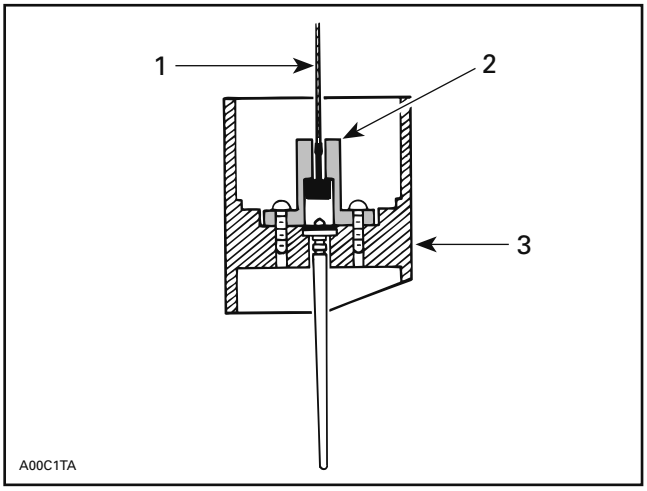
On applicable models, make sure to align tab of carburetor with notch of intake adapter.

NOTICE **The rubber of intake adapter must be checked for cracks and/or damage. At assembly, the intake adapter must match perfectly with carburetor and engine.**

Hook throttle cable into jet needle plate.

⚠ WARNING

Ensure throttle slide return spring is installed.



1. Throttle cable
2. Jet needle plate
3. Throttle slide

Install throttle slide with spring in carburetor.

NOTICE **Never allow throttle slide to snap shut. Be careful not to bent jet needle.**

Tighten carburetor cap.

⚠ WARNING

Ensure throttle lever operates normally.

Carburetor Adjustments

NOTE: Carburetor is calibrated at the factory for a temperature of -20°C (0°F) at sea level. For colder temperature or high altitude applications, carburetor must be recalibrated. A Service Bulletin gives information about carburetor calibration according to altitude and temperature.

Adjustments should be performed following this sequence:

– Float height
– Jet needle
– Air screw
– Preliminary idle speed adjustment
– Throttle cable and carburetor synchronization
– Choke cable
– Final idle speed adjustment.

Float Height

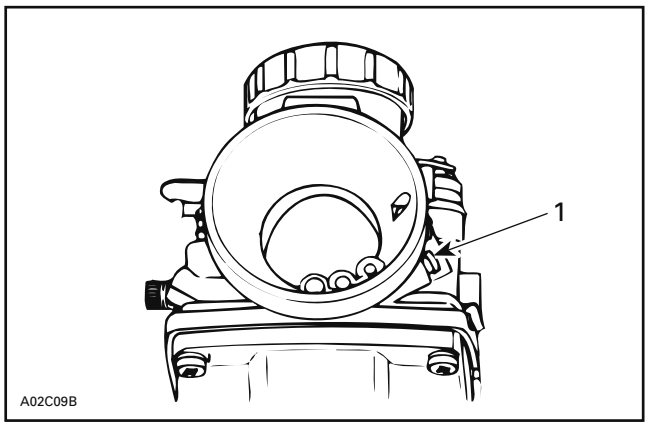
Refer to *CARBURETOR ASSEMBLY* to verify float height.

Jet Needle

Refer to *CARBURETOR ASSEMBLY* to position E-clip in the proper jet needle groove.

Air Screw Adjustment

Completely close the air screw **no. 6** (until a slight seating resistance is felt) then back off as specified.



1. Air screw

NOTE: Turning screw clockwise enriches mixture and turning it counterclockwise leans mixture.

AIR SCREW (REFERENCE ONLY)	
MAG: 1.25	PTO: 1.00

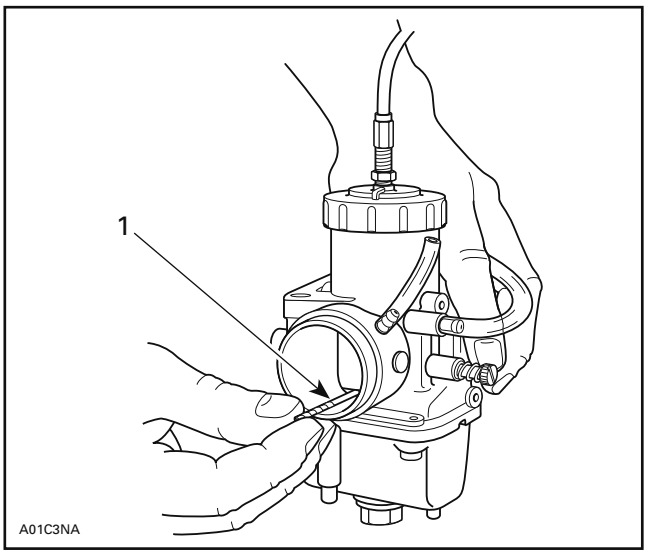
Preliminary Idle Speed Adjustment

Using a drill bit, adjust throttle slide height by turning idle speed screw **no. 7**.

Throttle slide height is measured on outlet side of carburetor (engine side).

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

IDLE THROTTLE SLIDE HEIGHT (DRILL BIT SIZE)
1.6 mm ± 0.1 mm (.063 in ± .004 in)



TYPICAL
1. Drill bit used as gauge for throttle slide height

Throttle Cable and Carburetor Synchronization

Refer to *THROTTLE CABLE* further in this subsection for proper procedure.

Choke Cable

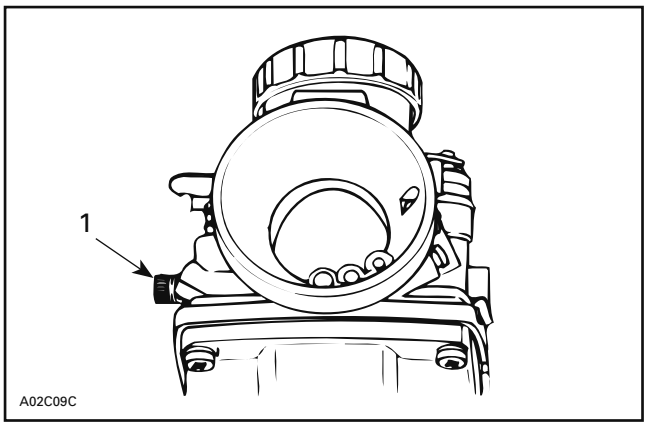
Adjust choke cable. Refer to *CHOKE CABLE* further in this subsection.

Final Idle Speed Adjustment

NOTICE **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 *LUBRICATION SYSTEM* subsection.**

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.

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



1. Idle speed screw

IDLE SPEED (RPM)
1650 ± 200

NOTE: Turn adjustment screw the same amount on each carburetor to keep carburetors synchronized.

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

THROTTLE CABLE

Throttle Cable Removal

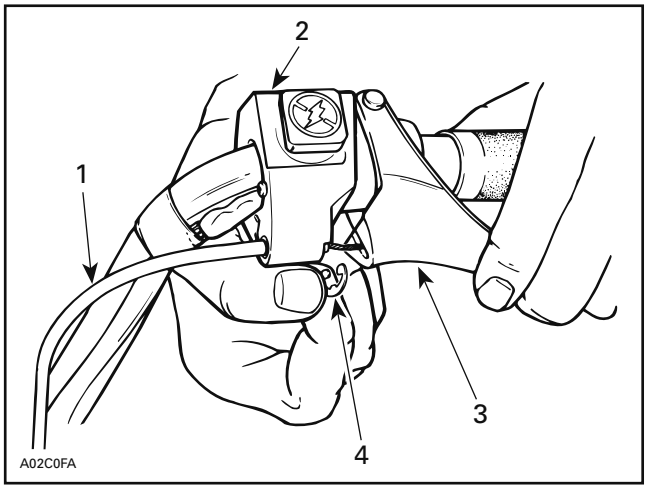
NOTE: Before removing throttle cable from vehicle, note its routing and locking ties location for installation.

Refer to *BODY* subsection and remove the following parts:
– Hood
– Side panels
– Console.

Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.

Remove the muffler. Refer to *EXHAUST SYSTEM* subsection.

Remove the circlip retaining throttle cable to throttle cable housing.



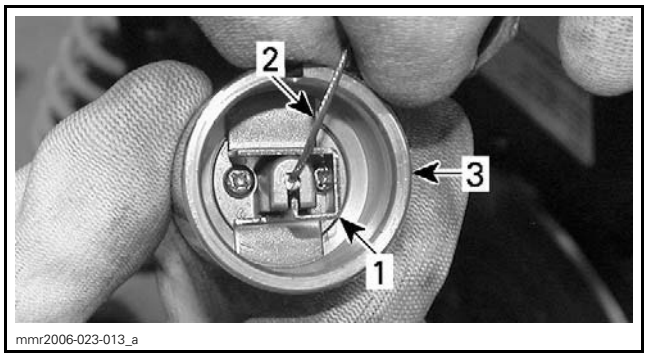
1. Throttle cable housing
2. Throttle lever housing
3. Throttle lever
4. Circlip

Using long nose pliers to hold cable, push the end of cable out of its location in throttle lever.

Remove cable from throttle cable housing.

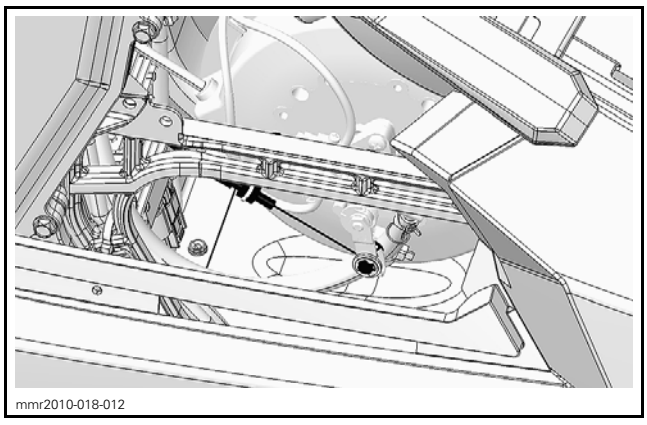
Unscrew carburetor cover then pull out throttle slide from carburetor.

Disconnect throttle cable from throttle slide.



1. Throttle cable lock
2. Throttle cable
3. Throttle slide

Disconnect cable end from oil pump.



Cut all locking ties and remove throttle cable.

Throttle Cable Inspection

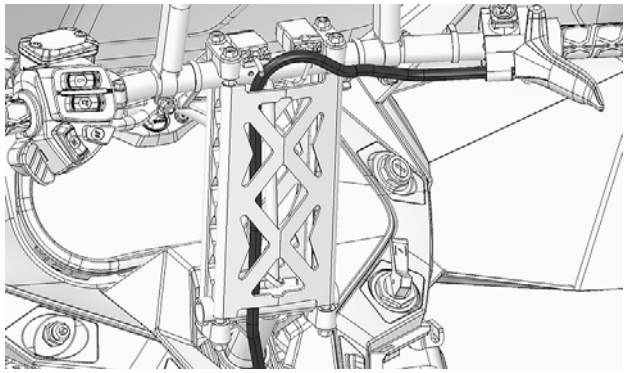
Inspect throttle cable and housing for any damages. Replace as necessary.

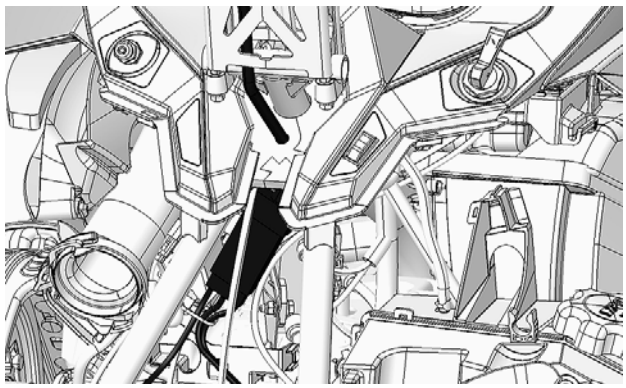
Throttle Cable Installation

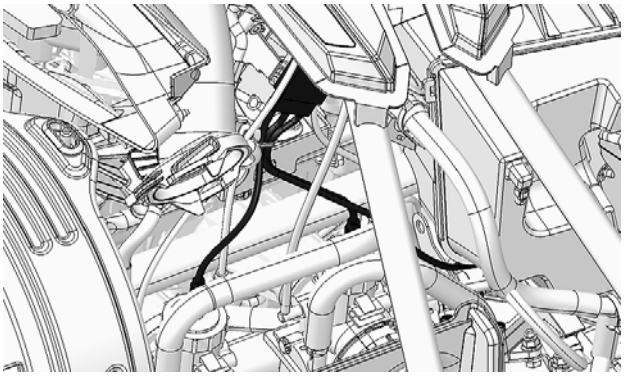
The installation is the reverse of the removal procedure.

NOTICE Check that throttle cable is routed away from sharp edges, hot or vibrating parts.

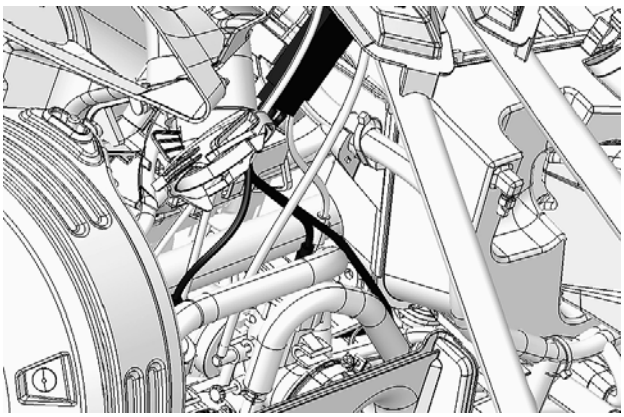
Throttle Cable Routing

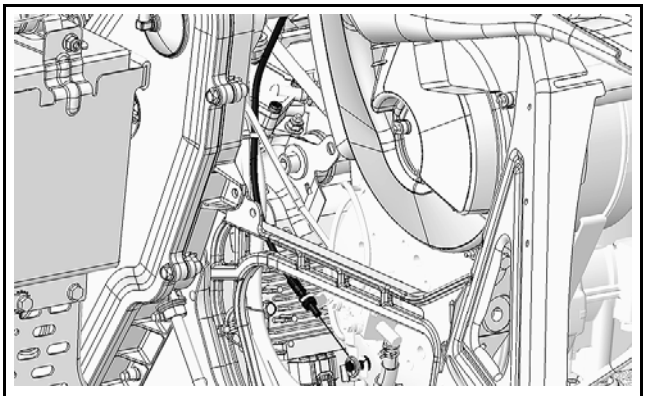

mmr2010-018-006
TYPICAL


mmr2010-018-007
TYPICAL


mmr2010-018-008
TYPICAL

Oil Pump Cable Routing


mmr2010-018-014
TYPICAL


mmr2010-018-013
TYPICAL

Throttle Cable Adjustment

⚠ WARNING

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

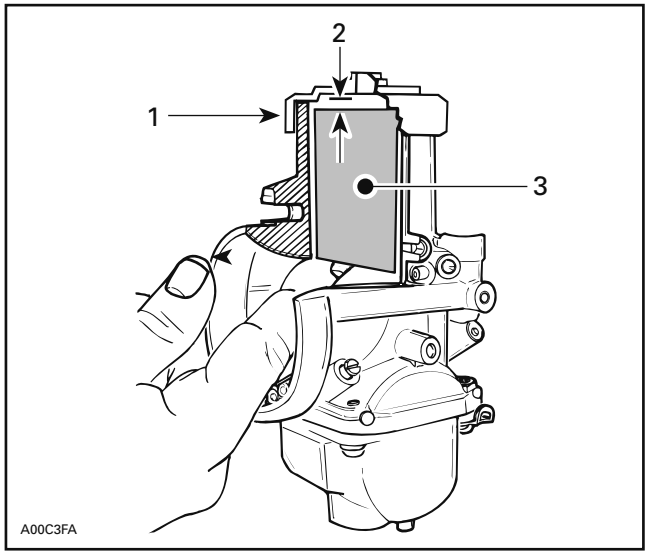
Carburetors must be installed on engine and throttle cable properly routed.

Adjust throttle cable as per following procedure:

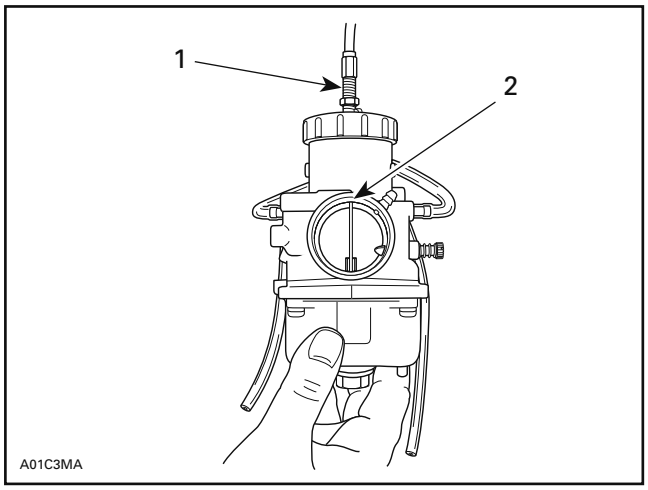
Loosen throttle cable housing adjusting and locking nuts.

While holding throttle lever to wide open throttle position, adjust throttle cable until cut-away lower edge is equal or 1.0 mm (.04 in) lower than the venturi bore on engine side. In this position, turn cable housing adjusting nut and tighten lock nut. Proceed on both carburetors.

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



TYPICAL – FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)
1. *Cover*
2. *Free play*
3. *Throttle slide*



TYPICAL – FULL OPENING (THROTTLE LEVER AGAINST HANDLE GRIP)
1. *Adjusting nut*
2. *Throttle slide flush or 1.0 mm (.040 in) lower than carburetor outlet bore (engine side)*

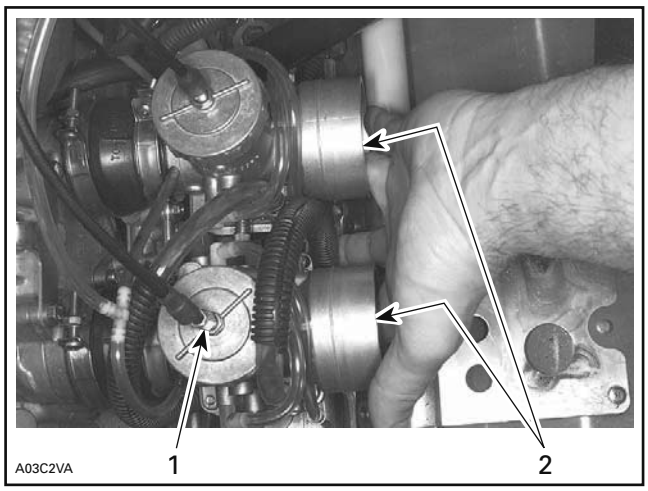
Also ensure that, when throttle is released to idle position, the idle adjusting screw end touches its stopper. No tension should be applied to throttle cable.

Carburetor Synchronization Verification

When depressing throttle lever, both carburetor slides must start to open at same time.

Screw or unscrew cable adjuster until all carburetor slides start to open at the same time. Cable play will be identical on all carburetors. Retighten jam nut.

NOTICE Make sure carburetors start to operate simultaneously.



TYPICAL
1. *Screw or unscrew adjuster*
2. *Check that all slides start to open at the same time*

Oil Pump Adjustment Verification

NOTICE Oil pump cable must be readjusted whenever throttle cable adjustment or idle speed are changed, otherwise serious engine damage may occur.

CHOKE CABLE

Choke Cable Removal

NOTE: Before removing choke cable, note its routing and locking tie locations for installation.

Refer to *BODY* subsection and remove the following parts:
– Hood
– Side panels.

Remove the primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.

Remove choke cable nut and pull cable underneath console.

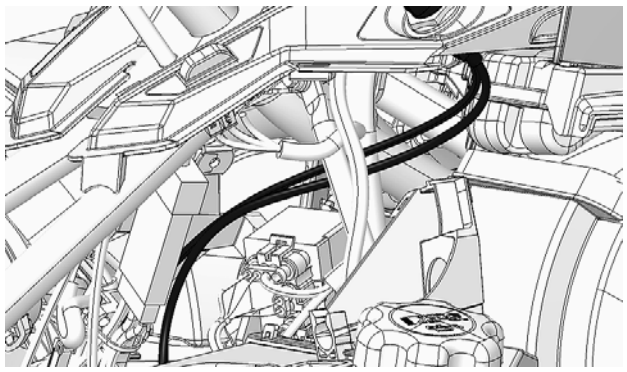
Unscrew choke cable from carburetor.

Cut all locking ties retaining cable and remove it from vehicle.

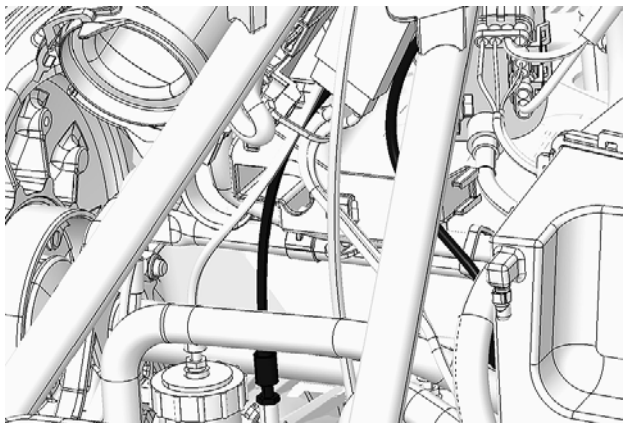
Choke Cable Installation

The installation is the reverse of the removal procedure.

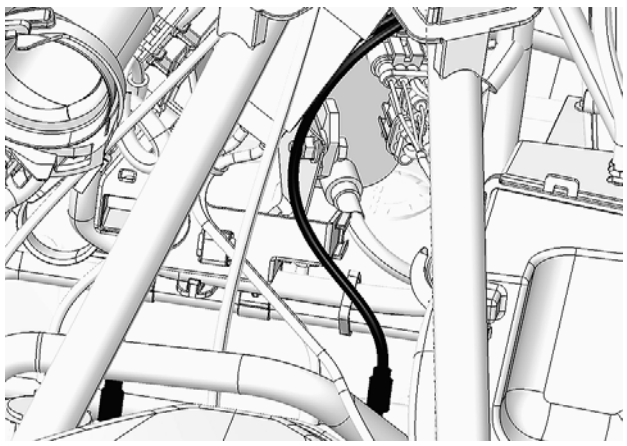
Choke Cable Routing


mmr2010-018-009

TYPICAL


mmr2010-018-010

TYPICAL


mmr2010-018-011

TYPICAL

Choke Cable Adjustment

Set choke lever to half open position.

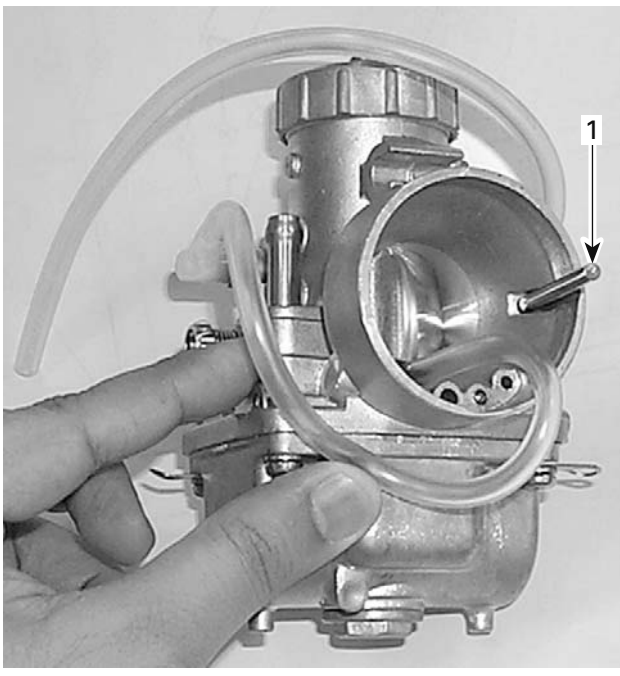

mmr2010-018-015

TYPICAL — CHOKE LEVER — HALF OPEN POSITION

Use the CHOKE ADJUSTER TOOL (P/N 529 036 163).

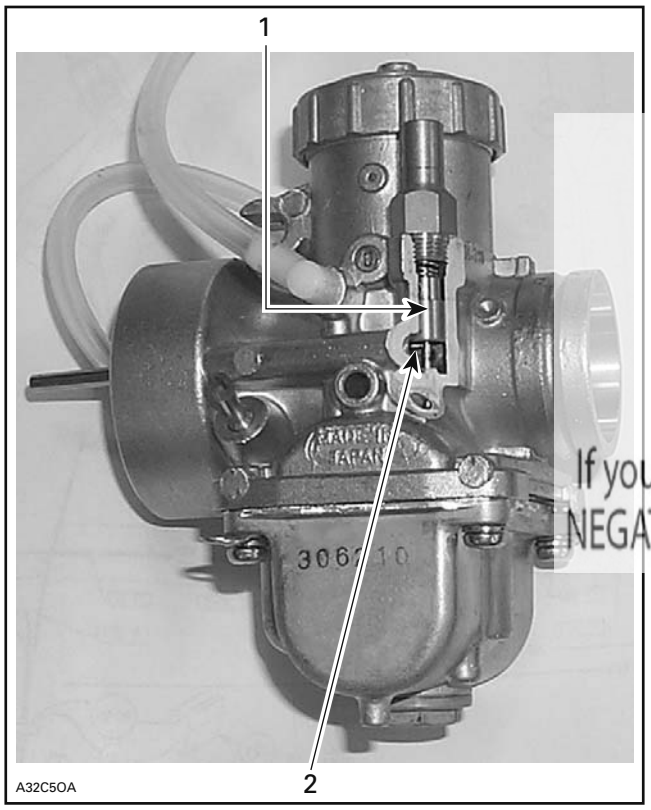

529036163

Insert the choke adjuster tool into choke air inlet of carburetor. Tool stopper may not lean against recess wall.



A32C5NB

TYPICAL – AIR SILENCER SIDE SHOWN
1. Choke adjuster tool



TYPICAL – CUT-AWAY — ENGINE SIDE SHOWN
1. Choke plunger
2. Tool properly seated under choke plunger

If tool tip does not seat under choke plunger **no. 12**, adjust as follows:

Make sure choke lever is at half open position.

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

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

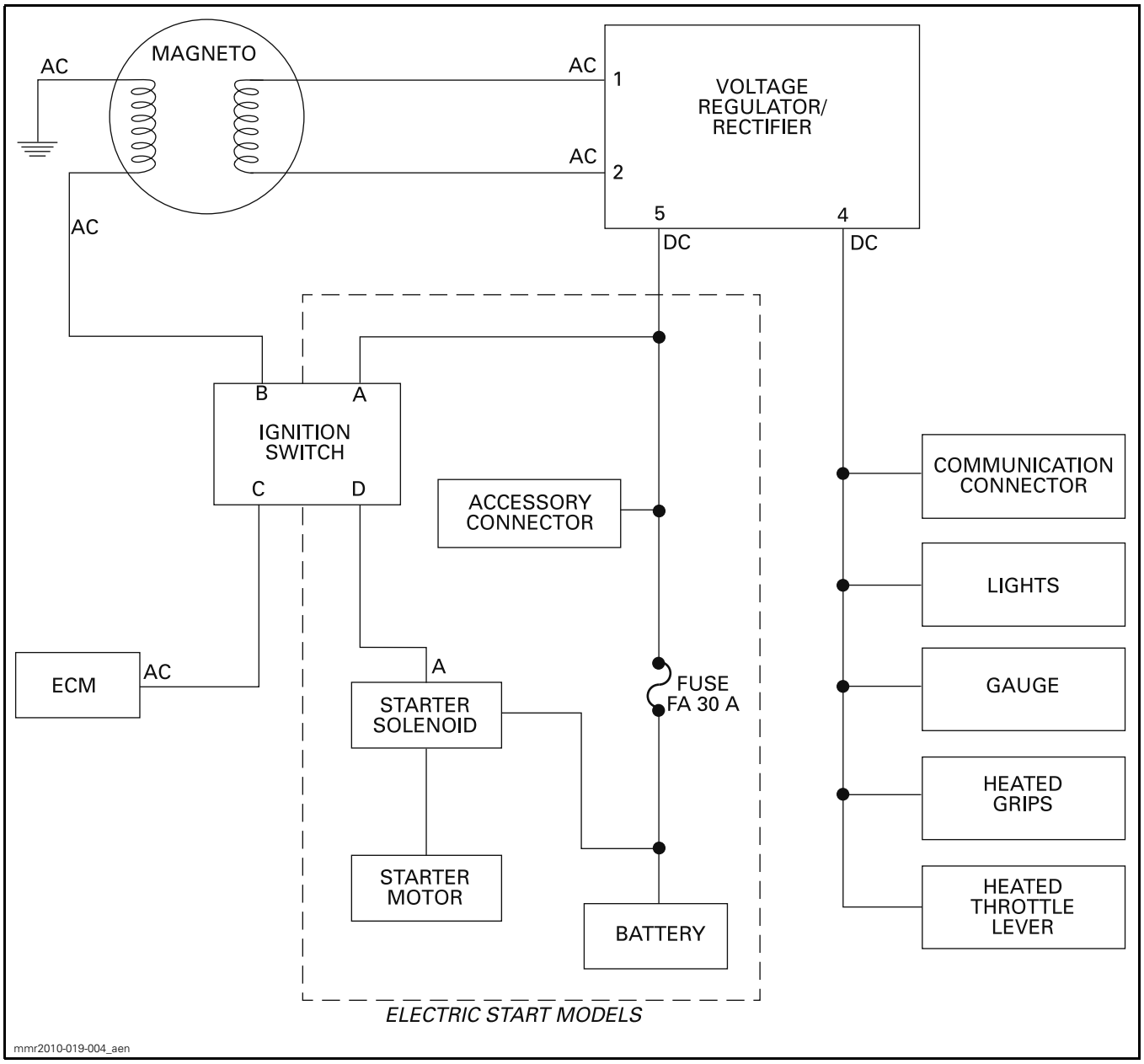
Tighten choke cable lock nut and reinstall protector cap.

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

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

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

POWER DISTRIBUTION AND GROUNDS



POWER DISTRIBUTION

GENERAL

SYSTEM OVERVIEW

The electrical power is provided by the magneto which is composed of windings in 2 separate circuits:

– The ignition winding
– A set of charging/lighting windings.

The ignition winding directly provides AC to the ECM.

The charging/lighting windings, wound in series, bring AC to the voltage regulator/rectifier.

The voltage regulator/rectifier has 2 different DC outputs:

VOLTAGE REGULATOR/RECTIFIER DC OUTPUTS	
MODEL	CIRCUIT
All	- Lights - Gauge - Heated grips - Heated throttle lever - Communication connector
Electric start	- Battery charging

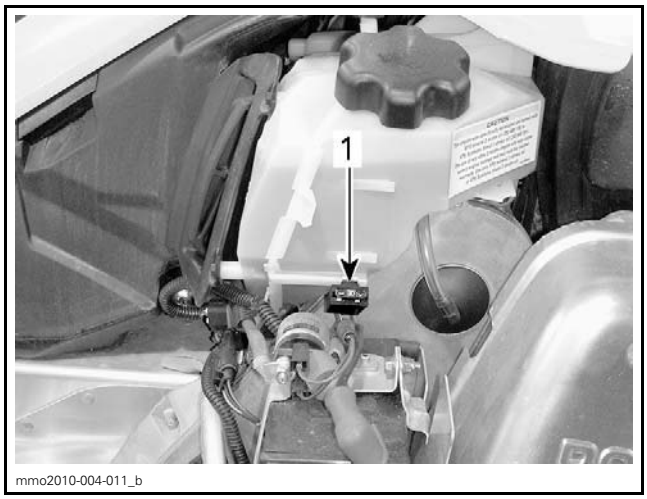
The battery cannot supply power through the regulator/rectifier, an internal diode isolates the battery circuit from the other circuits.

NOTE: On electric start models, there is an optional accessory connector that must be used to connect a sensitive electronic device such as a cellular phone or GPS. Do not connect a sensitive electronic device to a manual start vehicle.

FUSE (ELECTRIC START MODELS)

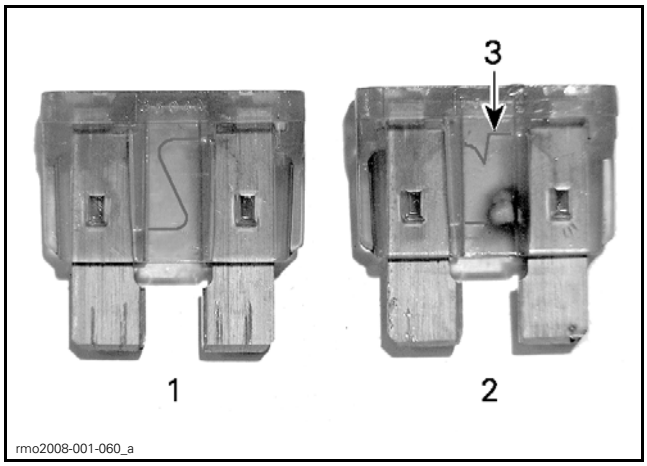
Fuse Location

There is one fuse: 30 A charging system fuse (FA), located on the injection oil reservoir.



1. 30 A charging system fuse (FA)

Fuse Inspection



1. Good fuse
2. Blown fuse
3. Melted filament

A visual inspection of a fuse may not be conclusive.

Two metal contacts are visible on top of the fuse. They can be used for testing the fuse using a test lamp, fuse tester or a multimeter. They can also be used for testing the circuit the fuse protects without removing the fuse.

However, when testing a fuse using an ohmmeter, the fuse must always be removed from the fuse box.

NOTE: A good fuse will show system voltage on both sides. Voltage read on one side only indicates a blown fuse.

Fuse Replacement

⚠ WARNING

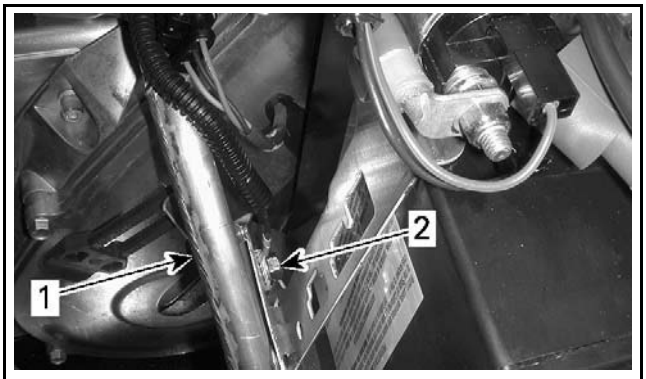
When replacing a fuse, do not use a higher rated fuse than recommended. Use of a higher rated fuse can lead to severe component or circuit damage, an overheat condition, and possibly and electrical fire. If fuse has burnt out, the source of the malfunction should be identified and corrected before applying power to the vehicle.

GROUNDS

Grounds Location

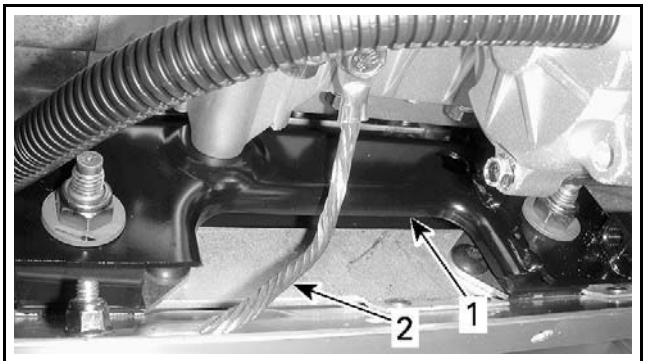
There are 3 grounds on electric start models
There are 2 grounds on manual start models.

VEHICLE GROUNDS		
MODEL	GROUND	LOCATION
All	Main harness to chassis ground: – Lights – Gauge – Engine stop switch – Tether stop switch – RER switch – Heated grips – Heated throttle lever – Optional accessories connector – ECM – Voltage regulator/rectifier – Communication connector	RH toe hold
All	Engine to chassis ground	Front of the engine
Electric start	Battery to chassis ground	RH toe hold



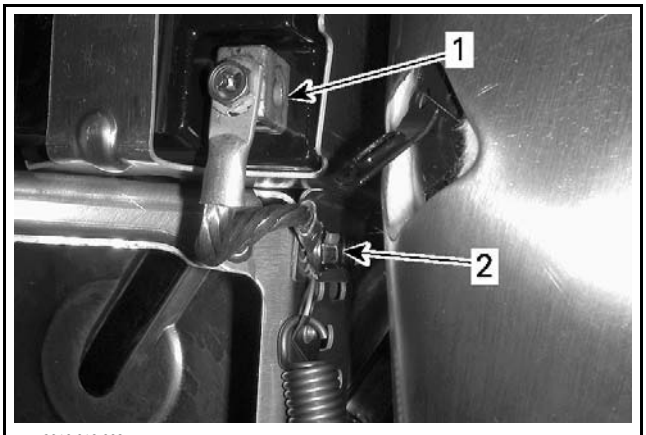
mmr2010-019-002_a

MAIN HARNESS TO CHASSIS GROUND
1. *Toe hold*
2. *Ground terminal*



mmr2010-019-001_a

ENGINE TO CHASSIS GROUND
1. *Front of engine support*
2. *Ground wire*



mmr2010-019-003_a

BATTERY TO CHASSIS GROUND
1. *Battery terminal*
2. *Ground terminal*

CONTROLLER AREA NETWORK (CAN)

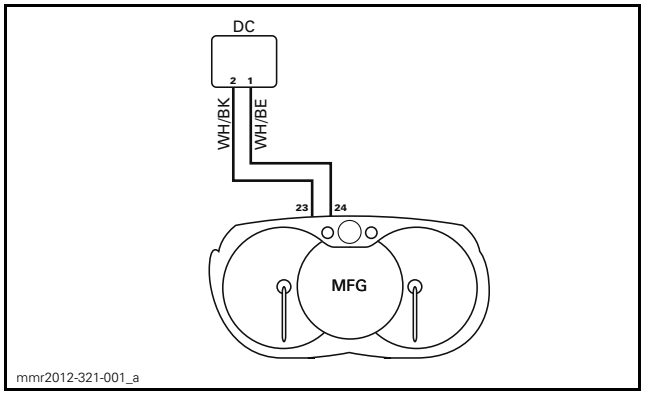
GENERAL

SYSTEM DESCRIPTION

The CAN protocol is an ISO standard for serial data communication.

The CAN lines consist of a twisted pair of wires that form a communication network (CAN bus). All modules or components connected to CAN bus are in constant communication with each other.

The CAN network is comprised of the:
- Gauge
- Diagnostic connector
- CAN bus.



TYPICAL - 550F
DC (diagnostic connector)
MFG (multifunction gauge)
WH/BE: WHITE/BEIGE
WH/BK: WHITE/BLACK

NOTE: This CAN network is only used for communicating with the gauge using B.U.D.S.

COMMUNICATION TOOLS AND B.U.D.S. SOFTWARE

SERVICE TOOLS

Description	Part Number	Page
12 V BATTERY SUPPLY CABLE	529 035 997	165, 167
MPI-2 DIAGNOSTIC CABLE	710 000 851	166
MPI-2 INTERFACE CARD	529 036 018	165–166
T-HARNESS	529 035 869	165

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
MALE-FEMALE EXTENSION SERIAL CABLE	DB9	166

GENERAL

Refer to *PROCEDURES* for instructions on the communication tools.

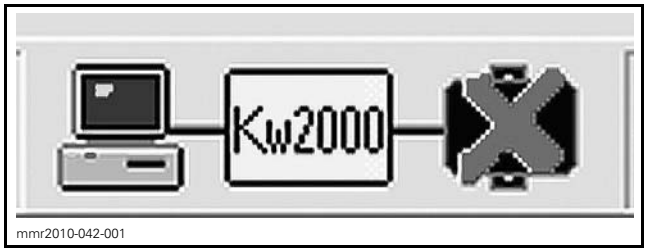
If communication problems occur, refer to *TROUBLESHOOTING*.

TROUBLESHOOTING

COMMUNICATION PROBLEMS

Communication Problems with B.U.D.S.

If communication is lost, a **"X"** will appear in the status bar on the lower part of the screen.



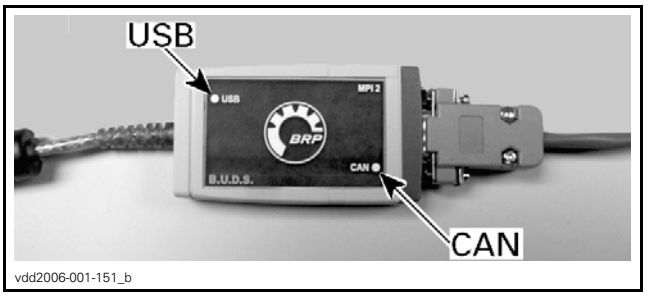
mmr2010-042-001

In such a case, refer to the *MPI-2 CONNECTION TROUBLESHOOTING* and *T-HARNESS AND SUPPLY CABLE TROUBLESHOOTING* topics.

MPI-2 Connection Troubleshooting

The MPI-2 includes 2 status lights to show the connection conditions: USB and CAN. Once communication is initialized, **Both lights must be green** indicating MPI-2 works properly. Otherwise, refer to the following charts.

NOTE: CAN light may blink instead of being constantly ON.



vdd2006-001-151_b

Prerequisite for USB Communication:

– PC Computer turned ON
– MPI-2 connected to PC computer.

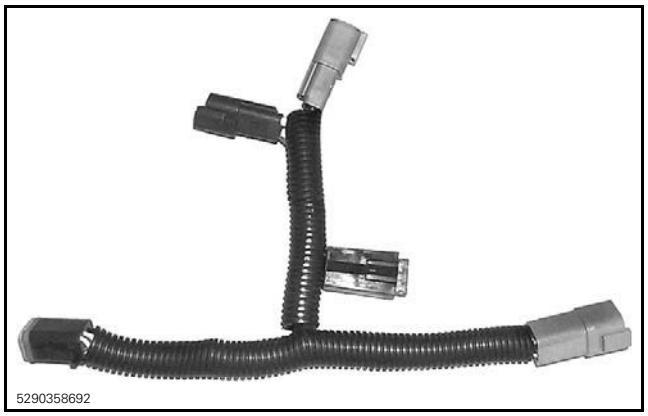
COMMUNICATION PROBLEM (USB)	
STATUS	WHAT TO DO
LIGHT OFF	– Check USB connection between MPI-2 and PC computer. – Check USB operation on PC computer (hardware or Windows drivers).

Prerequisite for CAN Communication:

1. MPI-2 connected to communication connector, refer to *MULTI-PURPOSE INTERFACE-2 (MPI-2)* in this subsection.
2. Power provided to the vehicle's gauge using the T-harness and the 12 V battery supply cable.
3. B.U.D.S. software started and logged, **Try active detection mode** button clicked.

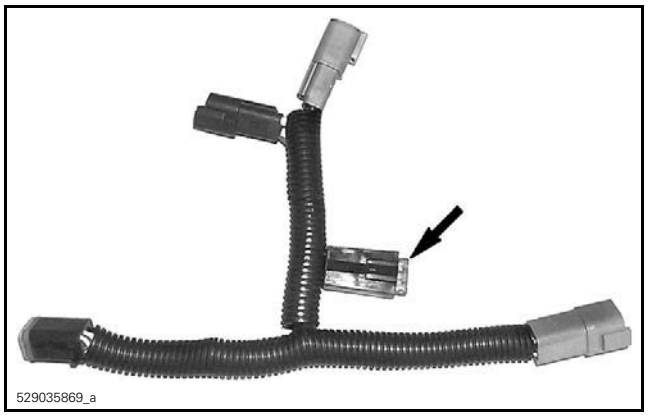
COMMUNICATION PROBLEM (CAN)	
STATUS	WHAT TO DO
LIGHT OFF	– Check connection between MPI-2 and diagnostic cable connector. – Check connection between diagnostic cable connector and T-harness. – Check connection between T-harness and communication connector. – Check that battery supply cable is connected to a 12 V battery. – Carry out *T-HARNESS AND SUPPLY CABLE TROUBLESHOOTING* in this subsection.
LIGHT RED	– Check CAN wires on vehicle.

T-Harness and Supply Cable Troubleshooting



If power is not supplied to the vehicle even when properly connected, check the following:

1. T-harness fuse



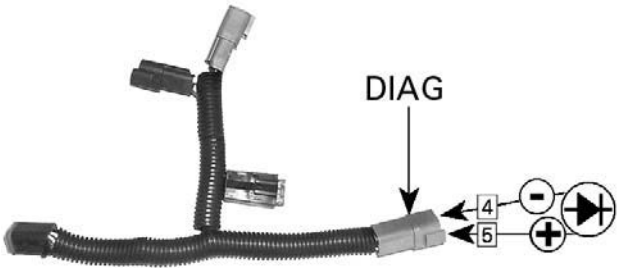
2. Battery voltage
3. Wiring and connectors of the T-harness

T-HARNESS CONTINUITY TEST			
"DPI" CONNECTOR	"DIAG" CONNECTOR	FUNCTION	TEST
1	1	CAN line	Continuity (close to 0 Ω)
2	2	CAN line	
3	3	Ground	
4	4	None	N.A.
5	5	Vehicle battery	Continuity (close to 0 Ω)
6	6	None	N.A.

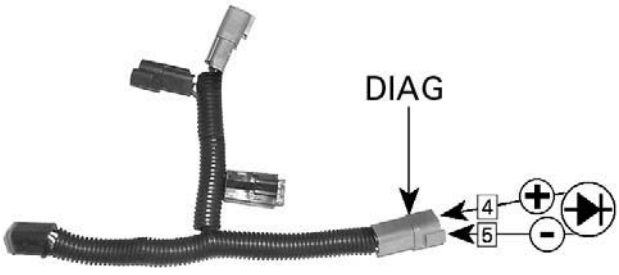


4. Diode in the T-harness

T-HARNESS DIODE TEST		
"DIAG" CONNECTOR		
FROM	TO	TEST
5	4	Close to 0.5 V



4	5	Open



Notes:
Set multimeter to ⏩

Probe diode paying attention to proper polarity. The "+" sign indicates the RED probe.

5. Check 12 V BATTERY SUPPLY CABLE (P/N 529 035 997) wiring, connector and clamps condition.


529035997

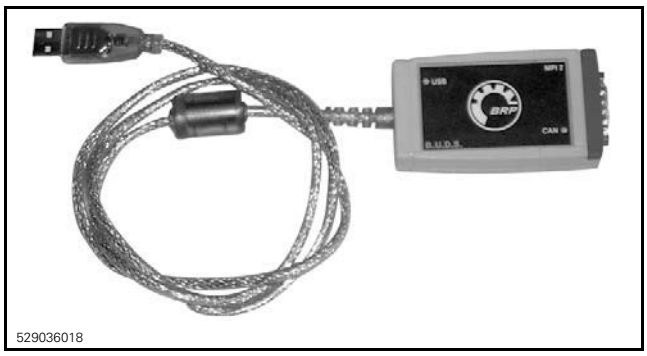
PROCEDURES

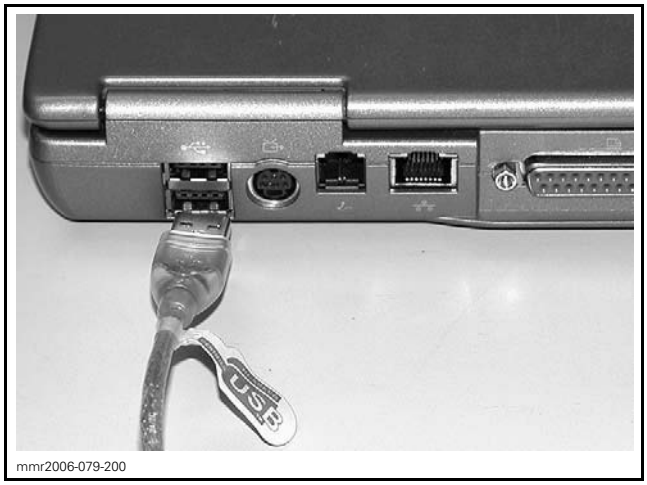
MULTI-PURPOSE INTERFACE-2 (MPI-2)

The MPI-2 (Multi-Purpose Interface-2) is used with B.U.D.S. software to communicate with the multifunction gauge.

MPI-2 Connection to Vehicle

1. Connect the MPI-2 INTERFACE CARD (P/N 529 036 018) to the USB port of a PC (personal computer).


529036018


mmr2006-079-200

MPI-2 INTERFACE CARD CONNECTED TO USB PORT

⚠ WARNING

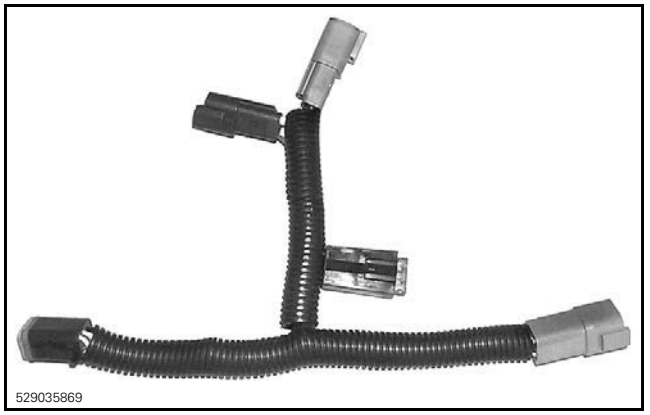
If the computer you are using is connected to the power outlet, there is a potential risk of electrocution when working in contact with water. Be careful not to touch water while working with the computer.

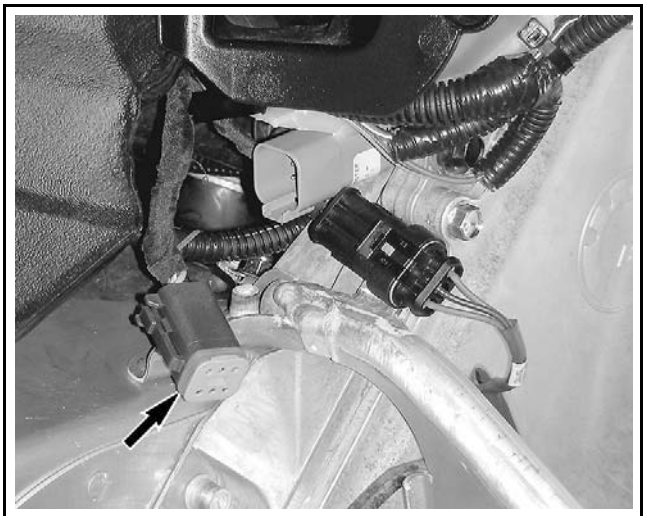
2. Remove the communication connector from the protective cap on the right side of the vehicle.


mmr2009-020-002_a

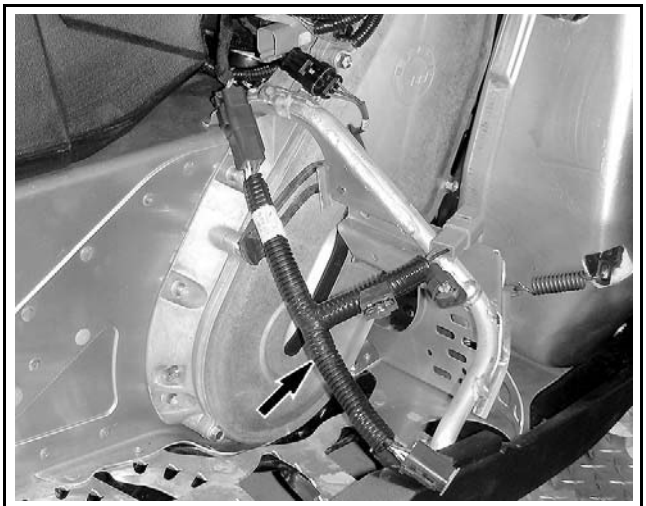
COMMUNICATION CONNECTOR STOWED

3. Connect the T-HARNESS (P/N 529 035 869) to communication connector.


529035869

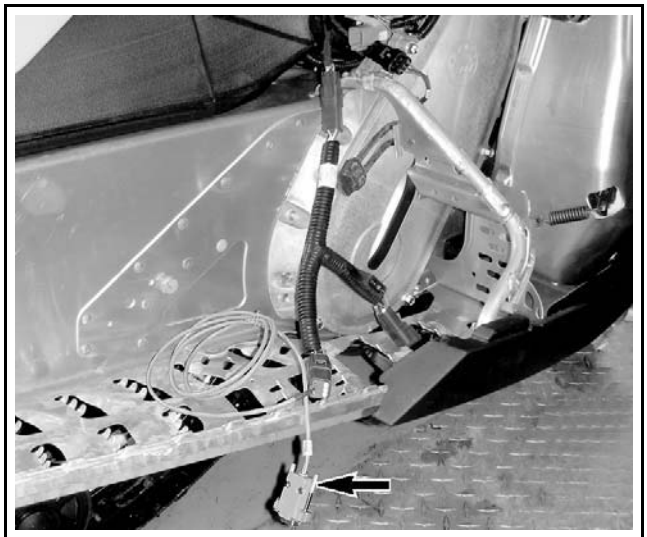

mmr2009-020-003_a

COMMUNICATION CONNECTOR


mmr2009-020-004_a

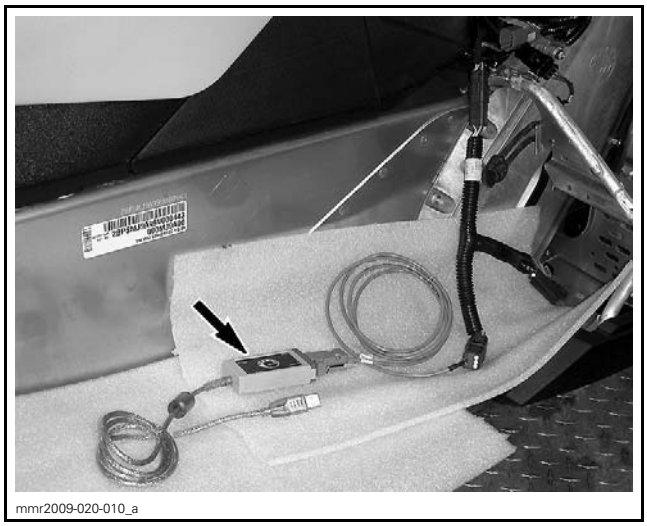
T-HARNESS CONNECTED TO THE COMMUNICATION CONNECTOR

4. Connect the MPI-2 DIAGNOSTIC CABLE (P/N 710 000 851) to T-harness connector.


mmr2009-020-009_a

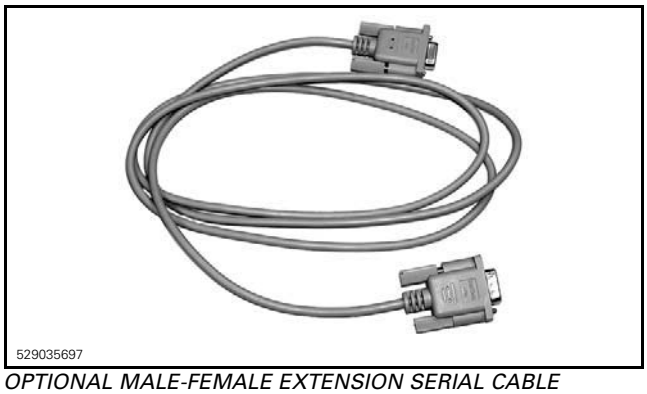
MPI-2 DIAGNOSTIC CABLE CONNECTED TO THE T-HARNESS

5. Connect the MPI-2 INTERFACE CARD (P/N 529 036 018) to diagnostic cable.


mmr2009-020-010_a

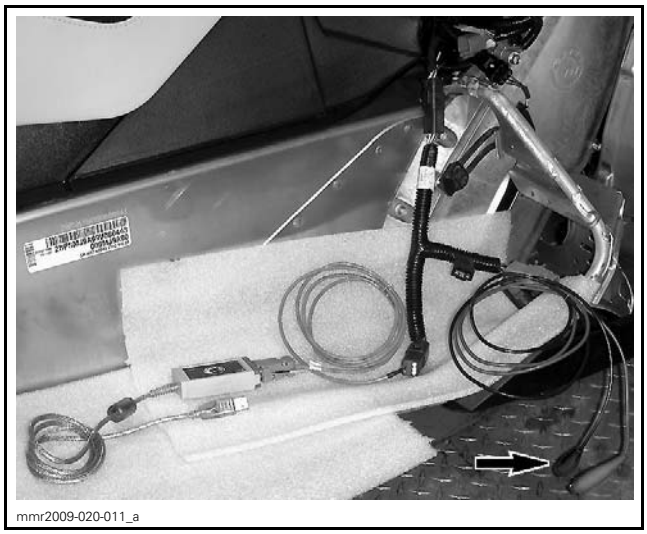
MPI-2 INTERFACE CARD CONNECTED TO THE MPI-2 DIAGNOSTIC CABLE

NOTE: An optional MALE-FEMALE EXTENSION SERIAL CABLE (P/N DB9), available at electronic retail outlets, can be used between MPI-2 DIAGNOSTIC CABLE (P/N 710 000 851) and MPI-2 INTERFACE CARD (P/N 529 036 018). Do not exceed 7.6 m (25 ft).



OPTIONAL MALE-FEMALE EXTENSION SERIAL CABLE

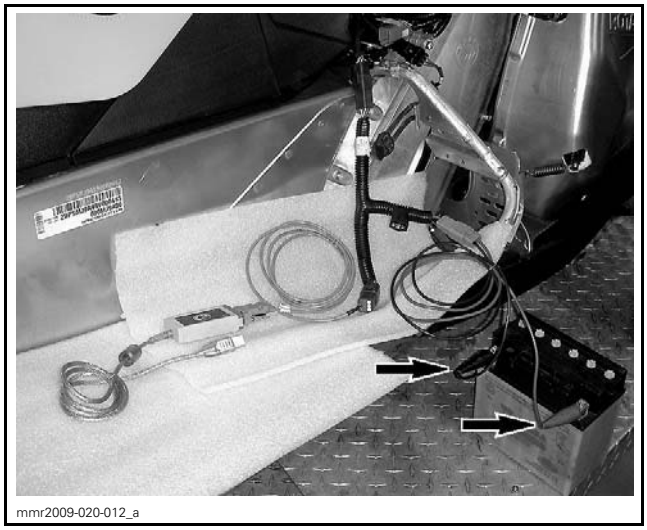
6. Connect the 12 V BATTERY SUPPLY CABLE (P/N 529 035 997) to T-harness.



12 V BATTERY SUPPLY CABLE CONNECTED TO THE T-HARNESS

7. Connect the battery supply cable clamps to a 12 V battery.

NOTE: On electric start models, connect cable clamps to the vehicle battery.



NOTICE Always use the proper supply harness and cables. Make sure to respect polarity when connecting cable clips to battery (RED cable to positive terminal and BLACK cable to negative terminal).

8. Set headlamp to low beam to reduce battery discharge rate.

B.U.D.S. SOFTWARE

B.U.D.S. (Bombardier Utility and Diagnostic Software) is designed to allow electrical component inspection, diagnostic options and adjustments.

On the 550F models, the software communicates only with the gauge.

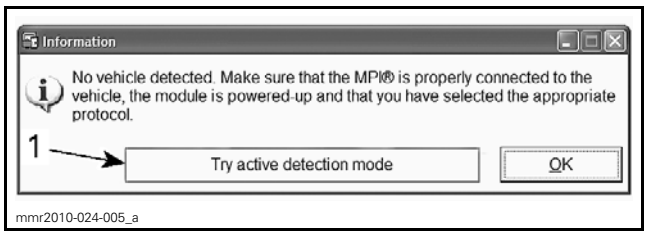
For more information pertaining to the use of the B.U.D.S. software, use its **Help** heading (top of screen) which contains detailed information on its functions.

Use the latest B.U.D.S. version available on BOSSWeb.

IMPORTANT: Make sure all connections have been made **before starting B.U.D.S.** to allow proper operation.

Reading Data from a Vehicle Using the B.U.D.S. Software

1. Connect MPI-2 to vehicle, start B.U.D.S. and logon.
2. If the following message appears, click on **Try active detection mode**.



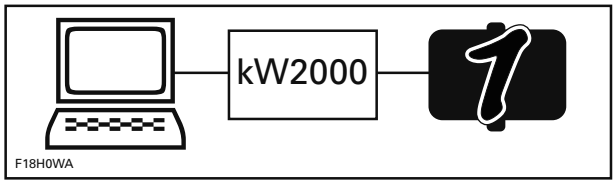
1. Try active detection mode button

The proper communication protocol (Kw2000) should be set by default.

Make sure both USB and CAN lights of MPI-2 are GREEN. Otherwise, refer to *TROUBLESHOOTING* in this subsection.

NOTE: CAN light may blink instead of being constantly ON.

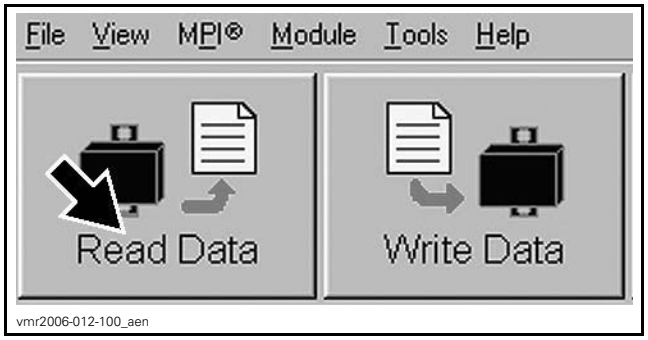
Make sure the status bar shows the kW2000 and the number 1 to its right. Otherwise, refer to *TROUBLESHOOTING* in this subsection.



COMMUNICATION ESTABLISHED

NOTE: Number 1 indicates that the multifunction gauge is recognized by the MPI.

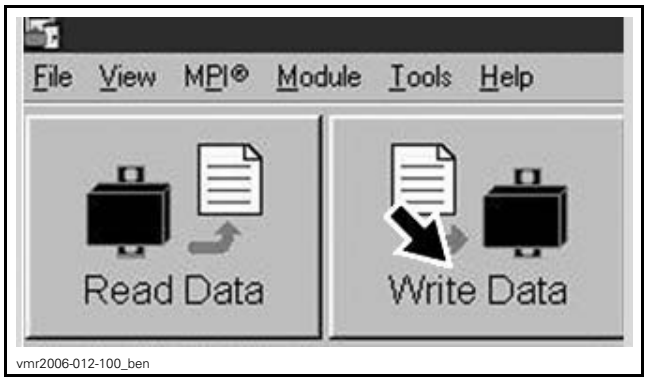
Read gauge by clicking the **Read Data** button.



READ DATA

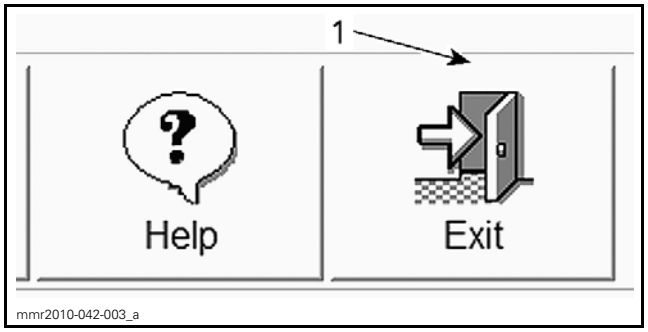
Writing Data Changes in Gauge

1. If changes were made, save new data in gauge by clicking the **Write Data** button.



WRITE DATA

2. Click on the Exit button.



1. Exit button

3. Disconnect MPI connections and reconnect the vehicle communication connector in its protective cap.

NOTICE **Failure to secure the communication connector in its protective cap would allow corrosion and damage to the terminals.**

Electronic Modules "ECU" Update

Whenever B.U.D.S. is started, check if there is an update icon in B.U.D.S. status bar.

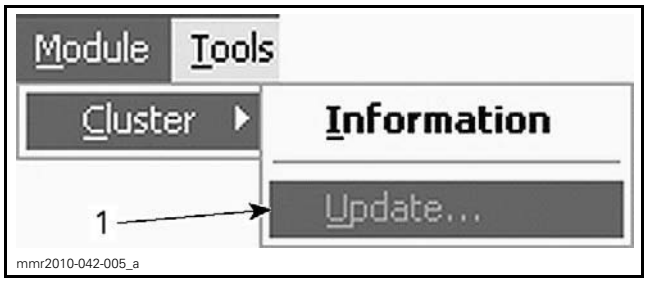


The icon indicates that a file is available in B.U.D.S. to update the multifunction gauge.

Use the **Module**, then **Cluster** menu.



1. If the **Update** option is **greyed out**, no update file is available.
2. If the **Update** option is **black**, an update file is available. Select the update option and load the proper file.



1. *Greyed out: No update to perform*
   Black: Update file available

IGNITION SYSTEM

SERVICE TOOLS

Description	Part Number	Page
DIGITAL INDUCTION TACHOMETER	529 014 500	174
FLUKE 115 MULTIMETER	529 035 868	175–176, 178, 180

GENERAL

SYSTEM DESCRIPTION

A CDI ignition system is used.

The ignition coil is integrated in the ECM.

The ECM is powered by the ignition winding of the magneto through the ignition switch.

The ECM controls ignition using the trigger coil signals.

INSPECTION

IGNITION TIMING

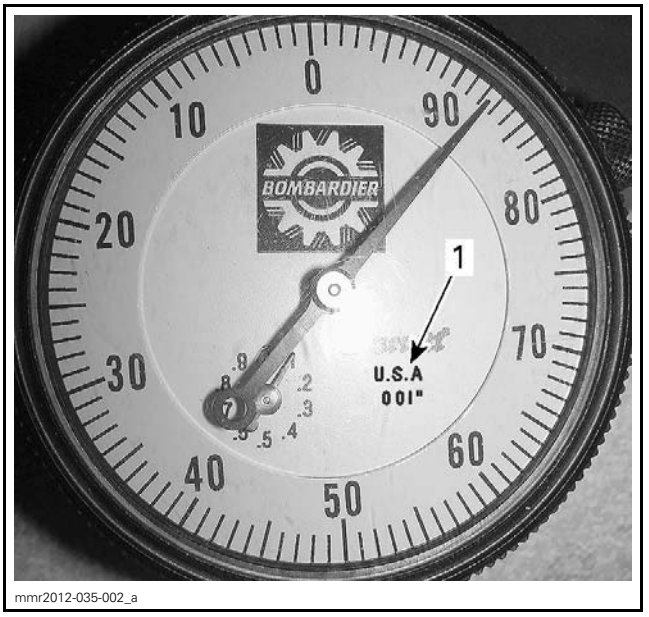
Ignition timing has been set at the factory and should remain correctly adjusted as every component is fixed and non adjustable.

The ignition timing includes the following steps:
- Understanding the TDC Gauge
- TDC Gauge Installation
- Locating Piston TDC
- Scribing a Timing Mark
- Checking Ignition Timing.

Understanding the TDC Gauge

Dial gauges can be either in imperial or metric units. It is crucial to identify gauge units and graduation.

Imperial Dial Gauge

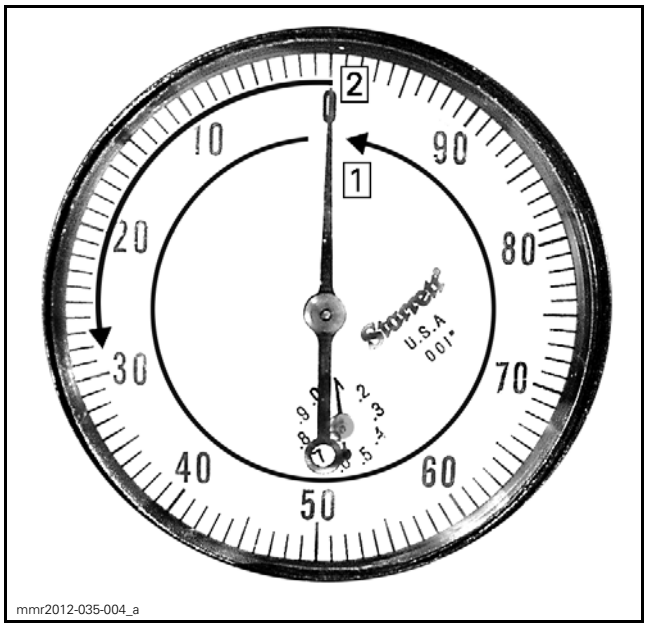


mmr2012-035-002_a

IMPERIAL GAUGE EXAMPLE
1. 001" means its graduated each 1/1000 inch

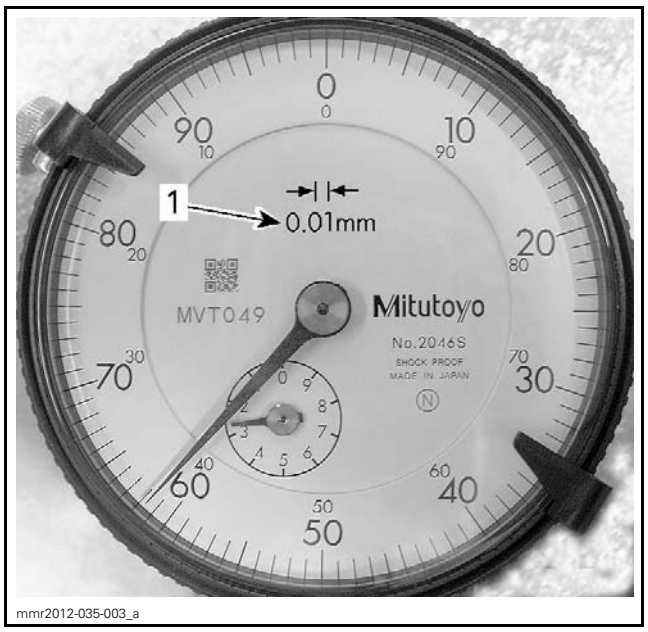
TYPICAL IMPERIAL DIAL GAUGE		
GRADUATION	MEASURE PER NEEDLE TURN	MEASURE EXAMPLE: .128 INCH
1/1000 inch (.001) per graduation line	1 turn = .100 inch	1 complete turn + 28 graduation lines

NOTE: The small dial indicates the number of turns the long needle traveled around the main dial.



.128 INCH AS AN EXAMPLE
Step 1: 1 complete turn
Step 2: 28 lines

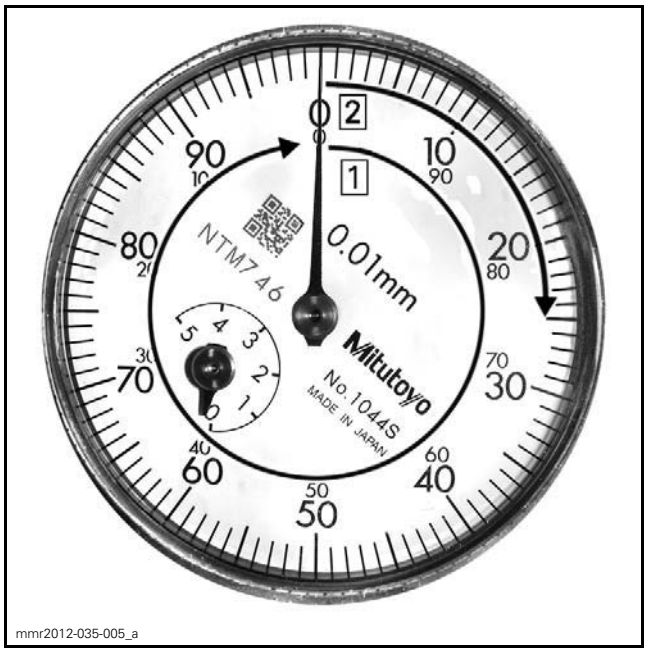
Metric Dial Gauge



METRIC GAUGE EXAMPLE
1. 0.01mm means its graduated each 1/100 millimeter

IMPERIAL DIAL GAUGE EXAMPLE		
GRADUATION	MEASURE PER NEEDLE TURN	MEASURE EXAMPLE: 3.25 mm
1/100 millimeter (.01) per graduation line	1 turn = 1 millimeter	3 complete turns + 25 graduation lines

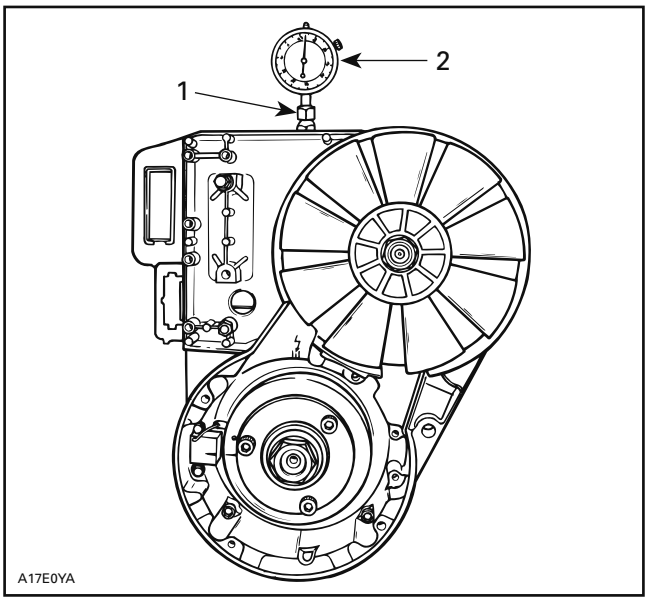
NOTE: The small dial indicates the number of turns the long needle traveled around the main dial.



3.25 mm AS AN EXAMPLE
Step 1: Complete turns (3 X)
Step 2: 25 lines

TDC Gauge Installation

1. Clean the area around the spark plugs, and remove them.
2. Install the TDC gauge in the MAG spark plug hole.
3. Position the magneto flywheel at approximately TDC.



TYPICAL — INSTALLATION OF TDC GAUGE
1. Adaptor lock nut
2. Gauge on MAG side cylinder

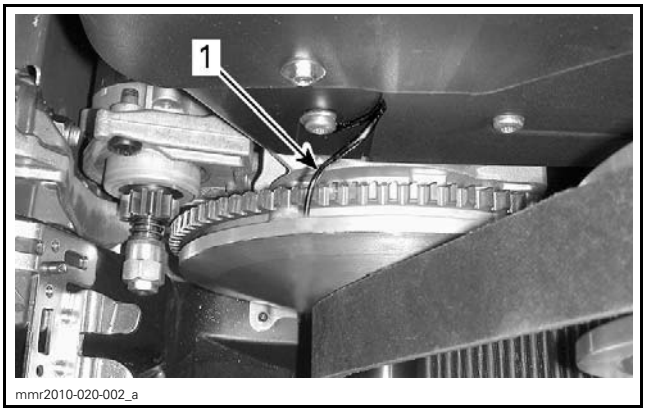
4. Assemble the gauge to the adaptor and tighten the roller lock nut. Do not tighten the adaptor lock nut.
5. Screw the adaptor into the spark plug hole and tighten to prevent movement in the plug hole.
6. Position the dial face toward the PTO side. Move the gauge down until the needle just begins to move, then move down a further approximately 6 mm (1/4 in). Tighten adaptor lock nut by hand.

Locating Piston TDC

NOTE: Normal engine rotation as seen from the PTO side is counterclockwise.

1. Craft a pointer using a strong metal wire such as a clothes hanger and attach it to the engine.

NOTE: The pointer has to be securely attached and strong enough to prevent it from moving.



1. Pointer

2. With a firm hold on the drive pulley, slowly rotate the drive pulley counterclockwise while observing the TDC gauge needle.

NOTE: Note that the needle stops moving only as the piston is changing direction at the top of its stroke.

3. Rotate the dial face so the "0" is in line with the needle when it stops moving.
4. Resume rotating the engine (counterclockwise) until the gauge needle has rotated approximately 1/4 turn past TDC.
5. Then, slowly rotate the engine in a clockwise direction until needle stops moving.

NOTE: The needle should stop on the "0". If not, reset the dial "0" to the needle.

6. Again, slowly rotate the drive pulley back and forth across TDC and confirm the needle always stops exactly at "0" before changing direction. "0" now indicates exact TDC.
7. Lock the dial face with the dial lock screw.

NOTE: If a difference in "0" setting the dial in each direction of rotation is easily noticeable, make sure dial gauge is installed correctly. If gauge is correct, the engine components may suffer from excessive wear.

Scribing the Timing Mark

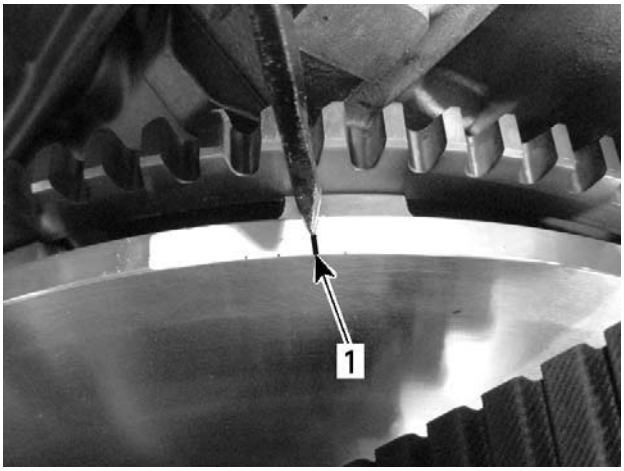
IMPORTANT: Be sure to understand how the TDC gauge functions. Refer to *UNDERSTANDING THE TDC GAUGE* in this subsection.

1. From the "0" (TDC), rotate the drive pulley clockwise (reverse engine rotation) until the dial needle rotates past the required BTDC measurement (see table that follows).
2. Carefully rotate engine counterclockwise (forward engine rotation) until the needle precisely indicates the measurement specified in the following table.

NOTE: Final setting must always be made counterclockwise (in the normal engine rotation).

IGNITION TIMING BTDC		
ENGINE	MEASUREMENT BTDC	DEGREE SETTING BTDC
550F	2.77 mm (.109 in)	22°

3. With the TDC gauge indicating specified timing, use a permanent marker to draw a line on the drive pulley fixed sheave directly in line with pointer.



TYPICAL
1. Timing mark in line with pointer

4. Repeat procedure to ascertain the mark is exactly in line with the pointer.
5. Remove the TDC gauge and dial indicator adapter.
6. Reinstall the spark plugs. Refer to *SPARK PLUG INSTALLATION* in this subsection.
7. Check ignition timing as per *CHECKING IGNITION TIMING* procedure in this subsection.

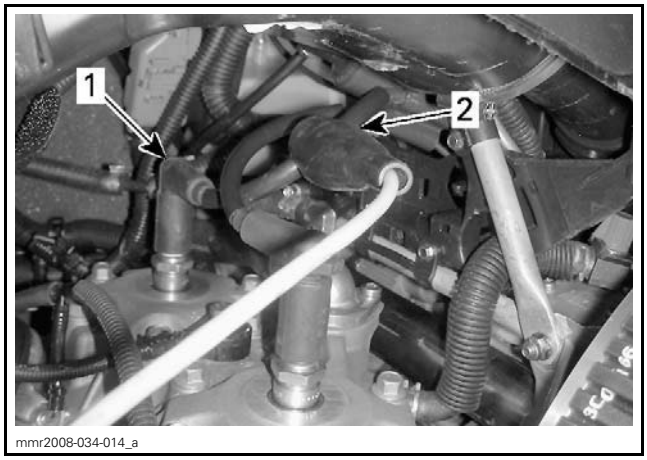
Checking Ignition Timing

⚠ WARNING

Do not allow anyone in front vehicle. NEVER stand behind or near a rotating track. Debris could be projected causing severe injuries.

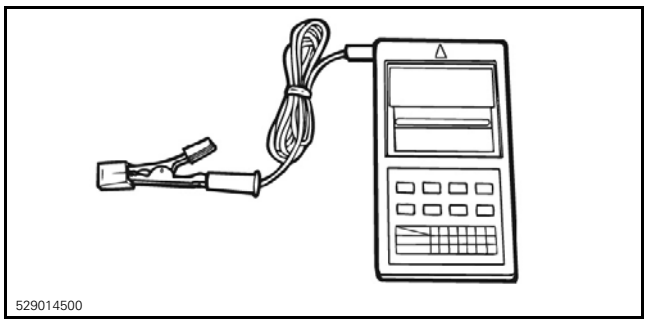
1. Place ski tips against a wall, raise rear of vehicle on a stand, so that track does not contact the ground.
2. Attach the timing light pick-up clamp to the MAG spark plug cable.

NOTE: Be careful to route timing light cable away from drive belt and pulleys.



TYPICAL - TIMING LIGHT CONNECTION
1. MAG side spark plug
2. Timing light connected to MAG plug cable

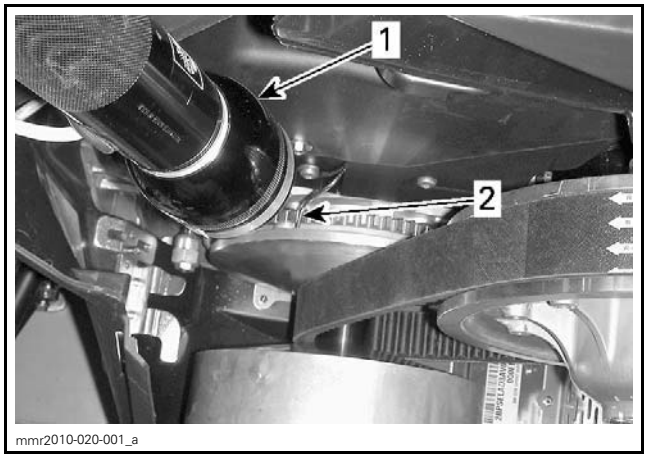
3. Connect the DIGITAL INDUCTION TACHOMETER (P/N 529 014 500) to a spark plug cable.



TACHOMETER

NOTICE **Before starting engine, check cable routing of test equipment to ensure it cannot come into contact with rotating parts or with the exhaust manifold.**

4. Start engine and point timing light on timing mark/pointer.
5. Throttle engine to specified speed for a brief instant.



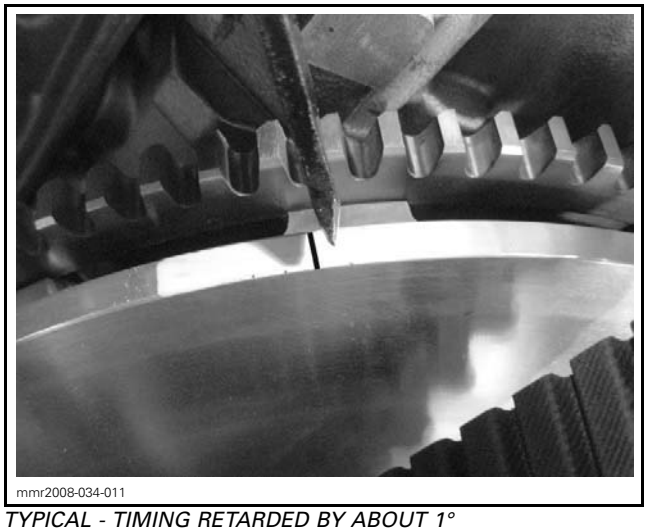
1. Timing light
2. Pointer

MODEL	ENGINE SPEED (HOT OR COLD)
550F	3500 RPM +/- 500

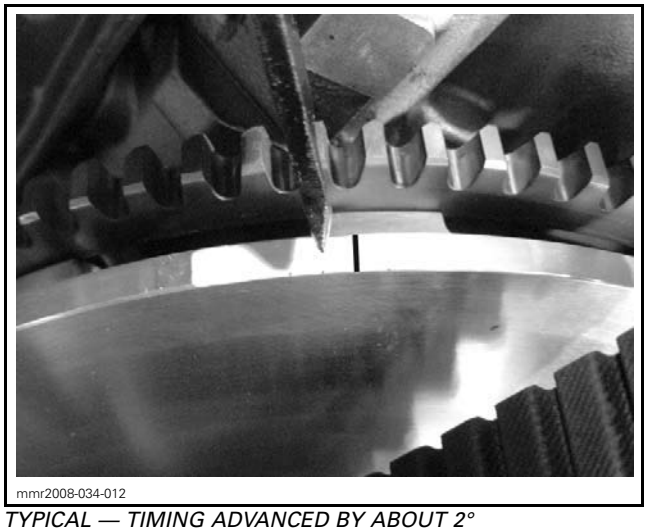
6. Ensure timing mark is aligned with the pointer end within the specified tolerance.

MODEL	TOLERANCE
550F	± 1°

If marks are aligned, no adjustment is required.


mmr2008-034-011

TYPICAL - TIMING RETARDED BY ABOUT 1°


mmr2008-034-012

TYPICAL — TIMING ADVANCED BY ABOUT 2°

If marks are misaligned by more than one degree, carry out a crankshaft alignment verification, refer to *ENGINE MEASUREMENT* subsection.

If crankshaft alignment is correct, substitute trigger coil or ECM, then check timing again.

TROUBLESHOOTING

IGNITION SYSTEM TESTING

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

1. Spark plugs
2. Spark plug cables
3. Wiring harness/electrical connectors
4. Emergency engine stop switch
5. Engine cut-off switch
6. Ignition switch
7. Trigger coil(s)
8. Stator (ignition winding)
9. ECM (Engine Control Module).

Check spark using the original spark plugs.

If there is no spark, try new spark plugs.

If there is no spark with new spark plugs, make sure connectors at ECM are securely installed.

PROCEDURES

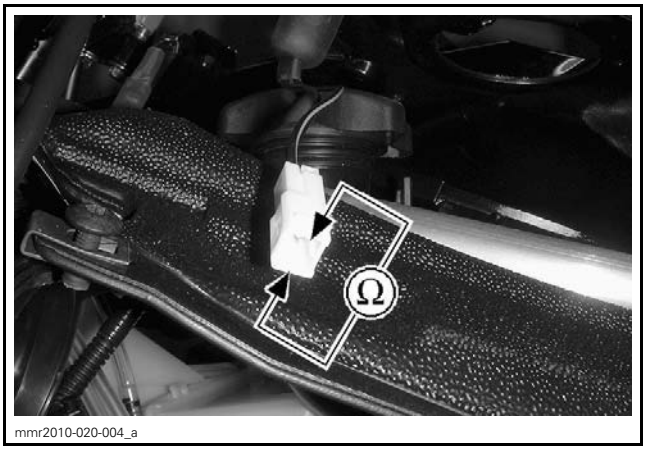
ENGINE CUT-OFF SWITCH

Engine Cut-Off Switch Continuity Test

1. Refer to *BODY* subsection and lift LH side of the console for access to engine cut-off switch connector.
2. Disconnect engine cut-off switch connector.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Measure resistance as per following table.



mmr2010-020-004_a

TYPICAL

ENGINE CUT-OFF SWITCH CONTINUITY TEST			
SWITCH POSITION	TEST PROBES		RESISTANCE
Tether cap installed	Switch connector (TS) Pin 1	Switch connector (TS) Pin 2	Infinite (OL)
Tether cap removed	Switch connector (TS) Pin 1	Switch connector (TS) Pin 2	Close to 0 Ω (continuity)

RESULT	SERVICE ACTION
Resistance as specified	– Check wiring and connectors (engine cut-off switch). – Test emergency engine stop switch.
Resistance NOT as specified	– Replace switch.

EMERGENCY ENGINE STOP SWITCH

Emergency Engine Stop Switch Continuity Test

1. Remove gauge, refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

NOTE: It is not necessary to disconnect gauge.

2. Disconnect the steering harness connector (HG).


mmr2009-024-009

TYPICAL - HG CONNECTOR

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Measure resistance as per following table.

EMERGENCY ENGINE STOP SWITCH CONTINUITY TEST			
SWITCH POSITION	TEST PROBES		RESISTANCE
RUN	HG connector Pin 4	HG connector Pin 1	Infinite (OL)
STOP			Close to 0 Ω (continuity)

RESULT	SERVICE ACTION
Resistance as specified	– Check wiring and connectors to ECM. – Check wiring and connectors to ground.
Resistance NOT as specified	– Repeat test at switch. – Test continuity of wiring between switch and HG connector – Replace switch.

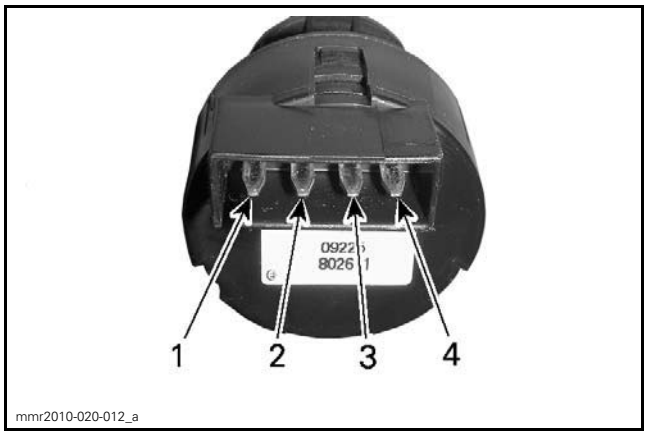
IGNITION SWITCH

Ignition Switch Continuity Test

1. Remove gauge, refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.
2. Remove ignition switch from headlight/gauge module.
3. Disconnect ignition switch connector.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

4. Measure continuity through ignition switch as per following table.



mmr2010-020-012_a

IGNITION SWITCH PINS
1. Pin D
2. Pin C
3. Pin B
4. Pin A

SWITCH POSITION	TEST PROBES		RESISTANCE
OFF	Pin B	Pin C	Infinite (OL)
	Pin A	Pin D	
ON	Pin B	Pin C	Close to 0 Ω
	Pin A	Pin D	Infinite (OL)
START	Pin B	Pin C	Close to 0 Ω (continuity)
	Pin A	Pin D	

RESULT	SERVICE ACTION
Resistance as specified	Check the following: – *IGNITION SWITCH INPUT VOLTAGE TEST*.
Resistance NOT as specified	– Replace ignition switch.

Ignition Switch Input Voltage Test

Manual Start Engine

Measure voltage while cranking using the rewind starter.

NOTE: Readings vary according to engine cranking force.

Repeat test several times.

Readings must be 3 times within or above the range indicated in the table.

IGNITION SWITCH INPUT VOLTAGE TEST		
PROBES		VOLTAGE
Ignition switch connector Pin A	Chassis ground	7 - 15 Vac

Electric Start Engine

Measure voltage at ignition switch harness connector as per following table.

IGNITION SWITCH INPUT VOLTAGE TEST		
PROBES		VOLTAGE
Ignition switch connector Pin A	Chassis ground	Battery voltage

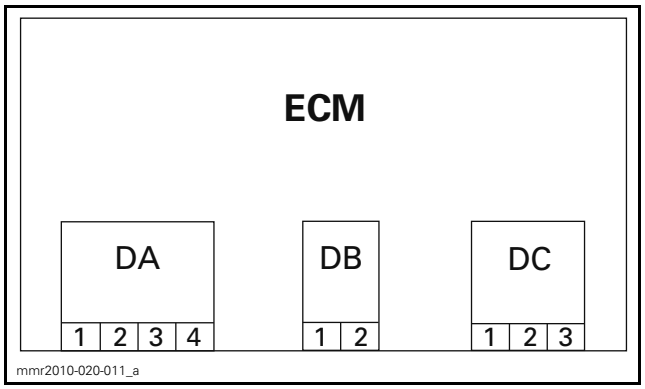
All Models

RESULT	SERVICE ACTION
NO voltage	– Check continuity of wiring to voltage regulator/rectifier (manual start engine). – Test charging fuse (electric start engine), refer to *POWER DISTRIBUTION AND GROUNDS*. – Check continuity of wiring to charging fuse (electric start engine).
Low voltage	– Test battery voltage (electric start engine), refer to *CHARGING SYSTEM*. – Check system connections from voltage regulator/rectifier (manual start engine) to ignition switch. – Check system connections from battery (electric start engine) to ignition switch.
Correct voltage measured	Check the following: – *STARTER SOLENOID CONTROL CIRCUIT TEST AT IGNITION SWITCH* (electric start engine). – *MAGNETO STATOR (IGNITION WINDING)*, refer to *MAGNETO SYSTEM* subsection. – *ECM IGNITION CIRCUIT TEST AT IGNITION SWITCH*.

ECM

NOTE: Due to the internal circuitry design, primary circuit is impossible to test.

ECM Connectors Identification



CONNECTOR DA
1. *RER switch signal (to ground through gauge and RER switch)*
2. *Beeper output (to gauge)*
3. *RER trigger coil*
4. *RER trigger coil*

CONNECTOR DB
1. *Forward trigger coil*
2. *Forward trigger coil*

CONNECTOR DC
1. *ECM ground*
2. *ECM input voltage (from ignition switch)*
3. *Engine stop switches (to ground through cutout and emergency switches)*

ECM Ignition Circuit Test at Ignition Switch

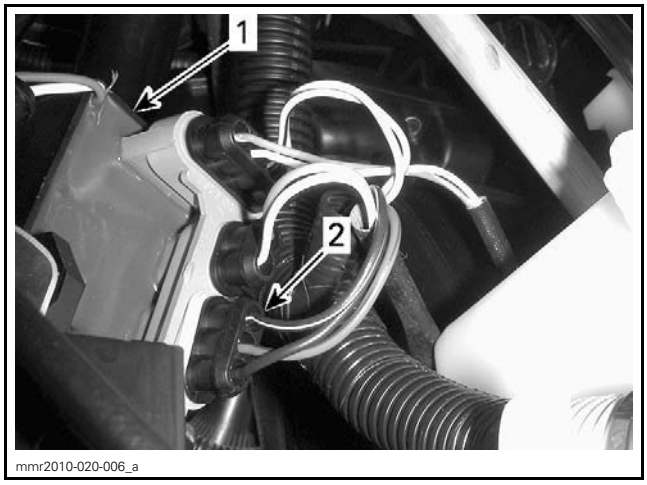
1. Disconnect the ECM 3 pin connector (DC).
2. Check for circuit continuity as follows.

ECM CIRCUIT TEST AT IGNITION SWITCH		
TEST PROBES		RESISTANCE
Ignition switch connector (Pin C)	ECM-DC connector (Pin 2)	Close to 0 Ω (Continuity)

RESULT	SERVICE ACTION
Resistance as specified	– Refer to *ECM INPUT VOLTAGE TEST*.
Resistance NOT as specified	– Check continuity between ignition switch connector (pin C) and ECM-DC connector (pin 2). – Repair or replace wiring and connectors.

ECM Input Voltage Test

1. Refer to *BODY* subsection and remove LH side panel.
2. Refer to *AIR INTAKE SYSTEM* subsection and remove primary intake silencer.
3. Disconnect the 3-pin (DC) connector.



1. ECM
2. 3 pin (DC) connector

4. Set FLUKE 115 MULTIMETER (P/N 529 035 868) to Vac.
5. Turn ignition switch (key) ON.

Manual Start Engine

Measure voltage while cranking using the rewind starter.

NOTE: Readings vary according to engine cranking force.

Repeat test several times.

Readings must be 3 times within or above the range indicated in the table.

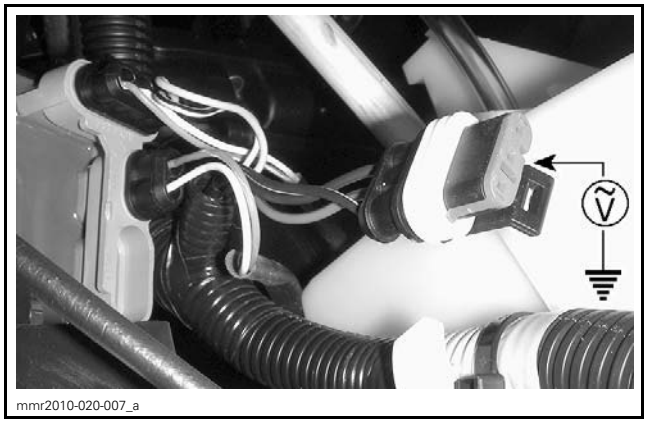
6. Measure voltage between pins as per table while manually cranking engine.



TEST PROBES		VOLTAGE WHILE CRANKING
Pin 2 of (DC) connector	Chassis ground	7 to 15 Vac

Electric Start Engine

Measure voltage at ignition switch harness connector as per table.



mmr2010-020-007_a

TEST PROBES		VOLTAGE WHILE CRANKING
Pin 2 of (DC) connector	Chassis ground	Battery voltage

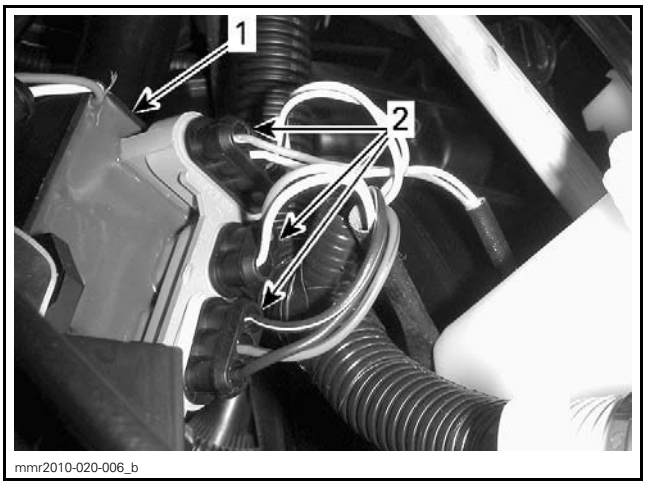
All Models

RESULT	SERVICE ACTION
Voltage as specified	– Refer to *IGNITION COIL RESISTANCE TEST (SECONDARY CIRCUIT)*.
Voltage NOT as specified	– Test ignition switch contacts between pins B and C, refer to *IGNITION SWITCH CONTINUITY TEST* in this subsection. – Check continuity between ECM-DC (pin 2) and Ignition switch. – Repair/replace wiring and connectors.

ECM Removal and Installation

To remove:

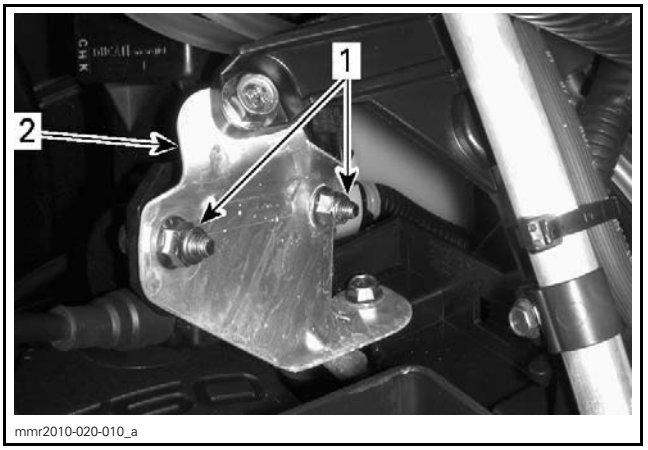
1. Remove primary intake silencer, refer to *AIR INTAKE SYSTEM* subsection.
2. Remove the air outlet duct, refer to *AXIAL FAN* subsection.
3. Disconnect all three ECM connectors and both spark plugs cables.



mmr2010-020-006_b

TYPICAL
1. ECM
2. ECM connectors

4. Remove ECM from its bracket by removing the retaining nuts.



mmr2010-020-010_a

TYPICAL
1. ECM retraining nuts
2. ECM bracket

Installation is the reverse of removal, however, pay attention to the following.

TIGHTENING TORQUE	
ECM retaining nuts	3.5 N•m (31 lbf•**in**)

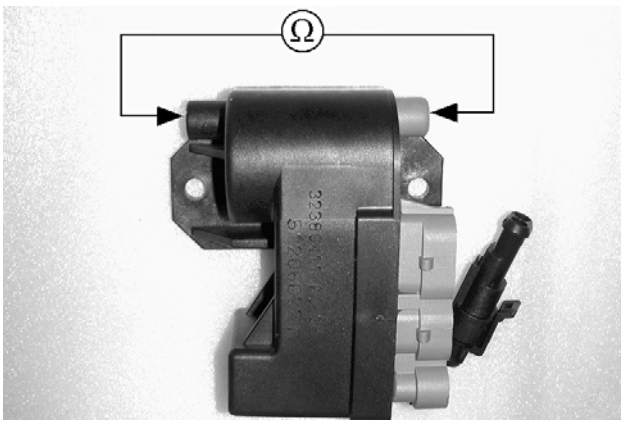
IGNITION COIL

Ignition Coil Resistance Test (Secondary Circuit)

1. Remove ECM, see procedure in this subsection.
2. Note the spark plug cable positions on the ECM (cables are not the same length).
3. Unscrew and remove spark plug cables from ECM.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

4. Measure resistance as per following table.



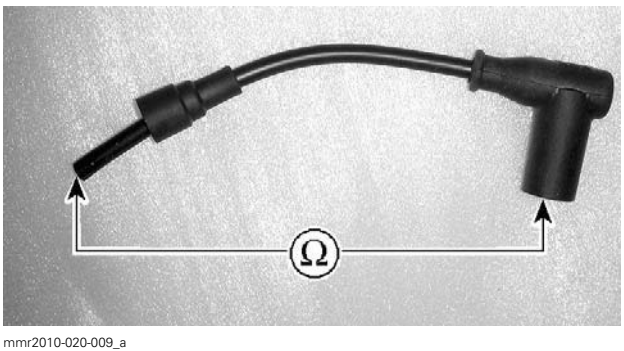
mmr2010-020-008_a

TEST PROBES		RESISTANCE AT 20°C (68°F)
PTO spark plug cable pin	MAG spark plug cable pin	900 to 1100 Ω

RESULT	SERVICE ACTION
Resistance as specified	– Refer to *SPARK PLUG CAP AND CABLE RESISTANCE TEST*.
Resistance NOT as specified	– Replace ignition coil.

Spark Plug Cap and Cable Resistance Test

1. Measure cable and cap resistance as per following table.



mmr2010-020-009_a

TEST PROBES		RESISTANCE AT 20°C (68°F)
Cable (ECM end)	Spark plug cap	4000 to 6000 Ω

RESULT	SERVICE ACTION
Resistance as specified	– Test trigger coils, refer to *MAGNETO SYSTEM*.
Resistance NOT as specified	– Replace ignition coil.

CHARGING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	181–182, 184

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
NAPA ULTRA PRO BATTERY LOAD TESTER	95260	184

SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	186

GENERAL

SYSTEM DESCRIPTION

Magneto

A 340 watts magneto provides the primary source of electrical energy. It transforms a magnetic field into an alternating current (AC).

The magneto provides two AC outputs:
– To the ECM (via ignition switch)
– To the voltage regulator.

Voltage Regulator

The AC current sent to the voltage regulator/rectifier is rectified and regulated within 14 and 15 volts DC for primary power to the vehicle electrical system, and to charge the battery on electric start models.

The voltage regulator/rectifier provides two DC outputs:
– Primary power for the vehicle electrical systems
– Battery charging, accessory and horn power.

Battery

A battery is installed on electric start models and it is used for energizing the starter only.

The regulator provides a pulsated unfiltered DC current that is not suitable for powering electronic equipment. On electric start models, the power outlet is connected directly to the battery and it stays on even if the engine is not running. This power outlet can be used to power electronic equipment.

INSPECTION

DC VOLTAGE OUTPUT TEST (ACCESSORIES)

Proceed as follows:

1. Raise rear of vehicle and ensure the track is off the ground and can turn freely.

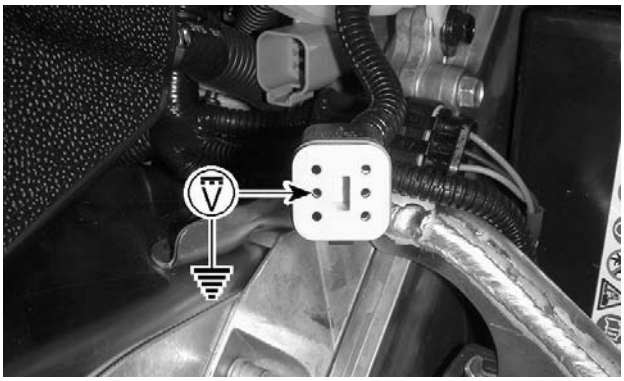
⚠ WARNING

Ensure vehicle track is completely raised off ground. If track should come into contact with ground when engine is at 5000 RPM, equipment damage and severe injury may result.

2. Set the multimeter to Vdc scale.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Disconnect the communication diagnostic connector.
4. Start engine and read voltage as follows.


mmr2010-021-003_a

DC VOLTAGE OUTPUT TEST — MANUAL START MODELS			
TEST ENGINE SPEED	TEST PROBES		VOLTAGE
5000 RPM	Pin 5 (diagnostic connector)	Chassis ground	14.5 Vdc ± 0.5

If no voltage is detected, check ground (wires and connectors) between voltage regulator/rectifier and frame.

If voltage is above specification, replace voltage regulator/rectifier.

If voltage is below specification, check stator and wiring/connections.

If the stator and associated wiring/connectors test good, try a new voltage regulator/rectifier.

DC VOLTAGE OUTPUT TEST (CHARGING SYSTEM)

Electric Start Models

Proceed as follows:

1. Raise rear of vehicle and ensure the track is off the ground and can turn freely.

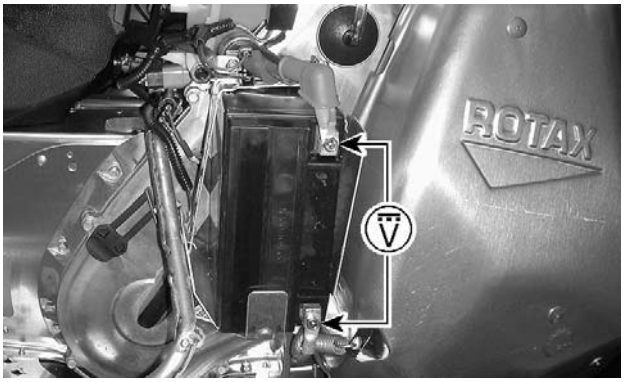
⚠ WARNING

Ensure vehicle track is completely raised off ground. If track should come into contact with ground when engine is at 5000 RPM, equipment damage and severe injury may result.

2. Remove RED rubber boot protector from positive battery post.
3. Set the multimeter to Vdc scale.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

4. Connect multimeter to battery posts.
5. Start engine and read voltage as follows.



mmr2010-021-004_a

DC VOLTAGE OUTPUT TEST — ELECTRIC START MODELS			
TEST ENGINE SPEED	TEST PROBES		VOLTAGE
5000 RPM	Battery (+)	Battery (-)	14.5 Vdc ± 0.5

If no voltage is detected, check ground (wires and connectors) between voltage regulator/rectifier and frame.

If voltage is above specification, replace voltage regulator/rectifier.

If voltage is below specification, check stator and wiring/connections. Refer to *MAGNETO SYSTEM* subsection for stator testing procedure.

If the stator and associated wiring/connectors test good, try a new voltage regulator/rectifier.

TROUBLESHOOTING

TROUBLESHOOTING GUIDELINES

Weak or Discharged Battery

Electric Start Models

If the battery is weak or discharged, check the following items:

– 30 A charging fuse (FA)

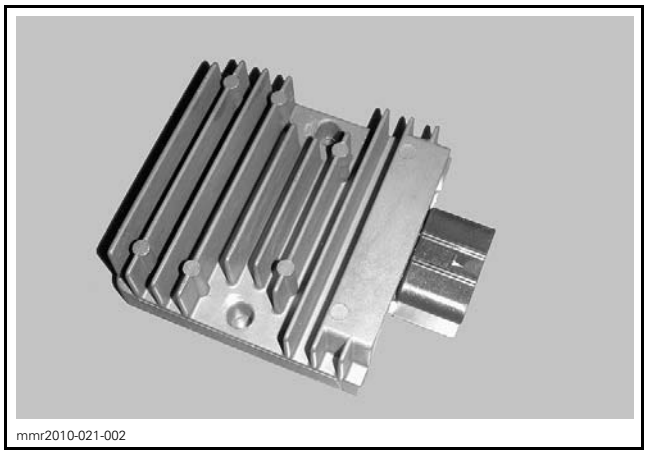
– Charging system voltage, see *DC VOLTAGE OUTPUT TEST (CHARGING SYSTEM)* in this subsection
– Stator, see *MAGNETO SYSTEM* subsection
– Battery
– Wiring and connections.

PROCEDURES

VOLTAGE REGULATOR/ RECTIFIER

Voltage Regulator/Rectifier Continuity Test

Due to internal circuitry, there is no static test available to check continuity.

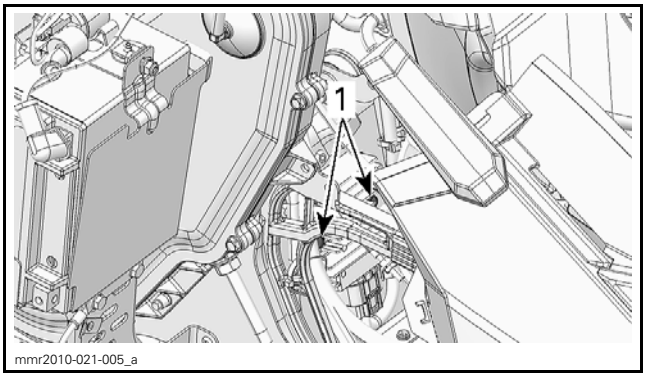


VOLTAGE REGULATOR/RECTIFIER

Voltage Regulator/Rectifier Removal

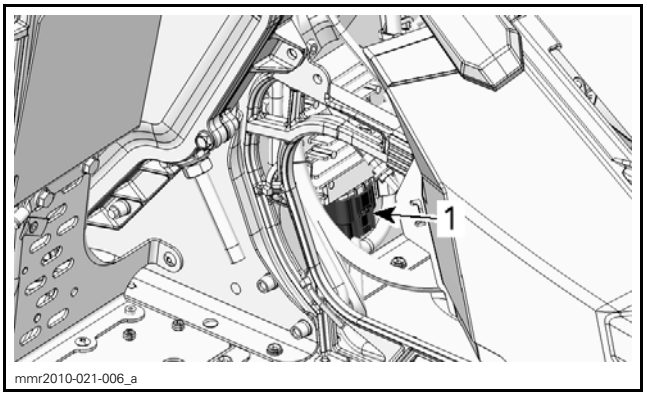
The voltage regulator/rectifier is located behind the chaincase and the engine.

1. On electric start models, disconnect the battery. See *BATTERY* in this subsection.
2. Remove the muffler. Refer to *EXHAUST SYSTEM* subsection.
3. Remove both screws securing the voltage regulator/rectifier to frame.



1. Voltage regulator/rectifier screws

4. Disconnect the connector from the voltage regulator/rectifier to complete the removal procedure.



1. Voltage regulator/rectifier connector

Voltage Regulator/Rectifier Installation

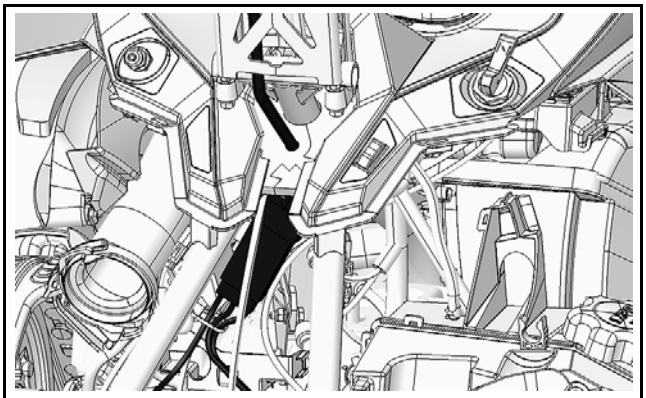
The installation is the reverse of the removal procedure. However, pay attention to the following.

TIGHTENING TORQUE	
Voltage regulator/rectifier retaining screws	5 N•m (44 lbf•**in**)

BATTERY (YTX20L-BS)

Battery Information

Electric start models are equipped with a sealed valve regulated lead acid (VRLA) battery. It is a non-spillable, maintenance reduced type (no electrolyte level to be checked and readjusted). No ventilation tube is attached to the battery.


mmr2010-018-007

Battery Voltage Test (No Load Applied)

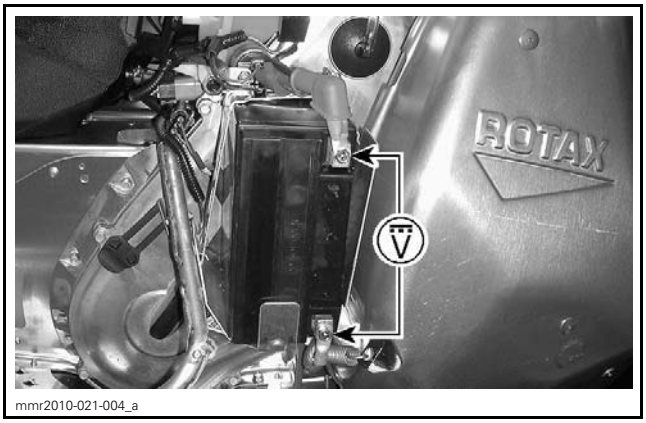
NOTE: An unloaded voltmeter test, with a high impedance multimeter, is carried out on a battery without discharging current. It is the simplest and most commonly used. However, be aware that a voltage test can indicate that the battery is in good condition even though the battery does not have enough power to crank the engine.

A voltage reading provides an instant indication of the state of charge of the battery, not of its current storage capacity. A battery load test gives a more accurate indication of the battery condition.

If the battery has just received a charge, allow it to rest for 1 - 2 hours before taking a voltage reading.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

Set multimeter to Vdc and connect to battery terminals. Always respect battery polarity.



mmr2010-021-004_a

BATTERY VOLTAGE TEST (NO LOAD APPLIED)	
RESULT	SERVICE ACTION
12.8 V and above	Battery full charge (no action required)
12.7 V and below	Recharge battery

If battery requires recharging, refer to *BATTERY CHARGING* in this subsection.

Battery Load Test (Engine Cranking)

Battery must be fully charged, refer to *BATTERY VOLTAGE TEST (NO LOAD APPLIED)*.

1. Place the emergency engine stop switch in OFF position.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set multimeter to Vdc and connect it to the battery.
3. Measure battery voltage at rest.
4. With the multimeter still connected, crank engine while reading multimeter.

Assuming the starting system is in good condition, a battery voltage that drops below the specification indicates a worn-out or defective battery.

BATTERY LOAD TEST	
Battery voltage while cranking	10 Vdc minimum

NOTE: Before replacing the battery, make sure the charging system is in good condition.

Battery Load Test (Using a Battery Load Tester)

This is the best test to determine the battery condition. Use a load testing device such as the NAPA ULTRA PRO BATTERY LOAD TESTER (P/N 95260). It has a 500 Amp carbon pile adjustable load.

Battery must be fully charged.

1. If battery has just been recharged, allow battery to rest for at least one hour.
2. Follow battery load tester instructions.
3. Apply a load as specified. At 5 seconds into the test, check battery voltage.

BATTERY LOAD TEST		
LOAD TO APPLY	TIME TO MEASURE INTO TEST	VOLTAGE
150 A	5 seconds	Minimum 10 Vdc

If battery voltage has dropped below specification, battery storage capacity has decreased appreciably and battery should be replaced.

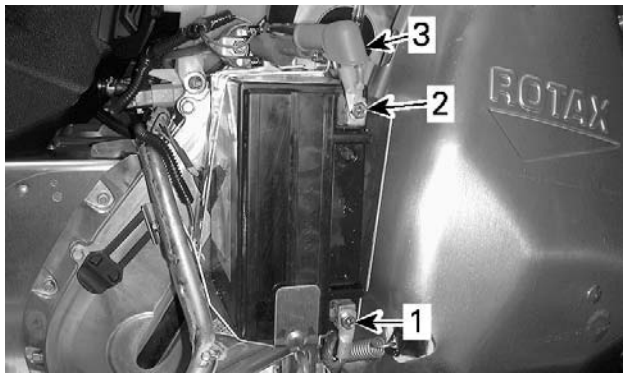
NOTE: Note, before replacing the battery, make sure the charging system is in good condition.

Battery Removal

⚠ WARNING

The BLACK (–) battery cable must always be disconnected first and reconnected last. Never charge or boost a battery while installed on vehicle.

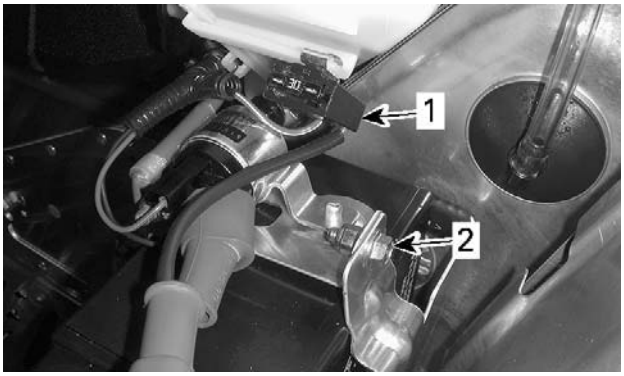
1. Open or remove the right side panel of vehicle.
2. Disconnect BLACK (–) cable terminal from the negative battery post.
3. Slide the RED rubber protector off the positive (+) cable terminal and disconnect it from the battery post.



mmr2010-021-008_a

1. Negative post (-)
2. Positive post (+)
3. Rubber protector

4. Unclip fuse holder from oil tank.
5. Remove the battery retaining strip nut and bolt.



mmr2010-021-009_a

1. Fuse holder
2. Battery retaining strip bolt

6. Lift the retaining strip and unhook it from the battery support to remove it.
7. Move retaining strip aside.
8. Remove battery.

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

Battery 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 with a soft brush and any grease-cutting soap or baking soda solution.

Battery Inspection

Visually inspect battery casing for cracks, leaks or other possible damage.

Discoloration, warping or raised top, indicates that the battery has overheated or been overcharged.

If the casing is damaged, replace battery and thoroughly clean battery tray and surrounding area with a water and baking soda solution.

⚠ WARNING

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

Inspect the battery posts for security of mounting.

Battery Storage

NOTICE A discharged battery will freeze and may damage its casing. A damaged casing will allow electrolyte spillage that may damage surrounding parts.

1. Disconnect and remove battery from the vehicle.
2. 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.
3. Clean battery casing using a solution of baking soda and water. Rinse battery with clear water and dry thoroughly using a clean cloth.

NOTE: The battery must always be stored in fully a charged state.

BATTERY CHARGING	
AMBIENT STORAGE TEMPERATURE	FREQUENCY
Below 15°C (59°F)	Every month
Above 15°C (59°F)	Every two weeks

New Battery Activation

Refer to the instructions provided with the battery.

Battery Charging

⚠ WARNING

Always wear safety glasses and charge the battery in a ventilated area. Never charge or boost a battery while installed on a vehicle. Do not open the sealed caps during charging. Do not place battery near an open flame.

NOTICE If the battery becomes hot to the touch, 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.

Carry out a *BATTERY UNLOADED VOLTMETER TEST* as described in this subsection, 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

A battery with a voltage below 11.5 V requires a special procedure to recharge. In charging an over discharged battery, its internal resistance may be too high to charge at a normal charging rate.

Set charger to the 10 A charging rate and monitor charging current for approximately 30 minutes. If there is no change in charging current or battery becomes abnormally hot, the battery is most likely at the end of its service life and should be replaced.

Battery Installation

Reinstall battery and secure retaining strip to support properly.

Install the fuse holder on oil tank.

Connect **RED (+) cable FIRST** to positive battery terminal.

Connect **BLACK (–) cable LAST**.

⚠ WARNING

Battery BLACK (–) cable must always be disconnected first and reconnected last.

TIGHTENING TORQUES	
Battery retaining screws	10 N•m (89 lbf•**in**)
Battery terminal screws	3 N•m (27 lbf•**in**)

Apply DIELECTRIC GREASE (P/N 293 550 004) on battery posts and connectors.

Cover the RED (+) cable terminal with the protective rubber boot.

STARTING SYSTEM

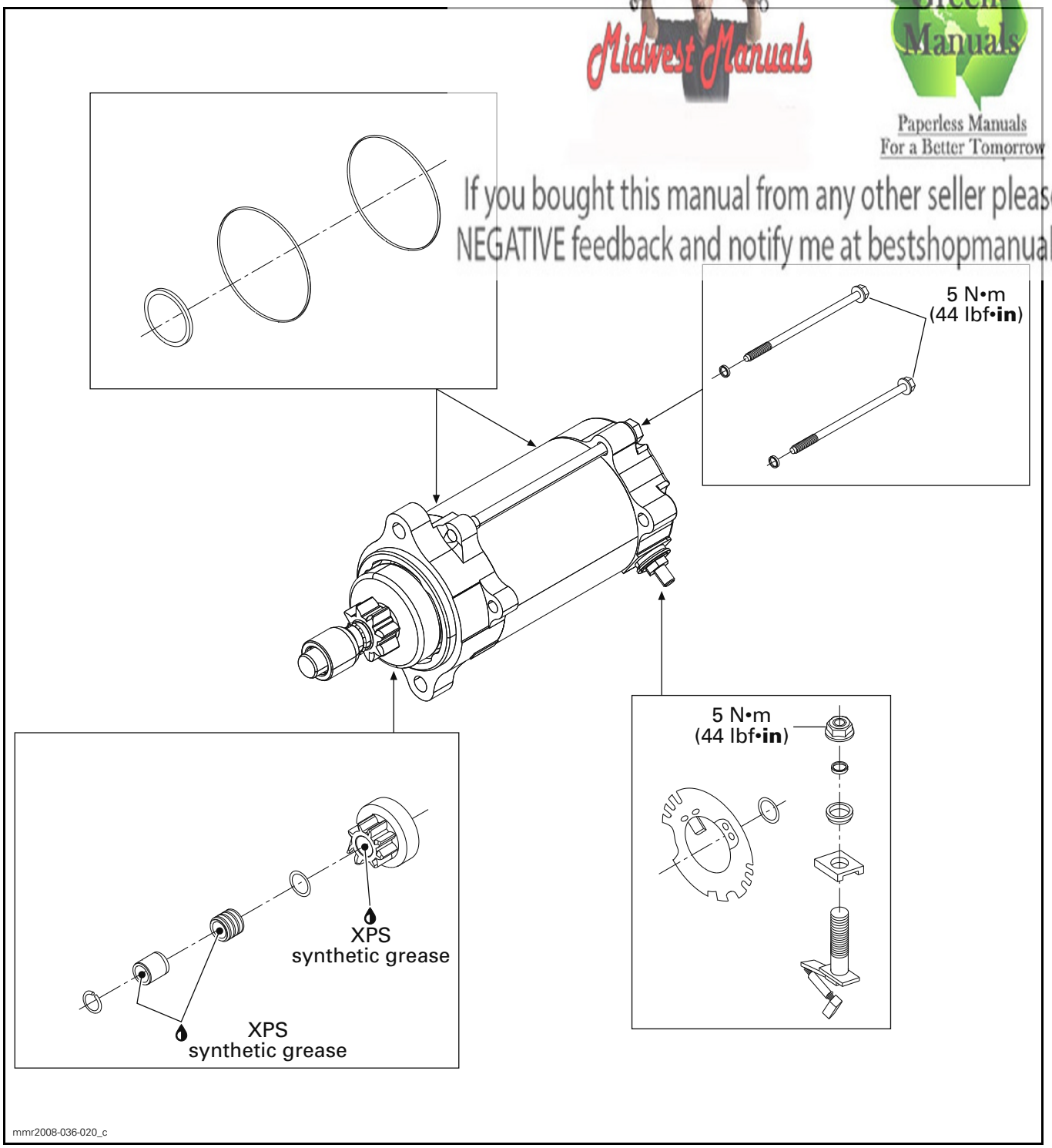
SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	189

SERVICE PRODUCTS

Description	Part Number	Page
XPS SYNTHETIC GREASE	293 550 010	191, 193

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



GENERAL

BASIC STARTING SYSTEM OPERATION

Conditions for Engine Starting

The following conditions must be met to allow engine starting:

– Safety engine stop switch to RUN.
– Tether cord cap installed.
– Ignition key turned clockwise in START position until starter engages.

NOTE: The starter will crank the engine even with the emergency engine stop switch set to STOP and the tether cord cap removed, however, the engine will not start.

TROUBLESHOOTING

TROUBLESHOOTING TIPS

If the starter does not crank the engine, first ensure the problem is not related to an engine mechanical component.

1. Try to pull start the engine.
2. If engine can be cranked, test starting system as per *STARTING SYSTEM TESTING SEQUENCE*.

STARTING SYSTEM TESTING SEQUENCE

Test starting system in the following order:

– 30 A charging fuse (FA). Refer to *POWER DISTRIBUTION AND GROUNDS* subsection.
– Battery connections, load test and voltage test, refer to *CHARGING SYSTEM*
– Starter, refer to *STARTER QUICK TEST*
– Starter solenoid, refer to *STARTER SOLENOID QUICK TEST*
– Ignition switch, refer to *IGNITION SYSTEM* subsection.
– Wiring and connectors.

PROCEDURES

ELECTRIC STARTER

Starter Quick Test

1. Set the emergency engine stop switch to STOP or remove tether cord cap to prevent engine from starting.
2. Connect one end of a battery booster cable to the positive (+) battery post.
3. Momentarily touch the other end of the booster cable to the starter cable terminal on the starter solenoid.

⚠ WARNING

A spark will be generated when making the final contact of the booster cables to power the starter directly. If there is a fuel or acid smell (fuel system or battery leak), or visible evidence of a leak, do not carry out this procedure as the spark generated may ignite the fuel or acid vapors.

NOTE: This procedure will bypass the starter solenoid and supply current from the battery directly to the starter through its power input cable.

If the starter does not turn, carry out a *STARTER INPUT VOLTAGE TEST*.

If the starter rotated, carry out a *STARTER SOLENOID QUICK TEST*.

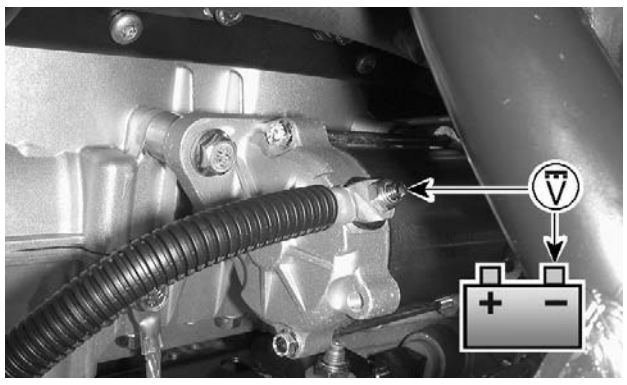
Starter Input Voltage Test

1. Set the emergency engine stop switch to STOP.
2. Remove the tether cord cap from its switch.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set multimeter to Vdc.
4. Measure voltage as per table while cranking engine.

NOTE: Battery voltage will drop and fluctuate with starter cranking load.



mmr2010-022-002_a

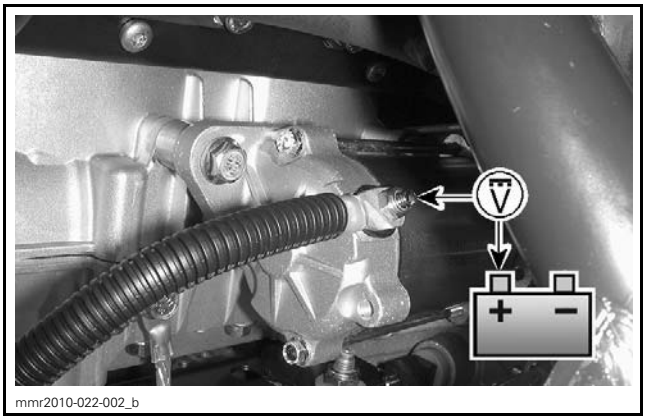
STARTER INPUT VOLTAGE TEST		
PROBES		SPECIFICATION (WHILE CRANKING)
Negative battery post	Starter terminal	Close to battery voltage

RESULT	SERVICE ACTION
No voltage	– Check 30 A charging fuse – Check starter solenoid – Check ignition switch – Check wiring and connectors.
Voltage is low	– Carry out a *STARTER CABLE TEST*.
Voltage is good	– Carry out a *GROUND CIRCUIT TEST*.

Starter Cable Test

This test confirms if there is parasitic resistance in the cable, solenoid or connections by measuring the voltage drop across the components.

1. Set multimeter to Vdc.
2. Connect multimeter probes to the starter terminal and battery positive post.



mmr2010-022-002_b

STARTER CABLE TEST

3. Turn ignition key to START to crank engine. Read multimeter **while cranking**.

STARTER CABLE TEST		
PROBES		SPECIFICATION (WHILE CRANKING)
Battery positive post	Starter terminal	1 Vdc maximum

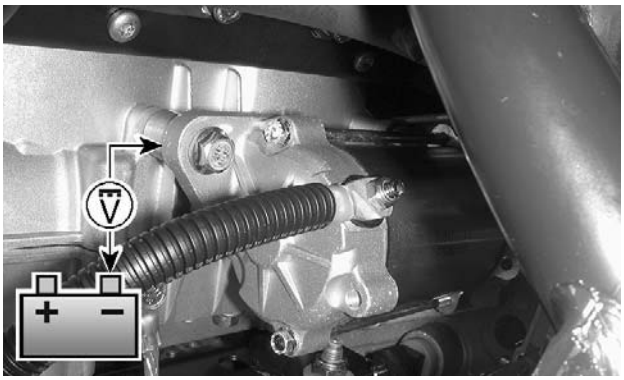
RESULT	SERVICE ACTION
Measured voltage within specification	– Carry out a *STARTER GROUND CIRCUIT TEST*
Measured voltage exceeds specification	Test the following using same method: – Battery positive post and starter solenoid post – Between both starter solenoid posts – Starter solenoid post and terminal on starter.

Replace cable or solenoid if necessary.

Starter Ground Circuit Test

This test confirms if there is parasitic resistance between starter and engine by measuring the voltage drop across the components.

1. Set multimeter to Vdc.
2. Connect multimeter probes to the starter housing and battery negative post.



mmr2010-022-002_c

STARTER GROUND CIRCUIT TEST

3. Turn ignition key to START to crank engine. Read multimeter **while cranking**.

STARTER GROUND CIRCUIT TEST		
PROBES		SPECIFICATION (WHILE CRANKING)
Starter housing	Battery negative post	0.8 Vdc maximum

RESULT	SERVICE ACTION
Measured voltage within specification	– Repair or replace starter
Measured voltage exceeds specification	– Check engine to chassis ground – Check battery ground.

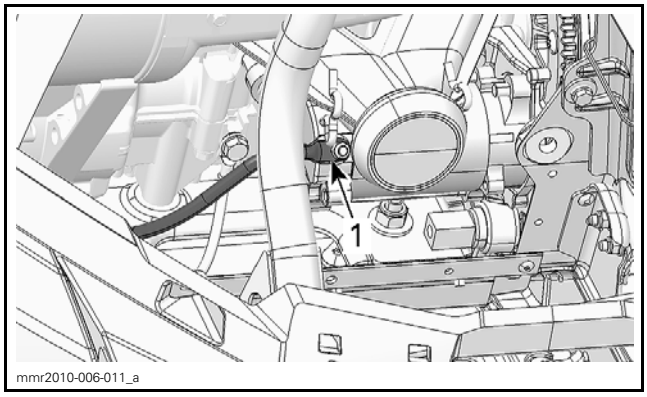
Starter Removal

1. Refer to *BODY* subsection and remove the following:
   – Hood
   – Front bottom pan cover (except Tundra models).
2. Refer to *EXHAUST SYSTEM* subsection and remove the tuned pipe.
3. Disconnect BLACK (-) cable from battery.
4. Disconnect RED (+) cable from battery.

⚠ WARNING

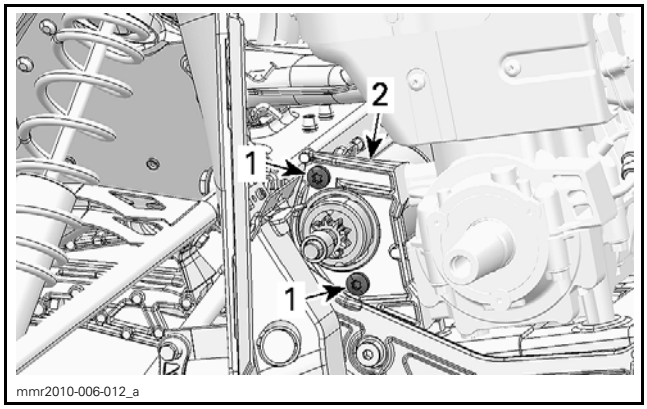
Always disconnect BLACK (-) cable first and reconnect last.

5. Refer to *DRIVE SYSTEM AND BRAKE* subsection and remove the following:
   – Drive belt
   – Drive pulley.
6. Disconnect RED power cable from starter.



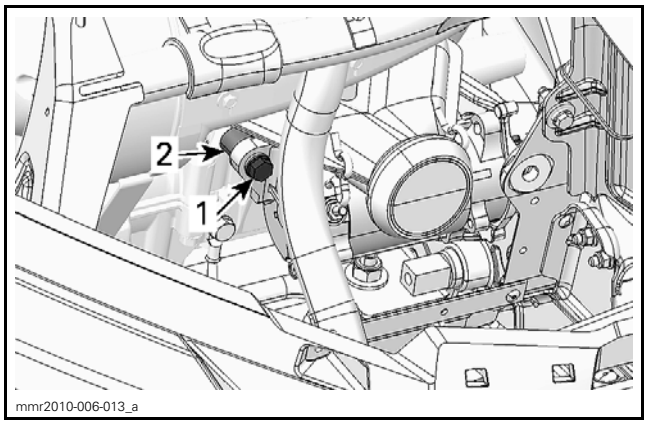
1. Starter cable

7. Remove and discard both TORX screws securing starter to starter support.



1. Starter retaining TORX screws
2. Starter support

8. Remove and discard the last retaining starter screw. Keep the washer and the starter spacer for reuse.

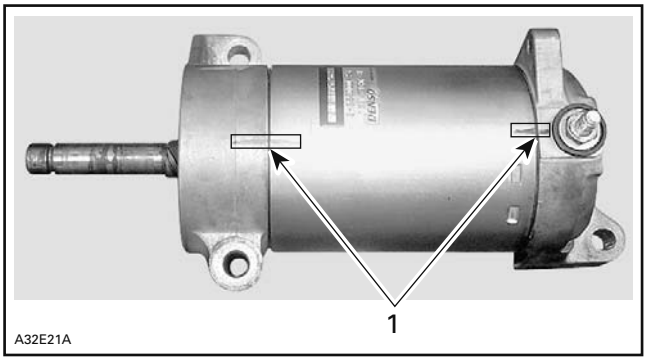


1. Starter retaining screw
2. Starter spacer

9. Remove starter from vehicle.

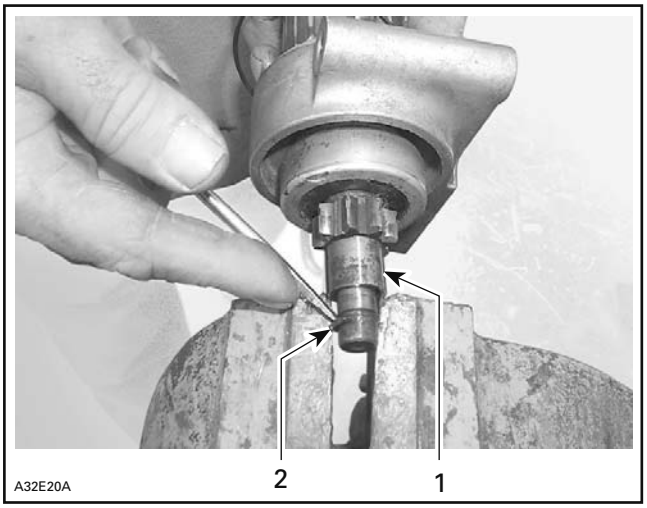
Starter Disassembly

1. Before disassembling, trace index marks on the starter housing and covers for parts alignment at reassembly.



TYPICAL
1. Trace alignment index marks for reassembly

2. Remove starter through bolts.
3. Separate end cap from starter housing.
4. Withdraw armature from starter housing.
5. If necessary, remove brush holder from end cap.
6. Check for radial play between the armature shaft and end cap bearing. Replace starter if excessive radial play is detected.
7. If parts are in good condition, coat them with XPS SYNTHETIC GREASE (P/N 293 550 010) before reinstalling them.
8. Push back the collar near the starter gear/clutch assembly using a screwdriver.
9. Remove snap ring, collar, and spring.



1. Collar
2. Snap ring

10. Turn starter clutch clockwise to remove it from the armature assembly.
11. Pull yoke from armature.

Starter Cleaning

NOTICE **Yoke, drive unit (clutch assembly) and end cap must not be immersed in cleaning solvent.**

1. Clean brushes and holders with a clean cloth impregnated with solvent. Brushes must be dried thoroughly with a clean cloth.
2. Blow brush holders clean using compressed air.

⚠ WARNING

Always wear safety glasses when using compressed air.

3. Remove dirt, oil or grease from commutator using a clean cloth soaked in suitable solvent. Dry well using a clean and dry cloth.
4. Clean engine ring gear teeth and drive unit (clutch).

NOTE: Bushings or bearings must not be cleaned with grease dissolving agents.

5. Immerse all metal components in cleaning solution. Dry using a clean and dry cloth.

Starter Inspection

Brush Holder

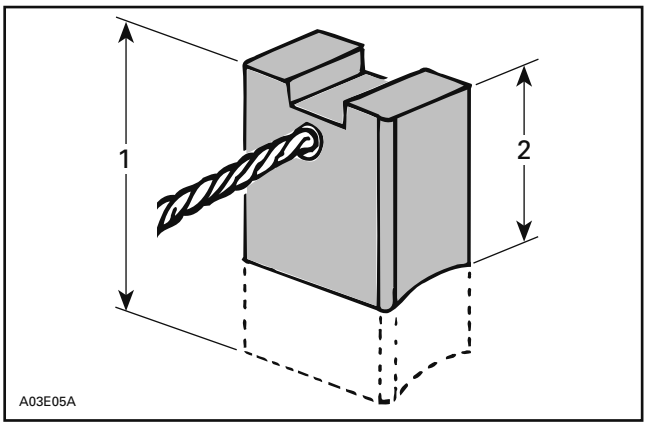
1. Check the brush holder for insulation using an ohmmeter.
2. Place one test probe on the insulated brush holder and the other test probe on the brush holder plate.

If the test failed, the brush holder has to be repaired or replaced.

Brush Length

Measure brush length as illustrated. If less than the specified value, replace them.

MODEL	LENGTH	
	NEW	WEAR LIMIT
All	10 mm (.4 in)	6 mm (.24 in)

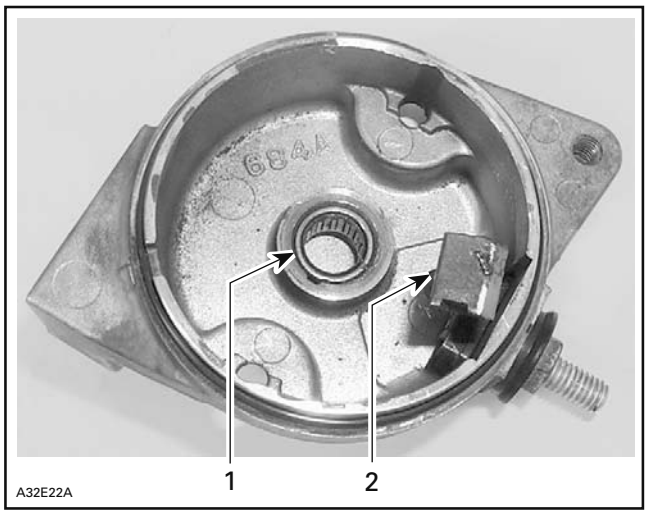


TYPICAL
1. New
2. Wear limit

End Cap

Check the mica insulation of the positive brush.

Check the roller bearing (or bushing) condition. Replace starter, 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 clutch assembly.

Check the pinion teeth for wear and damage. If defective, replace.

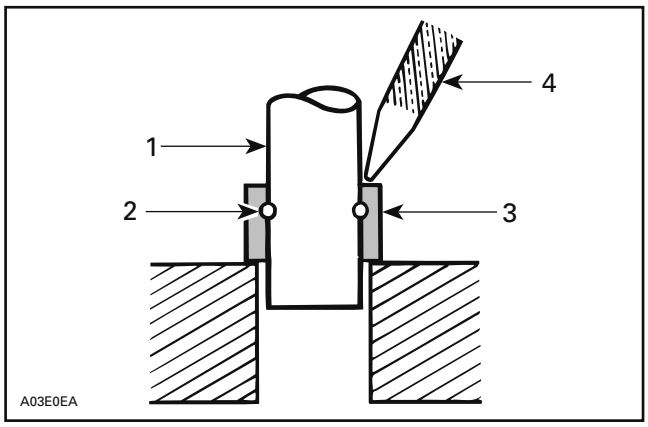
Starter Assembly

Reverse the order of disassembly to reassemble starter. However, pay attention to the following operations.

Prior to assembling, coat sliding surfaces on armature shaft splines, overrunning clutch and bushing with XPS SYNTHETIC GREASE (P/N 293 550 010).

After placing collar on armature shaft, install a new snap ring on the armature shaft and ensure that it is properly secured.

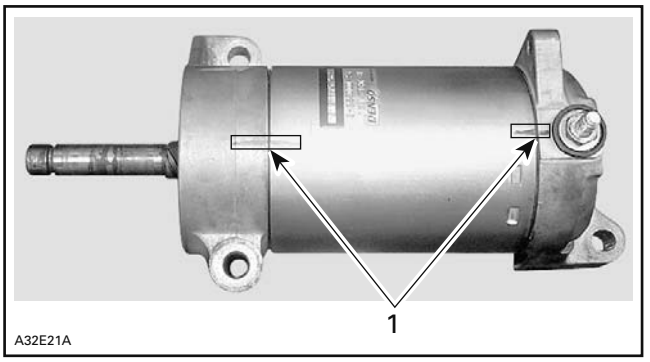
Slide collar over snap ring and secure in place by punching it at two or three places.



1. Armature shaft
2. Snap ring
3. Collar
4. Punch

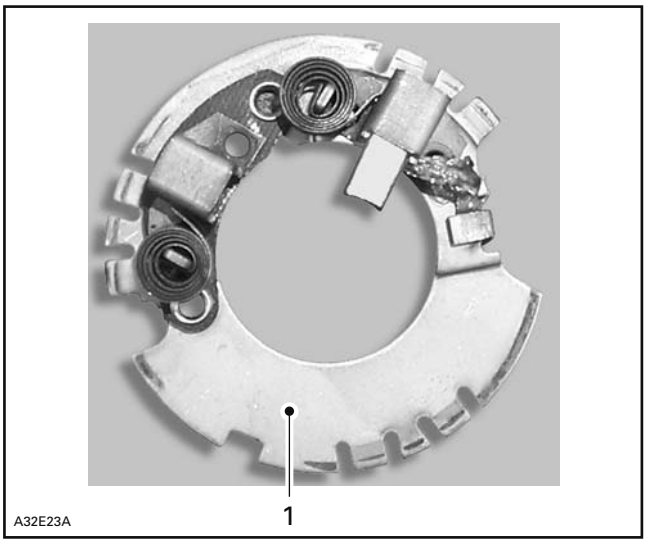
Starter Housing, Yoke and End Cap

1. Align previously traced index marks on housing, yoke and end cap.



TYPICAL
1. Aligned index marks

2. Open brushes and slide over commutator.
3. Align end cap locating notch with yoke locating protrusion and properly sit brush holder into cap.



1. Brush holder

NOTE: To ease end cap installation, retain brush holder with a small screwdriver while installing armature assembly.

NOTICE **Place two end caps on a flat surface before tightening the through bolts. Ensure end cap fits perfectly on yoke.**

4. Torque starter through bolts as per exploded view.

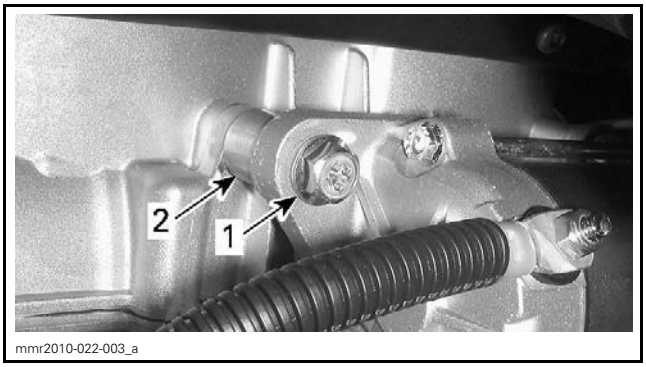
Starter Installation

Install removed parts in the reverse order of removal, however, pay attention to the following.

– Ensure starter and engine mating surfaces are free of grime. Serious trouble may arise if starter is not properly aligned.

– For ease of installation, install the three new starter mounting screws loosely before torquing.
– Torque starter mounting Torx screws first, then the hexagonal screw to 28 N•m (21 lbf•ft).
– Connect the RED wire to the large terminal on the starter. Tighten nut to specification.

NOTICE **Be sure to install the starter spacer between engine and starter, and the washer under the screw head when installing the mounting screw on the RH side of the starter.**



mmr2010-022-003_a

1. Washer under screw head
2. Starter spacer between starter and engine

TIGHTENING TORQUE	
Starter mounting screws	28 N•m (21 lbf•ft)
Cable terminal on starter	7 N•m (62 lbf•**in**)

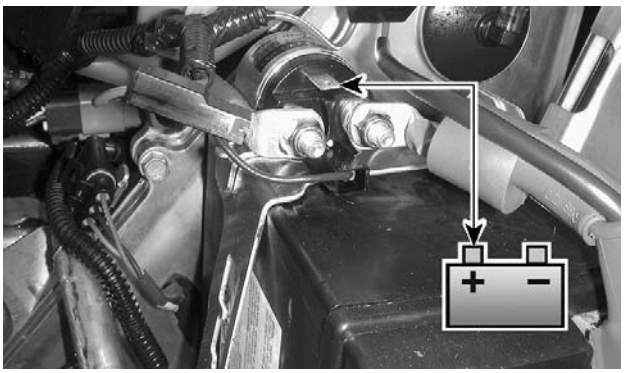
STARTER SOLENOID

Solenoid Quick Test

1. Test battery voltage, it should be as per specification.

BATTERY VOLTAGE	
CONDITION	SPECIFICATION
Fully charged	Approximately 12.8 Vdc

2. Disconnect the small positive connector (RED/GREEN wire) from the starter solenoid.
3. Install a jumper wire (with insulated clips) on the positive solenoid terminal and momentary touch the positive battery post with the other clip of jumper.

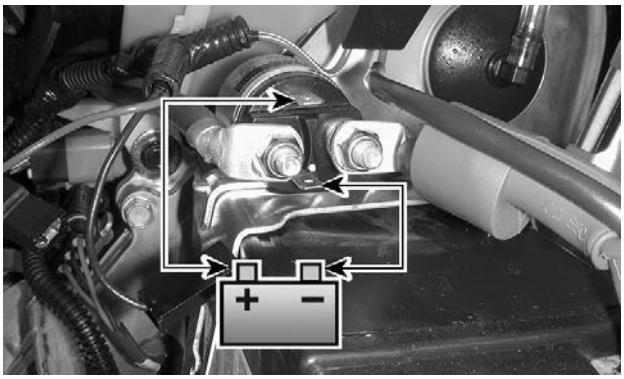


mmr2010-022-004_a

If starter engages, check ignition switch, wires and connectors for an open circuit. Refer to *IGNITION SYSTEM* subsection.

If the starter does not engage, do the following.

4. Secure the jumper to the positive battery post.
5. Disconnect the negative connector (BLACK wire) from the starter solenoid and install a jumper on the negative solenoid terminal.



mmr2010-022-005_a

6. Momentary touch the negative battery post with the jumper free clip.

If the starter engages, check grounds for an open circuit.

If the starter does not engage, replace the solenoid.

Starter Solenoid Winding Test

Disconnect the 2 small connectors from the starter solenoid.

Measure for continuity through the winding.

STARTER SOLENOID WINDING TEST AT STARTER SOLENOID	
RESISTANCE @ 20°C (69°F)	Approximately 7.5 Ω

RESULT	SERVICE ACTION
Resistance as specified	– Refer to *STARTER SOLENOID CIRCUIT TEST AT IGNITION SWITCH*.
Resistance NOT as specified	– Replace starter solenoid

Starter Solenoid Control Circuit Test (at Ignition Switch)

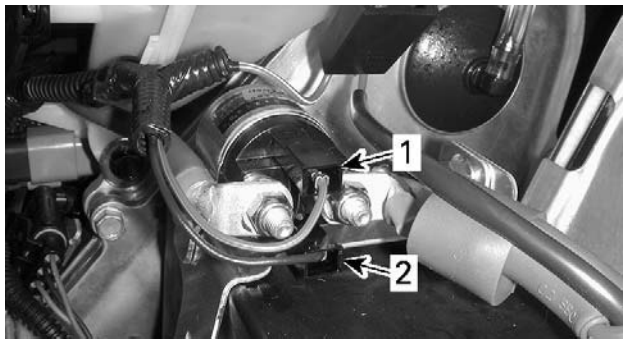
Read the resistance through the starter solenoid from the ignition switch harness connector as follows.

STARTER SOLENOID CIRCUIT TEST AT IGNITION SWITCH		
TEST PROBES		RESISTANCE @ 20°C (69°F)
Ignition switch connector Pin D	Chassis ground	Approximately 7.5 Ω

RESULT	SERVICE ACTION
Resistance as specified	– The starter solenoid control circuit is good.
Resistance NOT as specified	– Check continuity from ignition switch connector (pin D) to starter solenoid. – Check continuity from starter solenoid winding to ground.

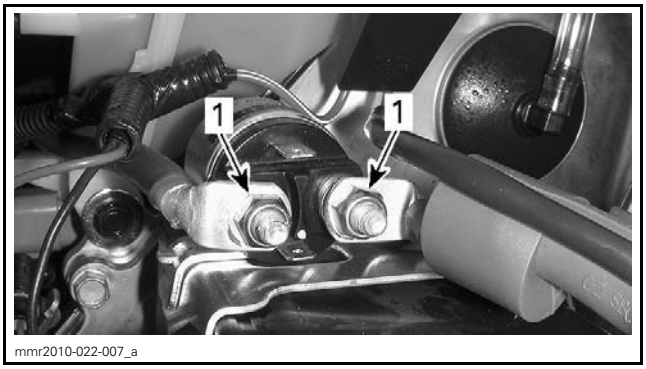
Solenoid Replacement

1. Disconnect BLACK (–) cable terminal from the negative battery post.
2. Disconnect both small connectors from solenoid.



1. Positive connector (RED/GREEN wire)
2. Negative connector (BLACK wire)

3. Remove nuts securing cable terminals on solenoid posts.



1. Cable terminal nuts

4. Remove battery retaining strip from vehicle.
5. Drill the rivet securing the solenoid to battery retaining strip.
6. Install the new solenoid and secure it with a rivet.
7. Reinstall the battery retaining strip.
8. Install and secure cable terminals. Tighten nuts as specified.

TIGHTENING TORQUE	
Solenoid power cable terminals	4 N•m (35 lbf•**in**)

ROTAX ELECTRONIC REVERSE

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	198

GENERAL

SYSTEM DESCRIPTION

There is 3 main components used for the RER system: the RER switch, the ECM and the RER trigger coil.

The ECM receives signals from the trigger coils for the following functions:

– Forward engine rotation

– Reverse engine rotation.

The ECM recognizes a signal sent by the RER switch.

When RER switch is activated and engine is not running, nothing takes place.

When RER switch is activated and engine is running, ECM cuts off ignition. Therefore, engine RPM gradually drops. When engine reaches a low threshold RPM, ECM sends an ignition spark at a great advance creating a thrust which reverses engine rotation.

In reverse operation, the RER trigger coil is used to give the ignition signal to the ECM.

The RER trigger coil is used only when engine is in reverse operation.

Under a threshold low RPM or above drive pulley engagement speed, the RER function is disabled. Nothing takes place when pressing RER button.

TROUBLESHOOTING

TROUBLESHOOTING GUIDELINES

RER Does not Respond when Depressing RER Button

Check if engine RER switch works properly.

Check wires and connectors.

Engine Stops after Pressing RER Button

Check trigger coil.

Check wires and connectors.

Check engine compression and piston condition. See *RER WORKS ERRATICALLY*.

Replace the ECM.

RER Works Erratically

Check engine compression. A low compression engine may result in RER working erratically making you think the problem is an electronic problem.

Check piston condition. Verify piston condition through the intake and exhaust ports. Look for scoring on piston skirts. Scored piston skirts may result in RER working erratically making you think the problem is an electronic problem.

Check RER switch.

PROCEDURES

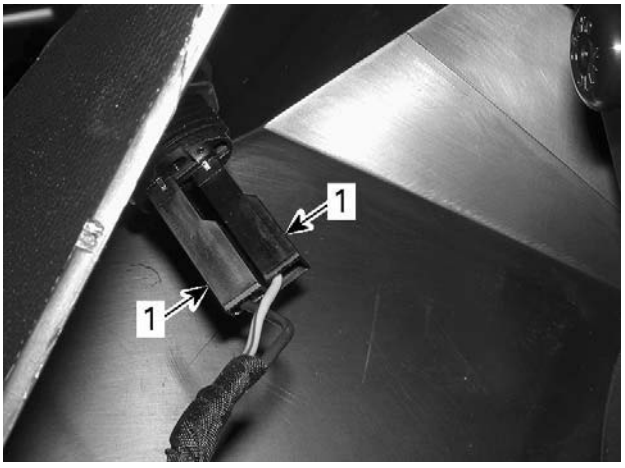
RER SWITCH

RER Switch Continuity Test

Remove the multifunction gauge. Refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

Models without a Multifunction Switch

Unplug both terminals from RER switch.

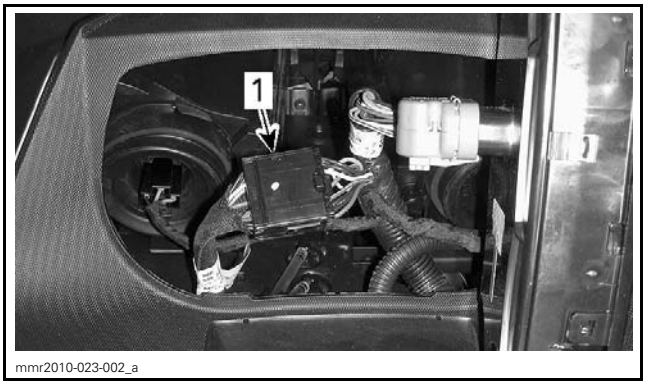


mmr2010-023-001_a

1. RER terminals

Models with a Multifunction Switch

Disconnect the HG connector.



mmr2010-023-002_a

1. HG connector

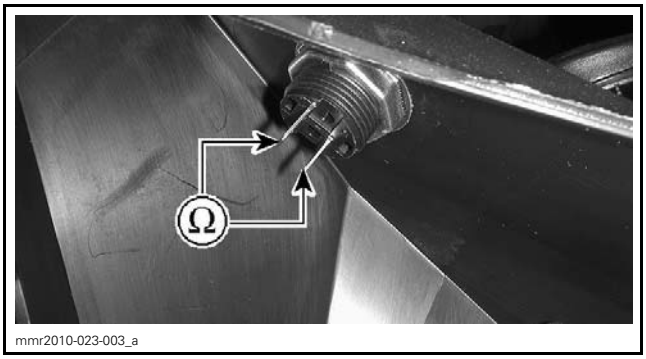
All Models

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

Set the multimeter to "Ω".

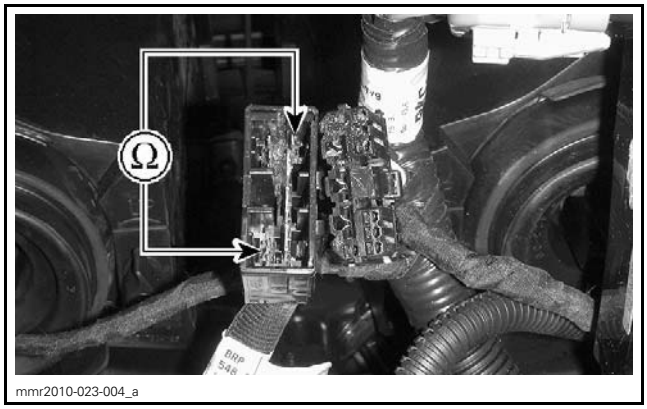
Measure the RER switch continuity as per following tables.

Check switch as follows.



mmr2010-023-003_a

TUNDRA		
SWITCH	TERMINAL	RESISTANCE
Release	A and B	Infinite (OL)
Pushed and held		Smaller than 2.8 Ω



mmr2010-023-004_a

REV-XP 550F/TUNDRA SPORT/TUNDRA LT			
SWITCH	HG CONNECTOR		RESISTANCE
Release	Pin 5	Pin 8	Infinite (OL)
Pushed and held			Lower than 0.5 Ω

If continuity test fails, check wires and connectors to RER switch.

If wires and connectors are good, replace the RER switch.

RER TRIGGER COIL

To test the RER trigger coil, refer to *MAGNETO SYSTEM* subsection.

BEEPER (REVERSE ALARM)

The reverse alarm (beeper) is integrated in the gauge cluster.

If the beeper does not function, check its wire continuity as per table.

TEST PROBES		RESISTANCE
ECM DA connector Pin 2	Gauge CV connector Pin 1	Close to 0 Ω

If the test is good, test the multifunction gauge input and the ECM output. Refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

LIGHTS, GAUGE AND ACCESSORIES

SERVICE TOOLS

Description	Part Number	Page
12 V BATTERY SUPPLY CABLE	529 035 997	200
FLUKE 115 MULTIMETER	529 035 868	202–205, 207–208, 210–211, 216–219, 223–224
T-HARNESS	529 035 869	200

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
MULTILOCK - TERMINAL EXTRACTION TOOL	755430-2	220

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 5900	293 800 066	215

GENERAL

When troubleshooting, always refer to applicable *POWER DISTRIBUTION* subsection and the wiring diagram for circuit details.

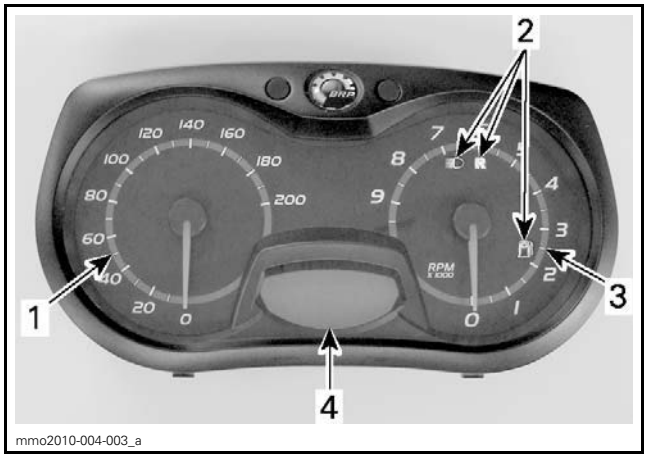
On electric start models, there is an accessory connector (VC) underneath the console.

- This connector is to be used to connect a sensitive electronic device such as a cellular phone or GPS.
- This connector is directly powered by the battery.
- DO NOT connect a sensitive electronic device to a power circuit directly from rectifier/voltage regulator (power from lights or from communication connector for example).

NOTICE Never force a multimeter probe into an electrical terminal.

SYSTEM DESCRIPTION (GAUGE)

The gauge includes an analog speedometer, an analog tachometer, a digital (LCD) display and pilot lamps.



mmo2010-004-003_a

1. *Speedometer*
2. *Pilot lamps*
3. *Tachometer*
4. *Digital display*

TROUBLESHOOTING

ELECTRICAL SYSTEM TESTING

Always refer to the wiring diagram when troubleshooting an electrical circuit.

SYMPTOM	ACTION
No electrical accessory nor gauge work	Carry out the *DC VOLTAGE OUTPUT TEST (ACCESSORIES)*, refer to *CHARGING SYSTEM* subsection.
Some accessories work and others don't	Carry out the applicable input voltage test in this subsection.
All lights are dim, heated throttle lever and heated grips are weak	Carry out a *DC VOLTAGE OUTPUT TEST (ACCESSORIES)*, refer to *CHARGING SYSTEM* subsection.
Taillight, brake light are dim, weak heated throttle lever or heated grips	Carry out the input voltage test but use a conventional test lamp instead of the multimeter. A dim test lamp indicates a parasitic resistance on the tested circuit.
Headlights are dim	Carry out the *HEADLIGHTS POSITIVE CIRCUIT VOLTAGE DROP TEST* in this subsection.
Erratic or inoperative speedometer	Refer to *GAUGE SPEEDOMETER FUNCTION TEST* and *SPEED SENSOR* in this subsection.

Electrical System Power Supply for Testing

The vehicle electrical system can be powered for testing without starting the engine.

REQUIRED TOOLS	
T-HARNESS (P/N 529 035 869)	
12 V BATTERY SUPPLY CABLE (P/N 529 035 997)	

Connect to vehicle as follows:

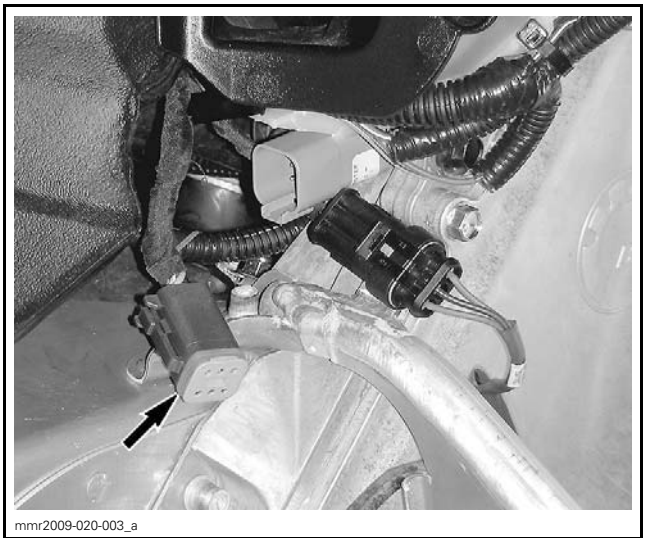
1. Remove the communication connector from the protective cap on the right side of the vehicle.


mmr2009-020-002_a

TYPICAL - COMMUNICATION CONNECTOR STOWED

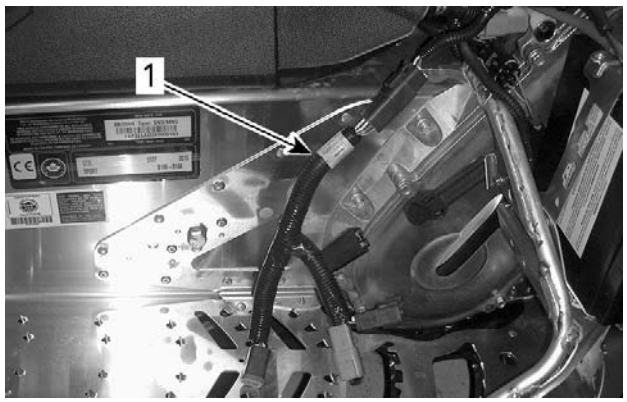
2. Connect the T-HARNESS (P/N 529 035 869) to communication connector.


529035869


mmr2009-020-003_a

TYPICAL - COMMUNICATION CONNECTOR

3. Connect the 12 V BATTERY SUPPLY CABLE (P/N 529 035 997) to T-harness.

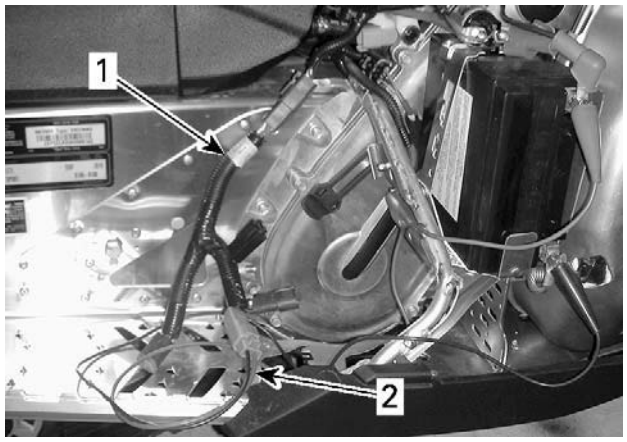


mmr2010-024-012_a

1. T-Harness

4. Connect the battery supply cable clamps to a 12 V battery.

NOTE: On electric start models, connect cable clamps to the vehicle battery.



mmr2010-024-013_a

CONNECTED TO THE VEHICLE BATTERY
1. T-Harness
2. 12 V battery supply cable

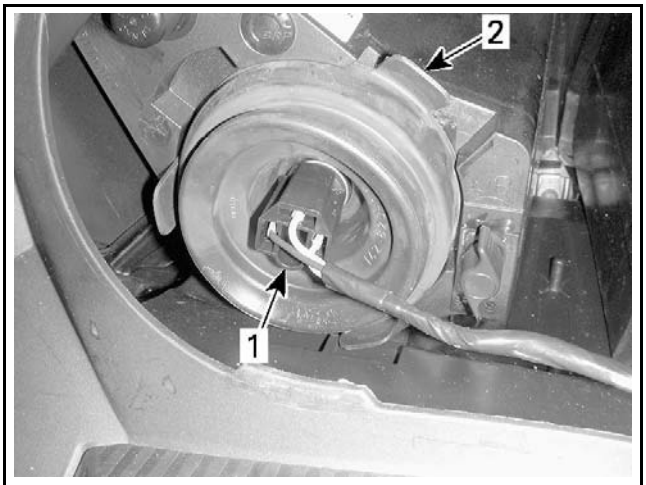
NOTICE **Always use the proper supply harness and cables. Make sure to respect polarity when connecting cable clips to battery. Match RED cables together. Otherwise the vehicle harness could melt.**

PROCEDURES

HEADLIGHTS

Headlight Bulb Removal

1. Remove multifunction gauge, see procedure in this subsection.
2. Disconnect bulb connector.
3. Remove top and center portion of rubber boot from headlight unit.



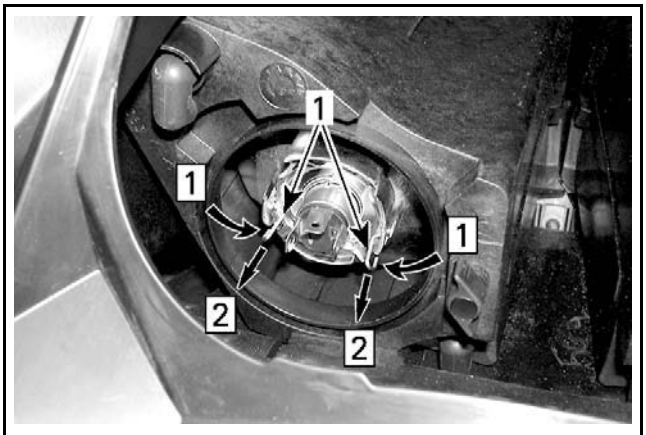
mmr2008-039-004_a

1. Remove headlight connector
2. Remove rubber boot

NOTE: It is not necessary to fully remove rubber boot.


mmr2008-039-005

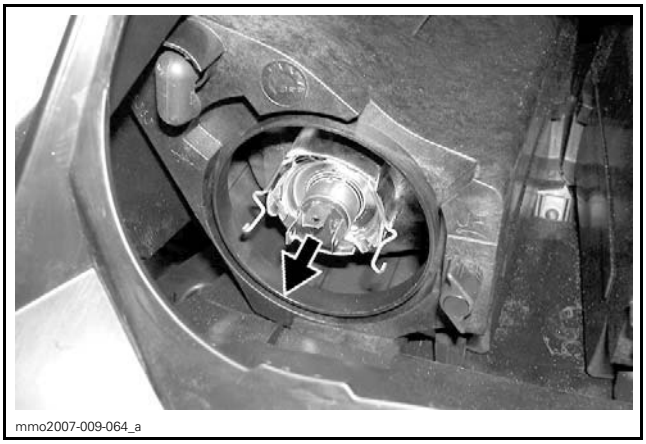
4. Press and pull both sides of the retaining clip at the same time to release it from bulb support.



mmo2007-009-063_a

Step 1: Press both sides
Step 2: Pull to release
1. Retaining clip

5. Pull bulb from headlight unit.


mmo2007-009-064_a

PULL TO REMOVE BULB

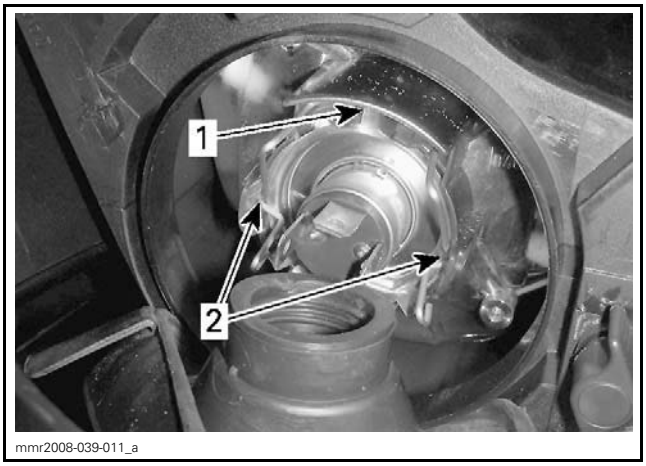
Headlight Bulb Installation

NOTICE Never touch glass portion of a halogen bulb with bare fingers, it shortens its operating life. If glass is touched, clean it with isopropyl alcohol which will not leave a film on the bulb.

1. Insert bulb in headlight unit.

NOTE: Widest alignment tab on bulb should be at top of headlight unit.

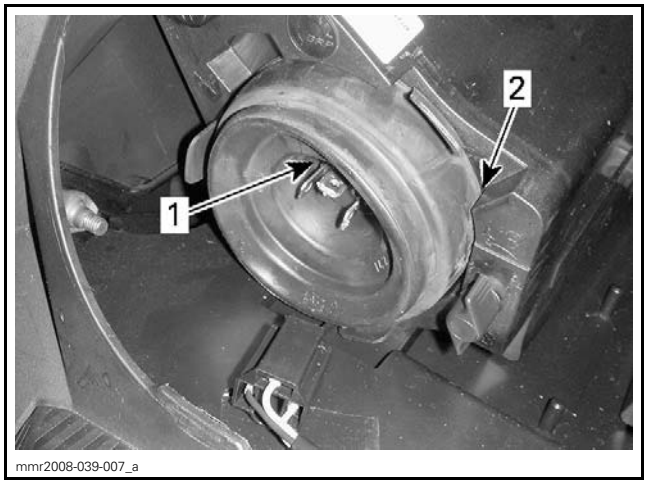
2. Insert top of bulb retaining clip as you squeeze the two sides inwards. Release retaining clip so that it locks in the grooves on either side of headlight unit.



mmr2008-039-011_a

1. *Wide bulb tab*
2. *Bulb holder locked*

3. Install rubber boot. Ensure boot is properly inserted in the headlight unit groove and around of the bulb base.



mmr2008-039-007_a

1. *Insert around bulb*
2. *Insert in groove*

4. Connect light connector.
5. Test light operation.
6. Install gauge, see procedure in this subsection.

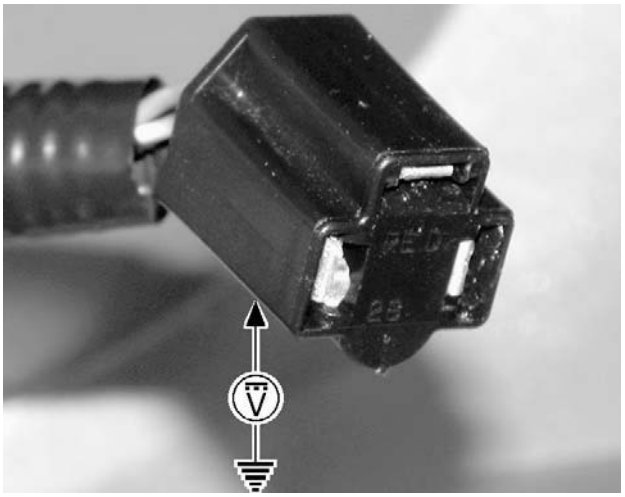
Headlight Input Voltage Test

If headlight(s) does not function with a known good bulb, proceed as follows.

1. Remove multifunction gauge, see procedure in this subsection.
2. Disconnect headlight connector(s).

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set the multimeter to Vdc.
4. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
5. Measure voltage as per following table.



mmr2006-027-017_d

SWITCH POSITION	TEST PROBES		VOLTAGE
LO beam	Headlight connector pin A (GY/VI wire)	Chassis ground	Battery voltage
HI beam	Headlight connector pin C (GY wire)	Chassis ground	

If voltage is as specified, carry out *HEADLIGHTS GROUND CIRCUIT TEST*.

If voltage is not as specified, carry out *HEADLIGHTS DIMMER SWITCH INPUT VOLTAGE TEST*.

Headlight Dimmer Switch Input Voltage Test

1. Remove gauge to access steering harness connector (HG), refer to *GAUGE REMOVAL* in this subsection.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set the multimeter to Vdc.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. With headlights connected, back probe steering harness connector (HG) and measure voltage as per following table.

NOTE: The vehicle can be equipped with an 11 pin HG connector or a 13 pin HG connector. Refer to the appropriate table for testing.

TEST PROBES VEHICLES WITH 11 PIN HG CONNECTOR		VOLTAGE
Pin 9 (RD/YL wire)	Chassis ground	Battery voltage

TEST PROBES VEHICLES WITH 13 PIN HG CONNECTOR		VOLTAGE
Pin 11 (RD/YL wire)	Chassis ground	Battery voltage

If voltage is as specified, carry out the *HEADLIGHT DIMMER SWITCH OUTPUT VOLTAGE TEST*.

If voltage is not as specified, look for an open circuit.

Headlight Dimmer Switch Output Voltage Test

NOTE: The Hi beam output can be verified using B.U.D.S. Refer to *HEADLIGHT DIMMER SWITCH TEST WITH B.U.D.S.* in this subsection.

1. Make sure the dimmer switch input voltage is good.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set the multimeter to Vdc.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. Back probe steering harness connector (HG) and measure voltage as per following table.

NOTE: The vehicle can be equipped with an 11 pin HG connector or a 13 pin HG connector. Refer to the appropriate table for testing.

SWITCH POSITION	TEST PROBES VEHICLES WITH 11 PIN HG CONNECTOR		VOLTAGE
LO beam	Pin 10 (GY/VI wire)	Chassis ground	Battery voltage
HI beam	Pin 8 (GY wire)	Chassis ground	

SWITCH POSITION	TEST PROBES VEHICLES WITH 13 PIN HG CONNECTOR		VOLTAGE
LO beam	Pin 12 (GY/VI wire)	Chassis ground	Battery voltage
HI beam	Pin 10 (GY wire)	Chassis ground	

If voltage is as specified, look for an open circuit between HG connector and headlight connector.

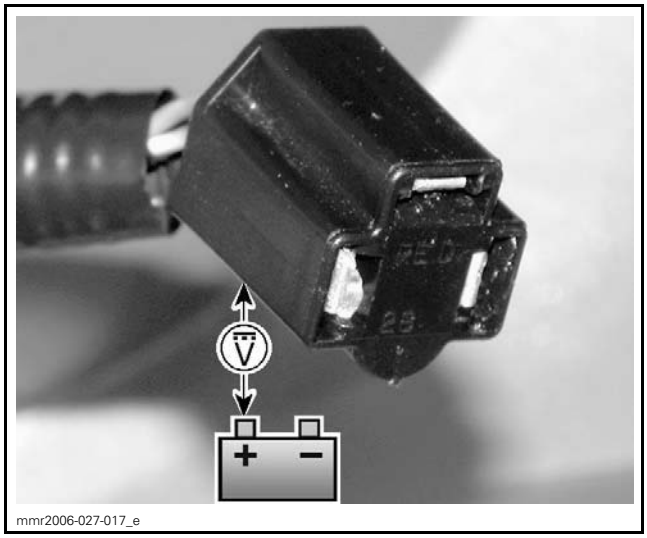
If voltage is not as specified, replace dimmer switch.

Headlight Ground Circuit Test

Make sure the headlights input voltage is good.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

1. Set the multimeter to Vdc.
2. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
3. Measure voltage as per following table.



mmr2006-027-017_e

TEST PROBES (HEADLIGHT CONNECTOR)		VOLTAGE
Pin B (BK wire)	Battery positive terminal	Battery voltage

If voltage is as specified, carry out the *HEADLIGHTS POSITIVE CIRCUIT VOLTAGE DROP TEST*.

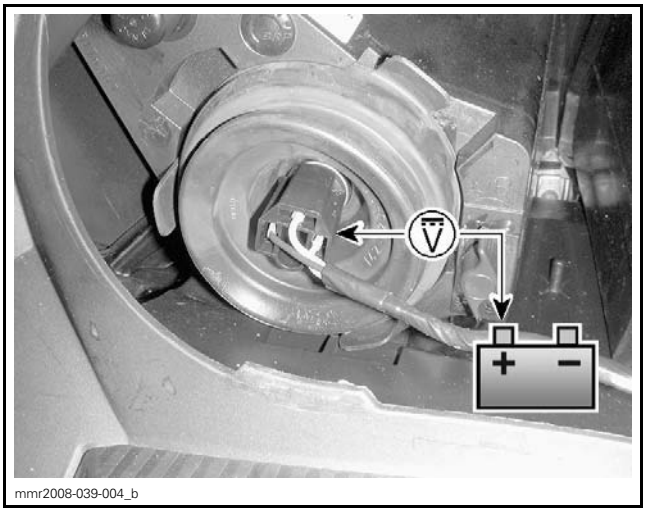
If voltage is not as specified, look for an open ground circuit.

Headlight Positive Circuit Voltage Drop Test

1. Connect the headlight connectors to the headlights bulbs.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set the multimeter to Vdc.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. Back-probe headlight pins and measure voltage as per following table.



mmr2008-039-004_b

SWITCH POSITION	TEST PROBES		VOLTAGE
LO beam	T-harness positive clamp	Headlight connector pin A (GY/VI wire)	Maximum 1 Vdc
HI beam	T-harness positive clamp	Headlight connector pin C (GY wire)	

If voltage is as specified, carry out the *HEADLIGHTS GROUND CIRCUIT VOLTAGE DROP TEST*.

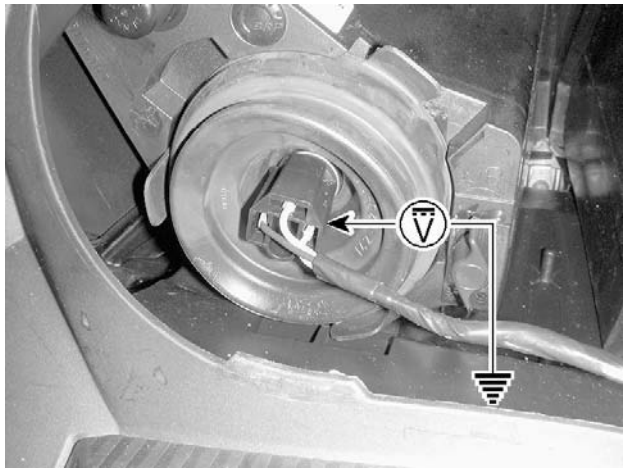
If voltage is not as specified, repair or replace wire or connector on positive circuit.

Headlight Ground Circuit Voltage Drop Test

1. Connect the headlight connectors to the headlights bulbs.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set the multimeter to Vdc.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. Back-probe headlight pins and measure voltage as per following table.



mmr2008-039-004_d

NOTE: HI beam or LO beam can be selected during this test.

TEST PROBES		VOLTAGE
Headlight connector pin B (BK wire)	Chassis ground	Maximum 1 Vdc

If voltage is not as specified, repair or replace wire or connector.

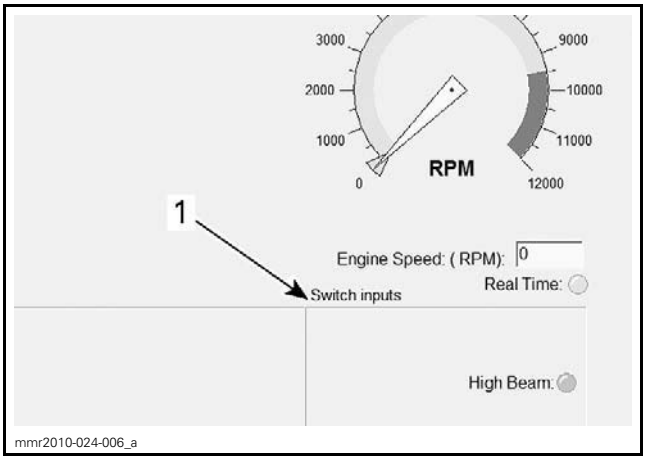
Headlight Dimmer Switch Test with B.U.D.S.

1. Connect vehicle to B.U.D.S., refer to *COMMUNICATION TOOLS AND B.U.D.S.* .

In B.U.D.S., click:

– **Read Data** button
– **Monitoring** tab

2. Look at the **High Beam** "LED" in the **Switch inputs** box while selecting high beam.



mmr2010-024-006_a

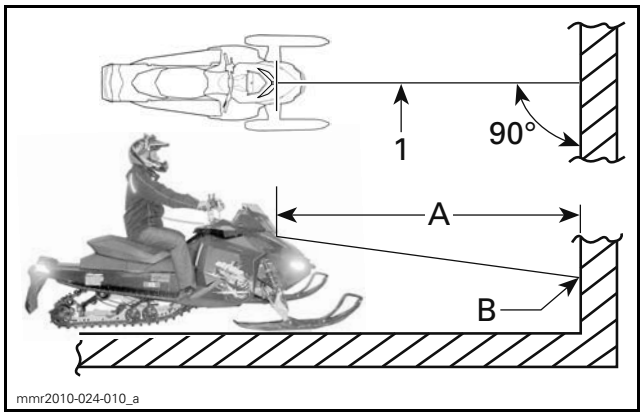
TYPICAL
1. Switch inputs box

The "LED" in the **Switch inputs** box should turn ON when HI beam is selected. If not, the dimmer switch Hi beam signal does not reach the gauge.

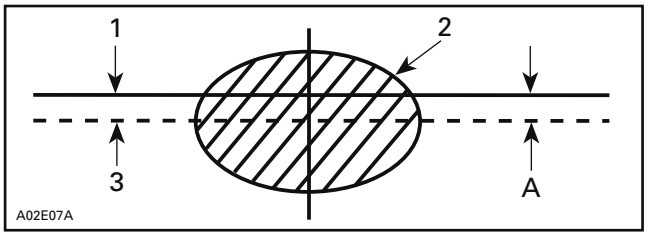
Headlight Beam Aiming

Beam aiming is correct when center of high beam projection is at the proper height on a test surface when vehicle is at a specific distance.

1. Place the vehicle as follows:
   1.1 On a flat surface
   1.2 Perpendicular, as seen from the top, to test surface (wall or screen)
   1.3 380 cm (12.5 ft) away from test surface
2. Ask rider to sit on vehicle or apply equivalent weight on the vehicle.
3. On the vehicle, measure the distance from the center of headlight to the ground.
4. Scribe a line at this height on the test surface.
5. Turn headlight ON.
6. Select **high** beam.
7. Light beam center should be 25 mm (1 in) below scribed line.



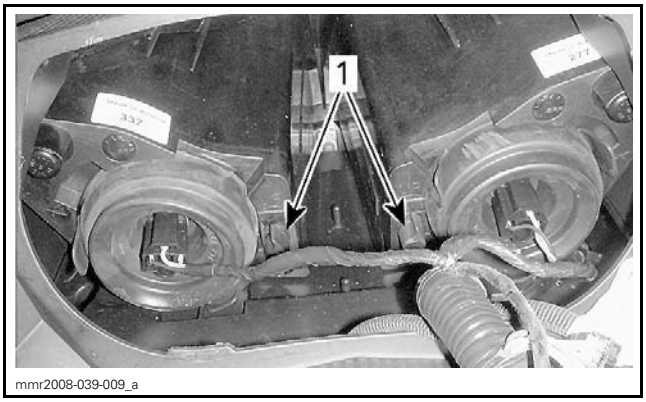
TYPICAL
1. Headlight center line
A. 380 cm (12.5 ft)
B. 25 mm (1 in) below center line



1. Headlight horizontal
2. Light beam (high beam) (projected on the wall)
3. Light beam center
A. 25 mm (1 in)

Beam Aiming Adjustment

1. Remove multifunction gauge.
2. Turn knob on light unit to adjust beam height.

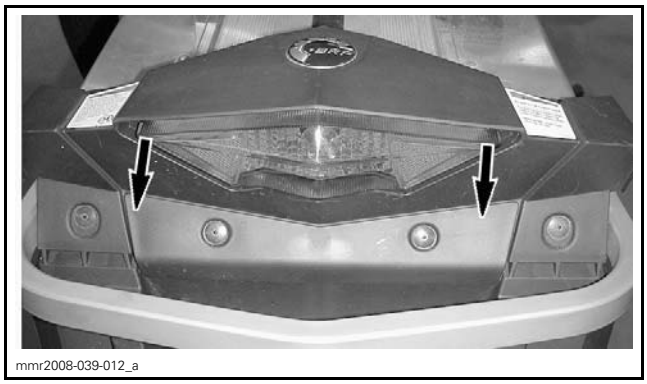


TYPICAL
1. Beam height adjustment knobs

TAILLIGHT

Taillight Bulb Replacement

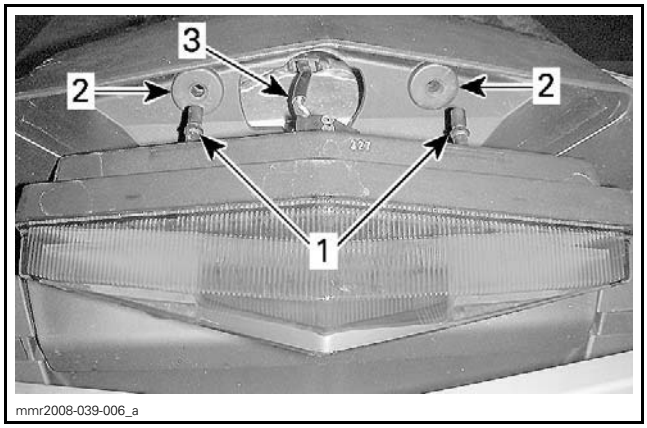
1. Remove taillight housing from holder by carefully pulling on lens at both ends.



CAREFULLY PULL OUT AT CORNERS

NOTE: Proceed the same way on models with a rear rack.

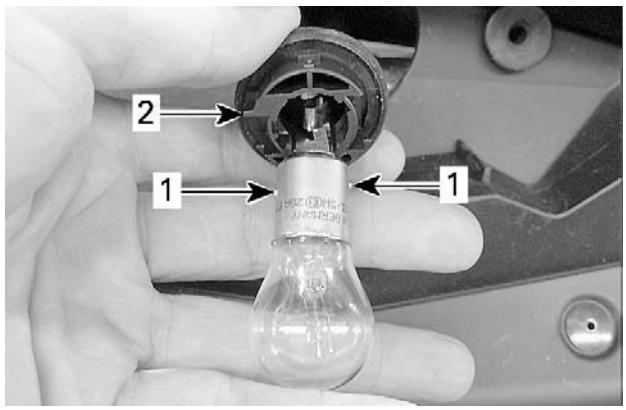
NOTICE Taillight housing is held in place by two plastic pins inserted in rubber grommets. If housing is forced too far sideways when removing, the mounting pins may break and housing will have to be replaced. Do not pull housing out too far to avoid damaging wiring.



1. Taillight housing retaining pins
2. Retaining grommets
3. Light wire harness

2. Rotate bulb socket counterclockwise to remove it from taillight housing.
3. Push in and rotate bulb counterclockwise to remove it from its socket.
4. Install the new bulb by pushing it in the socket and turning it clockwise.

NOTE: Note position of bulb locking pins on its base, and bulb socket alignment key to lens.



mmr2008-039-008_a

1. Bulb locking pins
2. Bulb holder alignment key

Taillight Holder Replacement

If the taillight lens is broken, see the *TAILLIGHT BULB REPLACEMENT* procedure in this subsection.

The taillight holder is part of the snow guard or rack rear support depending on the model.

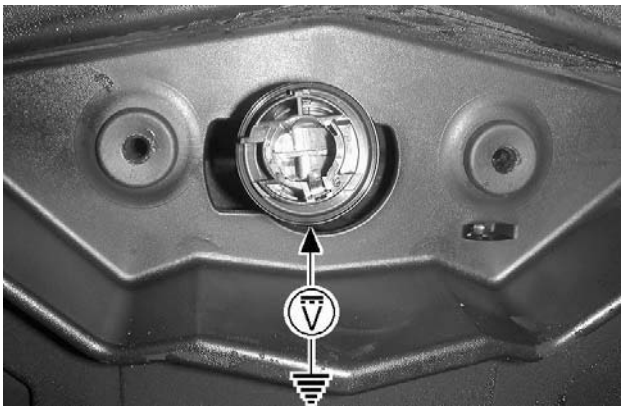
If the light bulb socket or wiring need to be replaced, you will have to lift up the rear of the fuel tank to access and disconnect the harness connector, refer to *FUEL TANK AND FUEL PUMP* subsection.

Taillight Input Voltage Test

1. Remove taillight bulb as explained in *TAILLIGHT BULB REPLACEMENT*.
2. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set the multimeter to Vdc.
4. Measure voltage as per following table.



mmr2010-024-001_a

NOTICE Be careful not to bypass socket terminals with the multimeter terminals.

TEST PROBES		VOLTAGE
Taillight terminal in bulb socket	Chassis ground	Battery voltage

If voltage is as specified, carry out a *TAILLIGHT AND BRAKE LIGHT GROUND CIRCUIT TEST*.

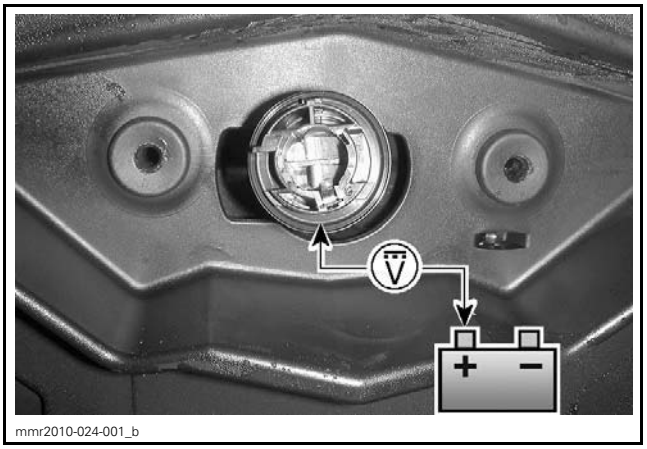
If voltage is not as specified, look for an open circuit.

Taillight and Brake Light Ground Circuit Test

1. Remove taillight bulb as explained in *TAILLIGHT BULB REPLACEMENT*.
2. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set the multimeter to Vdc.
4. Measure voltage to check ground condition as per following table.


mmr2010-024-001_b

NOTICE Be careful not to bypass socket terminals with the multimeter terminals.

TEST PROBES		VOLTAGE
Battery positive terminal	Ground terminal in bulb socket	Battery voltage

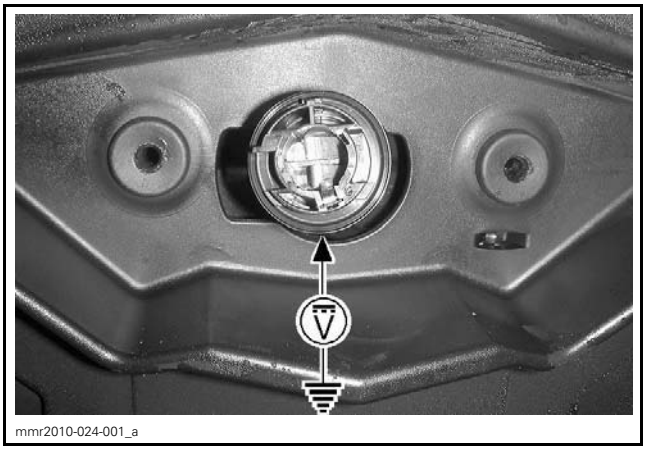
If voltage is not as specified, look for an open circuit.

Brake Light Input Voltage Test

1. Remove taillight bulb as explained in *TAILLIGHT BULB REPLACEMENT*.
2. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set the multimeter to Vdc.
4. Apply parking brake.
5. Measure voltage as per following table.


mmr2010-024-001_a

NOTICE Be careful not to bypass socket terminals with the multimeter terminals.

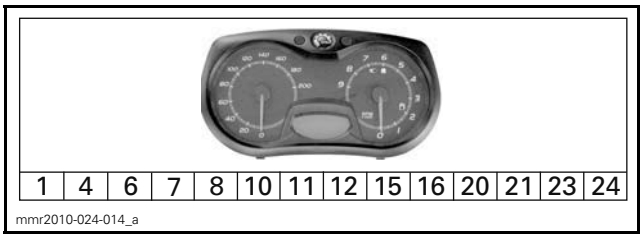
SWITCH POSITION	TEST PROBES		VOLTAGE
ON (brake applied)	Brake light terminal in bulb socket	Chassis ground	Battery voltage

If voltage is as specified, carry out the *TAILLIGHT AND BRAKE LIGHT GROUND CIRCUIT TEST*.

If voltage is not as specified, test brake light switch and wiring, refer to *BRAKE*.

GAUGE

Gauge Pin Information



mmr2010-024-014_a

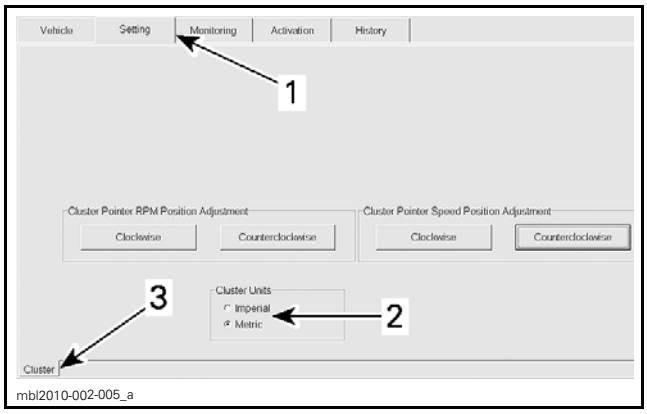
1. Reverse beeper and pilot lamp input
4. RER filter (in gauge) to ECM
6. Speed sensor signal
7. Speed sensor positive
8. Gauge input voltage (power)
10. Speed sensor ground
11. Gauge ground
12. Fuel level sensor ground
15. Fuel level sensor signal
16. High beam pilot lamp input
20. RER Filter (in gauge) to RER switch
21. Tachometer input (engine stop switches circuit)
23. CAN low
24. CAN High

Changing Gauge Units of Measurement

The gauge is factory preset in imperial units and can be changed to metric using B.U.D.S. .

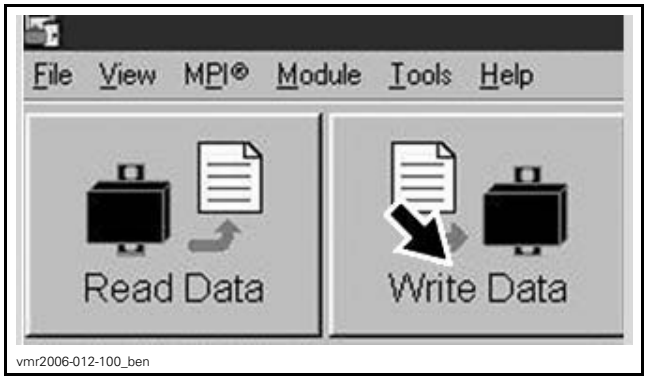
To change units, proceed as follows.

1. Connect vehicle to B.U.D.S., refer to *COMMUNICATION TOOLS AND B.U.D.S.* .
2. In B.U.D.S., click:
   – **Read Data** button
   – **Setting** tab
3. Select the desired units in the **Cluster Units** box.



1. *Setting tab*
2. *Cluster Units box*
3. *Cluster tab*

4. Click on **Write Data** to save the new setting in the gauge.

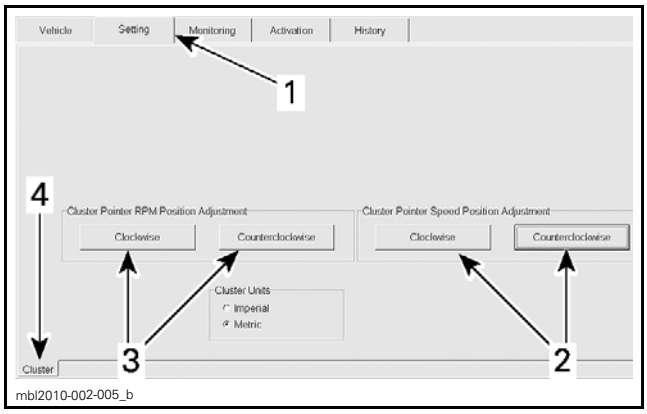


WRITE DATA

Speedometer and Tachometer Pointer Adjustment

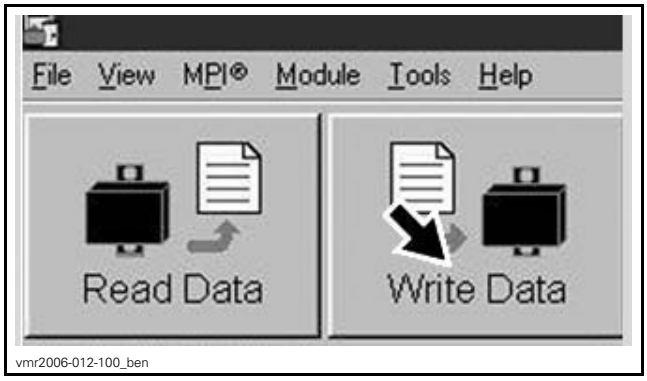
1. Connect vehicle to B.U.D.S., refer to *COMMUNICATION TOOLS AND B.U.D.S.* .
2. In B.U.D.S., click:
   - **Read Data** button
   - **Setting** tab
3. Adjust pointer by clicking on the appropriate **Clockwise** or **Counterclockwise** button.

NOTE: Look straight at pointer to prevent parallax error. Pointer has a fine tuning; press button repetitively.



1. *Setting tab*
2. *Speedometer pointer buttons*
3. *Tachometer pointer buttons*
4. *Cluster tab*

4. Click on **Write Data** to save the new setting in the gauge.



WRITE DATA

Gauge Self Test

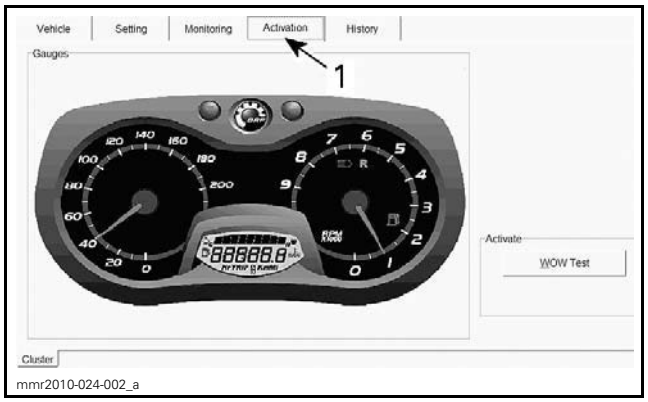
On **ECM wake-up**, the gauge will perform a self-test. All indications should come ON and gauge pointers will cycle once. You will have a few seconds to ensure the indications (**LEDs** and **LCDs**) are functioning correctly.

NOTE: This test only validates the gauge operation of the **LEDs**, **LCDs** in the gauge digital display and the pointers. It does not test the actual circuit functions related to each indication.

If the self test does not take place, proceed with the *GAUGE INPUT VOLTAGE TEST*.

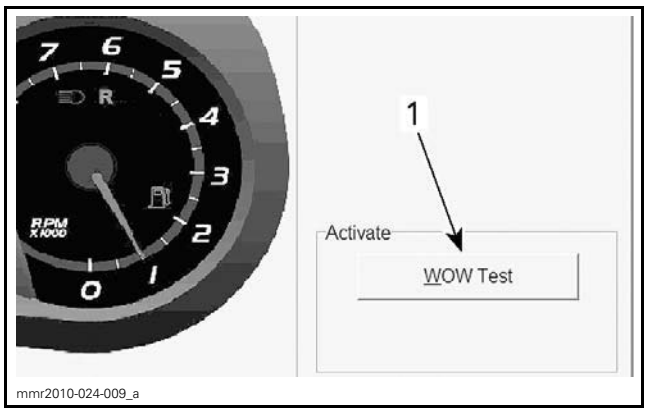
Gauge Test with B.U.D.S.

1. Connect vehicle to B.U.D.S., refer to *COMMUNICATION TOOLS AND B.U.D.S.* .
2. In B.U.D.S., click:
   - **Read Data** button
   - **Activation** tab



1. Activation tab

3. Click on the **WOW Test** button.



1. Click on WOW Test button

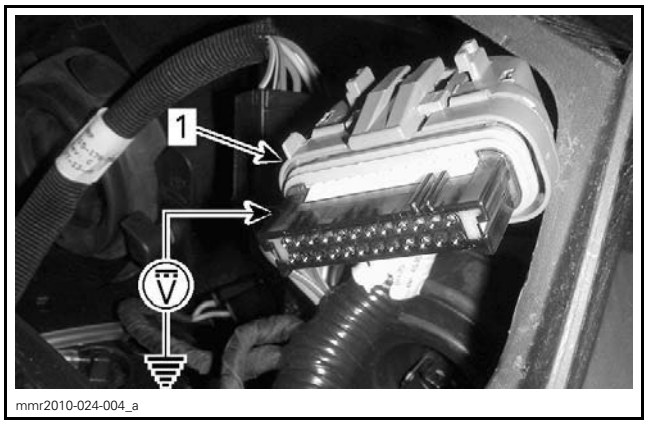
Gauge Input Voltage Test

If gauge does not come on when the engine is started, carry out the following test.

1. Remove gauge, see procedure in this subsection.
2. Disconnect the gauge connector.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set the multimeter to Vdc.
4. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
5. Measure voltage as per following table.



1. Gauge connector

TEST PROBES		VOLTAGE
Gauge connector pin 8	Chassis ground	Battery voltage

If voltage is as specified, carry out the *GAUGE GROUND CIRCUIT TEST*.

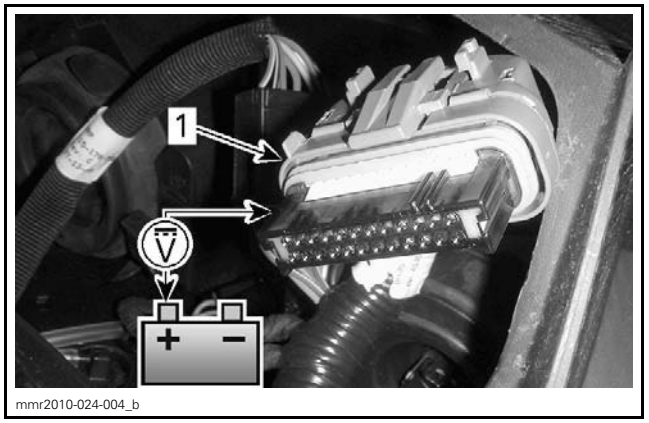
If voltage is not as specified, look for an open circuit.

Gauge Ground Circuit Test

1. Remove multifunction gauge.
2. Disconnect the gauge connector.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

4. Set the multimeter to Vdc.
5. Measure voltage to verify ground as per following table.



1. Gauge connector

TEST PROBES		VOLTAGE
Battery positive terminal	Gauge connector pin 11	Battery voltage

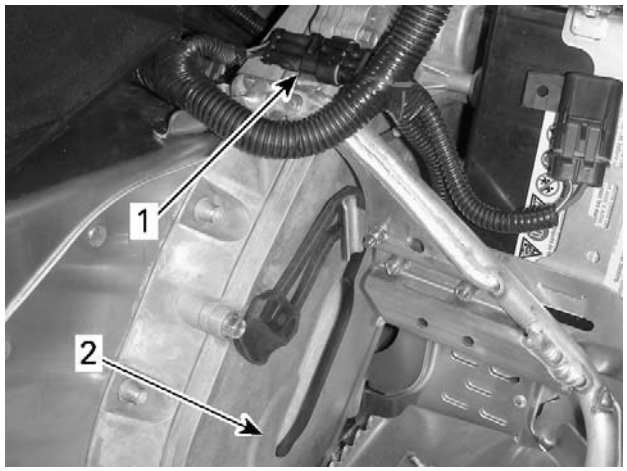
If ground and input voltage are good, try a new gauge.

If voltage is not as specified, look for an open circuit.

Gauge Speedometer Function Test

First ensure the gauge pointer is not stuck. Refer to *GAUGE TEST WITH B.U.D.S.* in this subsection.

1. Disconnect speed sensor connector.



TYPICAL
1. Speed sensor connector
2. Speed sensor (inside cover)

2. Provide power to the electrical system for testing. Refer to applicable *ELECTRICAL SYSTEM POWER SUPPLY FOR TESTING* in the *TROUBLESHOOTING* topic at the beginning of this subsection.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set multimeter to Vdc.
4. Probe connector on vehicle harness side as per applicable table.

GAUGE VOLTAGE TEST		
SPEED SENSOR CONNECTOR (VEHICLE HARNESS SIDE)		VOLTAGE
RD/BK	BK/RD	Close to battery voltage
GN/WH	BK/RD	Close to battery voltage

If test succeeded, gauge is good, proceed with *SPEED SENSOR SIGNAL TEST*.

If test failed, check wiring harness going to gauge. If wiring harness is good, replace gauge.

Gauge Reverse Beeper Function Test

Gauge Input Voltage Test

1. Disconnect DA connector from ECM.
2. Provide power to the electrical system for testing. Refer to applicable *ELECTRICAL SYSTEM POWER SUPPLY FOR TESTING* in the *TROUBLESHOOTING* topic at the beginning of this subsection.
3. Connect a fused jumper cable as per table.

JUMPER CABLE CONNECTION	
BATTERY SUPPLYING T-HARNESS	ECM DA CONNECTOR
Positive post (+)	Pin 2

TEST RESULT
Beeper and reverse indicator lamp must turn on

4. If test failed, replace gauge.

ECM Output Voltage Test

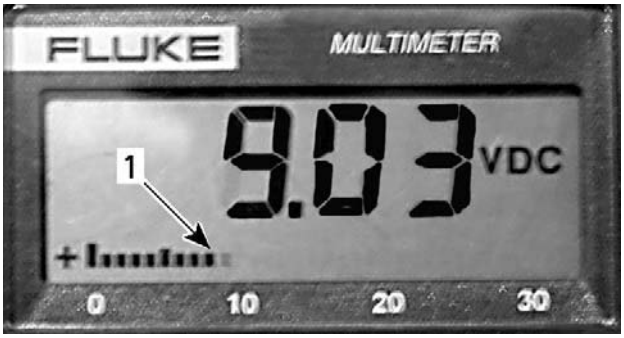
1. Start engine.
2. Press the RER button. Vehicle **must be** in reverse **before** disconnecting gauge connector.
3. Disconnect CV connector from gauge.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

4. Set multimeter to Vdc.
5. Probe connector on vehicle harness side as per table.

ECM OUTPUT VOLTAGE TEST		
CV CONNECTOR (VEHICLE HARNESS SIDE)	GROUND	VOLTAGE
Pin 1	Chassis ground	Continuously switching from approximately 10 Vdc to 0 Vdc

NOTE: Since a pulsating voltage is measured, the numeric display will continuously change. The analog display may be easier to follow.



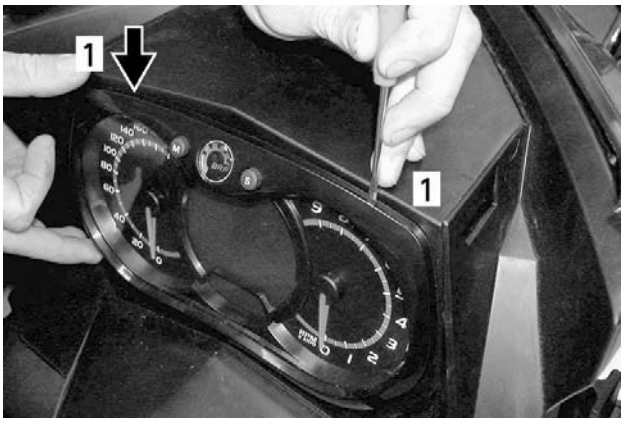
smr2005-056-010_a

TYPICAL
1. Analog display

6. If test failed, replace ECM.

Gauge Removal

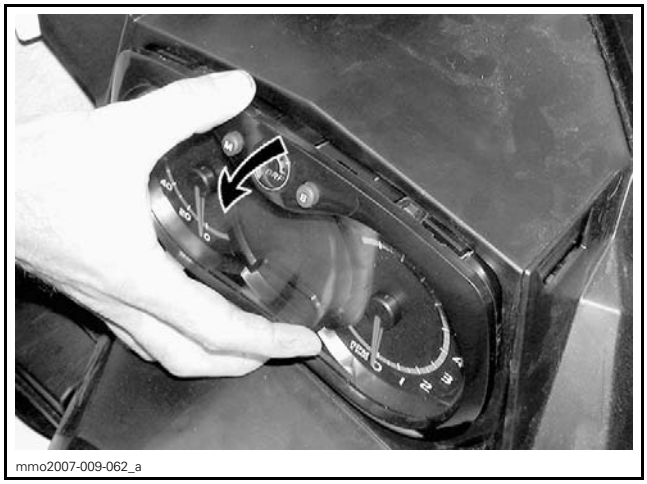
1. Insert a small screwdriver in one of the rectangular slots at top of gauge.
2. As you gently press down on the screwdriver to release multifunction gauge locking tab, pull out and hold gauge in position.
3. Insert screwdriver in second hole and press to release other tab.



mmo2007-009-061_a

TYPICAL
1. Locking tabs

4. Gently pull multifunction gauge from headlight/gauge module.


mmo2007-009-062_a

TYPICAL

5. Press on connector locking tab and pull connector off gauge.
6. Store gauge in a secure area to prevent it from being damaged.

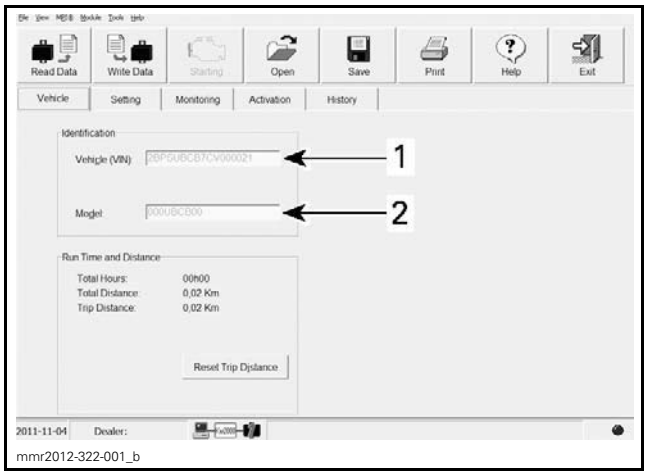
Gauge Installation

1. Carefully align and install gauge connector, pressing it in until connector lock engages.
2. Insert bottom of gauge in headlight/gauge module.
3. Press top of gauge towards headlight/gauge module until you feel locking tabs engage in support.
4. Start vehicle engine and test gauge functions.

If a new gauge is installed, carry out the *NEW GAUGE SET-UP*.

New Gauge Set-Up

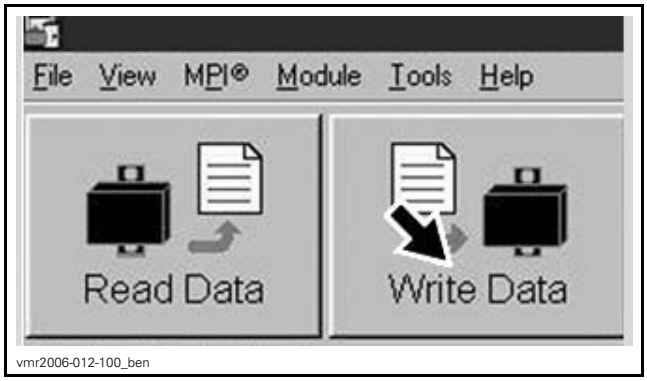
1. Connect vehicle to B.U.D.S., refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. In B.U.D.S., click:
   - **Read Data** button
   - **Vehicle** tab.
3. Enter the VIN and model in the appropriate boxes.



mmr2012-322-001_b

1. VIN (Vehicle Identification Number)
2. Model number

4. Set the desired units, refer to *CHANGING GAUGE UNITS OF MEASUREMENT* in this subsection if necessary.
5. Click on **Write Data** to save the new setting in the gauge.



vmr2006-012-100_ben

WRITE DATA

SPEED SENSOR

Speed Sensor Location

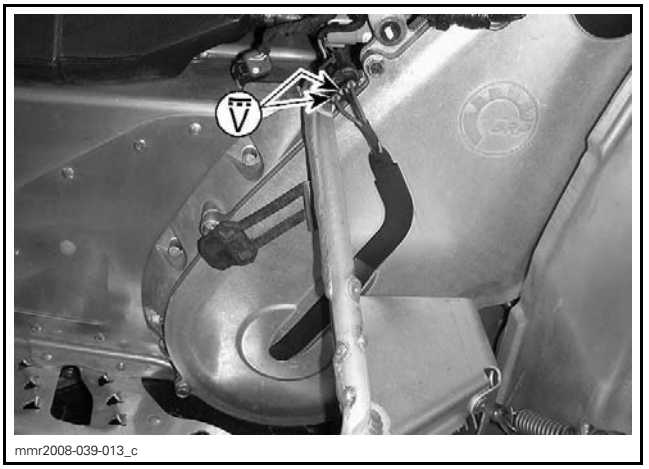
The speed sensor is mounted in the chaincase cover.

Speed Sensor Signal Test

First proceed with the *GAUGE SPEEDOMETER FUNCTION TEST* in this subsection.

1. Lift and support rear of vehicle.
2. Ensure speed sensor connector is properly connected.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. Back probe connector as per table.
5. Rotate driven pulley so that tracks rotates slowly.
6. Measure voltage while rotating driven pulley.

DRIVEN PULLEY SLOWLY ROTATED	TEST PROBES SPEED SENSOR CONNECTOR (NE)		VOLTAGE
	Pin 3 (GN wire)	Pin 2 (BK wire)	Continuously switching from approximately 9 Vdc to 0 Vdc

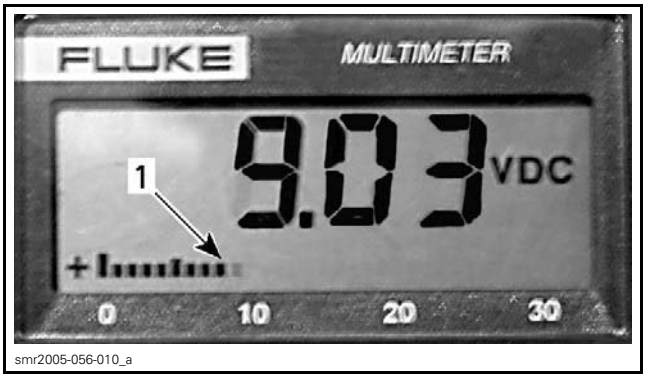


mmr2008-039-013_c

SENSOR SIGNAL VOLTAGE TEST

The signal voltage should alternate as per specification.

NOTE: Since a pulsating voltage is measured, the numeric display will continuously change. The analog display may be easier to follow.



smr2005-056-010_a

TYPICAL
1. Analog display

If voltage is as specified, repair or replace wiring and connectors between sensor and gauge.

If wiring and connectors are good, try a new gauge.

If signal voltage is not as specified, replace the speed sensor.

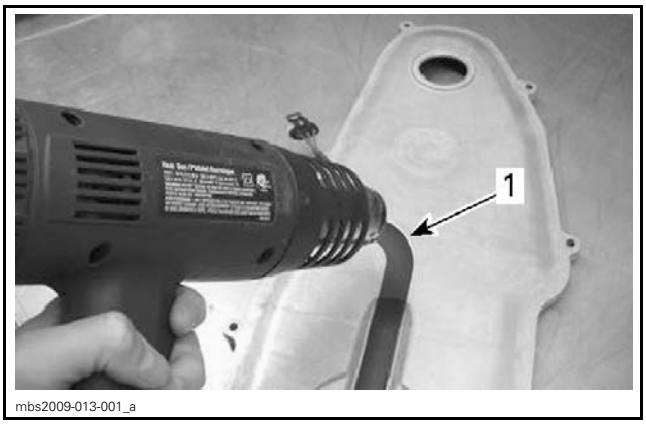
Speed Sensor Replacement

The sensor can be replaced with the chaincase cover as an assembly. In such a case, refer to *CHAINCASE* subsection.

To replace sensor only, proceed as follows.

Speed Sensor Removal

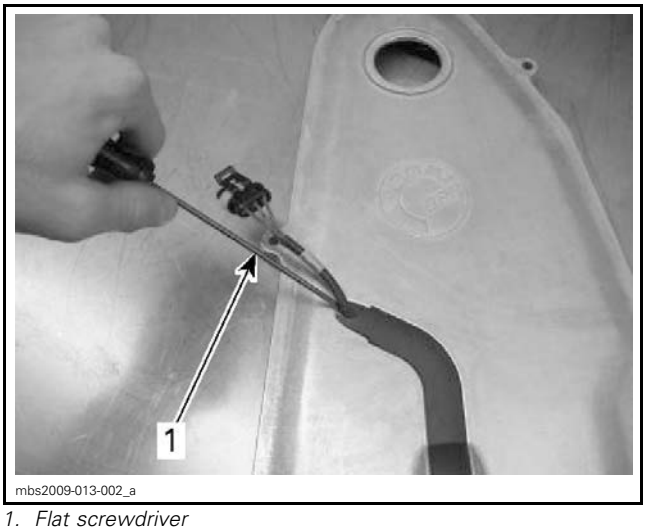
1. Remove chaincase cover, refer to *CHAINCASE* subsection.
2. Heat the speed sensor at wire end.



1. Speed sensor

NOTE: Material color will slightly change, which tells it is adequately heated.

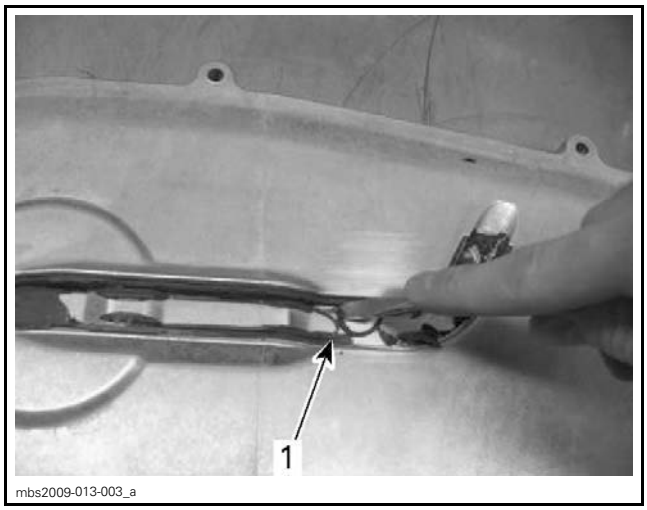
3. Use the flat screwdriver to peel off the end of the sensor from chaincase cover.



1. Flat screwdriver

NOTICE Use care when prying out the sensor not to damage the chaincase cover.

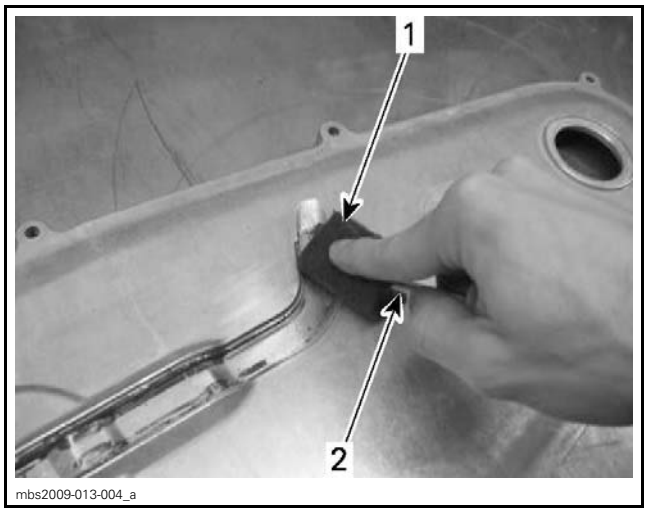
4. Heat the following section of the speed sensor.
5. Peel off the heated section using the flat screwdriver.
6. Repeat steps 4 and 5 until the speed sensor is completely removed.
7. Use the flat screwdriver to remove the remaining sealant from the chaincase cover.



1. Remaining sealant

NOTICE Do not apply excessive pressure when removing the remaining sealant not to damage the chaincase cover.

8. Rub the sealant using the scouring pad.



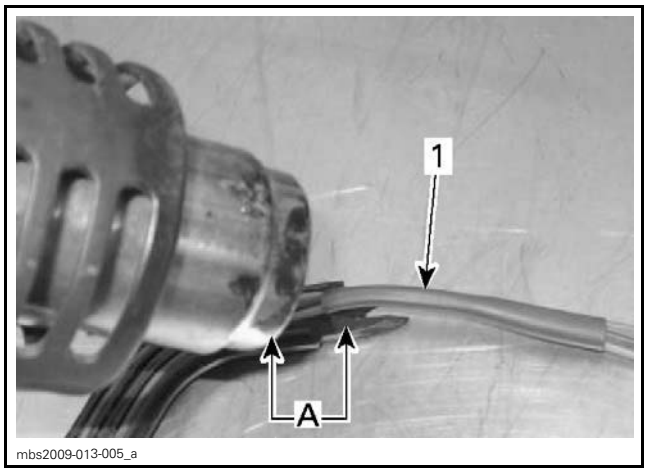
1. Scouring pad
2. Flat screwdriver

Speed Sensor Installation

1. Thoroughly clean the surface where the speed sensor is to be stuck.

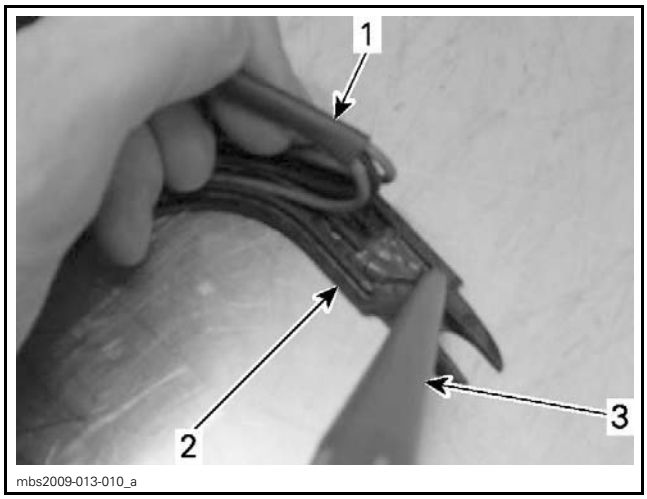
NOTE: Make sure surface is clean and free of grease.

2. Slide the shrink tubing into sensor plastic housing. The end of tubing must be inside sensor plastic housing about 15 mm (19/32 in).



1. Shrink tubing
A. 15 mm (19/32 in)

3. Apply LOCTITE 5900 (P/N 293 800 066) under the sensor wires, between the end of the guide grooves and the rubber sheath extremity.

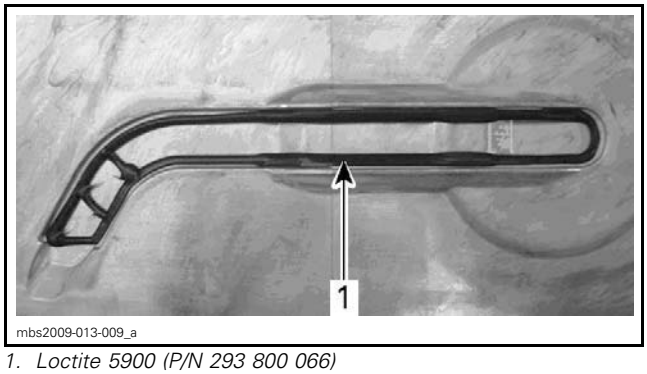


1. Sensor wires
2. Rubber sheath extremity
3. Loctite 5900 (P/N 293 800 066) bottle tip

NOTE: The assembly must be watertight.

4. Apply LOCTITE 5900 (P/N 293 800 066) all around the sensor location on the chaincase cover.

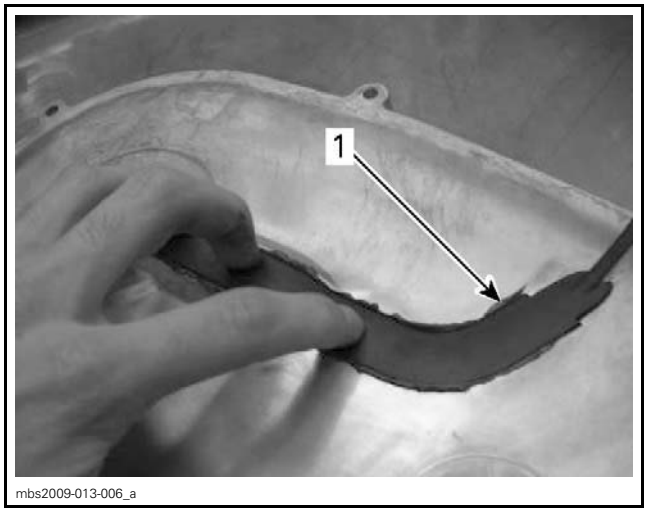
Follow the pattern shown on the next picture.



1. Loctite 5900 (P/N 293 800 066)

NOTE: Make sure the sensor circumference is well covered.

5. Place the sensor in position and firmly push in order to evacuate all the surplus sealant. Keep pressure for at least 1 minute.

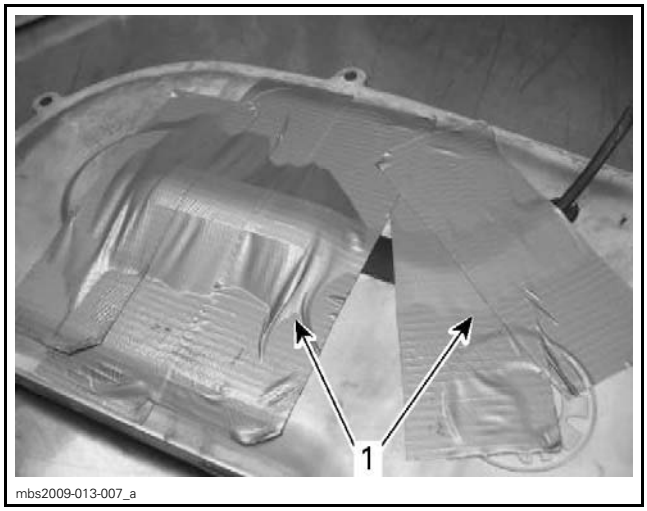


1. Surplus sealant

6. Wipe off all the sealant surplus around the sensor.
7. Once cleaned up, inspect all the circumference for sealant lacks.

NOTE: Sealant must be visible all around.

8. Place some adhesive tape on the sensor to maintain a pressure on the sensor for at least 24 hours.



1. Adhesive tape

NOTE: Wait for at least 1 hour before exposing vehicle to cold temperature.

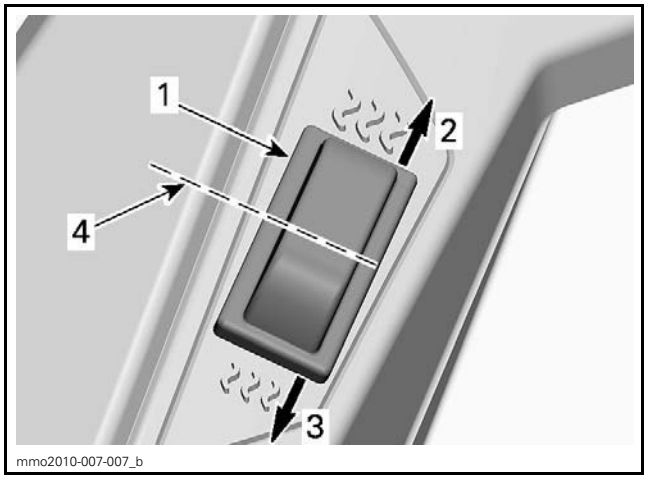
9. Reinstall chaincase cover, refer to *CHAINCASE* subsection.

HEATED THROTTLE LEVER

System Description

Models without a Multifunction Switch

The heated throttle lever is controlled along with the heated grips by a toggle switch mounted on the headlight/gauge module.



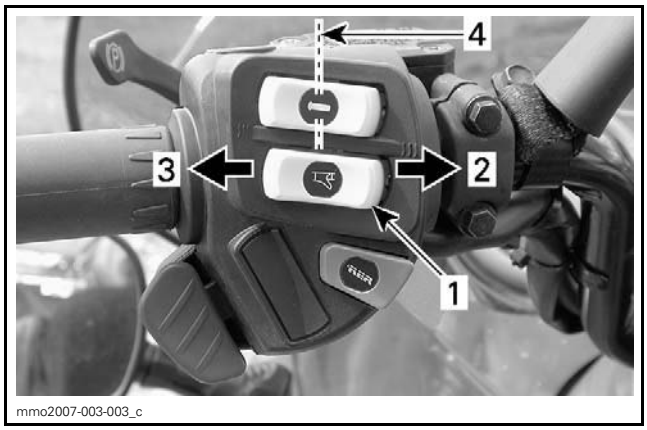
mmo2010-007-007_b

1. Heated grips and throttle lever switch
2. High
3. Low
4. Heat OFF (center position)

NOTE: The switch controls both the heated throttle lever and the heated grips.

Models with a Multifunction Switch

The heated throttle lever is controlled by a toggle switch on the LH multifunction switch assembly.

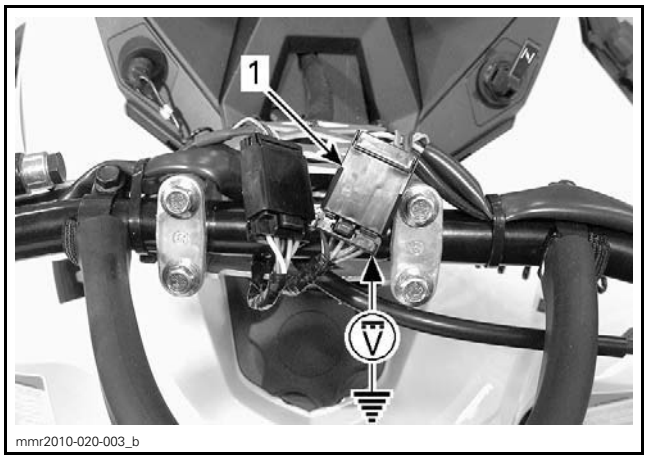


mmo2007-003-003_c

1. Throttle lever heat switch
2. High
3. Low
4. Heat OFF (center position)

Throttle Lever Heating Element Input Voltage Test

1. Remove steering cover.
2. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
3. Back-probe steering connector (GD) and measure voltage as per following table.



mmr2010-020-003_b

1. GD connector

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

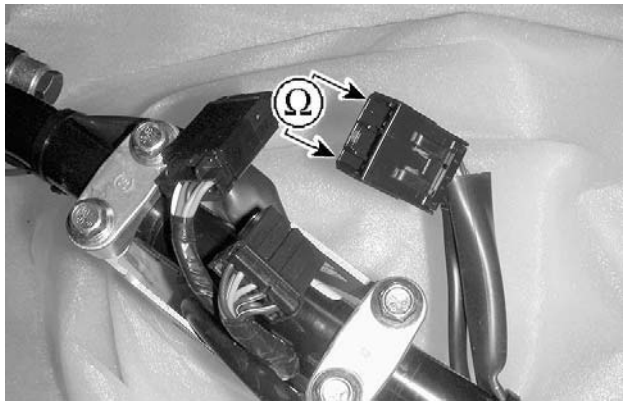
SWITCH POSITION	TEST PROBES		VOLTAGE
LOW	GD connector pin 2 (BR/YL wire)	Chassis ground	Battery voltage
HIGH	GD connector pin 1 (BR wire)	Chassis ground	

If voltage is as specified, carry out *THROTTLE LEVER HEATING ELEMENT RESISTANCE TEST*.

If voltage is not as specified, test switch input voltage, refer to *HEATED THROTTLE LEVER AND GRIPS SWITCH*.

Throttle Lever Heating Element Resistance Test

1. Remove steering cover.
2. Disconnect the RH steering connector GD.
3. Measure resistance as per following table.



mmr2010-020-005_a

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

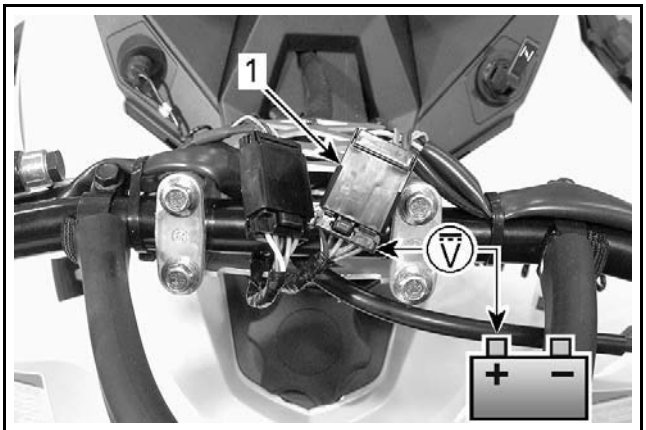
INTENSITY	TEST PROBES GD CONNECTOR		RESISTANCE @ 20°C (68°F)
LOW	Pin 2 (BR/YL wire)	Pin 3 (YL/BK wire)	5.7 to 18.5 Ω
HIGH	Pin 1 (BR wire)	Pin 3 (YL/BK wire)	1.7 to 4.2 Ω

If resistance is as specified, carry out the *HEATED THROTTLE LEVER GROUND CIRCUIT TEST*.

If resistance is not as specified, replace throttle lever.

Heated Throttle Lever Ground Circuit Test

1. Remove steering cover.
2. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
3. Back-probe steering connector (GD) and measure voltage to check ground condition as per following table.



mmr2010-020-003_c

1. GD connector

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

TEST PROBES		VOLTAGE
Battery positive terminal	GD connector pin 3 (YL/BK wire)	Battery voltage

If voltage is not as specified, look for an open circuit.

Throttle Lever Heating Element Replacement

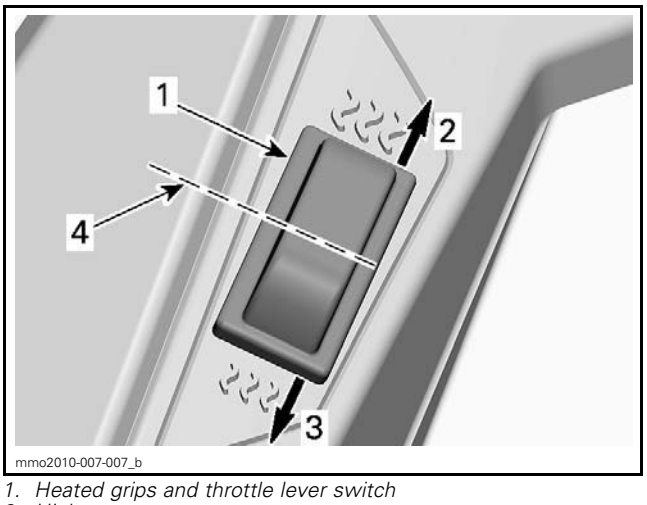
Heating element has to be replaced along with the throttle lever, refer to *STEERING SYSTEM* subsection.

HEATED GRIPS

System Description

Models without a Multifunction Switch

The heated grips are controlled along with heated throttle lever the by a toggle switch mounted on the headlight/gauge module.



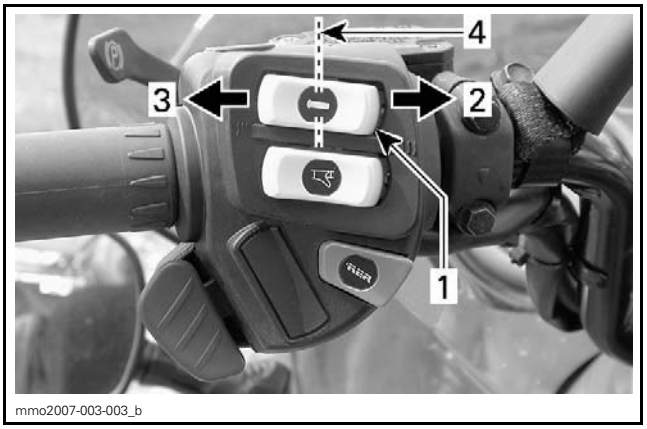
mmo2010-007-007_b

1. Heated grips and throttle lever switch
2. High
3. Low
4. Heat OFF (center position)

NOTE: The switch controls both the heated throttle lever and the heated grips.

Models without a Multifunction Switch

The heated grips are controlled by a toggle switch on the LH multifunction switch assembly.



mmo2007-003-003_b

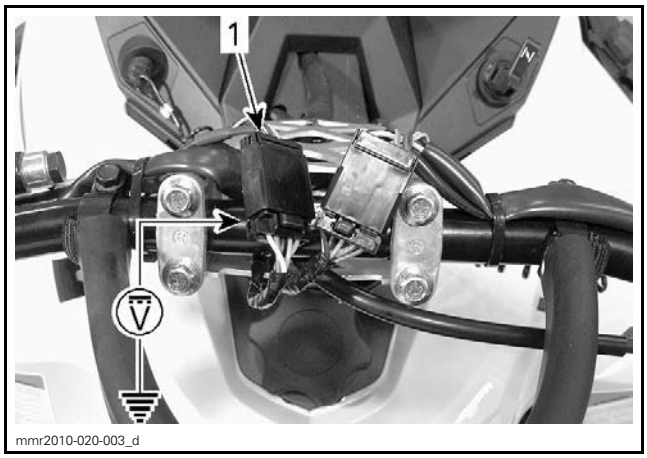
1. Grip heat control switch
2. High
3. Low
4. Heat OFF (center position)

Grip Heating Element Input Voltage Test

1. Remove steering cover.

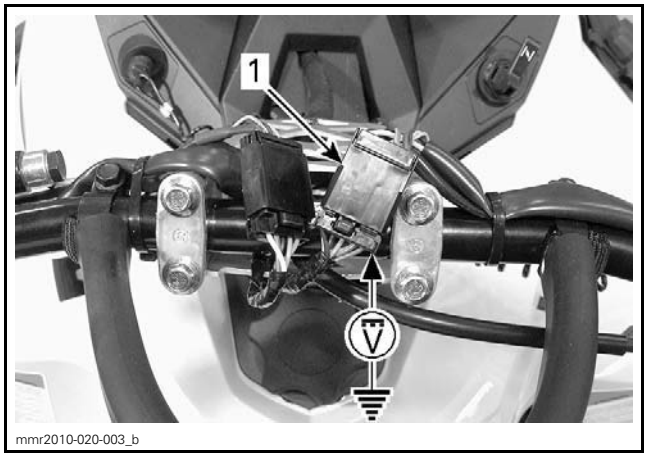
REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set the multimeter to Vdc.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. Back probe steering connector and measure voltage as per following tables.



mmr2010-020-003_d

1. GG connector



mmr2010-020-003_b

1. GD connector

SWITCH POSITION	TEST PROBES GG CONNECTOR		VOLTAGE
LH GRIP			
LOW	Pin 2 (OR/VI wire)	Chassis ground	Battery voltage
HIGH	Pin 1 (OR wire)	Chassis ground	

SWITCH POSITION	TEST PROBES GD CONNECTOR		VOLTAGE
RH GRIP			
LOW	Pin 5 (OR/VI wire)	Chassis ground	Battery voltage
HIGH	Pin 6 (OR wire)	Chassis ground	

If voltage is as specified, carry out *GRIP HEATING ELEMENT RESISTANCE TEST*.

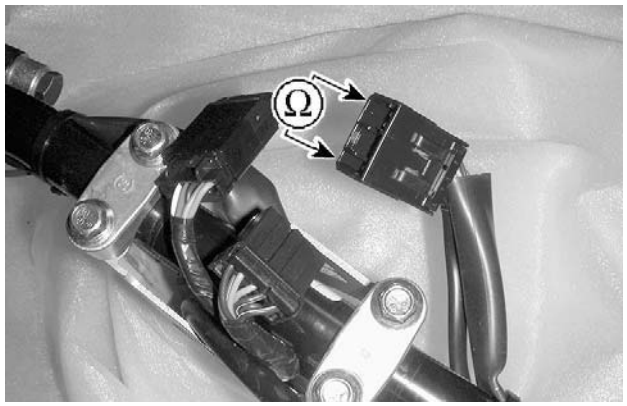
If voltage is not as specified, test switch input voltage, refer to *HEATED THROTTLE LEVER AND GRIPS SWITCH*.

Grip Heating Element Resistance Test

1. Remove steering cover.
2. Disconnect steering connector GD or GG depending on what side of the handlebar the heated grip is inoperative.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

3. Set the multimeter to "Ω".
4. Measure resistance as per following table.



GD CONNECTOR SHOWN

INTENSITY	TEST PROBES GG CONNECTOR		RESISTANCE @ 20°C (68°F)
LH HEATING ELEMENT			
LOW	Pin 2 (OR/VI wire)	Pin 3 (BK wire)	17 to 21 Ω
HIGH	Pin 1 (OR wire)	Pin 3 (BK wire)	8.5 to 10.5 Ω

INTENSITY	TEST PROBES GD CONNECTOR		RESISTANCE @ 20°C (68°F)
RH HEATING ELEMENT			
LOW	Pin 5 (OR/VI wire)	Pin 4 (BK wire)	17 to 21 Ω
HIGH	Pin 6 (OR wire)	Pin 4 (BK wire)	8.5 to 10.5 Ω

If resistance is as specified, carry out the *HEATED GRIP GROUND CIRCUIT TEST*.

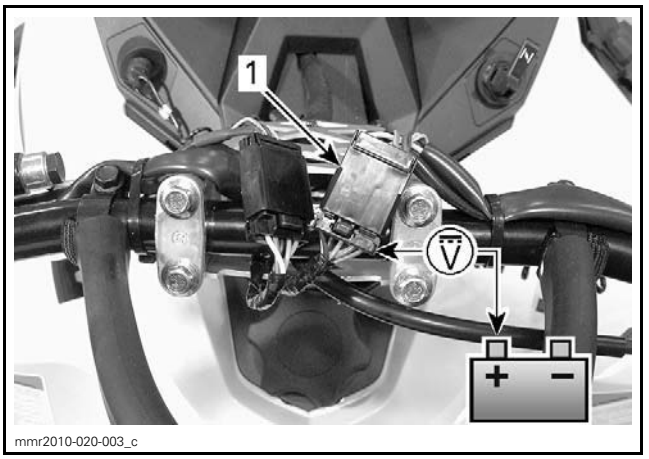
If resistance is not as specified, replace heating element.

Heated Grip Ground Circuit Test

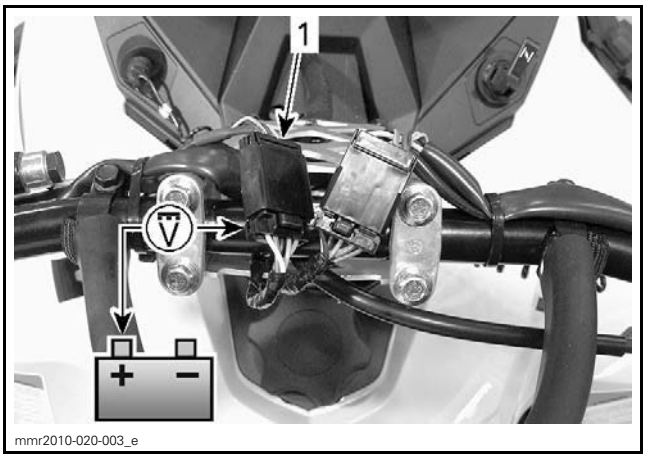
1. Remove steering cover.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

2. Set the multimeter to Vdc.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. Measure voltage on steering connector GD or GG depending on what side of the handlebar the heated grip is inoperative to check ground condition.



1. GD connector



1. GG connector

NOTE: Use GD connector to test RH heating element and GG to test on LH side.

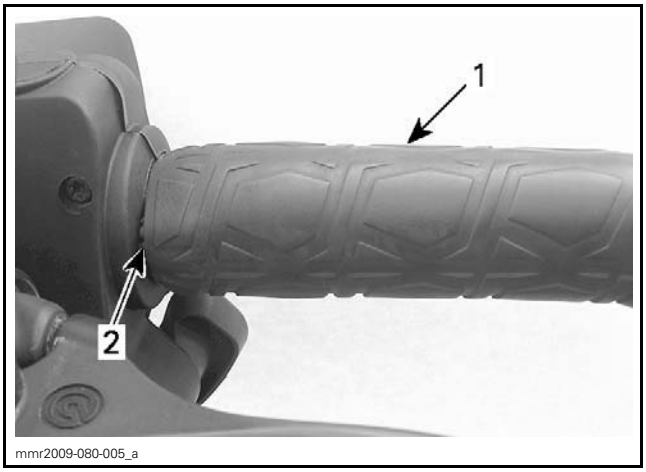
TEST PROBES GG CONNECTOR		VOLTAGE
Battery positive terminal	Pin 3 (BK wire)	Battery voltage

TEST PROBES GD CONNECTOR		VOLTAGE
Battery positive terminal	Pin 4 (BK wire)	Battery voltage

If voltage is not as specified, look for an open circuit.

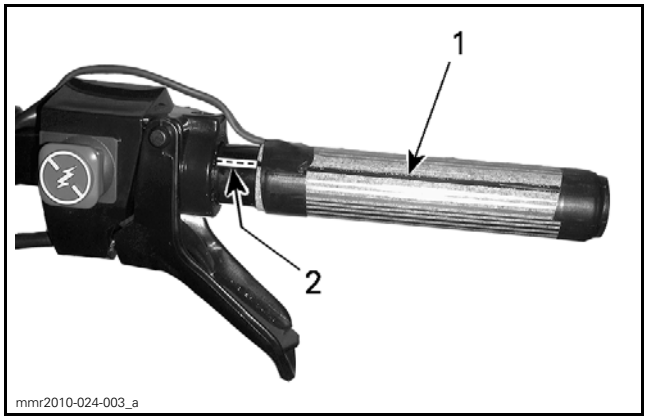
Heated Grip Element Removal

NOTICE Heater wire routing may vary significantly due to different type handlebars and vehicles. Its highly important to take note of exact positioning of grip heaters, locking ties, and wire routing before removing them from the handlebars. Failure to properly route wires may lead to equipment damage or failure.



TYPICAL - LH SIDE
1. *Hand grip with adhesive film heater*
2. *Heater wire*

1. Remove the following items, refer to *STEERING SYSTEM* subsection for details.
   - Steering cover
   - Rubber hand grip
   - Multifunction switch cover (REV-XP 550F, Tundra Sport and Tundra LT).
2. If cork insulator is to be replaced, mark the handlebar at the original cork insulator joint location. This will ensure proper wire position at installation.



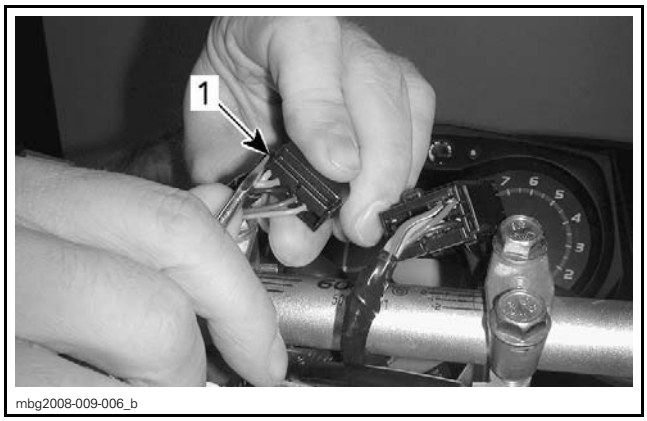
1. *Cork insulator joint*
2. *Mark*

3. Disconnect the applicable steering connector (GG or GD).



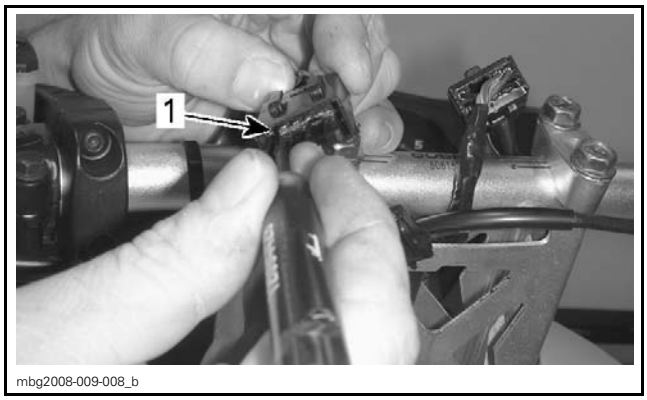
TYPICAL - STEERING CONNECTORS

4. Open the cover on the back of connector housing using a small screwdriver or a suitable tool.



TYPICAL
1. *Connector housing cover locks (one each side)*

5. Using an appropriate tool such as the MULTILOCK - TERMINAL EXTRACTION TOOL (P/N 755430-2), unlock the heater wire terminals and pull them out of the connector housing.



TYPICAL - UNLOCKING CONNECTOR PIN (FRONT SIDE)
1. Pin removal tool inserted above pin

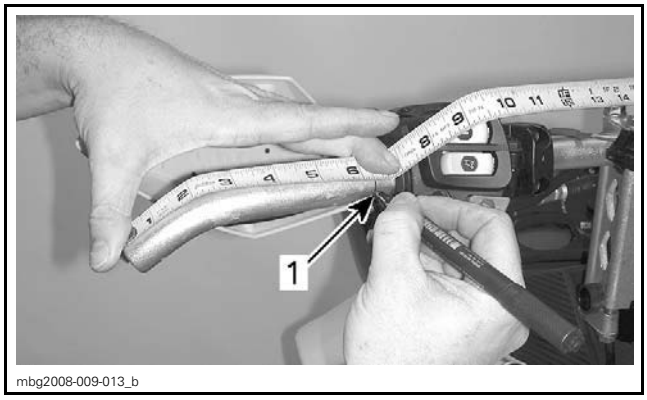
NOTE: Terminals are unlocked and pushed out from the front (pin side) of the connector housing.

NOTICE **Be sure to take note of exact positioning of grip heaters, locking ties, and wire routing before removing them from the handlebars.**

6. Cut locking ties securing heater wires to handlebars.
7. Pull wires from harness protective sheath, multifunction switch housing (if applicable) or throttle lever housing.
8. Cut and remove black electrical tape from heater element and remove heater from cork insulator.
9. If damaged, remove cork insulator from handlebar and clean all adhesive residue from the handlebar.

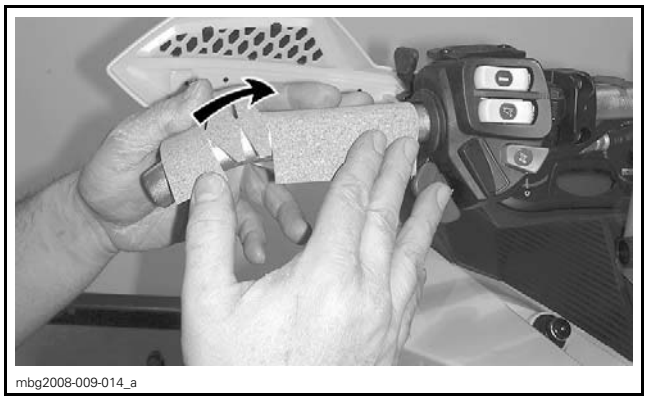
Heated Grip Element Installation

1. Measure 153 mm (6.02 in) from the end of the handlebar, and across the top of the bend in the bar. Trace a reference line with a marker at that point on the handlebar.



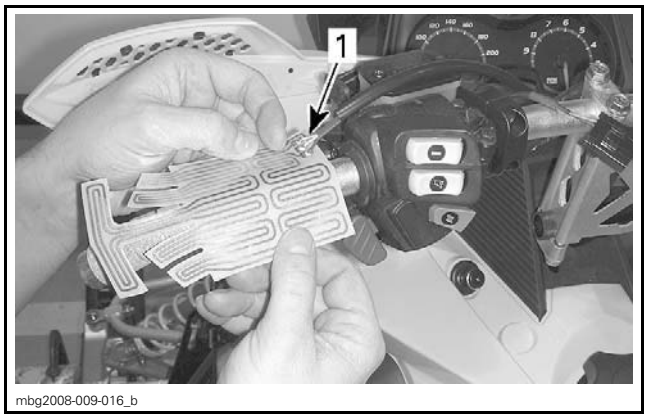
TYPICAL — MEASURING FOR HEATER POSITION
1. Trace reference line

2. Align the edge of the cork insulator with the reference line centered with the handlebar folding axis as illustrated.



TYPICAL — CORK INSULATOR ALIGNMENT

3. Apply firm pressure to cork insulator to assure proper adherence to handlebar.
4. Align the film heater element with the cork insulator and center of handlebar folding axis as illustrated.
5. Align heating element end flush to the end of the cork insulator (on wire side).

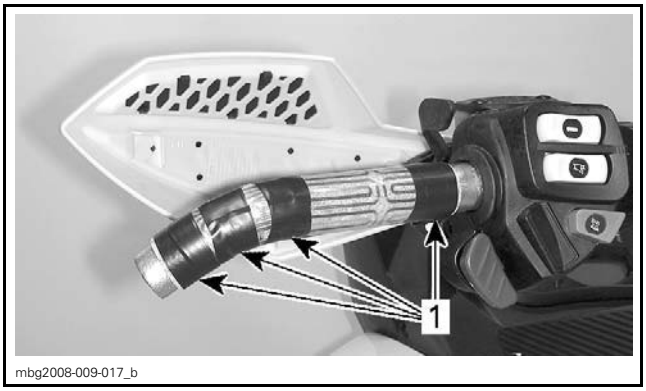


TYPICAL — HEATER ALIGNMENT
1. Heater wire position (LH front, RH rear) — Align element over insulator end

6. Apply firm pressure to heater to assure proper adherence to cork insulator.

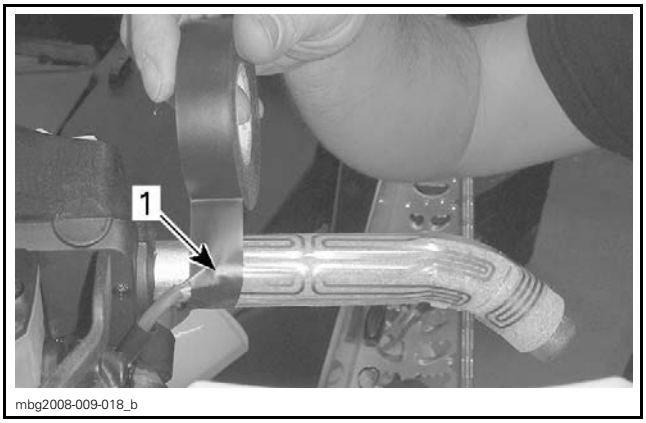
NOTE: The same heater element is used for both the LH and RH sides. Therefore, the electrical wiring will be in front of the handlebar on the LH side, and behind the handlebar (towards driver) on the RH side.

7. Apply two turns of black electrical tape at each of the four locations illustrated so that it covers the edges of the heater element and insulator to prevent snagging and damage to the element during rubber grip installation. Also ensure to cover the weld area.



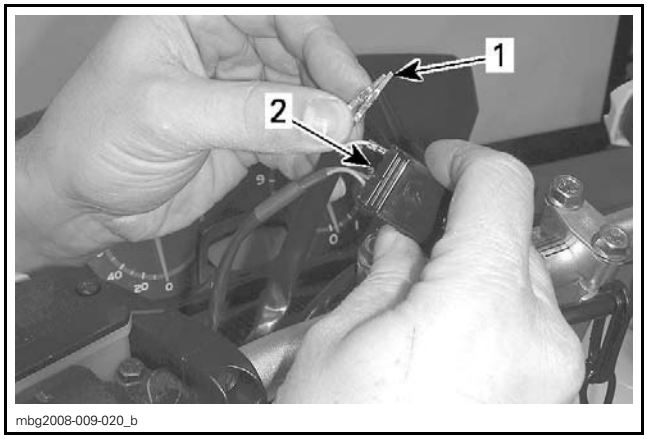
TYPICAL
1. Electrical tape application (4x)

NOTE: It is highly important to apply tape so that it fully secures the electrical wire connections. This will ease installation of the rubber hand grip and prevent undue stress to the connections.



TYPICAL — IMPORTANT
1. Tape application over wire connections

8. Install rubber hand grip, refer to *STEERING SYSTEM* subsection for detail.
9. Route wiring as noted during the removal procedure.
10. Insert wire connectors in steering connector housing.

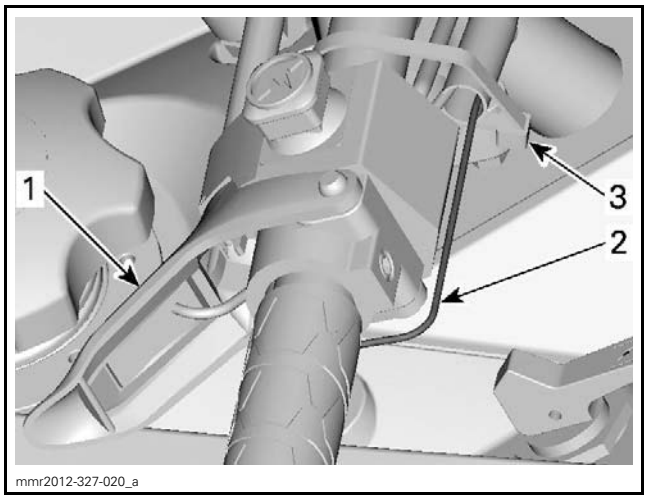


TYPICAL
1. Heater wire terminals
2. Insertion through back of connector

11. Route element wire toward front of vehicle and away from throttle lever as shown.
12. Install locking ties to secure the heater wire tightly against the handlebar.

⚠ WARNING

To ensure RH heater wires does not prevent smooth operation of throttle lever, it must be properly routed without any slack, and secured with a locking tie immediately after the lever housing.



1. Throttle lever
2. Element wire
3. Locking tie

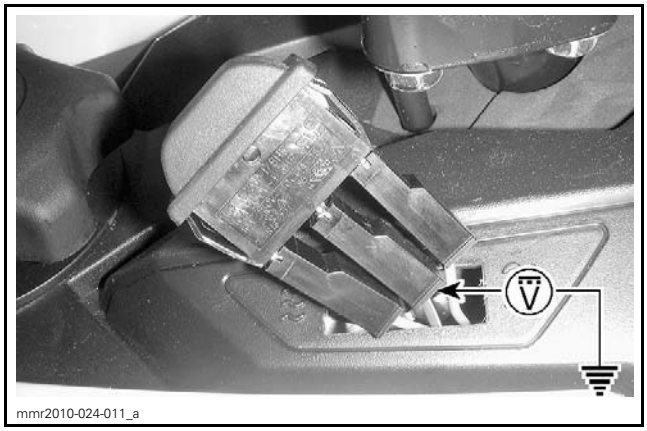
NOTICE **Ensure LH heater wires are properly routed through multifunction switch housing to prevent them from being pinched when installing housing cover. Pinched or damaged wires may result in a short circuit.**

13. Test both heated grip operation.

HEATED THROTTLE LEVER AND GRIPS SWITCH (NO MULTIFUNCTION SWITCH)

Heated Throttle Lever and Grips Switch Voltage Input Test

1. Lift headlight/gauge module. Refer to *BODY* subsection.
2. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
3. Measure voltage as per following table.



SWITCH INPUT

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

TEST PROBES		VOLTAGE
Heater elements switch pin B (RD/YL wire)	Chassis ground	Battery voltage

If voltage is as specified, carry out the *HEATED THROTTLE LEVER AND GRIPS SWITCH VOLTAGE OUTPUT TEST*.

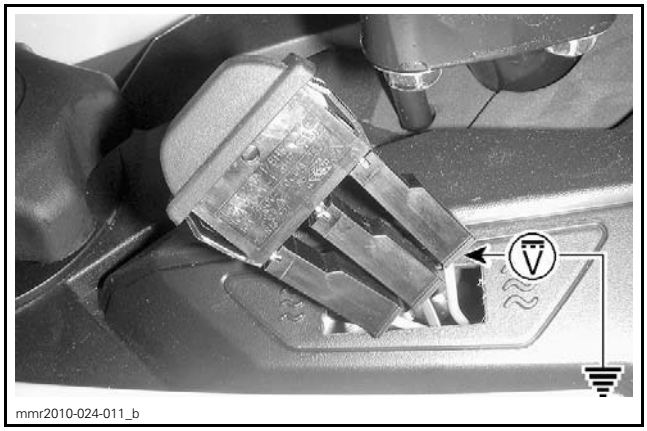
If voltage is not as specified, look for an open circuit on switch supply.

Heated Throttle Lever and Grips Switch Voltage Output Test

1. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
2. Measure voltage as per following table.

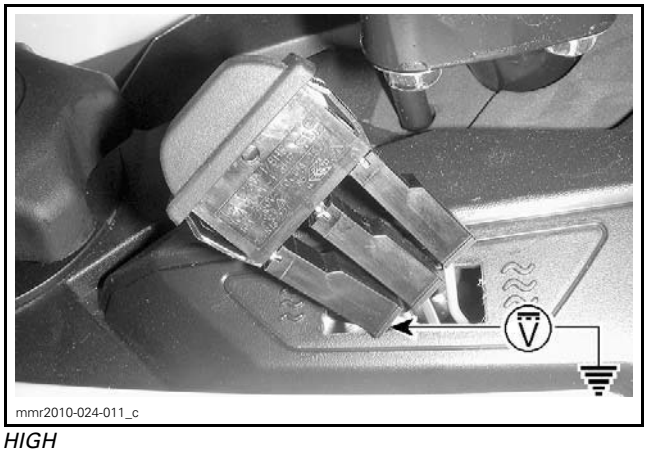
REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

INTENSITY	TEST PROBES HEATER ELEMENTS SWITCH CONNECTOR		VOLTAGE
LOW	Pin C (OR/VI wire)	Chassis ground	Battery voltage



LOW

INTENSITY	TEST PROBES HEATER ELEMENTS SWITCH CONNECTOR		VOLTAGE
HIGH	Pin A (OR wire)	Chassis ground	Battery voltage



HIGH

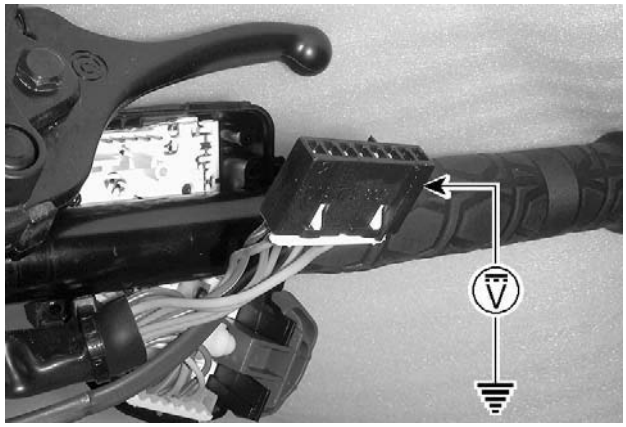
If voltage is as specified, look for an open circuit between switch and steering connector.

If voltage is not as specified, replace switch.

HEATED THROTTLE LEVER AND GRIPS SWITCHES (WITH MULTIFUNCTION SWITCH)

Heated Throttle Lever and Grips Switches Voltage Input Test

1. Remove multifunction switch cover, refer to *STEERING* subsection.
2. Disconnect multifunction switch connector LA1.
3. Apply electrical power to the accessories for testing. Refer to *TROUBLESHOOTING* in this subsection for procedure.
4. Measure voltage as per following table.



mmr2010-024-008_a

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

NOTE: Pins numbers are stamped underneath the connector.

TEST PROBES		VOLTAGE
Multifunction switch connector LA1 Pin A (RD/YL wire)	Chassis ground	Battery voltage

If voltage is as specified, possible causes are a defective switch or an open circuit between switch and applicable steering connector (GG or GD).

If voltage is not as specified, look for an open circuit on switch supply.

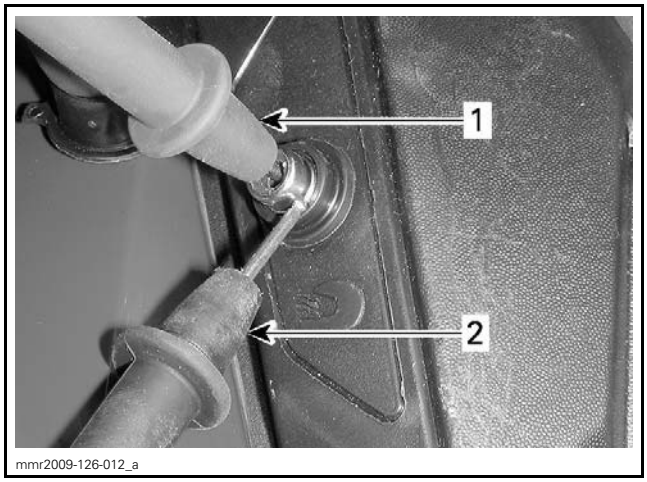
VISOR OUTLET

Visor Outlet Quick Test

1. Measure voltage in visor outlet.
   1.1 Put multimeter RED probe in the outlet female terminal and hold.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

   1.2 Touch the metal outer surface of the outlet with the BLACK multimeter probe.



mmr2009-126-012_a

1. RED probe
2. BLACK probe

TEST PROBES VISOR OUTLET		VOLTAGE
Female terminal	Metallic outer surface	Battery voltage

If voltage is not as specified, measure voltage and ground separately and look for an open circuit on the related wiring. Replace visor outlet or repair open circuit.

Visor Outlet Removal

1. Lift the console, refer to *BODY* subsection.
2. Disconnect the visor connector.
3. Unscrew visor outlet.

Visor Outlet Installation

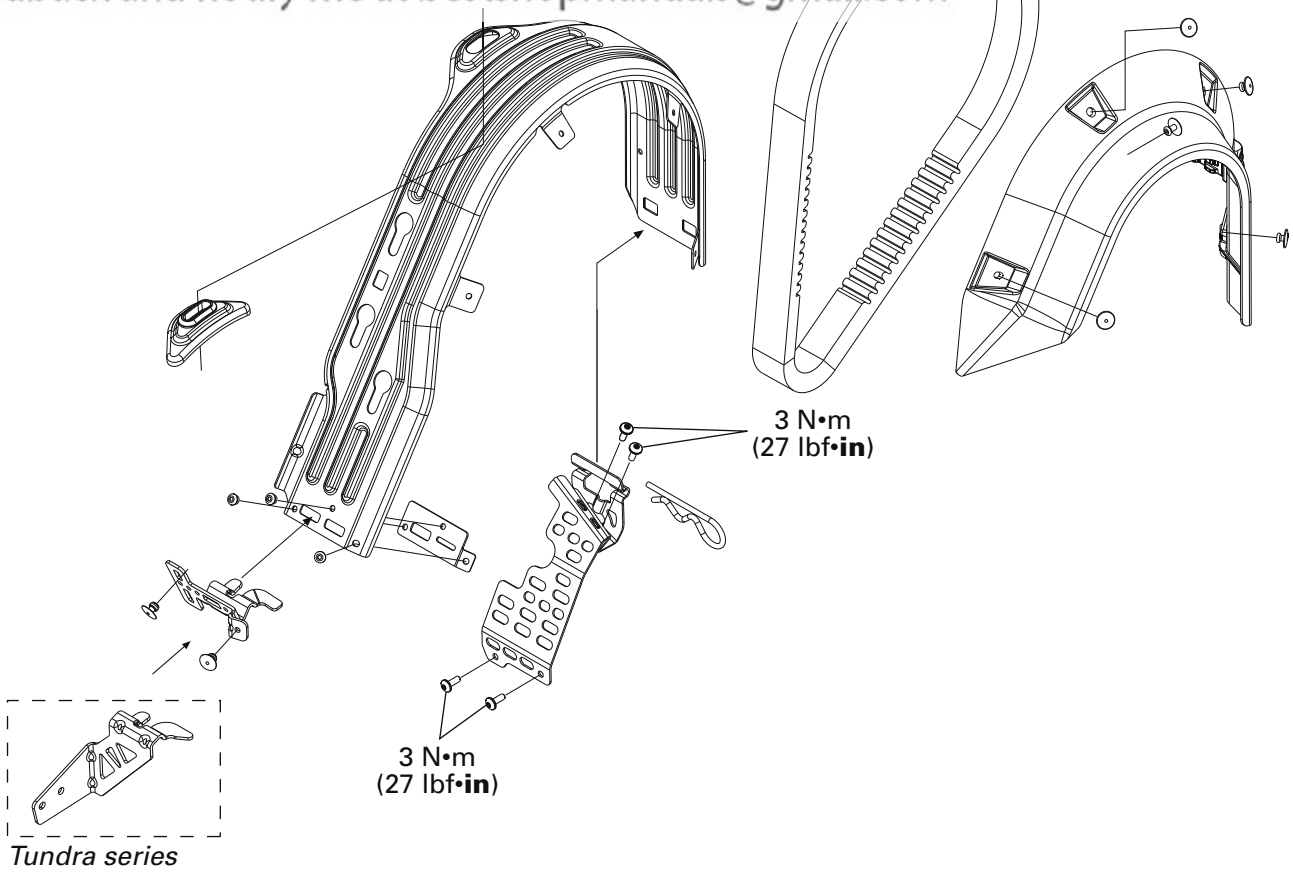
The installation is the reverse of the removal procedure, refer to *BODY* subsection for console installation.

DRIVE BELT

SERVICE TOOLS

Description	Part Number	Page
DRIVEN PULLEY OPENING TOOL	529 017 200	227

Midwest Manuals
Green-Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



mmr2012-328-100_a

GENERAL

DRIVE BELT APPLICATION

Always use the drive belt specified in the BRP *PARTS CATALOG* as applicable to vehicle and engine model.

TROUBLESHOOTING

VEHICLE CREEPS FORWARD AT IDLE

1. Improper drive belt height (too high).
   - *Refer to DRIVE BELT HEIGHT ADJUSTMENT procedure in this subsection.*

ENGINE STALLS WHEN ENGAGING RER

1. Improper drive belt height (too high).
   - *Refer to DRIVE BELT HEIGHT ADJUSTMENT procedure in this subsection.*

PROCEDURES

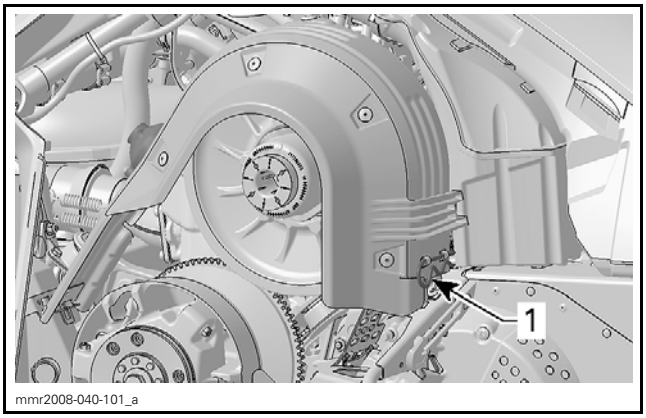
DRIVE BELT GUARD

NOTE: The drive belt guard is purposely made slightly oversize to maintain tension on its pins and retainers preventing undue noise and vibration.

Drive Belt Guard Removal

Open the LH side panel.

Remove retaining pin.



TYPICAL
1. Retaining pin

Lift rear portion of guard then release from front tabs by pivoting the guard outwards.

Drive Belt Guard Installation

Place the front LH slot of the guard over the longest tab.

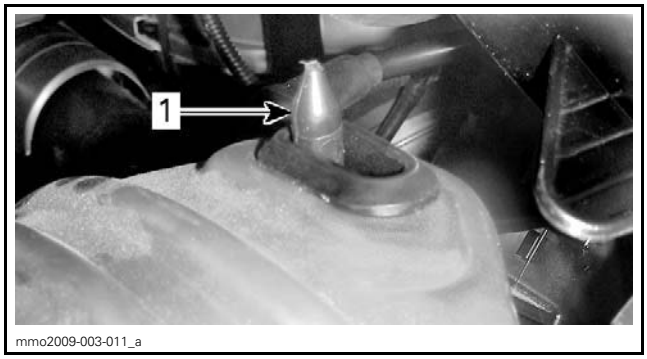
Pivot the guard inward to engage the shortest tab in the RH slot.



TYPICAL
1. Tabs

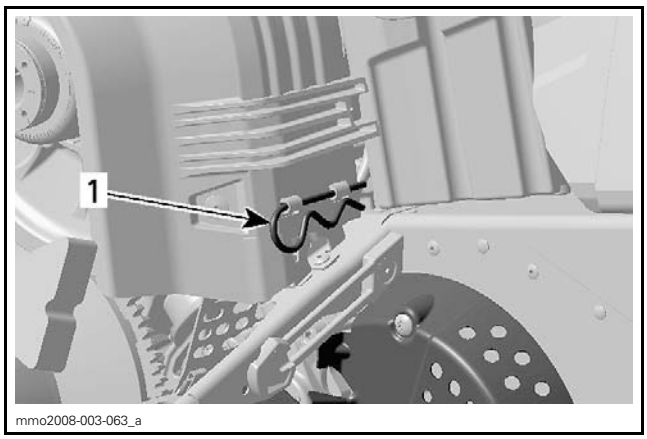
Position the grommet over the retaining rod.

NOTE: It may be necessary to slightly lift the console to make room.



TYPICAL
1. Retaining rod

Position rear portion of the drive belt guard over the retainer and secure it using the retaining pin.



TYPICAL
1. Retaining pin

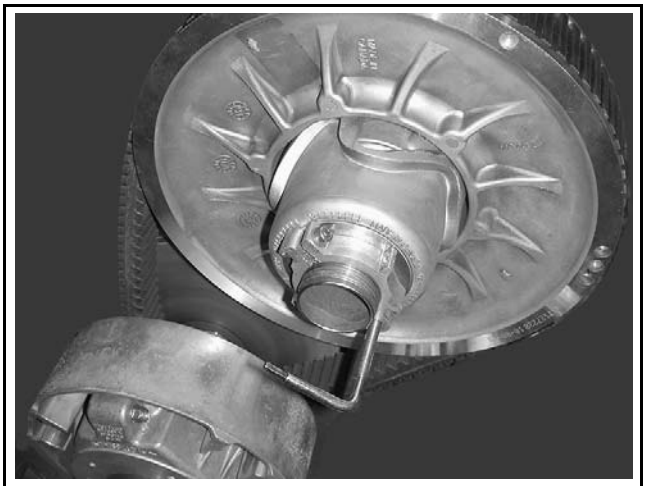
DRIVE BELT

Drive Belt Removal

1. Remove the drive belt guard.
2. Open the driven pulley by screwing the driven pulley opening tool in the threaded hole on the adjuster hub.

REQUIRED TOOL	
DRIVEN PULLEY OPENING TOOL (P/N 529 017 200)	

NOTE: A pulley expander is also provided in the vehicle tool box.


mmo2012-005-980

TYPICAL – PULLEY EXPANDER INSTALLED ON ADJUSTER HUB

3. To remove belt, slip the belt over the top of driven pulley, then over the drive pulley.

Drive Belt Inspection

Inspect belt for:
– Cracks
– Fraying
– 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
– Scratched or rusty sheave
– Oil on belt
– Distorted spare belt.

Check drive belt width. Replace the drive belt if its width is under minimum recommended specification.

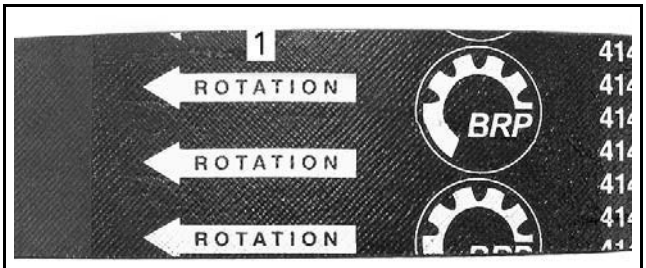
DRIVE BELT WIDTH	
NEW	35.3 MM (1.39 IN)
SERVICE LIMIT	32.90 MM (1.295 IN)

Drive Belt Installation

1. Insert drive belt in the opened drive pulley, then pull it over the driven pulley.

NOTICE **Do not force or use tools to pry the drive belt into place, as this could cut or break the cords in the belt.**

NOTE: The maximum drive belt life span is obtained when the belt is installed with the arrows on the belt pointing in the direction of rotation.



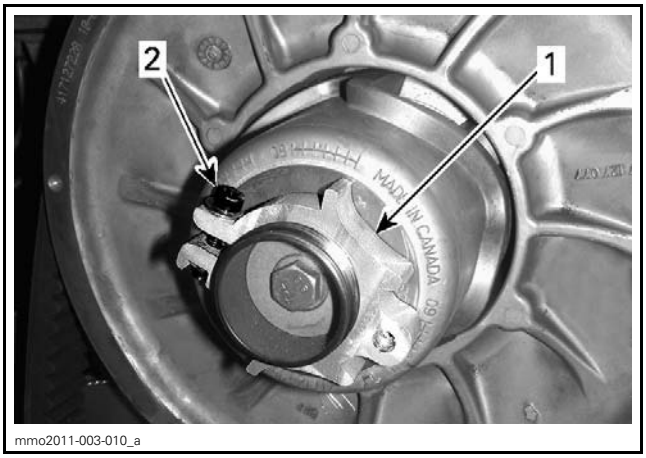
mmo2011-002-006_a

1. To be pointed in the direction of rotation

2. Unscrew and remove the driven pulley opening tool from the pulley.
3. Rotate the driven pulley several times to properly set the drive belt between the sheaves.
4. Adjust the drive belt height. Refer to *DRIVE BELT HEIGHT ADJUSTMENT* procedure.

Drive Belt Height Adjustment

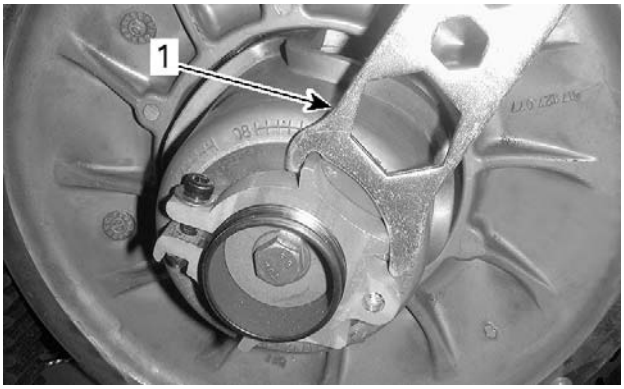
1. Loosen the clamping screw.



mmo2011-003-010_a

TYPICAL
1. Adjuster hub
2. Clamping screw

2. Using the suspension adjustment tool provided in the tool kit, turn the ring 1/4 turn at a time then rotate the driven pulley to properly set the drive belt between the pulley sheaves.



TYPICAL
1. Suspension adjustment tool

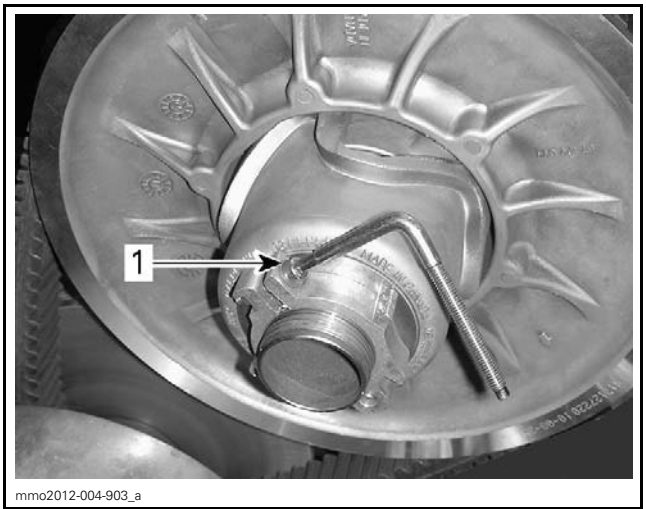
NOTE: The adjustment ring has **left hand treads**.

Repeat step 4 until the external surface of drive belt is even with the driven pulley edge.

NOTE: Turning the ring counterclockwise lowers the drive belt in the pulley. Turning the ring clockwise raises the drive belt in the pulley.

3. Tighten the adjustment ring clamping screw.

TIGHTENING TORQUE	
Adjustment ring clamping screw	5.5 N•m ± 0.5 N•m (49 lbf•**in** ± 4 lbf•**in**)



TYPICAL
1. Clamping screw

4. Install drive belt guard.
5. Install side panel.
6. Start engine and check if vehicle creeps.
   6.1 If vehicle does not creep, adjustment is complete.
   6.2 If the vehicle creeps, lower the drive belt height from the initial setting. Repeat procedure until creeping stops.

DRIVE PULLEY (eDRIVE)

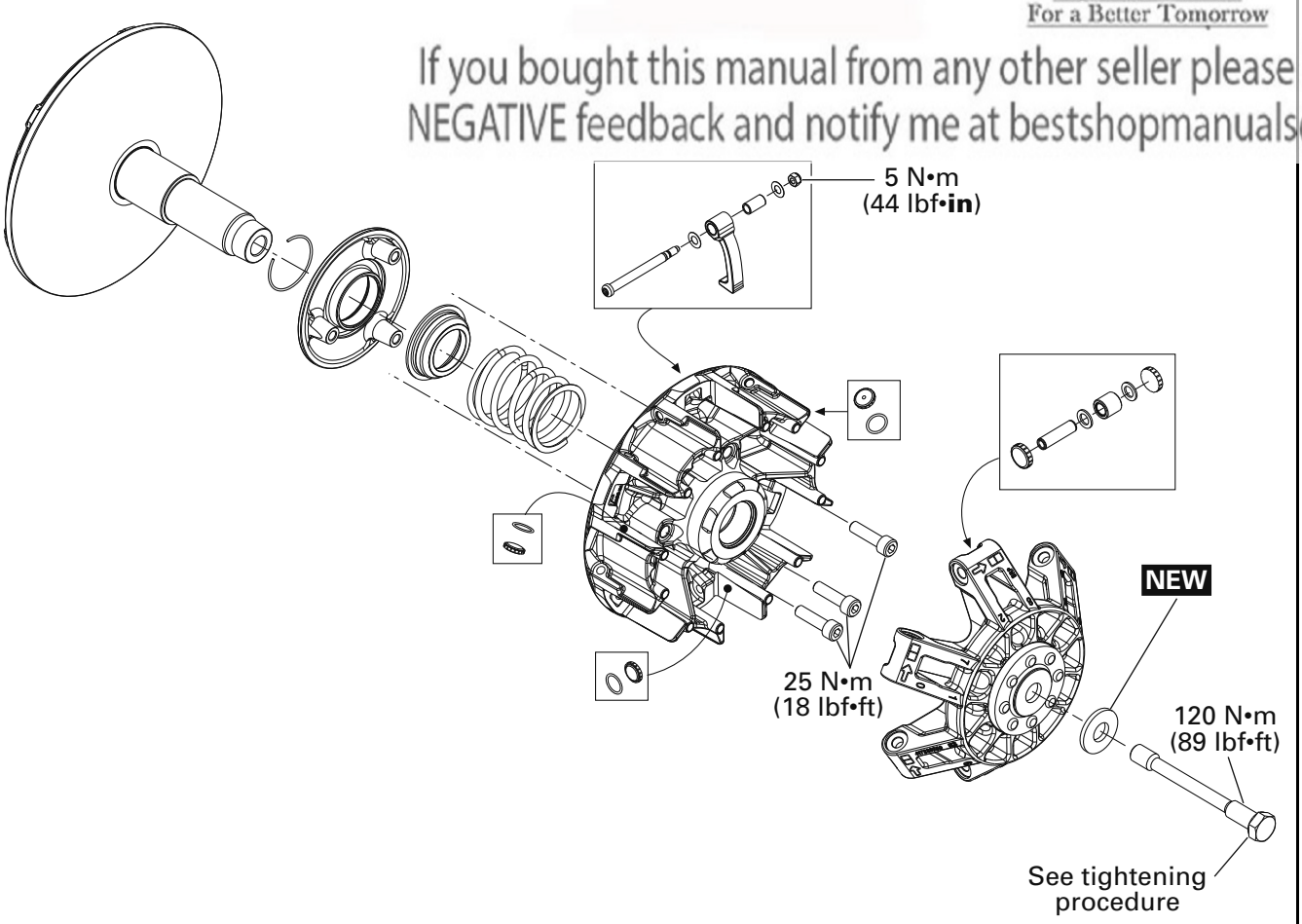
SERVICE TOOLS

Description	Part Number	Page
CLUTCH HOLDER	529 036 235	231, 239
DRIVE PULLEY PULLER	529 000 064	231
PULLEY SPRING COMPRESSOR TOOL	529 036 012	233

SERVICE PRODUCTS

Description	Part Number	Page
PULLEY FLANGE CLEANER	413 711 809	234

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



NEW = Component must be replaced when removed.

mmr2011-098-500_a

GENERAL

This drive pulley is lubrication free. Never lubricate any components.

Some drive pulley calibration components (spring, ramps) can be changed to adapt to different altitudes. Refer to appropriate Service Bulletin.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Ski-Doo dealer. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.

TROUBLESHOOTING

ERRATIC DRIVE PULLEY PERFORMANCE

1. Damaged slider shoe O-ring.
   - *Install new O-rings, refer to DRIVE PULLEY ASSEMBLY.*
2. Missing slider shoe O-ring.
   - *Install new O-rings, refer to DRIVE PULLEY ASSEMBLY.*
3. Excessive wear on slider shoes.
   - *Inspect slider shoes, refer to DRIVE PULLEY INSPECTION.*

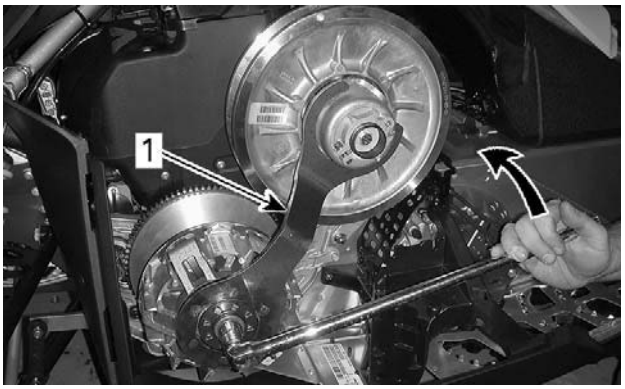
PROCEDURES

DRIVE PULLEY

Drive Pulley Removal

1. Remove drive belt. Refer to *DRIVE BELT* subsection.
2. Remove the drive pulley from engine as follows.
   2.1 Hold the drive pulley.

REQUIRED TOOL	
CLUTCH HOLDER (P/N 529 036 235)	

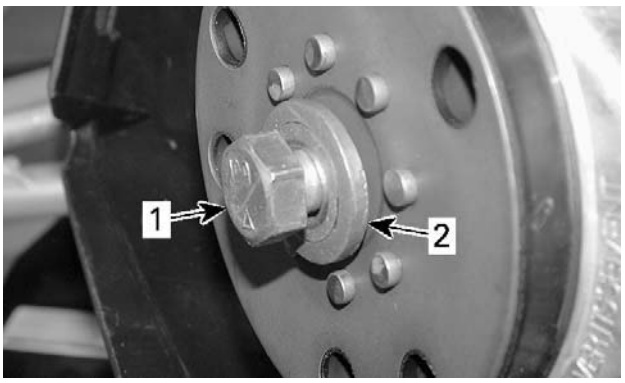


mmr2012-329-001_a

1. Clutch holder

   2.2 Remove the drive pulley screw.

NOTICE **Never use any type of impact wrench for drive pulley removal.**



mmr2008-041-103_a

TYPICAL
1. Drive pulley retaining screw
2. Conical spring washer

   2.3 Remove the drive pulley from crankshaft.

REQUIRED TOOL	
DRIVE PULLEY PULLER (P/N 529 000 064)	

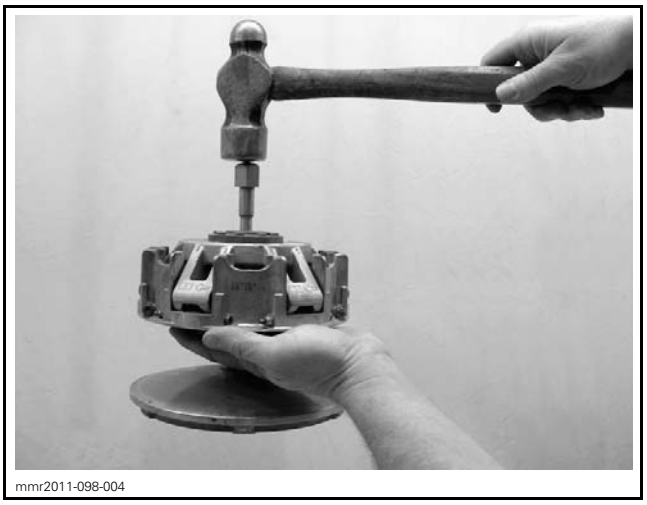
NOTICE **Always use the specified tool to avoid damaging crankshaft.**

Drive Pulley Disassembly

Fixed Sheave Removal

Separate fixed sheave from sliding sheave as follows:

– Screw puller into fixed sheave shaft (about 13 mm (1/2 in).
– Hold drive pulley in your hand by the sliding sheave as illustrated.
– Tap on puller head to disengage fixed sheave.

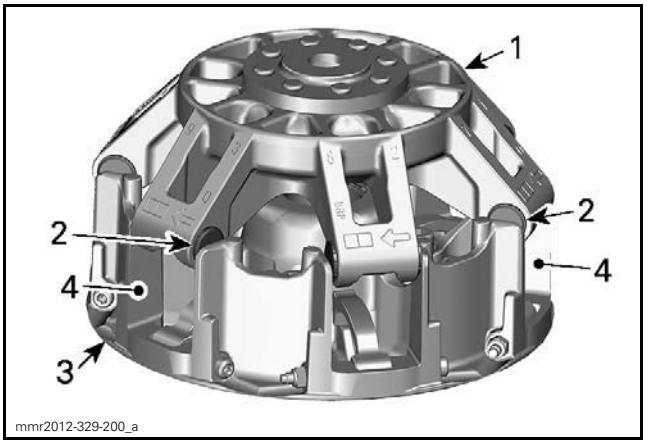

mmr2011-098-004

NOTE: If necessary, use a heat gun to slightly heat the governor cup to ease disassembly.

NOTICE Never use any type of torch to heat governor cup.

Governor Cup Removal

Carefully pull up on governor cup until the slider shoes are at their highest position in the guides.

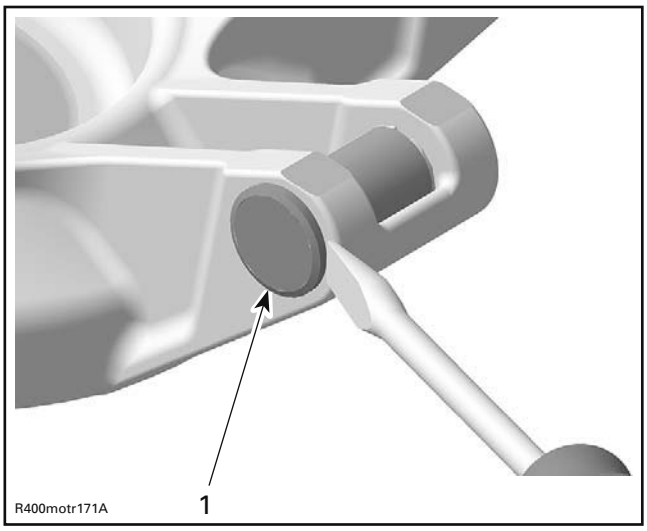


mmr2012-329-200_a

1. Governor cup
2. Slider shoes
3. Sliding sheave
4. Guides

Slider Shoes and Roller Removal

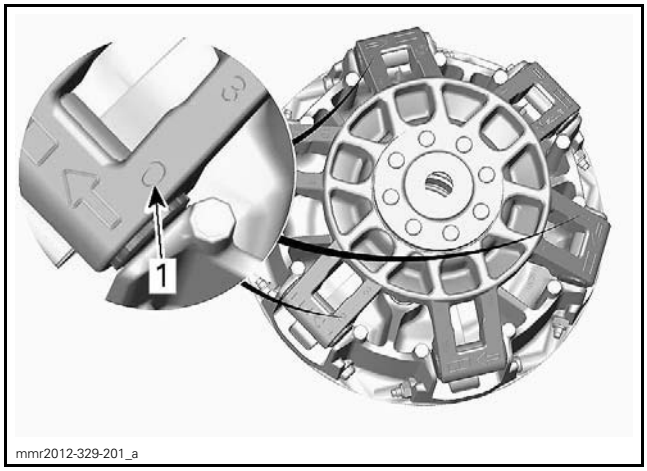
1. Remove slider shoes from governor cup using a flat screwdriver.



1. Slider shoe

2. Remove O-ring from slider shoes.

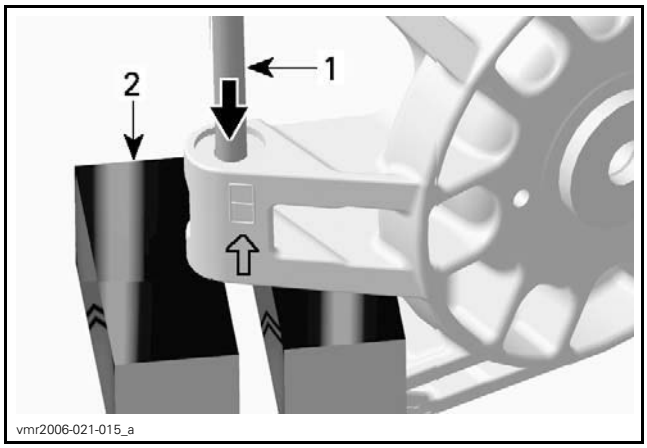
NOTE: The O-rings are positioned on the slider shoes identified by an O on the governor cup. (total of 3 slider shoes with O-rings).



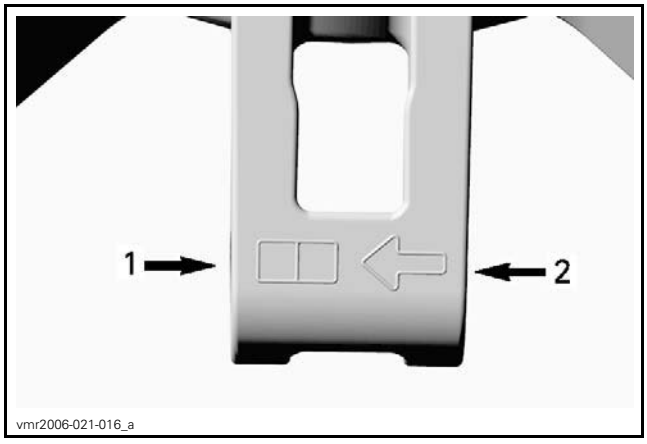
mmr2012-329-201_a

O-RING POSITION
1. O on governor cup

3. Place governor cup **on** a vice using protection plates.
4. Remove bearing sleeve using a punch by pushing it towards the opposite direction of the arrow.



1. *Punch*
2. *Vice*

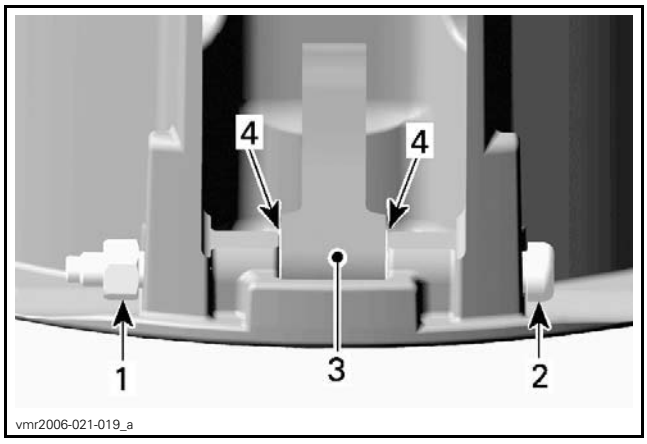


1. *Removal direction*
2. *Assembly direction*

NOTICE Do not clamp governor cup **in** the vice to avoid damaging it.

Centrifugal Lever Removal

1. Unscrew lock nut and remove centrifugal lever pivot bolt.
2. Remove centrifugal lever and both thrust washers.



1. *Lock nut*
2. *Centrifugal lever pivot bolt*
3. *Centrifugal lever*
4. *Thrust washers*

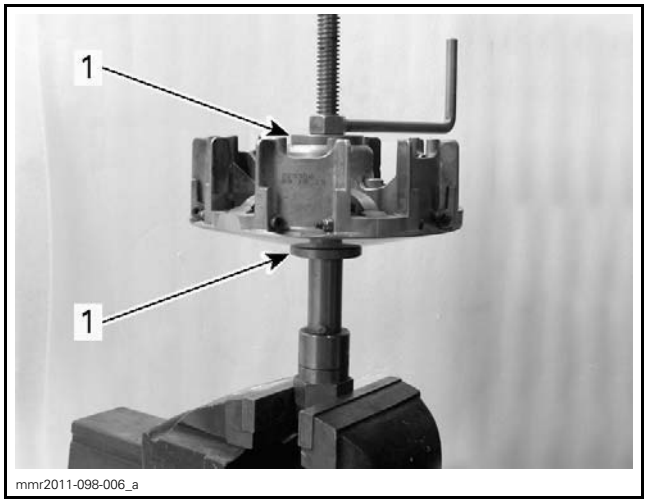
Spring Cover Removal

⚠ WARNING

The spring cover is under high clutch spring preload. Never attempt to remove the spring cover without the recommended tool.

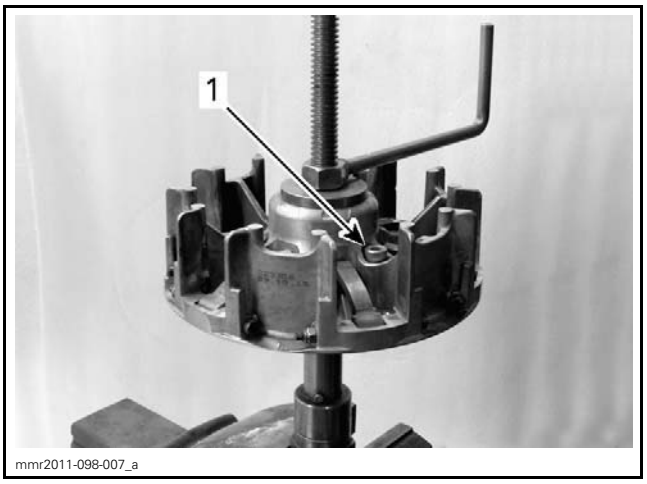
REQUIRED TOOL	
PULLEY SPRING COMPRESSOR TOOL (P/N 529 036 012)	

1. Install tool in a vice with the sliding sheave between the washers.



1. *Washers*

2. Remove retaining screws from spring cover.



1. Retaining screw

3. Unscrew tool to disengage spring cover from sliding sheave.

Drive Pulley Cleaning

NOTICE **Always use the specified cleaning solvent and abrasive type to avoid damaging components.**

Clean pulley faces and shaft using fine steel wool and dry cloth.

Clean the following components using a paper towel with PULLEY FLANGE CLEANER (P/N 413 711 809).

- Crankshaft tapered end
- Crankshaft threads
- Fixed sheave shaft
- Inside the fixed sheave taper
- Drive pulley screw threads.

NOTICE **Avoid contact between cleaner and crankshaft seal.**

If additional cleaning is required on tapered surfaces, use a medium or coarse steel wool or a no. 600 sand paper.

Reclean tapered surfaces with paper towel and PULLEY FLANGE CLEANER (P/N 413 711 809).

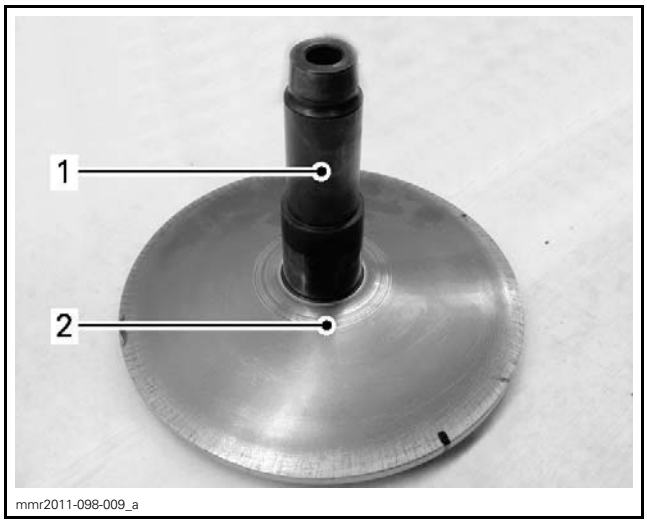
NOTICE **Tapered surfaces must be free of any foreign particles.**

Drive Pulley Inspection

NOTE: Unless otherwise noted, during inspection, replace any component found defective or out of specifications.

Fixed Sheave Inspection

Check fixed sheave shaft and surface for scratches or other damage.



1. Fixed sheave shaft
2. Fixed sheave surface

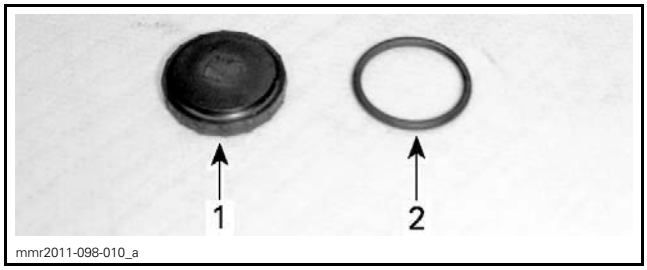
Governor Cup Inspection

Check governor cup for cracks or other visible damage.

Slider Shoes and Roller Inspection

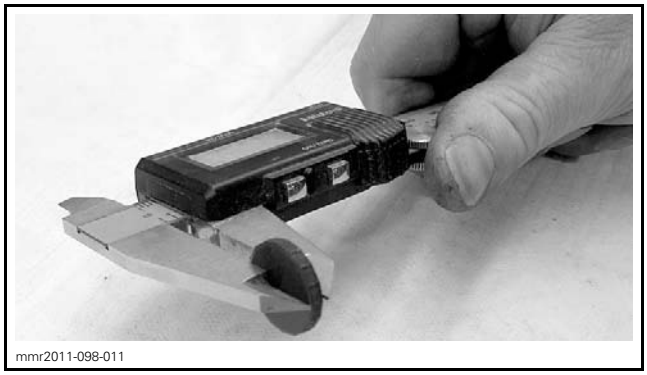
Check if O-rings of slider shoes are cracked, cut or crushed.

Check slider shoes for visible wear.



1. Slider shoe
2. O-ring

Measure the thickness of the slider shoes.



NOTE: Take measurement at the center of slider shoe.

SLIDER SHOE SERVICE LIMIT	
With O-ring	3.70 mm (.146 in)
Without O-ring	3.80 mm (.15 in)

Check each roller for roundness of external diameter.

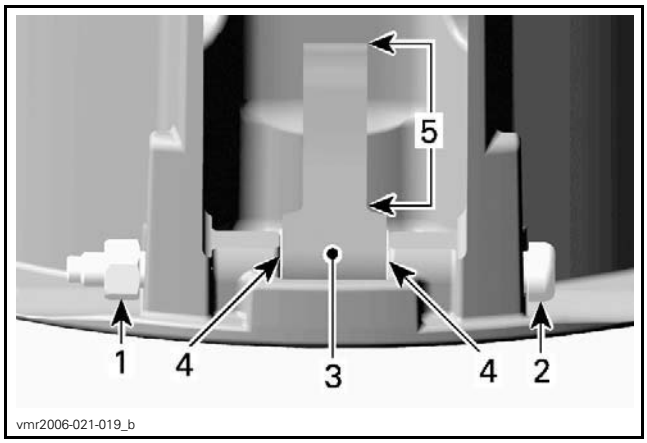
Check if rollers move freely.

NOTICE Whenever replacing rollers and slider shoes, always replace all rollers and slider shoes at the same time.

Centrifugal Lever Inspection

Check contact surfaces of centrifugal lever for visible wear.

If major wear is visible, replace the following:
- Centrifugal levers
- Thrust washers
- Centrifugal lever pivot bolts
- Centrifugal lever pivot lock nuts.

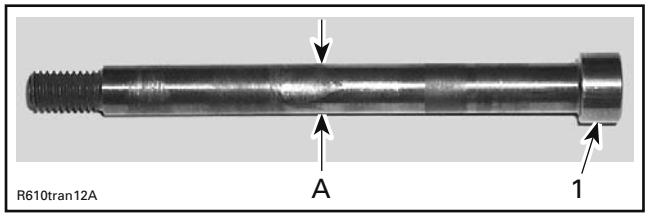


1. Lock nut
2. Centrifugal lever pivot bolt
3. Centrifugal lever
4. Thrust washers
5. Contact surface to the roller

⚠ WARNING

Whenever replacing centrifugal levers, always replace all levers at the same time. Otherwise, drive pulley imbalance will occur.

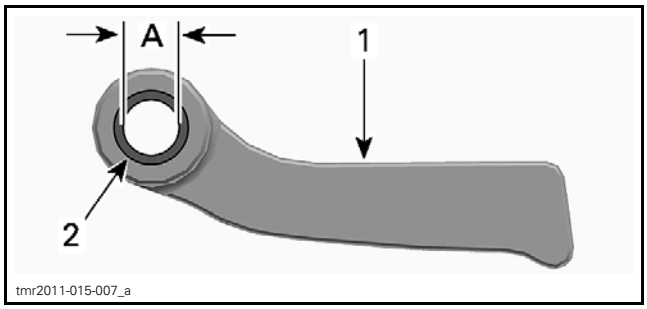
Measure diameter of centrifugal lever pivot bolt.



1. Centrifugal lever pivot bolt
A. Measure diameter here

CENTRIFUGAL LEVER PIVOT BOLT	
SPECIFICATION	**DIAMETER**
NOMINAL	6.063 mm to 6.091 mm (.239 in to .24 in)
SERVICE LIMIT	6.00 mm (.236 in)

Measure diameter of centrifugal lever bushing.



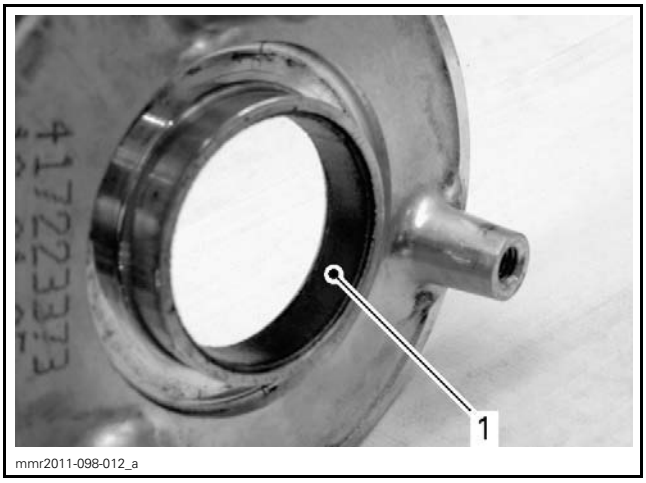
1. Centrifugal lever
2. Bushing
A. Bushing inner diameter

CENTRIFUGAL LEVER BUSHING	
SPECIFICATION	**INNER DIAMETER**
NOMINAL	6.00 mm to 6.12 mm (.236 in to .241 in)
SERVICE LIMIT	6.200 mm (.244 in)

Spring Cover Inspection

Check spring cover for cracks or wear.

Check coating of spring cover bushing for wear.

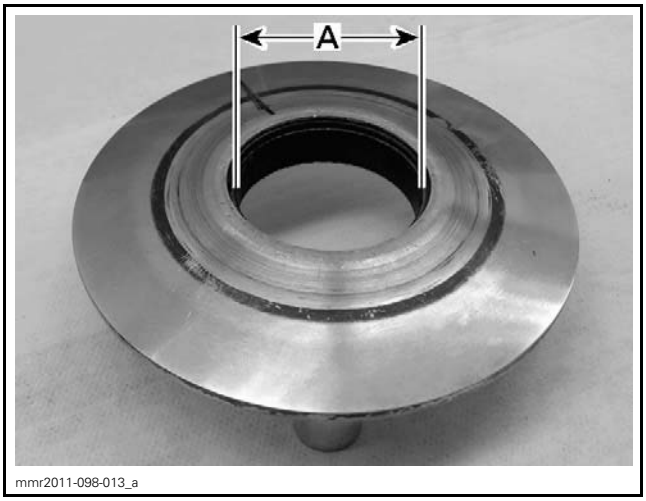


mmr2011-098-012_a

1. Coating of spring cover bushing

Using a bore gauge, measure the inner diameter of spring cover bushing.

NOTE: Measuring point must be at least 6 mm (1/4 in) from bushing edge.



mmr2011-098-013_a

A. Inner diameter of spring cover bushing

SPRING COVER BUSHING	
SPECIFICATION	**INNER DIAMETER**
SERVICE LIMIT	38.37 mm (1.511 in)

If bushing is out of specification, replace spring cover.

Spring Inspection

Check spring free length.

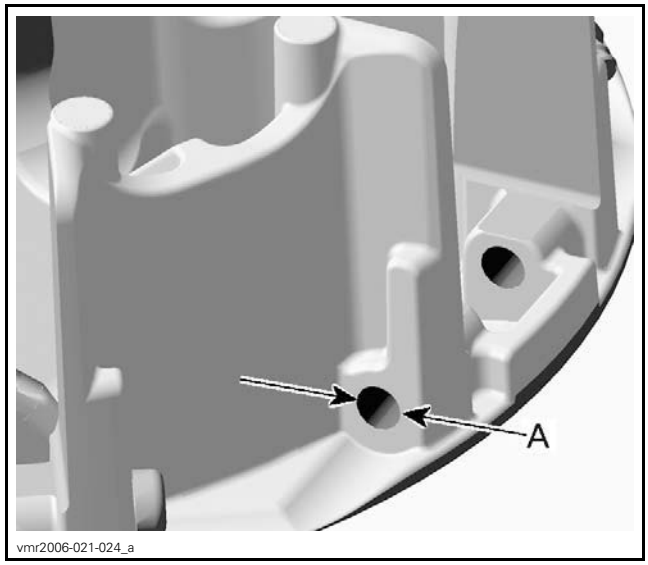
SPRING FREE LENGTH	
COLOR CODE	FREE LENGTH
RED/WHITE	115.0 mm (4.528 in)

Sliding Sheave Inspection

Check sliding sheave for cracks or other damage.

Check sliding contact surface for excessive wear.

Measure centrifugal lever pivot bolt bores.



vmr2006-021-024_a

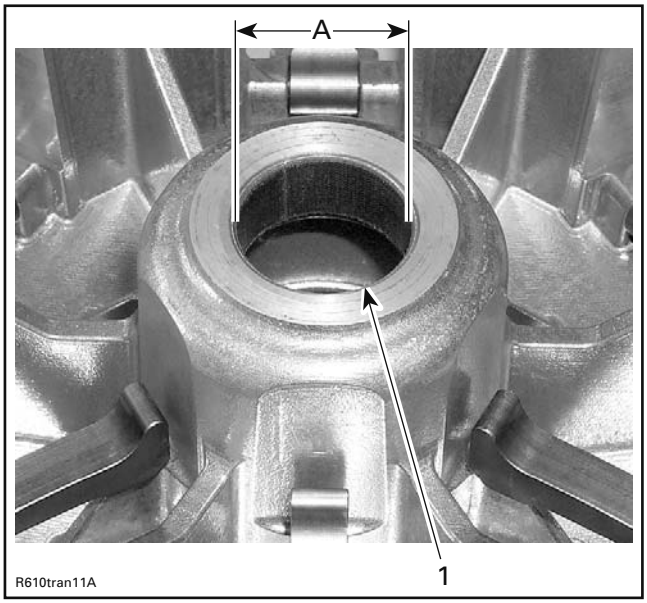
A. Centrifugal lever pivot bolt bore diameter

CENTRIFUGAL LEVER PIVOT BOLT	
SPECIFICATION	**BORE DIAMETER**
NOMINAL	6.113 mm to 6.171 mm (.241 in to .243 in)
SERVICE LIMIT	6.300 mm (.248 in)

Check coating of sliding sheave bushing for wear.

Measure bushing diameter of sliding sheave.

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



TYPICAL
1. Sliding sheave bushing
A. Inner diameter of bushing

SLIDING SHEAVE BUSHING	
SPECIFICATION	**INNER DIAMETER**
NOMINAL	32.01 mm to 32.13 mm (1.26 in to 1.265 in)
SERVICE LIMIT	33.22 mm (1.308 in)

If bushing is out of specification, replace sliding sheave.

Drive Pulley Assembly

Spring Cover Installation

The installation is the reverse of removal procedure, however pay attention to the following.

Tighten spring cover retaining screws to specification.

TIGHTENING TORQUE	
Spring cover retaining screws	25 N•m (18 lbf•ft)

Centrifugal Lever Installation

The installation is the reverse of removal procedure, however pay attention to the following.

Install centrifugal levers with both thrust washers.

NOTICE **Centrifugal levers must move easily after installation.**

Tighten centrifugal lever pivot nuts to specification.

TIGHTENING TORQUE	
Centrifugal lever pivot nut	5 N•m (44 lbf•**in**)

Slider Shoes and Roller Installation

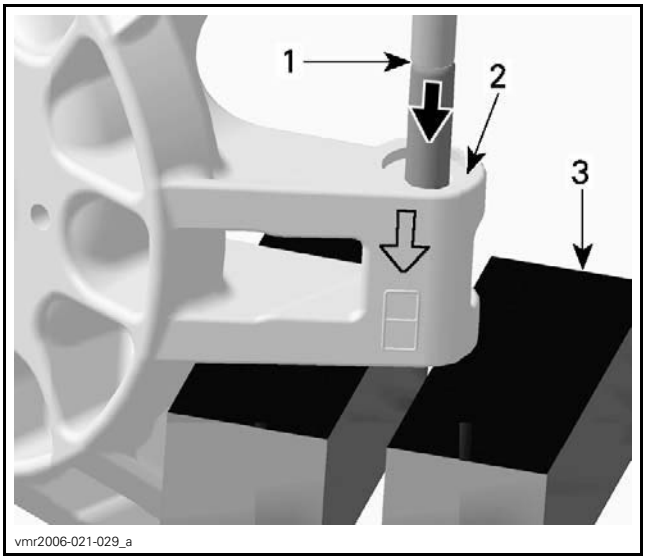
The installation is the reverse of removal procedure, however pay attention to the following.

Ensure that rollers move easily after installation.

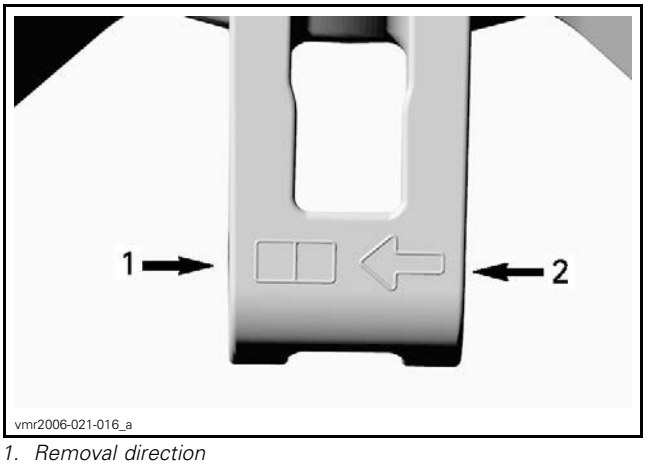
Install bearing sleeve by pushing it towards the same direction as the arrow.

Ensure the bearing sleeve is aligned with the contact surface of the slider shoes (no protrusion).

NOTICE **Do not clamp governor cup in the vice to avoid to damaging it.**

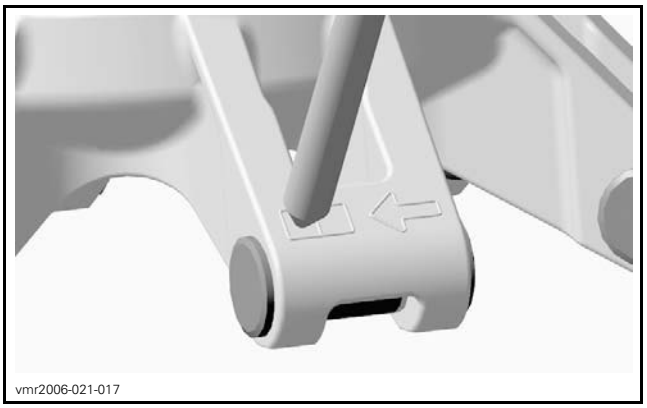


1. Top edge of bearing sleeve
2. Contact surface of slider shoes
3. Vice

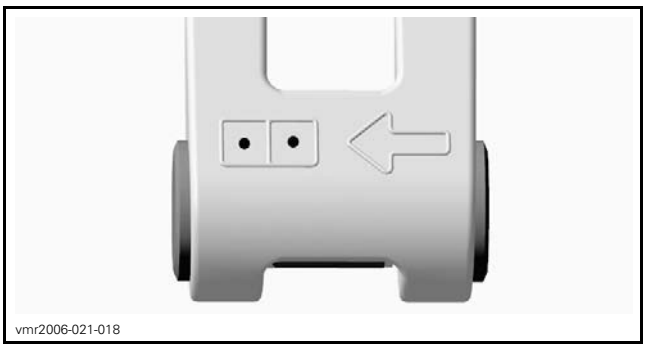


1. Removal direction
2. Assembly direction

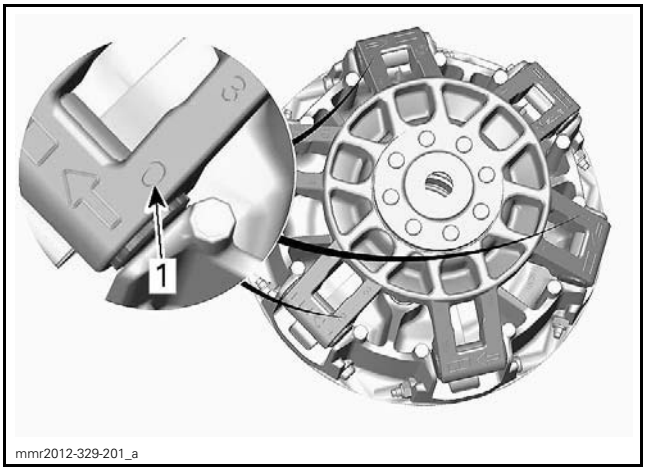
Carefully mark governor cup box using a punch.


vmr2006-021-017

NOTE: Never install a governor cup with two marks.


vmr2006-021-018

Install O-rings on slider shoes identified by an O on the governor cup. (total of 3 slider shoes with O-rings).



mmr2012-329-201_a

O-RING POSITION
1. O on governor cup

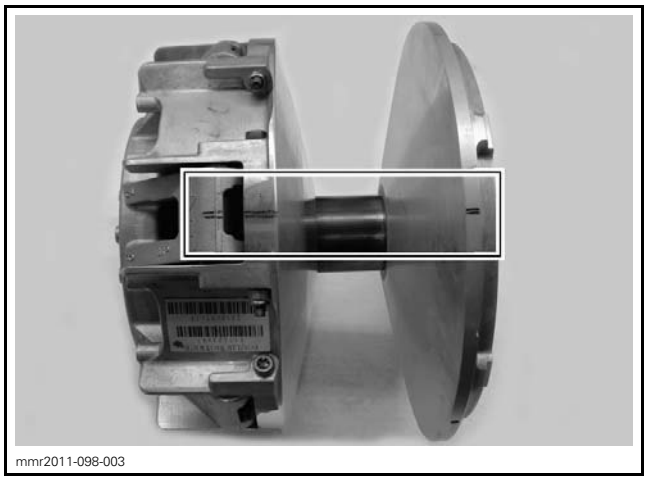
Governor Cup Installation

The installation is the reverse of removal procedure.

Fixed Sheave Assembly

The installation is the reverse of removal procedure, however pay attention to the following.

Align fixed sheave, sliding sheave and governor cup together using the index marks (index marks have been traced at the factory).


mmr2011-098-003

Drive Pulley Installation

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

Clean mounting surfaces as described in *DRIVE PULLEY CLEANING* above.

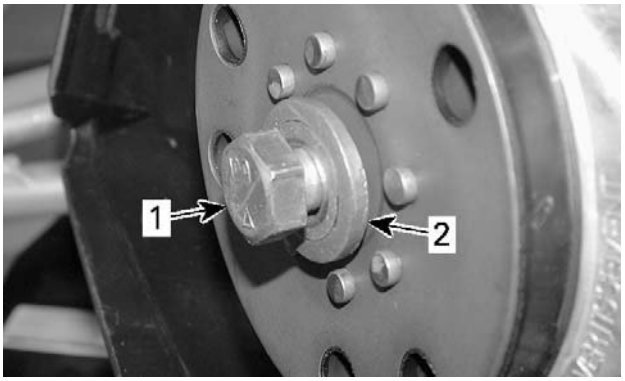
NOTICE **Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.**

Install NEW conical spring washer with its concave side towards drive pulley.

Install drive pulley screw with a NEW conical spring washer.

NOTE: Spring washer concave side must be towards drive pulley.

NOTICE **Always use BRP genuine parts for conical spring washer and screw.**



TYPICAL
1. *Drive pulley screw*
2. *Conical spring washer*

1. Tighten drive pulley retaining screw to specification.

NOTICE Never use any type of impact wrench for drive pulley installation.

REQUIRED TOOL
CLUTCH HOLDER (P/N 529 036 235)

DRIVE PULLEY FIRST TORQUE
120 N•m (89 lbf•ft)

2. Lift rear of vehicle and support it safely.

⚠ WARNING

Ensure 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.

3. Start engine.
4. Release parking brake.
5. Accelerate vehicle at low speed (maximum 32 km/h (20 MPH)).
6. Apply brake.
7. Repeat the above sequence 5 times.
8. Stop engine.
9. Lower vehicle back on ground.
10. Retighten drive pulley retaining screw to specification.

REQUIRED TOOL
CLUTCH HOLDER (P/N 529 036 235)

DRIVE PULLEY FINAL TORQUE
120 N•m (89 lbf•ft)

⚠ WARNING

After 10 hours of operation, the torque of the drive pulley retaining screw must be checked.

DRIVEN PULLEY AND COUNTERSHAFT (QRS SHORT SHAFT)

SERVICE TOOLS

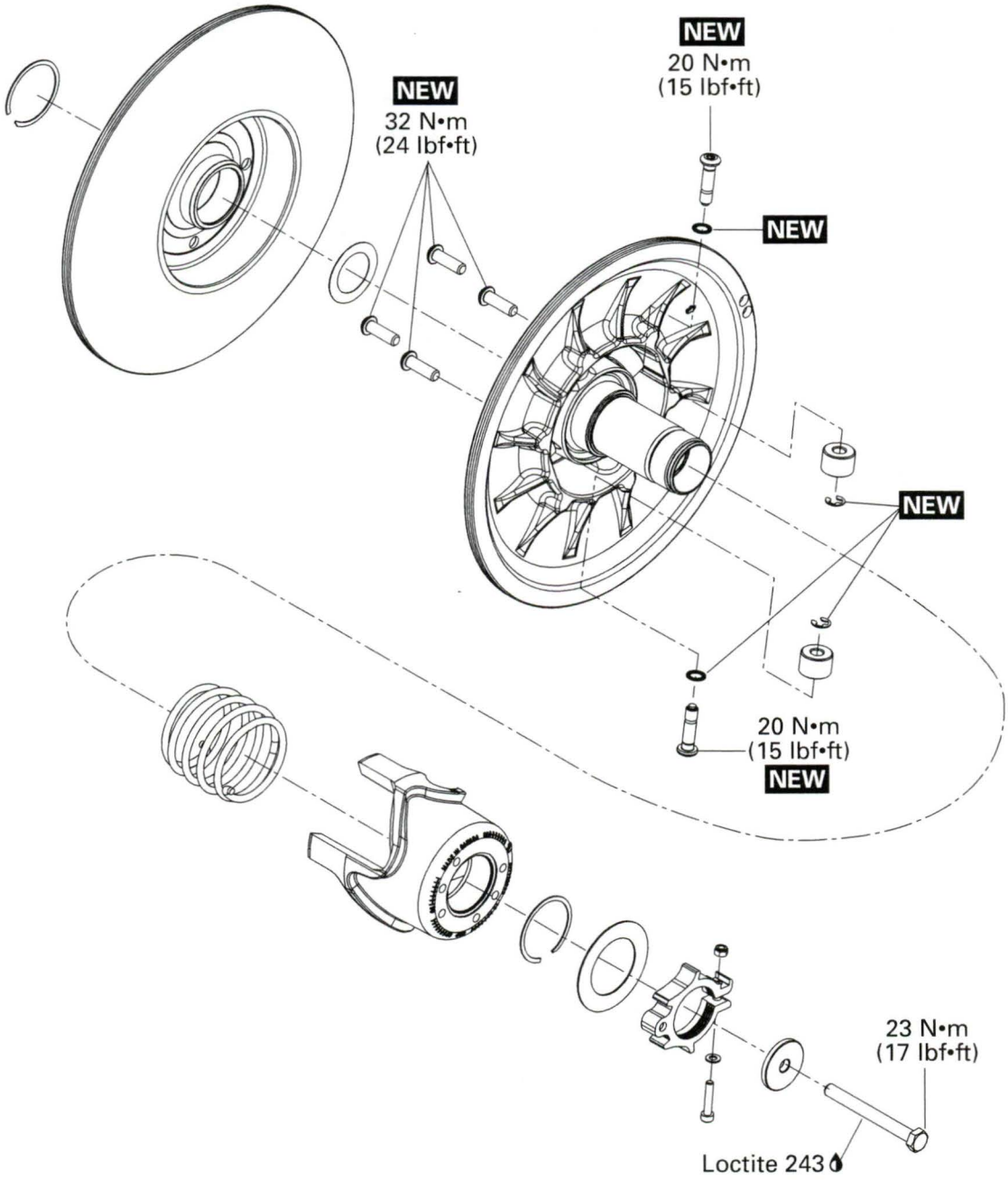
Description	Part Number	Page
ALIGNMENT BAR	529 036 157	244
DRIVEN PULLEY SPRING COMPRESSOR	529 036 182	246
UPPER GEAR RETAINING TOOL	529 036 110	250

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
ROTOR CLIP® APPLICATOR	A-150	248

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	249
LOCTITE 609	413 703 100	252
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	249, 251
PULLEY FLANGE CLEANER	413 711 809	252



NEW = Component must be replaced when removed.

mmr2011-118-001_a

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



NEW = Component must be replaced when removed.

mmr2012-330-100_a

GENERAL

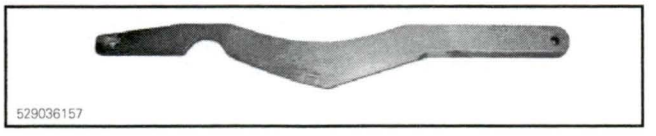
⚠ WARNING

Never start engine when the pulley guard is removed.

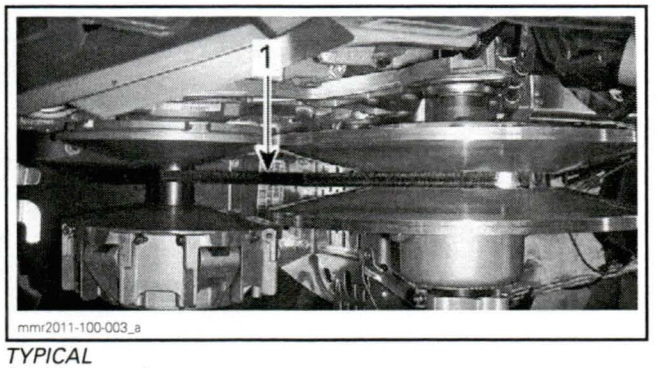
ADJUSTMENT

DRIVEN PULLEY ALIGNMENT

1. Remove drive belt, refer to *DRIVE BELT* subsection.
2. Completely open driven pulley.
3. Insert ALIGNMENT BAR (P/N 529 036 157) between the pulley sheaves. The half moon recess must match the drive pulley fixed sheave shaft.

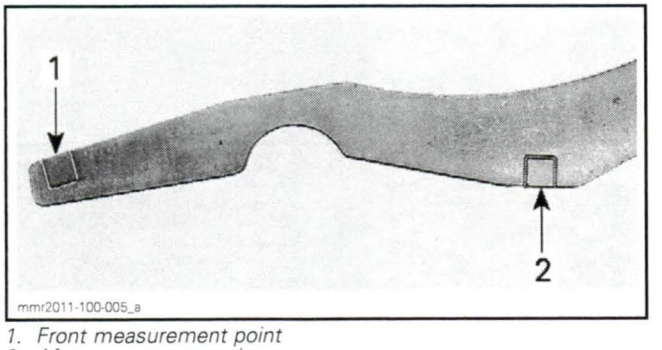


4. Close the driven pulley on the alignment bar. Make sure it stays against the pulley bottom.



TYPICAL
1. Alignment bar

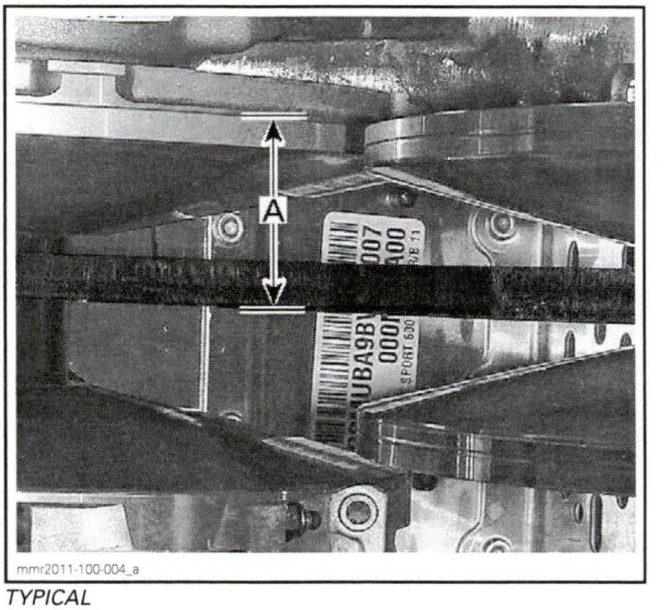
5. Locate the measurement points on the alignment bar.



1. Front measurement point
2. Aft measurement point

6. Measure "X" distance as per the following illustration.

NOTE: Always measure "X" distance from the farther alignment bar side to the fixed sheave inner edge (including alignment bar thickness).



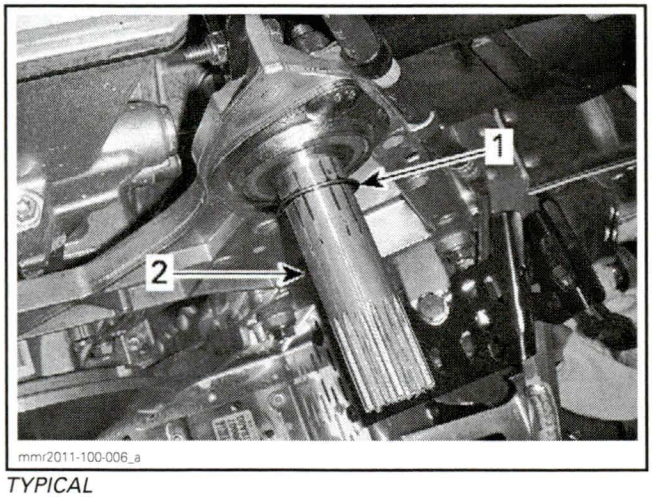
TYPICAL
A. "X" distance

7. Compare the result to the specification.

"X" DISTANCE SPECIFICATION	
Minimum	36.7 mm (1.445 in)
Maximum	37.7 mm (1.484 in)

8. If an alignment is necessary:
   - 8.1 Remove driven pulley, see *DRIVEN PULLEY REMOVAL* in this subsection.
   - 8.2 Add or remove shim(s) to obtain the specified alignment.

NOTICE **Keep a minimum shim thickness of 0.4 mm (.016 in) to avoid contact between driven pulley and its support.**



TYPICAL
1. *Shim*
2. *Countershaft*

8.3 Refer to the following table to use the proper shim thickness.

SHIM THICKNESS P/N	
504 112 000	0.42 mm ± 0.05 mm (.017 in ± .002 in)
417 300 265	1.02 mm ± 0.10 mm (.04 in ± .004 in)

NOTICE **Total shim thickness must not exceed 3 mm (.118 in).**

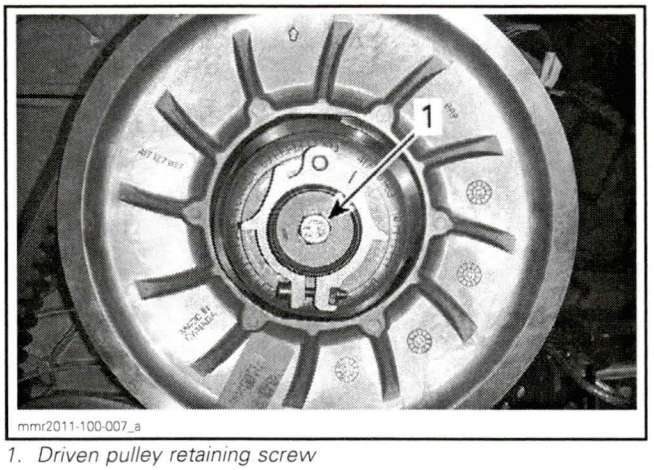
9. Install drive belt, refer to *DRIVE BELT INSTALLATION* in *DRIVE BELT* subsection.

PROCEDURES

DRIVEN PULLEY

Driven Pulley Removal

1. Apply parking brake.
2. Remove drive belt, refer to *DRIVE BELT* subsection.
3. Remove driven pulley retaining screw and shouldered washer.



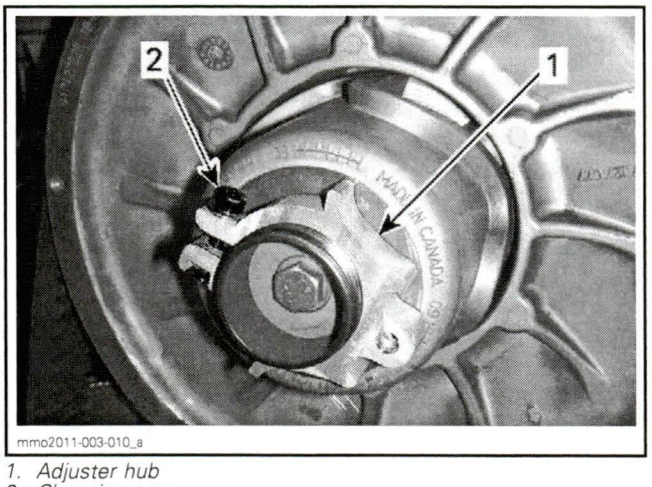
1. *Driven pulley retaining screw*

4. Remove driven pulley from countershaft.

Driven Pulley Disassembly

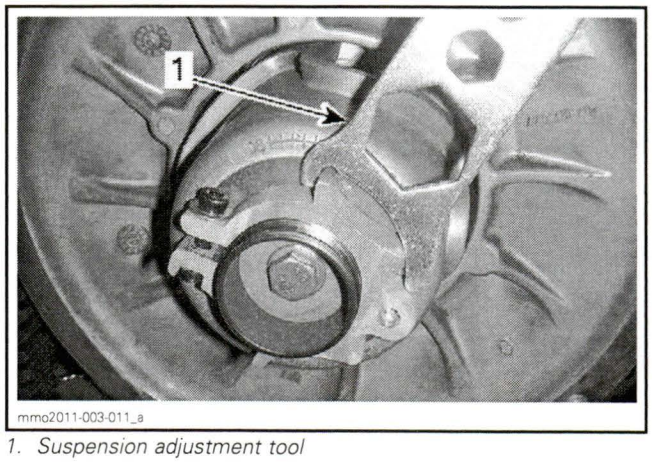
Cam and Spring Removal

1. Loosen the adjuster ring clamping screw.



1. *Adjuster hub*
2. *Clamping screw*

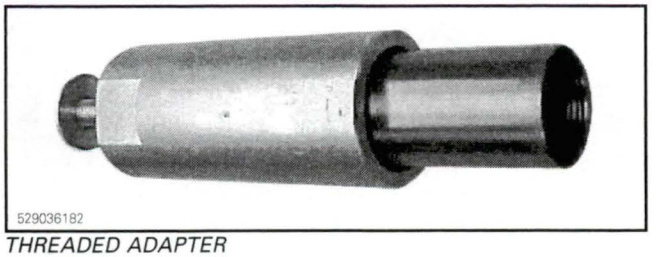
2. Unscrew the adjuster hub **clockwise**, using the suspension adjustment tool.



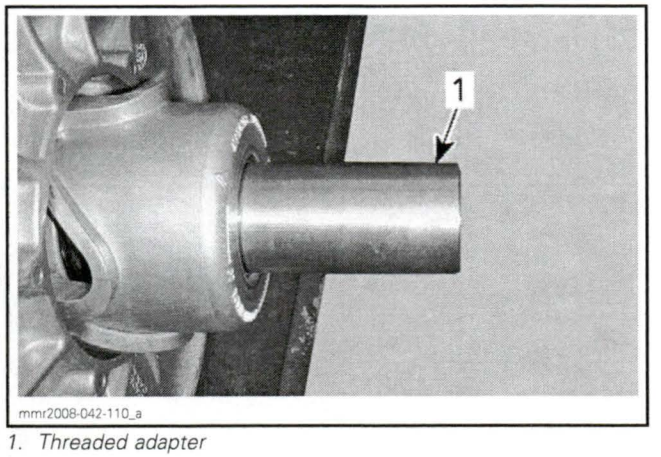
1. *Suspension adjustment tool*

NOTE: When reaching the end of the threads, slightly spread the adjuster ring to remove it from the pulley.

3. Install the threaded adapter of the DRIVEN PULLEY SPRING COMPRESSOR (P/N 529 036 182) on the driven pulley.

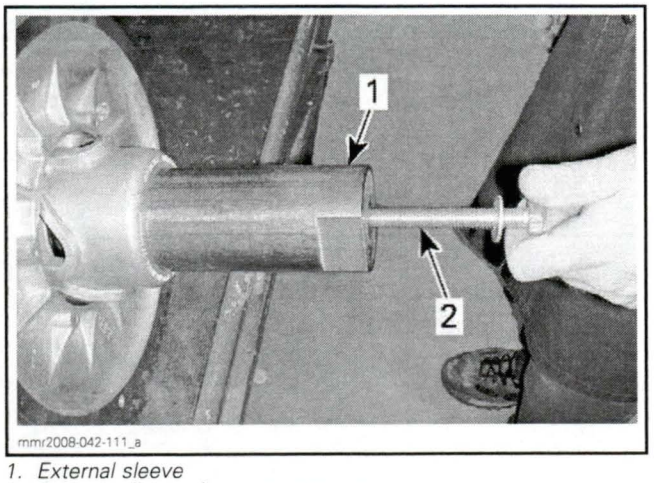


THREADED ADAPTER



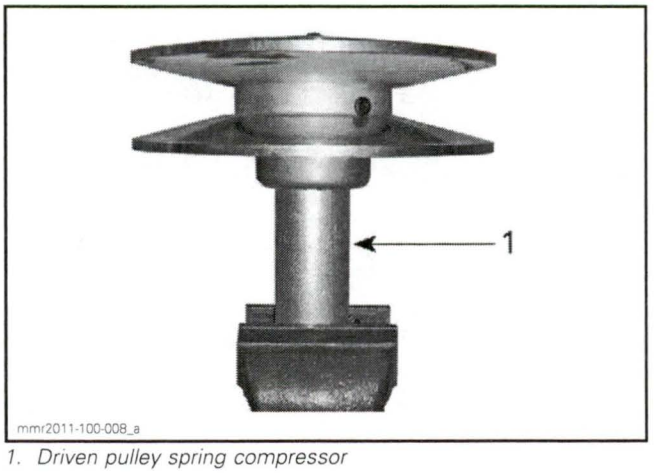
1. Threaded adapter

4. Install the external sleeve over the threaded adapter and secure sleeve with the tool screw.



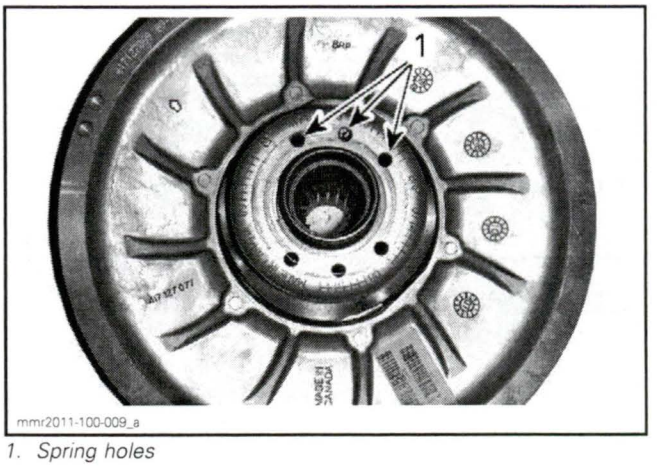
1. External sleeve
2. Driven pulley spring compressor screw

5. Tighten the tool screw to compress the cam.
6. Install the tool in a vice.



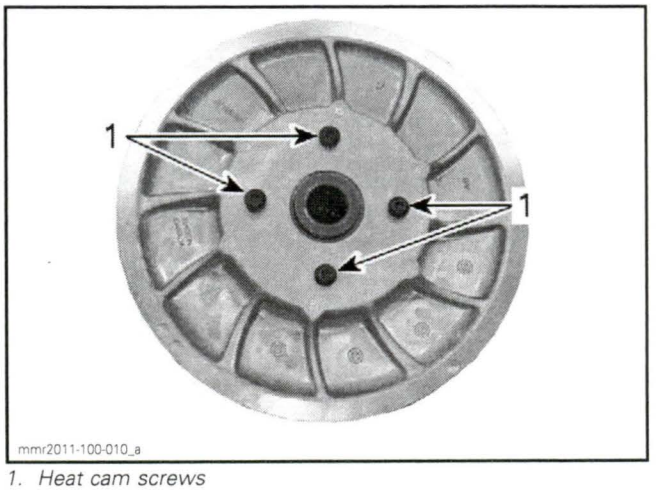
1. Driven pulley spring compressor

7. Note in which hole the spring hook is inserted in the cam.



1. Spring holes

8. Using a heat gun, heat cam screws to break the thread locker.



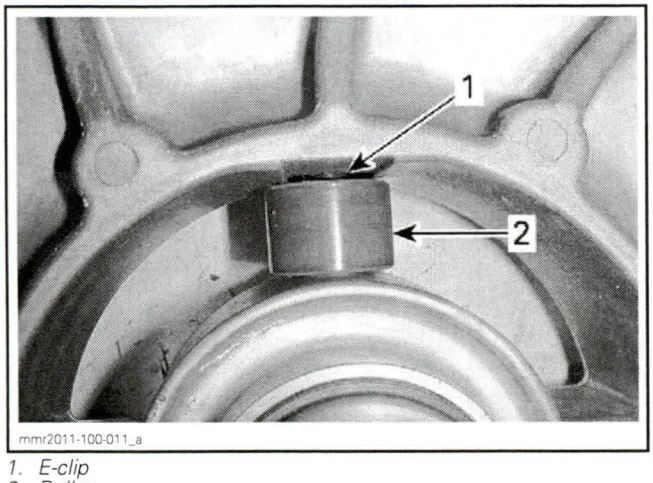
1. Heat cam screws

9. Remove and discard cam screws.
10. Remove the sliding sheave.
11. Unscrew the tool screw completely.

12. Note in which hole the spring hook is inserted to the fixed sheave.
13. Remove cam and spring.
14. Remove the tool threaded adapter.

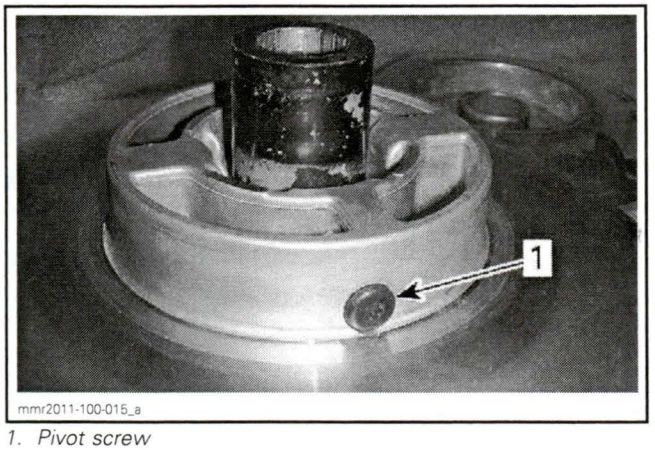
Driven Pulley Rollers Removal

1. Remove and **discard** the E-clips.



1. E-clip
2. Roller

2. Remove and **discard** pivot screws.



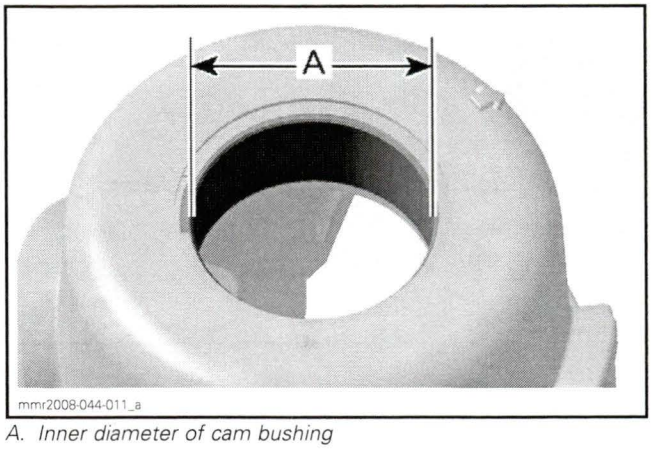
1. Pivot screw

3. Remove rollers.

Driven Pulley Inspection

Cam and Spring Inspection

1. Verify contact surfaces of cam for visible damage. Ensure circlip properly locks the inner bushing. Replace part if necessary.
2. Using a dial bore gauge, measure the inner diameter of cam bushing. Measuring point must be at least 6 mm (1/4 in) from bushing edge.



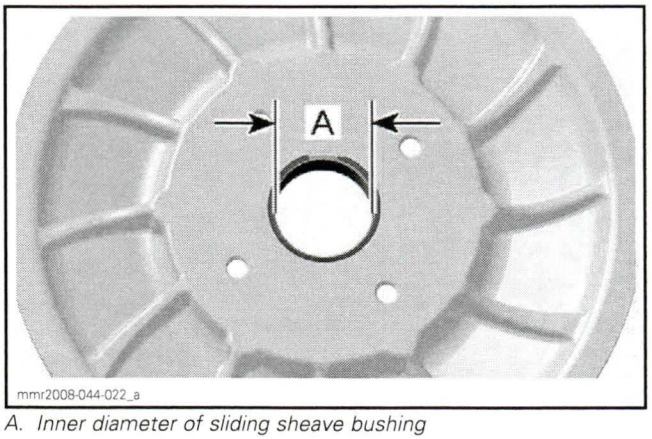
A. Inner diameter of cam bushing

BUSHING	SERVICE LIMIT
Cam bushing	41.5 mm (1.634 in)

3. Replace the cam if the inner diameter of bushing is out of specification.

Sliding Sheave Inspection

1. Inspect pulley sheave for marks or scratches.
2. Ensure circlip properly locks the inner bushing. Replace part if necessary.
3. Using a dial bore gauge, measure the inner diameter of sliding sheave bushing. Measuring point must be at least 6 mm (1/4 in) from bushing edge.



A. Inner diameter of sliding sheave bushing

BUSHING	SERVICE LIMIT
Sliding sheave bushing	41.5 mm (1.634 in)

4. Replace the sliding sheave if the inner diameter of bushing is out of specification.

Fixed Sheave Inspection

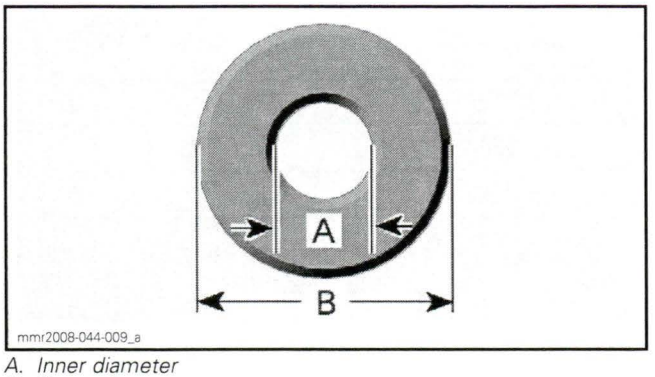
Replace fixed sheave and countershaft if one of the following problem is detected:

– Marks or scratches on pulley sheave

- Bent, twisted or otherwise damaged countershaft
- Defective splines and threads at the end of countershaft.

Driven Pulley Rollers Inspection

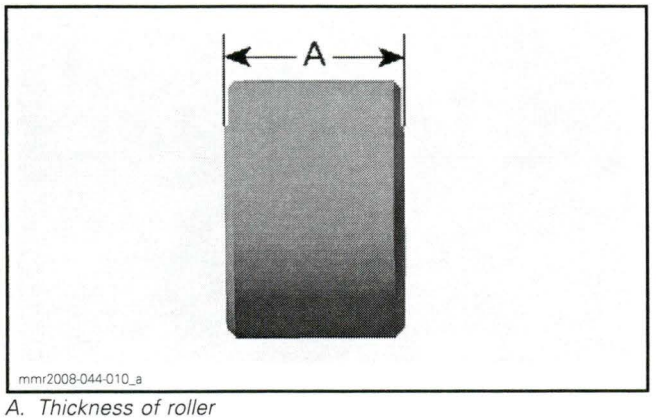
1. Check the rollers for flat spots, cracks or other visible damage. Replace if necessary (as a set).
2. Measure inner and outer diameter of rollers.



A. Inner diameter
B. Outer diameter

ROLLER DIAMETER	SERVICE LIMIT
Inner diameter	8.5 mm (.335 in)
Outer diameter	21.5 mm (.846 in)

3. Measure the roller thickness.



A. Thickness of roller

ROLLER THICKNESS	
SERVICE LIMIT	14.75 mm (.581 in)

4. If a roller is out of specifications, replace both rollers at the same time.

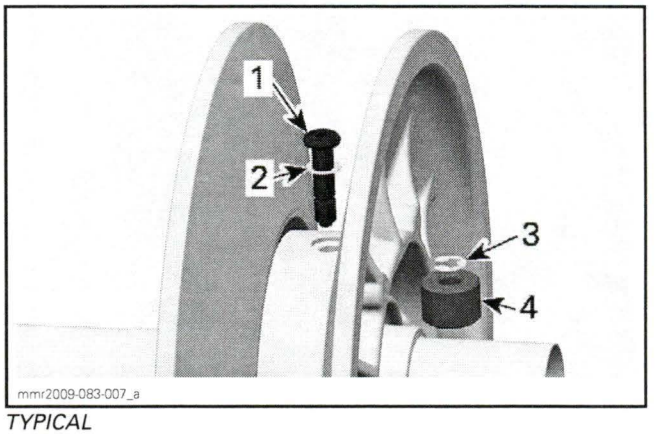
Driven Pulley Assembly

Driven Pulley Rollers Installation

1. Using a screw tap, clean pivot screw threaded holes into fixed sheave.
2. Install rollers into fixed sheave using NEW pivot screws with ribbed lock washers.

NOTICE Always use new pivot screws with pre-applied threadlocker.

3. Tighten pivot screws to the specified torque.

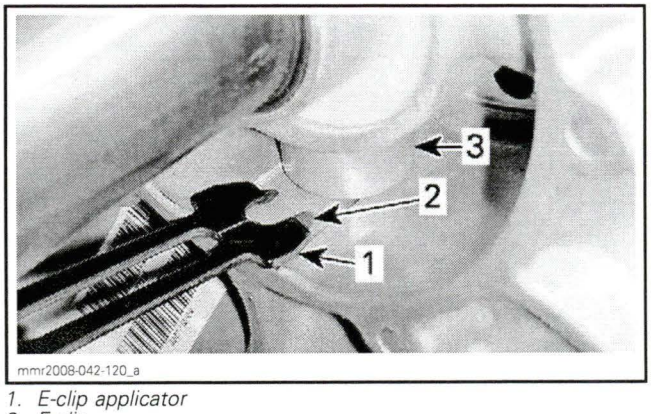


TYPICAL
1. Pivot screw
2. Ribbed lock washer
3. E-clip
4. Roller

TIGHTENING TORQUE	
Pivot screws	20 N•m (15 lbf•ft)

4. Using a ROTOR CLIP® APPLICATOR (P/N A-150), install **NEW** E-clips to lock pivot screws.

NOTE: To purchase an applicator, contact Rotor Clip Company at **www.rotorclip.com**.



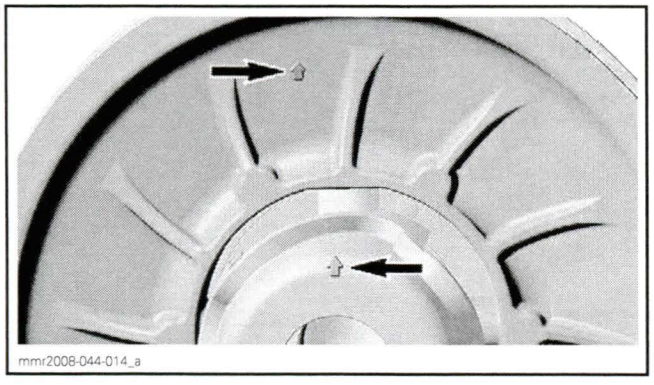
1. E-clip applicator
2. E-clip
3. Roller

Rotor Clip® is a trademark of Rotor Clip Company, Inc.

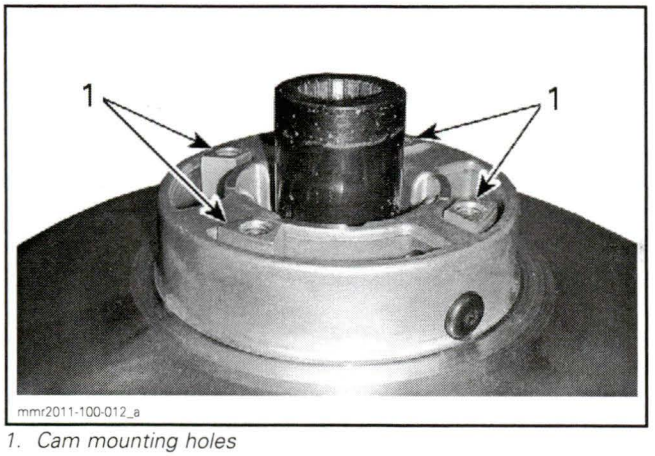
Cam and Spring Installation

1. Install the spring compressor threaded adapter on the fixed sheave.
2. Slide the cam over the tool threaded adapter.
3. Turn cam against the spring and align its arrow with the arrow on the fixed sheave.

NOTE: At the end of cam installation, the arrow on the cam should have moved clockwise (approximately 30°).



4. Compress spring until cam mounting holes exceed the fixed sheave.



1. Cam mounting holes

5. Install the sliding sheave on the cam using 4 **NEW** screws.
6. Tighten cam screws to the specified torque.

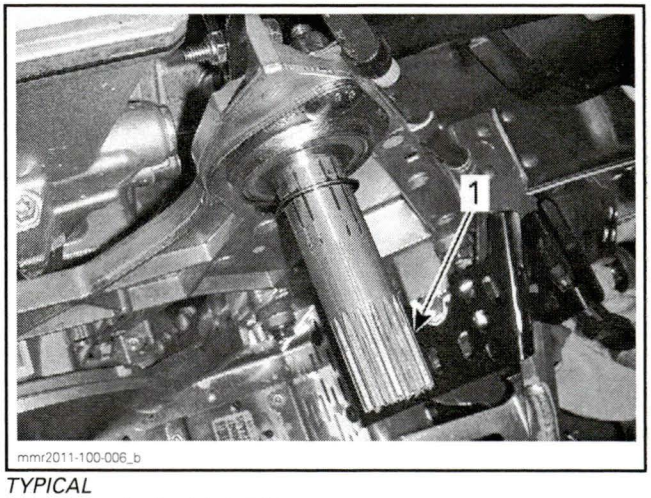
TIGHTENING TORQUE	
Cam screws	32 N•m (24 lbf•ft)

7. Remove the tool.

Driven Pulley Installation

The installation is the reverse of removal procedure, however pay attention to the following.

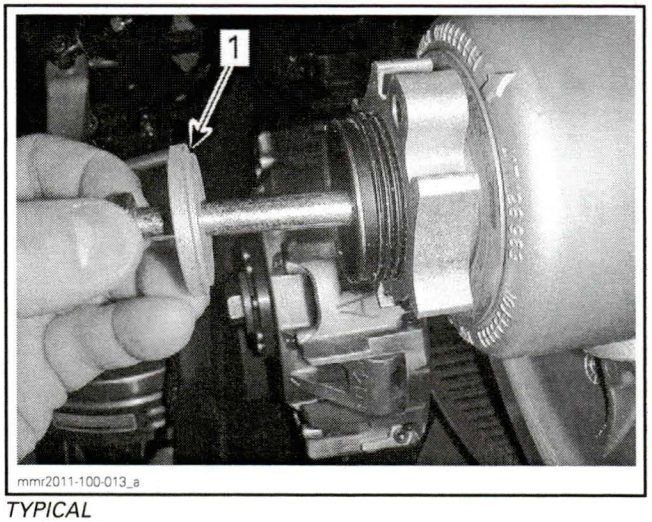
Apply LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070) on countershaft splines.



TYPICAL
1. Apply antiseize lubricant here

Check pulley alignment, refer to *DRIVEN PULLEY ALIGNMENT* in this subsection.

Install driven pulley shouldered washer as per illustration.



TYPICAL
1. Shouldered washer

Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on driven pulley retaining screw threads.

Tighten driven pulley retaining screw to the specified torque.

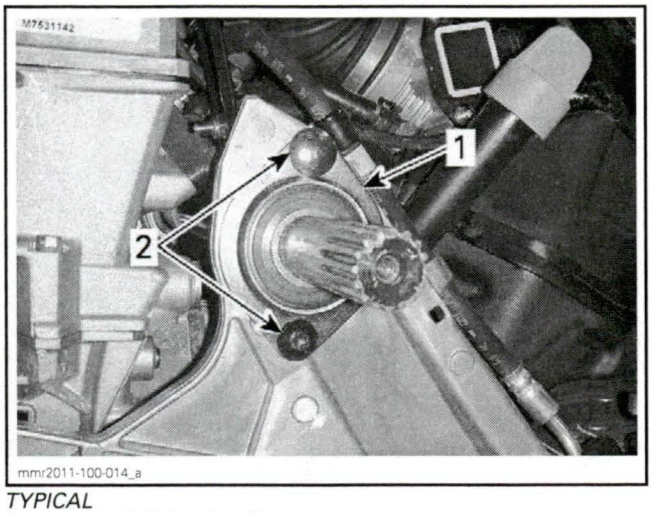
TIGHTENING TORQUE	
Driven pulley retaining screw	23 N•m (17 lbf•ft)

NOTICE **Driven pulley alignment must always be checked whenever pulleys have been removed, disassembled or replaced.**

COUNTERSHAFT

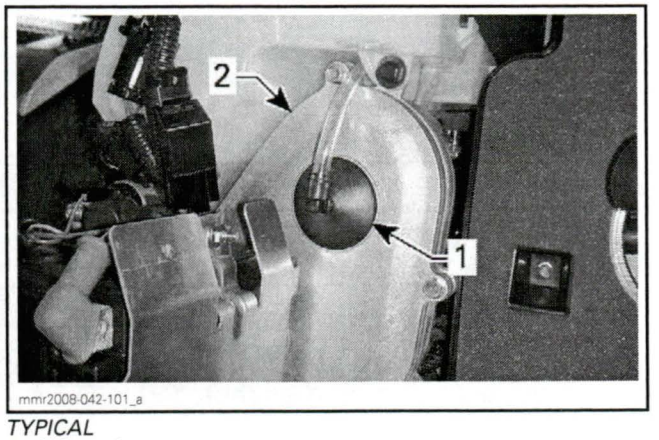
Countershaft Removal

1. Remove side panels, refer to *BODY* subsection.
2. Remove driven pulley, see *DRIVEN PULLEY REMOVAL* in this subsection.
3. Remove muffler. Refer to *EXHAUST SYSTEM* subsection.
4. Remove countershaft bearing flange as follows:
   4.1 Remove retaining fasteners.



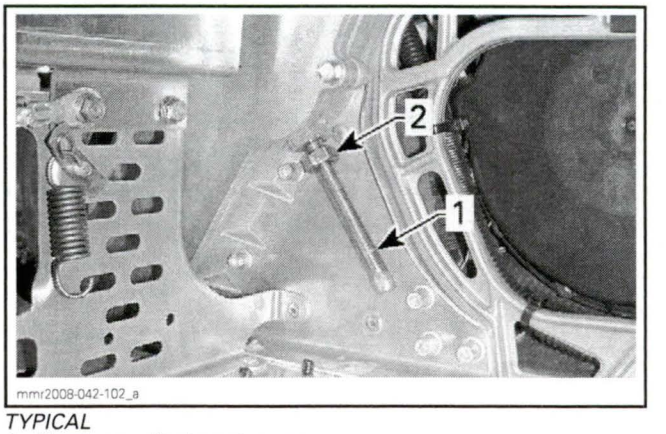
TYPICAL
1. Countershaft bearing flange
2. Retaining fasteners

   4.2 Be careful not to loose the brake hose retainer.
   4.3 Remove countershaft bearing flange from support.
5. Remove fill plug on the top of chaincase.



TYPICAL
1. Filling plug
2. Chaincase

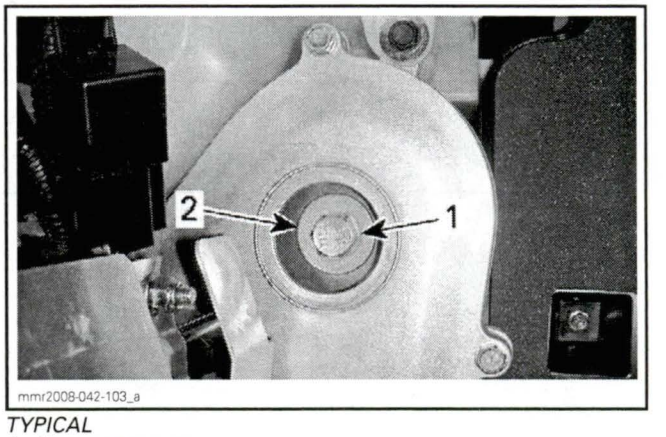
6. Release drive chain tension by unscrewing tensioner adjustment screw.



TYPICAL
1. Tensioner adjustment screw
2. Lock nut

NOTE: Do not remove tensioner adjustment screw completely.

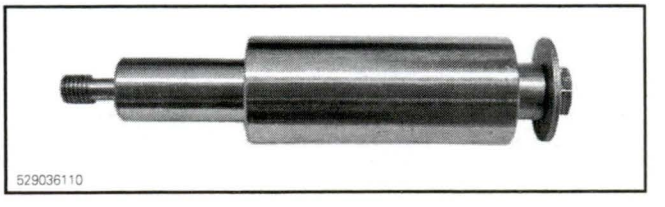
7. Remove the upper gear screw and the conical spring washer.

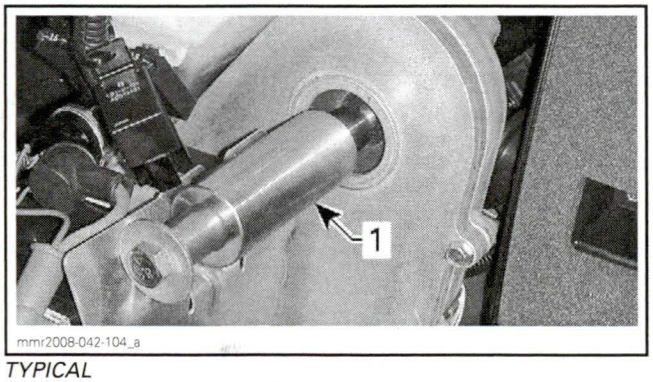


TYPICAL
1. Upper gear screw
2. Conical spring washer

NOTE: Slightly tilt the bolt to avoid dropping washer inside chaincase.

8. Install the UPPER GEAR RETAINING TOOL (P/N 529 036 110) on countershaft end.

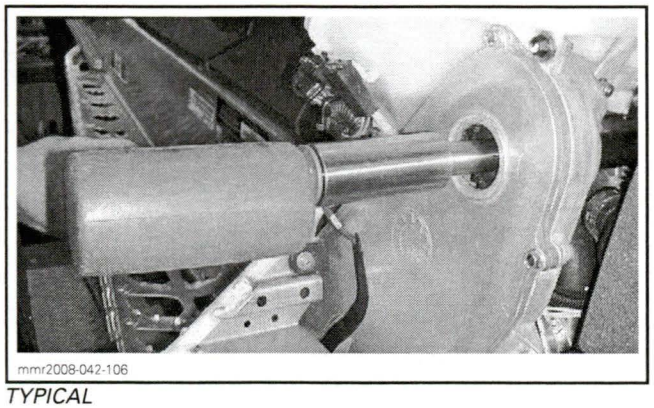




TYPICAL
1. Upper gear retaining tool

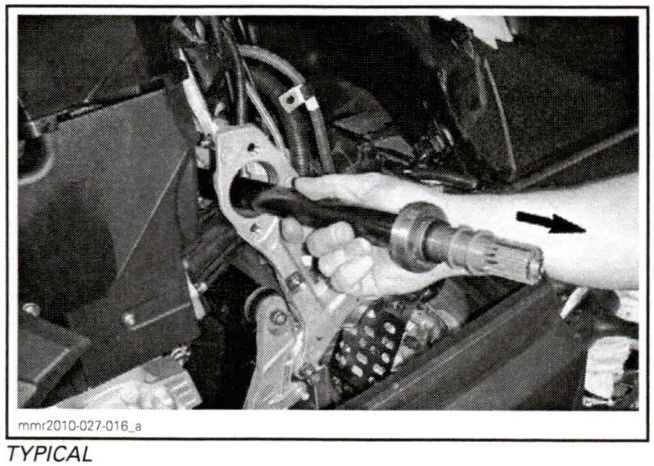
9. Pull the driven pulley to disengage countershaft and upper gear.

NOTE: If necessary, tap the upper gear retaining tool with a plastic hammer.



TYPICAL

10. Unscrew countershaft from the upper gear retaining tool. **Do not** remove tool.
11. Remove countershaft from the vehicle.



TYPICAL

NOTE: The drive chain and the upper gear are maintained in place by the tool gear.

Countershaft Inspection

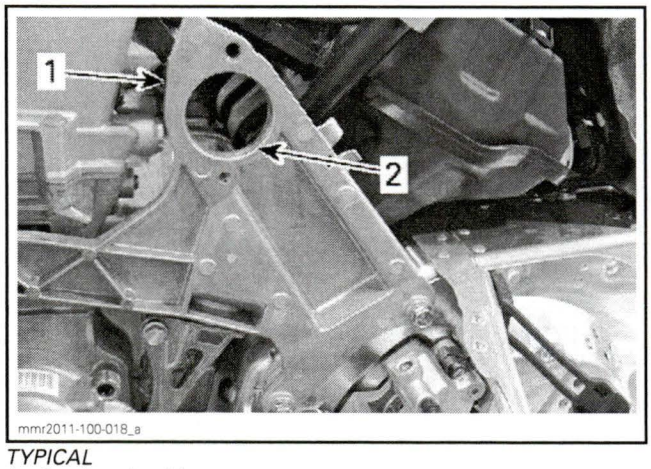
Replace countershaft if one of the following problem is detected:

- Bent, twisted or otherwise damaged countershaft.
- Defective splines and threads at the end of countershaft.

Countershaft Installation

The installation is the reverse of removal procedure, however pay attention to the following.

Remove any rust on bearing shoulder of countershaft bearing support using sand paper (600-grit or 1000-grit) or steel wool.



TYPICAL
1. Bearing shoulder
2. Countershaft bearing support

Apply a thin layer of LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070) on bearing shoulder.

1. Insert countershaft through countershaft bearing support.
2. Fasten the end of countershaft to upper gear retaining tool.
3. Align countershaft splines with upper gear splines.
4. Using the upper gear retaining tool as a puller, install countershaft in upper gear. Ensure countershaft bearing is installed properly in countershaft bearing support.
5. Remove the upper gear retaining tool.
6. Install the upper gear screw and the conical spring washer.

NOTE: The conical spring washer must be installed with its concave side towards upper gear.

Tighten upper gear screw to the specified torque.

Secure the brake hose using the upper flange retaining bolt.

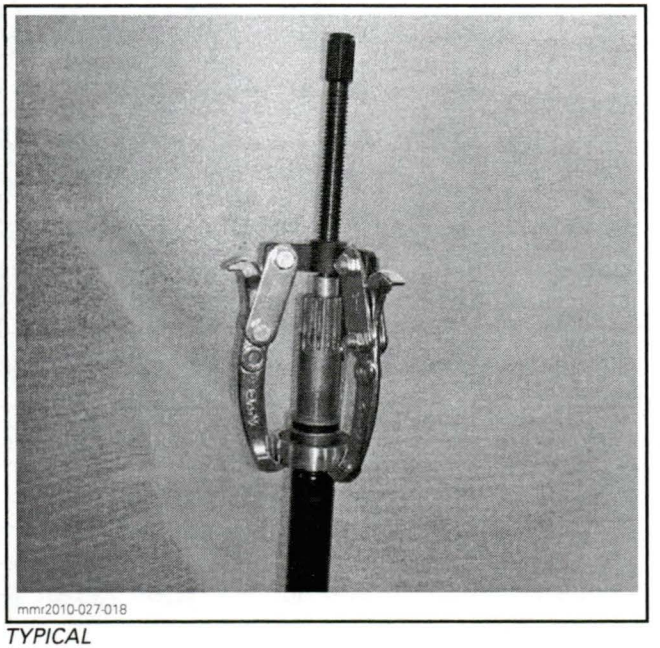
Tighten countershaft bearing flange bolts to the specified torque.

COUNTERSHAFT FASTENERS TIGHTENING TORQUE	
Upper gear screw	48 N•m (35 lbf•ft)
Bearing flange fasteners	15 N•m (133 lbf•**in**)

COUNTERSHAFT BEARING

Countershaft Bearing Removal

1. Proceed with *COUNTERSHAFT REMOVAL*, see procedure in this subsection.
2. Install an appropriate puller on the countershaft bearing.

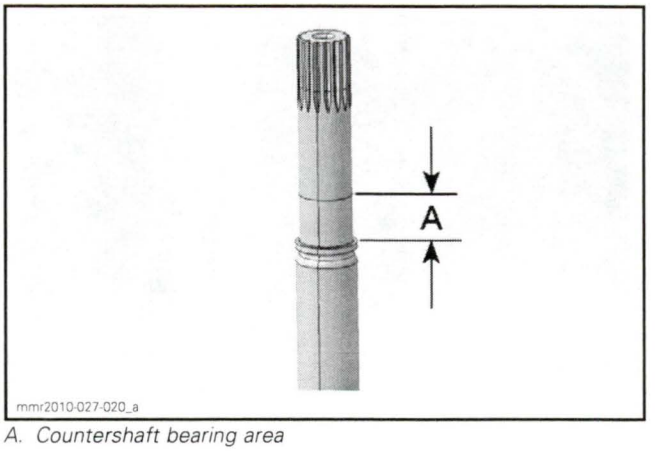


TYPICAL

3. Tighten puller to extract the bearing.
4. Discard the bearing.

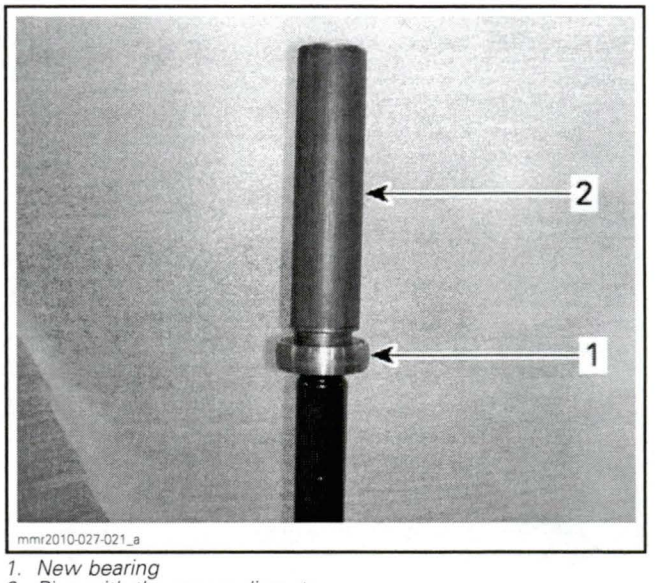
Countershaft Bearing Installation

1. Clean residues on countershaft bearing area using PULLEY FLANGE CLEANER (P/N 413 711 809).



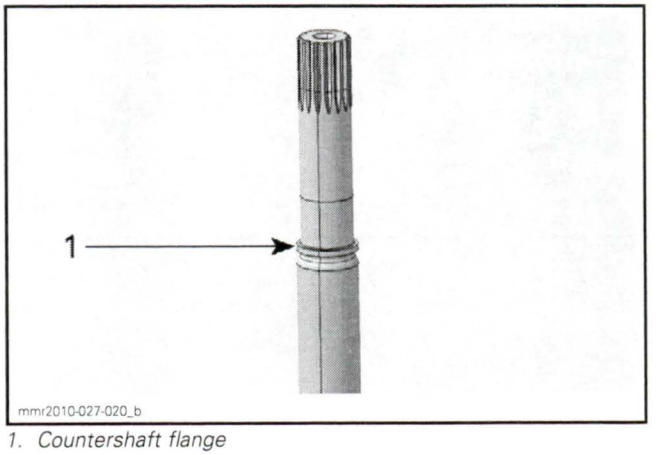
A. Countershaft bearing area

2. Apply LOCTITE 609 (P/N 413 703 100) on countershaft bearing area.
3. Install a **NEW** bearing on countershaft using a press and a pipe with the proper diameter.



1. New bearing
2. Pipe with the proper diameter

4. Press bearing until it is properly seated on countershaft flange.



1. Countershaft flange

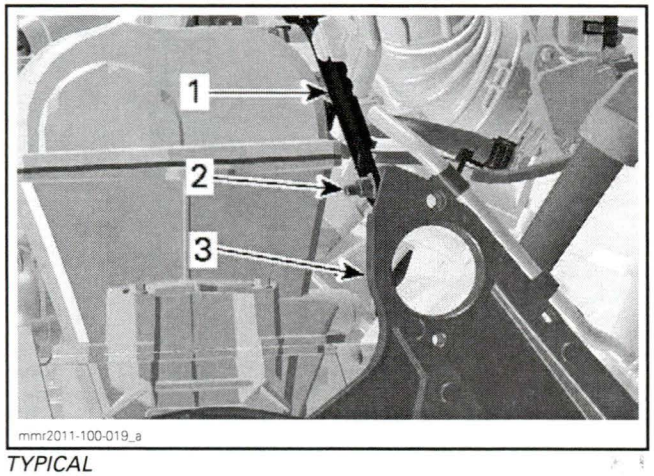
5. Clean the surplus of Loctite with a rag to avoid having Loctite on sliding sheave bushing.

NOTICE **Always use a press, never tap on countershaft bearing installer with an hammer to avoid damaging bearing and countershaft. Always apply force on the inner race of the bearing.**

COUNTERSHAFT BEARING SUPPORT

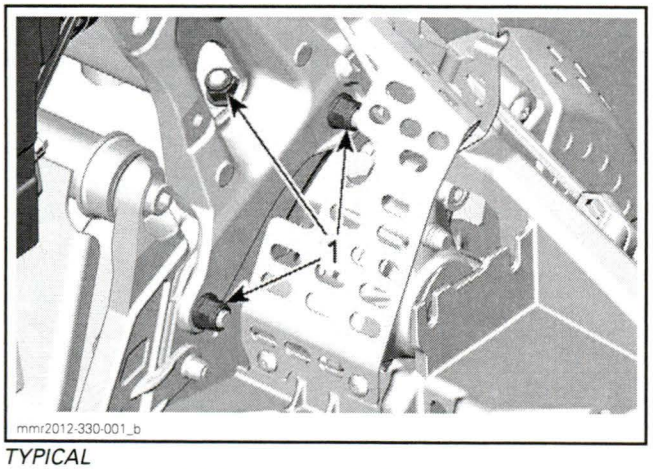
Countershaft Bearing Support Removal

1. Remove countershaft, see *COUNTERSHAFT REMOVAL* in this subsection.
2. Remove the bolt attaching the upper frame member to the countershaft bearing support.



TYPICAL
1. *Upper frame member*
2. *Bolt*
3. *Countershaft bearing support*

3. Remove the countershaft bearing support retaining nuts.



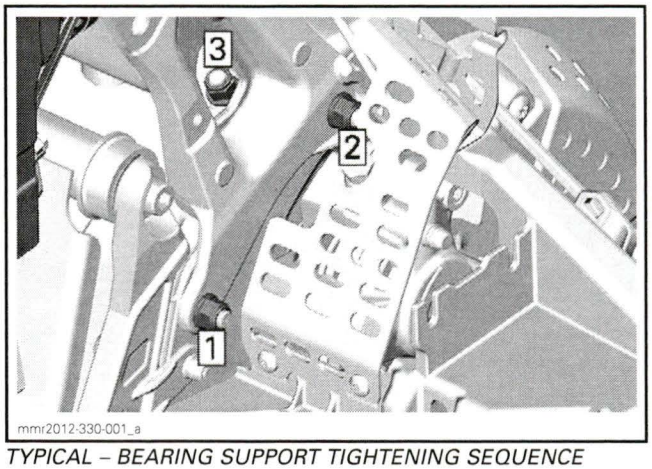
TYPICAL
1. *Countershaft bearing support retaining nuts*

4. Remove the countershaft bearing support.

Countershaft Bearing Support Installation

1. Thread the fasteners retaining the bearing support to the chassis without tightening yet.
2. Tighten the retaining fasteners to the specified torque following the illustrated sequence.

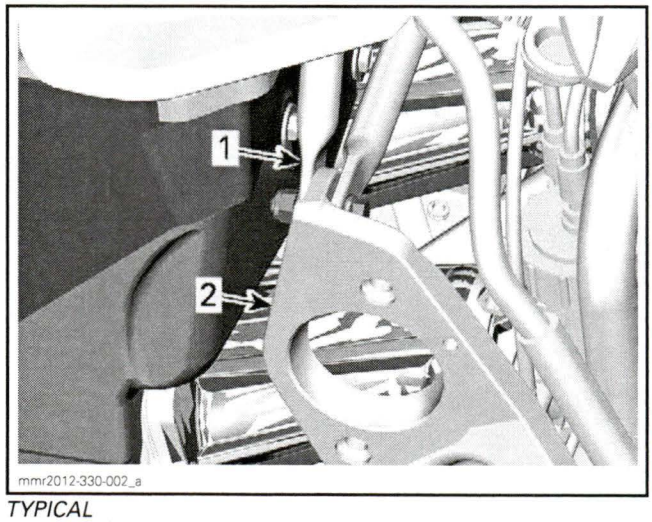
TIGHTENING TORQUE	
Bearing support lower retaining nuts	34 N•m (25 lbf•ft)



TYPICAL – BEARING SUPPORT TIGHTENING SEQUENCE

3. Install the upper frame member to the bearing support and tighten bolt to the specified torque.

TIGHTENING TORQUE	
Bearing support upper retaining bolt	14 N•m (124 lbf•**in**)



TYPICAL
1. *Upper frame member*
2. *Bearing support*

4. Install all other removed parts.

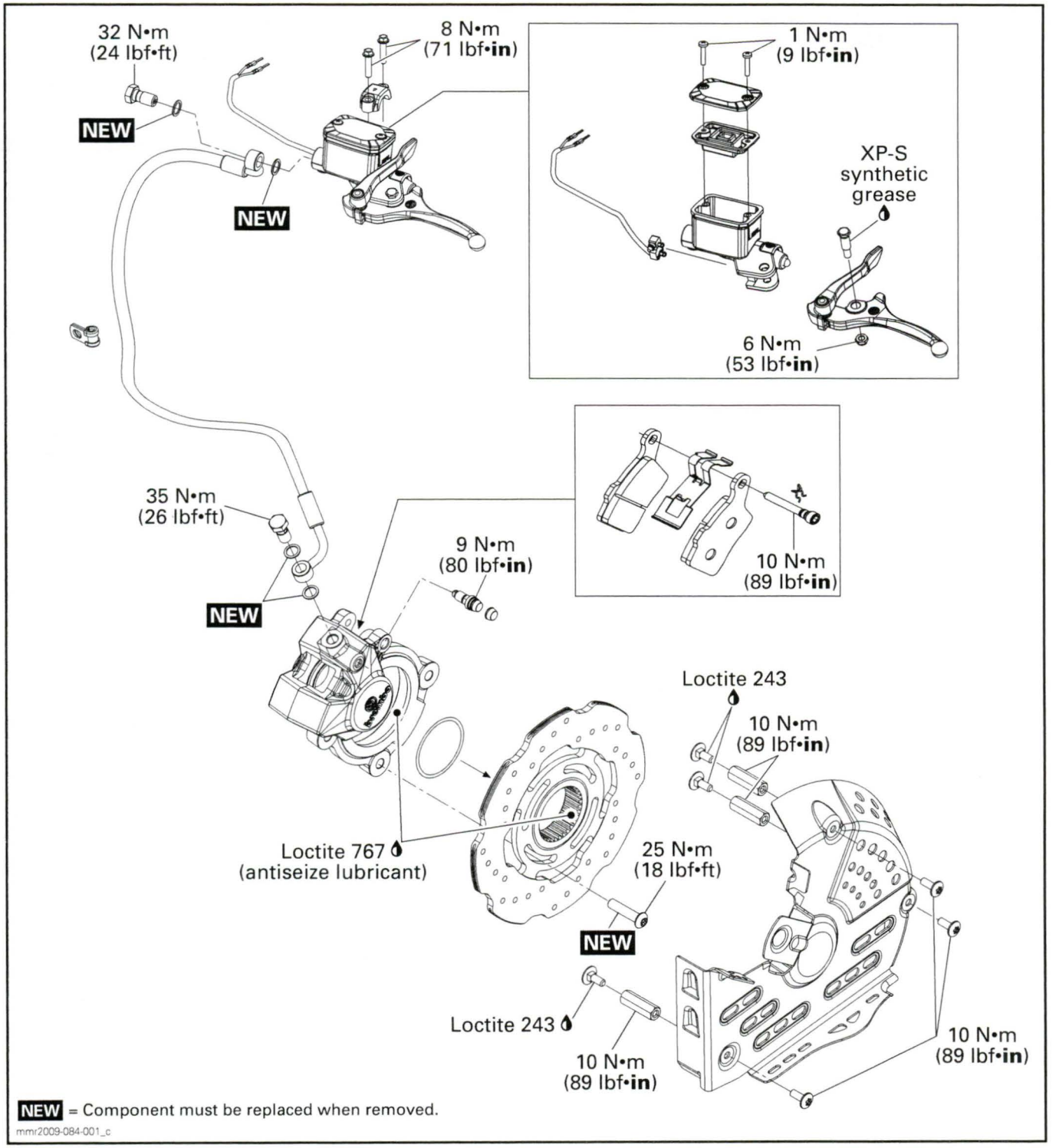
BRAKE

SERVICE TOOLS

Description	Part Number	Page
CALIPER PULLER	529 036 145	259
FLUKE 115 MULTIMETER	529 035 868	263
PROTECTIVE CAP	529 036 150	259

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 767 (ANTISEIZE LUBRICANT)	293 800 070	260
XPS SYNTHETIC GREASE	293 550 010	263


32 N•m
(24 lbf•ft)
NEW
NEW
8 N•m
(71 lbf•in)
1 N•m
(9 lbf•in)
XP-S
synthetic
grease
6 N•m
(53 lbf•in)
35 N•m
(26 lbf•ft)
NEW
9 N•m
(80 lbf•in)
10 N•m
(89 lbf•in)
Loctite 243
10 N•m
(89 lbf•in)
Loctite 767
(antiseize lubricant)
25 N•m
(18 lbf•ft)
NEW
Loctite 243
10 N•m
(89 lbf•in)
10 N•m
(89 lbf•in)
NEW = Component must be replaced when removed.
mmr2009-084-001_c

GENERAL

NOTICE Avoid spilling brake fluid on plastic, rubber or painted parts. Protect these parts with a rag when servicing brake system.

⚠ WARNING

To avoid serious damage to the brake system, use only DOT 4 brake fluid from a sealed container. Do not use brake fluid taken from old or already opened containers, nor mix different fluids for topping off.

PROCEDURES

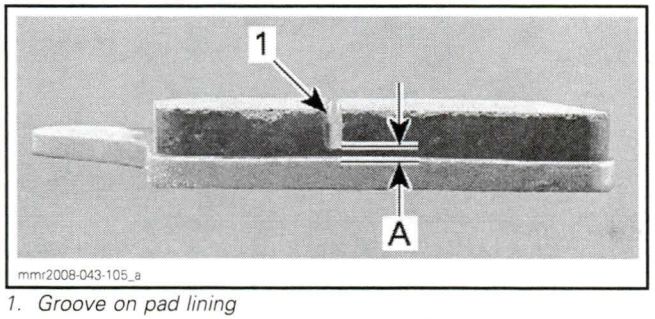
BRAKE PADS

Brake Pads Inspection

1. Measure brake pad lining thickness.

SERVICE LIMIT	
Brake pad thickness	1 mm (1/32 in)

NOTICE Brake pads must always be replaced in pairs.

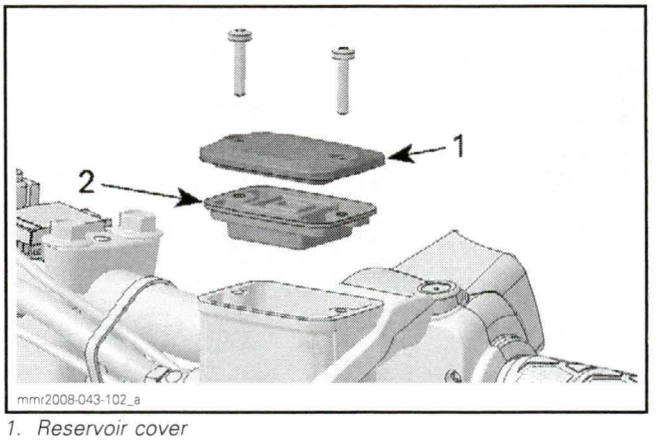


1. Groove on pad lining
A. Brake pad minimum thickness 1 mm (1/32 in)

2. Inspect brake disc at the same time. See *BRAKE DISC INSPECTION* in this subsection.

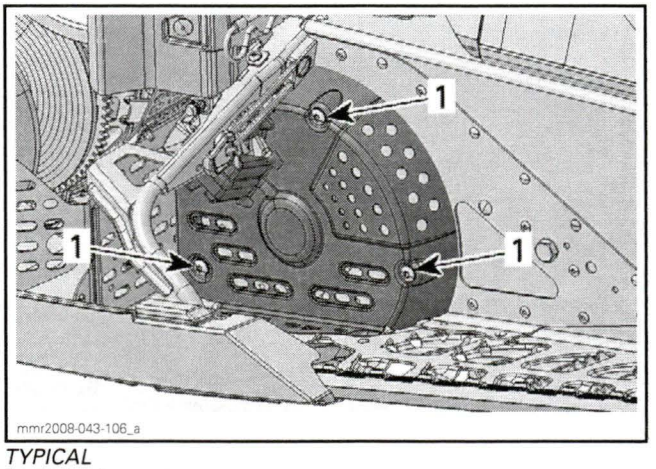
Brake Pads Replacement

1. Place the vehicle on a level surface.
2. Cover the plastic parts under and near master cylinder in the event that brake fluid would be spilled.
3. Remove reservoir cover with its diaphragm.



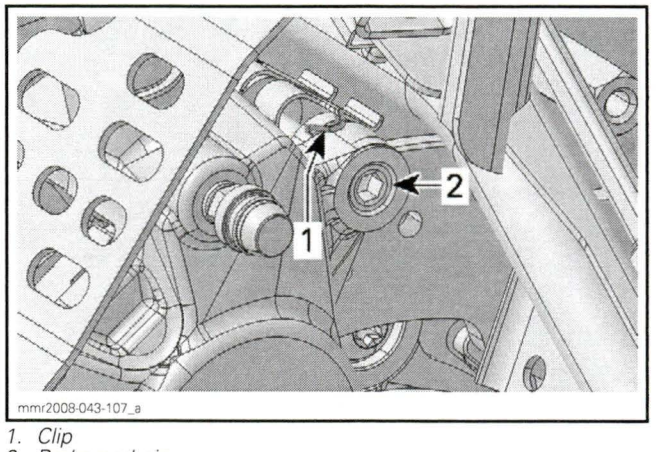
1. Reservoir cover
2. Diaphragm

4. Remove the disc brake protective cover.



TYPICAL
1. Retaining screws

5. Remove the clip securing pad pin.
6. Unscrew and remove the pad pin.

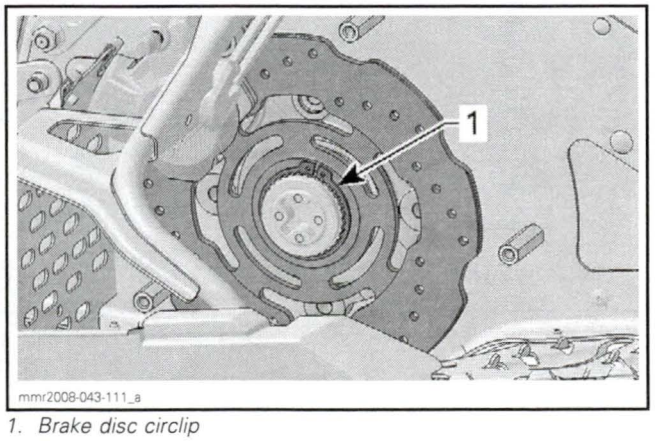


1. Clip
2. Brake pad pin

7. Using a flat screwdriver, retract pistons into their bores.

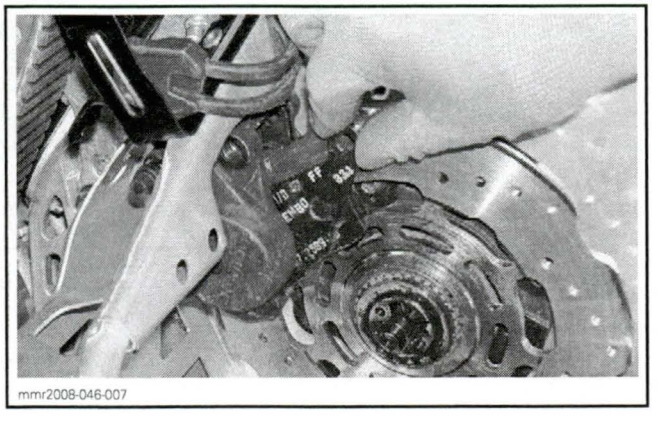
NOTICE Pay attention to avoid scratching brake disc.

8. Remove the circlip securing disc brake to drive shaft.

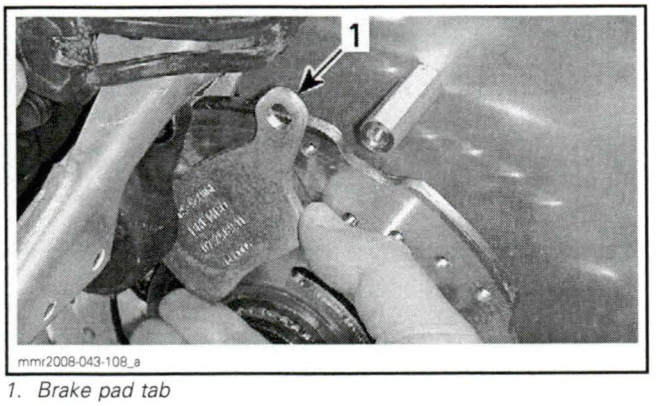


1. Brake disc circlip

9. Remove brake pads.
   9.1 Remove the external pad first.
   9.2 Pull the brake disc and remove the internal pad.

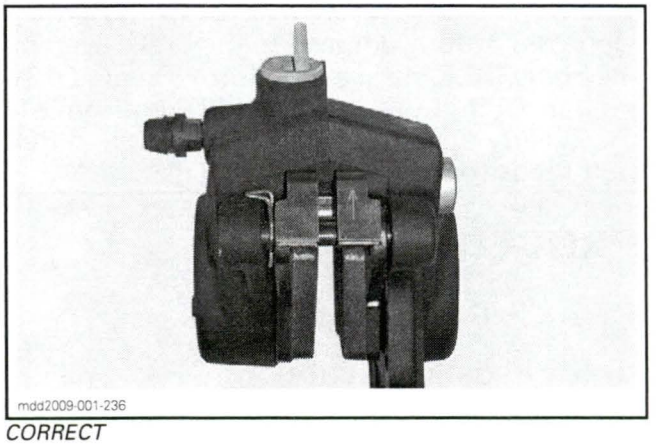


10. At this time, check brake disc condition. Refer to *BRAKE DISC INSPECTION* further in this subsection.
11. Install **NEW** brake pads with tabs upward.

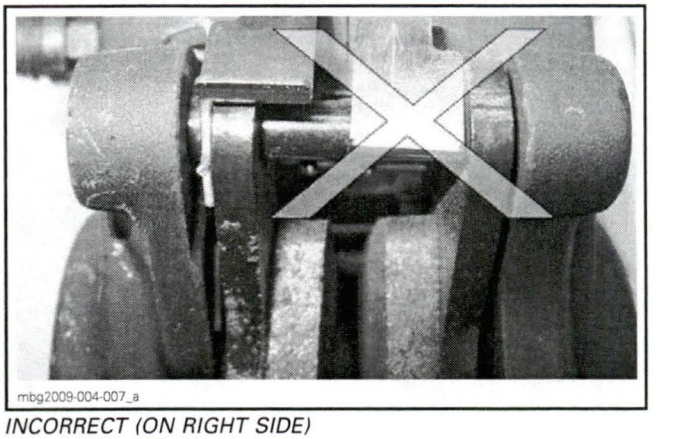


1. Brake pad tab

12. Install brake pad pin.
13. Tighten pin to 10 N•m (89 lbf•**in**).
14. Install clip on brake pad pin. If the clip seems loose, replace it with a new one.
15. Make sure spring ends on brake pads pins are correctly installed as per the following pictures.



CORRECT



INCORRECT (ON RIGHT SIDE)

16. Operate the brake lever several times to bring the brake pads into contact with the disc brake.
17. Check brake fluid level in master cylinder and refill if necessary.
18. Install the diaphragm and the reservoir cover.
19. Install the disc brake protective cover.
20. Ride the vehicle a few minutes to make sure the repair is successful.

CALIPER

Caliper Removal

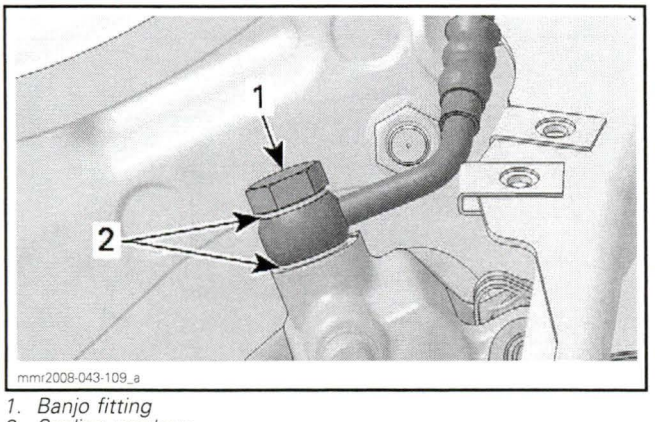
1. Open the RH side panel.
2. Refer to *CHAINCASE* subsection and carry out the following steps.
   2.1 Remove chaincase cover.
   2.2 Loosen drive chain.

2.3 Remove lower sprocket.

3. Open LH side panel.
4. Remove drive belt guard support. Refer to *DRIVE BELT* subsection.

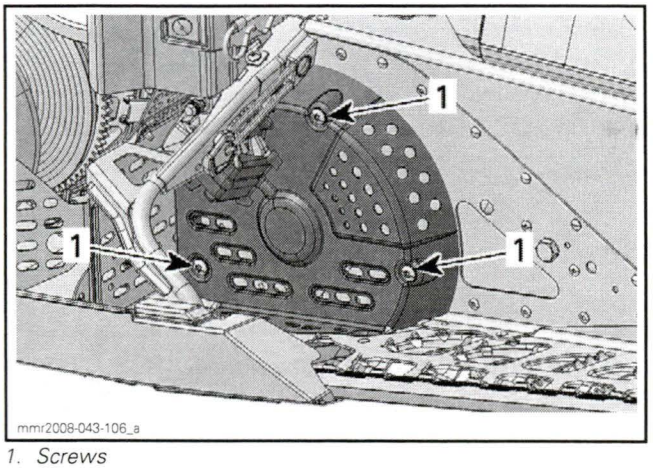
NOTE: If the caliper is not replaced, omit steps 5 and 6 concerning the brake system draining and brake hose removal.

5. Drain the brake system, refer to *BRAKE FLUID REPLACEMENT* in this subsection.
6. Remove the Banjo fitting and discard the sealing washers.



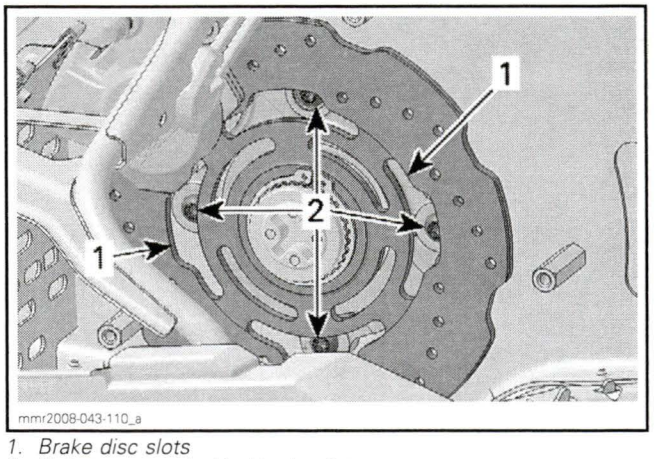
1. Banjo fitting
2. Sealing washers

7. Remove the brake disc protective cover.



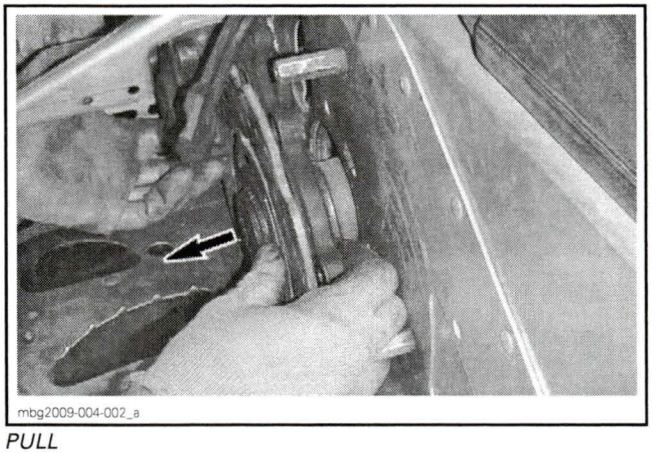
1. Screws

8. Lift the rear of vehicle and release track tension completely. Refer to *TRACK* subsection.
9. Turn driven pulley to align brake disc slots with caliper bracket screws.
10. Remove caliper screws (4) behind brake disc.



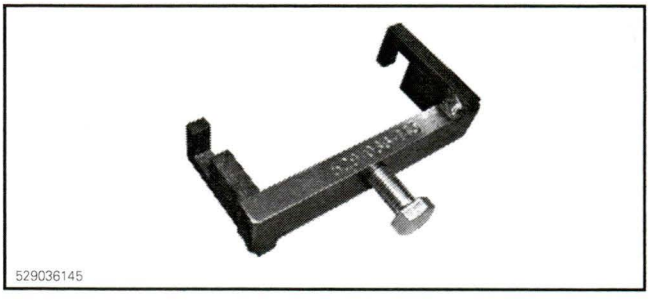
1. Brake disc slots
2. Caliper screws behind brake disc

11. Pull the drive axle assembly (brake disc, caliper and bearing) from LH side.



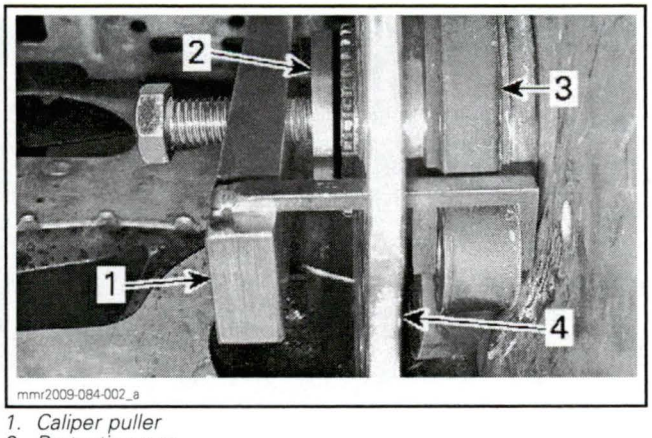
PULL

12. Remove *BRAKE PADS*, see procedure in this subsection.
13. Install the CALIPER PULLER (P/N 529 036 145) on the brake caliper through brake disc slots.



NOTE: Make sure puller tabs are correctly engaged on caliper.

14. Install the PROTECTIVE CAP (P/N 529 036 150) between caliper puller bolt and plastic cap.



1. Caliper puller
2. Protective cap
3. Caliper bracket
4. Brake disc

15. Tighten caliper puller bolt to separate caliper from drive axle bearing.

NOTICE Never use an impact tool to operate caliper puller. The caliper or the puller could break.

16. When brake disc is out of splines, remove it.
17. Remove caliper.

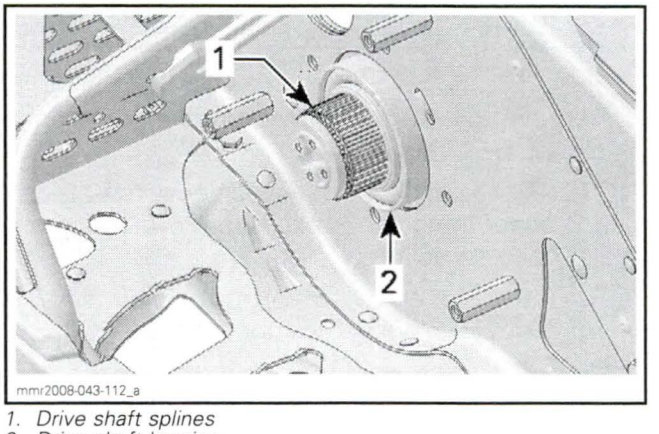
NOTICE Do not let caliper hangs by the hose and do not stretch or twist the hose.

Caliper Inspection

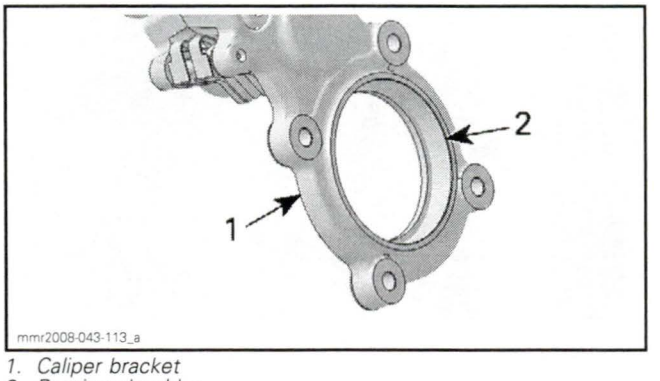
1. Check pistons for:
   - Rust
   - Scratches
   - Leaks.
2. Check caliper bracket for:
   - Cracks
   - Rust on bearing shoulder (clean with a steel wood).
3. Replace caliper if required.

Caliper Installation

1. Using your fingers or a small piece of wood, push both pistons into their bores.
2. Clean brake caliper bearing shoulder with fine steel wool.
3. Apply LOCTITE 767 (ANTISEIZE LUBRICANT) (P/N 293 800 070) on drive shaft splines and on caliper bracket bearing shoulder.

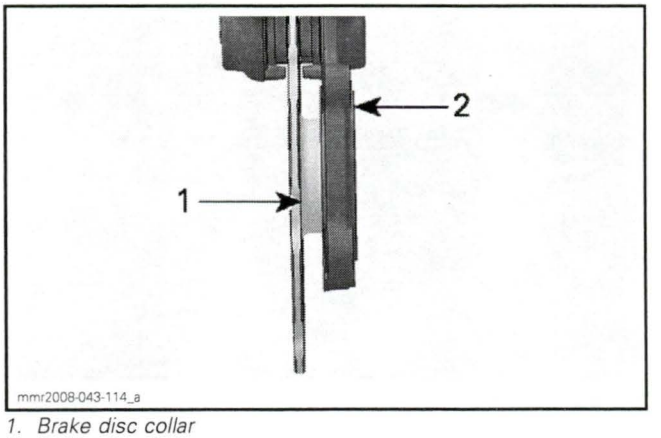


1. Drive shaft splines
2. Drive shaft bearing



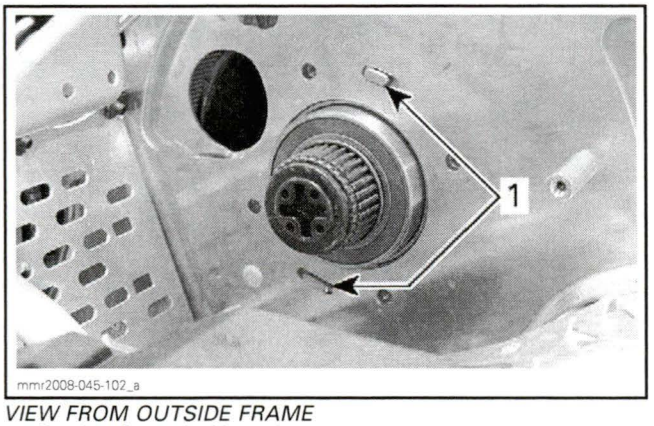
1. Caliper bracket
2. Bearing shoulder

4. Insert brake disc into caliper. The brake disc collar must be inserted into caliper bracket.



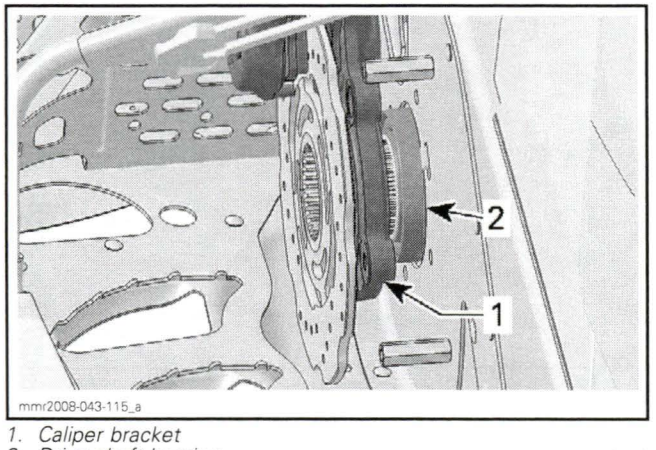
1. Brake disc collar
2. Caliper bracket

5. Ensure bearing flange is properly locked. Tabs must be properly inserted in frame.



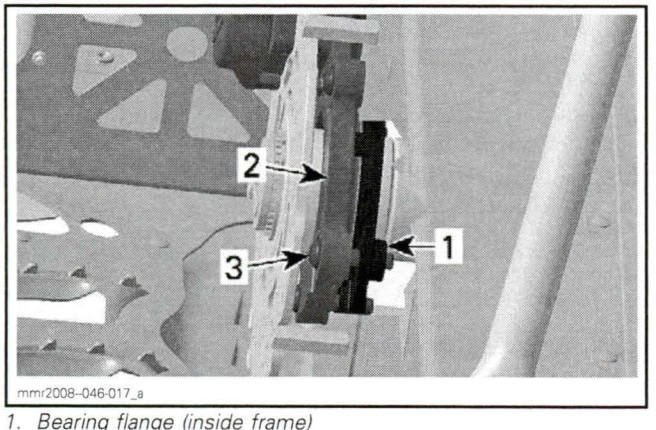
VIEW FROM OUTSIDE FRAME
1. Bearing flange locking tabs

6. Align brake disc splines with drive shaft splines and push the disc on the shaft.
7. Push the caliper bracket over drive shaft bearing.



1. Caliper bracket
2. Drive shaft bearing

8. Align caliper bracket holes with bearing flange holes and install caliper screws.



1. Bearing flange (inside frame)
2. Caliper bracket
3. Caliper screws

9. **HAND TORQUE** each caliper bracket screws evenly in a criss-cross pattern until bracket is correctly positioned against frame.

NOTICE Never use an air tool to tighten caliper screws. The caliper bracket could crack.

10. Torque caliper bracket screws to specification.

TIGHTENING TORQUE	
Caliper bracket screws	25 N•m (18 lbf•ft)

11. Install *BRAKE PADS*, see procedure in this subsection.
12. Install the brake disc circlip.
13. Install the Banjo fitting with two **NEW** sealing washers.

⚠ WARNING

Never apply threads sealant or Teflon tape to brake fittings.

14. Torque Banjo fitting to specification.

TIGHTENING TORQUE	
Banjo fitting	35 N•m (26 lbf•ft)

15. Fill and bleed the brake system. Refer to *BRAKE FLUID REPLACEMENT* in this subsection.
16. Install all other removed parts.
17. Check the operation of the brake carefully before riding the snowmobile.

BRAKE DISC

Brake Disc Inspection

Prior Brake Disc Removal

1. Remove the disc brake protective cover.
2. Check for scoring, cracking or bending, replace as required.
3. Measure brake disc thickness. If the brake disc is out of specification, replace it with a new one.

NOTICE Brake disc should never be machined.

BRAKE DISC THICKNESS	
Minimum thickness	4.5 mm (.177 in)

After Brake Disc Removal

1. Check brake disc splines and drive shaft splines for wear or other damages. Replace defective parts.

Brake Disc Removal and Installation

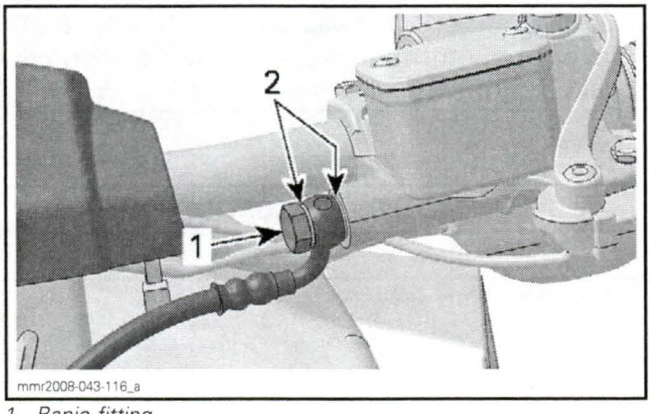
Use the same procedure as for the caliper.

MASTER CYLINDER

Master Cylinder Removal

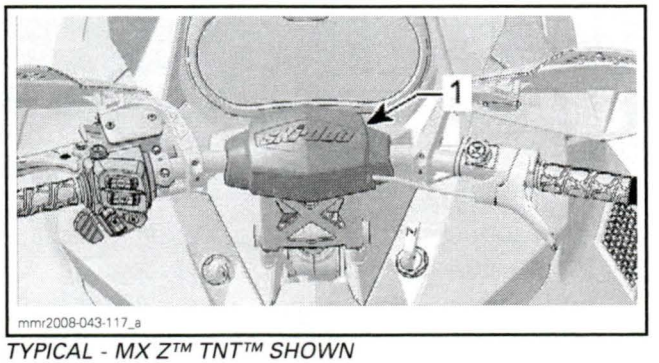
NOTE: If the master cylinder is not replaced, omit the next steps concerning the brake system draining and brake hose removal.

1. Drain the brake system, refer to *BRAKE FLUID REPLACEMENT* in this subsection.
2. Remove the Banjo fitting and discard the sealing washers.



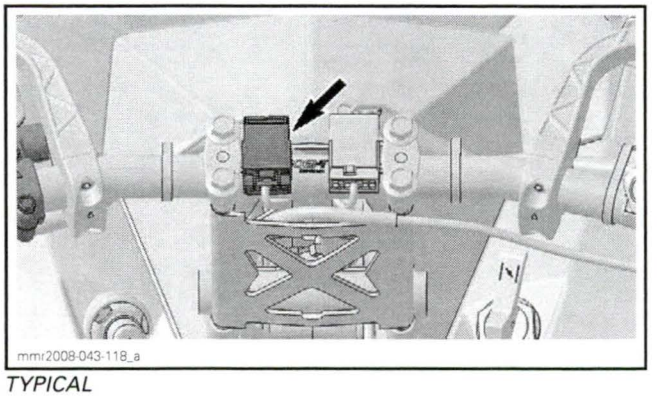
1. Banjo fitting
2. Sealing washers

3. Remove steering pad.



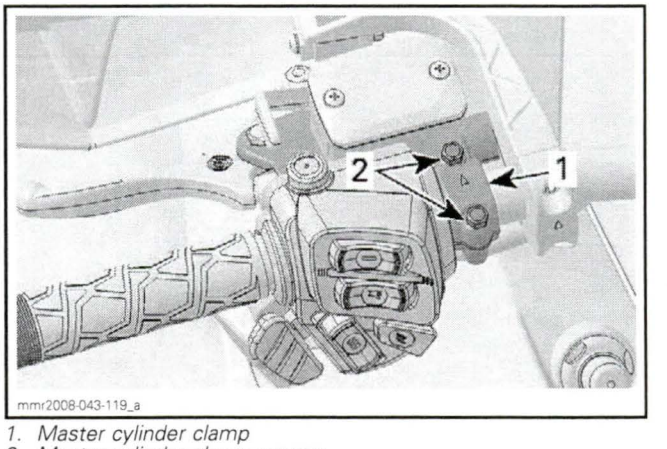
TYPICAL - MX Z™ TNT™ SHOWN
1. Steering pad

4. Unplug the LH connector.



TYPICAL

5. Cut locking tie securing brake light switch wiring to handlebar.
6. Remove screws and clamp securing master cylinder to handlebar.



1. Master cylinder clamp
2. Master cylinder clamp screws

7. Remove master cylinder.

NOTICE **Do not let master cylinder hangs by the hose and do not stretch or twist the hose.**

Master Cylinder Inspection

Discard all remaining fluid inside master cylinder reservoir.

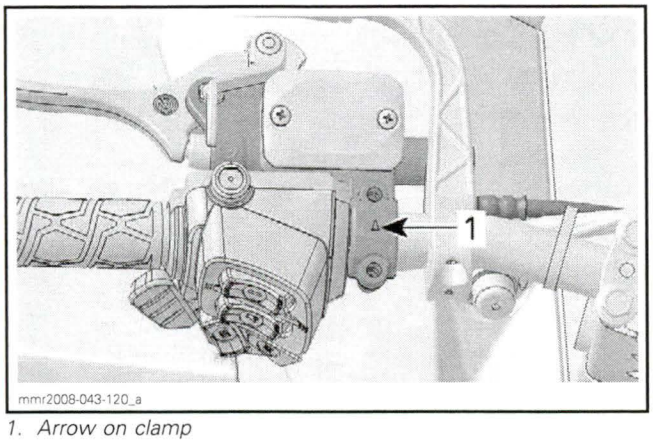
Check if the seal of the reservoir cap is brittle, hard or damaged. Replace if necessary.

If the reservoir is damaged or leaking, replace master cylinder.

Check if brake lever is bent, cracked or otherwise damaged. Replace brake lever if required.

Master Cylinder Installation

1. Place the master cylinder on the handlebar.
2. Install master cylinder clamp with its arrow pointing toward the front of vehicle.



1. Arrow on clamp

3. Install master cylinder clamp screws and tighten loosely.
4. With the handlebar in a straight ahead position, place the reservoir parallel to the ground.
5. Tighten master cylinder clamp screws to specification.

TIGHTENING TORQUE	
Master cylinder clamp screws	8 N•m (71 lbf•**in**)

6. Install the Banjo fitting with two **NEW** sealing washers.

⚠ WARNING

Never apply threads sealant or Teflon tape to brake fittings.

7. Torque Banjo fitting to specification.

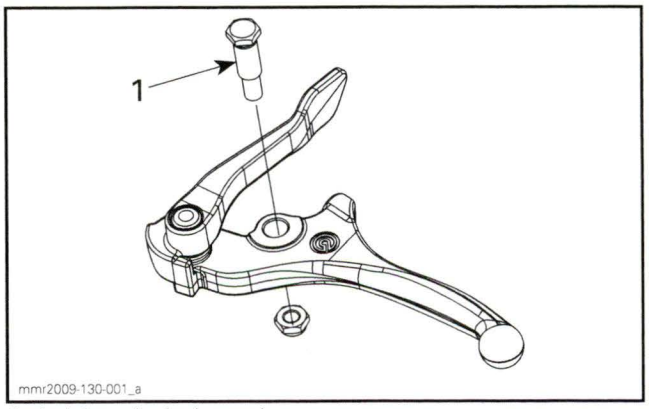
TIGHTENING TORQUE	
Banjo fitting	32 N•m (24 lbf•ft)

8. Fill and bleed the brake system. Refer to *BRAKE FLUID REPLACEMENT* in this subsection.
9. Connect brake light switch connector.
10. Install steering cover.

BRAKE LEVER

Brake Lever Replacement

1. Remove brake lever by unscrewing the pivot nut of brake lever.
2. Lubricate brake lever pivot using XPS SYNTHETIC GREASE (P/N 293 550 010).



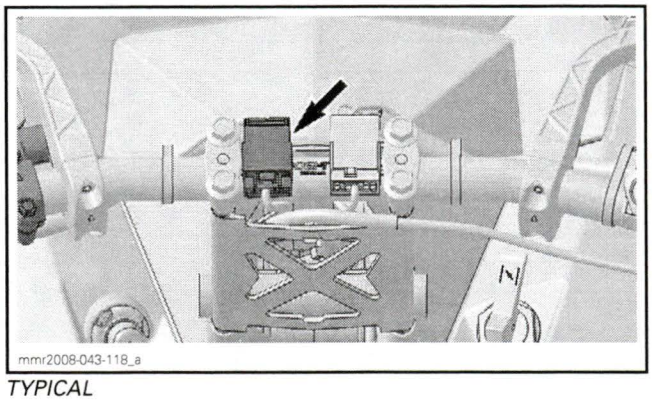
1. Lubricate brake lever pivot

3. Install brake lever.
4. Torque pivot nut of brake lever to 6 N•m (53 lbf•**in**).

BRAKE LIGHT SWITCH

Brake Light Switch Continuity Test

1. Remove steering cover.
2. Disconnect brake light switch connector.



TYPICAL

3. Release brake lever.
4. Measure resistance as per the following table.

REQUIRED TOOL	
FLUKE 115 MULTIMETER (P/N 529 035 868)	

TEST PROBES	RESISTANCE
Pin 4 (GY)	Open (OL)
Pin 5 (BR)	

5. Press and hold brake lever.
6. Measure resistance as per the following table.

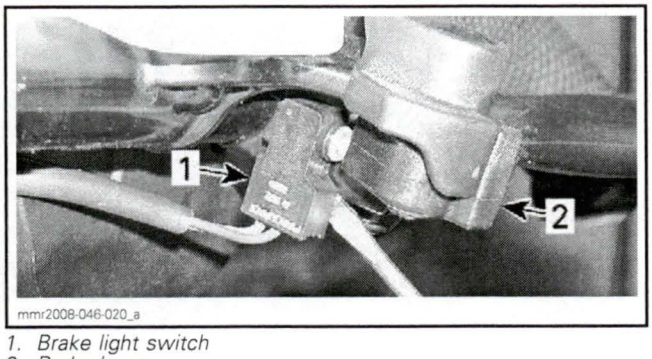
TEST PROBES	RESISTANCE
Pin 4 (GY)	Close to 0 Ω
Pin 5 (BR)	

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

If readings correspond to the above tables, check wiring and connectors going to switch. Refer to wiring diagram and *LIGHTS, GAUGE AND ACCESSORIES* subsection.

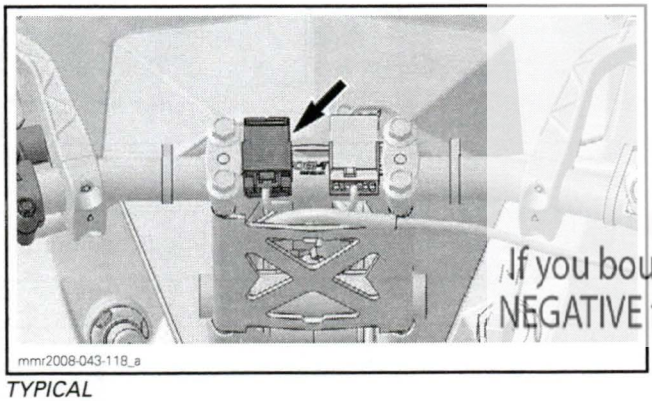
Brake Light Switch Removal

1. Slip a small screwdriver between brake light switch and brake lever and separate them.



1. Brake light switch
2. Brake lever

2. Remove the steering cover and unplug the LH connector.



TYPICAL

3. Cut all locking ties securing switch wires.
4. Remove switch wires from connector.

NOTE: Check wires location for reinstallation.

Brake Light Switch Installation

1. Plug switch wires into connector.
2. Squeeze brake lever.
3. Insert the both tabs of switch into brake lever body.
4. Plug the connector.
5. Check if switch is working properly.
6. Install new locking ties and the steering cover.

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

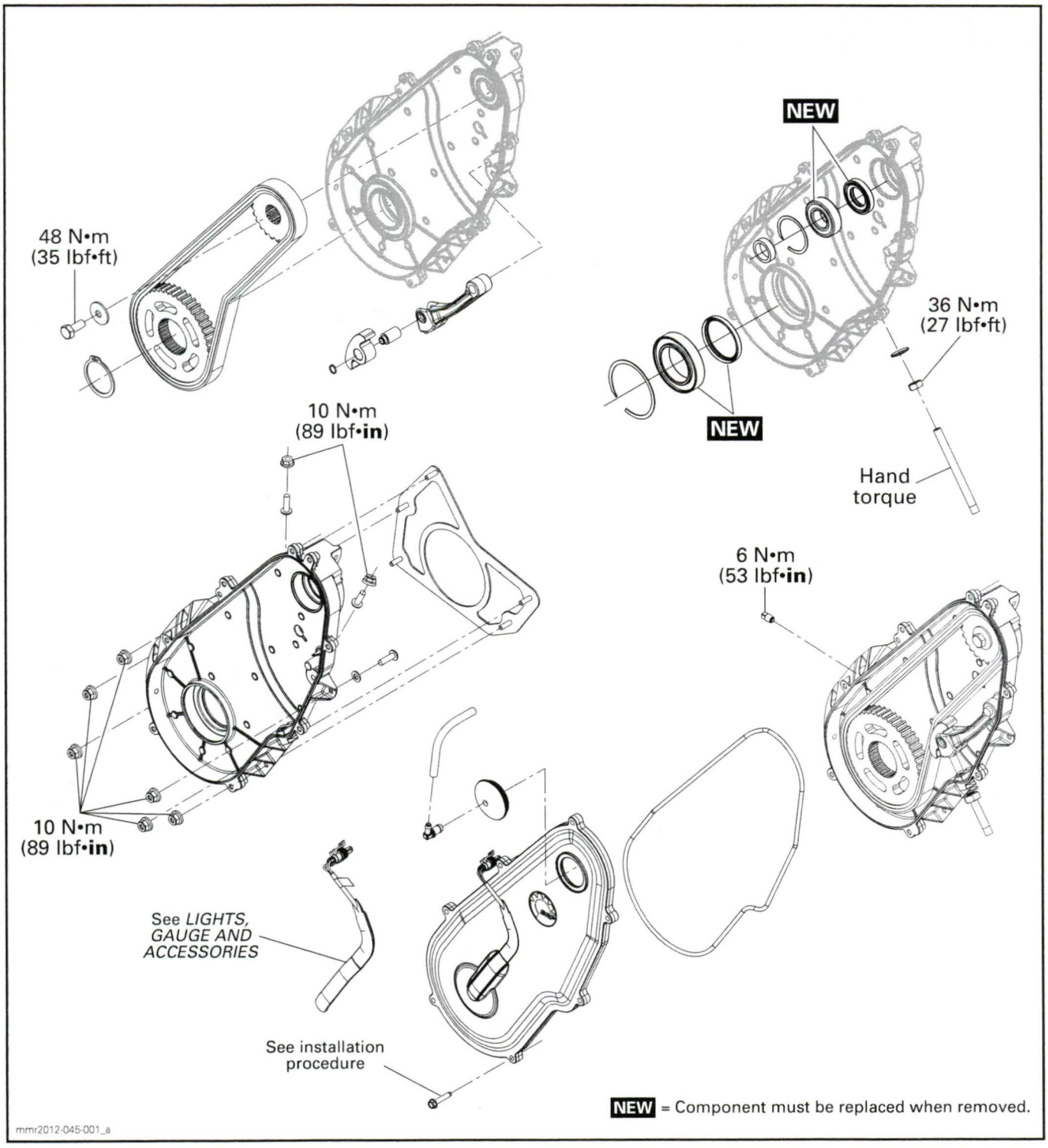
CHAINCASE

SERVICE TOOLS

Description	Part Number	Page
BEARING PULLER/PUSHER	529 036 111	269
BEARING PULLER/PUSHER	529 036 112	269

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON SEAL PULLER	YA105	269


48 N•m
(35 lbf•ft)
NEW
36 N•m
(27 lbf•ft)
NEW
Hand
torque
10 N•m
(89 lbf•in)
6 N•m
(53 lbf•in)
10 N•m
(89 lbf•in)
See LIGHTS, GAUGE AND ACCESSORIES
See installation procedure
NEW = Component must be replaced when removed.
mmr2012-045-001_a

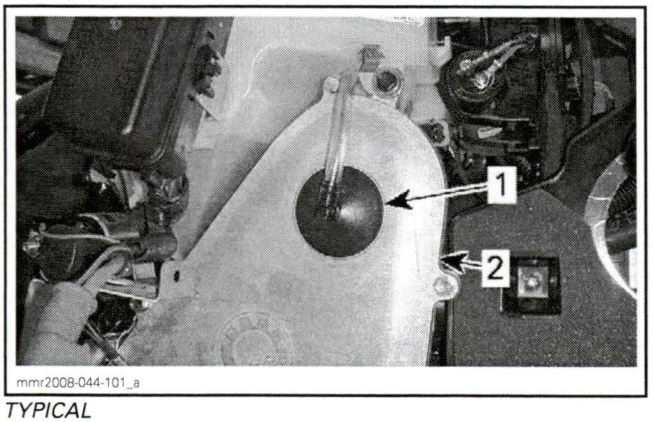
PROCEDURES

CHAINCASE

Chaincase Disassembly

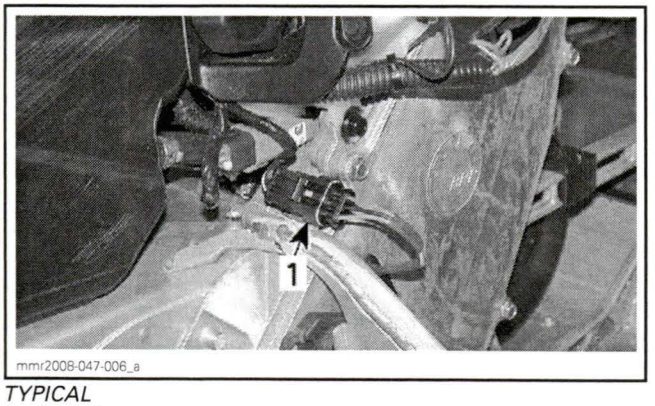
Chaincase Cover Removal

1. Apply parking brake.
2. Proceed with *MUFFLER REMOVAL*. Refer to *EXHAUST SYSTEM* subsection.
3. On electric start models, remove battery and battery rack. Refer to *CHARGING SYSTEM* subsection.
4. Remove filler plug on top of chaincase cover.



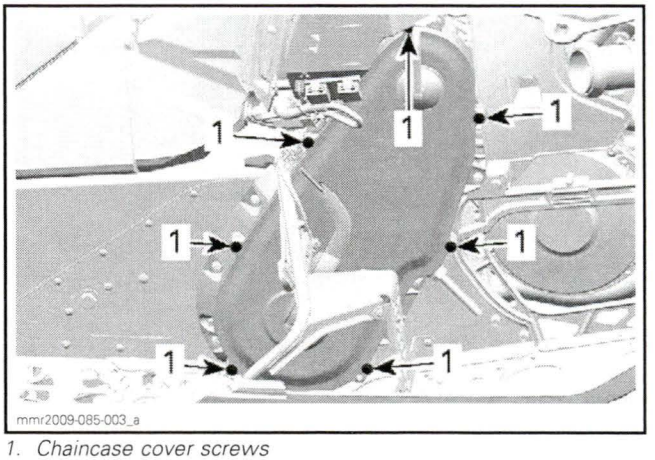
TYPICAL
1. *Filler plug*
2. *Chaincase cover*

5. Disconnect speed sensor connector.



TYPICAL
1. *Speed sensor connector*

6. Place a container under vehicle in line with chaincase to catch chaincase oil.
7. Unscrew and remove chaincase cover screws.

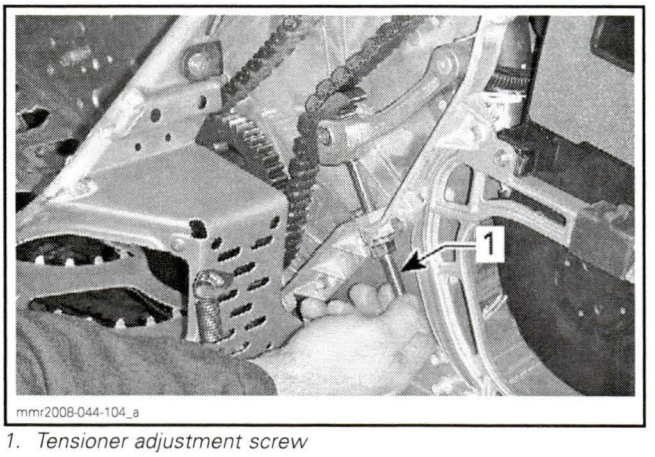


1. *Chaincase cover screws*

8. Pull on bottom of chaincase cover to drain oil.
9. Wait a moment then remove the cover completely.

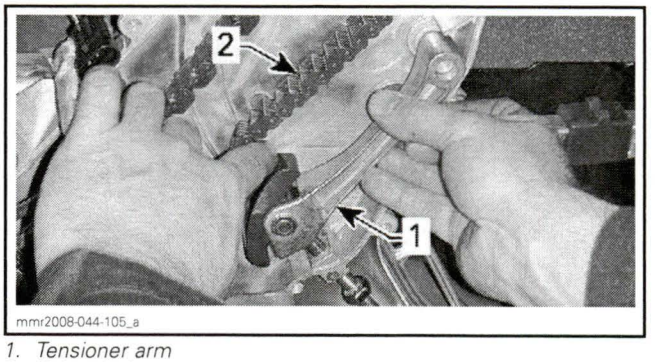
Chain Tensioner Removal

1. Release tension from drive chain by unscrewing the tensioner adjustment screw.



1. *Tensioner adjustment screw*

2. Remove tensioner arm.

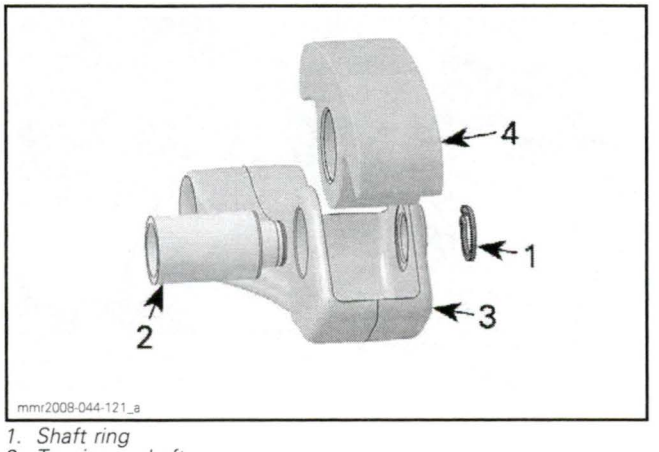


1. *Tensioner arm*
2. *Drive chain*

NOTE: The following steps are required only if the tensioner or the slider is defective.

3. Remove the shaft ring securing the tensioner shaft to tensioner arm.

4. Remove the tensioner shaft to remove the slider.

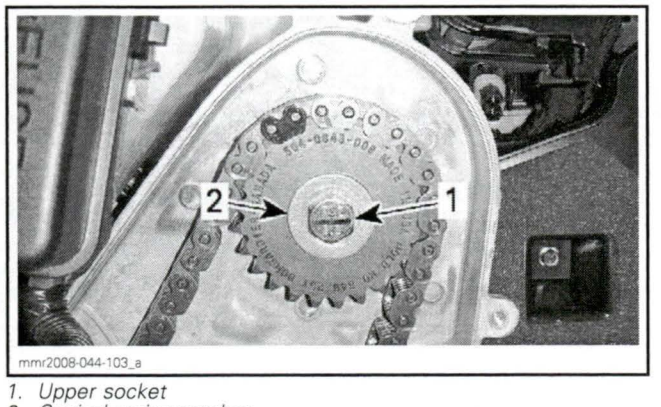


1. Shaft ring
2. Tensioner shaft
3. Tensioner arm
4. Slider

Drive Chain and Sprocket Removal

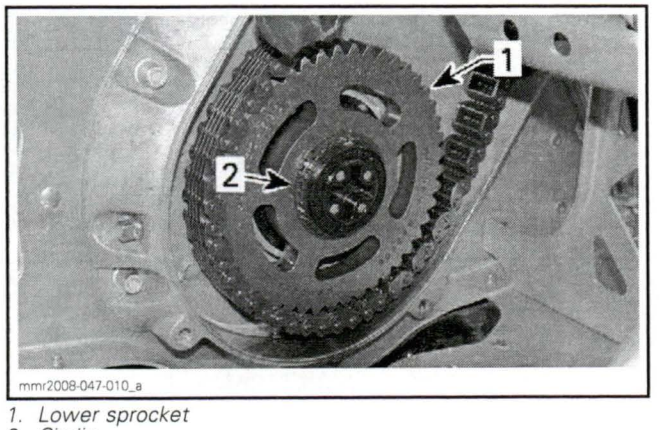
NOTE: Prior to removing the drive chain, check the drive chain deflection.

1. Remove the upper sprocket screw and its conical spring washer.



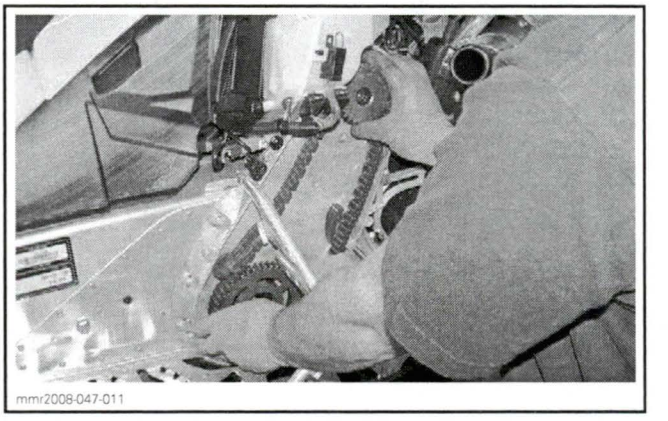
1. Upper socket
2. Conical spring washer

2. Remove the lower sprocket circlip.

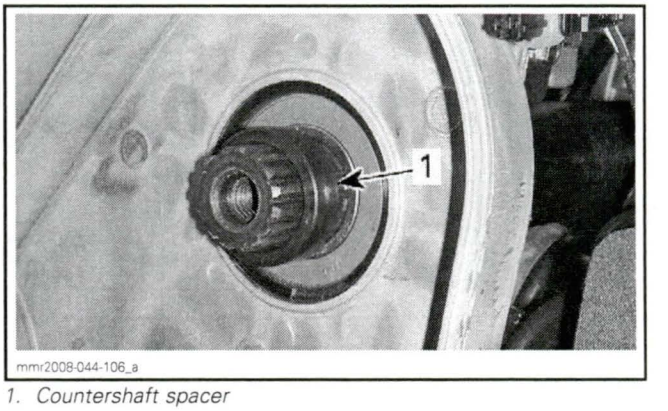


1. Lower sprocket
2. Circlip

3. Remove the upper sprocket, lower sprocket and drive chain simultaneously.



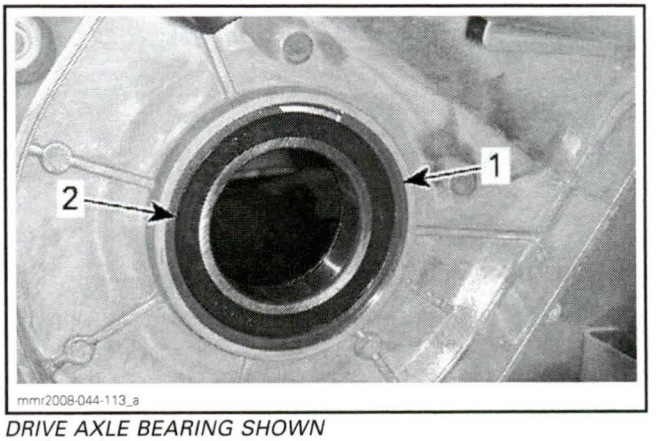
4. Remove the countershaft spacer.



1. Countershaft spacer

Chaincase Bearing Removal

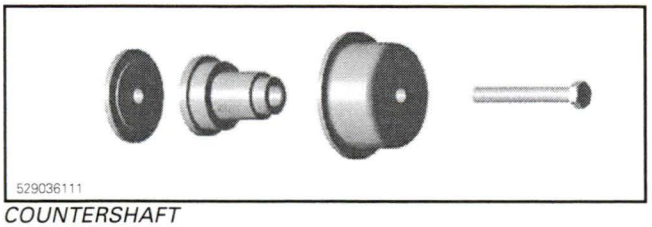
1. Remove countershaft or drive axle, depending which bearing is replaced. Refer to the appropriate subsection, *DRIVEN PULLEY AND COUNTERSHAFT* or *DRIVE AXLE*.
2. Remove snap ring securing bearing into chaincase.



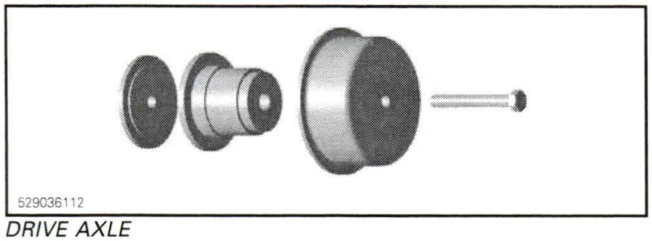
DRIVE AXLE BEARING SHOWN
1. Snap ring
2. Bearing

3. Install the appropriate bearing extractor:

BEARING	TOOL
Countershaft	BEARING PULLER/PUSHER (P/N 529 036 111)
Drive axle	BEARING PULLER/PUSHER (P/N 529 036 112)

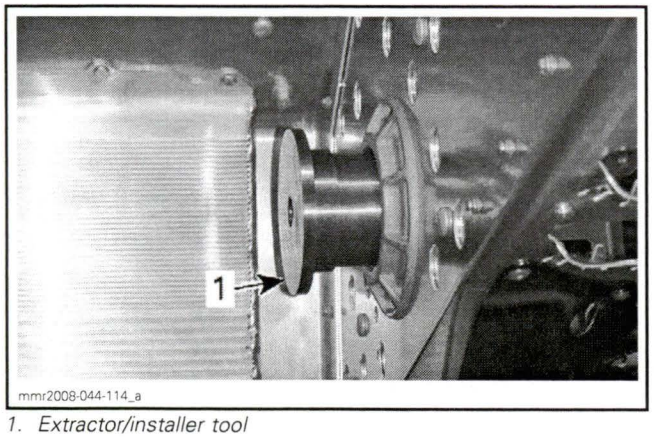


COUNTERSHAFT



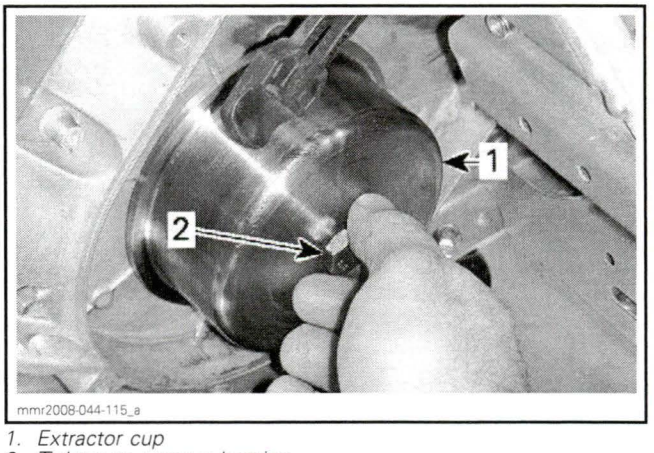
DRIVE AXLE

4. Install the extractor/installer tool behind the bearing.



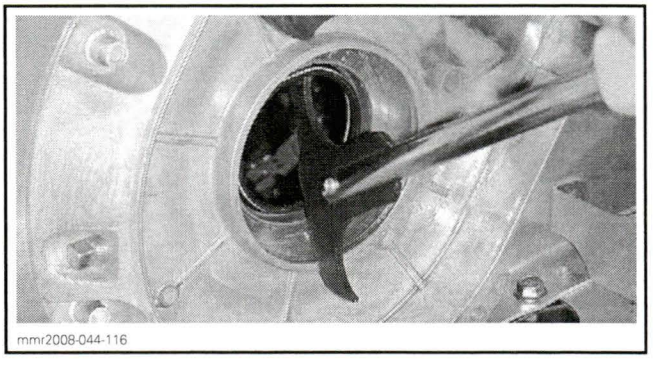
1. Extractor/installer tool

5. Install the extractor cup over bearing.
6. Tighten the extractor/installer tool screw to remove the bearing.



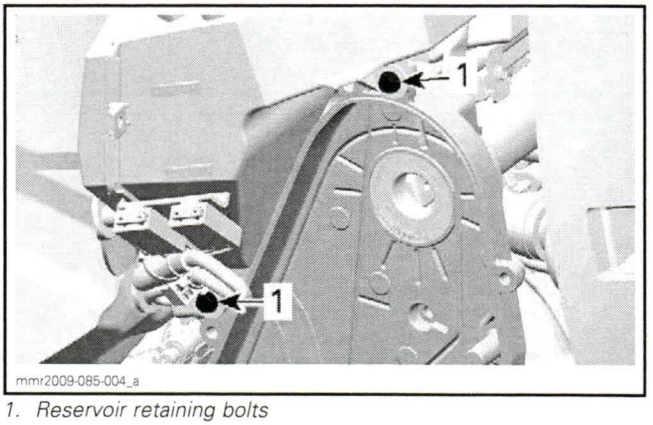
1. Extractor cup
2. Tighten to remove bearing

7. Using a seal puller such as the SNAP-ON SEAL PULLER (P/N YA105), remove and discard the oil seal.



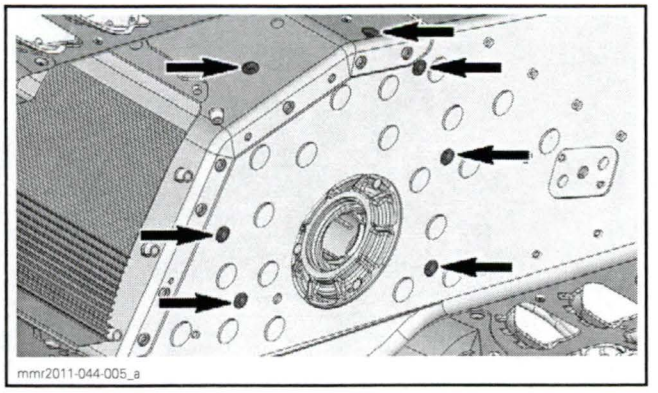
Chaincase Housing Removal

1. Proceed with *DRIVE AXLE REMOVAL*. Refer to *DRIVE AXLE* subsection.
2. Proceed with *COUNTERSHAFT REMOVAL*. Refer to *DRIVEN PULLEY AND COUNTERSHAFT* subsection.
3. Remove bolts securing the injection oil reservoir.

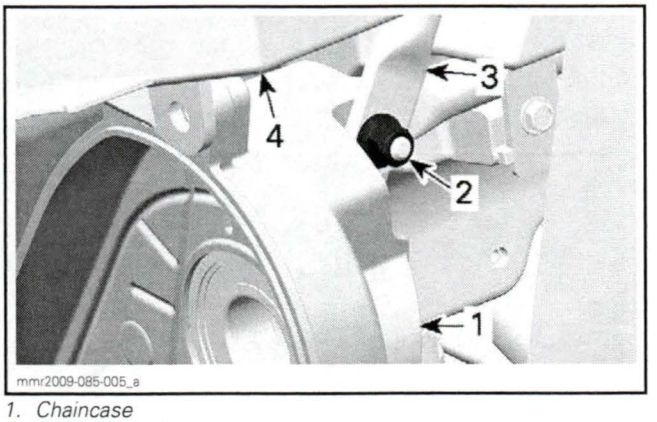


1. Reservoir retaining bolts

4. Remove the following Huck rivets. Refer to *FRAME* subsection for proper removal procedure.


mmr2011-044-005_a

5. Unscrew bolt behind the top of chaincase.



mmr2009-085-005_a

1. *Chaincase*
2. *Retaining bolt*
3. *RH side frame member*
4. *Injection oil reservoir*

6. Using 2 large pry bars inserted between chaincase and frame, pry chaincase out of vehicle.

Chaincase Inspection

Chaincase Cover Inspection

Check the cover for cracks or other damages. Replace it if necessary.

Check if O-ring inside cover is brittle, hard or damaged. Replace it if necessary.

Chain Tensioner Inspection

Check chain tensioner slider for wear or other damages. Replace if necessary.

Check threads of tensioner adjustment screw for damages or wear.

Replace screw if necessary and check chaincase for damages.

Check rubber washer condition, replace as required.

Drive Chain and Sprockets Inspection

Visually inspect the drive chain and sprockets for:
- Wear
- Cracks
- Damages teeth
- Missing links.

If a problem is detected, replace drive chain and sprockets as an assembly.

Check the drive chain deflection.

If the deflection is greater than 38 mm (1-1/2 in) without the chain tensioner, replace the drive chain.

Chaincase Bearing Inspection

Check for worn or defective bearings.

Chaincase Assembly

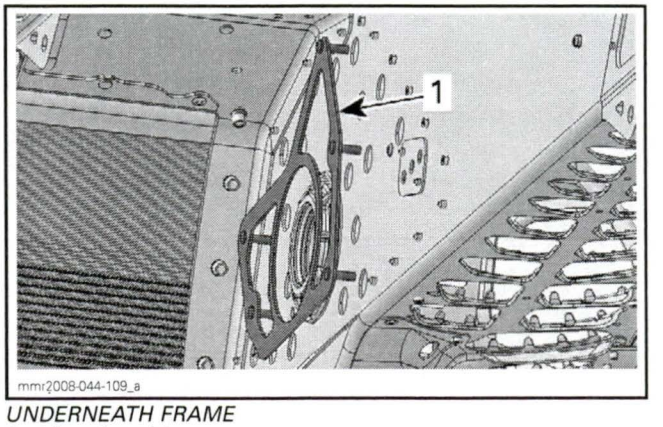
Chaincase Housing Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Have the following parts in hands:

PARTS TO INSTALL CHAINCASE		
QTY	FASTENERS	PART NUMBER
1	Mounting plate	(P/N 518 325 816)
2	M6 x 20 hexagonal flanged bolt	(P/N 207 662 034)
8	M6 elastic flanged nut	(P/N 233 261 434)

Install the mounting plate on frame.



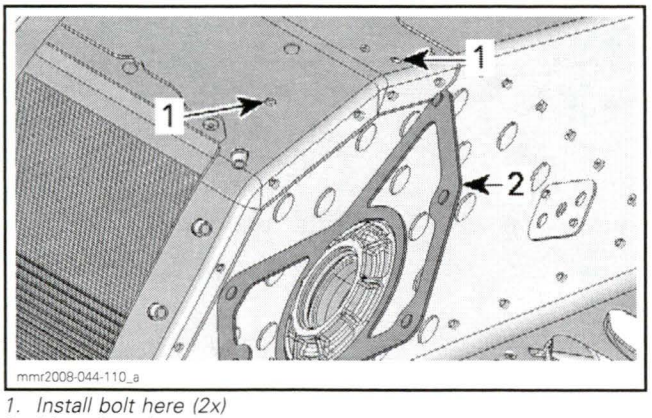
mmr2008-044-109_a

UNDERNEATH FRAME
1. *Mounting plate*

Install 5 elastic flanged nuts to secure chaincase on mounting plate.

Bolts and nuts holding the chaincase must be installed loosely FIRST.

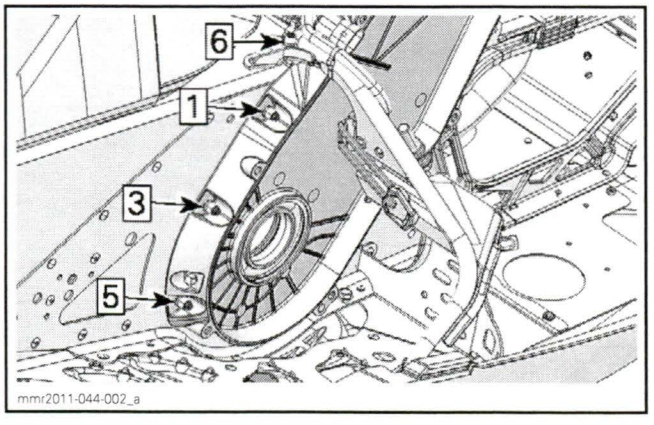
Install 2 flanged bolts and 2 elastic flanged nuts to secure chaincase on frame.

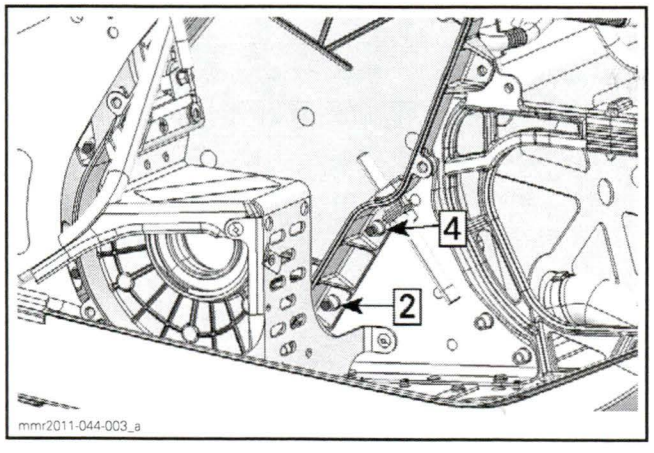


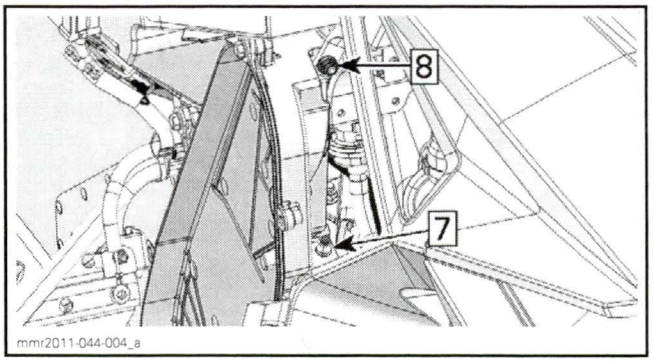
1. *Install bolt here (2x)*
2. *Mounting plate*

Install bolt behind the top of chaincase.

Using the following sequence, tighten all nuts to 10 N•m (89 lbf•**in**).







Install all removed parts.

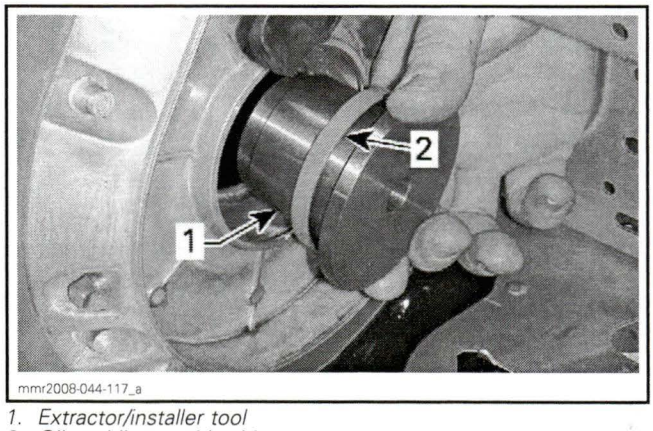
Proceed with *DRIVE CHAIN ADJUSTMENT*, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Refill chaincase with recommended oil, refer to *CHAINCASE OIL REPLACEMENT* in *PERIODIC MAINTENANCE PROCEDURES* subsection.

Chaincase Bearing Installation

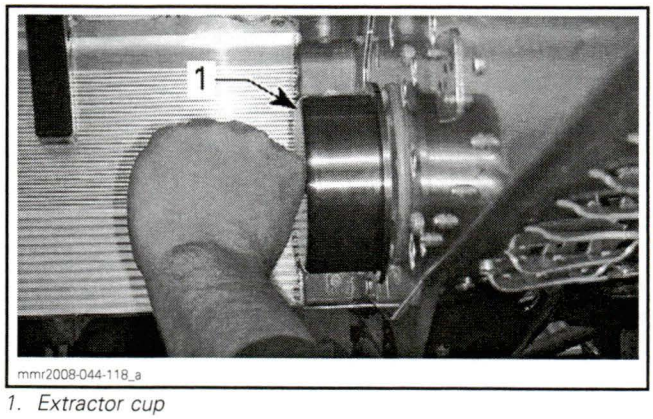
The installation is the reverse of the removal procedure. However, pay attention to the following.

Install the **NEW** oil seal on the extractor/installer tool. Position the lips toward bearing.



1. *Extractor/installer tool*
2. *Oil seal lips on this side*

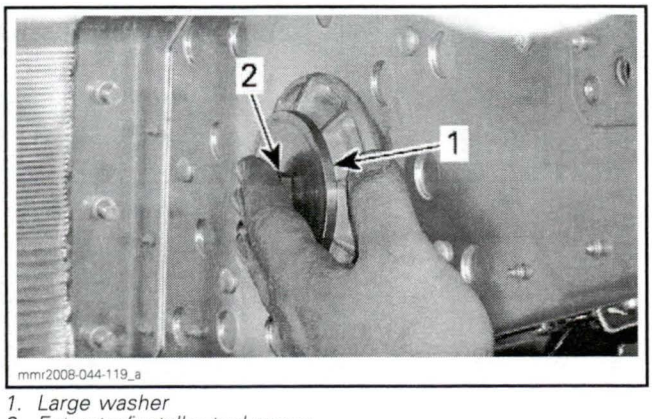
Install the extractor cup inside frame.



1. *Extractor cup*

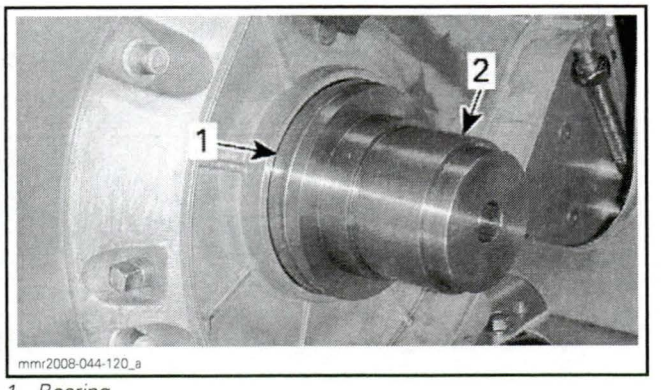
Tighten the extractor/installer tool screw to install the oil seal.

Install the large washer and the extractor/installer tool screw inside frame.



1. *Large washer*
2. *Extractor/installer tool screw*

In chaincase, install **NEW** bearing and the extractor/installer tool.



1. *Bearing*
2. *Extractor/installer tool*

Tighten the extractor/installer tool screw to install the bearing.

Drive Chain and Sprocket Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Make sure to install sprockets with their inscriptions outward.

Install the conical spring washer on the upper socket with its concave side toward sprocket.

Torque upper sprocket screw to 48 N•m (35 lbf•ft).

Chain Tensioner Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

If the tensioner has been disassembled, make sure circlip turns freely and slider moves easily.

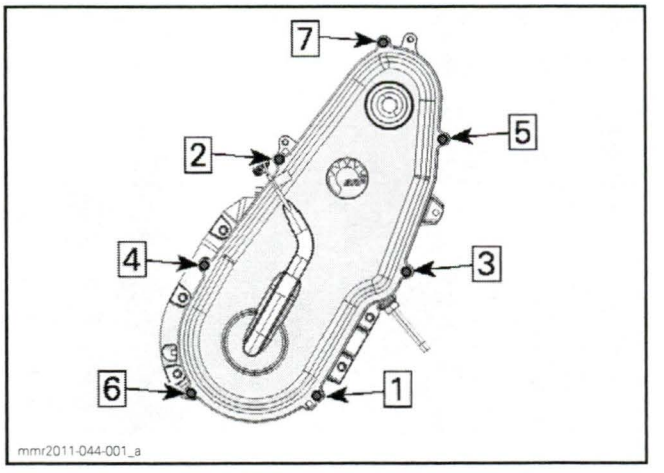
Proceed with *DRIVE CHAIN ADJUSTMENT*, see procedure in *PERIODIC MAINTENANCE PROCEDURES* subsection.

Chaincase Cover Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Ensure cover O-ring is positioned correctly in its groove.

Tighten chaincase cover screws in accordance with the following sequence.



CHAINCASE COVER SCREWS TORQUE	
SAME CHAINCASE	10 N•m (89 lbf•**in**)
NEW CHAINCASE	15 N•m (133 lbf•**in**)

Refill chaincase with recommended oil, refer to *CHAINCASE OIL REPLACEMENT* in *PERIODIC MAINTENANCE PROCEDURES* subsection.

Reinstall all other removed parts.

DRIVE AXLE

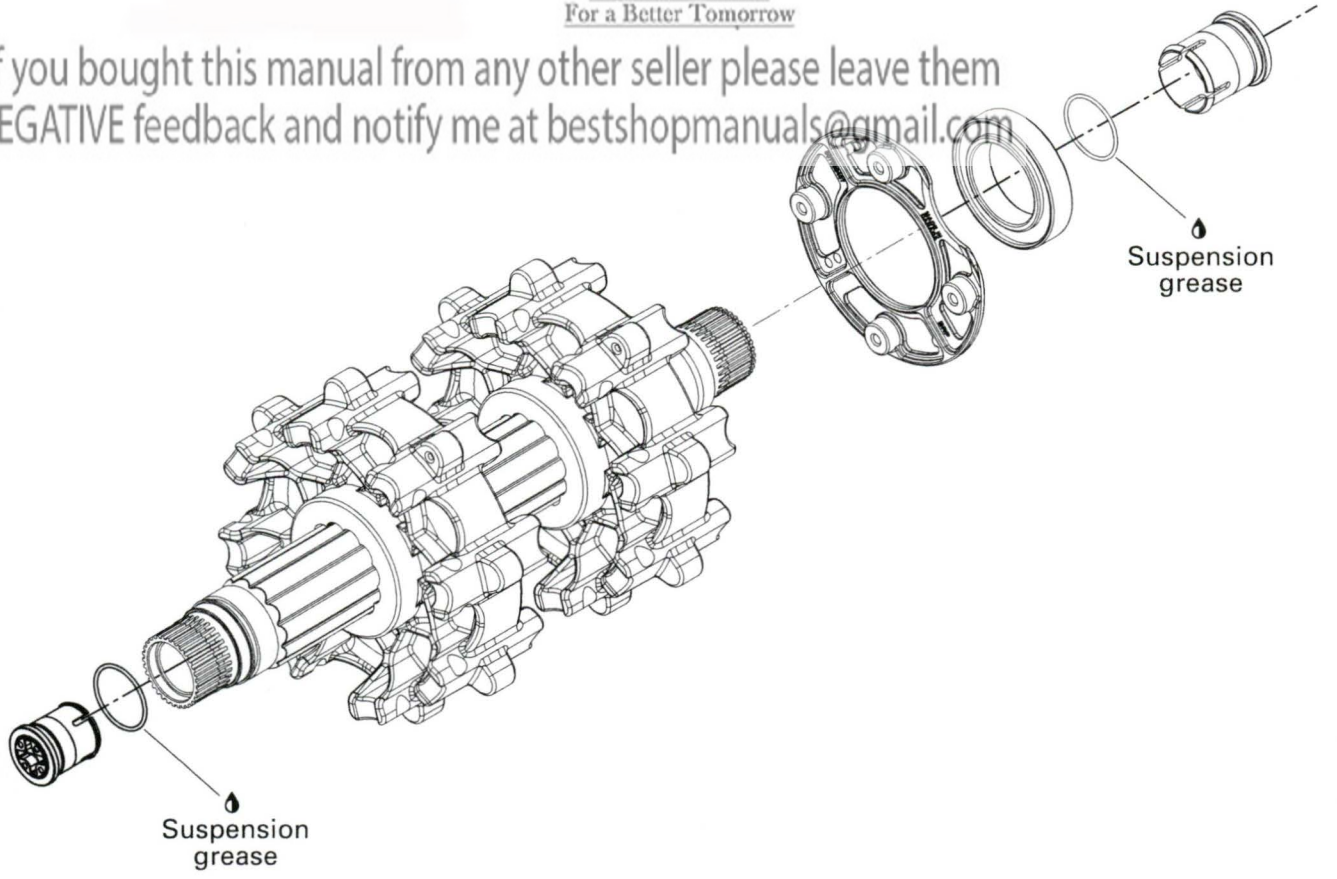
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON 3-JAW PULLER	CG273	276

SERVICE PRODUCTS

Description	Part Number	Page
SUSPENSION GREASE	293 550 033	276

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



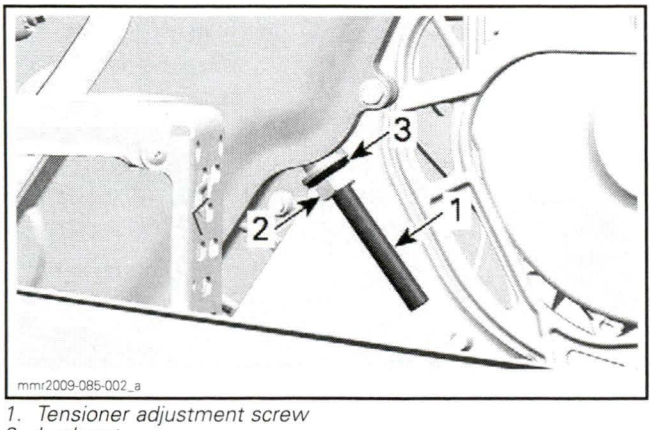
mmr2008-045-100_b

PROCEDURES

DRIVE AXLE

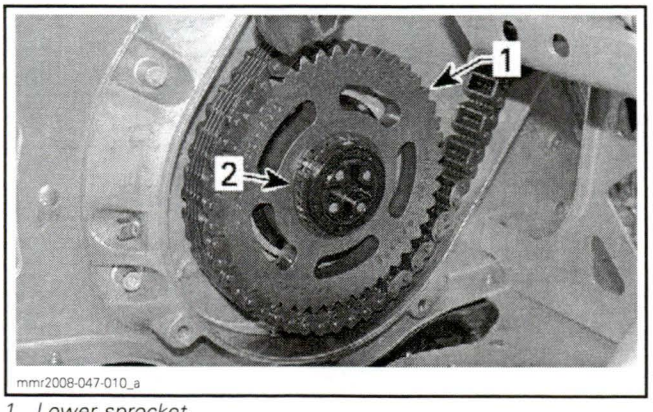
Drive Axle Removal

1. Remove the rear suspension. Refer to *REAR SUSPENSION* subsection.
2. Remove the chaincase cover. Refer to *CHAINCASE* subsection.
3. Release tension from drive chain by unscrewing the tensioner adjustment screw.



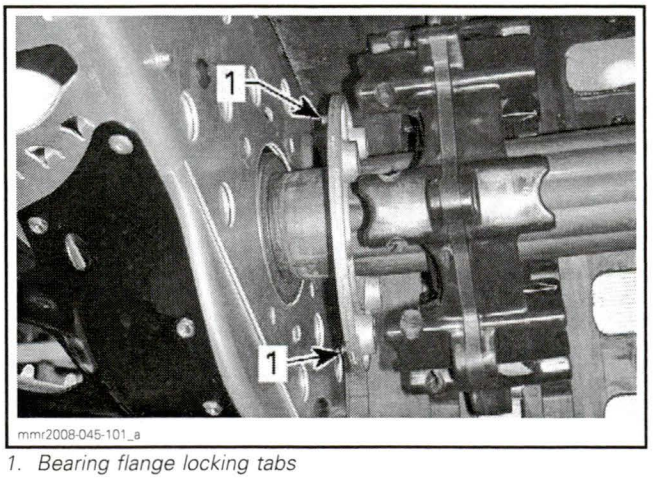
1. *Tensioner adjustment screw*
2. *Lock nut*
3. *Washer with rubber surface*

4. Remove the lower sprocket circlip.



1. *Lower sprocket*
2. *Circlip*

5. Remove lower gear and drive chain.
6. Remove the caliper. Refer to *BRAKE* subsection.
7. From underneath of vehicle, turn the LH bearing flange counterclockwise to unlock it from frame.



1. *Bearing flange locking tabs*

8. Release drive axle sprockets from track and at the same time, push the drive axle toward the LEFT side.
9. Move the drive axle towards the right side to remove it from vehicle.

Drive Axle Inspection

Check if bearing turns smoothly and freely. Replace bearing if necessary.

Check if bearing seals are not damaged. Replace bearing if necessary.

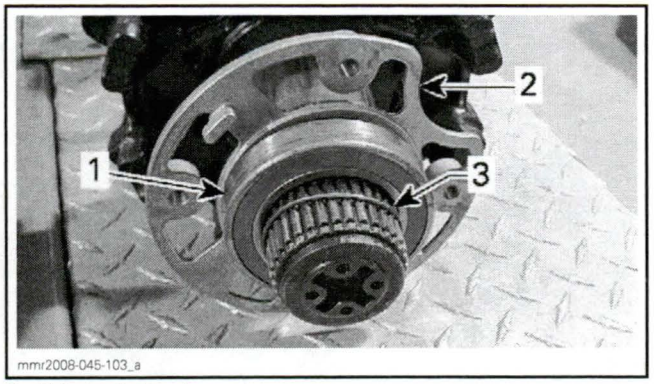
Check if the bearing flange is cracked, bent or otherwise damaged. Replace it if required.

Replace drive axle if one of the following situations is detected:

- Cracked, worn or damaged drive axle
- Worn or damaged drive axle splines
- Worn or damaged sprockets
- Worn bearing journal.

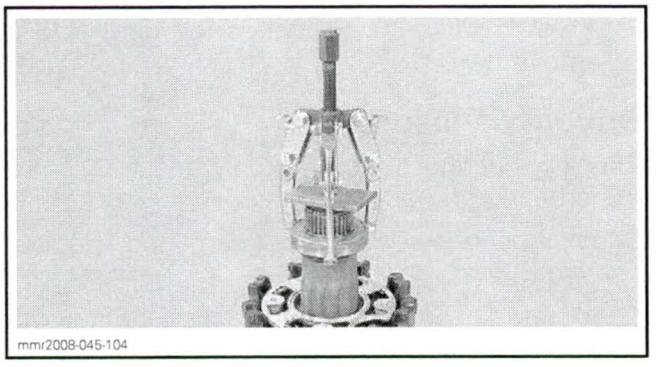
Drive Axle Bearing Removal

1. Proceed with *DRIVE AXLE REMOVAL*, see procedure in this subsection.
2. Remove the O-ring.



1. Drive axle bearing
2. Bearing flange
3. O-ring

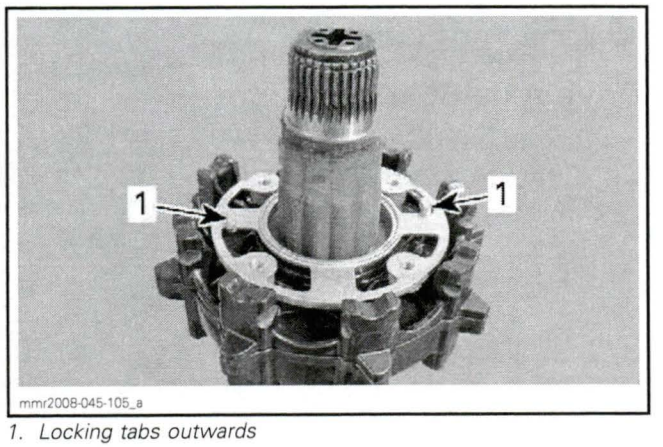
3. Using a 3-jaw puller such as the SNAP-ON 3-JAW PULLER (P/N CG273), remove the drive axle bearing.



4. Remove the bearing flange.

Drive Axle Bearing Installation

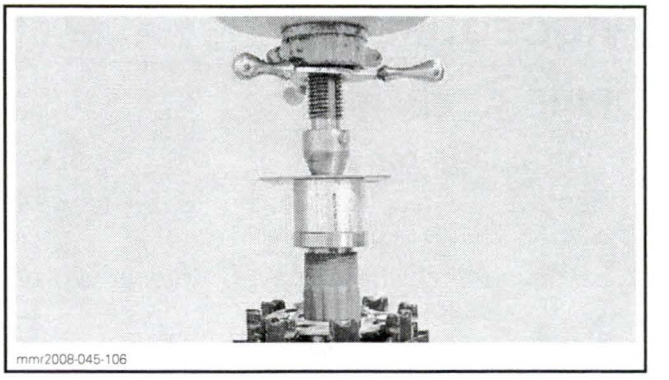
1. Install bearing flange on drive axle.



1. Locking tabs outwards

2. Using a press and a suitable pipe, push the bearing.

NOTICE **Always push the bearing by inner race.**

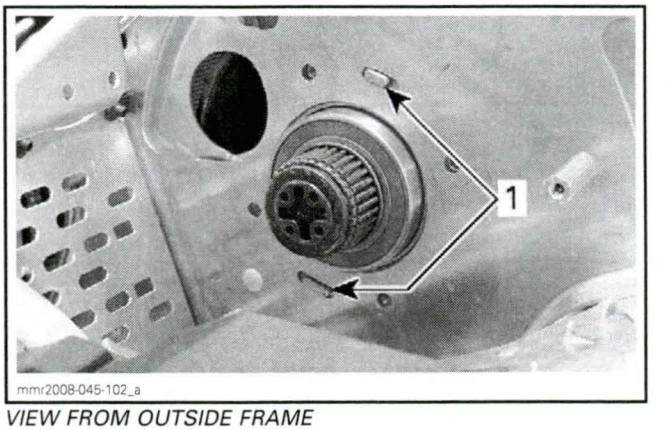


Drive Axle Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install drive axle then lock the bearing flange on frame.

NOTICE **Ensure bearing flange is properly locked. Tabs must be properly inserted in frame.**



VIEW FROM OUTSIDE FRAME
1. Bearing flange locking tabs

MAGNETIC CAPS

Magnetic Cap Removal

1. For the RH cap, remove brake disc protective cover. Refer to *BRAKE* subsection.
2. For the LH cap, remove the chaincase cover. Refer to *CHAINCASE* subsection.
3. Using two screwdrivers or pliers, pry or pull the magnetic cap out of drive axle end.
4. Discard the magnetic cap.

Magnetic Cap Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Apply SUSPENSION GREASE (P/N 293 550 033) on O-ring.

TRACK

SERVICE TOOLS

Description	Part Number	Page
TRACK CLEAT INSTALLER	529 036 044	277

PROCEDURES

TRACK

Track Inspection

1. Visually inspect track for:
   - Cuts and abnormal wear
   - Broken rods
   - Broken or missing track cleats
   - Perforations in the track
   - Tears in the track (particularly around traction product holes)
   - Lugs that are broken or torn off, exposing portion of rods
   - Delamination of the rubber
   - Broken studs
   - Bent studs
   - Studs that are torn off the track
   - Missing track guide(s).

If track is damaged or rods are broken, replace track.

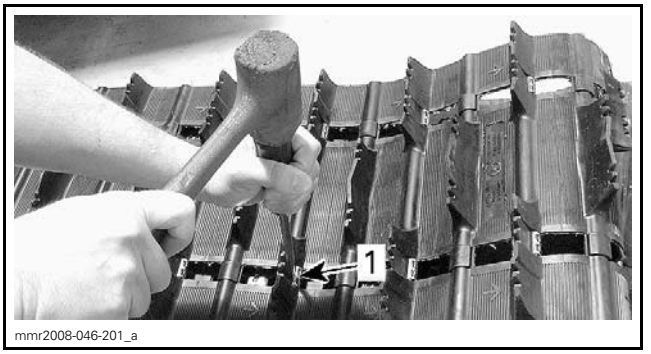
For damaged or missing cleats, replace by new ones.

⚠ WARNING

Do not operate a snowmobile with a cut, torn or damaged track.

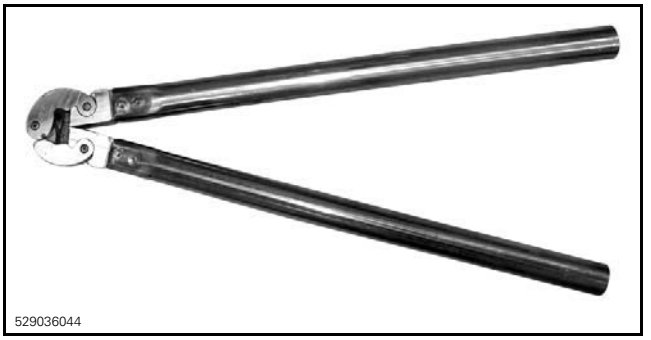
Track Cleat Replacement

1. Raise rear of vehicle off the ground.
2. Lift snow guard.
3. Rotate track to expose a cleat to be replaced.
4. Remove cleat from track using plastic hammer and a big screwdriver.

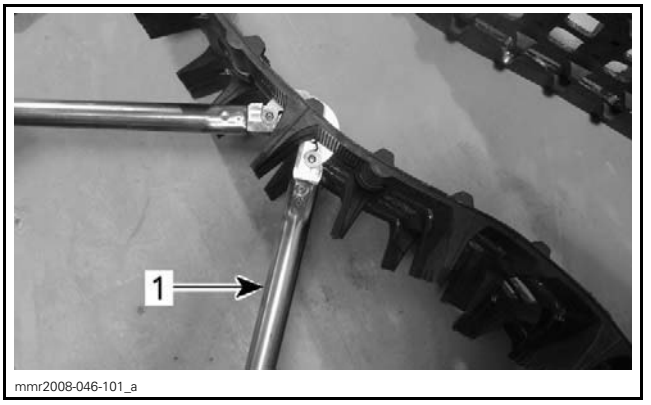


TYPICAL
1. Cleat

5. Place new cleat in position on the track.
6. Secure cleat using the TRACK CLEAT INSTALLER (P/N 529 036 044).



7. Bend cleat and push tabs into rubber.



TYPICAL
1. Narrow-cleat installer

8. Reopen narrow-cleat installer.
9. Position cleat tabs on open end of tool.
10. Squeeze tabs until they are indented in rubber.

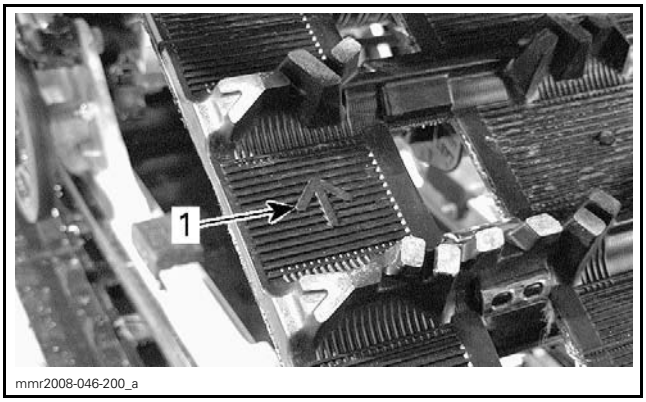
Track Removal

1. Remove rear suspension from vehicle. Refer to *REAR SUSPENSION* subsection.
2. Remove drive axle from vehicle. Refer to *DRIVE AXLE* subsection.
3. Remove track.

Track Installation

The installation is the reverse of removal procedure, however pay attention to the following.

Respect rotation direction indicated by an arrow on track thread.



1. Arrow pointing forwards

Track Adjustment and Alignment

Refer to *PERIODIC MAINTENANCE PROCEDURE* subsection to adjust and align the track.

TRACTION ENHANCING PRODUCTS (STUDS)

Important Safety Rules

The Ski-Doo models covered in this manual are equipped with tracks made of a single layer of fabric and tensile cord. This result in a track with reduce weight and rolling resistance. If studded, these tracks absolutely require the use of the 286 Phantom series designed studs.

⚠ WARNING

REV-XP and REV-XU™ Tundra require special studs. Use only the 286 phantom series studs and support plates on these tracks. The use of other kinds of studs on these tracks may cause risks of injuries.

⚠ WARNING

Installing an incorrect number of studs or an improper installation could reduce the track life and possibly resulting in serious injury or death.

⚠ WARNING

Never stud a track that has not been approved for studs. Installing studs on an unapproved track could increase the risk of the track tearing or severing, possibly resulting in serious injury or death. Approved tracks can be identified by a stud symbol molded into the track surface.
Studs should only be installed in the locations indicated by molded bulges in the track surface.
Never stud a track with a profile of 35 mm (1.378 in) or more.
The maximum allowable stud penetration range is 6.4 mm to 9.5 mm (1/4 in to 3/8 in).
The number of studs installed must match the number of molded bulges in the track.
Strictly adhere to the specified tightening torque.

⚠ WARNING

To prevent serious injury to individuals near the snowmobile:
– NEVER stand behind or near a moving track.
– ALWAYS use a wide-base snowmobile stand with a rear deflector panel.
– When the track is raised off the ground, only run it at lowest possible speed.
Centrifugal force could cause debris, damaged or loose studs, pieces of torn track, or an entire severed track to be violently thrown backwards out of the tunnel with tremendous force, possibly resulting in the loss of a leg or other serious injury.

Effects of Having a Studded Track on the Life of the Snowmobile

The use of traction enhancing products can increase the load and the stress on certain snowmobile components, as well as the vibration level. This can cause premature wear on parts such as belts, brake lining, bearings, chain, and chaincase sprockets, and on approved studded tracks, shorten track life. For this reason, it is even more

important to follow the detailed maintenance program given in the *PERIODIC MAINTENANCE SCHEDULE*.

Studs on the track can also cause serious damage to the snowmobile if it is **not equipped** with the tunnel protectors designed for the particular model. Damage to the electrical wiring or perforation of the heat exchangers are potential hazards, that could cause the engine to overheat and be severely damaged.

⚠ WARNING

If tunnel protectors are excessively worn or not installed, the gas tank could be punctured, causing a fire.

Studs and Track Inspection

A visual inspection of the track should be performed before each use. Refer to *TRACK INSPECTION*.

Replace broken or damaged studs immediately. If the track shows signs of deterioration, it must be replaced immediately. In doubt, replace the track.

⚠ WARNING

Riding with a damaged track or studs could lead to loss of control, resulting in a risk of serious injury or death.

Stud Installation Tables

Use the following table for appropriate size and quantity of studs.

APPROVED STUDS ACCORDING TO TRACK LUG HEIGHT			
LUG HEIGHT	STUD SIZE	QTY OF STUDS FOR A 120" TRACK	QTY OF STUDS FOR A 137" TRACK
1.000"	1.075"	84	96
1.250"	1.325"	84	96
1.500"	Not to be studded		

Use the following table for appropriate tunnel protector kits.

TUNNEL PROTECTOR KITS		
CHASSIS TYPE	TRACK DIMENSION	KIT
REV-XP 550F	All 120" and 137" (up to 31.75 mm (1-1/4 in))	(P/N 860 200 381)

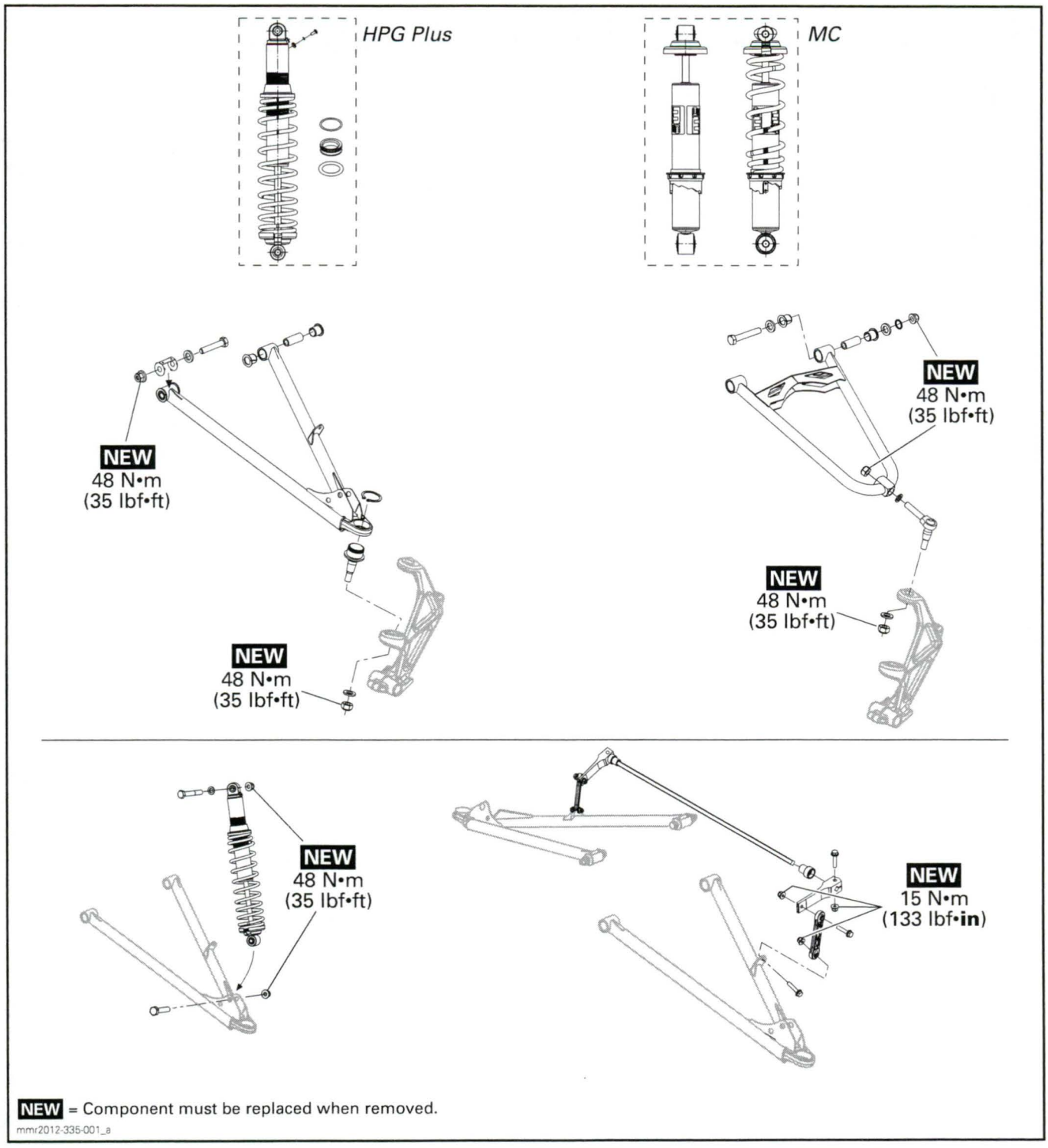
Stud Installation Procedure

Refer to manufacturer's instructions for complete installation procedure.

FRONT SUSPENSION (XP-ESR)

SERVICE TOOLS

Description	Part Number	Page
BALL JOINT EXTRACTOR	529 035 827	286
BALL JOINT INSTALLER	529 035 975	289
BALL JOINT REMOVER SUPPORT	529 036 121	288–289
SPRING COMPRESSOR	529 036 184	284



NEW = Component must be replaced when removed.

mmr2012-335-001_a

ADJUSTMENT

SPRINGS

Front spring preload has an effect on front suspension firmness and on steering behavior.

ACTION	RESULT
Increasing preload	Firmer front suspension
	Higher front end
	More precise steering
	More bump absorption capability
Decreasing preload	Softer front suspension
	Lower front end
	Lighter steering
	Less bump absorption capability

⚠ WARNING

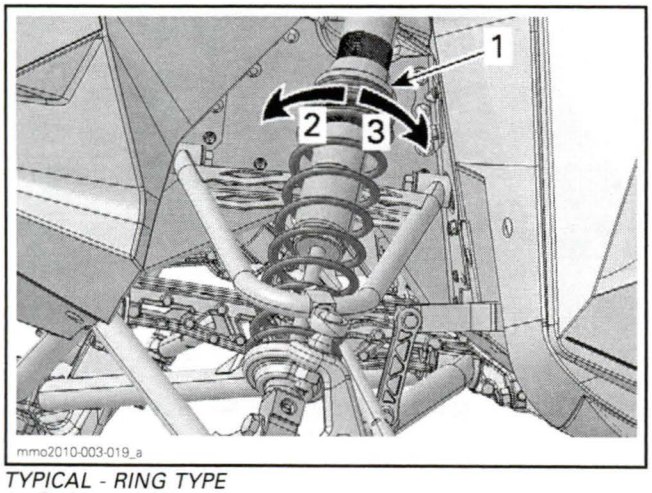
Adjust both springs to the same load. Uneven adjustment can cause poor handling and loss of stability, and/or control, and increase the risk of an accident.

Spring Preload Adjustment

NOTICE **Make sure that both front springs are still pre-loaded when front of vehicle is off the ground.**

Ring Type Adjustment

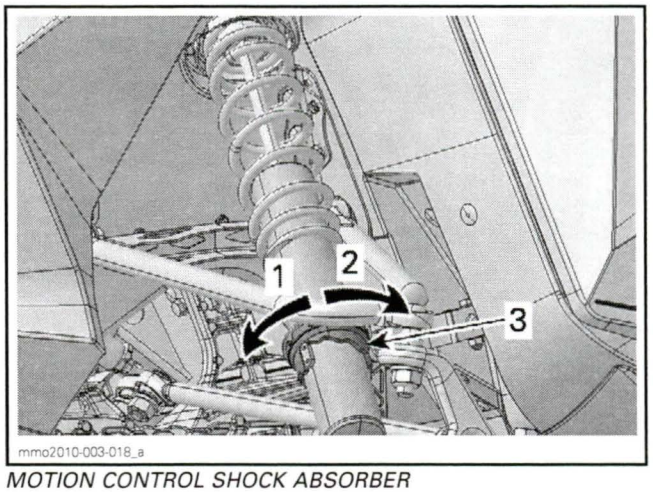
Grab and turn the spring to increase or decrease spring preload.



TYPICAL - RING TYPE
1. *Spring preload adjustment ring*
2. *Increase preload*
3. *Decrease preload*

Cam Type Adjustment

Using the suspension adjustment tool (included in the tool kit), turn the cam to increase or decrease spring preload.



MOTION CONTROL SHOCK ABSORBER
1. *Increase preload*
2. *Decrease preload*
3. *Spring preload adjustment cam*

PROCEDURES

SHOCK ABSORBERS

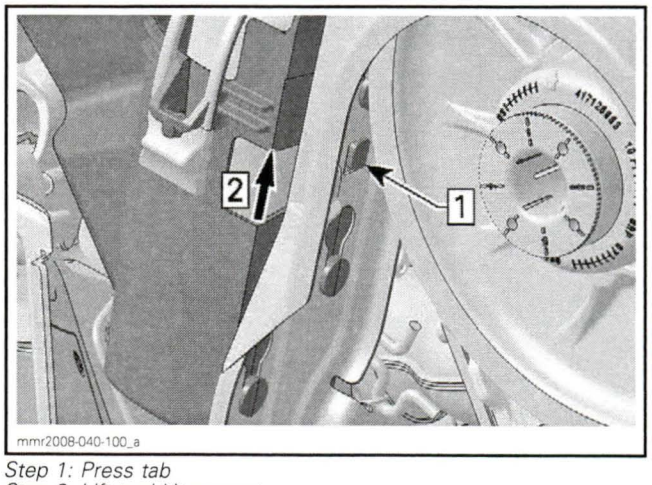
Shock Absorber Removal

Refer to *BODY* subsection to remove the following:

- Hood
- Side panel(s).

To remove the RH shock absorber, remove the muffler. Refer to *EXHAUST SYSTEM* subsection.

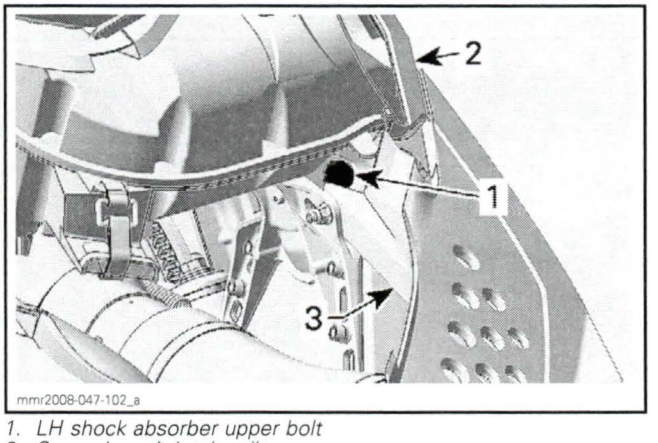
To remove the LH shock absorber, remove the tool kit support by pressing the locking tab.



Step 1: Press tab
Step 2: Lift tool kit support

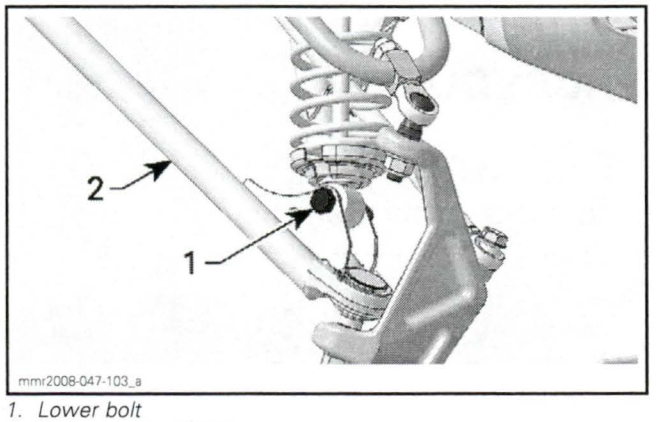
Lift the front of vehicle until skis are off the ground.

Remove the shock absorber upper bolt.



1. *LH shock absorber upper bolt*
2. *Secondary air intake silencer*
3. *Front bumper*

Remove the shock absorber lower bolt.



1. *Lower bolt*
2. *Lower suspension arm*

Remove the shock absorber.

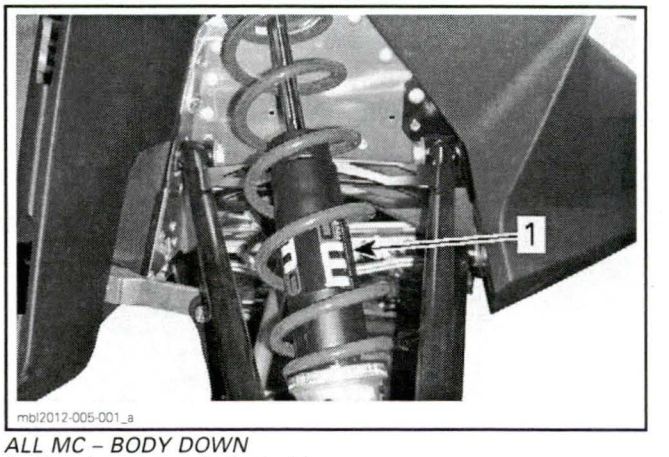
Shock Absorber Inspection

Refer to *REAR SUSPENSION (SC-5)* subsection.

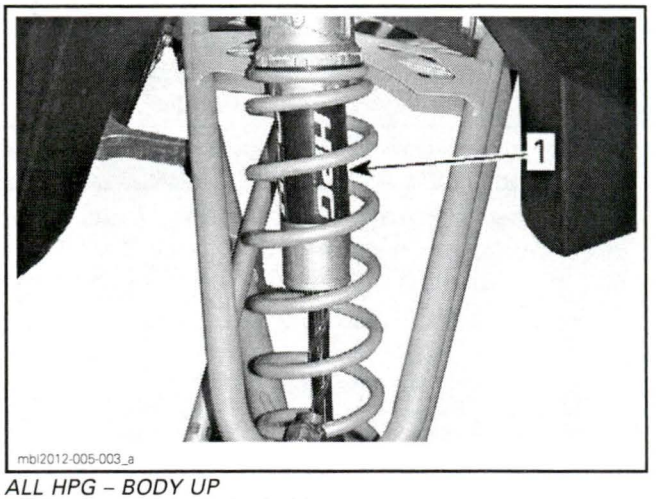
Shock Absorber Installation

For installation, reverse the removal procedure.

NOTE: Always install shock valve outwards when applicable.



ALL MC – BODY DOWN
1. *Decal gap towards the inside*

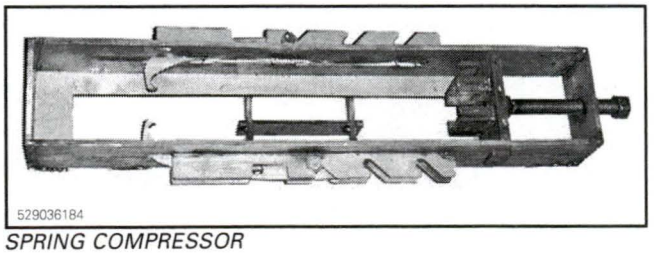


ALL HPG – BODY UP
1. *Decal gap towards the inside*

SPRINGS

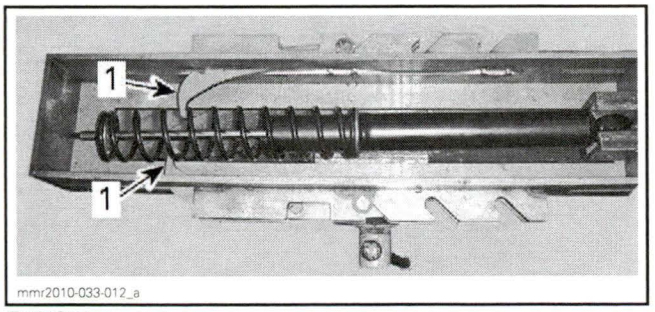
Spring Removal

1. Secure the SPRING COMPRESSOR (P/N 529 036 184) in a vise.



SPRING COMPRESSOR

2. Position the shock absorber in the tool and install the spring compressor hooks.



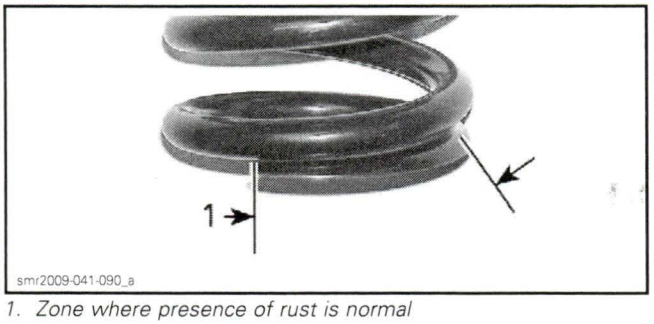
TYPICAL
1. Spring compressor hooks

3. Tighten the spring compressor tool screw until the spring is sufficiently compressed to remove spring stopper.
4. Release the spring compressor tool screw.
5. Remove spring from shock absorber.

Spring Inspection

Inspect spring and replace if one of the following damage is detected:
- Crack in the paint
- Rust
- Other visible damages.

NOTE: If rust is present ONLY on the first 1/4 of coil, the spring should not be replaced.



1. Zone where presence of rust is normal

Spring Installation

The spring installation is the reverse of the removal procedure. However, pay attention to the following.

Make sure to position the stopper opening at 180° with cap opening.

UPPER SUSPENSION ARMS

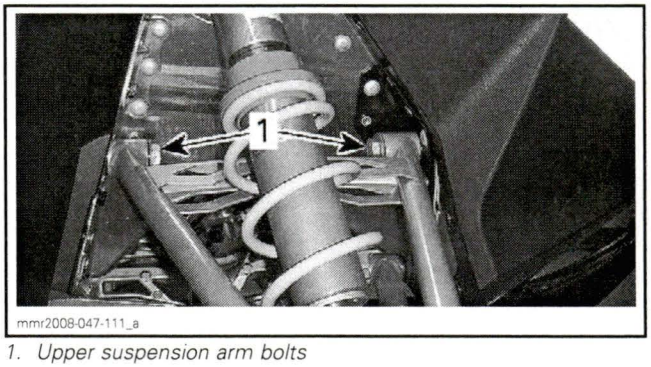
Upper Suspension Arm Inspection

1. Check suspension arm for distortion or damage. Replace if necessary.
2. Check suspension for abnormal play as follows:
   2.1 Lift the front of vehicle until skis are off the ground.
   2.2 Move suspension arm from side to side.
   2.3 Lower vehicle to the ground.
   2.4 Move suspension up and down.
3. Check sleeves inside suspension arm attachments for wear or damage.
4. Replace bushings and/or sleeves if some play is detected.

NOTE: A play of 2 mm (.079 in) is acceptable when the suspension arm is moved forward and backward.

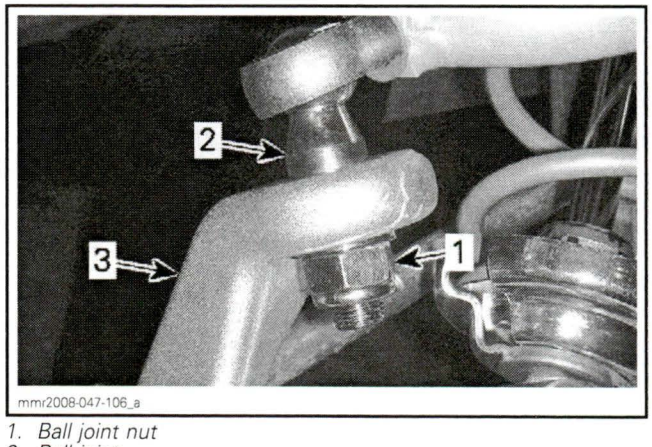
Upper Suspension Arm Removal

1. Lift the front of vehicle until skis are off the ground.
2. Remove muffler and tuned pipe. Refer to *EXHAUST SYSTEM* subsection.
3. Remove shock absorber upper bolt. See procedure in *SHOCK ABSORBER REMOVAL* in this subsection.
4. Remove the upper suspension arm bolts.



1. Upper suspension arm bolts

5. Remove ball joint from ski leg. See procedure in *UPPER BALL JOINT REMOVAL* in this subsection.



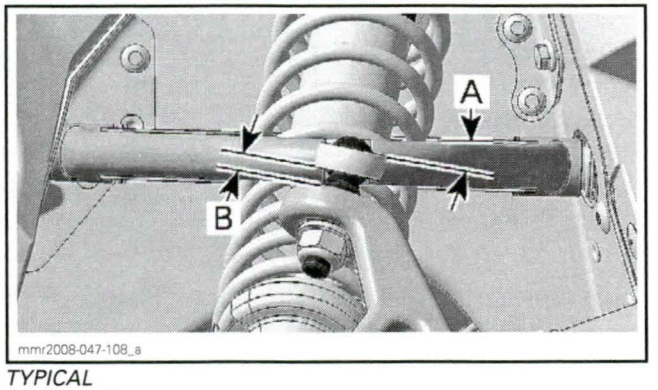
1. Ball joint nut
2. Ball joint
3. Ski leg

6. Remove upper suspension arm.

Upper Suspension Arm Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

The ball joint must be parallel to ski leg tab. This mounting position corresponds to 10° ± 3° angle from upper arm.



TYPICAL
A. 10° ± 3°
B. Parallel

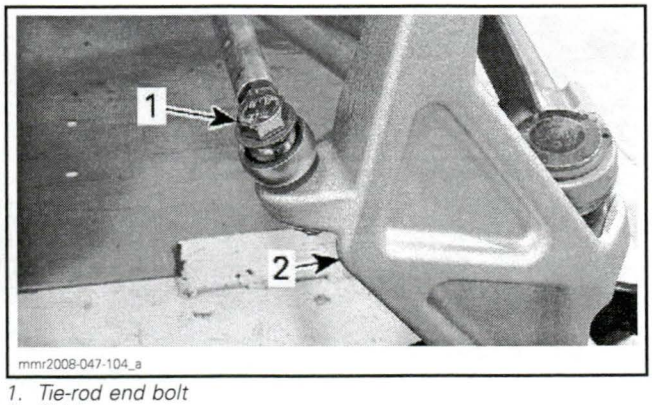
UPPER BALL JOINTS

Upper Ball Joint Inspection

Check both upper ball joints for damage, pitting, looseness and roughness. If so, replace with a new one.

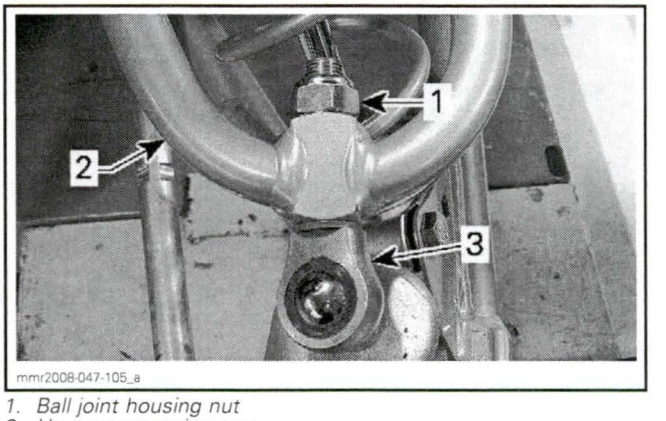
Upper Ball Joint Removal

1. Position upper suspension arm so that ball joint becomes parallel with ski leg.
2. Detach tie-rod end from ski leg.



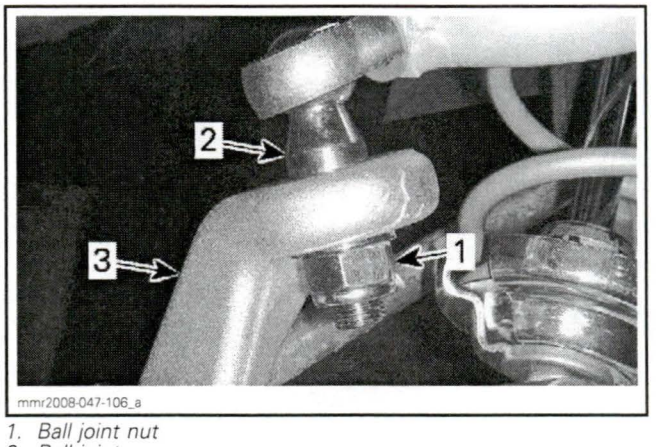
1. Tie-rod end bolt
2. Ski leg

3. Unscrew nut retaining ball joint housing to upper suspension arm.



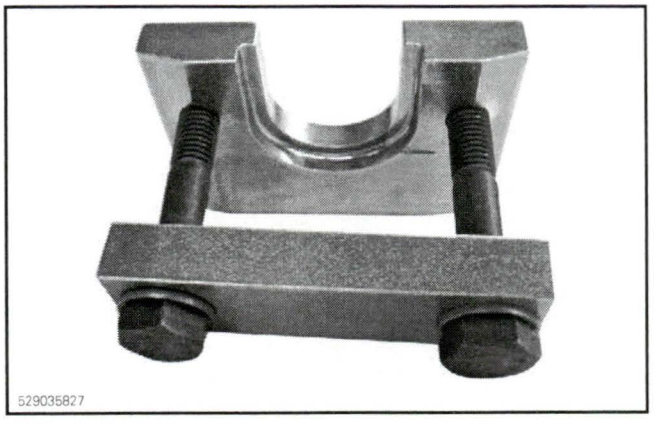
1. Ball joint housing nut
2. Upper suspension arm
3. Ball joint housing

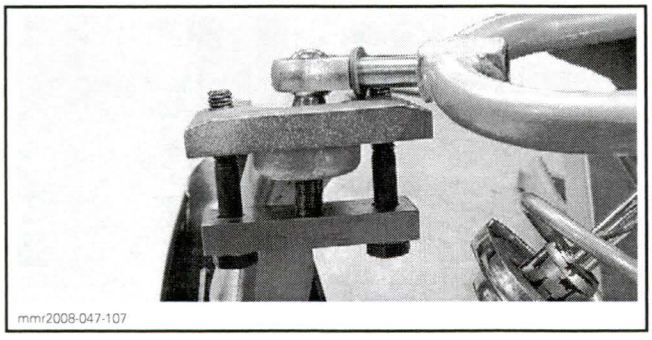
4. Remove nut securing ball joint to ski leg.



1. Ball joint nut
2. Ball joint
3. Ski leg

5. Install the BALL JOINT EXTRACTOR (P/N 529 035 827) and detach ball joint from ski leg.



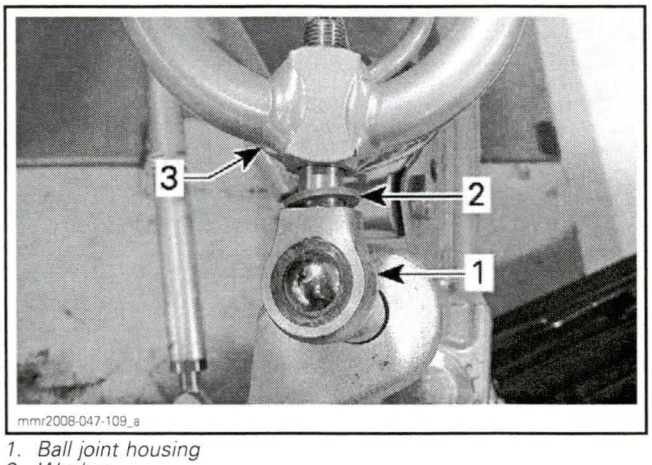


6. Remove ball joint.

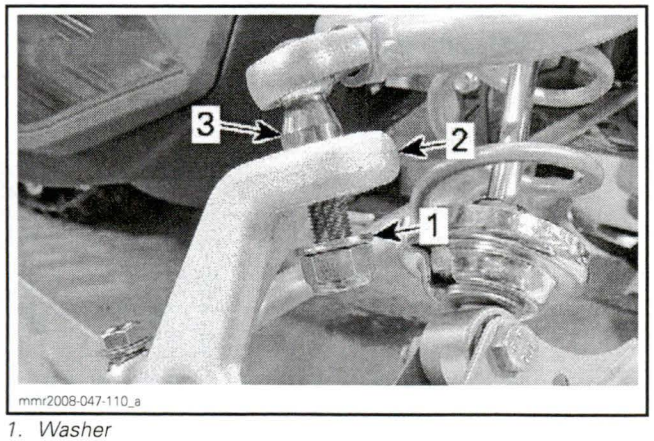
Upper Ball Joint Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

1. Install ball joint washers as shown.



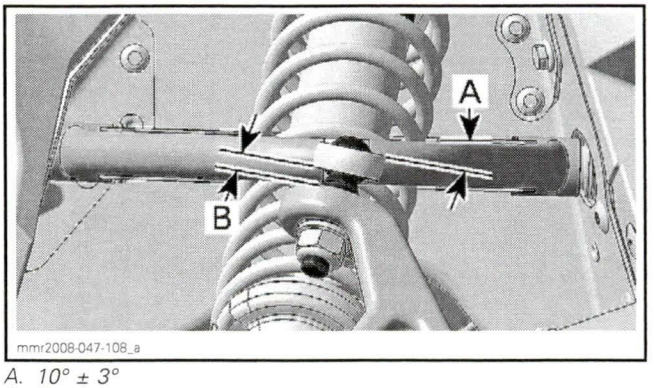
1. Ball joint housing
2. Washer
3. Upper suspension arm



1. Washer
2. Ski leg
3. Ball joint

2. Tighten nuts to 48 N•m (35 lbf•ft).

Ensure ball joint has the proper angle as shown. The ball joint must be parallel to ski leg tab. This mounting position corresponds to 10° ± 3° angle from upper arm.



A. 10° ± 3°
B. Parallel

LOWER SUSPENSION ARMS

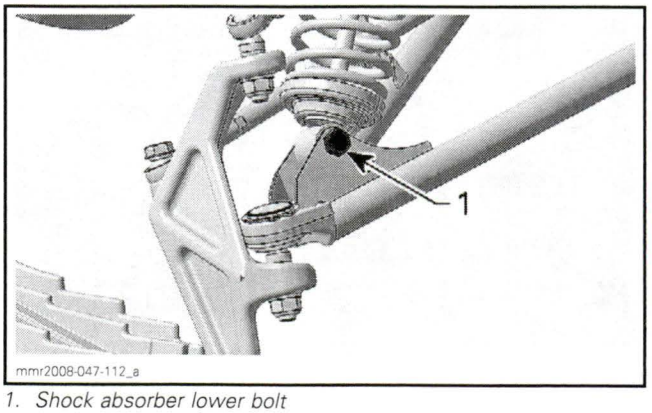
Lower Suspension Arm Inspection

1. Check suspension arm for distortion or damage. Replace if necessary.
2. Check suspension for abnormal play as follows:
   - 2.1 Lift the front of vehicle until skis are off the ground.
   - 2.2 Detach shock absorber and stabilizer bar link from lower suspension arm.
   - 2.3 Move suspension arm from side to side.
   - 2.4 Lower vehicle to the ground.
   - 2.5 Move suspension up and down.
3. Check sleeves inside suspension arm attachments for wear or damage.
4. Replace bushings and/or sleeves if some play is detected.

NOTE: A play of 2 mm (.079 in) is acceptable when the suspension arm is moved forward and backward.

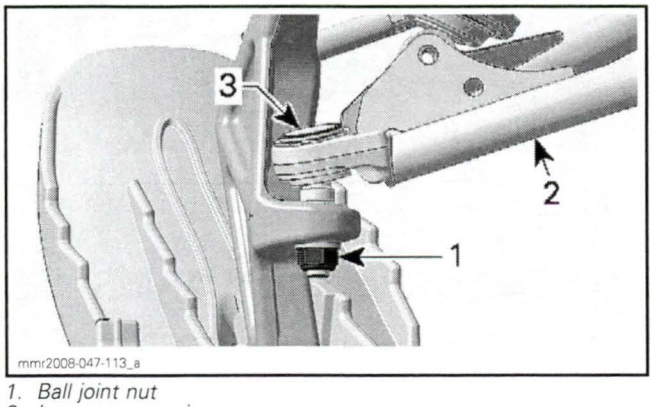
Lower Suspension Arm Removal

1. Lift the front of vehicle until skis are off the ground.
2. Remove shock absorber lower bolt.



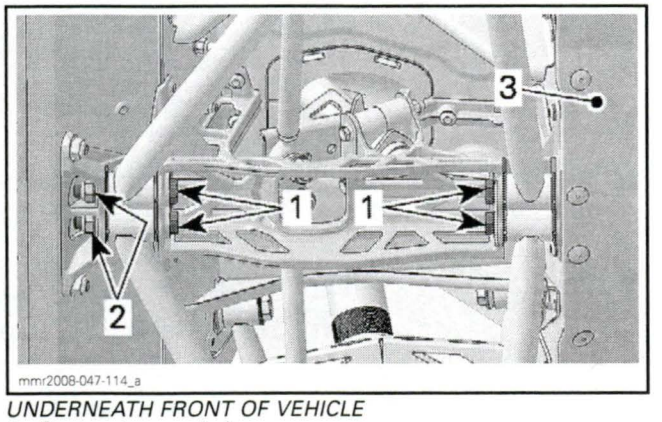
1. Shock absorber lower bolt

3. Detach stabilizer link from lower suspension arm. Refer to *STABILIZER BAR* further in this subsection.
4. Remove lower ball joint nuts.



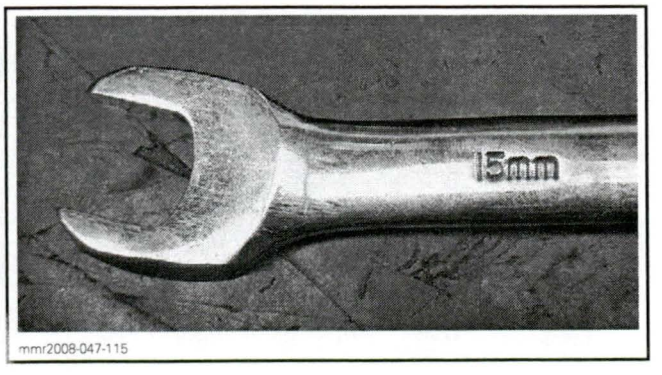
1. Ball joint nut
2. Lower suspension arm
3. Lower ball joint

5. Using a suitable ball joint remover, detach lower ball joint from ski leg.
6. Remove suspension arm bolts.



UNDERNEATH FRONT OF VEHICLE
1. Suspension arm bolts
2. Rear nuts
3. Bottom pan

NOTE: To hold rear nuts, modify a 15 mm opened wrench as shown.

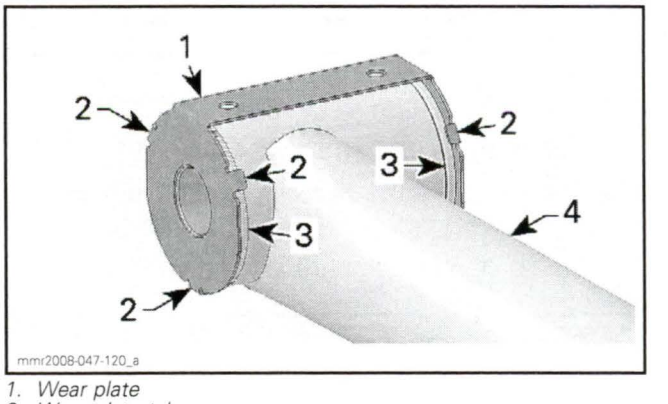


7. Remove lower suspension arm from vehicle.

Lower Suspension Arm Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

1. Install a wear plate over bushings.
2. Position the wear plate on top.
3. Fold all tabs against bushings.



1. Wear plate
2. Wear plate tabs
3. Bushings
4. Lower suspension arm

Install all other removed parts.

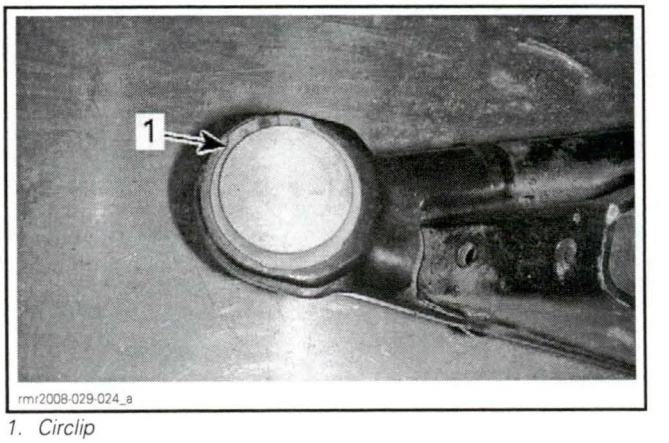
LOWER BALL JOINTS

Lower Ball Joint Inspection

Inspect ball joint end for damage. Ensure it's moving freely without play. Replace ball joints as required.

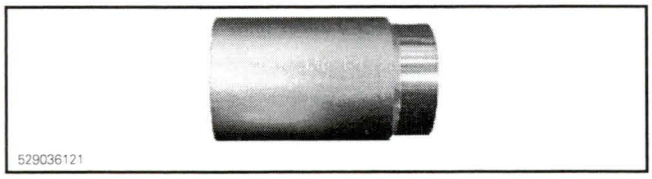
Lower Ball Joint Removal

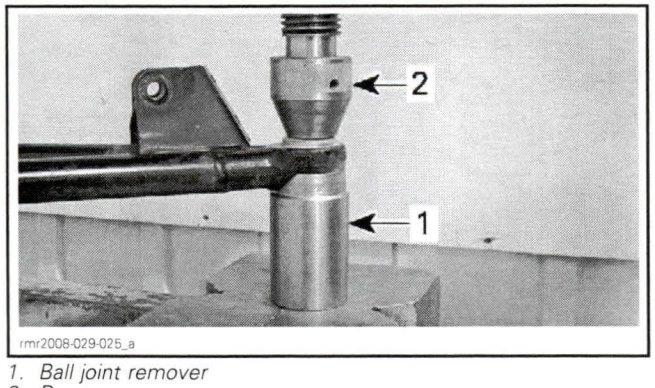
1. Remove the *LOWER SUSPENSION ARM*, see procedure in this subsection.
2. Remove circlip securing ball joint to suspension arm.



1. Circlip

3. Using a press and the BALL JOINT REMOVER SUPPORT (P/N 529 036 121), press ball joint out of the lower suspension arm.

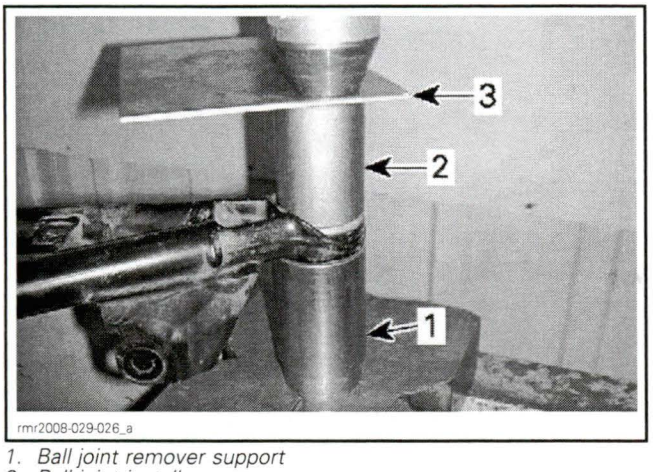




1. *Ball joint remover*
2. *Press*

Lower Ball Joint Installation

1. Using a press, the BALL JOINT REMOVER SUPPORT (P/N 529 036 121) and the BALL JOINT INSTALLER (P/N 529 035 975), press ball joint into the suspension arm end.



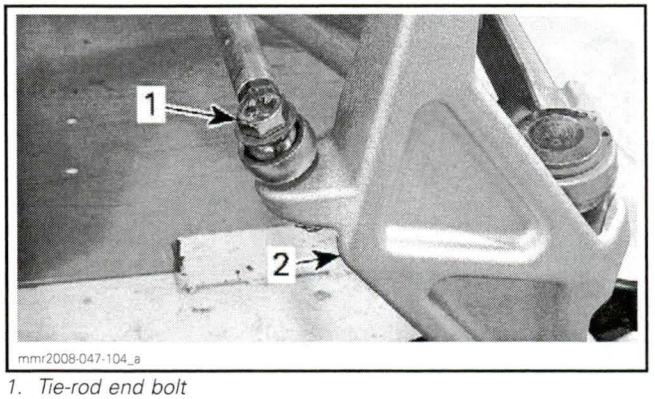
1. *Ball joint remover support*
2. *Ball joint installer*
3. *Steel plate*

2. Reinstall the circlip. If the circlip seems loose, replace it with a new one.
3. Install the *LOWER SUSPENSION ARM* on vehicle, see procedure in this subsection.

SKI LEGS

Ski Leg Removal

1. Remove ski from ski leg.
2. Detach tie-rod end from ski leg.



1. *Tie-rod end bolt*
2. *Ski leg*

3. Remove upper and lower ball joints from ski leg. Refer to *UPPER BALL JOINT* and *LOWER BALL JOINT* in this subsection.

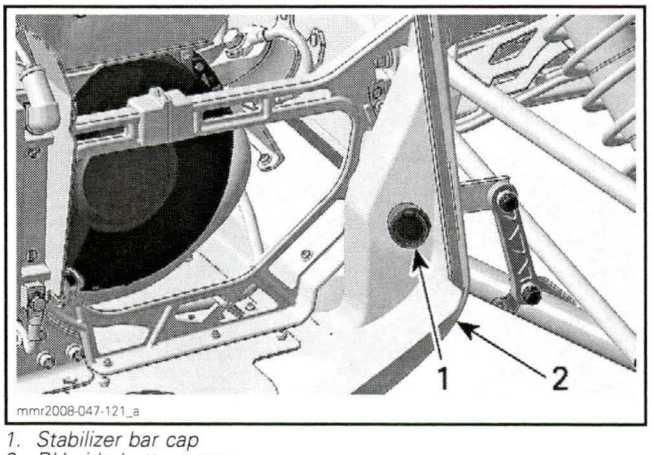
Ski Leg Installation

The installation is the reverse of the removal procedure.

STABILIZER BAR

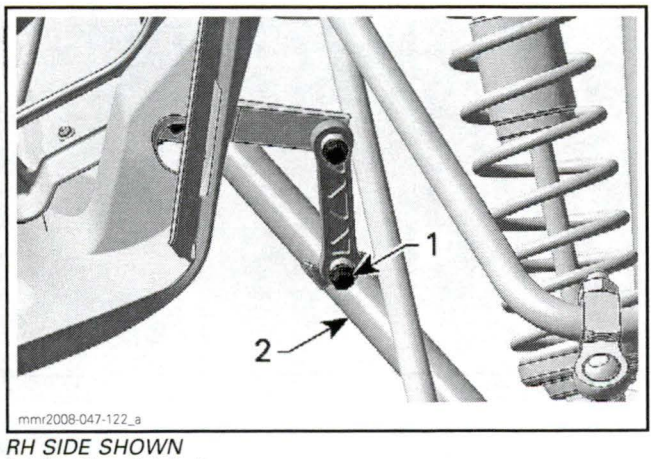
Stabilizer Bar Removal

1. Remove the RH side panel. Refer to *BODY* subsection.
2. Remove the muffler. Refer to *EXHAUST SYSTEM* subsection.
3. Remove the cap at the bottom of the RH side bottom pan.



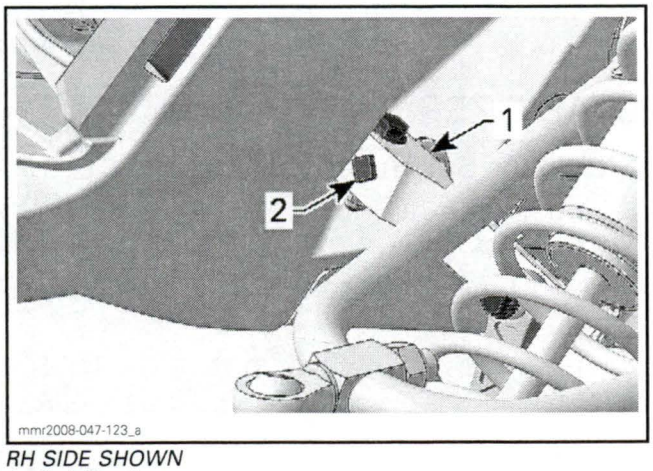
1. *Stabilizer bar cap*
2. *RH side bottom pan*

4. Remove bolts securing stabilizer links to lower suspension arms.



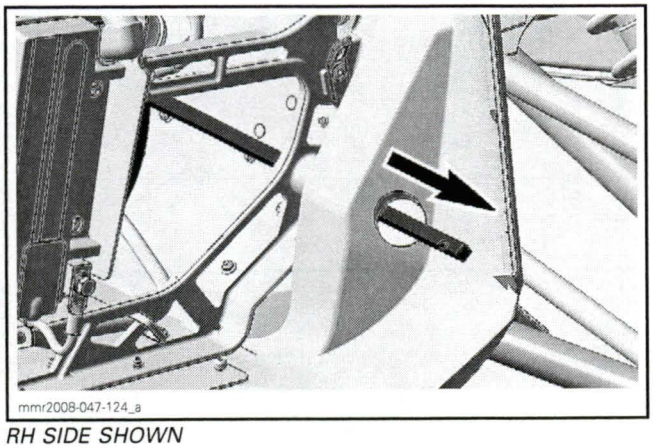
RH SIDE SHOWN
1. *Stabilizer link bolt*
2. *Lower suspension arm*

5. Unscrew stabilizer lever bolts.
6. Remove stabilizer levers from stabilizer bar.



RH SIDE SHOWN
1. *Stabilizer lever*
2. *Stabilizer bar*

7. Slide stabilizer bar out of vehicle.



RH SIDE SHOWN

Stabilizer Bar Installation

The installation is the reverse of the removal procedure.

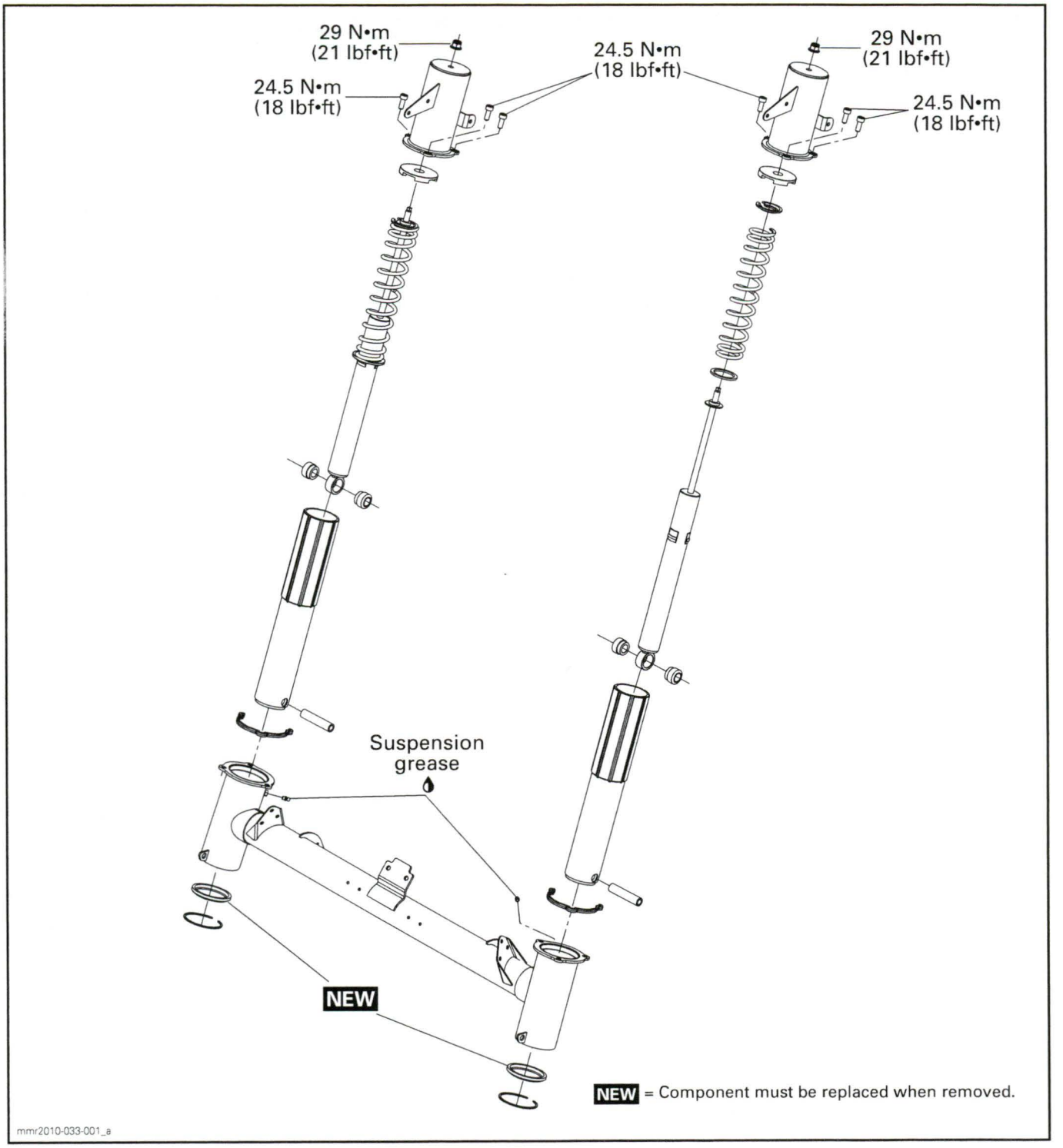
FRONT SUSPENSION (XP-LTS)

SERVICE TOOLS

Description	Part Number	Page
SPRING COMPRESSOR	529 036 184	295

SERVICE PRODUCTS

Description	Part Number	Page
SUSPENSION GREASE	293 550 033	296


29 N•m
(21 lbf•ft)
24.5 N•m
(18 lbf•ft)
24.5 N•m
(18 lbf•ft)
29 N•m
(21 lbf•ft)
24.5 N•m
(18 lbf•ft)
Suspension
grease
NEW
NEW = Component must be replaced when removed.
mmr2010-033-001_a

GENERAL

The procedure explained below is the same for the RH and LH sides unless otherwise noted.

⚠ CAUTION To avoid potential burns, never touch exhaust system components immediately after the engine has been running. Let engine and exhaust system cool down before performing any servicing.

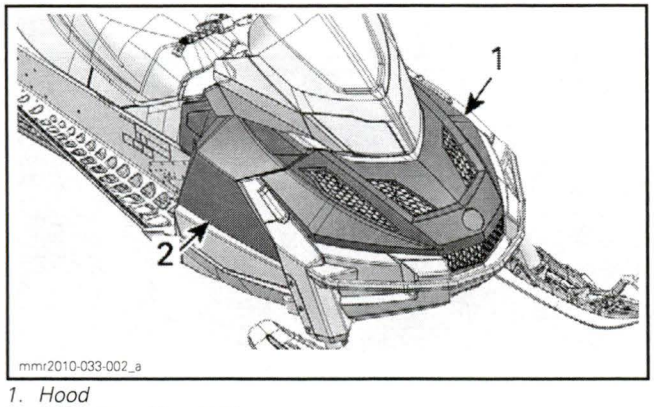
PROCEDURES

SHOCK ABSORBER COVERS

Shock Absorber Cover Removal

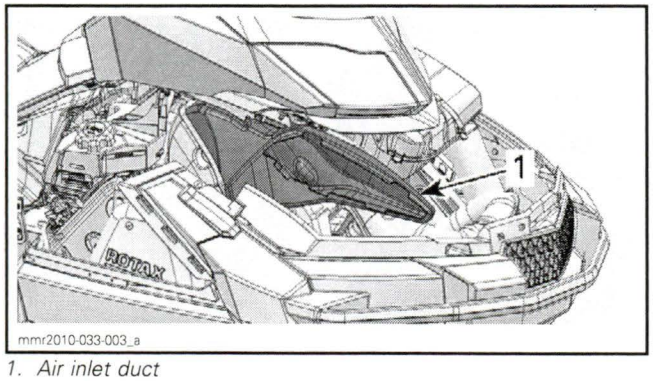
⚠ CAUTION To avoid potential burns, let engine and exhaust system cool down before performing any servicing.

1. Refer to *BODY* subsection and remove the following parts:
   - Hood
   - Upper side panels.



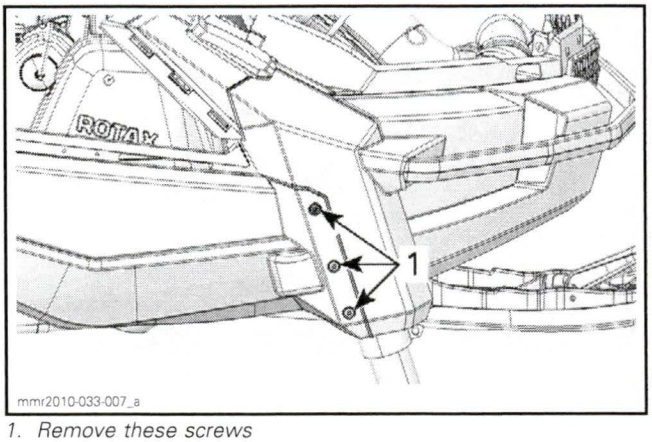
1. Hood
2. RH upper side panel

2. When working on the right side of the vehicle, the air inlet duct removal is recommended. Refer to *AXIAL FAN* subsection.



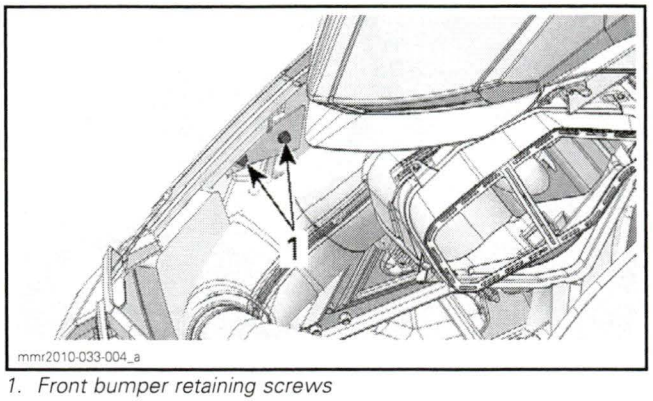
1. Air inlet duct

3. Lift the front of vehicle until skis are off the ground.
4. Place the front portion of frame on a wooden box to support it securely.
5. Remove the three screws retaining the rear bottom pan.



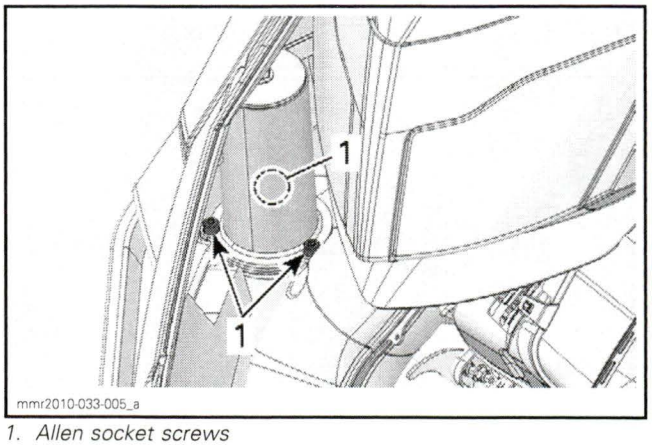
1. Remove these screws

6. From inside engine compartment, remove screws securing the front bumper.



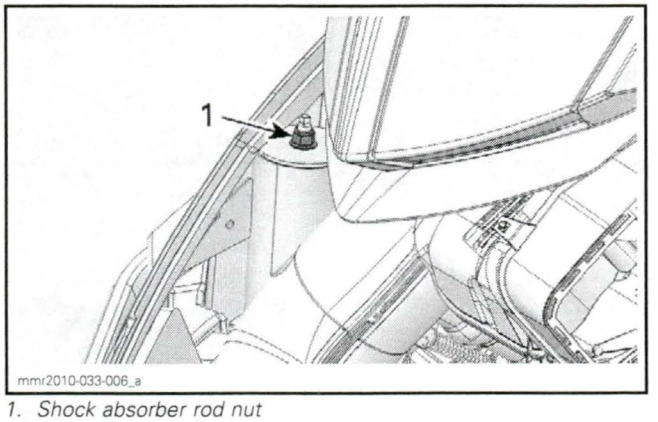
1. Front bumper retaining screws

7. Remove the three Allen socket screws retaining the shock absorber cover.



1. Allen socket screws

8. Remove the shock absorber rod nut on the top of the cover.

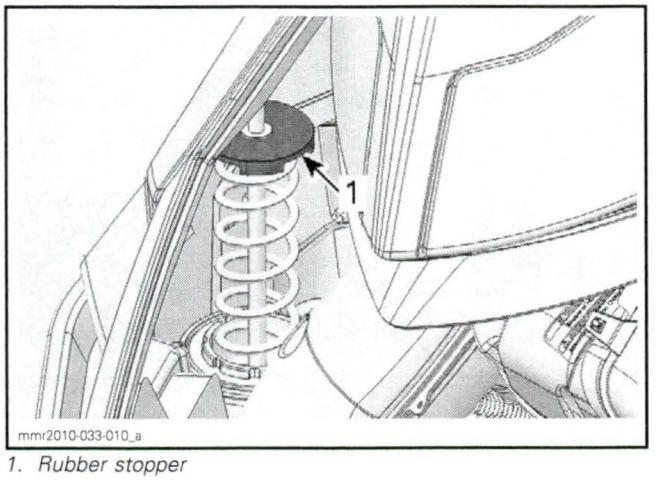


1. Shock absorber rod nut

9. Remove shock absorber cover from vehicle. Pull the top rear portion of the bottom pan to make room.

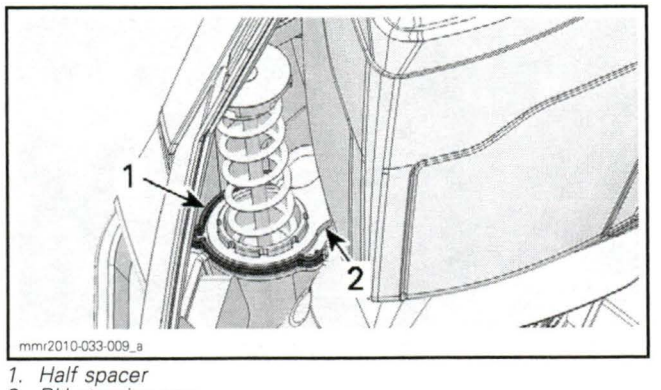
Shock Absorber Cover Installation

Make sure the rubber stopper on the top of the shock absorber is in place.



1. Rubber stopper

Check that half spacer and steering arm are properly installed on the LTS module post.



1. Half spacer
2. RH steering arm

Install and tight loosely all screws.

Tighten the front bumper screws to 10 N•m (89 lbf•**in**).

Tighten the three Allen socket screws to 24.5 N•m (18 lbf•ft).

Tighten the shock absorber rod nut to 29 N•m (21 lbf•ft).

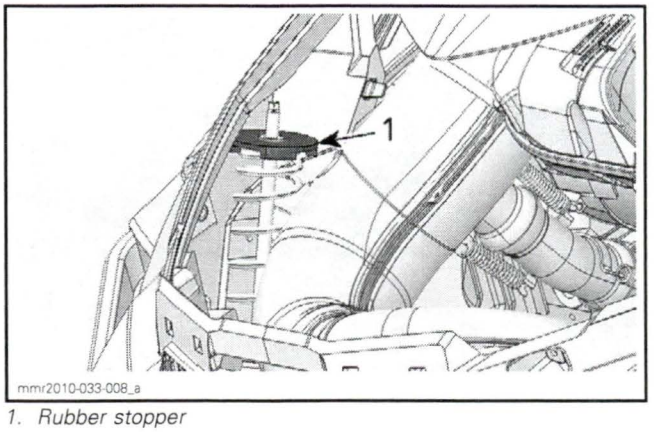
Finger tight rear bottom pan screws.

Install all other removed parts.

SHOCK ABSORBERS

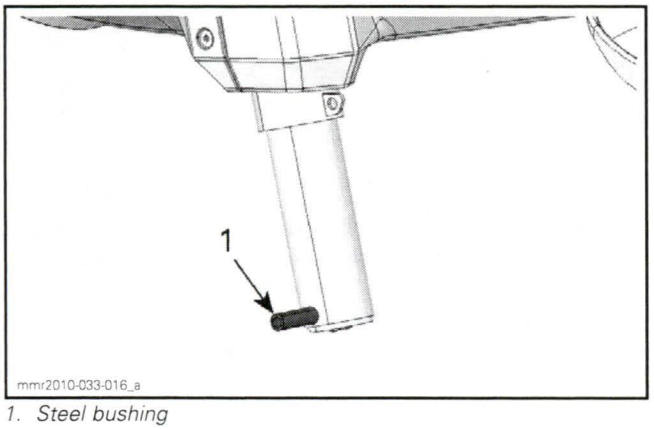
Shock Absorber Removal

1. Lift the front of vehicle until skis are off the ground.
2. Place the front portion of frame on a wooden box to support it securely.
3. Remove the ski. Refer to *STEERING SYSTEM* subsection.
4. Remove the *SHOCK ABSORBER COVER*. See procedure in this subsection.
5. Remove the rubber stopper on the top of shock absorber.



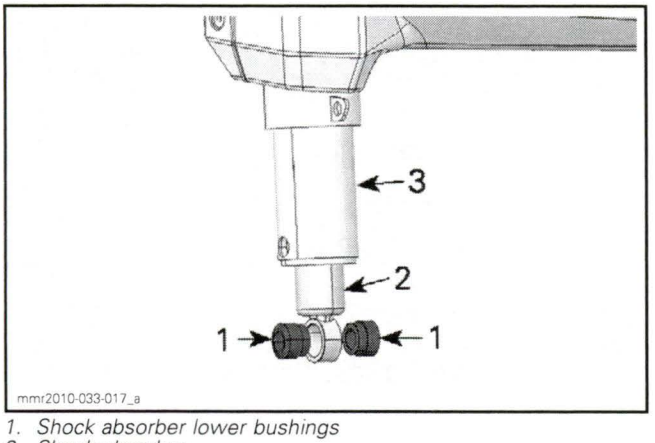
1. Rubber stopper

6. At the bottom of the ski leg, remove the steel bushing retaining the bottom of the shock absorber.



1. Steel bushing

7. Lift up ski leg and remove both lower bushing from the shock absorber.



1. Shock absorber lower bushings
2. Shock absorber
3. Ski leg

8. From engine compartment, pull up the shock absorber to remove it.

Shock Absorber Inspection

Remove spring from shock absorber.

Inspect shock as following:

1. Examine shock for leaks. Extend and compress the piston at least 5 complete strokes with its rod upward.
2. After, check that shock moves smoothly and with uniform resistance over its entire stroke.

NOTE: For the first 5 complete strokes, it could be normal to note uneven resistance.

3. Check 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 strokes.
4. If suspecting a shock is freezing, place it in a freezer (temperature below 0°C (32°F)) for 4 hours.
5. Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.
6. Replace if any faults are present.

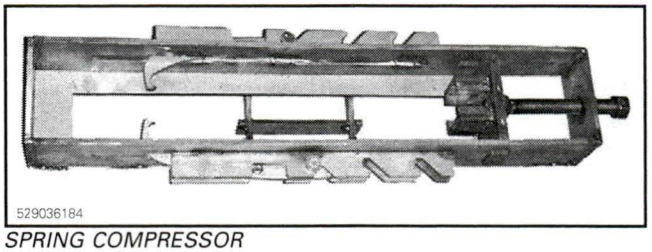
Shock Absorber Installation

For installation, reverse the removal procedure.

SPRINGS

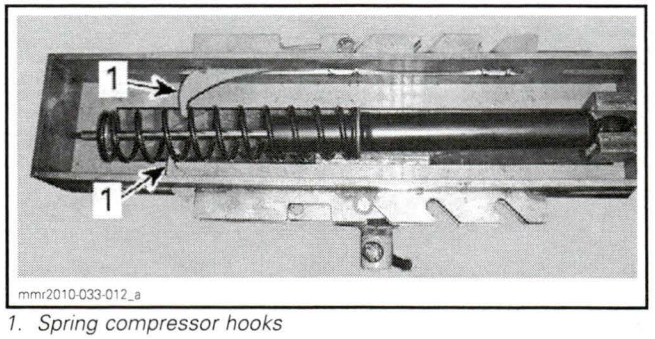
Spring Removal

1. Secure the SPRING COMPRESSOR (P/N 529 036 184) in a vise.



SPRING COMPRESSOR

2. Position the shock absorber in the tool and install the spring compressor hooks.

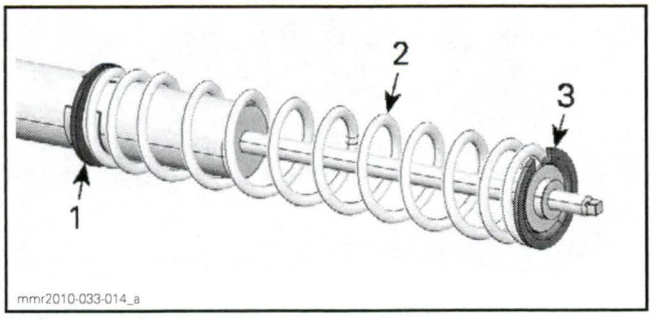


1. Spring compressor hooks

3. Tighten the spring compressor tool screw until the spring is sufficiently compressed to remove spring stopper.
4. Release the spring compressor tool screw.
5. Remove spring from shock absorber.

Spring Installation

Position the large washer, the spring and secure them with the spring stopper.



1. *Large washer*
2. *Spring*
3. *Spring stopper*

SKI LEGS

Ski Leg Inspection

Remove the ski and the steel sleeve. Lift the ski leg to check its free movement.



Check straightness of ski leg. Check for scored or scratched surface. Replace as required.

When the shock absorber cover is removed, check the splines on ski leg and steering arm interlock for abnormal free play. Replace as necessary.

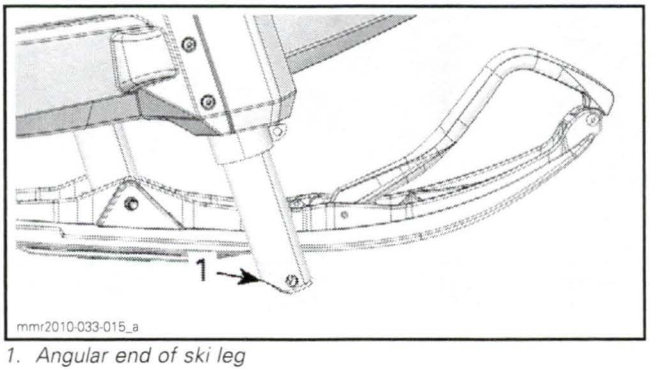
Ski Leg Removal

1. Remove the *SHOCK ABSORBER*, see procedure in this subsection.
2. Disconnect the tie-rod end from the steering arm, refer to *STEERING SYSTEM* subsection.
3. Remove the half spacer and the steering arm from the ski leg.
4. From the engine compartment, pull the ski leg out of vehicle.

Ski Leg Installation

Apply a thin layer of SUSPENSION GREASE (P/N 293 550 033) on ski leg splines.

Insert the ski leg into the LTS module tube. Make sure to place the angular end of the ski leg rearward.



1. *Angular end of ski leg*

Reinstall all removed parts.

Lubricate the suspension. Refer to *PERIODIC MAINTENANCE PROCEDURE* subsection.

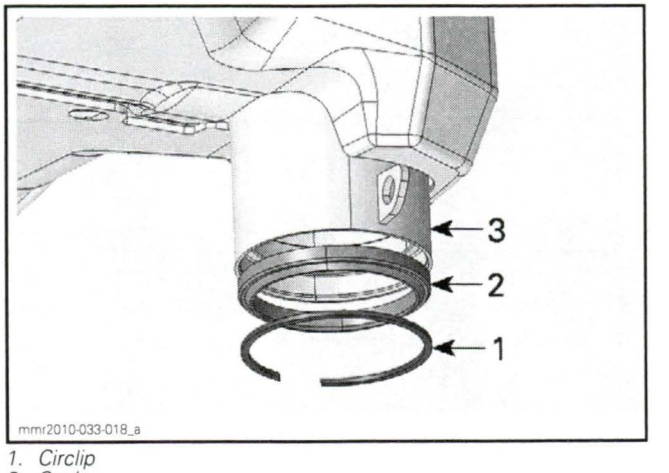
NOTE: When a ski leg is changed, perform a steering alignment. Refer to *STEERING SYSTEM* subsection.

SEALS

Seal Replacement

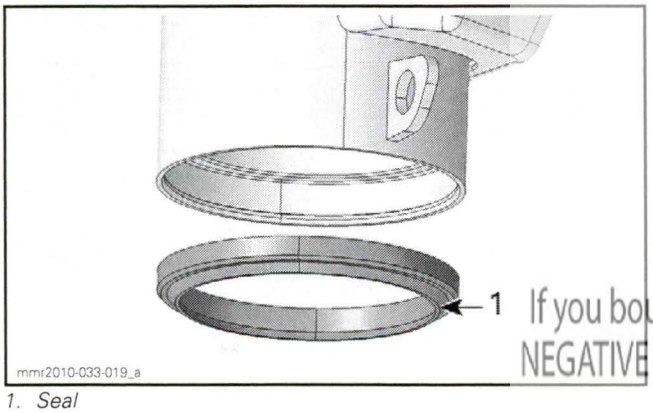
The seals are located at the bottom ends of each LTS module tube.

1. Remove *SKI LEG*, see procedure in this subsection.
2. Remove the circlip at the bottom of the LTS module tube.
3. Remove and discard the seal.



1. *Circlip*
2. *Seal*
3. *LTS module tube*

4. Clean seal location inside LTS module tube. Make sure all grease is removed before inserting the new seal.
5. Install the new seal with the lips outward.



Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

1. Seal

6. Reinstall the circlip. Replace the circlip with a new if it seems loose.
7. Reinstall all removed parts.
8. Lubricate the suspension. Refer to *PERIODIC MAINTENANCE PROCEDURE* subsection.

REAR SUSPENSION (SC-5)

SERVICE TOOLS

Description	Part Number	Page
DOME GUIDE	529 026 500	314
FLOATING PISTON PULLER	529 035 901	314, 320, 322
GAS FILL TOOL KIT	503 190 102	314, 319, 322
GAS SHOCK VALVE TOOL (TIRE VALVE TYPE)	529 035 570	314, 319
PISTON GUIDE	529 026 600	314
SHOCK ABSORBER SUPPORTS	529 036 186	312
SHOCK RETAINER TOOL	529 035 769	314

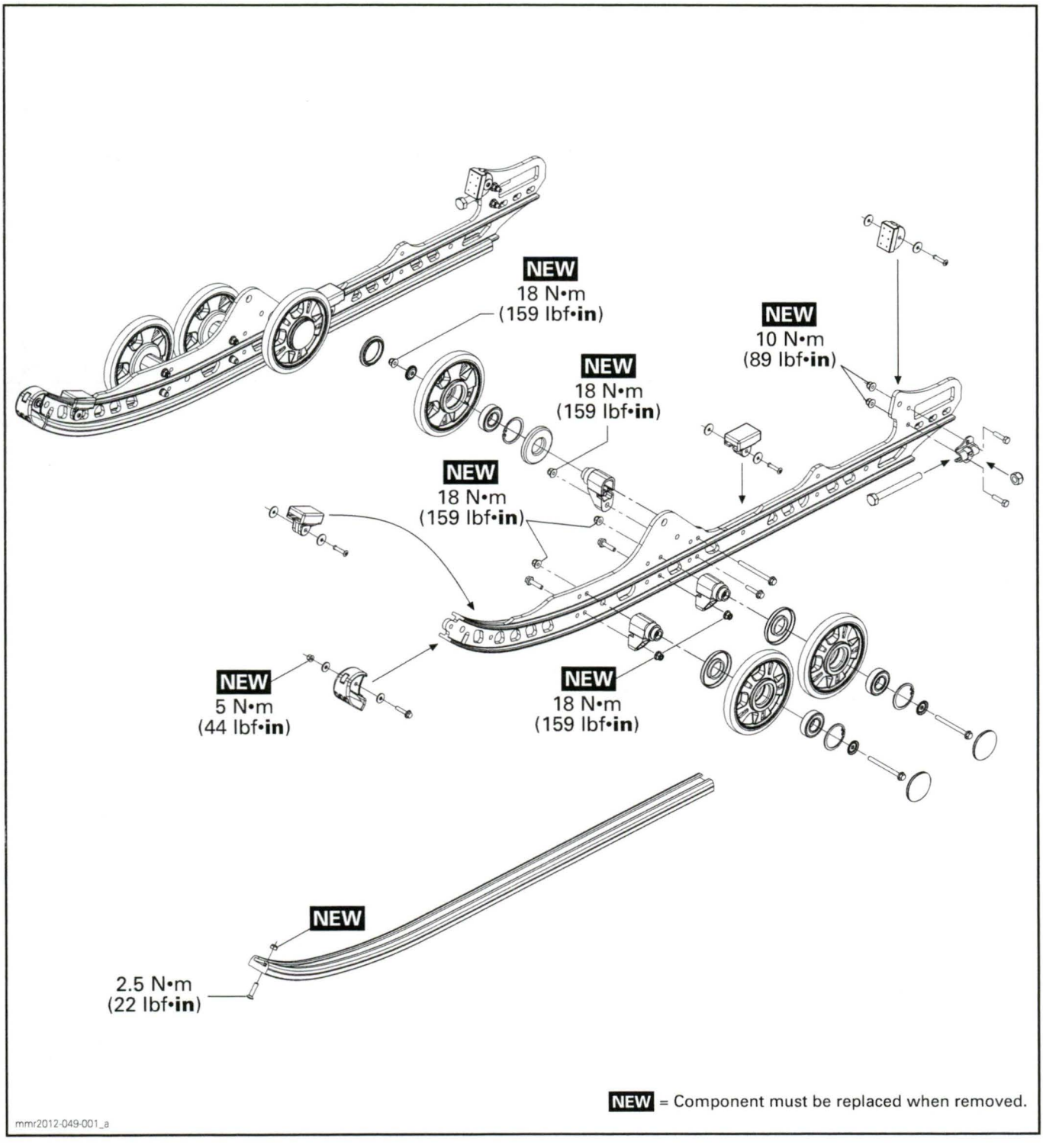
SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
BENCH SCALE SUCH AS SALTER BRECKNELL	PS 400	312

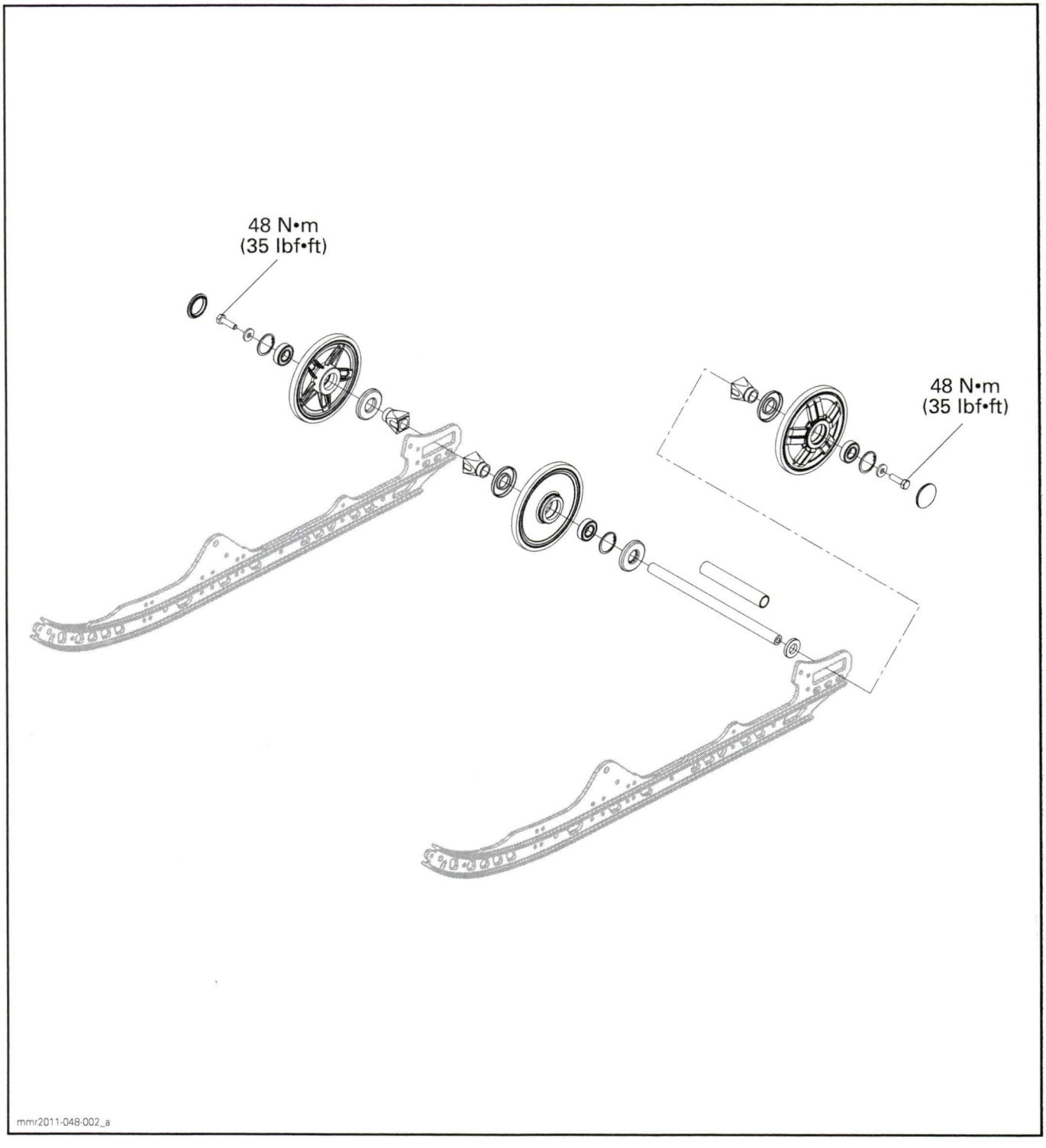
SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	338
LOCTITE 271 (RED)	293 800 005	316
MOLYKOTE G-N	420 297 433	317
PULLEY FLANGE CLEANER	413 711 809	319, 321–322
SHOCK ABSORBER OIL	293 600 035	318, 322

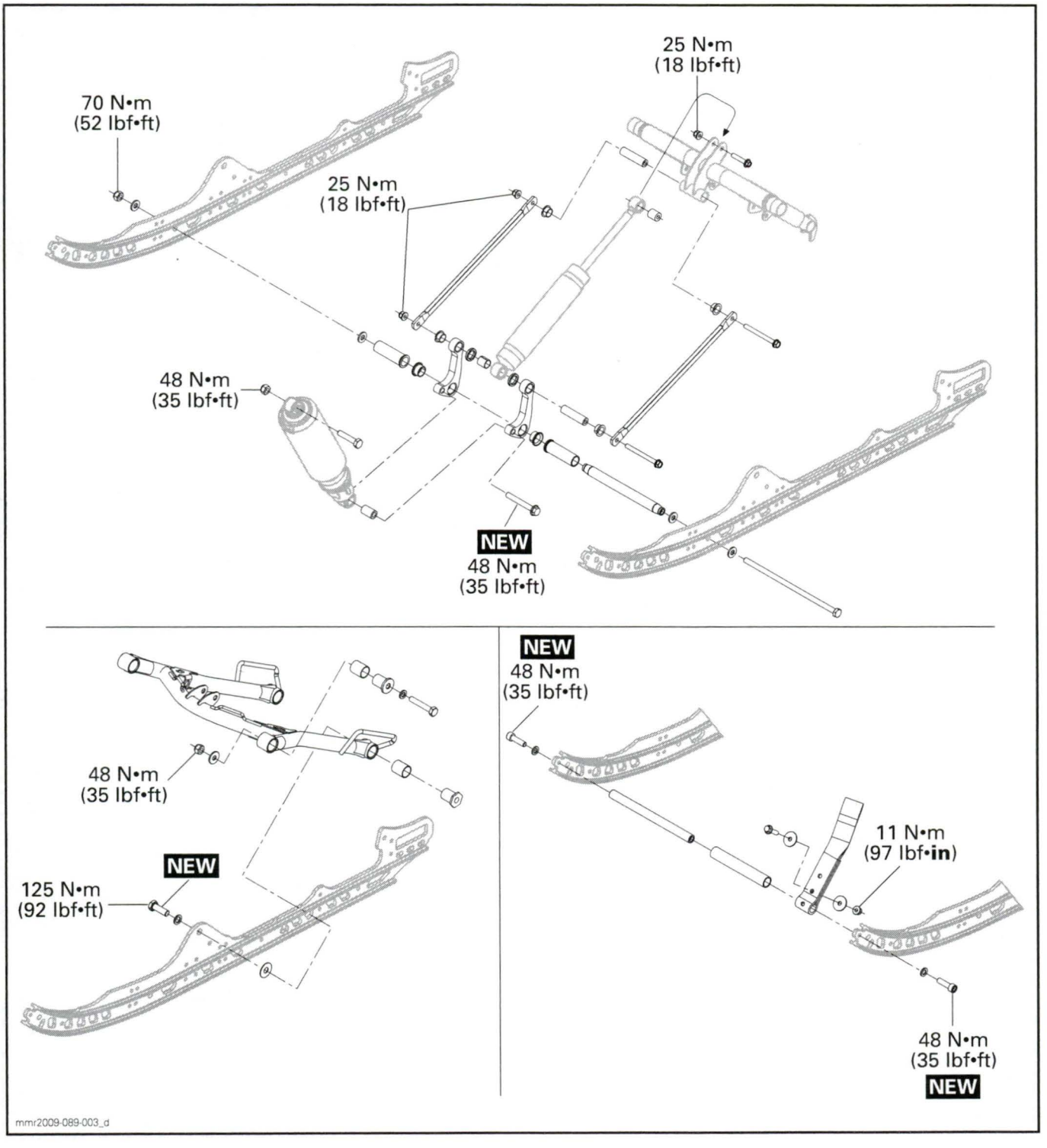
RAILS AND FRONT IDLER WHEELS



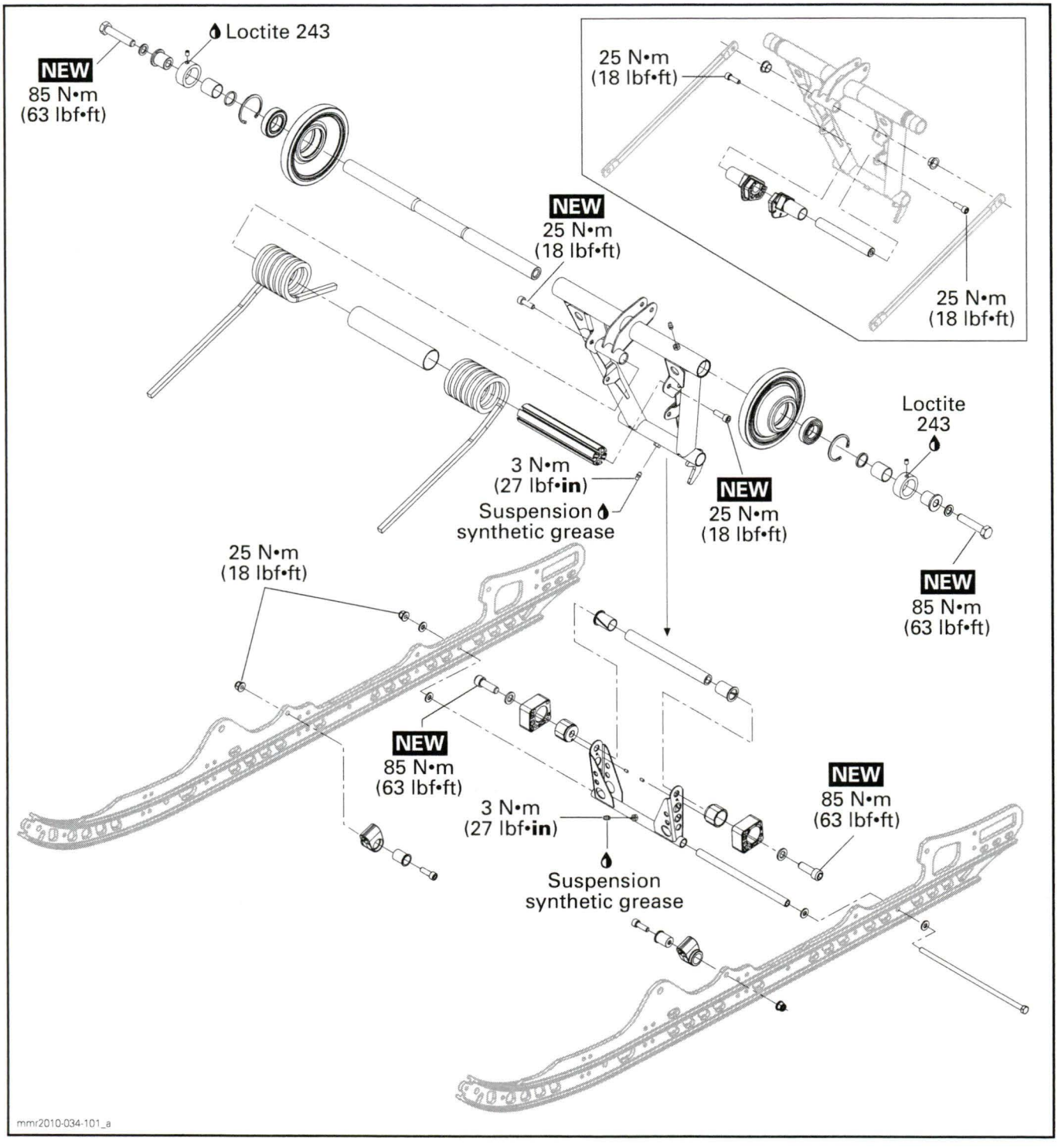
REAR IDLER WHEELS (3 WHEELS LAYOUT)



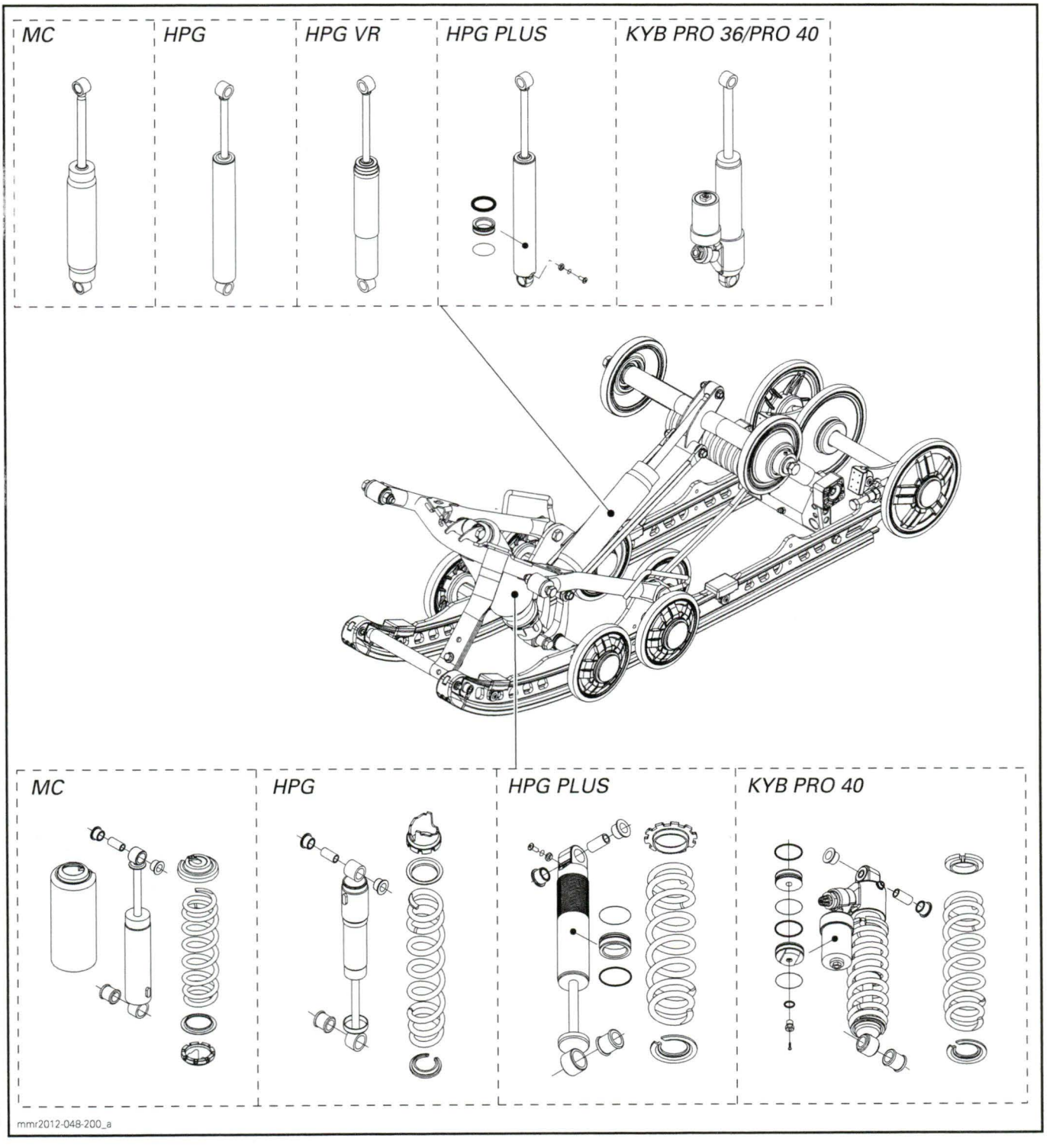
FRONT ARM


25 N•m
(18 lbf•ft)
70 N•m
(52 lbf•ft)
25 N•m
(18 lbf•ft)
48 N•m
(35 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
48 N•m
(35 lbf•ft)
NEW
125 N•m
(92 lbf•ft)
NEW
48 N•m
(35 lbf•ft)
11 N•m
(97 lbf•in)
48 N•m
(35 lbf•ft)
NEW
mmr2009-089-003_d

REAR ARM

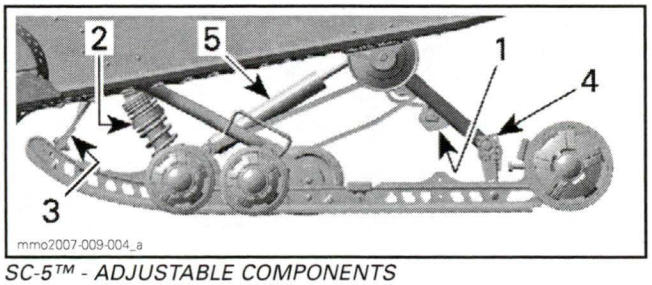

Loctite 243
NEW
85 N•m
(63 lbf•ft)
25 N•m
(18 lbf•ft)
NEW
25 N•m
(18 lbf•ft)
25 N•m
(18 lbf•ft)
Loctite
243
3 N•m
(27 lbf•in)
Suspension
synthetic grease
NEW
25 N•m
(18 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
25 N•m
(18 lbf•ft)
NEW
85 N•m
(63 lbf•ft)
3 N•m
(27 lbf•in)
Suspension
synthetic grease
NEW
85 N•m
(63 lbf•ft)
mmr2010-034-101_a

SHOCK ABSORBERS



ADJUSTMENT

REAR SUSPENSION ADJUSTMENTS



SC-5™ - ADJUSTABLE COMPONENTS
1. *Rear springs*
2. *Center spring*
3. *Stopper strap*
4. *Coupling blocks*
5. *Rear shock absorber*

NOTICE **Whenever adjusting rear suspension, check track tension and adjust if necessary.**

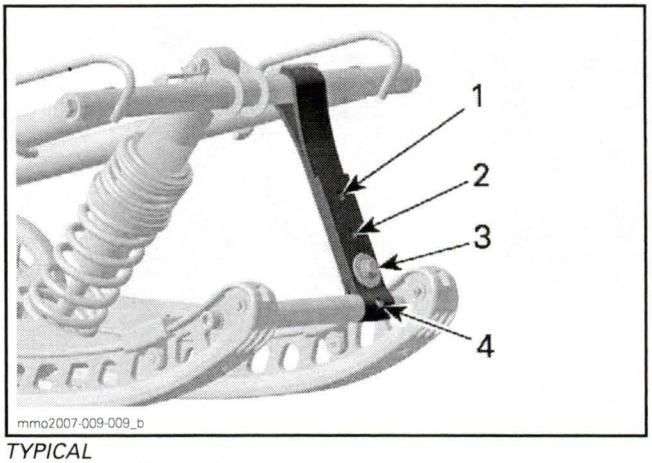
Stopper Strap

Stopper strap length has an effect on the amount of weight the center spring has to carry especially during acceleration, therefore on the front end uplift.

Stopper strap length also has an effect on center spring travel.

NOTICE **Whenever stopper strap length is changed, track tension must be checked.**

ACTION	RESULT
Increasing stopper strap length	Lighter ski pressure under acceleration
	More center spring travel
	More bump absorption capability
Decreasing stopper strap length	Heavier ski pressure under acceleration
	Less center spring travel
	Less bump absorption capability



TYPICAL
1. *Position 1 (longest)*
2. *Position 2*
3. *Position 3*
4. *Position 4*

NOTE: Decreasing the stopper strap length may reduce comfort. If too much weight transfer is felt, try to correct it by adjusting the coupling blocks first. Always install stopper strap bolt as close as possible to the lower shaft.

When operating the snowmobile in deep snow, it may be necessary to vary stopper strap length and/or riding position, to change the angle at which the track rides on the snow. Operator's familiarity with the various adjustments as well as snow conditions will dictate the most efficient combination.

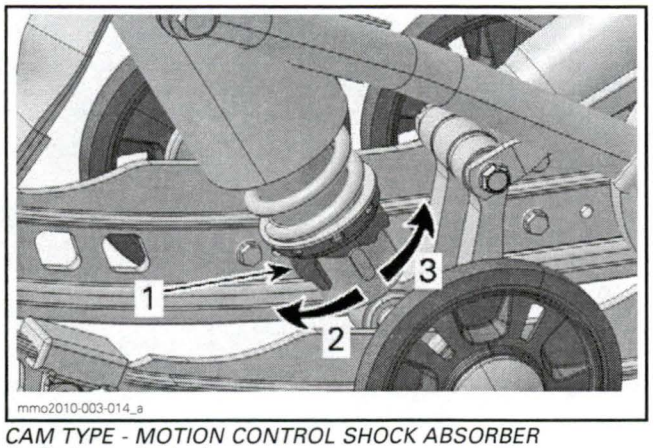
Generally, a longer stopper strap setting gives better performance in deep snow on a flat landscape.

Center Spring

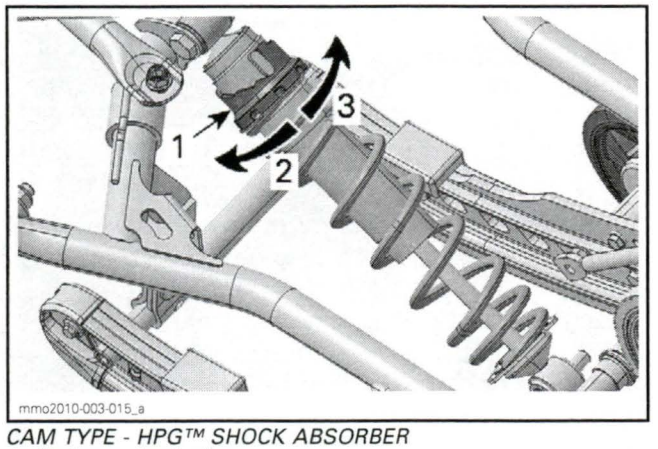
Center spring preload has an effect on steering effort, handling and bump absorption.

Also, since center spring preload adjustment puts more or less pressure on the front of the track, it has an effect on the performance in deep snow.

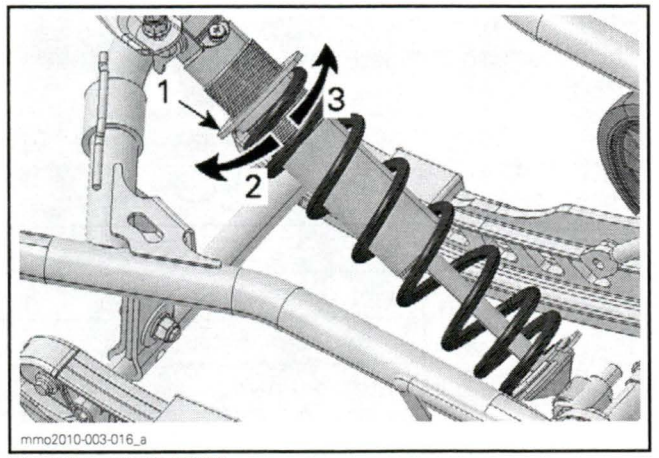
ACTION	RESULT
Increasing preload	Lighter steering
	More bump absorption capability
	Better deep snow starts
	Better deep snow performance and handling
Decreasing preload	Heavier steering
	Less bump absorption capability
	Better trail handling



CAM TYPE - MOTION CONTROL SHOCK ABSORBER
1. *Spring preload adjustment cam*
2. *Increase preload*
3. *Decrease preload*



CAM TYPE - HPG™ SHOCK ABSORBER
1. *Spring preload adjustment cam*
2. *Decrease preload*
3. *Increase preload*



TYPICAL- RING TYPE
1. *Spring preload adjustment ring*
2. *Increase preload*
3. *Decrease preload*

NOTE: For cam type or ring type preload adjuster, use the suspension adjustment tool provided in the tool kit.

Rear Springs

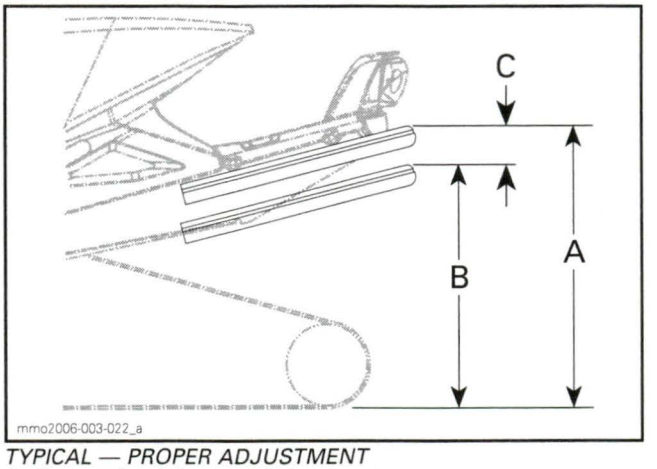
Rear spring preload has an effect on comfort, ride height and load compensation.

Also, adjusting rear spring preload shifts more or less weight to the snowmobile front end. As a result, more or less weight is applied to the skis. This has an effect on performance in deep snow, steering effort and handling.

Slight suspension bottoming occurring under the worst riding conditions indicates a good choice of spring preload.

ACTION	RESULT
Increasing preload	Firmer rear suspension
	Higher rear end
	More bump absorption capability
	Heavier steering
Decreasing preload	Softer rear suspension
	Lower rear end
	Less bump absorption capability
	Lighter steering
	Better deep snow performance and handling

Refer to the following to determine if preload is correct.



TYPICAL — PROPER ADJUSTMENT
A. *Suspension fully extended*
B. *Suspension has collapsed with operator, passenger and load added*
C. *Distance between dimension "A" and "B", see table below*

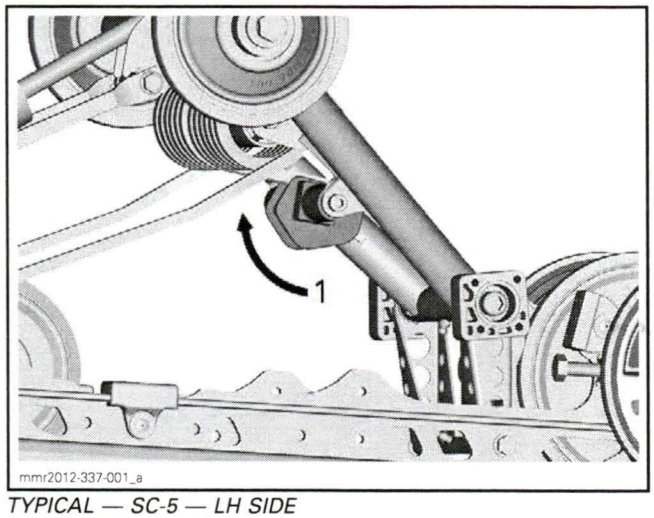
"C"	WHAT TO DO
50 mm to 75 mm (2 in to 3 in)	No adjustment required
More than 75 mm (3 in)	Adjusted too soft, increase preload
Less than 50 mm (2 in)	Adjusted too firm, decrease preload

NOTE: If the specification is unattainable with the original springs, refer to the applicable *SPRING CHART* bulletin for other available springs.

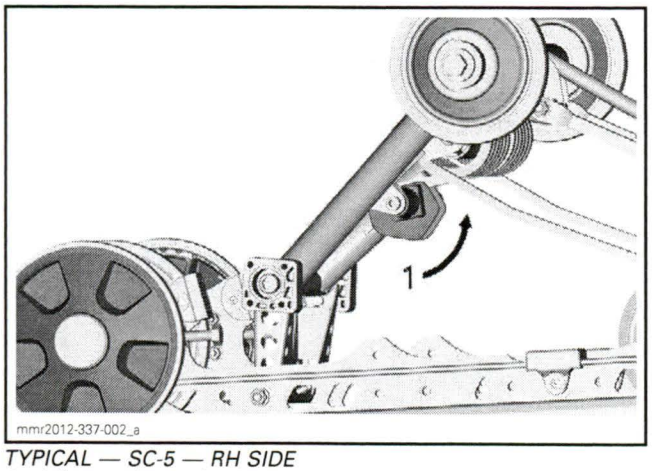
To increase spring preload, using tool, always turn the left side adjustment cam in a clockwise direction, and the right side cam in a counterclockwise direction.

⚠ CAUTION Never set preload cams directly from position 5 to 1 or directly from position 1 to 5.

The adjustment cams have 5 different settings, 1 being the softest.



TYPICAL — SC-5 — LH SIDE
1. Adjust spring preload



TYPICAL — SC-5 — RH SIDE
1. Adjust spring preload

Coupling Blocks

Coupling blocks adjustment has an effect on vehicle handling during acceleration only.

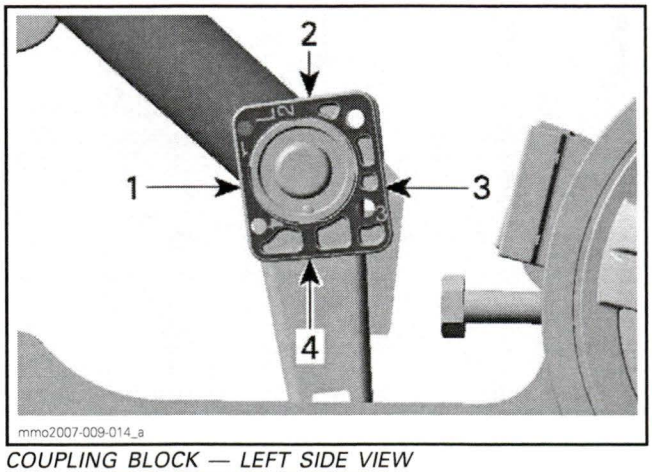
NOTE: A high coupling block setting will reduce both comfort and transfer under acceleration.

To adjust, turn coupling blocks using the suspension adjustment tool provided in the tool kit.

Place the desired setting number towards rubber stopper.

⚠ WARNING

Both blocks must be set at the same position. Otherwise vehicle behavior may be unpredictable and suspension may become warped.



COUPLING BLOCK — LEFT SIDE VIEW
("L" — LEFT EMBOSSED ON BLOCK)
1. Position 1 (minimum)
2. Position 2
3. Position 3
4. Position 4 (maximum)

Coupling Blocks Setting

POSITION	USE
1	More ski lift during acceleration
2	Intermediate setting
3	Intermediate setting
4	Less ski lift during acceleration

MAINTENANCE

For rear suspension lubrication, mechanism and stopper strap inspection, refer to *PERIODIC MAINTENANCE PROCEDURES*.

For shock absorbers inspection, refer to *SHOCK ABSORBERS* in this subsection.

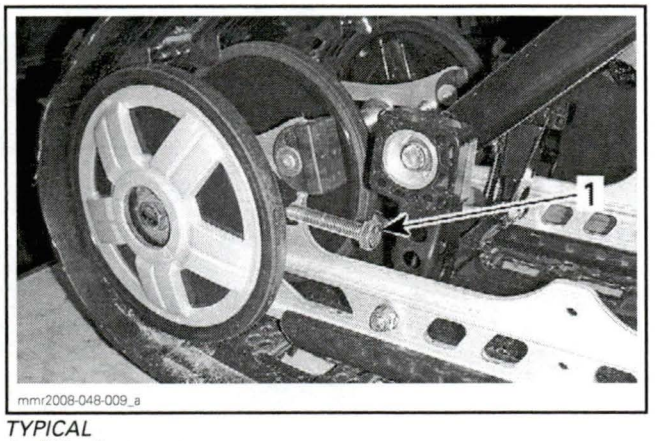
PROCEDURES

NOTE: Many parts can be changed with rear suspension in place. When specified, refer to *SUSPENSION ASSEMBLY* to remove rear suspension from vehicle.

SUSPENSION ASSEMBLY

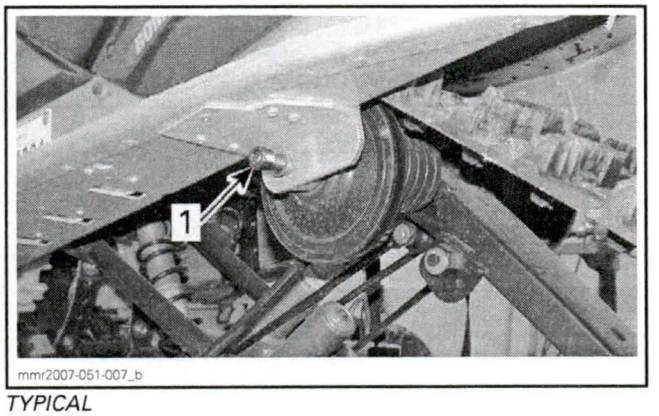
Suspension Assembly Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.



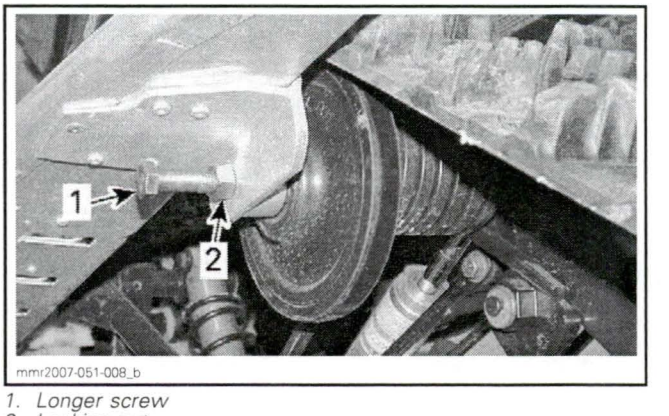
TYPICAL
1. RH adjustment screw

3. Remove and discard rear arm bolts from chassis. Use the following procedure to remove bolts easily.
   3.1 Unscrew one screw securing the rear arm to frame.



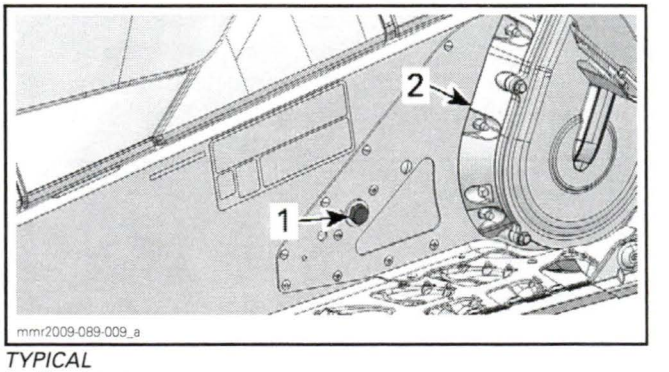
TYPICAL
1. Screw

   3.2 Replace the screw with a longer one and a nut.
   3.3 Screw in the longer screw by approximately 7 turns.
   3.4 Hold the longer screw and tighten locking nut.



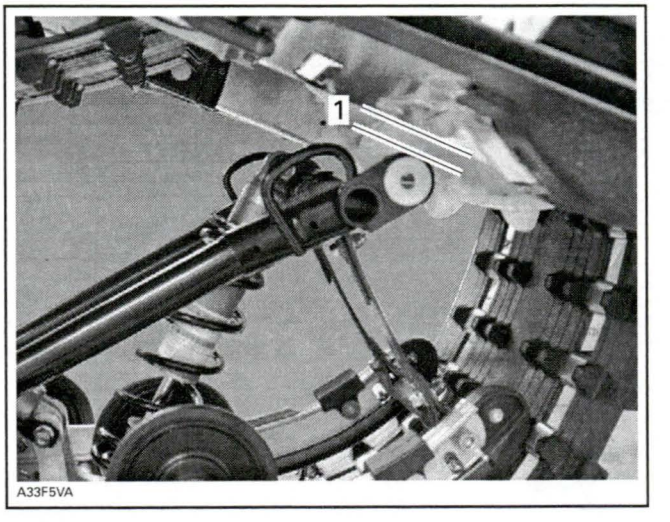
1. Longer screw
2. Locking nut

   3.5 Unscrew the screw on the other side then unlock nut and remove the longer screw.
4. Remove and discard both screws retaining front arm to tunnel.



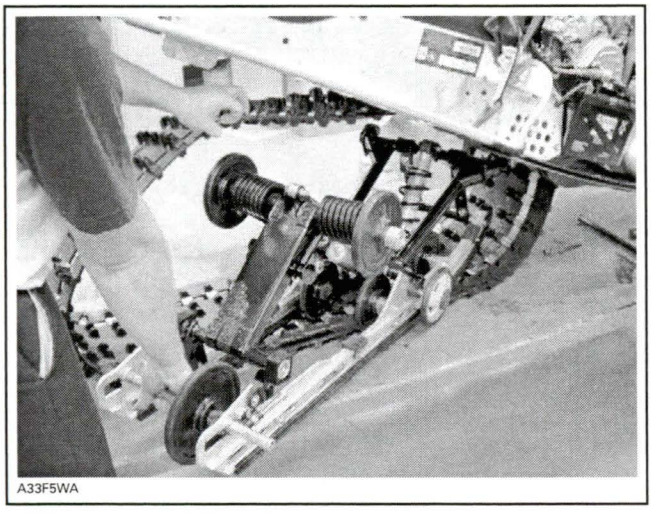
TYPICAL
1. Front arm screw
2. Chaincase

5. Lift rear of vehicle until front arm as enough clearance to pass underneath tunnel.



TYPICAL
1. Enough clearance

6. Remove suspension assembly from vehicle.



TYPICAL — REMOVE SUSPENSION

Suspension Assembly Installation

Installation is the reverse of removal procedure. Pay attention to the following.

Inspect track thoroughly before reinstalling suspension. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Install suspension into track with front portion first.

Install **NEW** front arm nuts.

Install **NEW** rear arm screws.

Tighten screws to specified torque.

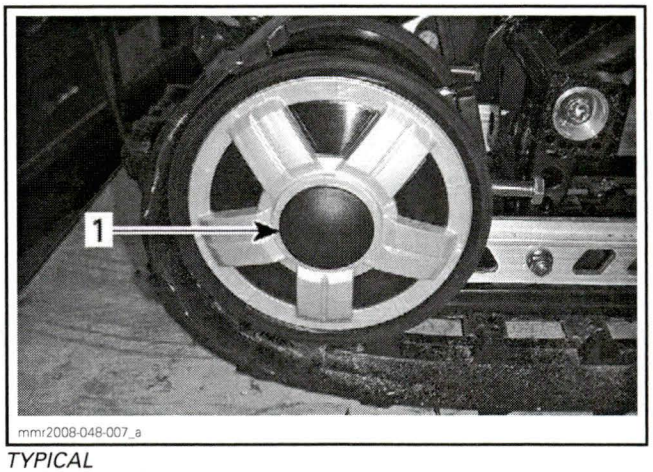
TIGHTENING TORQUE	
Front arm nuts	48 N•m (35 lbf•ft)
Rear arm screws	85 N•m (63 lbf•ft)

Adjust track tension, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

REAR AXLE

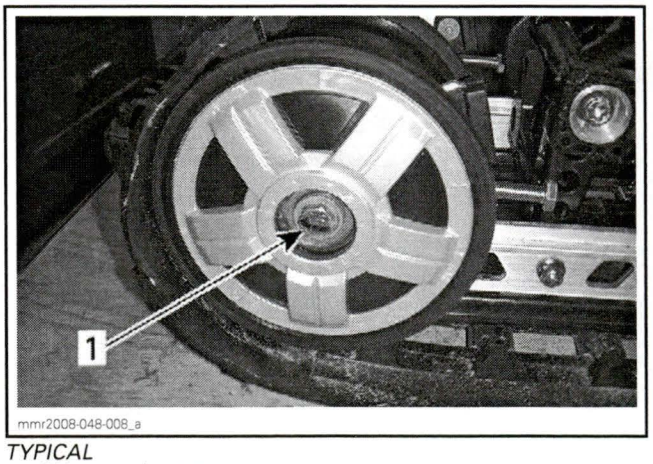
Rear Axle Removal

1. Lift rear of vehicle and support it off the ground.
2. Remove rear idler wheel caps.



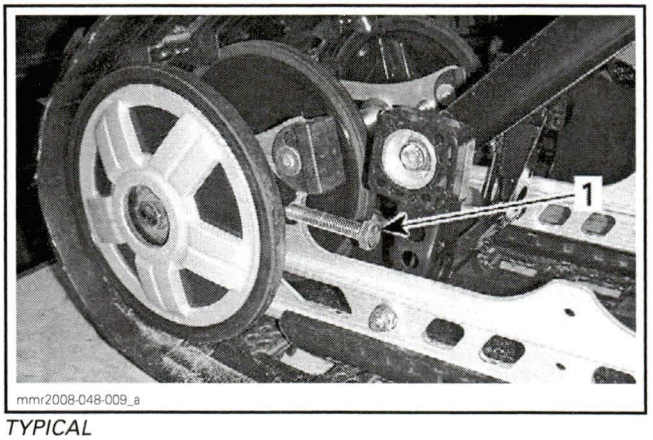
TYPICAL
1. RH rear idler wheel cap

3. Loosen rear axle screws (one each side).



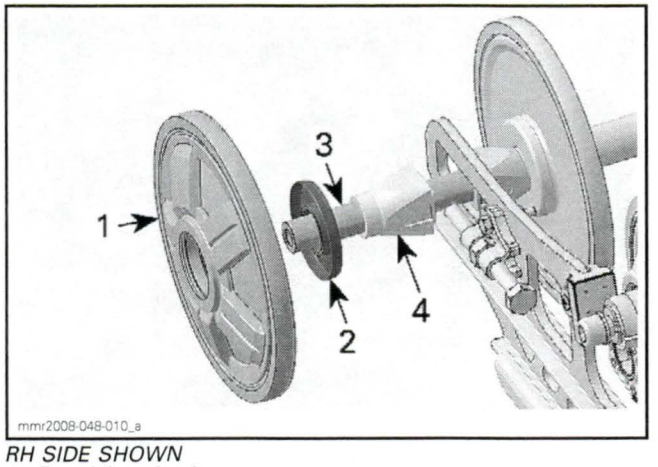
TYPICAL
1. RH rear axle screw

4. Completely loosen track tension by unscrewing both adjustment screws.



TYPICAL
1. RH adjustment screw

5. Remove both rear axle screws.
6. Remove rear idler wheels, seals and wheel spacers.



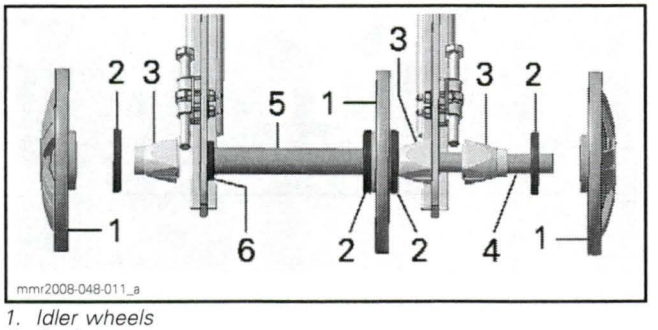
RH SIDE SHOWN
1. *Rear idler wheel*
2. *Seal*
3. *Rear axle*
4. *Wheel spacer*

7. Pull out the rear axle.

Rear Axle Installation

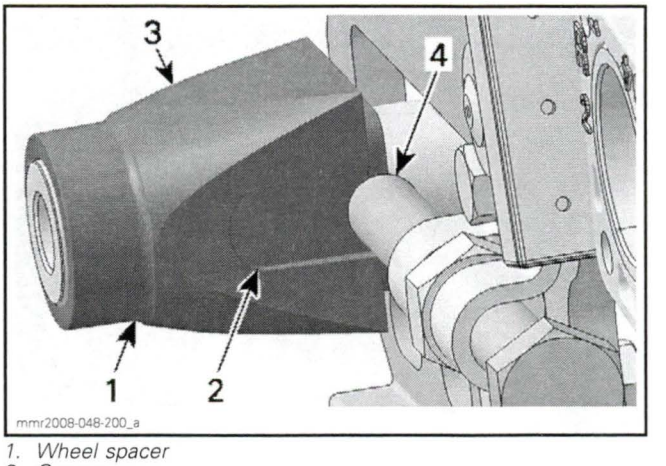
Installation is reverse of removal procedure. However, pay attention to the following.

Make sure to position all parts correctly.



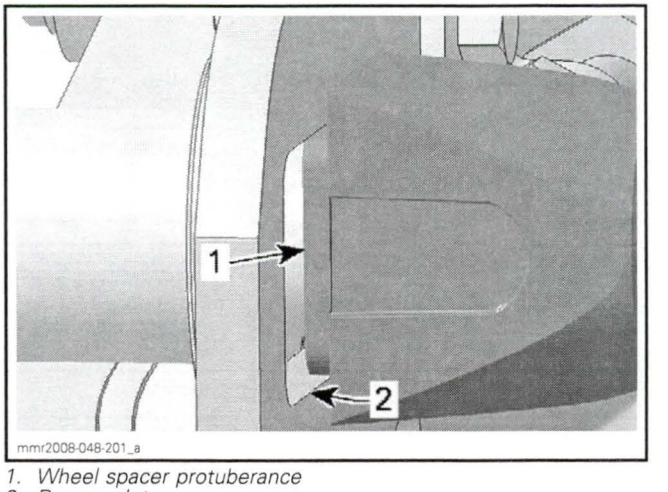
1. *Idler wheels*
2. *Seals*
3. *Wheel spacers*
4. *Rear axle*
5. *Rear axle spacer*
6. *Washer*

Position wheel spacers with a flat side up and a groove in front of tensioner screw.



1. *Wheel spacer*
2. *Groove*
3. *Flat side*
4. *Tensioner screw*

When tightening rear axle, make sure each wheel spacer protuberance is engaged into runner slot.



1. *Wheel spacer protuberance*
2. *Runner slot*

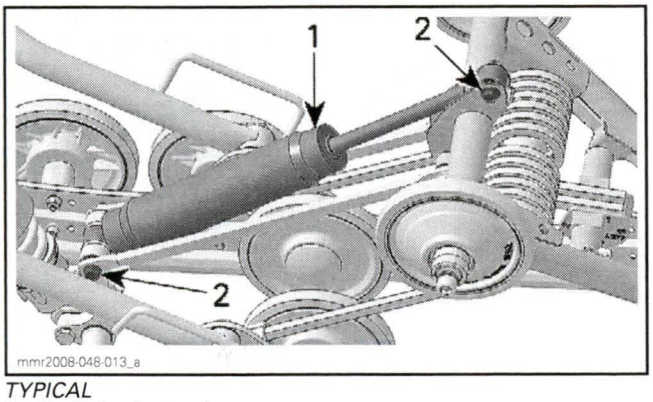
Adjust track tension. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

SHOCK ABSORBERS

Rear Shock Absorber Removal

NOTE: If necessary, to ease shock removal, unfasten stopper strap to release shock pressure.

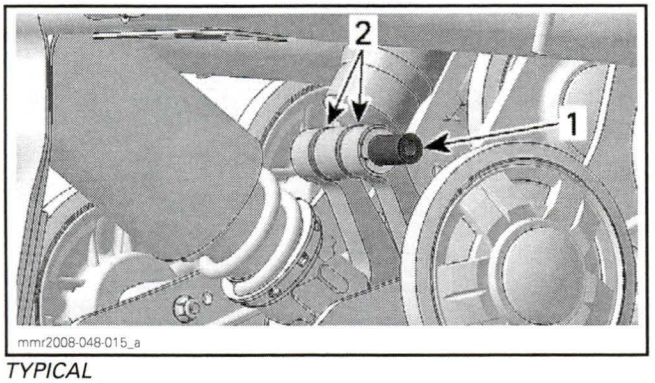
1. Lift rear of vehicle and support it off the ground.
2. Remove bolts and nuts from shock.



TYPICAL
1. *Rear shock absorber*
2. *Remove bolts and nuts*

3. Lower the bottom end of throttle rods to reach the bar axle.
4. Remove bar axle retaining the bottom of shock absorber.

NOTE: Pay attention to plastic spacers located between rocker arms and shock absorber.

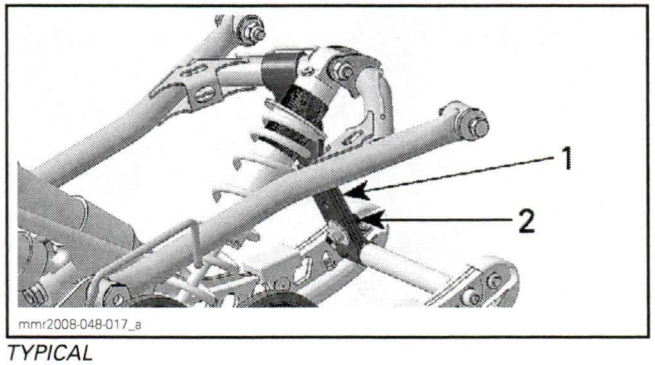


TYPICAL
1. *Bar axle*
2. *Plastic spacers*

5. Remove rear shock absorber from vehicle.

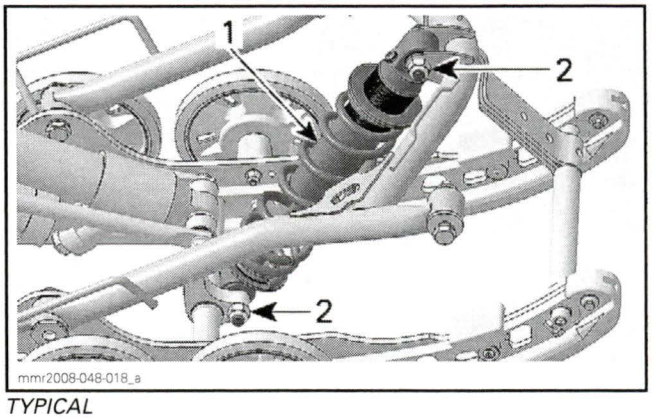
Center Shock Absorber Removal

1. Lift the rear of vehicle and support it off the ground.
2. Unfasten stopper strap.



TYPICAL
1. *Stopper strap*
2. *Stopper strap bolt*

3. Remove bolts and nuts from shock.



TYPICAL
1. *Front shock absorber*
2. *Remove bolts and nuts*

4. Remove shock absorber from vehicle.

Shock Absorber Inspection

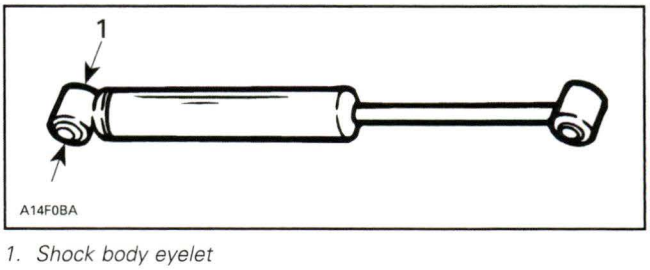
NOTE: Refer to *TECHNICAL SPECIFICATIONS* to identify the shock absorber relating to the vehicle model.

NOTE: Unless otherwise noted, shock absorber must be at normal room temperature (21°C ± 2°C (70°F ± 36°F)) during inspection.

MC™ Hydraulic Shock

1. Perform a visual inspection of the shock:
   - The shock must be exempt of any dent or scratch, especially on the rod.
   - Small dent on the shock body may not affect any performance or reliability of this shock.
   - Any defect on the rod, as small as it is, can lead to seal failure and oil leak.
   - If such defect (on rod) is detected, the shock must be replaced, and this will not be cover under warranty.
2. Secure the shock body end in a vise, clamping on eyelet, with its rod upward.

NOTICE **Do not clamp directly on shock body.**



1. *Shock body eyelet*

3. Examine shock for leaks. Extend and compress the piston at least 5 complete strokes with its rod upward.
4. Check that shock moves smoothly and with uniform resistance over its entire stroke.

NOTE: For the first 5 complete strokes, it could be normal to note uneven resistance.

5. Check 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 strokes.
6. If suspecting a shock is freezing, place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.
7. Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.
8. If any faults are present, replace shock.

All HPG Shock (Including KYB PRO Series)

1. Perform a visual inspection of the shock:
   - The shock must be exempt of any dent or scratch, especially on the rod.
   - Any defect on the rod, as small as it is, can lead to seal failure and oil leak.
   - If such defect is detected, the shock must be replaced and this will not be covered under warranty.
2. Completely push down shock rod into the body and check result as per table.

HPG SHOCK	RESULT
All except 551 mm (21-11/16 in) rear shock	The rod should completely get in the shock body
551 mm (21-11/16 in) rear shock	The stroke must be at least 138 mm (5-7/16 in)

NOTE: For the **HPG™ Variable Rate Shock**, it should be stiff for approximately the first 25 mm (1 in), then softer for about 50 mm (2 in), and stiffer again. This stiff/soft/stiff phenomenon shows the normal operation of VR shock.

3. Release shock from completely collapsed position and check result as per table.

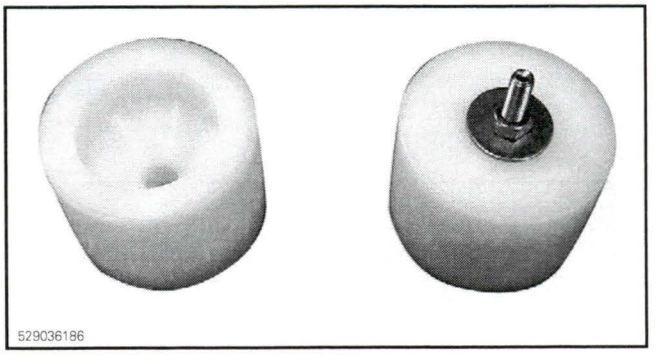
HPG SHOCK EXCEPT VARIABLE RATE
– The shock should extend unassisted. – The rod must come out at a steady speed.

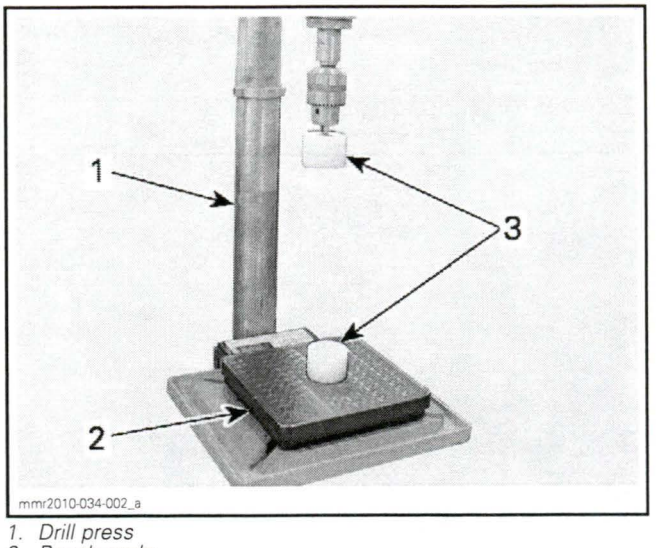
HPG VARIABLE RATE SHOCK
– The shock should extend unassisted. – Rod must come out slowly first, than faster and finally slow again for the last 25 mm (1 in).

4. Proceed with *SHOCK ABSORBER COMPRESSION TEST*. See procedure in this subsection.
5. If any faults are present, replace shock.

Shock Absorber Compression Test

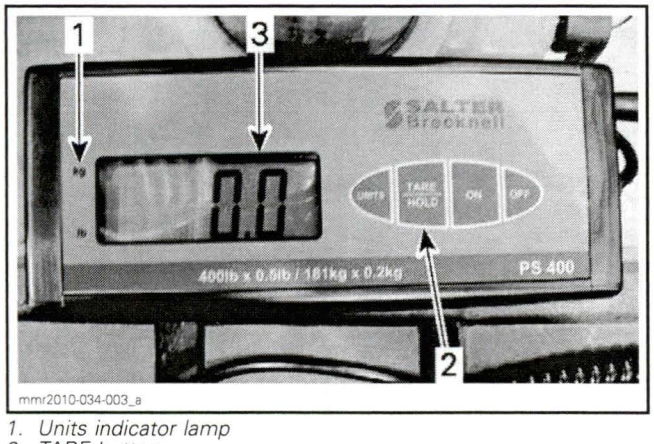
1. Ensure shock absorber is at normal room temperature (21°C ± 2°C (70°F ± 36°F)).
2. Remove spring from shock absorber (if applicable).
3. Place a BENCH SCALE SUCH AS SALTER BRECKNELL (P/N PS 400) (or an equivalent) on a suitable drill press.
4. Install SHOCK ABSORBER SUPPORTS (P/N 529 036 186) onto drill press.





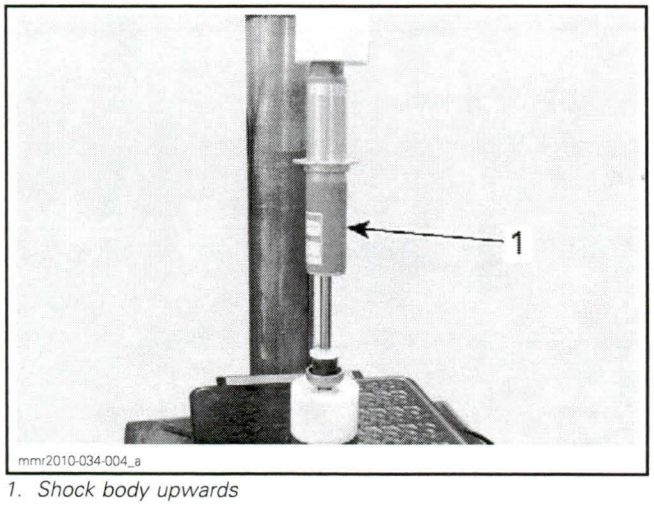
1. *Drill press*
2. *Bench scale*
3. *Shock absorber supports*

5. Set bench scale units to **kg** (or lb).
6. Press **TARE** to reset digits (must indicate (0) zero).



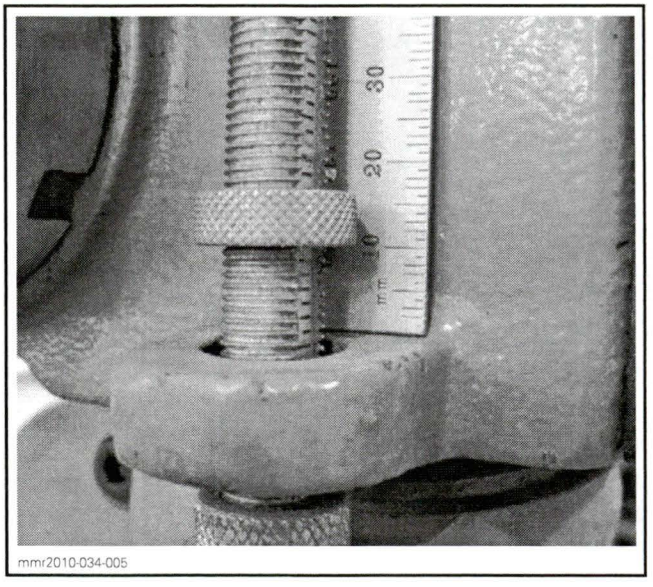
1. Units indicator lamp
2. TARE button
3. Digits

7. Install shock absorber into support with shock body upwards.
8. Adjust drill press table height in order to set the upper shock support flush with the shock body end.
9. Ensure shock absorber is aligned with drill press axis.

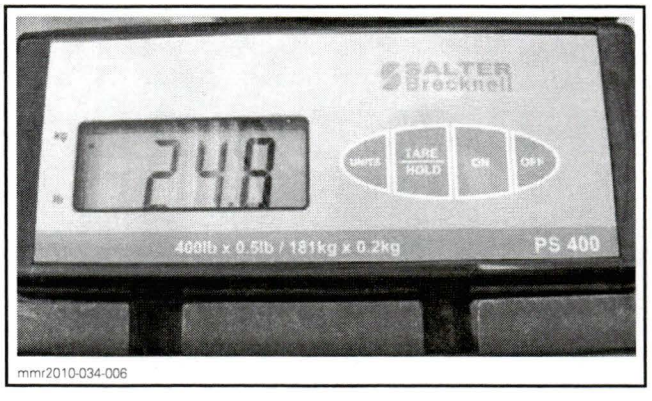


1. Shock body upwards

10. Set the drill press displacement to 10 mm (.394 in) using locking nut.



11. Compress shock absorber by 10 mm (.394 in) and hold it in position.
12. Read load recorded on the bench scale.



13. Load reading must be as per the following table.

MODEL	ROD DIAMETER	SERVICE RANGE
All HPG VR/Plus/Plus R	12.5 mm (1/2 in)	24 kgf ± 4 kgf (53 lbf ± 9 lbf)
All HPG KYB PRO	16 mm (5/8 in)	39 kgf ± 5 kgf (86 lbf ± 11 lbf)

Shock Absorber Rebuild Procedure (HPG Plus)

Use the following service tools for servicing shock absorbers.

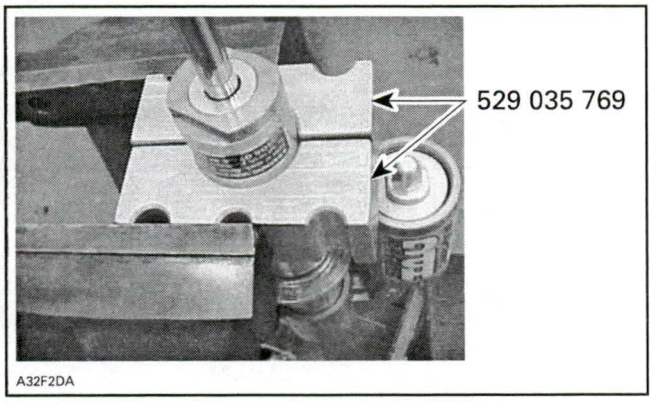
REQUIRED TOOLS	
SHOCK RETAINER TOOL (P/N 529 035 769)	
GAS FILL TOOL KIT (P/N 503 190 102)	
GAS SHOCK VALVE TOOL (TIRE VALVE TYPE) (P/N 529 035 570)	
PISTON GUIDE (P/N 529 026 600)	
DOME GUIDE (P/N 529 026 500)	
FLOATING PISTON PULLER (P/N 529 035 901)	

NOTE: Release nitrogen (N) pressure on any HPG Plus shock with internal floating piston (IFP).

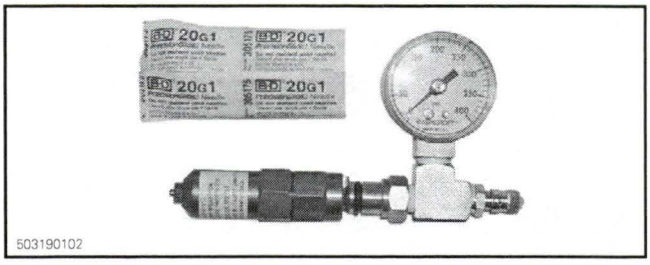
⚠ WARNING

Nitrogen gas is under extreme pressure. Use caution when releasing this gas volume. Protective eye wear should be used.

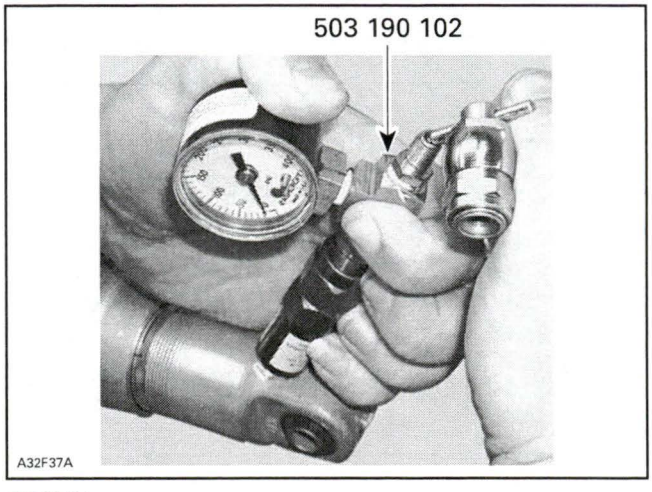
1. Mount shock in a vise with the SHOCK RETAINER TOOL (P/N 529 035 769).



2. Remove screw on top of valve.
3. Place the needle guide of GAS FILL TOOL KIT (P/N 503 190 102) on the shock valve.

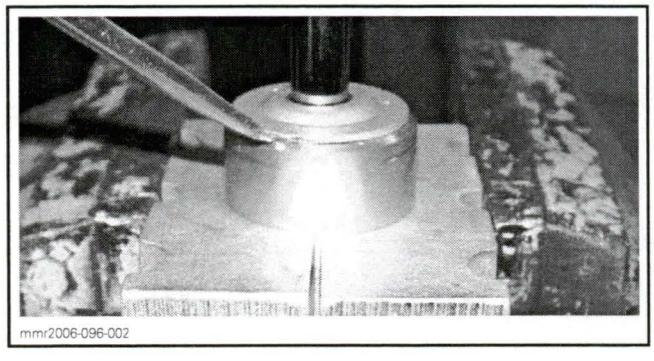


4. Press the detent pin and push forward the needle assembly very slowly towards rubber of needle valve.
5. Push on shock tool valve center rod to release gas pressure.

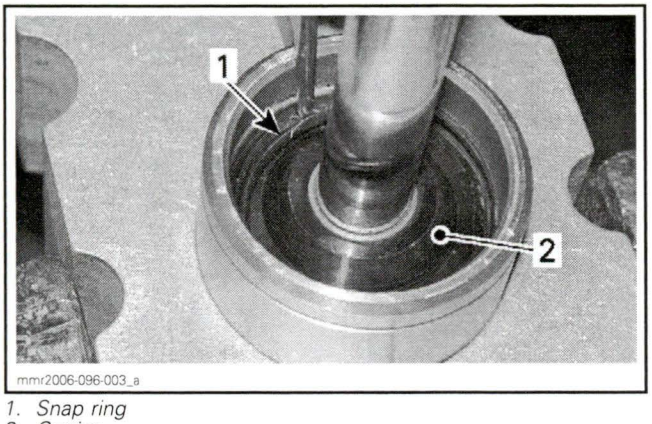


TYPICAL

6. Remove tool from shock.
7. Using a flat tool (small screwdriver or small chisel), pop-out the cap.



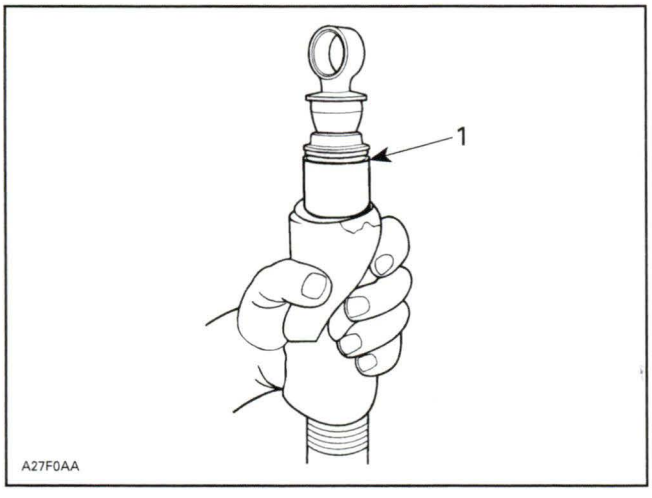
8. Compress the carrier to access and using a pick, remove the snap ring.



1. Snap ring
2. Carrier

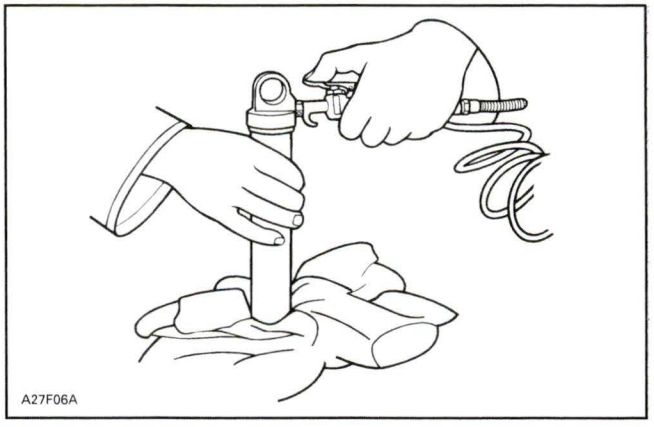
9. With the seal carrier removed, slowly lift and remove shock rod assembly from the shock body.

NOTE: Remove shock rod assembly slowly to reduce oil spillage and prevent piston seal damage by shock body threads. Wrap the shock body with a shop cloth to capture possible overflow oil while removing the shock piston.



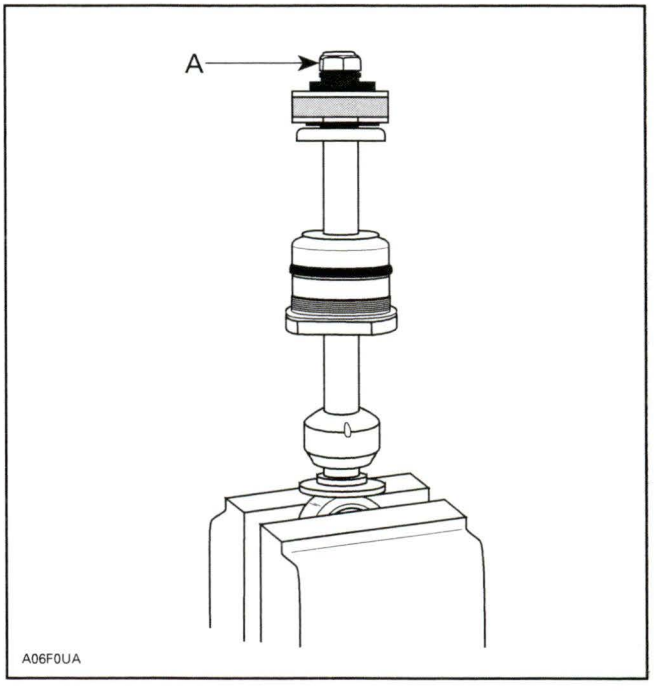
1. Oil flows

10. Discard old oil into storage container. Never reuse shock oil during shock rebuild.
11. Remove valve core.
12. Place shock absorber in a position where opened extremity is blocked.
13. Using compressed air pressure, carefully remove floating piston from shock body.
    13.1 Hold shop cloth over shock body opening to catch released floating piston.
    13.2 Allow room for floating piston to leave shock body.



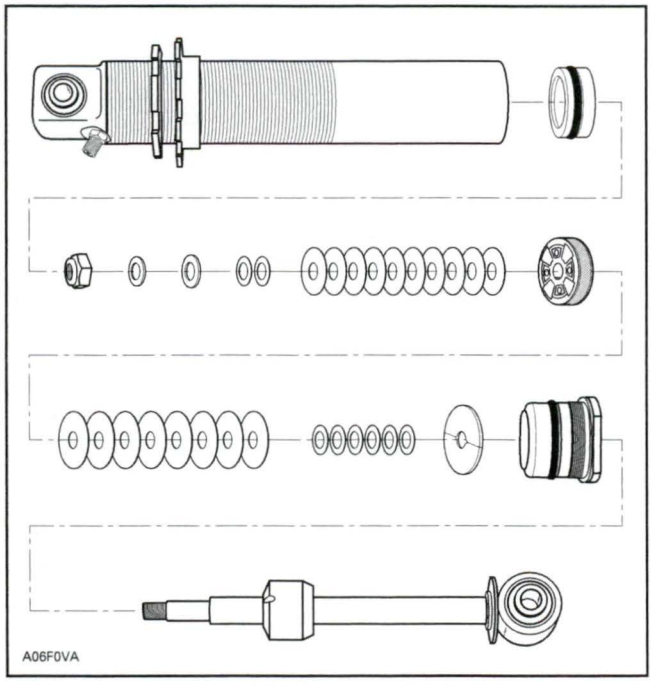
TYPICAL

14. Holding the shock rod assembly in a bench vise by the eyelet section, begin piston and valve removal.



A. Remove shock rod nut

15. Always arrange parts removed in the sequence of disassembly.



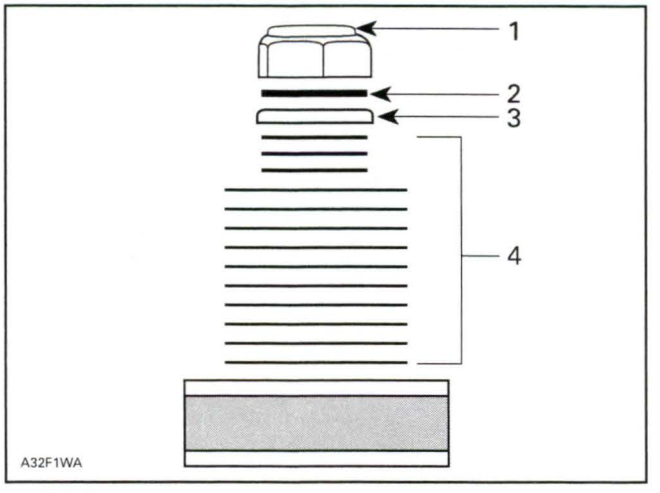
NOTE: If revalving is to be done, it is imperative that you identify the original shim pack (size and number of shims). There is no need to remove seal carrier if only revalving is to be done.

NOTE: 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.

16. After the new or replacement shim pack has been selected, reassemble in the reverse order of disassembly.
17. Torque shock rod nut to specification.

TIGHTENING TORQUE	
Shock rod nut	18 N•m (159 lbf•**in**)



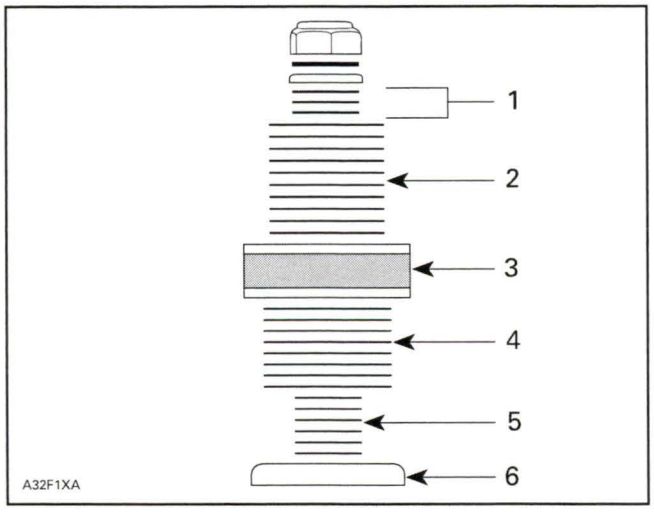
1. Shock rod nut
2. Spacer
3. Stopper with its round edge facing nut
4. Shim pack

NOTE: As a general rule, we suggest replacing the shock rod nut after 4 rebuilds to ensure proper locking friction and the use of LOCTITE 271 (RED) (P/N 293 800 005) each time.

NOTICE **Do not substitute the shock rod nut for non - O.E.M.**

18. This (these) spacer washer(s) must be used as shown to ensure shock rod nut does not bottom out or contact shaft threads.
19. Place rebound valve stopper with round edge facing nut.

NOTE: Rebound shim stack must not reach into threads of shock rod. Spacer under shock rod nut is used to prevent shock rod nut from bottoming on threads.

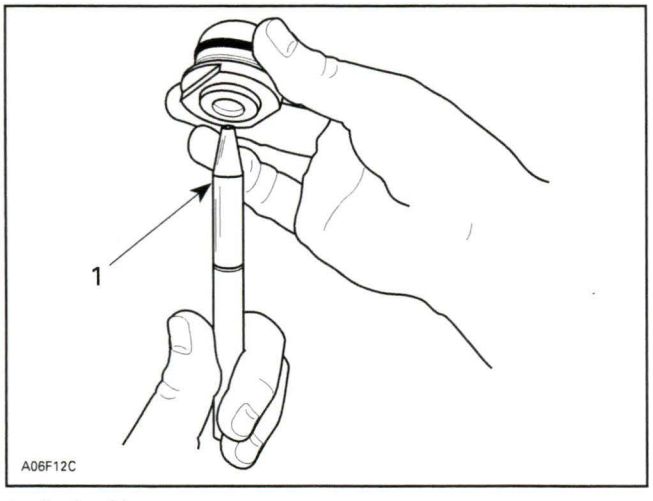


1. *Rebound dampening shim pack*
2. *Rebound dampening shim pack*
3. *Piston*
4. *Compression dampening shim pack*
5. *Compression dampening shim pack*
6. *Stopper*

20. If the seal carrier assembly is replaced, use seal pilot to guide seal over shock rod. Lubricate seal carrier guide pilot before use.

NOTICE **Failure to use seal pilot will result in seal damage.**

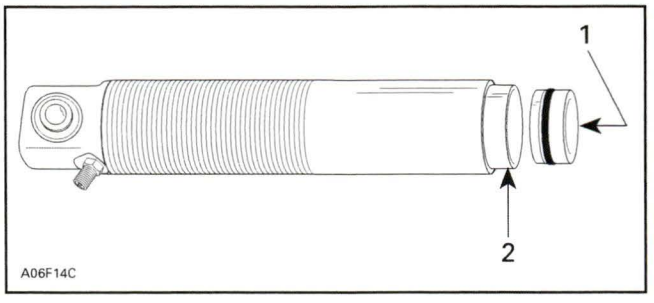
21. Reassemble shock rod assembly, taking care to properly assemble shim packs as required for your dampening needs.
22. Ensure that the shaft piston is installed with the slits/larger intake holes facing the rebound shim stack.



1. *Seal guide*

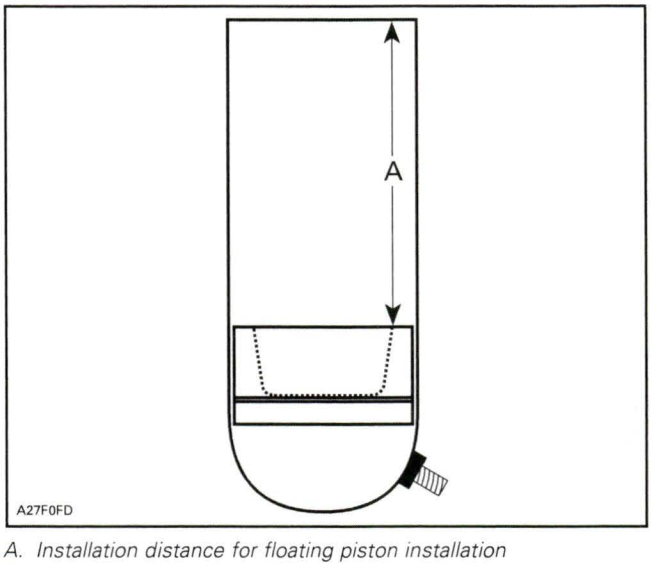
23. If internal floating piston has been removed, reinstall it into shock body (ensure that valve core has been removed).
24. Use MOLYKOTE G-N (P/N 420 297 433) to ease O-ring past shock body threads with floating piston guide.

NOTICE **Failure to install internal floating piston correctly could result in shock damage.**



1. *Push (slowly) by hand*
2. *Floating piston guide*

25. Lubricate inside of piston guide with MOLYKOTE G-N (P/N 420 297 433).
26. Install floating piston to the proper depth, refer to *SHOCK ABSORBER CALIBRATION CHARTS* further in this subsection.
27. On all HPG Plus shocks, the floating piston is installed hollow side up.



A. Installation distance for floating piston installation

NOTE: If the floating piston is installed too far into the shock body, light air pressure through valve (with core removed) will move piston outward.

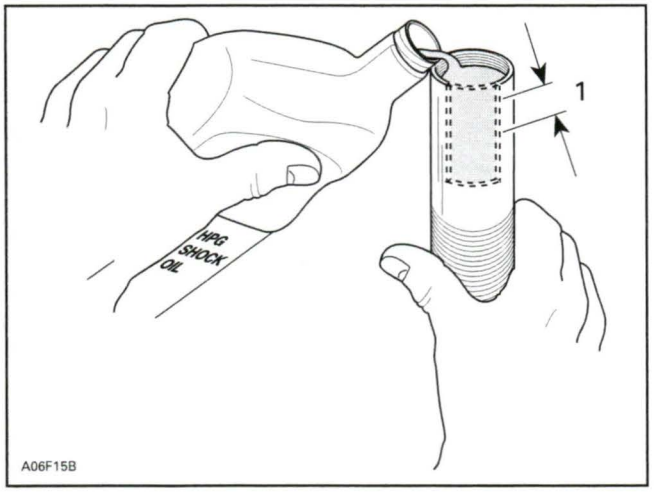
28. Reinstall tire valve core after internal floating piston has been installed at the correct height and before adding oil.

⚠ WARNING

Whenever using compressed air exercise extreme caution, cover shock opening with shop cloth to reduce chance of possible injury.

NOTICE **Moisture laden compressed air will contaminate the gas chamber and rust floating piston.**

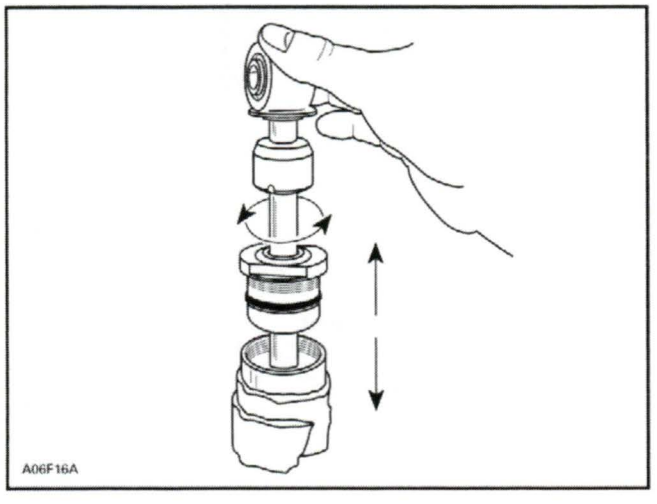
29. Fill the shock with SHOCK ABSORBER OIL (P/N 293 600 035) to approximately 10 mm (3/8 in), from the base of seal carrier threads.



1. Fill to 10 mm (3/8 in)

NOTE: Although we do not measure the exact amount of oil added to the shock, approximately 252 ml (8.52 U.S. oz) will be used.

30. Carefully insert shock rod into the shock body. Lightly oil shock piston seal ring with shock oil to ease installation.



NOTE: Some shock oil will overflow when installing shock. Wrap shock with shop cloth to catch possible overflow oil.

NOTICE **Use care when passing piston into shock body at shock body threads.**

31. Slight oscillation of shock rod may be required to allow piston to enter shock body bore.
32. Slowly push piston into shock body.

NOTE: 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 shock rod may displace the floating piston from its original position. This must not occur if the shock is expected to perform as designed.

33. With shock rod piston into oil, TOP OFF shock oil volume. Oil level should be to shock body thread base.
34. Seal carrier assembly can now be pushed into shock body to pass snap ring groove. Install snap ring into groove.

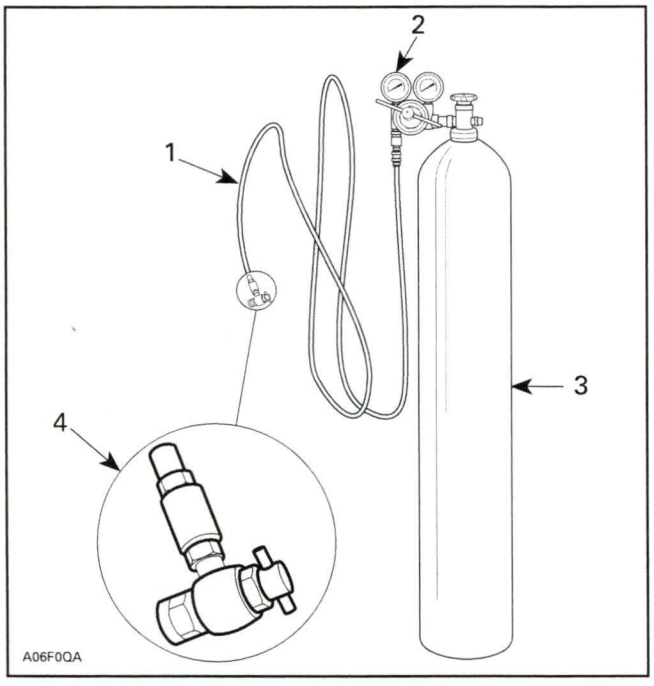
NOTE: Some oil must overflow when the seal carrier is pushed down.

35. Tap the cap on the shock body.

NOTICE **After the seal carrier is fully in place avoid pushing the shaft into the body until the nitrogen charge is added.**

NOTE: 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.

36. Nitrogen (N) can now be added to shock body.



1. *High pressure hose*
2. *Stage regulator, delivery pressure range 2070 kPa (300 PSI)*
3. *High pressure cylinder filled with industrial grade nitrogen*
4. *Valve tip 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.

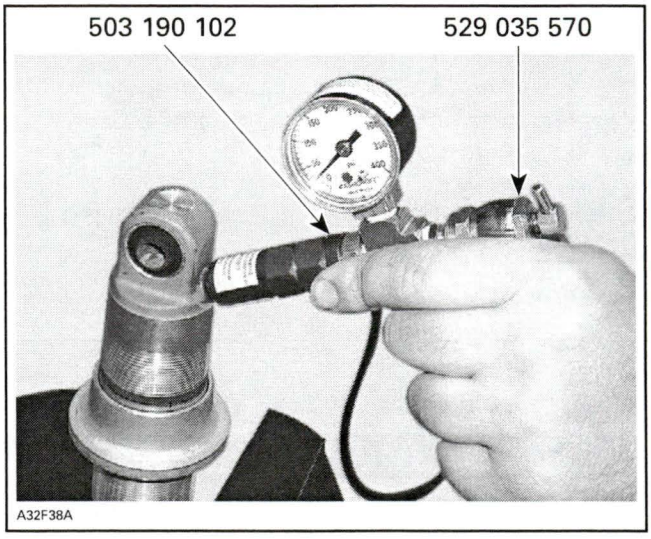
37. Preset your pressure regulator to 2070 kPa (300 PSI) nitrogen (N), this gas pressure will restore the correct pressure for your shock.

NOTICE **Do not exceed the recommended pressure values.**

⚠ WARNING

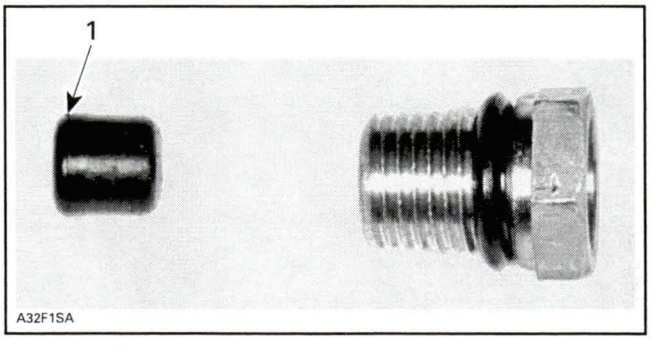
Whenever working with high pressure gas, use eye wear protection. Never direct gas pressure toward anybody.

38. Install the GAS FILL TOOL KIT (P/N 503 190 102) on GAS SHOCK VALVE TOOL (TIRE VALVE TYPE) (P/N 529 035 570). Set the regulator pressure on the nitrogen cylinder as per the shock requirement.
39. Mount the shock on vise.
40. Remove screw on top of valve.
41. Place the needle guide of gas refill tool on the shock valve.
42. 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 FILL TOOL KIT (P/N 503 190 102).

43. 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*

44. Carefully inspect shock for gas or oil leaks. Any leaks must be corrected before continuing. If no leak is detected, install the screw on top of the valve and clean the shock with the PULLEY FLANGE CLEANER (P/N 413 711 809).

NOTE: Shock 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.

45. 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.

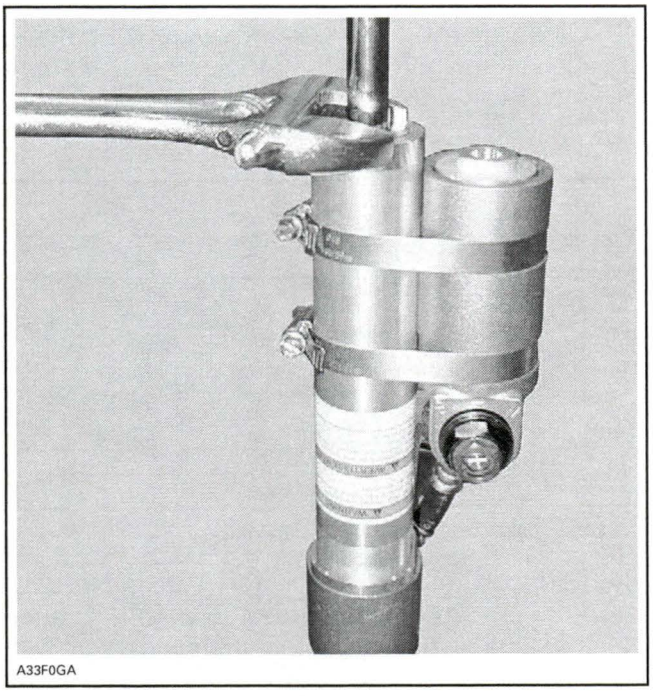
Shock Absorber Rebuild Procedure (KYB PRO Series)

1. Tightly secure the shock base in vise. DO NOT CLAMP ONTO SHOCK BODY.
2. Slowly remove air inlet valve, allowing the pressurized gas inside the reservoir to escape.

⚠ WARNING

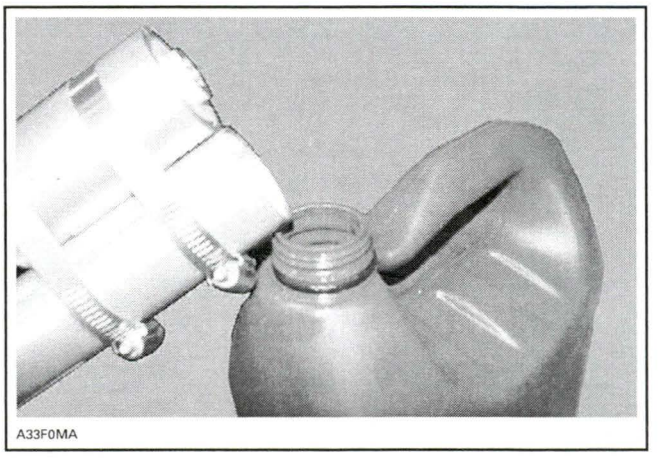
Always release gas pressure in the reservoir before removing the shock cover.

3. Remove (unscrew) the shock body cover.

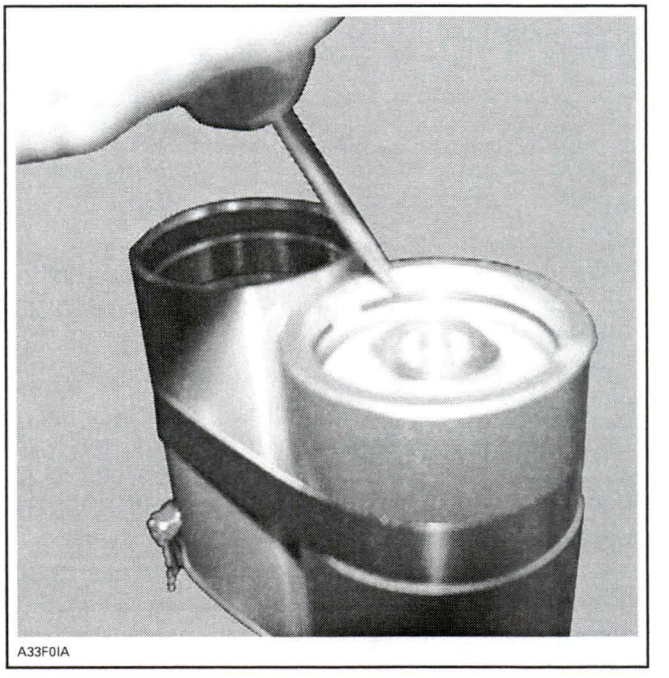


SHOCK BODY COVER REMOVAL

4. Pull shock rod out of main shock body.
5. Drain oil from the shock body. Dispose of used oil properly.

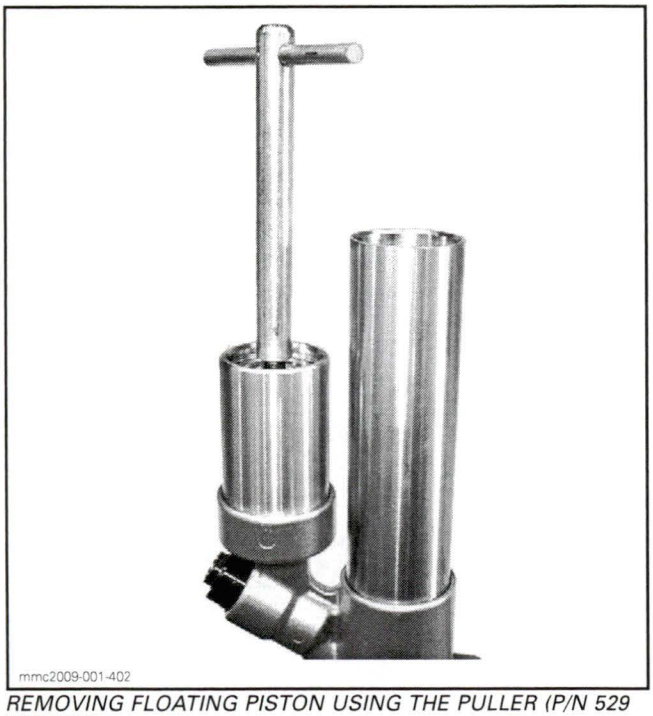


6. Push down the remote reservoir cover to remove the retaining circlip.

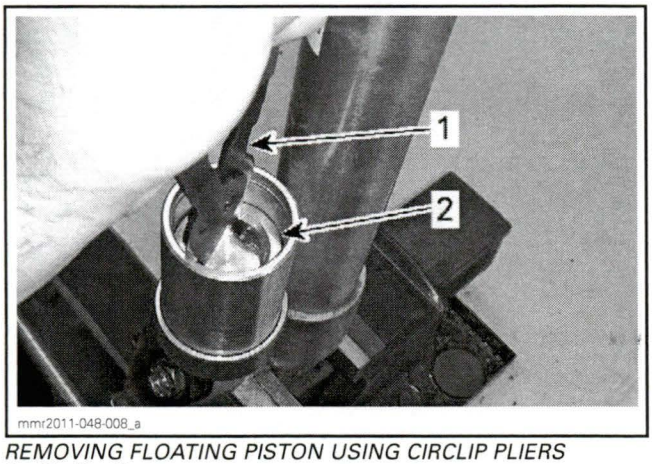


7. Using the FLOATING PISTON PULLER (P/N 529 035 901), remove the remote reservoir cover.
8. Remove the floating piston inside the remote reservoir.

NOTE: If the piston has a bleed screw, remove it, then use the puller to pull the piston out of the reservoir. If the piston does not have a bleed screw, it can be pulled out using circlip pliers.

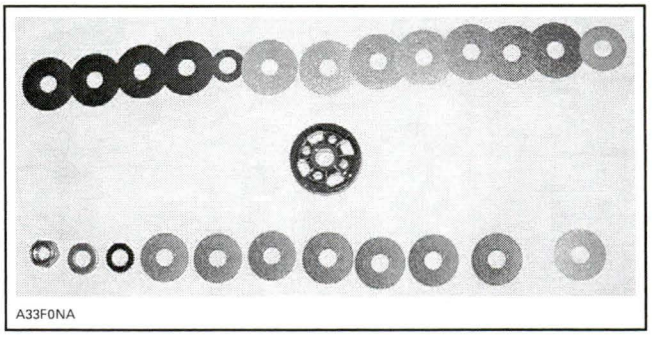


REMOVING FLOATING PISTON USING THE PULLER (P/N 529 035 901)



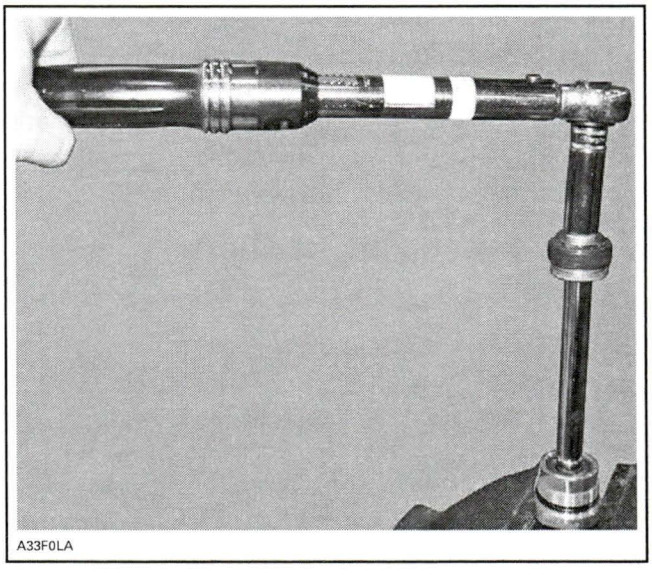
REMOVING FLOATING PISTON USING CIRCLIP PLIERS
1. *Circlip pliers*
2. *Floating piston*

9. Remove the lock nut securing shims, washers and piston to shock rod.
10. Carefully remove and layout shims, washers and piston from shock rod. Play close attention to shims and washers sequence and piston position.

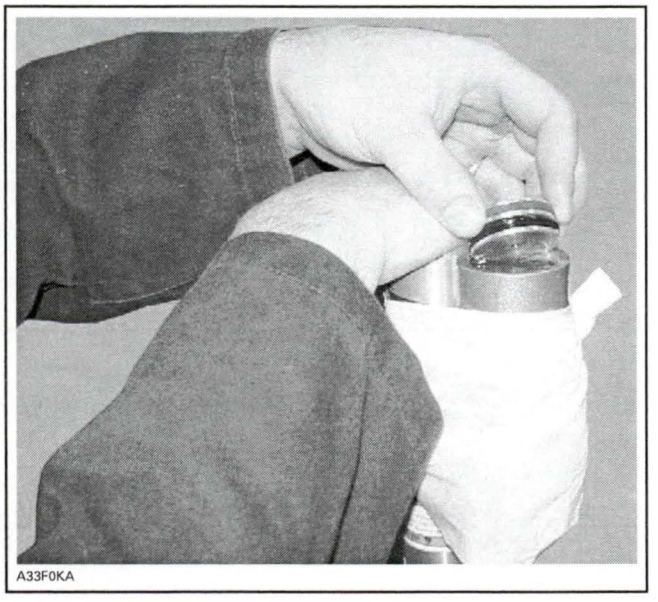


TYPICAL

11. Clean all shock components using PULLEY FLANGE CLEANER (P/N 413 711 809). DO NOT MIX SHIMS AND WASHERS TOGETHER.
12. Assemble valve shims, washers and piston in proper order and place them back onto shock rod.
13. Torque the shock rod nut at 18 N•m (159 lbf•**in**).



14. Half fill the main shock body with shock absorber oil.
15. Fill remote reservoir with shock absorber oil until level reaches 6.4 mm (1/4 in) from the top.
16. Cup your hand and place it over the remote reservoir. Pump with your hand to force the oil to circulate through the shock and reservoir to remove any trapped air. Low speed adjuster must be open 1 turn minimum.
17. Fill the remote reservoir with shock absorber oil.
18. Lubricate the floating piston O-ring with shock oil and install it.


A33F0KA

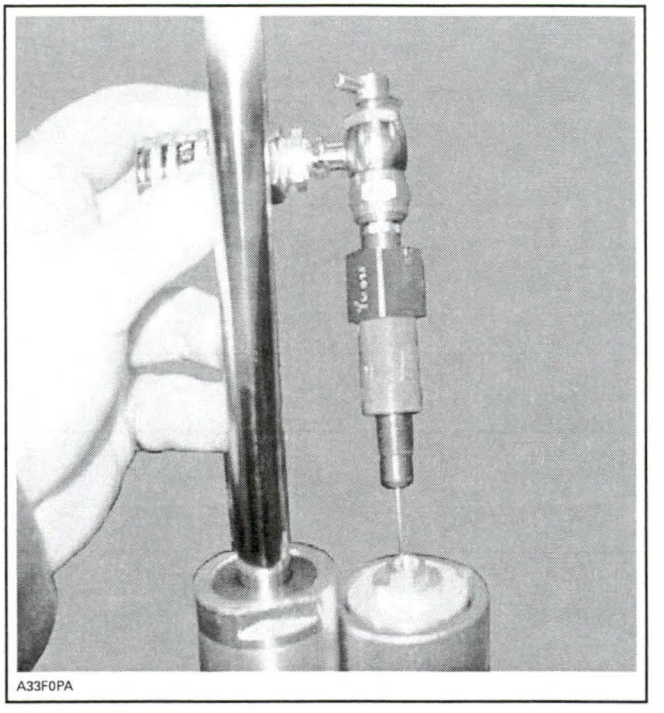
NOTE: Be careful not to trap air under the piston. The key to good shock performance is to remove all the air from shock body and reservoir.

19. Push the floating piston to the bottom of the remote reservoir. Oil will rise in the main shock body almost to the top.
20. Fill the shock body with SHOCK ABSORBER OIL (P/N 293 600 035) until level reaches the bottom of threads.
21. Lubricate the piston seal and valve stack and gently push into main shock body.
22. Move the piston and valve stack slowly to remove any trapped air. Using a small hammer or wrench, gently tap on the rod mounting eyelet to help remove air.
23. Again, push the floating piston to the bottom of the remote reservoir.
24. Pull shock rod as far out as possible. Work very slowly to avoid floating piston movement.
25. Reinstall the shock cover and tighten to 65 N•m (48 lbf•ft). Oil must spill from the shock body before the cover O-ring seals the shock.
26. Lubricate the remote reservoir cover O-ring with shock oil and install the remote reservoir cover.
27. Push the cover in and install the retaining circlip.
28. Using the FLOATING PISTON PULLER (P/N 529 035 901), pull the cover to seat it against the retaining circlip.

⚠ WARNING

Make sure the cover is firmly seated against the retaining circlip before filling with gas.

29. Install the air inlet valve.
30. Pressurize the shock at 2070 kPa (300 PSI) with nitrogen (N). Use the correct GAS FILL TOOL KIT (P/N 503 190 102).


A33F0PA

31. Carefully inspect shock for gas or oil leaks. Any leaks must be corrected before continuing. If no leak is detected, install the safety screw into the air inlet valve and clean the shock with the PULLEY FLANGE CLEANER (P/N 413 711 809).
32. After recharging is complete, the rebuilt shock should be bench-tested. Move the rod in and out to ensure full travel, smooth compression and rebound action. If the shock rod moves in or out erratically this could indicate air is trapped inside. If the shock rod will not move or has partial travel then it may be hydraulically locked. In either event the shock must be taken apart.

Shock Absorber Calibration Charts

Front - Take Apart	
XP/XR MXZ TNT & Ren Adren	
505072754	
Valve spec	
REB.	COMP.
1 x 26 x .203	2 x 30 x .203
1 x 15 x .114	1 x 15 x .152
3 x 26 x .152	3 x 30 x .152
1 x 16 x .254	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 167mm	
Extended length = 431mm	
Compressed length = 285mm	
XP Spring rate = 90 lbs/in	
XR Spring rate = 120 lbs/in	

Front - Take Apart	
XP/XR Renegade X & MXZ X	
505073117	
Valve spec	
REB.	COMP.
1 x 26 x .254	3 x 30 x .203
1 x 15 x .114	1 x 15 x .114
3 x 26 x .203	3 x 30 x .152
1 x 15 x .254	1 x 26 x .114
	1 x 16 x .152
No slit piston	
IFP height = 164mm	
Extended length = 440mm	
Compressed length = 302.7mm	
XP Spring rate = 90 lbs/in	
XR Spring rate = 120 lbs/in	

Front - Take Apart	
XP MXZ XRS	
505073093/094	
Valve spec	
REB.	COMP.
1 x 30 x .203	3 x 34 x .152
1 x 16 x .114	1 x 26 x .114
1 x 26 x .114	1 x 18 x .254
4 x 30 x .203	
1 x 17 x .114	
No slit piston	
IFP height = 52mm	
Extended length = 456mm	
Compressed length = 305 mm	
XP Spring rate = 90 lbs/in	

Front - Take Apart	
Summit X	
505073118	
Valve spec	
REB.	COMP.
1 x 26 x .152	4 x 30 x .152
1 x 15 x .114	1 x 15 x .152
2 x 26 x .152	2 x 30 x .152
1 x 15 x .203	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 161mm	
Extended length = 420mm	
Compressed length = 280mm	
XP Spring rate = 75 lbs/in	

Front - Take Apart	
Freeride 146/154 38.4/40.1	
505073123/124	
Valve spec	
REB.	COMP.
1 x 30 x .203	3 x 34 x .152
1 x 16 x .114	1 x 18 x .152
1 x 24 x .114	1 x 28 x .114
3 x 30 x .203	3 x 34 x .152
1 x 18 x .152	1 x 26 x .114
	1 x 24 x .114
	1 x 16 x .203
No slit piston	
IFP height = 52mm	
Extended length = 431mm	
Compressed length = 293 mm	
XP Spring rate = 90 lbs/in	

mdd2012-001-603_1

Front - Non Take Apart	
Summit Everest	
505072935	
Valve spec	
REB.	COMP.
1 x 26 x .152	4 x 30 x .152
1 x 15 x .114	1 x 15 x .152
2 x 26 x .152	2 x 30 x .152
1 x 15 x .203	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 420mm	
Compressed length = 280mm	
XP Spring rate = 75 lbs/in	

Front - Non Take Apart	
XP GT & GSX LE	
505072261	
Valve spec	
REB.	COMP.
1 x 26 x .203	1 x 30 x .203
1 x 15 x .114	1 x 14 x .152
2 x 26 x .152	4 x 30 x .152
1 x 15 x .254	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 431mm	
Compressed length = 285mm	
Spring rate = 90 lbs/in	

Front - Non Take Apart	
XR GT & GSX SE	
505072489	
Valve spec	
REB.	COMP.
1 x 26 x .203	3 x 30 x .203
1 x 15 x .114	1 x 15 x .152
4 x 26 x .152	3 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 431mm	
Compressed length = 285mm	
Spring rate = 120 lbs/in	

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

mdd2012-001-603_7

Front - Take Apart	
Freeride 41.6/43.3 (Race)	
505072937/938	
Valve spec	
REB.	COMP.
1 x 30 x .254	2 x 34 x .203
1 x 16 x .114	1 x 15 x .152
1 x 24 x .114	1 x 28 x .114
3 x 30 x .203	3 x 34 x .152
1 x 18 x .152	1 x 26 x .114
	1 x 24 x .114
	1 x 16 x .203
No slit piston	
IFP height = 52mm	
Extended length = 441mm	
Compressed length = 298 mm	
XP Spring rate = 90 lbs/in	

Center - Take Apart	
Freeride 41.6/43.3 (Race)	
503192458	
Valve spec	
REB.	COMP.
1 x 30 x .254	3 x 34 x .203
1 x 16 x .114	1 x 15 x .152
1 x 26 x .114	1 x 28 x .114
5 x 30 x .203	4 x 34 x .152
1 x 18 x .152	1 x 26 x .114
	1 x 24 x .114
	1 x 18 x .203
0.9mm hole piston	
IFP height = 52mm	
Extended length = 366mm	
Compressed length = 260mm	
Spring rate = 215/275 lbs/in	

Rear - Take Apart	
Freeride 41.6/43.3 (Race)	
503192459	
Valve spec	
REB.	COMP.
1 x 30 x .254	4 x 34 x .203
1 x 16 x .114	1 x 18 x .152
1 x 28 x .114	1 x 30 x .114
4 x 30 x .203	3 x 34 x .152
1 x 18 x .152	1 x 26 x .114
	1 x 24 x .114
	2 x 16 x .114
0.9mm hole piston	
IFP height = 52mm	
Extended length = 551mm	
Compressed length = 406 mm	
Spring rate = 1.27-80deg	

Front - Take Apart	
600 RS (Production Calibration - PCX)	
505073145/146	
2012 Prod Cal - Valve spec	
REB.	COMP.
1 x 30 x .254	4 x 34 x .254
1 x 16 x .114	1 x 22 x .152
5 x 30 x .203	1 x 32 x .114
2 x 17 x .114	6 x 34 x .203
	1 x 32 x .203
	1 x 30 x .254
	1 x 28 x .254
	1 x 26 x .254
	1 x 24 x .254
	1 x 20 x .305
No piston bleed	
BASE VALVE SPEC	
RL=2 BL=4 BH=3/4 turn	
IFP height = 66mm	
Spring rate = 165lbs/in * 3/4"	
Spring rate = 28.9N/mm * 19mm	

Center - Take Apart	
600 RS (Production Calibration - PCX)	
503193111	
2012 Prod Cal - Valve spec	
REB.	COMP.
2 x 30 x .254	6 x 34 x .254
1 x 16 x .114	1 x 34 x .203
5 x 30 x .203	1 x 22 x .152
2 x 17 x .114	1 x 30 x .114
	5 x 34 x .254
	1 x 30 x .203
	1 x 28 x .203
	1 x 26 x .203
	1 x 24 x .203
	1 x 22 x .203
	1 x 20 x .305
1 slit piston (2 x 0.1)	
BASE VALVE SPEC	
BL=4 BH=3/4 turn	
IFP height = 66mm	
Spring rate = 735/240lbs/in x 1/8"	
Spring rate = 128/42N/mm * 3mm	

Rear - Take Apart	
600 RS (Production Calibration - PCX)	
503193109	
2012 Prod Cal - Valve spec	
REB.	COMP.
2 x 30 x .254	6 x 34 x .254
1 x 16 x .114	1 x 23 x .152
5 x 30 x .203	1 x 32 x .114
2 x 19 x .114	2 x 34 x .203
	1 x 32 x .254
	1 x 30 x .305
	1 x 28 x .305
	1 x 26 x .305
	1 x 24 x .305
	1 x 22 x .305
	1 x 20 x .305
1 slit piston (2 x 0.1)	
BASE VALVE SPEC	
BL=4 BH=3/4 turn	
IFP height = 66mm	
Spring rate = 1.56-100 #1 - #1	
Coupling #4 (Maximum is #5)	

mdd2012-001-603_10

Center - Take Apart	
XP/XR MXZ TNT	
503191791	
Valve spec	
REB.	COMP.
1 x 26 x .203	2 x 30 x .203
1 x 15 x .114	1 x 14 x .152
3 x 26 x .254	6 x 30 x .152
1 x 16 x .203	1 x 26 x .114
	1 x 18 x .114
1 slit piston (2 x 0.3)	
IFP height = 119.5mm	
Extended length = 331mm	
Compressed length = 238mm	
XP/XR Spring rate = 110 lbs/in	

Center - Take Apart	
MXZ X - rMotion	
503192769	
Valve spec	
REB.	COMP.
1 x 26 x .203	1 x 30 x .203
1 x 15 x .114	1 x 14 x .152
3 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .254
1 slit piston (2 x 0.3)	
IFP height = 133mm	
Extended length = 366mm	
Compressed length = 260mm	
XP Spring rate = 190/175 lbs/in	

Center - Take Apart	
MXZ XRS - rMotion - Freeride 38.4/40.1	
503192783	
Valve spec	
REB.	COMP.
1 x 30 x .254	2 x 34 x .203
1 x 16 x .114	1 x 22 x .114
1 x 26 x .114	1 x 34 x .203
3 x 30 x .203	1 x 28 x .114
1 x 17 x .114	1 x 26 x .114
	1 x 18 x .254
0.9mm hole piston	
IFP height = 52mm	
Extended length = 366mm	
Compressed length = 260mm	
XP Spring rate = 190/197 lbs/in	

Center - Take Apart	
XP Renegade X	
503192035	
Valve spec	
REB.	COMP.
1 x 26 x .203	6 x 30 x .203
1 x 15 x .114	1 x 17 x .152
3 x 26 x .203	5 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 22 x .114
1 slit piston (2 x 0.3)	
IFP height = 119.5	
Extended length = 331mm	
Compressed length = 238mm	
XP Spring rate = 135 lbs/in	

Center - Take Apart	
XR Renegade X	
503191797	
Valve spec	
REB.	COMP.
1 x 26 x .203	2 x 30 x .203
1 x 15 x .114	1 x 17 x .152
3 x 26 x .254	10 x 30 x .152
1 x 16 x .203	1 x 26 x .114
	1 x 22 x .114
1 slit piston (2 x 0.3)	
IFP height = 119.5mm	
Extended length = 331mm	
Compressed length = 238mm	
Spring rate = 180 lbs/in	

Center - Take Apart	
Summit X	
503192210	
Valve spec	
REB.	COMP.
1 x 26 x .254	1 x 30 x .203
1 x 15 x .114	1 x 14 x .152
4 x 26 x .254	4 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 20 x .114
1 slit piston (2 x 0.3)	
IFP height = 133mm	
Extended length = 366mm	
Compressed length = 260mm	
XP Spring rate = 215/275 lbs/in	
XR Spring rate = 319/325 lbs/in	

Center - Take Apart	
Freeride 137	
503192962	
Valve spec	
REB.	COMP.
1 x 30 x .254	2 x 34 x .203
1 x 16 x .114	1 x 22 x .114
1 x 26 x .114	1 x 34 x .203
3 x 30 x .203	1 x 28 x .114
1 x 17 x .114	1 x 26 x .114
	1 x 18 x .254
0.9mm hole piston	
IFP height = 52mm	
Extended length = 331mm	
Compressed length = 238mm	
Spring rate = 135 lbs/in	

Center - Take Apart	
Freeride 41.6/43.3 (Racing)	
503192458	
Valve spec	
REB.	COMP.
1 x 30 x .254	3 x 34 x .203
1 x 16 x .114	1 x 15 x .152
1 x 26 x .114	1 x 28 x .114
5 x 30 x .203	4 x 34 x .152
1 x 18 x .152	1 x 26 x .114
	1 x 24 x .114
	1 x 18 x .203
0.9mm hole piston	
IFP height = 52mm	
Extended length = 366mm	
Compressed length = 260mm	
Spring rate = 215/275 lbs/in	

mdd2012-001-603_2

Center - Non Take Apart	
XP Renegade Adren	
503192504	
Valve spec	
REB.	COMP.
1 x 26 x .203	6 x 30 x .203
1 x 15 x .114	1 x 17 x .152
3 x 26 x .203	5 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 22 x .114
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 331mm	
Compressed length = 238mm	
Spring rate = 135 lbs/in	

Center - Non Take Apart	
XR Renegade Adren	
503192984	
Valve spec	
REB.	COMP.
1 x 26 x .203	2 x 30 x .203
1 x 15 x .114	1 x 17 x .152
3 x 26 x .254	10 x 30 x .152
1 x 16 x .203	1 x 26 x .114
	1 x 22 x .114
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 331mm	
Compressed length = 238mm	
Spring rate = 180 lbs/in	

Center - Non Take Apart	
GTX / GSX SE	
503192988	
Valve spec	
REB.	COMP.
1 x 26 x .203	1 x 30 x .203
1 x 15 x .114	1 x 14 x .152
3 x 26 x .203	5 x 30 x .152
1 x 16 x .203	1 x 17 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 331mm	
Compressed length = 238mm	
Spring rate = 135 lbs/in	

Center - Non Take Apart	
Tundra Extreme	
503192991	
Valve spec	
REB.	COMP.
1 x 26 x .254	1 x 30 x .203
1 x 15 x .114	1 x 14 x .152
4 x 26 x .254	5 x 30 x .203
1 x 16 x .203	1 x 28 x .114
	1 x 24 x .114
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 331mm	
Compressed length = 238mm	
Spring rate = 215/275 lbs/in	

Center - Non Take Apart	
Summit Everest	
503192986	
Valve spec	
REB.	COMP.
1 x 26 x .254	1 x 30 x .203
1 x 15 x .114	1 x 14 x .152
4 x 26 x .254	4 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 20 x .114
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 366mm	
Compressed length = 260mm	
Spring rate = 215/275 lbs/in	

mdd2012-001-603_8

Rear - Take Apart	
XP MXZ TNT	
503192120	
Valve spec	
REB.	COMP.
1 x 26 x .203	4 x 30 x .203
1 x 16 x .114	1 x 15 x .152
4 x 26 x .254	2 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 171.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP Spring rate = 1.28-95deg	

Rear - Take Apart	
XP/XR MXZ X rMotion	
503192456	
Valve spec	
REB.	COMP.
1 x 26 x .203	3 x 30 x .152
1 x 15 x .114	1 x 15 x .152
3 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE single speed	
IFP height = 54.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP/XR Spring rate = 1.35-80deg	

Rear - Take Apart	
XP/XR MXZ X rMotion SAK	
503193172	
Valve spec	
REB.	COMP.
1 x 26 x .203	3 x 30 x .152
1 x 15 x .114	1 x 15 x .152
3 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE single speed	
IFP height = 54.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP/XR Spring rate = 1.35-80deg	
SAK = Suspension Adjustability Kit	

Rear - Take Apart	
MXZ XRS rMotion	
503192908	
Valve spec	
REB.	COMP.
1 x 30 x .203	3 x 34 x .203
1 x 16 x .114	1 x 22 x .114
4 x 30 x .254	2 x 34 x .203
1 x 17 x .305	1 x 28 x .114
	1 x 26 x .114
	1 x 18 x .254
0.9mm hole piston	
IFP height = 52mm	
Extended length = 437.5mm	
Compressed length =288.5 mm	
Spring rate = 1.35-80deg	

Rear - Take Apart	
MXZ XRS rMotion SAK	
503193173	
Valve spec	
REB.	COMP.
1 x 30 x .203	3 x 34 x .203
1 x 16 x .114	1 x 22 x .114
4 x 30 x .254	2 x 34 x .203
1 x 17 x .305	1 x 28 x .114
	1 x 26 x .114
	1 x 18 x .254
0.9mm hole piston	
IFP height = 52mm	
Extended length = 437.5mm	
Compressed length = 288.5 mm	
Spring rate = 1.35-80deg	
SAK = Suspension Adjustability Kit	

Rear - Take Apart	
XP/XR Renegade X	
503192205	
Valve spec	
REB.	COMP.
1 x 26 x .203	5 x 30 x .254
1 x 16 x .114	1 x 15 x .152
4 x 26 x .254	4 x 30 x .254
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE SPEC	
2 x 18 x .305 ; 3 x 15 x .305	
BV Spring 11501-14387	
IFP height = 54.5mm	
Extended length = 551mm	
Compressed length = 413mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

mdd2012-001-603_3

Rear - Take Apart	
Freeride 137 SC-5	
503192963	
Valve spec	
REB.	COMP.
1 x 30 x .254	6 x 34 x .254
1 x 16 x .114	1 x 22 x .114
4 x 30 x .203	2 x 34 x .203
1 x 17 x .305	1 x 28 x .114
	1 x 26 x .114
	1 x 18 x .254
0.9mm hole piston	
IFP height = 52mm	
Extended length = 551mm	
Compressed length = 413mm	
Spring rate = 1.33-100deg	

Rear - Take Apart	
Freeride 146/154 38.4/40.1	
503192964	
Valve spec	
REB.	COMP.
1 x 30 x .254	2 x 34 x .203
1 x 16 x .114	1 x 20 x .114
5 x 30 x .203	1 x 34 x .203
1 x 17 x .305	1 x 28 x .114
	1 x 26 x .114
	1 x 18 x .254
0.9mm hole piston	
IFP height = 52mm	
Extended length = 437.5mm	
Compressed length =288.5 mm	
Spring rate = 1.35-80deg	

Rear - Take Apart	
Summit X	
503192208	
Valve spec	
REB.	COMP.
1 x 26 x .203	6 x 30 x .203
1 x 15 x .114	1 x 15 x .152
4 x 26 x .254	4 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 171.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP Spring rate = 1.27-80deg	
XR Spring rate = 1.35-80deg	

Rear - Take Apart	
XP/XR MXZ TNT (Europe)	
503192023	
Valve spec	
REB.	COMP.
1 x 26 x .203	7 x 30 x .203
1 x 16 x .114	1 x 17 x .152
4 x 26 x .254	4 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 171.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

Rear - Take Apart	
XP/XR Renegade (Europe)	
503192298	
Valve spec	
REB.	COMP.
1 x 26 x .203	7 x 30 x .254
1 x 16 x .114	1 x 18 x .152
4 x 26 x .254	6 x 30 x .254
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE SPEC	
2 x 18 x .305 ; 3 x 15 x.305	
BV Spring 11501-14387	
IFP height = 54.5mm	
Extended length = 551mm	
Compressed length = 413mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

mdd2012-001-603_4

Optional Soft Valving	
XP/XR MXZ TNT	
503192023	
Valve spec	
REB.	COMP.
1 x 26 x .203	3 x 30 x .203
1 x 16 x .114	1 x 15 x .152
4 x 26 x .254	2 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 171.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

Rear T/A - Standard Valving	
XP & XR MXZ TNT	
503192023	
Valve spec	
REB.	COMP.
1 x 26 x .203	7 x 30 x .203
1 x 16 x .114	1 x 17 x .152
4 x 26 x .254	4 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 171.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

Optional Hard Valving	
XP & XR MXZ TNT	
503192023	
Valve spec	
REB.	COMP.
1 x 26 x .203	5 x 30 x .254
1 x 16 x .114	1 x 19 x .152
4 x 26 x .254	7 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = 171.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

Optional Soft Valving	
XP/XR MXZ X rMotion	
503192456 or 503193172	
Valve spec	
REB.	COMP.
1 x 26 x .203	2 x 30 x .152
1 x 15 x .114	1 x 15 x .152
3 x 26 x .254	1 x 30 x .152
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE single speed	
IFP height = 54.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP/XR Spring rate = 1.35-80deg	

Rear T/A - Standard Valving	
XP/XR MXZ X rMotion	
503192456 or 503193172	
Valve spec	
REB.	COMP.
1 x 26 x .203	3 x 30 x .152
1 x 15 x .114	1 x 15 x .152
3 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE single speed	
IFP height = 54.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP/XR Spring rate = 1.35-80deg	

Optional Hard Valving	
XP/XR MXZ X rMotion	
503192456 or 503193172	
Valve spec	
REB.	COMP.
1 x 26 x .203	4 x 30 x .203
1 x 15 x .114	1 x 15 x .152
4 x 26 x .254	2 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE single speed	
IFP height = 54.5mm	
Extended length = 437.5mm	
Compressed length = 288.5mm	
XP/XR Spring rate = 1.35-80deg	

mdd2012-001-603_5

Optional Soft Valving	
XP/XR Renegade X	
503192205	
Valve spec	
REB.	COMP.
1 x 26 x .203	4 x 30 x .203
1 x 16 x .114	1 x 15 x .152
4 x 26 x .254	3 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE SPEC	
2 x 18 x .305 ; 3 x 15 x .305	
BV Spring 11501-14387	
IFP height = 54.5mm	
Extended length = 551mm	
Compressed length = 413mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

Rear T/A - Standard Valving	
XP/XR Renegade X	
503192205	
Valve spec	
REB.	COMP.
1 x 26 x .203	5 x 30 x .254
1 x 16 x .114	1 x 15 x .152
4 x 26 x .254	4 x 30 x .254
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE SPEC	
2 x 18 x .305 ; 3 x 15 x .305	
BV Spring 11501-14387	
IFP height = 54.5mm	
Extended length = 551mm	
Compressed length = 413mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

Optional Hard Valving	
XP & XR Renegade X	
503192205	
Valve spec	
REB.	COMP.
1 x 26 x .203	7 x 30 x .254
1 x 16 x .114	1 x 18 x .152
4 x 26 x .254	6 x 30 x .254
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
BASE VALVE SPEC	
2 x 18 x .305 ; 3 x 15 x .305	
BV Spring 11501-14387	
IFP height = 54.5mm	
Extended length = 551mm	
Compressed length = 413mm	
XP Spring rate = 1.28-95deg	
XR Spring rate = 1.33-100deg	

mdd2012-001-603_6

Rear - Non Take Apart	
GTX 550	
503192295	
Valve spec	
REB.	COMP.
1 x 26 x .203	4 x 30 x .152
1 x 16 x .114	1 x 15 x .152
4 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length =477mm	
Compressed length = 335mm	
Spring rate = 1.66-80deg	

Rear - Non Take Apart	
XR GTX LE VR	
503191853	
Valve spec - Variable Rate	
REB.	COMP.
1 x 26 x .254	1 x 30 x .254
1 x 15 x .114	1 x 30 x .203
5 x 26 x .254	1 x 19 x .152
1 x 16 x .254	3 x 30 x .203
	1 x 17 x .254
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 551mm	
Compressed length = 413mm	
Spring rate = 1.78-100deg	

Rear - Non Take Apart	
XP Renegade Adren	
503192037	
Valve spec	
REB.	COMP.
1 x 26 x .203	5 x 30 x .203
1 x 15 x .114	1 x 15 x .152
3 x 26 x .254	3 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 551mm	
Compressed length = 413mm	
Spring rate = 1.28-95deg	

Rear - Non Take Apart	
XR Renegade Adren	
503192026	
Valve spec	
REB.	COMP.
1 x 26 x .203	6 x 30 x .203
1 x 16 x .114	1 x 15 x .152
4 x 26 x .254	6 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 551mm	
Compressed length = 413mm	
Spring rate = 1.33-100deg	

Rear - Non Take Apart	
Tundra 137	
503192159	
Valve spec	
REB.	COMP.
1 x 26 x .203	2 x 30 x .152
1 x 16 x .114	1 x 16 x .152
3 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length =477mm	
Compressed length = 335mm	
Spring rate = 1.27-80deg	

Rear - Non Take Apart	
Tundra LT	
503192294	
Valve spec	
REB.	COMP.
1 x 26 x .203	3 x 30 x .152
1 x 16 x .114	1 x 16 x .152
3 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 551mm	
Compressed length = 413mm	
Spring rate = 1.35-80deg	

Rear - Non Take Apart	
Tundra Extreme	
503192639	
Valve spec	
REB.	COMP.
1 x 26 x .203	4 x 30 x .203
1 x 16 x .114	1 x 16 x .152
4 x 26 x .254	2 x 30 x .203
1 x 16 x .203	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 551mm	
Compressed length = 413mm	
Spring rate = 1.35-80deg	

Rear - Non Take Apart	
Expedition Sport	
503192638	
Valve spec	
REB.	COMP.
1 x 26 x .203	4 x 30 x .152
1 x 16 x .114	1 x 16 x .152
4 x 26 x .254	1 x 30 x .203
1 x 16 x .203	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended length = 551mm	
Compressed length = 413mm	
Spring rate = 1.66-80deg	

Rear - Non Take Apart	
Summit Everest	
503192207	
Valve spec	
REB.	COMP.
1 x 26 x .203	6 x 30 x .203
1 x 15 x .114	1 x 15 x .152
4 x 26 x .254	4 x 30 x .203
1 x 16 x .203	1 x 26 x .114
	1 x 16 x .152
1 slit piston (2 x 0.3)	
IFP height = not t/a	
Extended lenght = 437.5mm	
Compressed lenght = 288.5mm	
XP Spring rate = 1.27-80deg	
XR Spring rate = 1.35-80deg	

mdd2012-001-603_9

Rear Shock Absorber Installation

Installation is reverse of removal procedure. However, pay attention to the following.

To ease shock installation, secure upper side of shock first.

Install **NEW** shock absorber retaining nuts and tighten to specified torque.

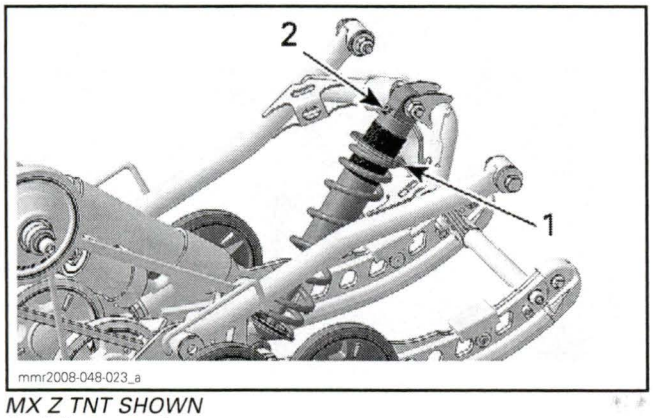
TIGHTENING TORQUE	
Rear shock absorber retaining nuts	25 N•m (18 lbf•ft)

Center Shock Absorber Installation

Installation is reverse of removal procedure. However, pay attention to the following.

All Shock Types Except MC

Position the adjustment ring or the cam upwards and the valve (if equipped) towards the tunnel.



MX Z TNT SHOWN
1. *Adjustment ring*
2. *Valve*

MC Shocks

Position the adjustment ring or the cam downwards.

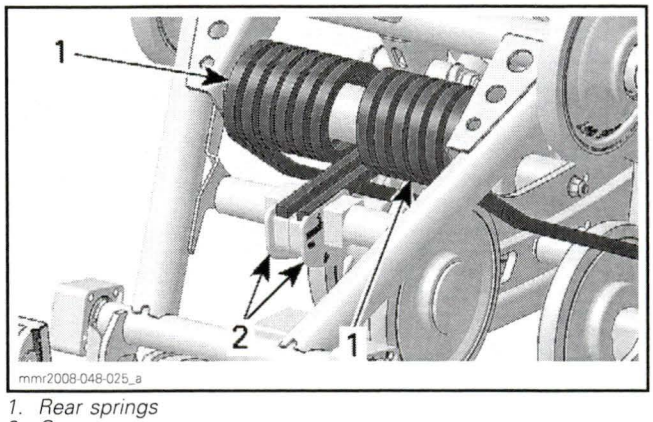
Torque shock absorber nuts to specification.

TIGHTENING TORQUE	
Shock absorber nuts	48 N•m (35 lbf•ft)

REAR SPRINGS

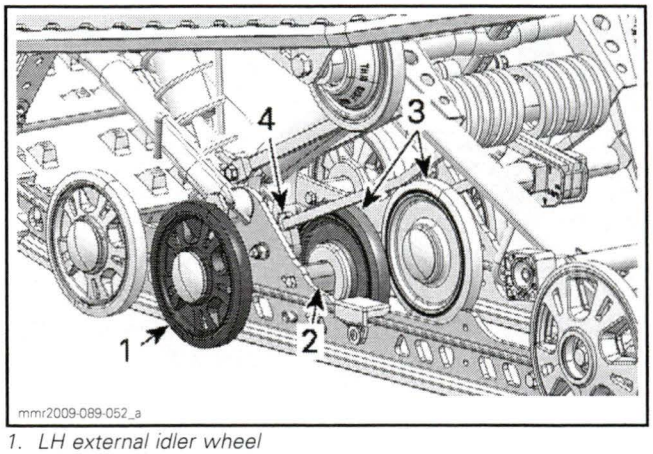
Rear Spring Removal

1. Lift rear of vehicle and support it off the ground.
2. Decrease springs preload by turning cams accordingly.



1. *Rear springs*
2. *Cams*

3. Remove external and internal idler wheels to have access to spring support screws.

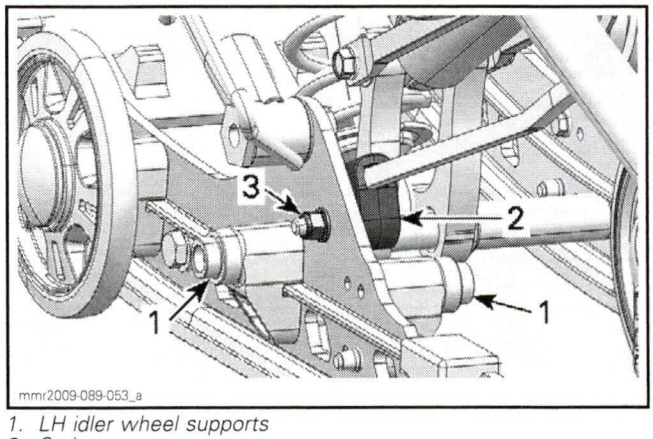


1. *LH external idler wheel*
2. *Idler wheel support*
3. *Internal idler wheels*
4. *LH spring support*

4. Firmly hold the spring supports and remove spring support nuts.

⚠ WARNING

Firmly hold the spring support, they are spring loaded.

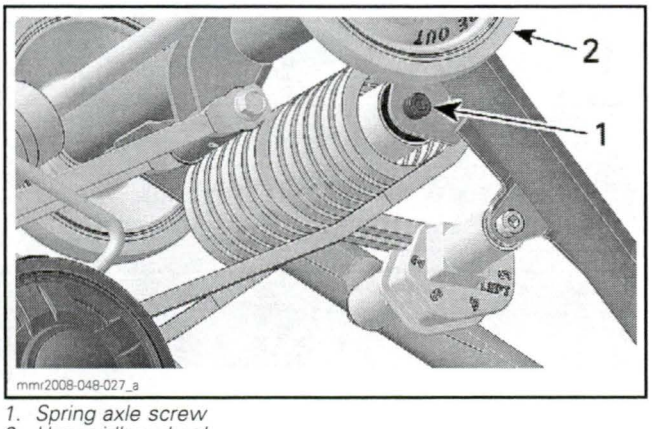


1. *LH idler wheel supports*
2. *Spring support*
3. *Spring support nut*

5. Move spring supports with spring ends over the idler wheel supports and let them sits on the track.

NOTE: If the springs are still loaded, completely loosen track tension in order to make room to unload springs.

6. Remove spring axle screws (one each side).



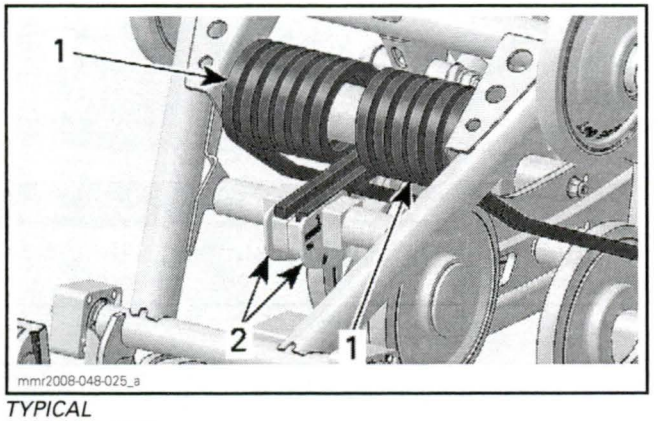
1. Spring axle screw
2. Upper idler wheel

7. Remove springs and spring axle.

Rear Spring Installation

Installation is reverse of removal procedure. However, pay attention to the following.

Make sure that spring end is in cam adjuster.



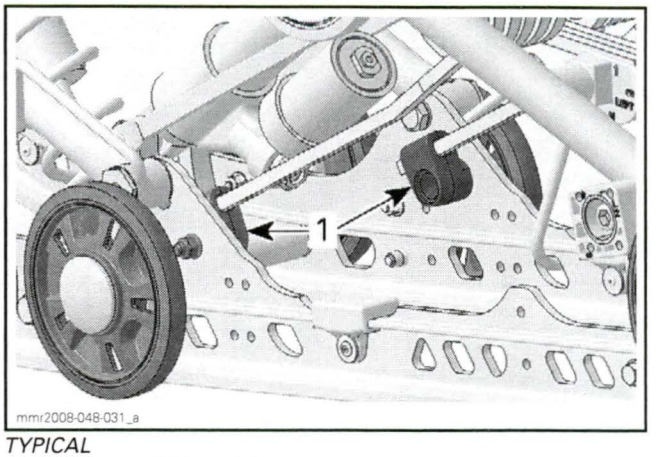
TYPICAL
1. Rear springs
2. Cams

Install **NEW** spring axle screws.

Torque spring axle screws to specification.

TIGHTENING TORQUE	
Spring axle screws	25 N•m (18 lbf•ft)

Install spring supports upwards.

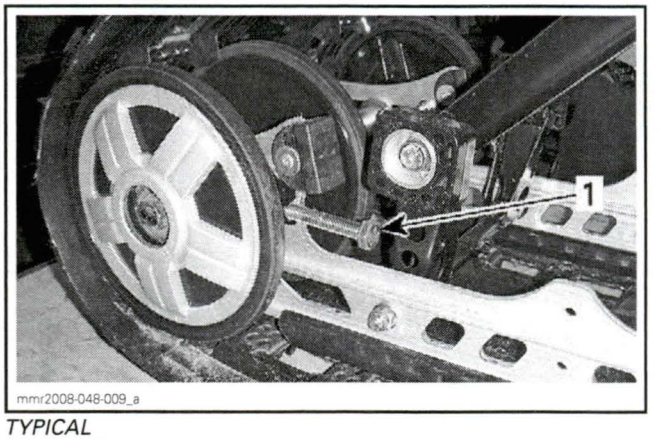


TYPICAL
1. Spring supports upwards

SLIDER SHOES

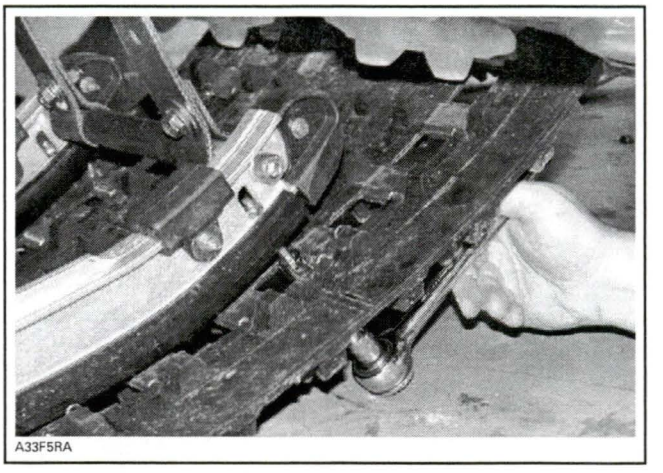
Slider Shoe Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.



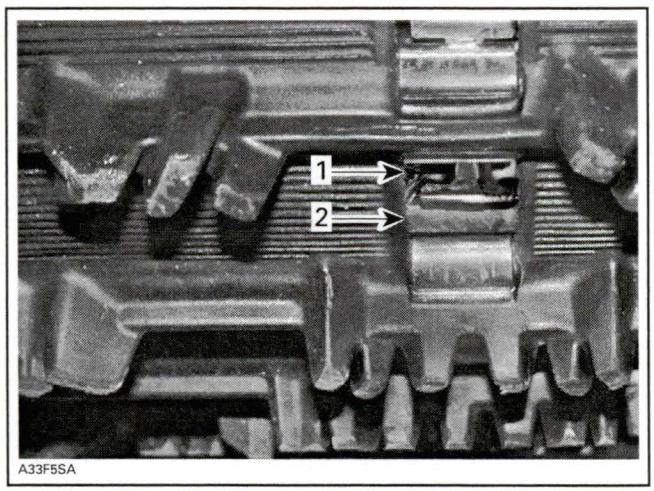
TYPICAL
1. RH adjustment screw

3. Remove nut and screw of each runner.



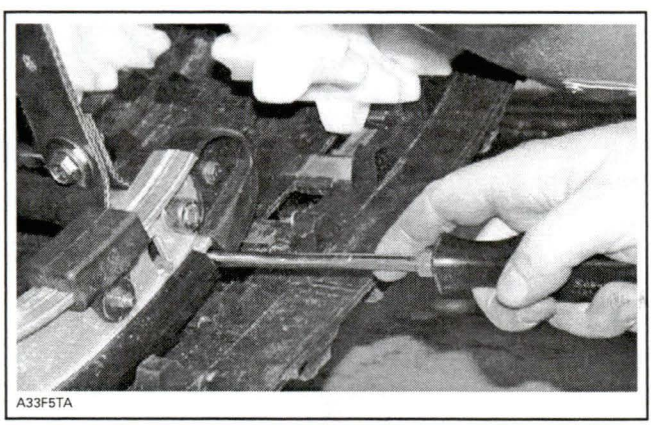
REMOVE NUT AND SCREW OF EACH RUNNER

4. At the rear of vehicle, align a track window with slider shoe.



TYPICAL
1. *Track window*
2. *Slider shoe*

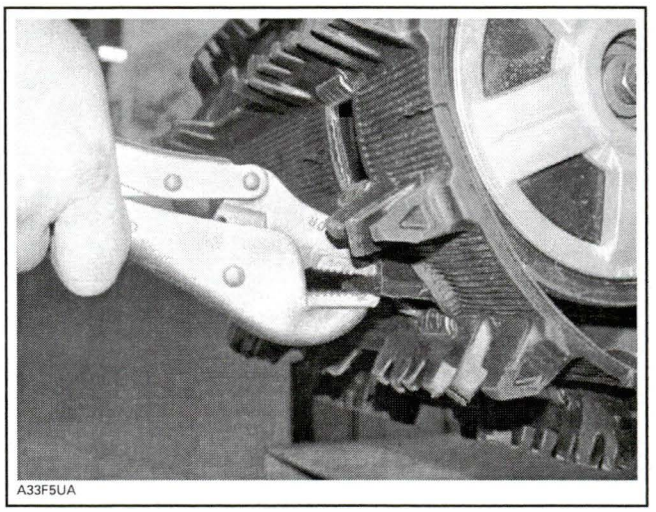
5. Using a pry bar or a screwdriver, push slider shoe rearward until it comes in contact with track.



PUSH ON SLIDER SHOE

6. Using locking pliers, pull slider shoe through track window to remove.

NOTE: If necessary, lubricate track window to facilitate slider shoe removal.



PULL ON SLIDER SHOE TO REMOVE

Slider Shoe Installation

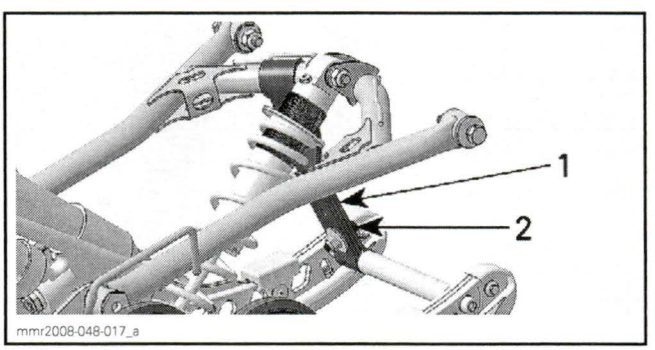
Installation is reverse of removal procedure. However, pay attention to the following.

Make sure to insert slider shoe end with hole first.

FRONT ARM

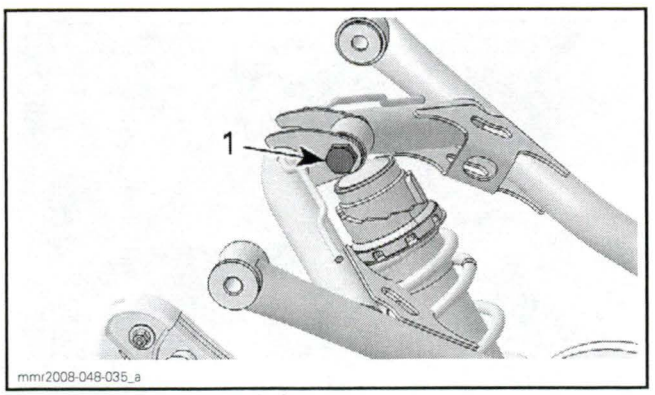
Front Arm Removal

1. Proceed with *SUSPENSION ASSEMBLY REMOVAL*. See procedure in this subsection.
2. Unfasten stopper strap.



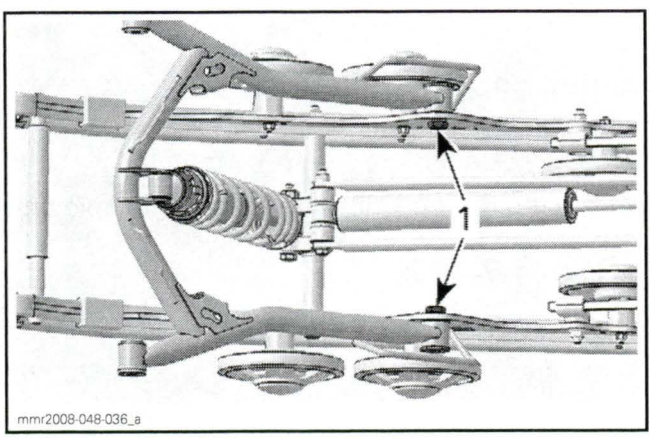
1. *Stopper strap*
2. *Stopper strap bolt*

3. Remove upper bolt securing the center shock absorber.



1. Shock absorber upper bolt

4. Unscrew bolts securing the bottom ends of front arm.



1. Front arm lower bolts

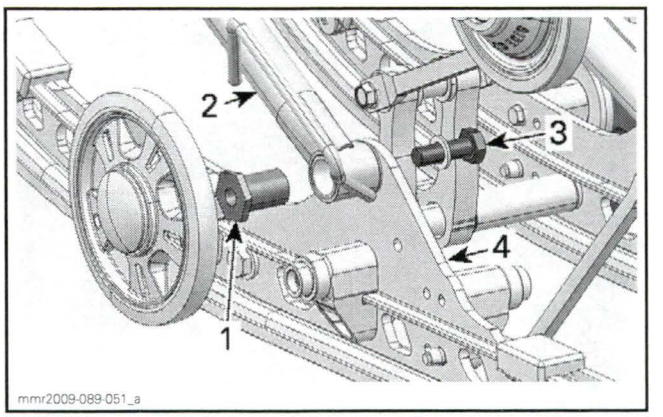
5. Remove front arm from suspension assembly.

Front Arm Installation

Installation is reverse of removal procedure. However, pay attention to the following.

Install the lower bolts and tighten axles to specification.

TIGHTENING TORQUE	
Front arm axle bolts	125 N•m (92 lbf•ft)



TYPICAL
1. Front arm axle
2. Front arm
3. Front arm lower bolt
4. LH runner

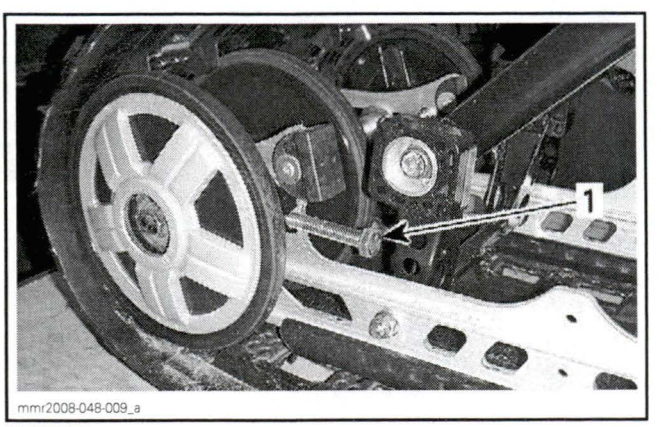
Torque upper bolt of center shock absorber to specification.

TIGHTENING TORQUE	
Center shock absorber upper bolt	48 N•m (35 lbf•ft)

REAR ARM

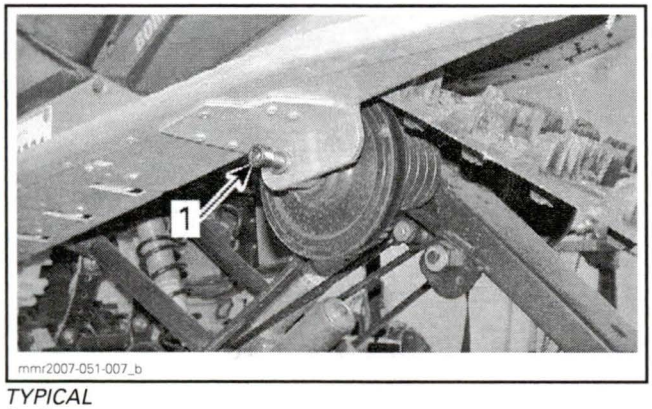
Rear Arm Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.



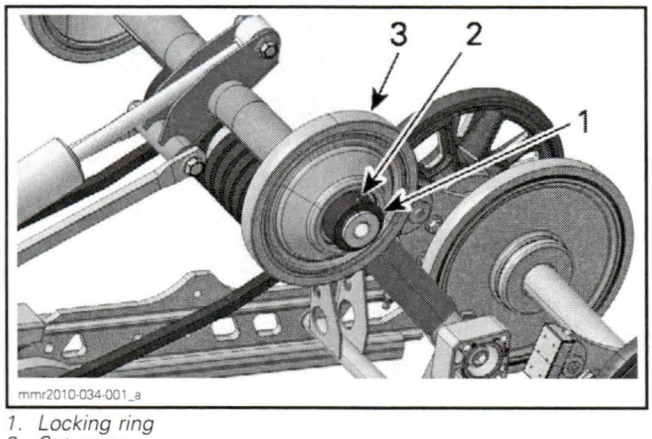
TYPICAL
1. RH adjustment screw

3. Remove screws and washers from rear arm top axle.



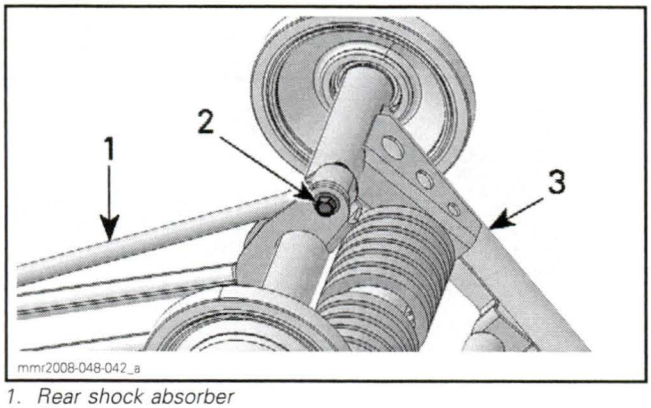
TYPICAL
1. *Screw*

4. Loosen set screw from locking rings.
5. Remove locking rings.
6. Remove upper idler wheels.



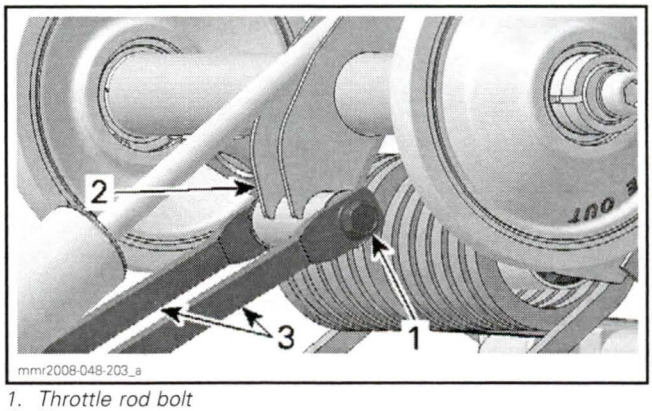
1. *Locking ring*
2. *Set screw*
3. *Upper idler wheel*

7. Remove rear shock absorber upper bolt and nut.



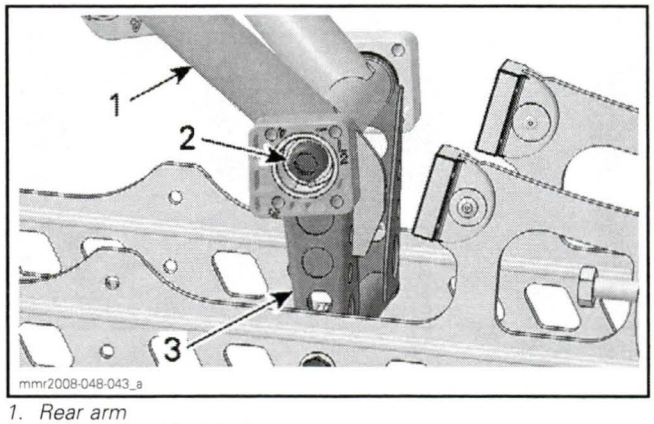
1. *Rear shock absorber*
2. *Shock absorber bolt*
3. *Rear arm*

8. Remove bolt and nut securing throttle rods to rear arm.



1. *Throttle rod bolt*
2. *Rear arm*
3. *Throttle rods*

9. Proceed with *REAR SPRING REMOVAL*. See procedure in this subsection.
10. Remove and discard coupling block screws securing rear arm to pivot arm.



1. *Rear arm*
2. *LH coupling block bolt*
3. *Pivot arm*

11. Remove rear arm from vehicle.

Rear Arm Installation

Installation is reverse of removal procedure. However, pay attention to the following.

Respect THIS SIDE OUT inscription on top idler wheels.

Place rear arm grease fitting towards the front of the vehicle.

Make sure rear arm stroke limiter is placed on rear side.

Install coupling block with **NEW** socket screws.

Install **NEW** rear arm screws.

Torque rear arm screws to specification85 N•m (63 lbf•ft).

TIGHTENING TORQUE	
Rear arm screws	85 N•m (63 lbf•ft)

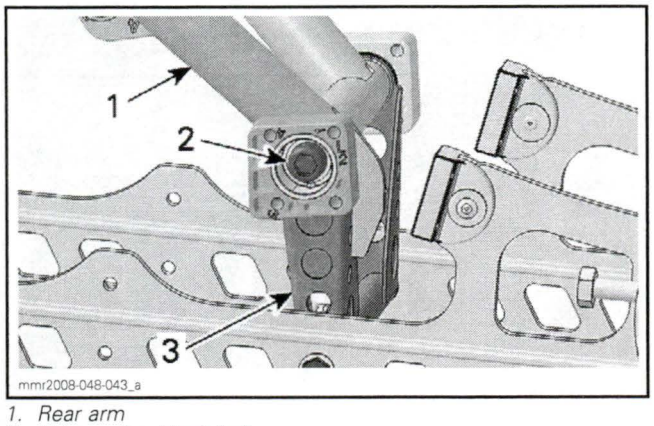
Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on set screw of the locking rings.

Lubricate rear arm pivot. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

PIVOT ARM

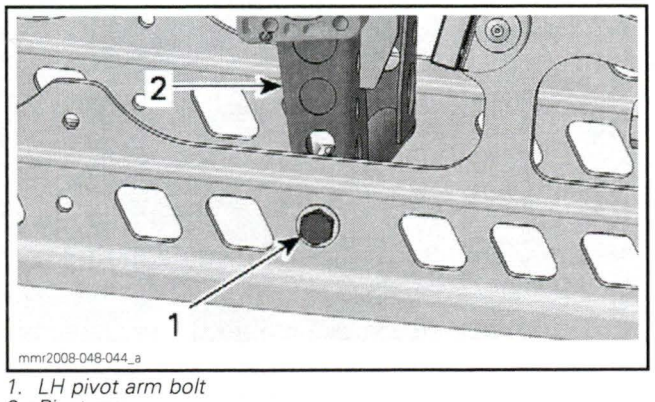
Pivot Arm Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.
3. Remove rear spring supports. Refer to *REAR SPRING* in this subsection.
4. Remove and discard coupling block screws securing rear arm to pivot arm.



1. Rear arm
2. LH coupling block bolt
3. Pivot arm

5. Remove screws and washers holding pivot arm to runners.



1. LH pivot arm bolt
2. Pivot arm

6. Carefully remove pivot arm from rear arm.

Pivot Arm Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Install **NEW** coupling block screws.

Torque coupling block screws to specification.

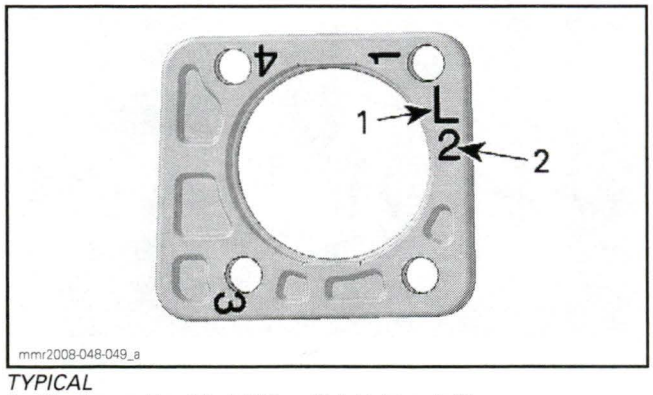
TIGHTENING TORQUE	
Coupling block screws	85 N•m (63 lbf•ft)

Lubricate pivot arm. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

COUPLING BLOCKS

Coupling Blocks Removal and Installation

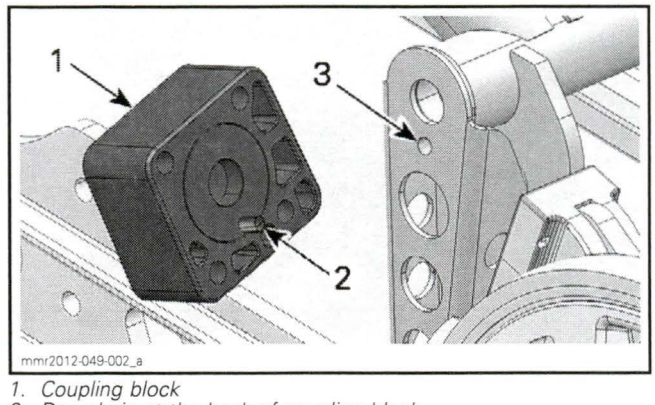
Both coupling blocks are identified "R" or "L" (right or left) and have position number (from 1 to 4). At installation make sure to install proper block on proper side with the same adjustment position on both sides.



TYPICAL
1. Blocks are identified "R" or "L" (right or left)
2. Blocks position number (from 1 to 4)

MODELS	BLOCK POSITION
All models	2

Insert the dowel pin located at the back of coupling block in the pivot arm hole.



1. Coupling block
2. Dowel pin at the back of coupling block
3. Hole in pivot arm

Install **NEW** coupling block screws.

Torque coupling block screws to specification.

TIGHTENING TORQUE	
Rear arm screws	85 N•m (63 lbf•ft)

IDLER WHEELS AND SUPPORTS

Idler Wheels Removal and Installation

Refer to the exploded views at the beginning of this subsection for parts layout and fasteners tightening torque.

STOPPER STRAP

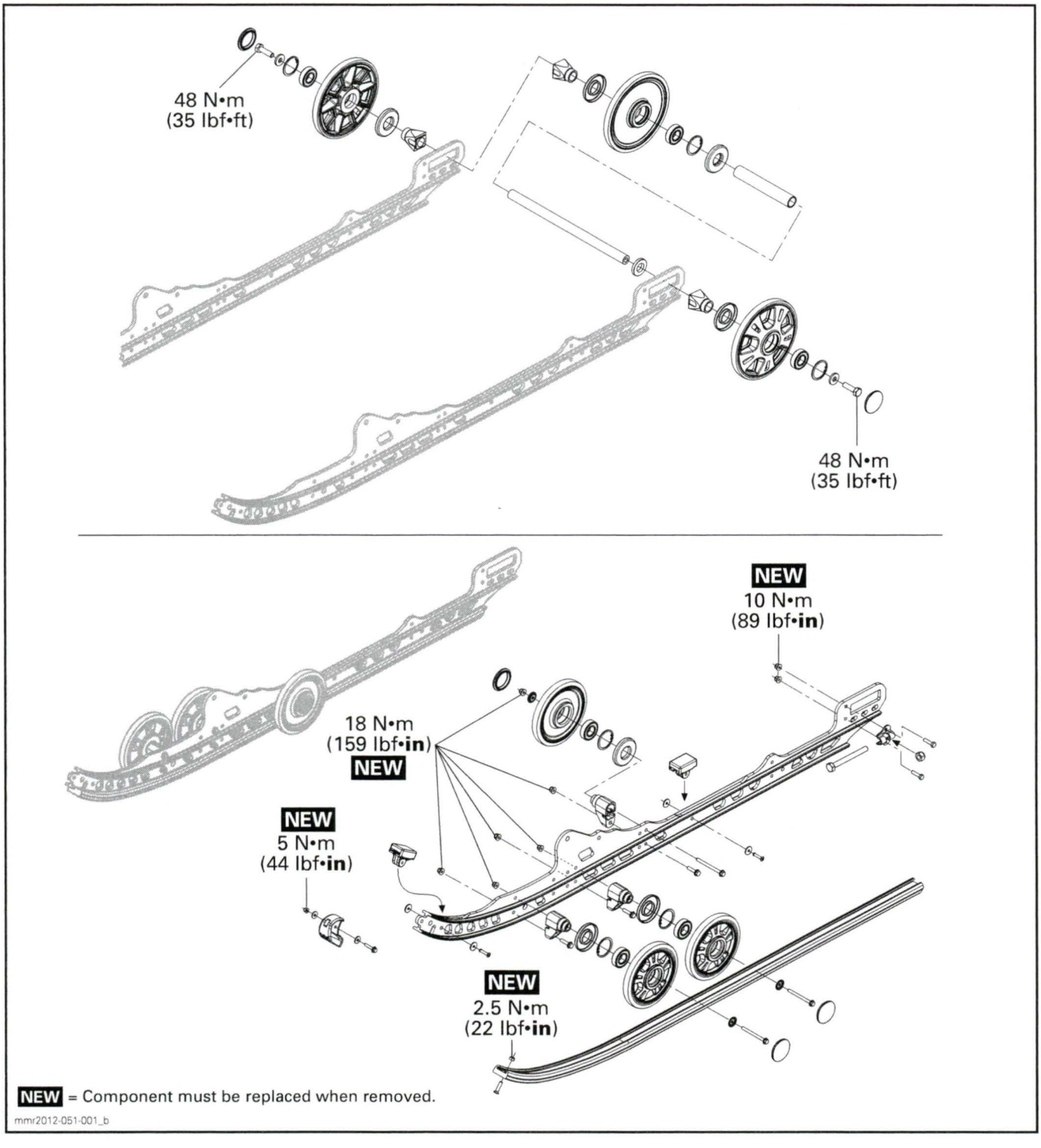
Refer to the exploded views at the beginning of this subsection for parts layout and fasteners tightening torque.

REAR SUSPENSION (SC-5M)

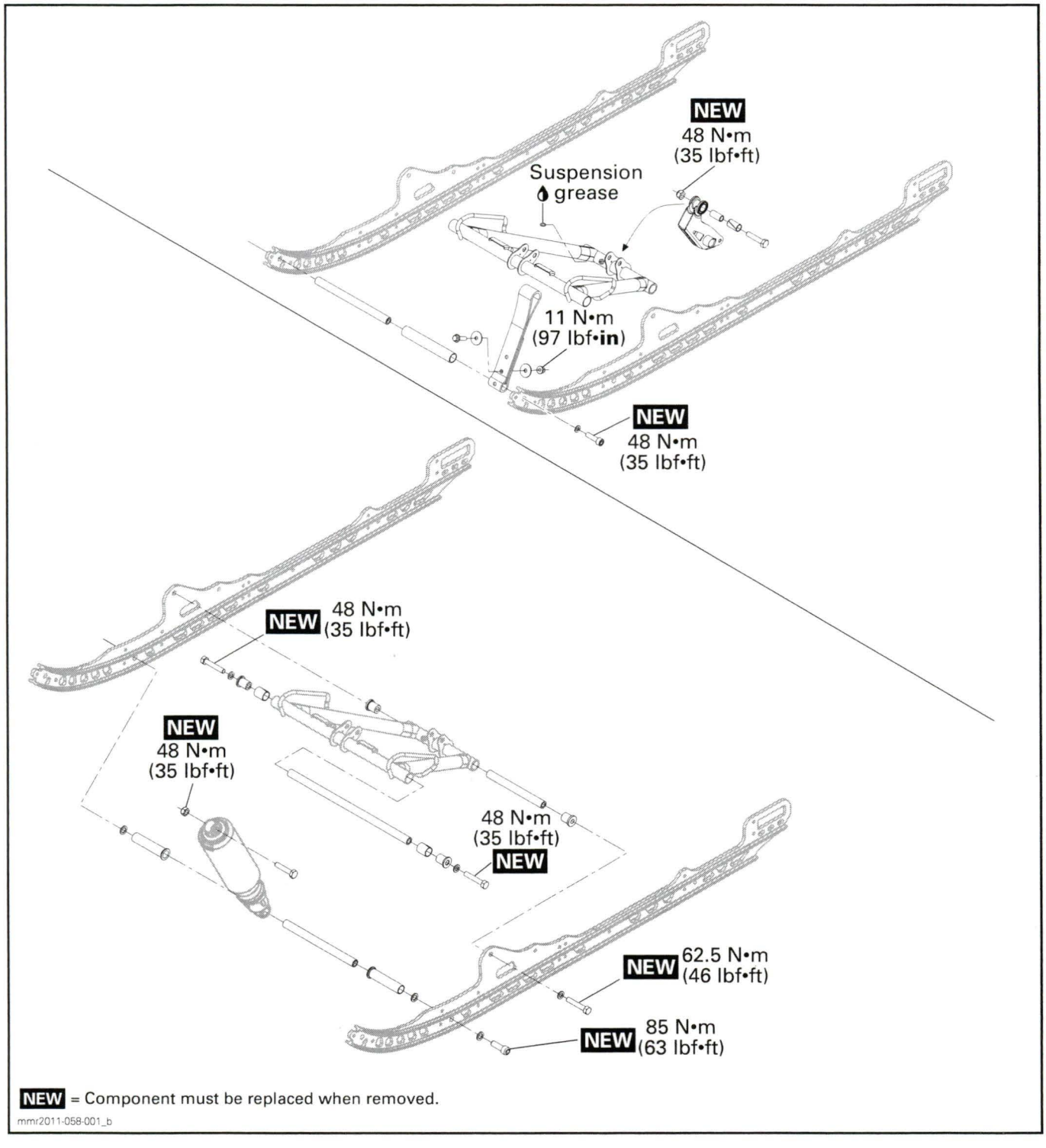
SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	353
SUSPENSION GREASE	293 550 033	355–356

RAILS AND IDLERS WHEELS



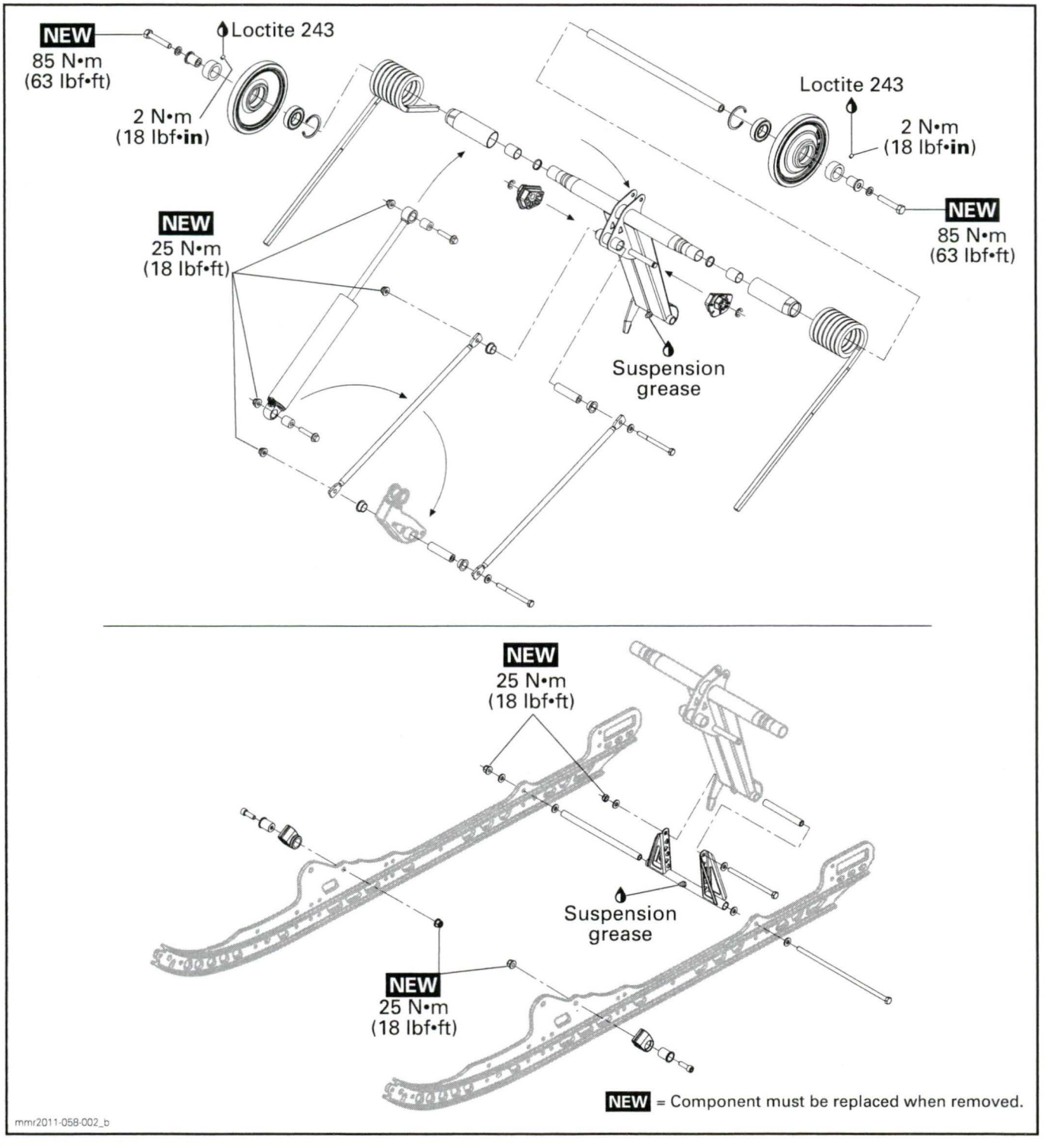
FRONT ARM



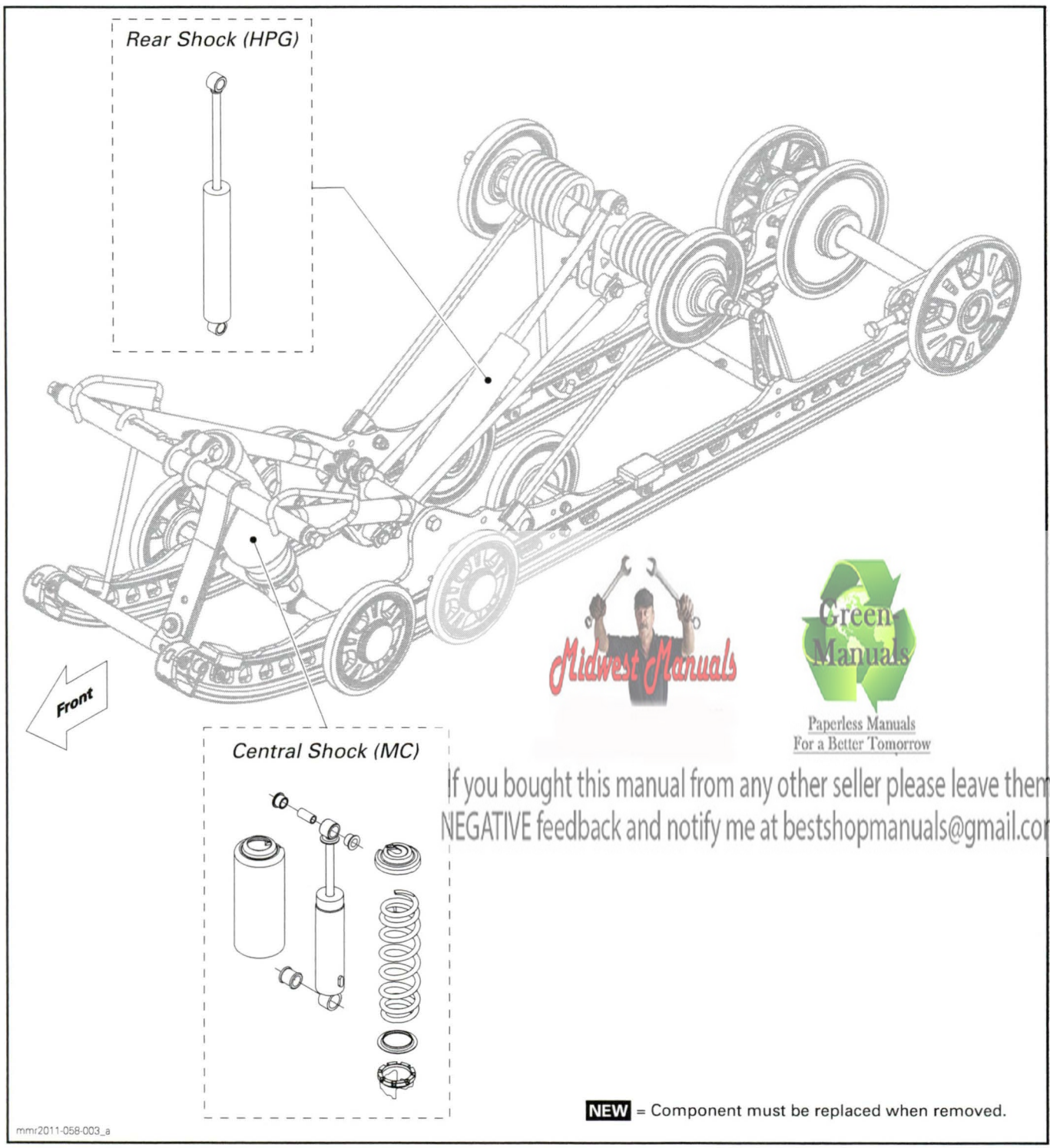
NEW = Component must be replaced when removed.

mmr2011-058-001_b

REAR ARM


NEW
85 N•m
(63 lbf•ft)
Loctite 243
2 N•m
(18 lbf•in)
NEW
25 N•m
(18 lbf•ft)
Loctite 243
2 N•m
(18 lbf•in)
NEW
85 N•m
(63 lbf•ft)
Suspension
grease
NEW
25 N•m
(18 lbf•ft)
Suspension
grease
NEW
25 N•m
(18 lbf•ft)
NEW = Component must be replaced when removed.
mmr2011-058-002_b

SHOCK ABSORBERS

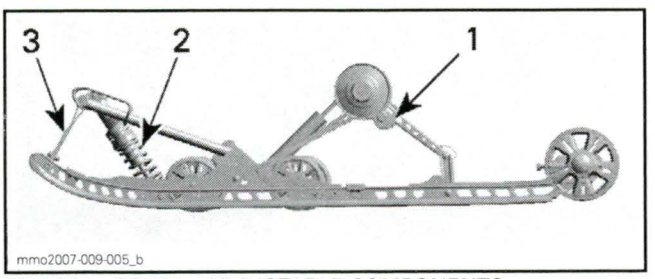


Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

NEW = Component must be replaced when removed.

ADJUSTMENT

REAR SUSPENSION ADJUSTMENTS (SC-5M)



TYPICAL - SC-5M - ADJUSTABLE COMPONENTS
1. *Rear springs*
2. *Center spring*
3. *Stopper strap*

NOTICE **Whenever adjusting rear suspension, check track tension and adjust if necessary.**

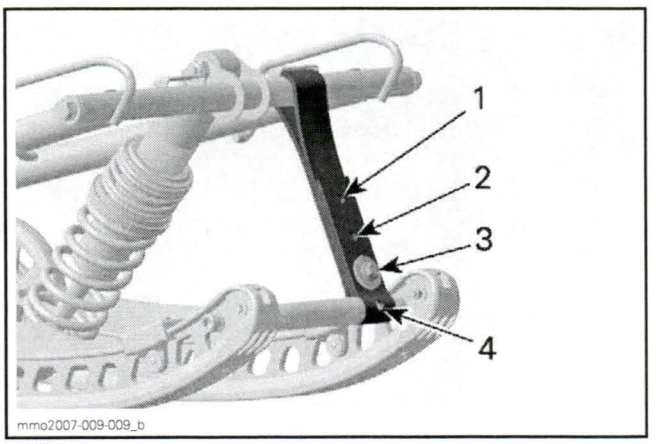
Stopper Strap

Stopper strap length has an effect on the amount of weight the center spring has to carry especially during acceleration, therefore on the front end uplift.

Stopper strap length also has an effect on center spring travel.

NOTICE **Whenever stopper strap length is changed, track tension must be checked.**

ACTION	RESULT
Increasing stopper strap length	Lighter ski pressure under acceleration
	More center spring travel
	More bump absorption capability
Decreasing stopper strap length	Heavier ski pressure under acceleration
	Less center spring travel
	Less bump absorption capability



TYPICAL
1. *Position 1 (longest)*
2. *Position 2*
3. *Position 3*
4. *Position 4*

NOTE: Always install stopper strap bolt as close as possible to the lower shaft.

When operating the snowmobile in deep snow, it may be necessary to vary stopper strap length and/or riding position, to change the angle at which the track rides on the snow. Operator's familiarity with the various adjustments as well as snow conditions will dictate the most efficient combination.

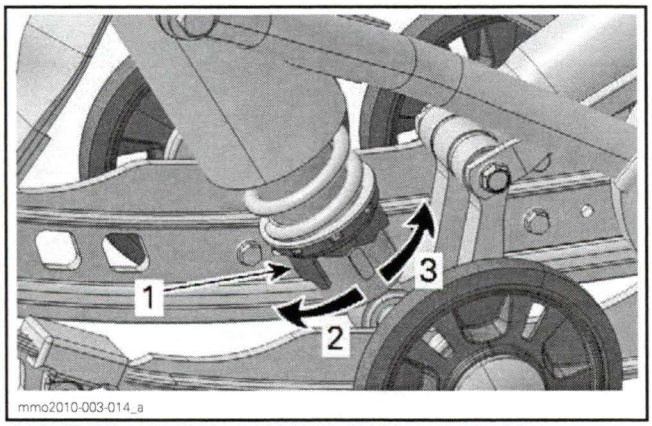
Generally, a longer stopper strap setting gives better performance in deep snow on a flat landscape.

Center Spring

Center spring preload has an effect on steering effort, handling and bump absorption.

Also, since center spring preload adjustment puts more or less pressure on the front of the track, it has an effect on the performance in deep snow.

ACTION	RESULT
Increasing preload	Lighter steering
	More bump absorption capability
	Better deep snow starts
	Better deep snow performance and handling
Decreasing preload	Heavier steering
	Less bump absorption capability
	Better trail handling



CAM TYPE - MOTION CONTROL SHOCK ABSORBER
1. *Spring preload adjustment cam*
2. *Increase preload*
3. *Decrease preload*

NOTE: Use the suspension adjustment tool provided in the tool kit.

Rear Springs

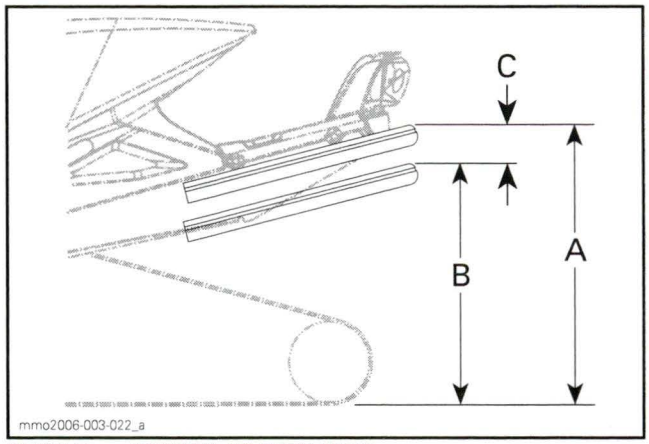
Rear spring preload has an effect on comfort, ride height and load compensation.

Also, adjusting rear spring preload shifts more or less weight to the snowmobile front end. As a result, more or less weight is applied to the skis. This has an effect on performance in deep snow, steering effort and handling.

Slight suspension bottoming occurring under the worst riding conditions indicates a good choice of spring preload.

ACTION	RESULT
Increasing preload	Firmer rear suspension
	Higher rear end
	More bump absorption capability
	Heavier steering
Decreasing preload	Softer rear suspension
	Lower rear end
	Less bump absorption capability
	Lighter steering
	Better deep snow performance and handling

Refer to the following to determine if preload is correct.



TYPICAL — PROPER ADJUSTMENT
A. *Suspension fully extended*
B. *Suspension has collapsed with operator, passenger and load added*
C. *Distance between dimension "A" and "B", see table below*

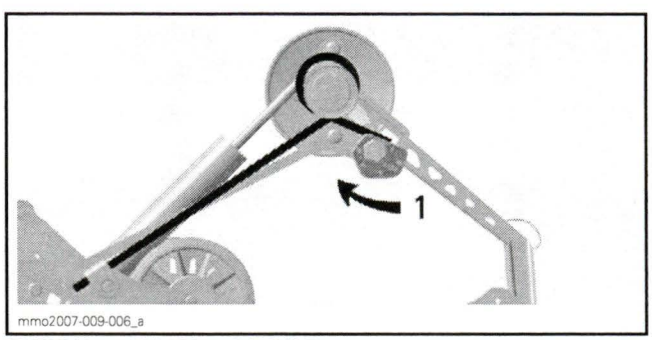
SC-5M 137	
"C"	WHAT TO DO
50 mm to 75 mm (2 in to 3 in)	No adjustment required
More than 75 mm (3 in)	Adjusted too soft, increase preload
Less than 50 mm (2 in)	Adjusted too firm, decrease preload

NOTE: If the specification is unattainable with the original springs, refer to the applicable *SPRING CHART* bulletin for other available springs.

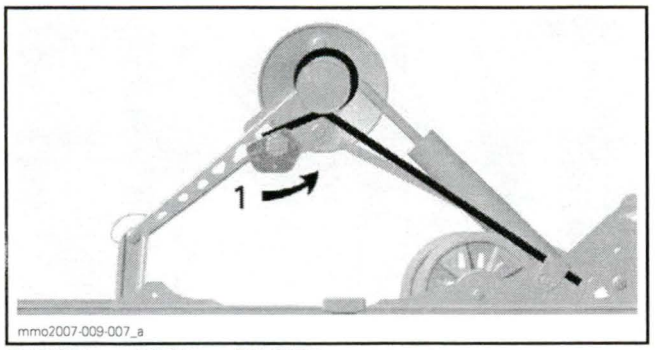
To increase spring preload, using tool, always turn the left side adjustment cam in a clockwise direction, and the right side cam in a counterclockwise direction.

⚠ CAUTION Never set preload cams directly from position 5 to 1 or directly from position 1 to 5.

The adjustment cams have 5 different settings, 1 being the softest.



TYPICAL — SC-5M — LH SIDE
1. *Adjust spring preload*



TYPICAL — SC-5M — RH SIDE
1. Adjust spring preload

MAINTENANCE

For rear suspension lubrication, mechanism and stopper strap inspection, refer to *PERIODIC MAINTENANCE PROCEDURES*.

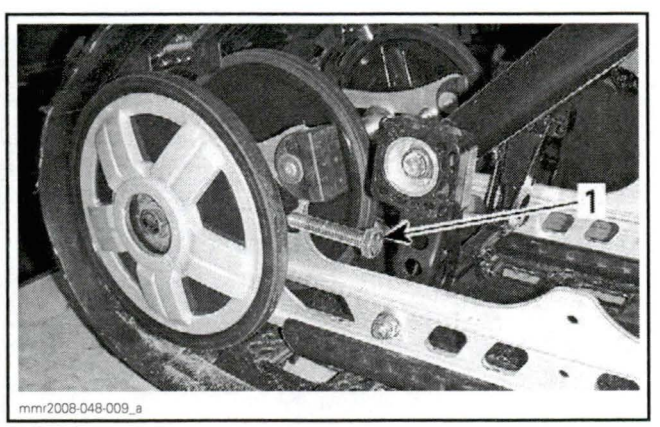
PROCEDURES

NOTE: Many parts can be changed with rear suspension in place. When specified, refer to *SUSPENSION ASSEMBLY* to remove rear suspension from vehicle.

SUSPENSION ASSEMBLY

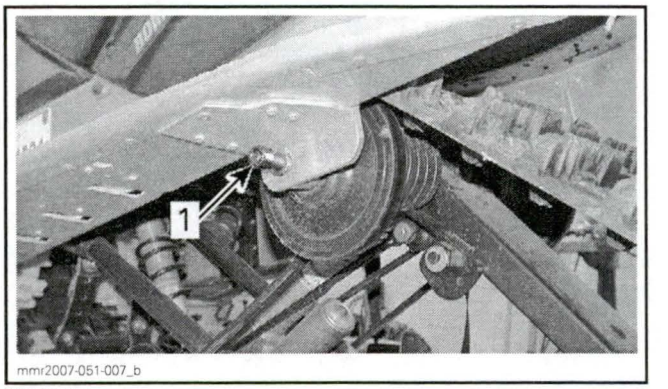
Suspension Assembly Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.



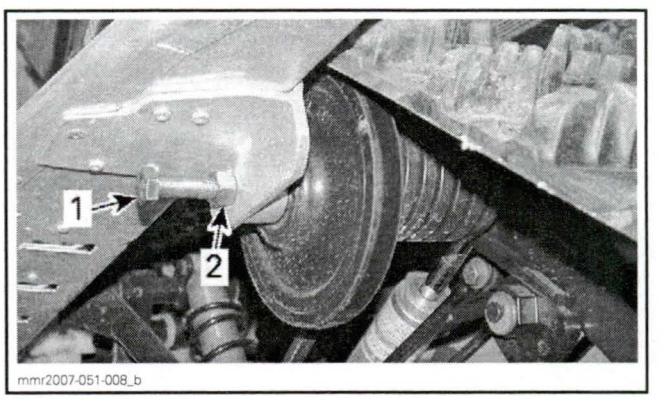
TYPICAL
1. RH adjustment screw

3. Remove and discard rear arm bolts from chassis as follows:
   3.1 Unscrew one screw securing the rear arm to frame.



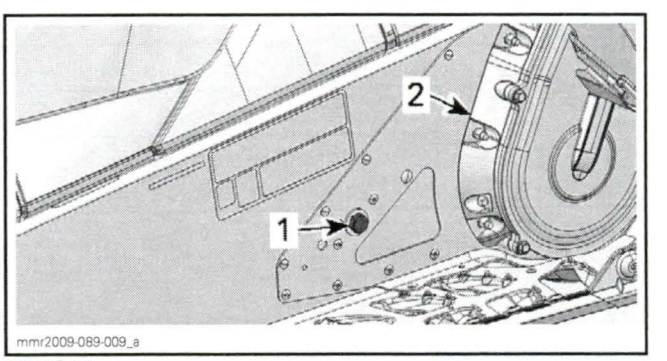
TYPICAL
1. Screw

   3.2 Replace the screw with a longer one and a nut.
   3.3 Screw in the longer screw by approximately 7 turns.
   3.4 Hold the longer screw and tighten locking nut.



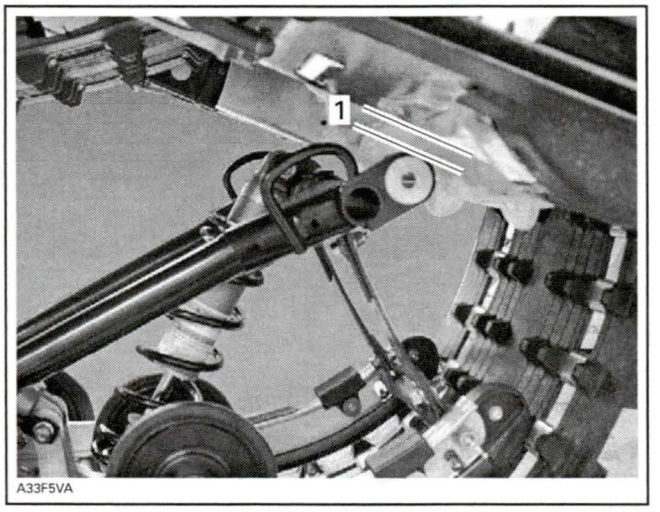
1. Longer screw
2. Locking nut

   3.5 Unscrew the screw on the other side then unlock nut and remove the longer screw.
4. Remove and discard both screws retaining front arm to tunnel.



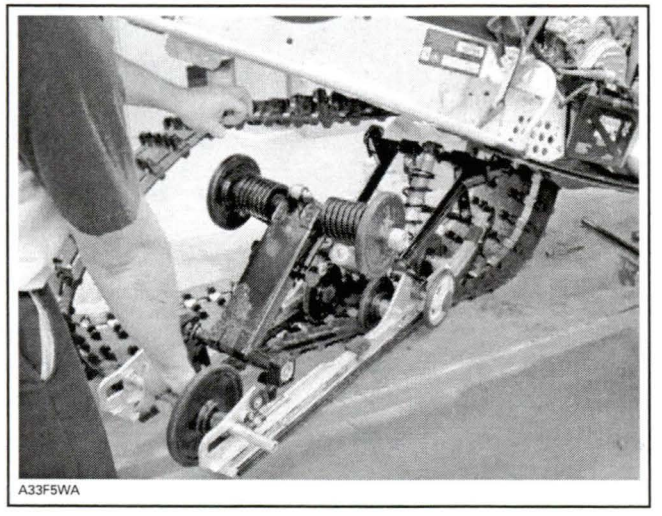
TYPICAL
1. Front arm screw
2. Chaincase

5. Lift rear of vehicle until front arm as enough clearance to pass underneath tunnel.



TYPICAL
1. Enough clearance

6. Remove suspension assembly from vehicle.



TYPICAL — REMOVE SUSPENSION

Suspension Assembly Installation

Installation is the reverse of removal procedure. Pay attention to the following.

Inspect track thoroughly before reinstalling suspension. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Install suspension into track with front portion first.

Install **NEW** front arm screws.

Install **NEW** rear arm screws.

Tighten screws to specified torque.

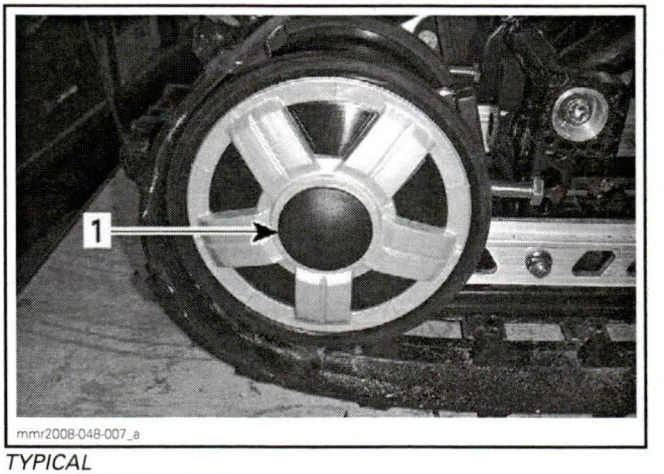
TIGHTENING TORQUE	
Front arm screws	48 N•m (35 lbf•ft)
Rear arm screws	85 N•m (63 lbf•ft)

Adjust track tension, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

REAR AXLE

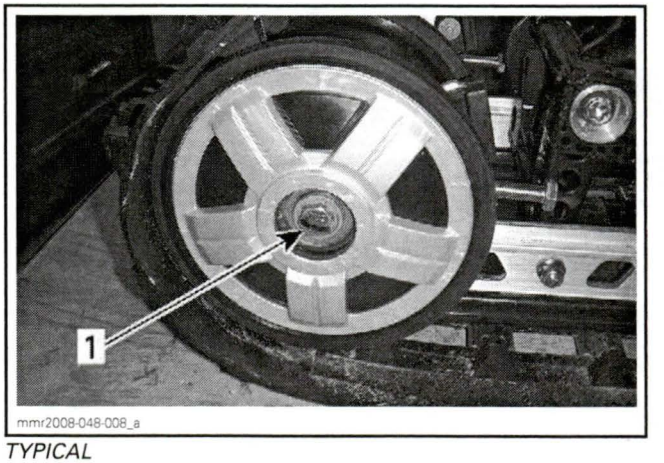
Rear Axle Removal

1. Lift rear of vehicle and support it off the ground.
2. Remove rear idler wheel caps.



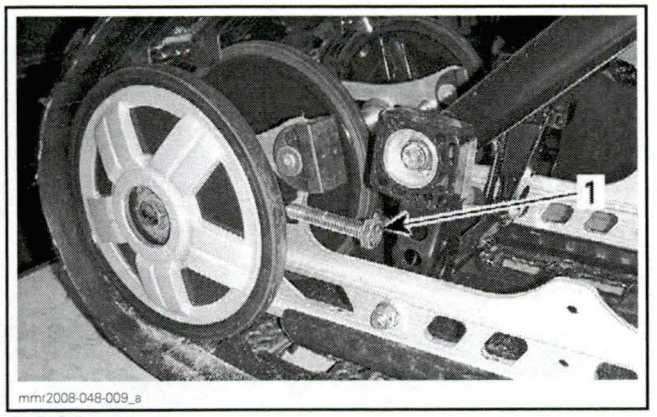
TYPICAL
1. RH rear idler wheel cap

3. Loosen rear axle screws (one each side).



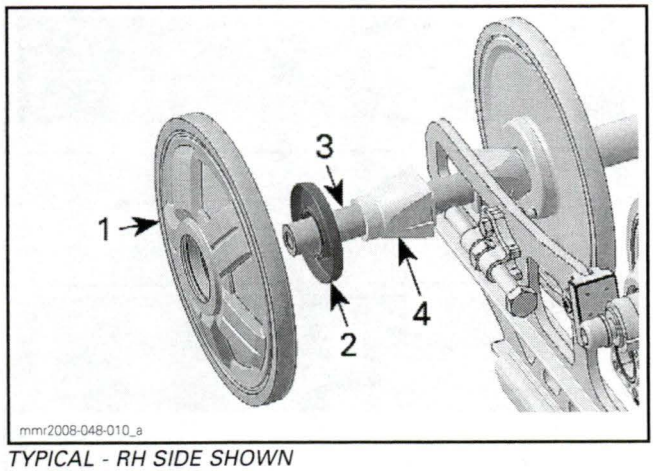
TYPICAL
1. RH rear axle screw

4. Completely loosen track tension by unscrewing both adjustment screws.



TYPICAL
1. *RH adjustment screw*

5. Remove both rear axle screws.
6. Remove rear idler wheels, seals and wheel spacers.



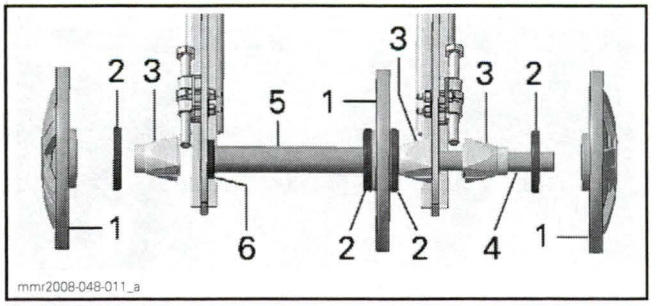
TYPICAL - RH SIDE SHOWN
1. *Rear idler wheel*
2. *Seal*
3. *Rear axle*
4. *Wheel spacer*

7. Pull out the rear axle.
8. Remove spacer, washers and inner idler wheel.

Rear Axle Installation

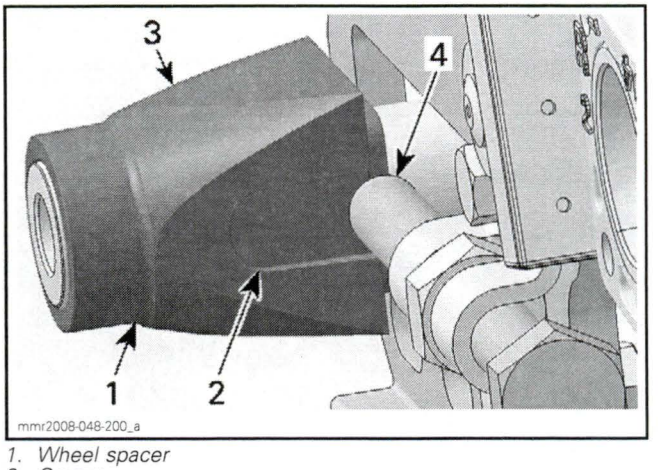
Installation is the reverse of removal procedure. However, pay attention to the following.

Make sure to position all parts correctly.



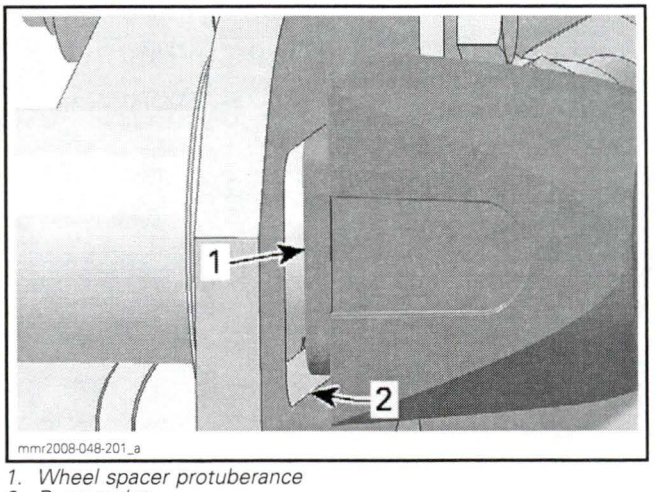
1. *Idler wheels*
2. *Seals*
3. *Wheel spacers*
4. *Rear axle*
5. *Rear axle spacer*
6. *Washer*

Position wheel spacers with a flat side up and a groove in front of tensioner screw.



1. *Wheel spacer*
2. *Groove*
3. *Flat side*
4. *Tensioner screw*

When tightening rear axle, make sure each wheel spacer protuberance is engaged into runner slot.



1. *Wheel spacer protuberance*
2. *Runner slot*

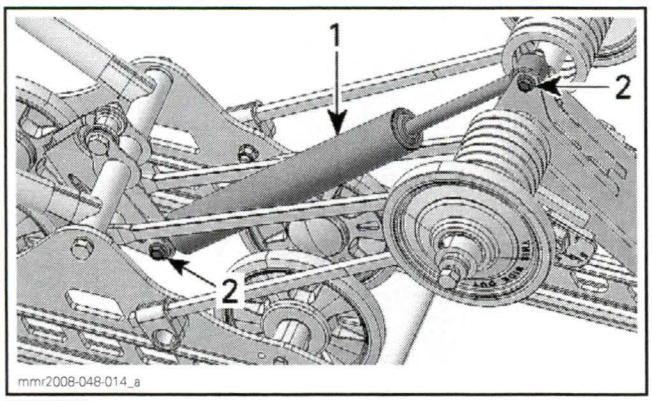
Adjust track tension. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

SHOCK ABSORBERS

Rear Shock Absorber Removal

NOTE: If necessary, to ease shock removal, unfasten stopper strap to release shock pressure.

1. Lift rear of vehicle and support it off the ground.
2. Remove bolts and nuts from shock.

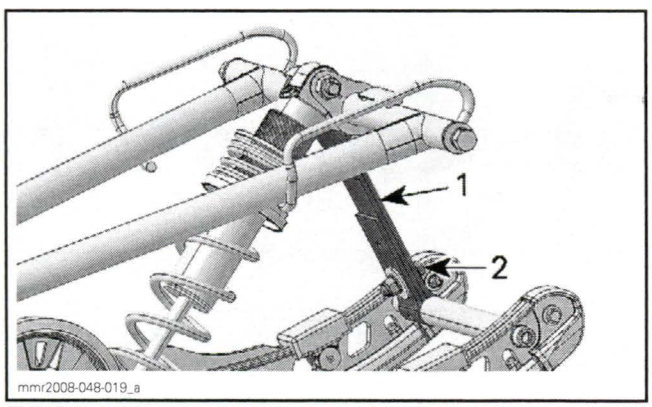


TYPICAL
1. *Rear shock absorber*
2. *Remove bolts and nuts*

3. Remove rear shock absorber from vehicle.

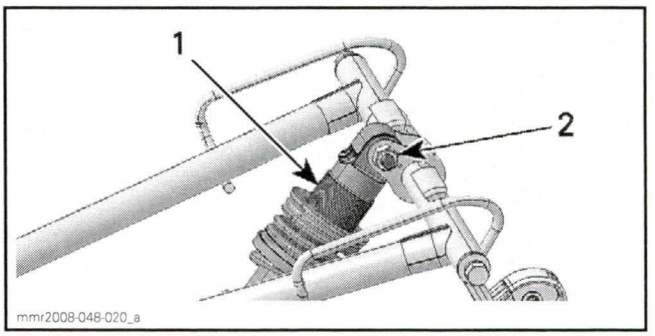
Center Shock Absorber Removal

1. Lift the rear of vehicle and support it off the ground.
2. Unfasten stopper strap.



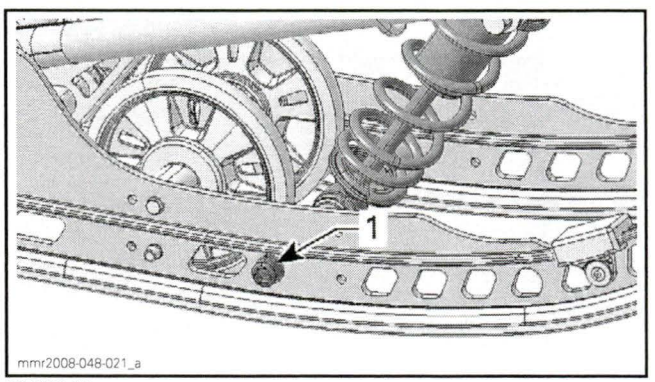
TYPICAL
1. *Stopper strap*
2. *Stopper strap bolt*

3. Remove upper shock absorber bolt and nut.



TYPICAL
1. *Front shock absorber*
2. *Remove bolt and nut*

4. Remove and discard socket screws (one on each side) securing shock shaft.



TYPICAL
1. *RH socket screw*

5. Remove center shock absorber from vehicle.
6. Remove bushings and shock shaft from shock absorber.

Shock Absorber Inspection

Refer to *REAR SUSPENSION (SC-5)* subsection for complete procedures.

Rear Shock Absorber Installation

Installation is the reverse of removal procedure. However, pay attention to the following.

Make sure upper and lower shock absorber bushings are properly installed.

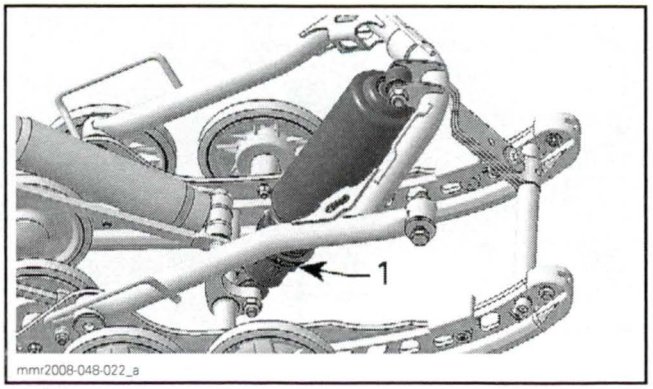
Install **NEW** shock absorber retaining nuts and tighten to specified torque.

TIGHTENING TORQUE	
Rear shock absorber retaining nuts	25 N•m (18 lbf•ft)

Center Shock Absorber Installation

Installation is the reverse of removal procedure. However, pay attention to the following.

Position the adjustment cam downwards.

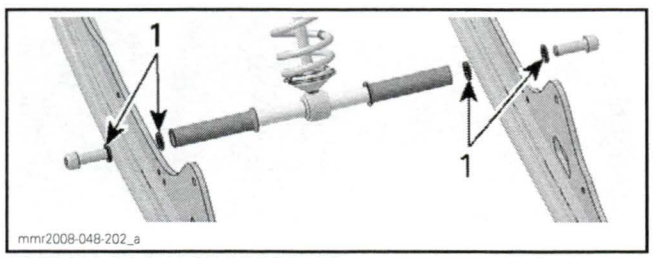


1. Adjustment cam

Torque shock absorber upper nut to specification.

TIGHTENING TORQUE	
Upper retaining nuts	48 N•m (35 lbf•ft)

Position washers in proper position.



BOTTOM OF SHOCK ABSORBER
1. Washers location

Install **NEW** socket screws.

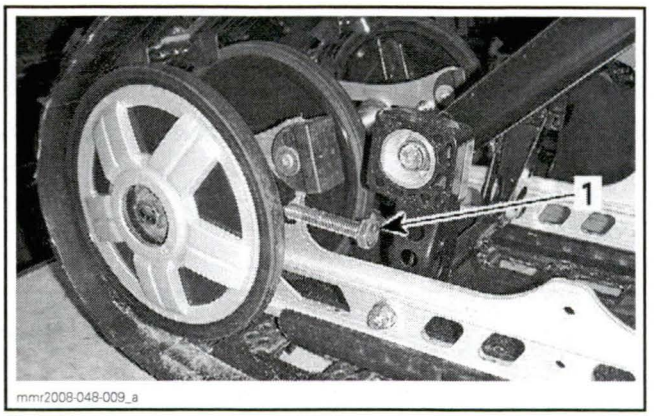
Torque socket screws to specification.

TIGHTENING TORQUE	
Lower socket screws	85 N•m (63 lbf•ft)

REAR SPRINGS

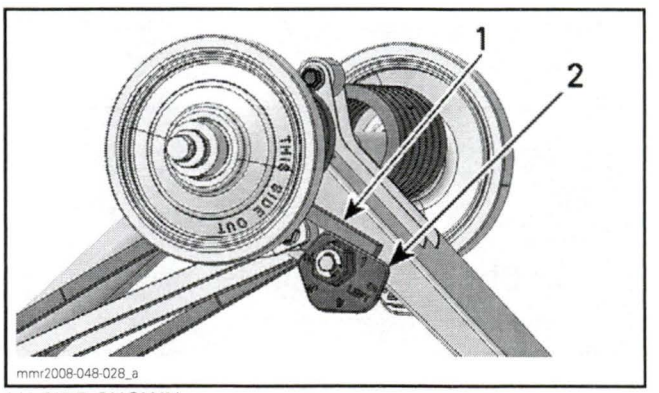
Rear Spring Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.



TYPICAL
1. RH adjustment screw

3. Decrease springs preload by turning cams accordingly.

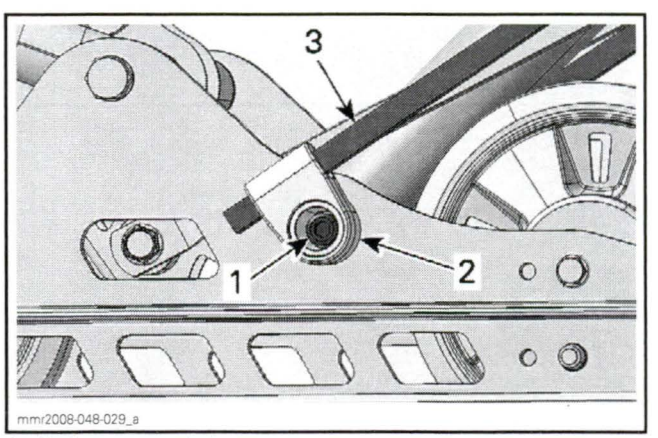


LH SIDE SHOWN
1. Rear spring
2. Cam

4. Firmly hold the spring support and unscrew its retaining bolt (one on each side).

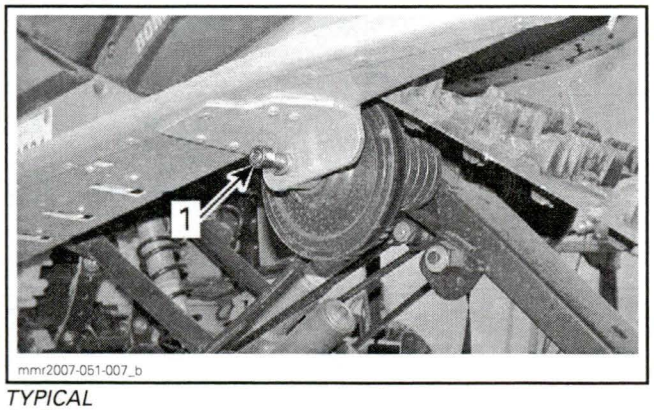
⚠ WARNING

Firmly hold the spring support, they are spring loaded.



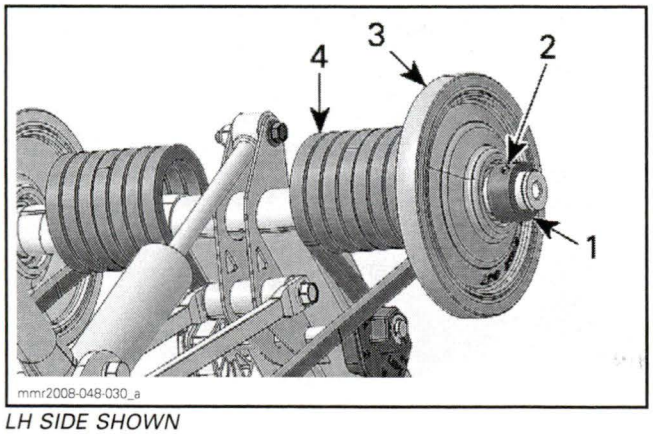
1. Spring support bolt
2. Spring support
3. Spring

5. Remove screws and washers from rear arm top axle.



TYPICAL
1. Screw

6. Loosen set screw from locking rings.
7. Remove locking rings.
8. Remove upper idler wheels.
9. Remove springs.



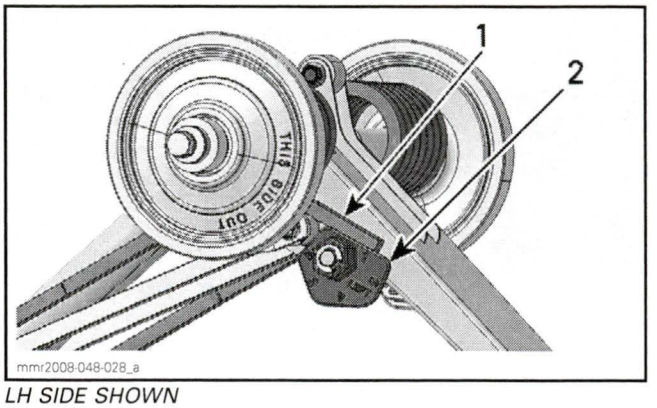
LH SIDE SHOWN
1. Locking ring
2. Set screw
3. Upper idler wheel
4. Rear spring

Rear Spring Installation

Installation is the reverse of removal procedure. However, pay attention to the following.

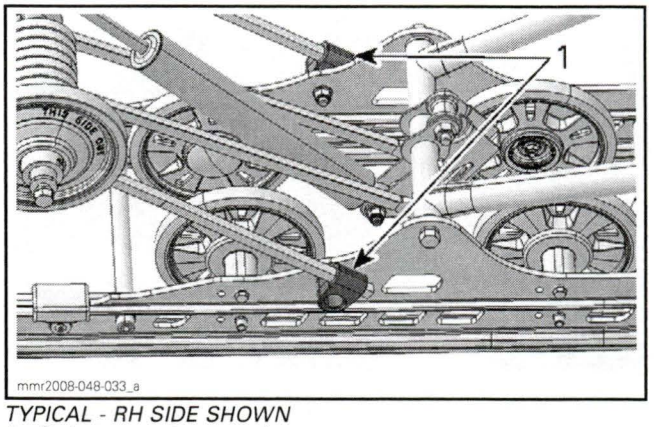
Respect THIS SIDE OUT inscription on top idler wheels.

Make sure that spring end is in cam adjuster.



LH SIDE SHOWN
1. Spring end
2. Cam

Install spring supports upwards.



TYPICAL - RH SIDE SHOWN
1. Spring supports upwards

Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on set screw of the locking rings.

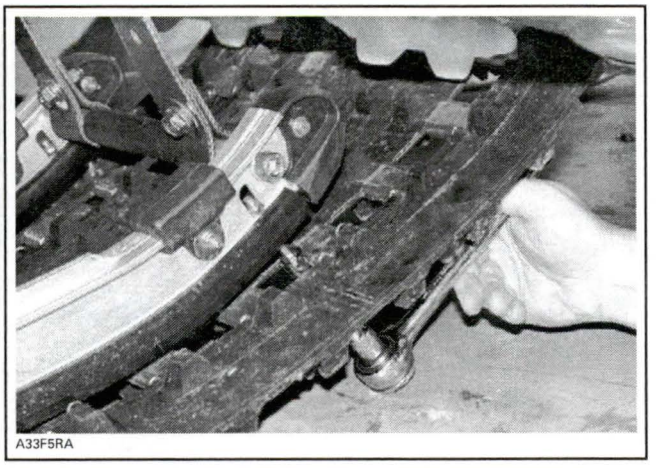
Torque screws on rear arm top axle as per the following table.

TIGHTENING TORQUE	
Rear arm top axle screws	85 N•m (63 lbf•ft)

SLIDER SHOES

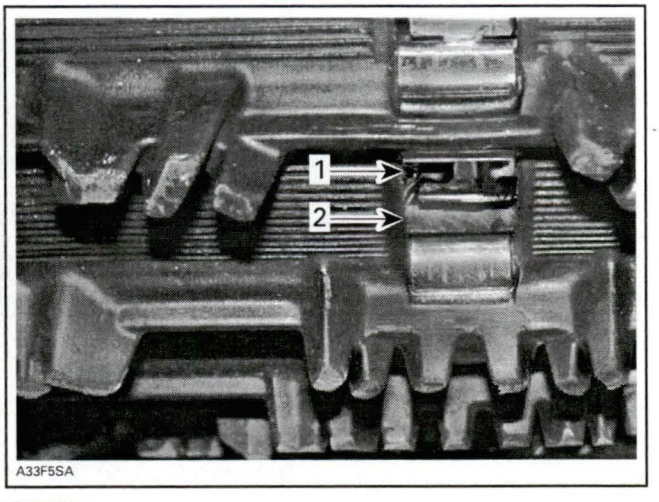
Slider Shoe Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.
3. Remove nut and screw of each runner.


A33F5RA

REMOVE NUT AND SCREW OF EACH RUNNER

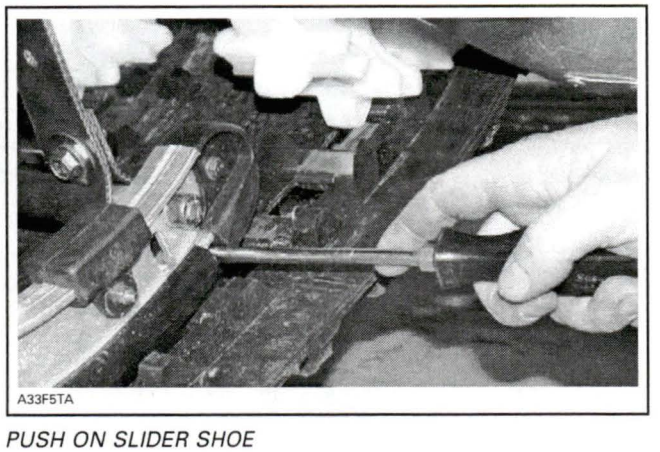
4. At the rear of vehicle, align a track window with slider shoe.



A33F5SA

TYPICAL
1. *Track window*
2. *Slider shoe*

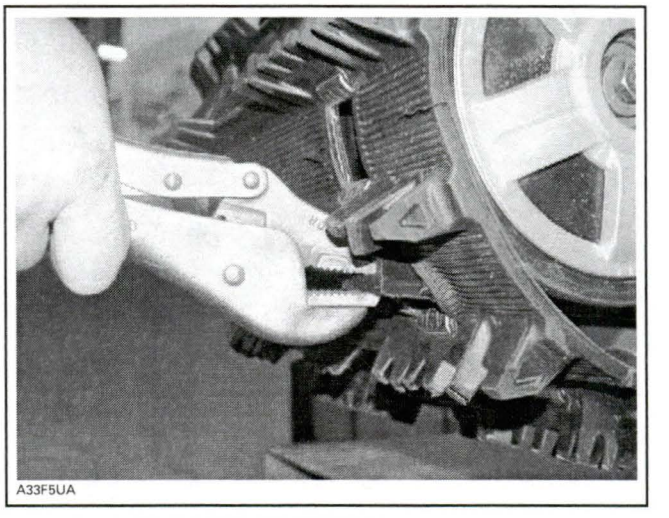
5. Using a pry bar or a screwdriver, push slider shoe rearward until it comes in contact with track.


A33F5TA

PUSH ON SLIDER SHOE

6. Using locking pliers, pull slider shoe through track window to remove.

NOTE: If necessary, lubricate track window to facilitate slider shoe removal.


A33F5UA

PULL ON SLIDER SHOE TO REMOVE

Slider Shoe Installation

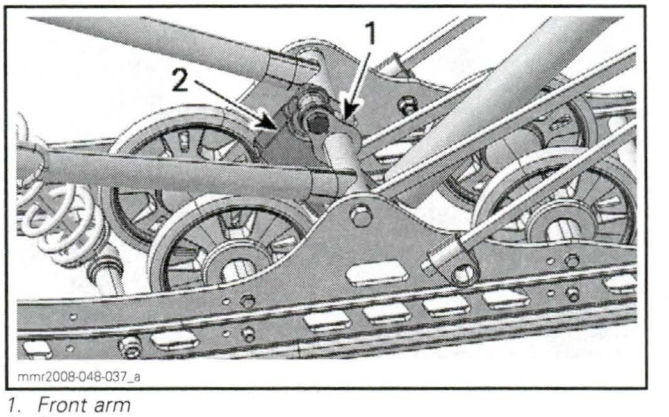
Installation is the reverse of removal procedure. However, pay attention to the following.

Make sure to insert slider shoe end with hole first.

FRONT ARM

Front Arm Removal

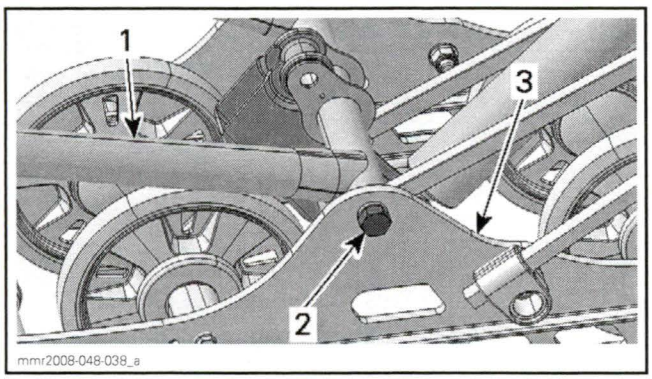
1. Proceed with *SUSPENSION ASSEMBLY REMOVAL*. See procedure in this subsection.
2. Remove the bolt securing rocker to front arm.



mmr2008-048-037_a

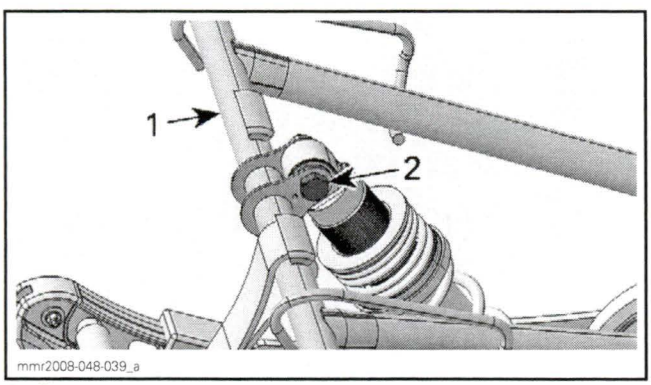
1. *Front arm*
2. *Rocker*

3. Unscrew and remove the front arm lower bolts and washers.



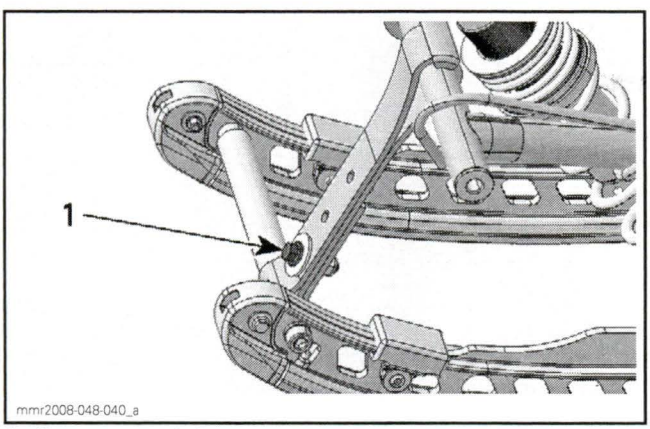
1. *Front arm*
2. *Lower bolt*
3. *LH runner*

4. Remove the shock absorber upper bolt.



1. *Front arm*
2. *Shock absorber upper bolt*

5. Unfasten stopper strap.



1. *Stopper strap bolt*

6. Remove front arm from suspension assembly.

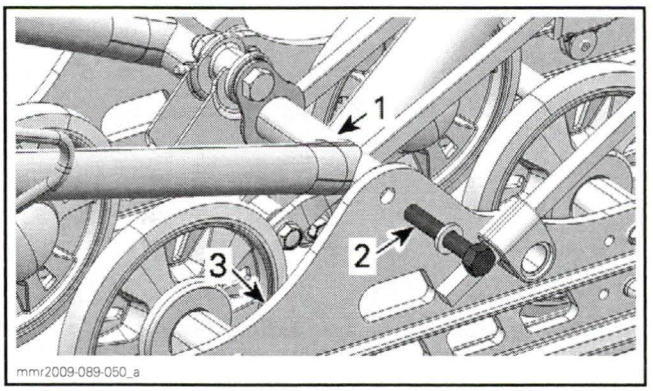
Front Arm Installation

Installation is the reverse of removal procedure. However, pay attention to the following.

Install **NEW** front arm lower bolts.

Torque front arm lower bolts to specification.

TIGHTENING TORQUE	
Front arm lower bolts	62.5 N•m (46 lbf•ft)



1. *Front arm*
2. *Front arm lower bolt (LH side)*
3. *Runner*

Torque nut securing rocker on front arm to specification.

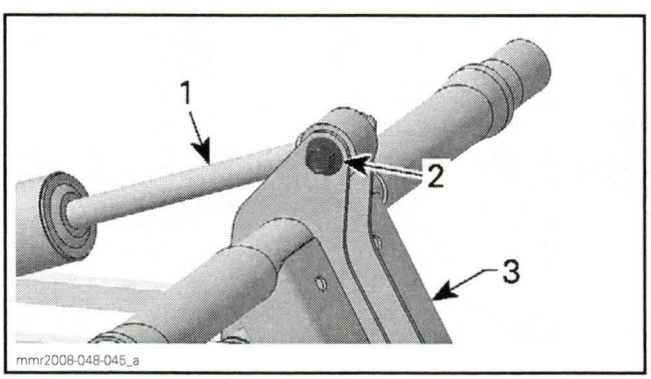
TIGHTENING TORQUE	
Rocker retaining nut	48 N•m (35 lbf•ft)

Lubricate front arm pivot at grease fitting using SUSPENSION GREASE (P/N 293 550 033). Refer to *MAINTENANCE*.

REAR ARM

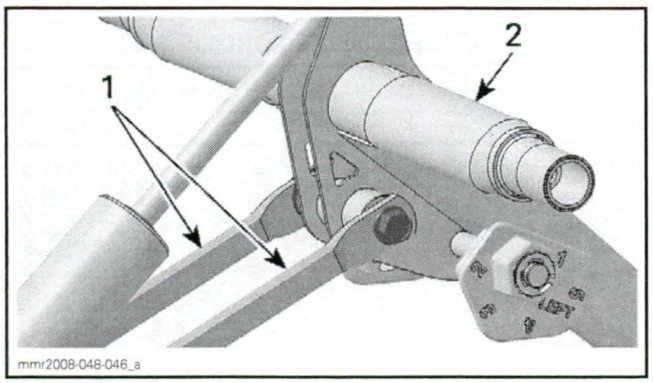
Rear Arm Removal

1. Lift rear of vehicle and support it off the ground.
2. Proceed with *REAR SPRING REMOVAL*. See procedure in this subsection.
3. Remove the rear shock absorber upper bolt and nut.



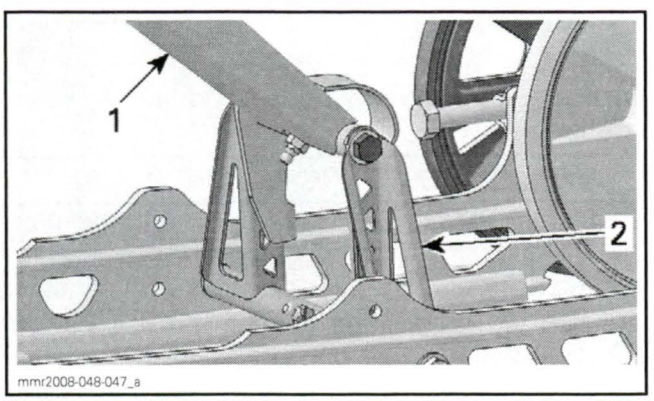
1. *Rear shock absorber*
2. *Shock absorber bolt*
3. *Rear arm*

4. Remove throttle rods from rear arm.



1. *Throttle rods*
2. *Rear arm*

5. Remove bolt, washers and nut holding rear arm to pivot arm.



1. *Rear arm*
2. *Pivot arm*

6. Remove rear arm from vehicle.
7. Remove adjustment cams from rear arm.

Rear Arm Installation

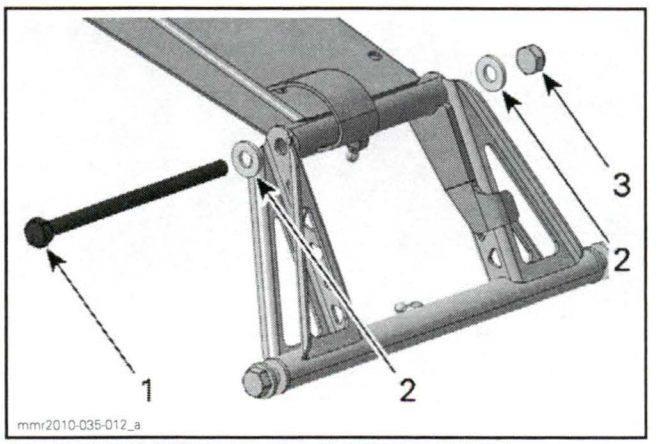
Installation is the reverse of removal procedure. However, pay attention to the following.

Place rear arm grease fitting towards the front of the vehicle.

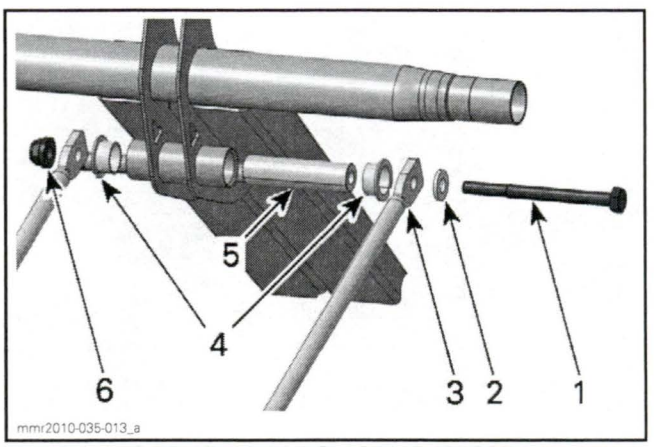
Make sure rear arm stroke limiter is placed at rear.

Install **NEW** nuts and tighten to the specified torque.

Assemble rear arm fasteners as per following illustrations.



SOME PARTS REMOVED FOR CLARITY PURPOSE
1. *Rear arm lower bolt*
2. *Washers*
3. *Rear arm lower nut*



SOME PARTS REMOVED FOR CLARITY PURPOSE
1. *Throttle rod upper bolt*
2. *Washer*
3. *Throttle rod*
4. *Bushings*
5. *Axle*
6. *Throttle rod upper nut*

TIGHTENING TORQUE	
Rear shock absorber upper nut	25 N•m (18 lbf•ft)
Throttle rods upper nut	25 N•m (18 lbf•ft)
Pivot to rear arm nut	25 N•m (18 lbf•ft)

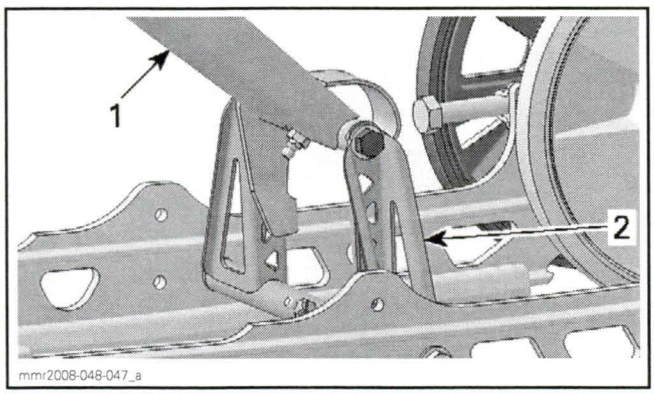
Lubricate rear arm pivot at grease fitting using SUSPENSION GREASE (P/N 293 550 033). Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

PIVOT ARM

Pivot Arm Removal

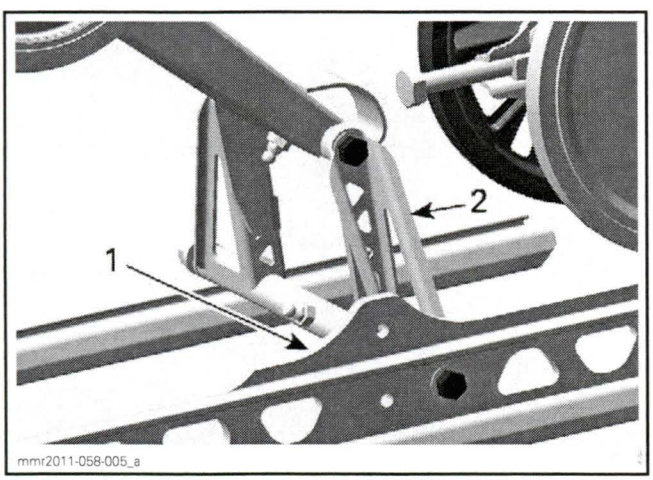
1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.

3. Remove bolt and washers retaining rear arm to pivot arm.



1. *Rear arm*
2. *Pivot arm*

4. Remove bolt and washers retaining pivot arm to runners.



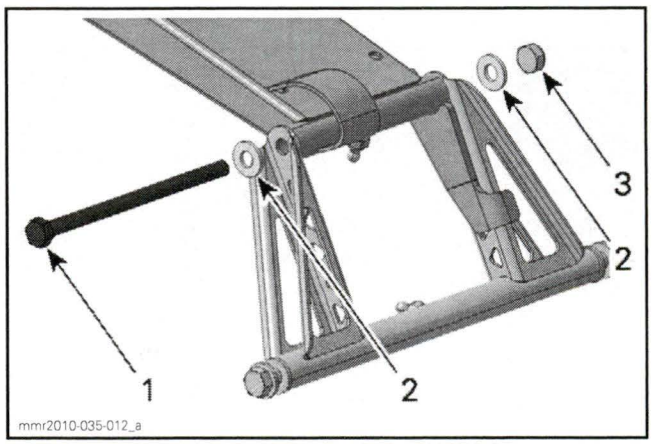
1. *Runner*
2. *Pivot arm*

5. Carefully remove pivot arm from rear arm.

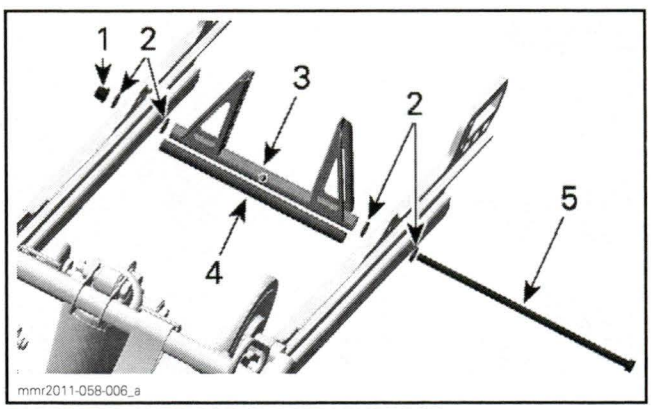
Pivot Arm Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Assemble pivot arm fastener as per following illustrations.



SOME PARTS REMOVED FOR CLARITY PURPOSE
1. *Rear arm lower bolt*
2. *Washers*
3. *Rear arm lower nut*



PARTS REMOVED FOR CLARITY PURPOSE
1. *Pivot arm lower nut*
2. *Washers*
3. *Pivot arm*
4. *Axle*
5. *Pivot arm lower screw*

Torque pivot arm lower nut to specification.

TIGHTENING TORQUE	
Pivot arm lower nut	25 N•m (18 lbf•ft)

Lubricate pivot arm. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

IDLER WHEELS AND SUPPORTS

Idler Wheels Removal and Installation

Refer to the exploded views at the beginning of this subsection for parts layout and fasteners tightening torque.

STOPPER STRAP

Refer to the exploded views at the beginning of this subsection for parts layout and fasteners tightening torque.

REAR SUSPENSION (SC-5U)

SERVICE TOOLS

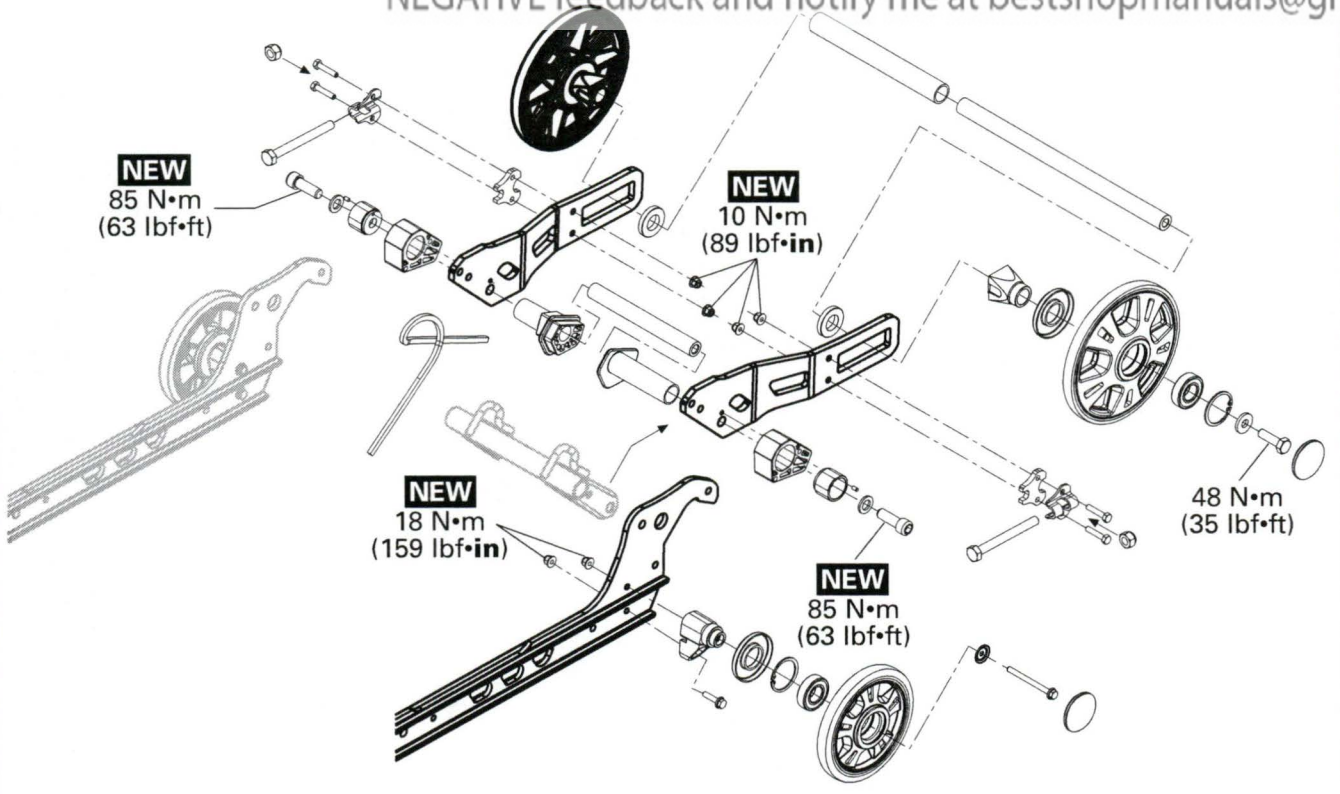
Description	Part Number	Page
SHOCK ABSORBER SUPPORTS	529 036 186	370

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
BENCH SCALE SUCH AS SALTER BRECKNELL	PS 400	370

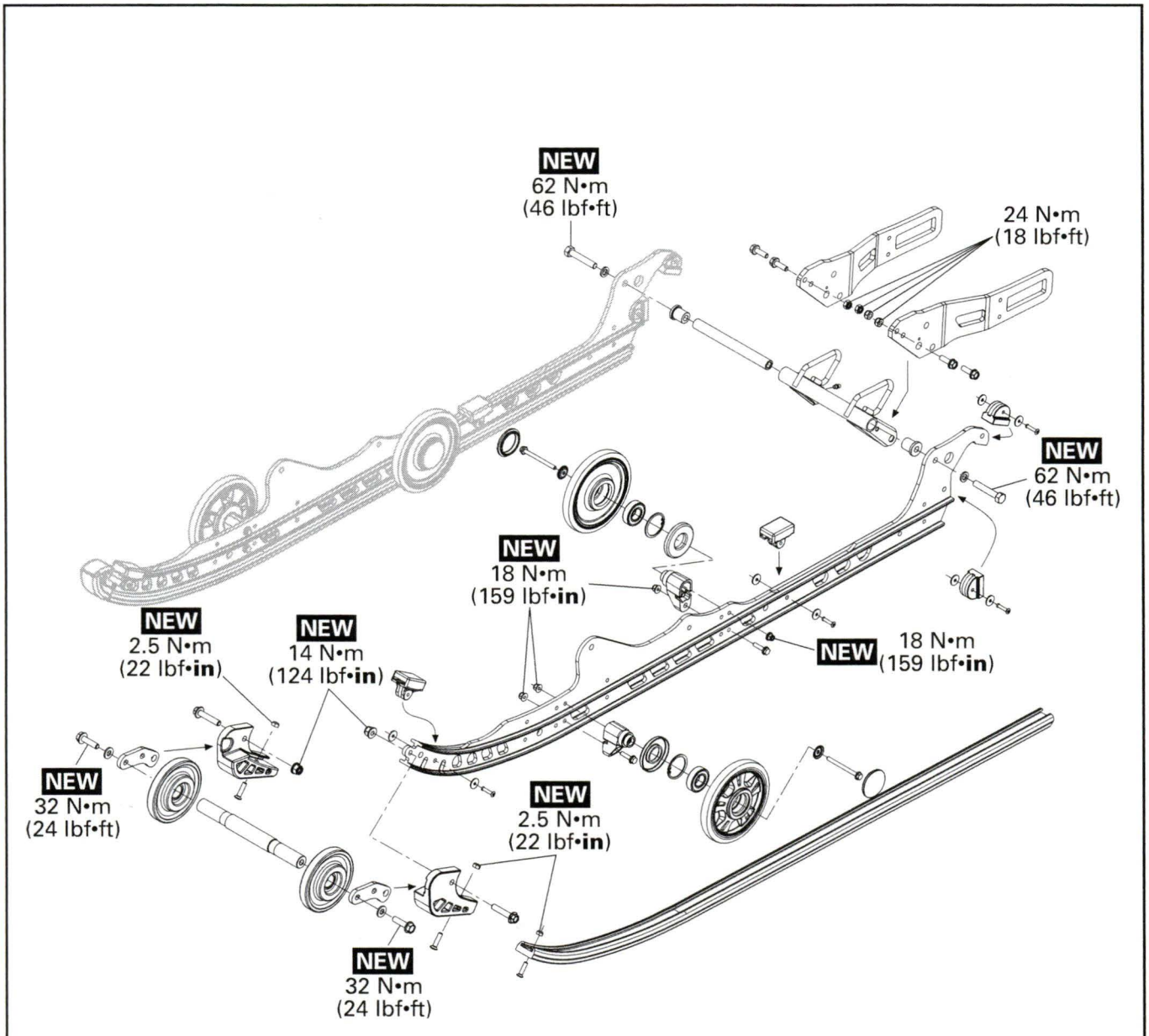
RAILS AND IDLER WHEELS

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



NEW = Component must be replaced when removed.

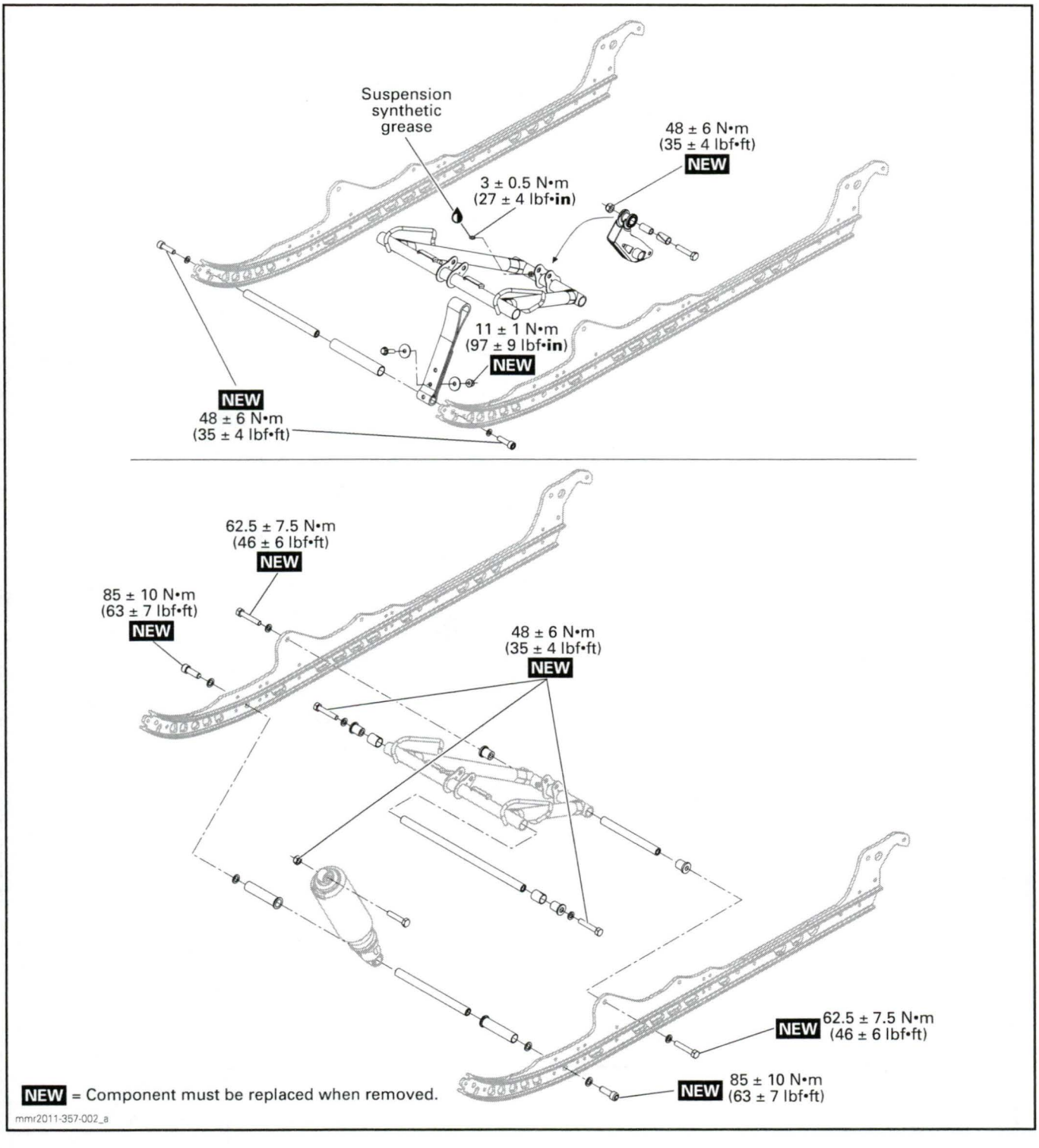
mmr2012-346-001_a



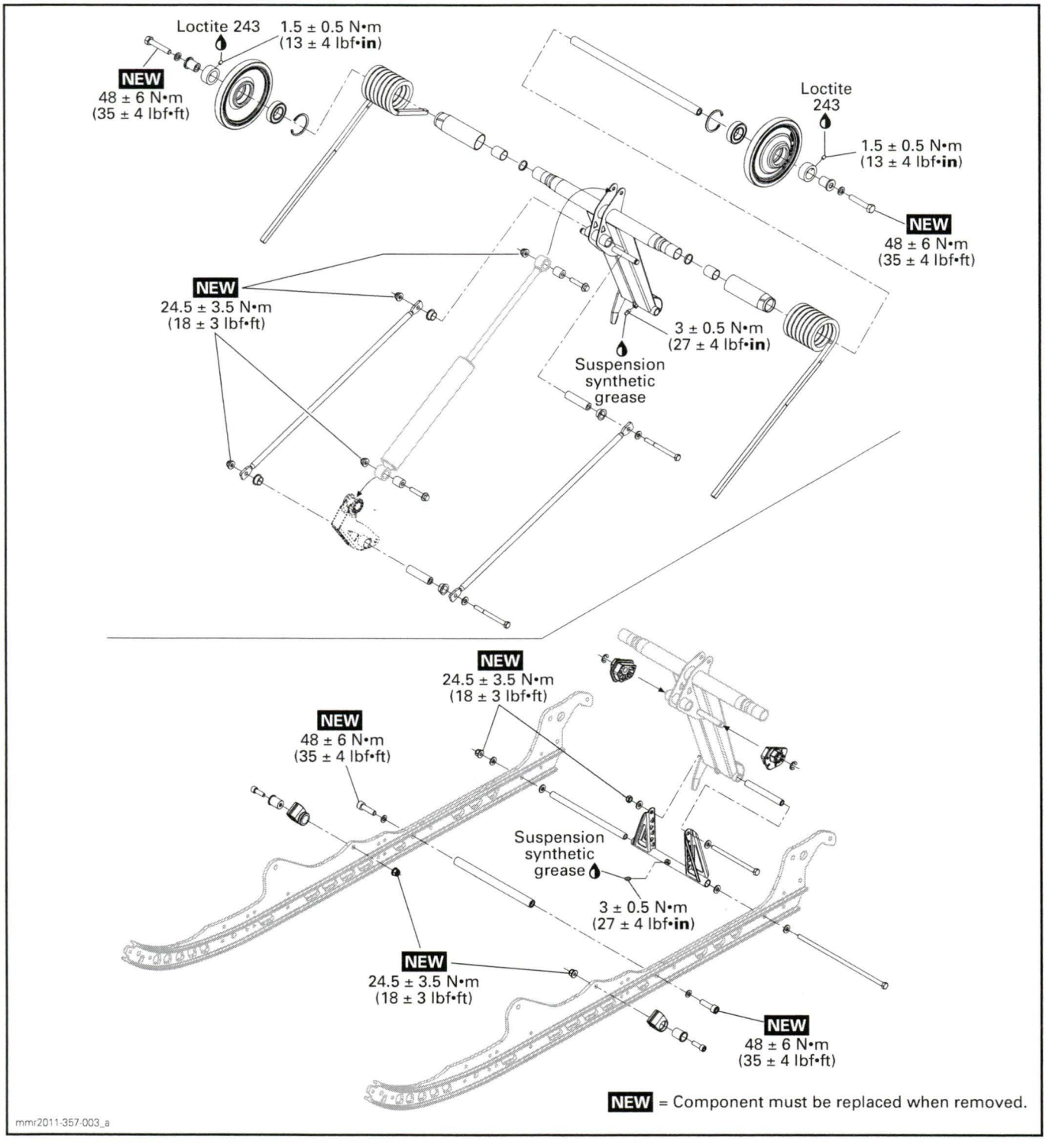
NEW = Component must be replaced when removed.

mmr2012-346-002_a

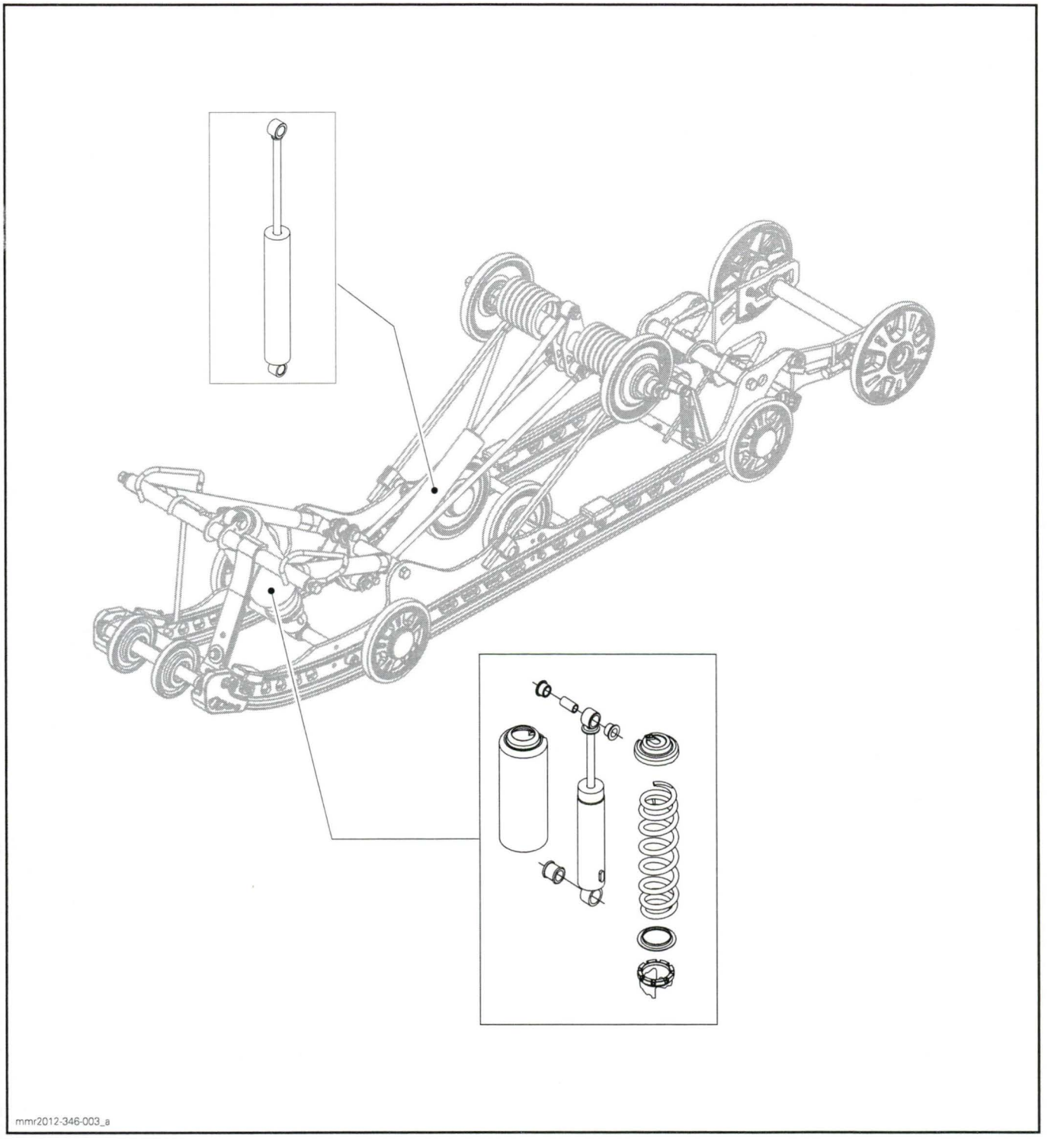
FRONT ARM


Suspension synthetic grease
48 ± 6 N•m (35 ± 4 lbf•ft) NEW
3 ± 0.5 N•m (27 ± 4 lbf•in)
11 ± 1 N•m (97 ± 9 lbf•in) NEW
NEW 48 ± 6 N•m (35 ± 4 lbf•ft)
62.5 ± 7.5 N•m (46 ± 6 lbf•ft) NEW
85 ± 10 N•m (63 ± 7 lbf•ft) NEW
48 ± 6 N•m (35 ± 4 lbf•ft) NEW
NEW 62.5 ± 7.5 N•m (46 ± 6 lbf•ft)
NEW 85 ± 10 N•m (63 ± 7 lbf•ft)
NEW = Component must be replaced when removed.
mmr2011-357-002_a

REAR ARM


Loctite 243
1.5 ± 0.5 N•m
(13 ± 4 lbf•in)
NEW
48 ± 6 N•m
(35 ± 4 lbf•ft)
Loctite
243
1.5 ± 0.5 N•m
(13 ± 4 lbf•in)
NEW
48 ± 6 N•m
(35 ± 4 lbf•ft)
NEW
24.5 ± 3.5 N•m
(18 ± 3 lbf•ft)
3 ± 0.5 N•m
(27 ± 4 lbf•in)
Suspension
synthetic
grease
NEW
24.5 ± 3.5 N•m
(18 ± 3 lbf•ft)
NEW
48 ± 6 N•m
(35 ± 4 lbf•ft)
Suspension
synthetic
grease
3 ± 0.5 N•m
(27 ± 4 lbf•in)
NEW
24.5 ± 3.5 N•m
(18 ± 3 lbf•ft)
NEW
48 ± 6 N•m
(35 ± 4 lbf•ft)
NEW = Component must be replaced when removed.
mmr2011-357-003_a

SHOCK ABSORBERS



mmr2012-346-003_a

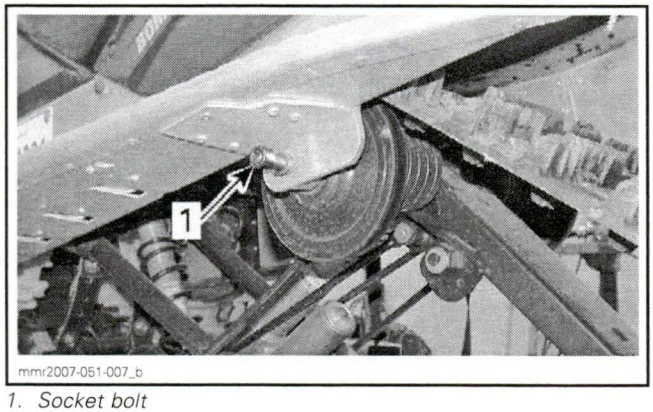
PROCEDURES

NOTE: Many parts can be changed with rear suspension in place. When specified, refer to *SUSPENSION ASSEMBLY* to remove rear suspension from vehicle.

SUSPENSION ASSEMBLY

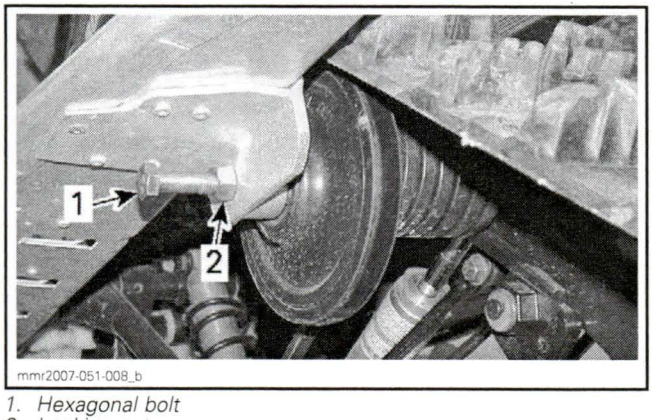
Suspension Assembly Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension.
3. Remove and discard rear arm bolts from chassis. Use the following procedure to remove bolts easily.
   - 3.1 Unscrew one of the socket screws securing the rear arm to frame.



1. Socket bolt

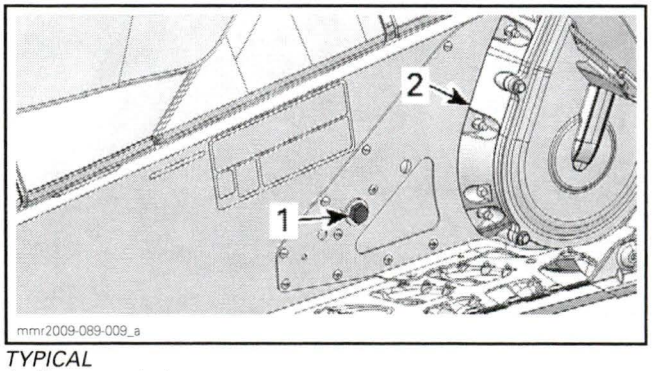
   - 3.2 Replace this socket screw with an hexagonal bolt (longer than socket screw) and a nut.
   - 3.3 Screw in the hexagonal bolt by approximately 7 turns.
   - 3.4 Hold the hexagonal bolt and tighten locking nut.



1. Hexagonal bolt
2. Locking nut

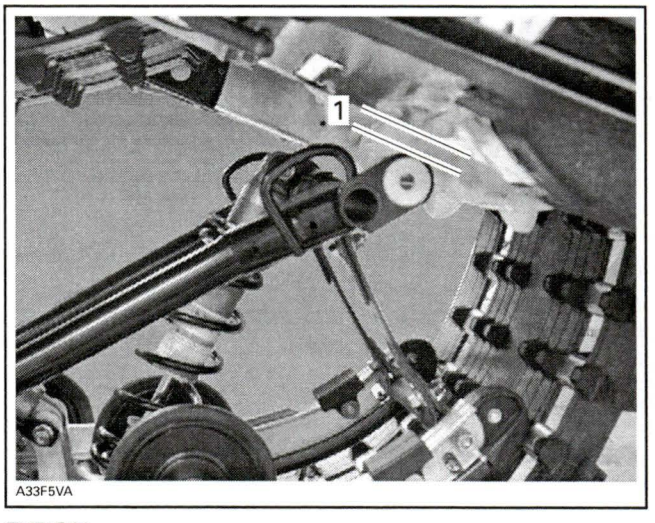
   - 3.5 Unscrew the socket screw on the other side then unlock nut and remove the hexagonal bolt.
4. Remove bolts retaining front arm to tunnel.

NOTE: Discard the front arm bolts.

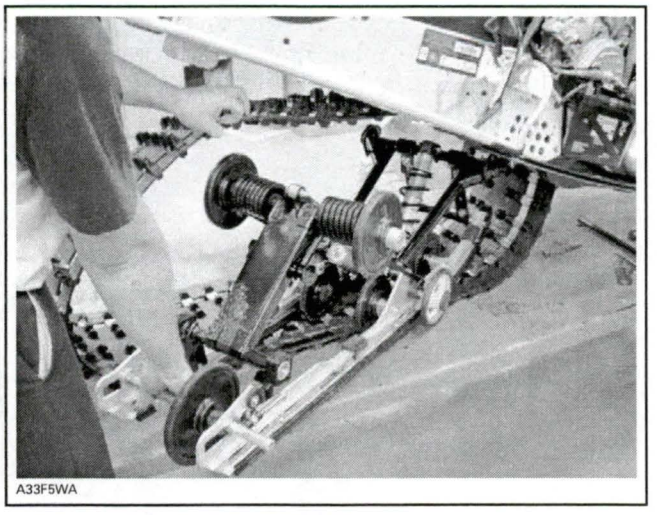


TYPICAL
1. Front arm bolt
2. Chaincase

5. Lift rear of vehicle until front arm as enough clearance to pass underneath tunnel.



TYPICAL
1. Enough clearance



TYPICAL — REMOVE SUSPENSION

Suspension Assembly Installation

Installation is the reverse of removal procedure. Pay attention to the following.

Inspect track thoroughly before reinstalling suspension. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

Install suspension into track with front portion first.

Install **NEW** front arm nuts.

Install **NEW** rear arm screws.

Tighten screws to specified torque.

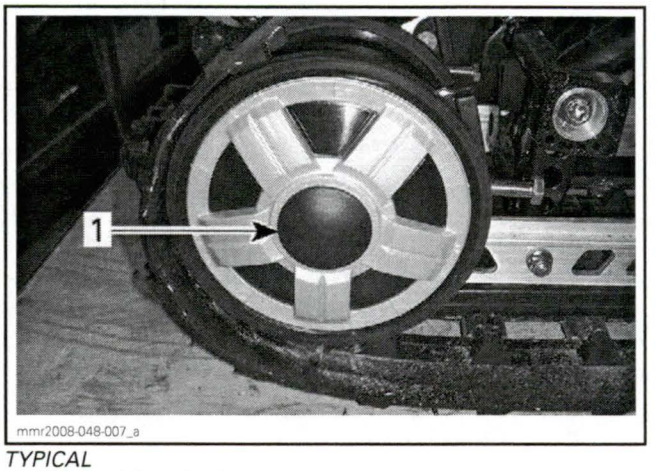
TIGHTENING TORQUE	
Front arm nuts	48 N•m ± 6 N•m (35 lbf•ft ± 4 lbf•ft)
Rear arm screws	48 N•m ± 6 N•m (35 lbf•ft ± 4 lbf•ft)

Adjust track tension, refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

REAR AXLE

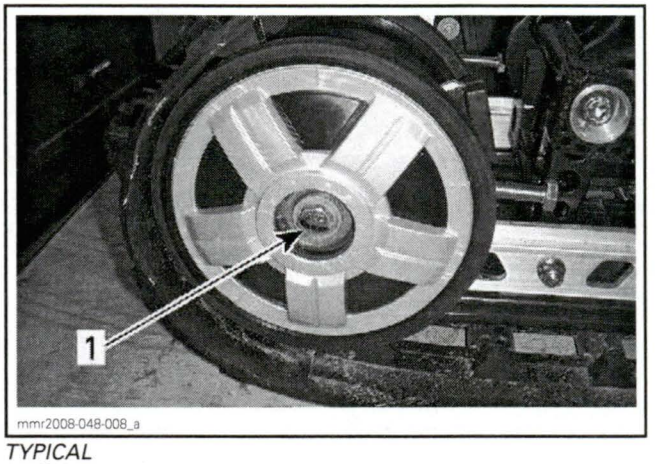
Rear Axle Removal

1. Lift rear of vehicle and support it off the ground.
2. Remove rear idler wheel caps.



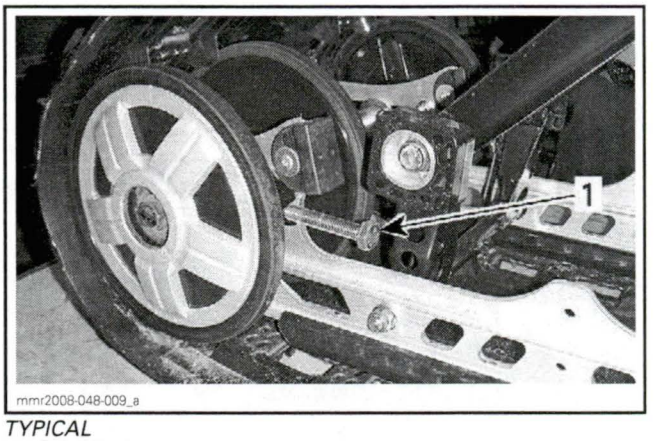
TYPICAL
1. RH rear idler wheel cap

3. Loosen rear axle screws (one each side).



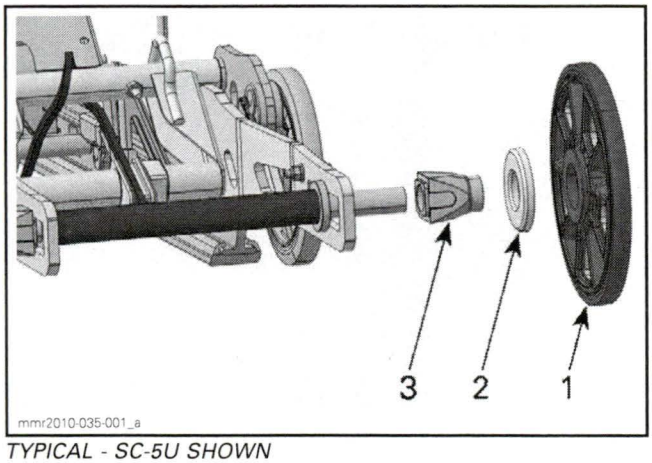
TYPICAL
1. RH rear axle screw

4. Completely loosen track tension by unscrewing both adjustment screws.



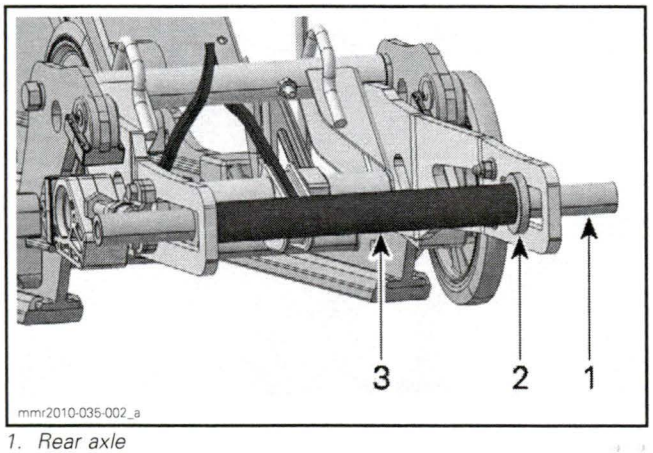
TYPICAL
1. RH adjustment screw

5. Remove both rear axle screws.
6. Remove rear idler wheels, seals and wheel spacers.



TYPICAL - SC-5U SHOWN
1. *Rear idler wheel*
2. *Seal*
3. *Wheel spacer*

7. Pull out the rear axle.
8. Remove rear spacer and washers.

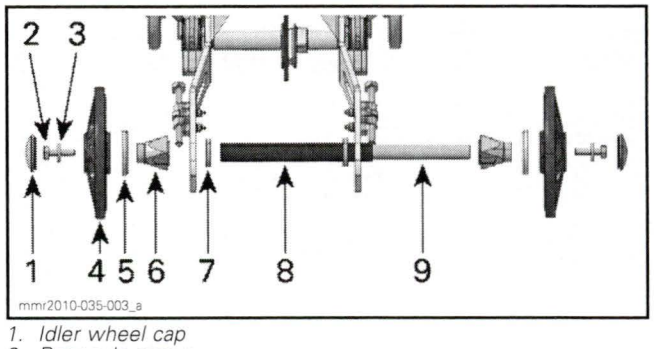


1. *Rear axle*
2. *Washers*
3. *Rear axle spacer*

Rear Axle Installation

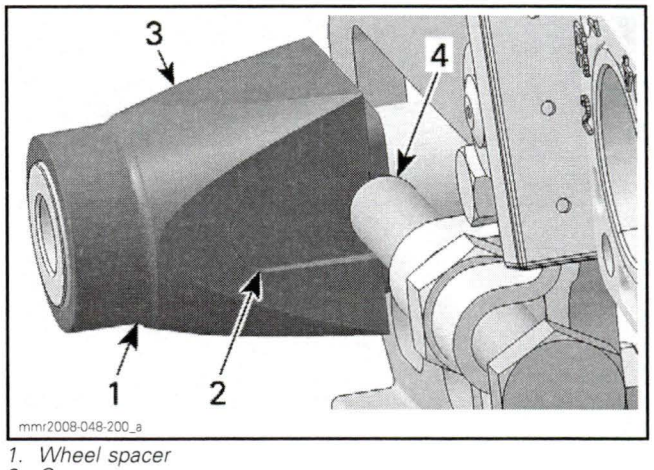
Installation is reverse of removal procedure. However, pay attention to the following.

Make sure to position all parts correctly.



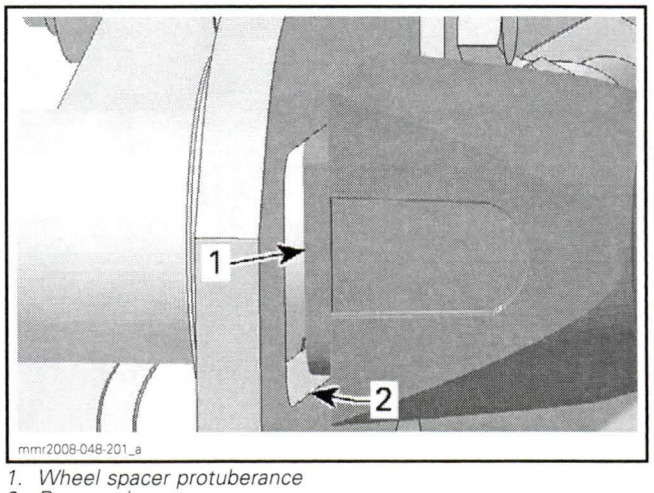
1. *Idler wheel cap*
2. *Rear axle screw*
3. *Rear axle washer*
4. *Idler wheel*
5. *Seal*
6. *Wheel spacer*
7. *Washer*
8. *Rear axle spacer*
9. *Rear axle*

Position wheel spacers with a flat side up and a groove in front of tensioner screw.



1. *Wheel spacer*
2. *Groove*
3. *Flat side*
4. *Tensioner screw*

When tightening rear axle, make sure each wheel spacer protuberance is engaged into runner slot.



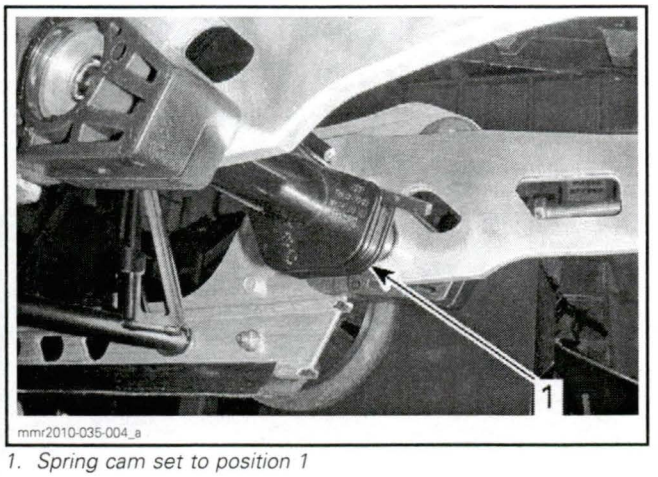
1. *Wheel spacer protuberance*
2. *Runner slot*

Adjust track tension. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

REAR EXTENSION

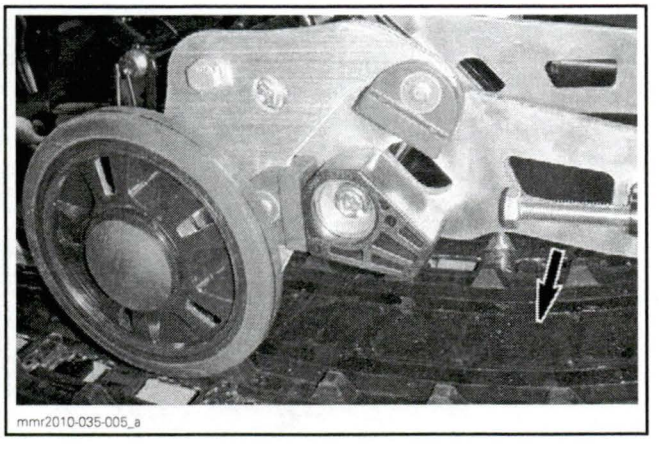
Rear Extension Removal

1. Lift rear of vehicle and support it off the ground.
2. Proceed with *REAR AXLE REMOVAL*. See procedure in this subsection.
3. Unload the spring cam of rear extension by placing it to position 1.

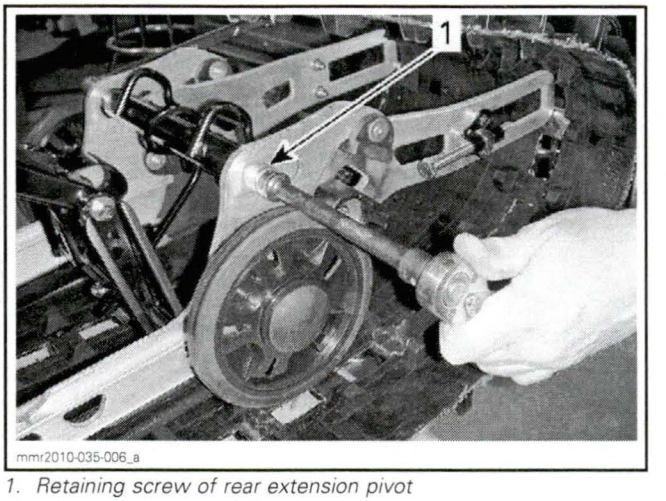


1. Spring cam set to position 1

4. Ensure that rear extension is positioned fully downwards (against lower stopper).

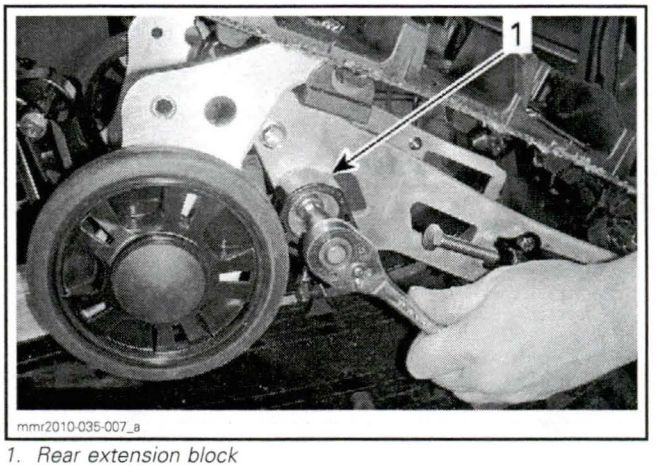


5. Remove retaining screws and washers from rear extension pivot.



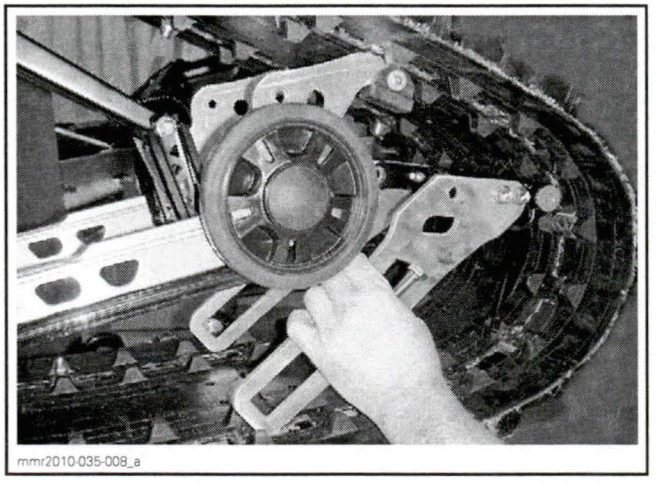
1. Retaining screw of rear extension pivot

6. Remove retaining screws and washers from rear extension block.
7. Remove rear extension blocks and spacer.



1. Rear extension block

8. Rotate rear extension downwards then remove it from rear suspension.



Rear Extension Installation

The installation is reverse of removal procedure. However, pay attention to the following.

Lubricate rear extension pivot. Refer to *PERIODIC MAINTENANCE PROCEDURES* in subsection.

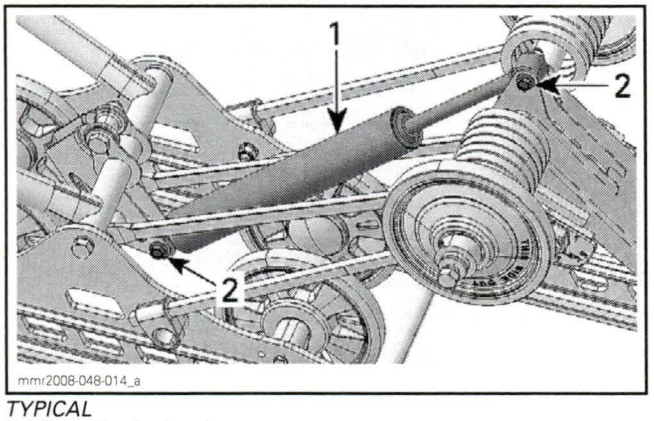
SHOCK ABSORBERS

Rear Shock Absorber Removal

1. Lift rear of vehicle and support it off the ground.

NOTE: If necessary, to ease shock removal, unfasten stopper strap to release shock pressure.

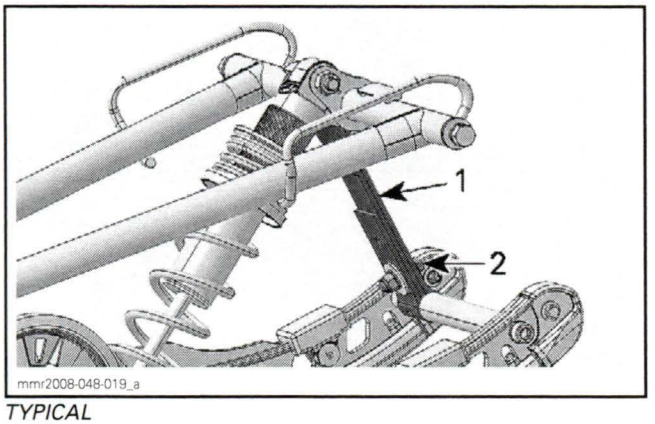
2. Remove bolts and nuts from shock.



TYPICAL
1. *Rear shock absorber*
2. *Remove bolts and nuts*

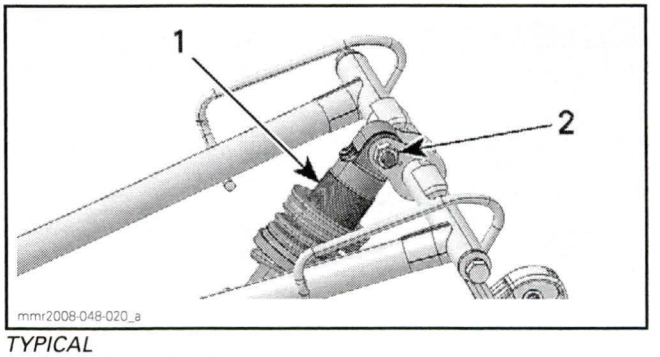
Center Shock Absorber Removal

1. Lift the rear of vehicle and support it off the ground.
2. Unfasten stopper strap.



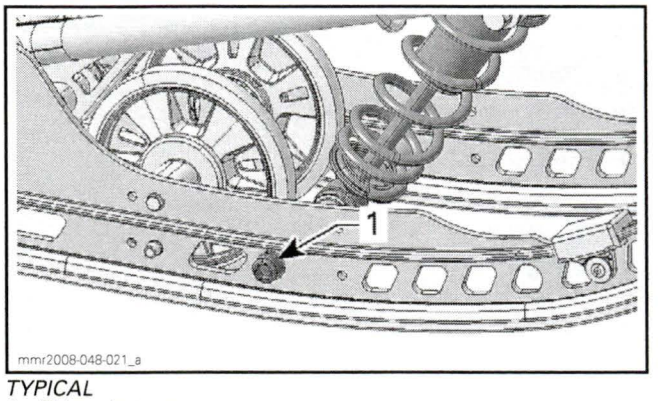
TYPICAL
1. *Stopper strap*
2. *Stopper strap bolt*

3. Remove upper shock absorber bolt.



TYPICAL
1. *Front shock absorber*
2. *Remove bolt and nut*

4. Remove and discard socket screws (one each side) securing shock shaft.



TYPICAL
1. *RH socket screw*

5. Remove shock absorber from vehicle.
6. Remove bushings and shock shaft from shock absorber.

Shock Absorber Inspection

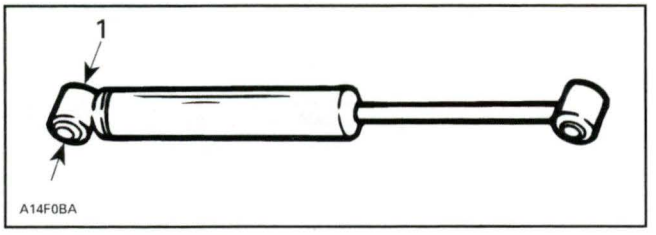
NOTE: Refer to *TECHNICAL SPECIFICATIONS* to identify the shock absorber relating to the vehicle model.

NOTE: Unless otherwise noted, shock absorber must be at normal room temperature (21°C ± 2°C (70°F ± 36°F) during inspection.

MC Hydraulic Shock

1. Perform a visual inspection of the shock:
   - The shock must be exempt of any dent or scratch, especially on the rod.
   - Small dent on the shock body may not affect any performance or reliability of this shock.
   - Any defect on the rod, as small as it is, can lead to seal failure and oil leak.
   - If such defect (on rod) is detected, the shock must be replaced, and this will not be cover under warranty.
2. Secure the shock body end in a vise, clamping on eyelet, with its rod upward.

NOTICE Do not clamp directly on shock body.



1. Shock body eyelet

3. Examine shock for leaks. Extend and compress the piston at least 5 complete strokes with its rod upward.
4. Check that shock moves smoothly and with uniform resistance over its entire stroke.

NOTE: For the first 5 complete strokes, it could be normal to note uneven resistance.

5. Check 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 strokes.
6. If suspecting a shock is freezing, place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.
7. Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.
8. If any faults are present, replace shock.

All HPG™ Shock (Including KYB PRO Series)

1. Perform a visual inspection of the shock:
   - The shock must be exempt of any dent or scratch, especially on the rod.
   - Any defect on the rod, as small as it is, can lead to seal failure and oil leak.
   - If such defect is detected, the shock must be replaced and this will not be covered under warranty.
2. Completely push down shock rod into the body and check result as per table.

HPG SHOCK	RESULT
All except 551 mm (21-11/16 in) rear shock	The rod should completely get in the shock body
551 mm (21-11/16 in) rear shock	The stroke must be at least 138 mm (5-7/16 in)

NOTE: For the **HPG Variable Rate Shock**, it should be stiff for approximately the first 25 mm (1 in), then softer for about 50 mm (2 in), and stiffer again. This stiff/soft/stiff phenomenon shows the normal operation of VR shock.

3. Release shock from completely collapsed position and check result as per table.

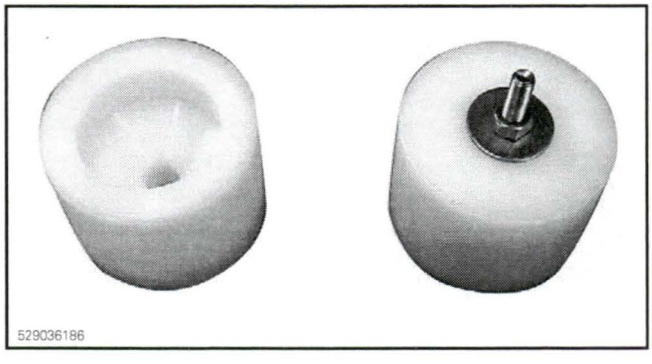
HPG SHOCK EXCEPT VARIABLE RATE
– The shock should extend unassisted. – The rod must come out at a steady speed.

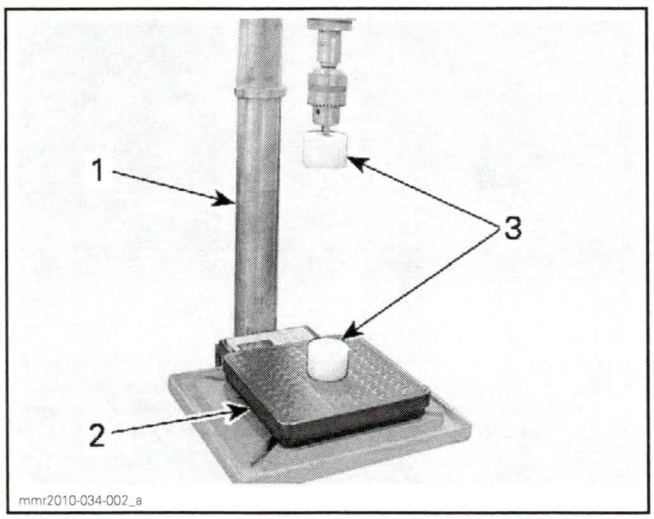
HPG VARIABLE RATE SHOCK
– The shock should extend unassisted. – Rod must come out slowly first, than faster and finally slow again for the last 25 mm (1 in).

4. Proceed with *SHOCK ABSORBER COMPRESSION TEST*. See procedure in this subsection.
5. If any faults are present, replace shock.

Shock Absorber Compression Test

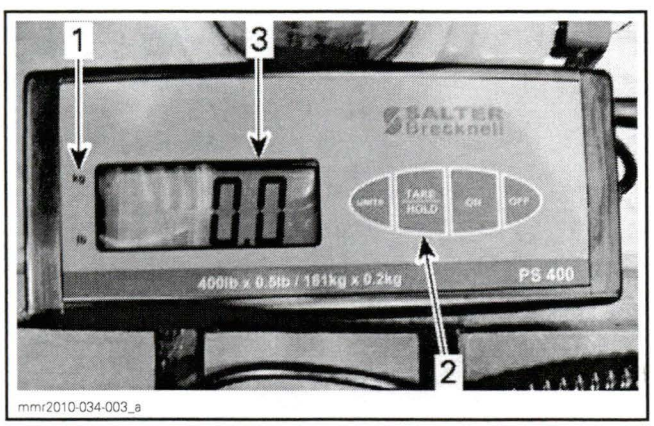
1. Ensure shock absorber is at normal room temperature (21°C ± 2°C (70°F ± 36°F).
2. Remove spring from shock absorber (if applicable).
3. Place a BENCH SCALE SUCH AS SALTER BRECKNELL (P/N PS 400) (or an equivalent) on a suitable drill press.
4. Install SHOCK ABSORBER SUPPORTS (P/N 529 036 186) onto drill press.





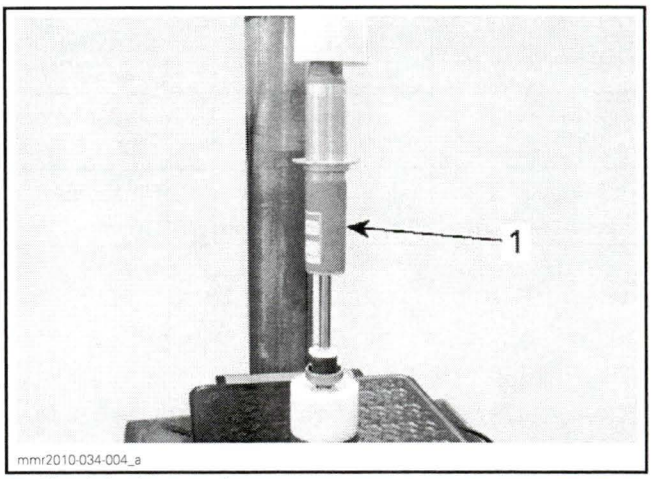
1. Drill press
2. Bench scale
3. Shock absorber supports

5. Set bench scale units to **kg** (or lb).
6. Press **TARE** to reset digits (must indicate (0) zero).



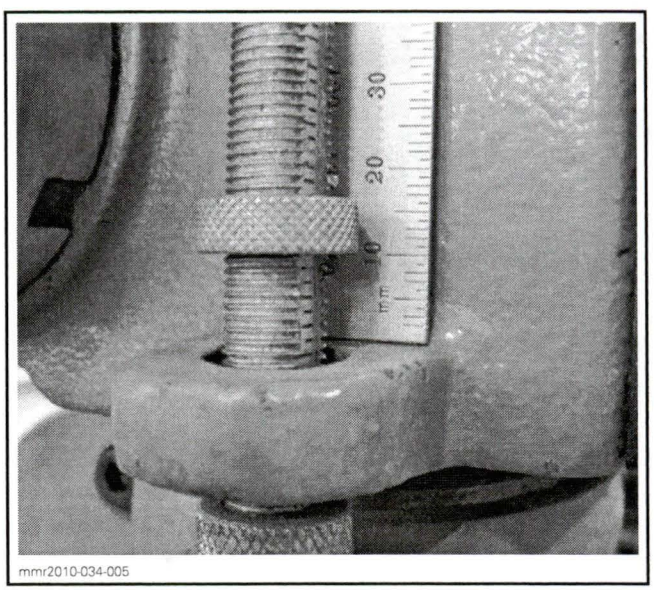
1. Units indicator lamp
2. TARE button
3. Digits

7. Install shock absorber into support with shock body upwards.
8. Adjust drill press table height in order to set the upper shock support flush with the shock body end.
9. Ensure shock absorber is aligned with drill press axis.

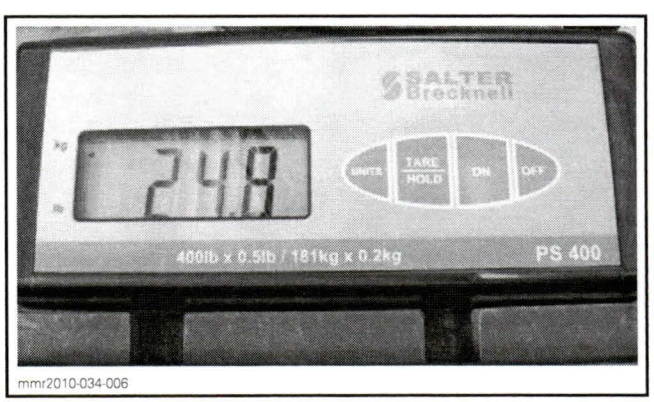


1. Shock body upwards

10. Set the drill press displacement to 10 mm (.394 in) using locking nut.



11. Compress shock absorber by 10 mm (.394 in) and hold it in position.
12. Read load recorded on the bench scale.



13. Load reading must be as per the following table.

MODEL	ROD DIAMETER	SERVICE RANGE
All HPG VR/Plus/Plus R	12.5 mm (1/2 in)	24 kgf ± 4 kgf (53 lbf ± 9 lbf)
All HPG KYB PRO	16 mm (5/8 in)	39 kgf ± 5 kgf (86 lbf ± 11 lbf)

Rear Shock Absorber Installation

Installation is the reverse of removal procedure. Pay attention to the following.

To ease shock installation, secure upper side of shock first.

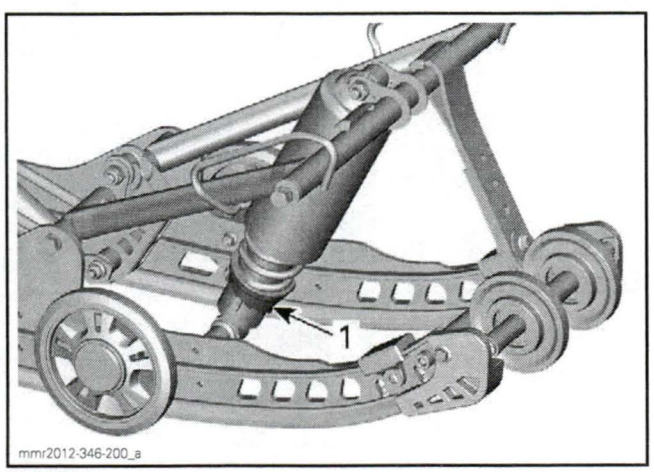
Install **NEW** shock absorber retaining nuts and tighten to specified torque.

TIGHTENING TORQUE	
Rear shock absorber retaining nuts	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)

Center Shock Absorber Installation

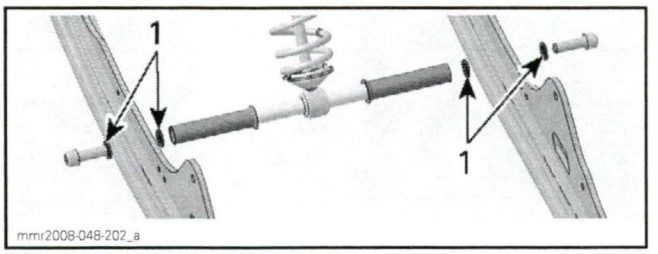
Installation is the reverse of removal procedure. Pay attention to the following.

1. Position the adjustment ring or cam downwards.



TYPICAL
1. Cam

2. Using **NEW** socket screws, install shock shaft to runners.
3. Position washers in proper position.



BOTTOM OF SHOCK ABSORBER
1. Washers location

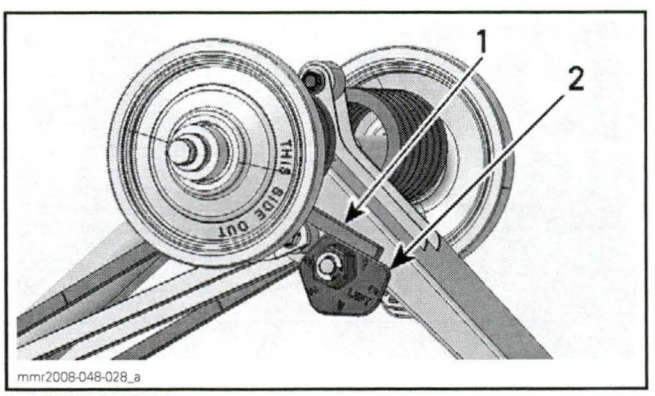
Tighten screws to the specified torque.

TIGHTENING TORQUE	
Center shock shaft retaining screws	85 N•m ± 10 N•m (63 lbf•ft ± 7 lbf•ft)

REAR SPRINGS

Rear Spring Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension by unscrewing both adjustment screws.
3. Decrease springs preload by turning cams accordingly.

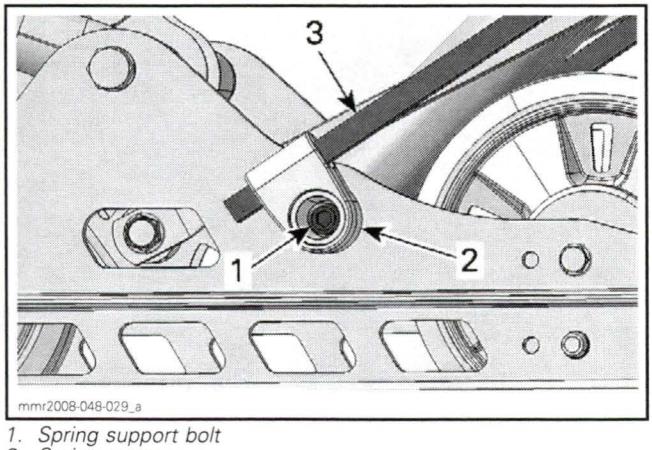


LH SIDE SHOWN
1. Rear spring
2. Cam

4. Firmly hold the spring support and unscrew its retaining bolt (one each side).

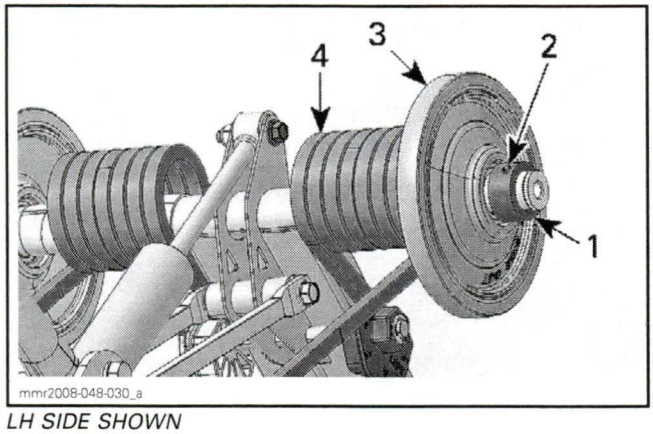
⚠ WARNING

Supports are spring loaded.



1. *Spring support bolt*
2. *Spring support*
3. *Spring*

5. Remove screws and washers from rear arm top axle.
6. Loosen set screw from locking rings.
7. Remove locking rings.
8. Remove upper idler wheels.
9. Remove springs.

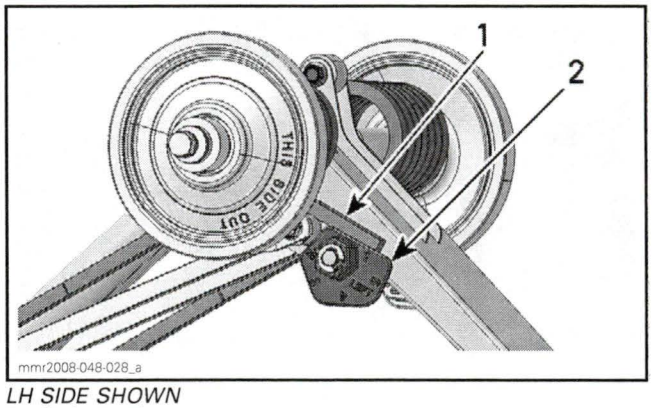


LH SIDE SHOWN
1. *Locking ring*
2. *Set screw*
3. *Upper idler wheel*
4. *Rear spring*

Rear Spring Installation

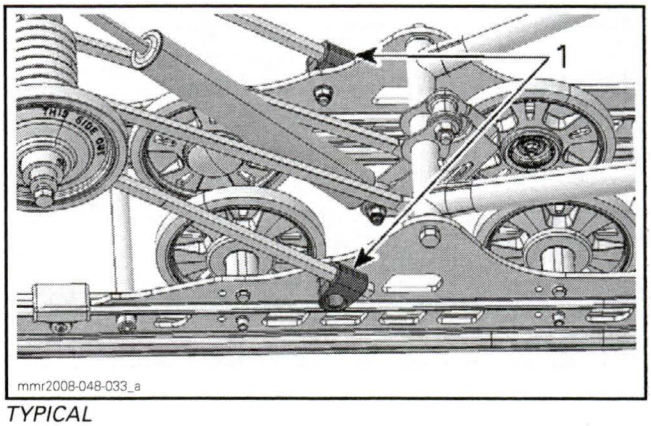
Installation is the reverse of removal procedure. Pay attention to the following.

1. Respect THIS SIDE OUT inscription on top idler wheels.
2. Make sure that spring end is in cam adjuster.



LH SIDE SHOWN
1. *Spring end*
2. *Cam*

3. Install spring supports upwards.

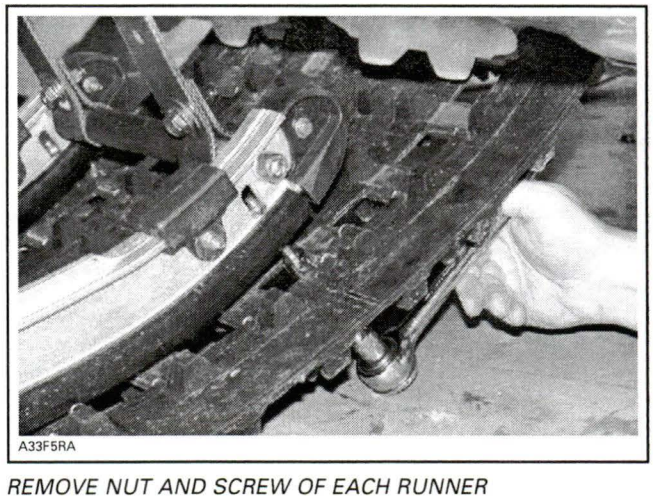


TYPICAL
1. *Spring supports upwards*

SLIDER SHOES

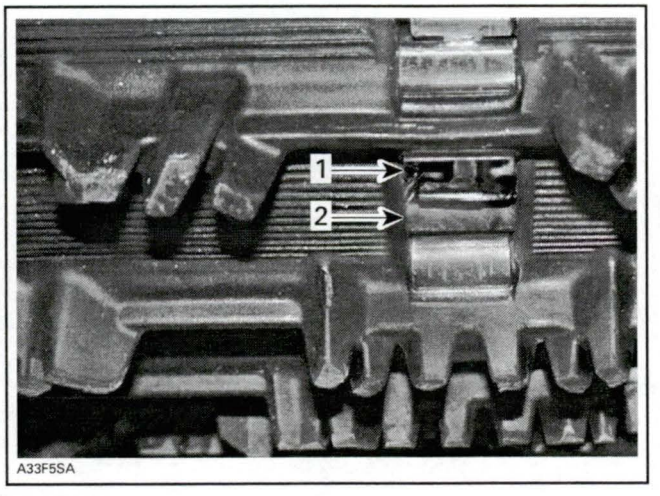
Slider Shoe Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension.
3. Remove nut and screw of each runner.



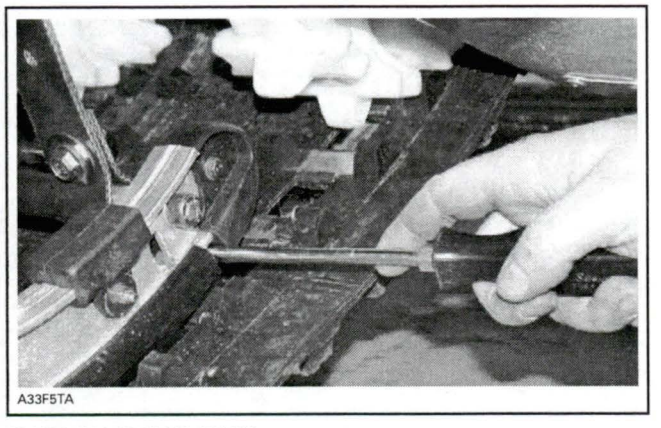
REMOVE NUT AND SCREW OF EACH RUNNER

4. At the rear of vehicle, align a track window with slider shoe.



TYPICAL
1. *Track window*
2. *Slider shoe*

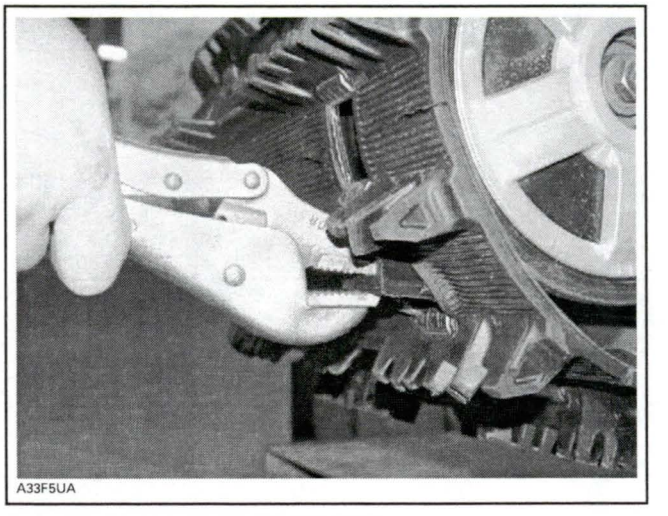
5. Using a pry bar or a screwdriver, push slider shoe rearward until it comes in contact with track.



PUSH ON SLIDER SHOE

6. Using locking pliers, pull slider shoe through track window to remove.

NOTE: If necessary, lubricate track window to facilitate slider shoe removal.



PULL ON SLIDER SHOE TO REMOVE

Slider Shoe Installation

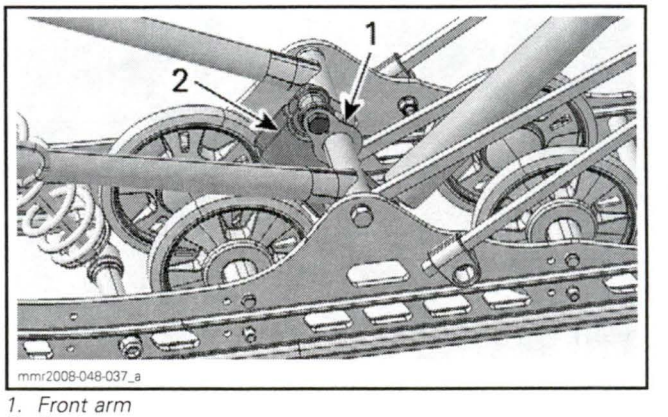
Installation is the reverse of removal procedure. Pay attention to the following detail.

Make sure to insert slider shoe end with hole first.

FRONT ARM

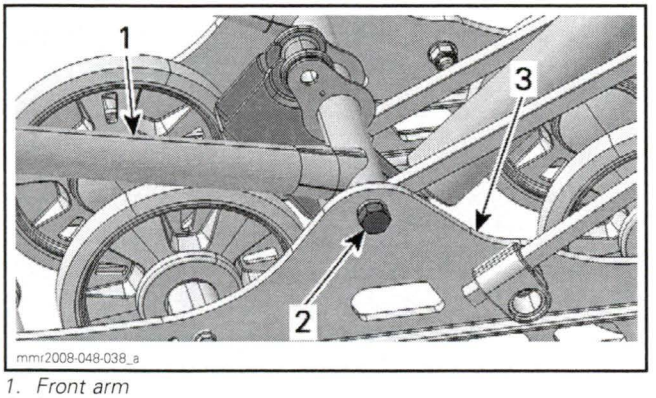
Front Arm Removal

1. Proceed with *SUSPENSION ASSEMBLY REMOVAL*, see procedure in this subsection.
2. Remove the bolt securing rocker to front arm.



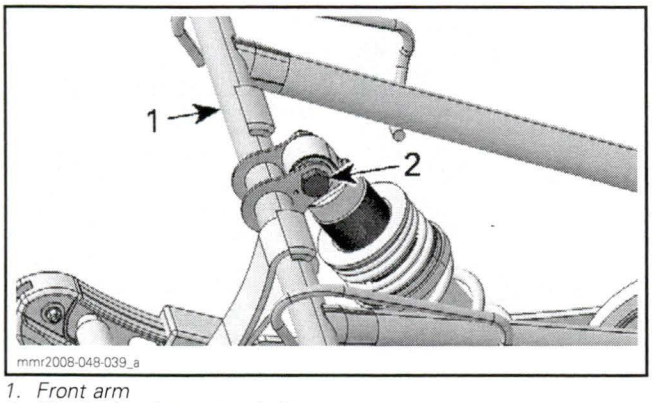
1. *Front arm*
2. *Rocker*

3. Unscrew and remove the front arm lower bolts and washers.



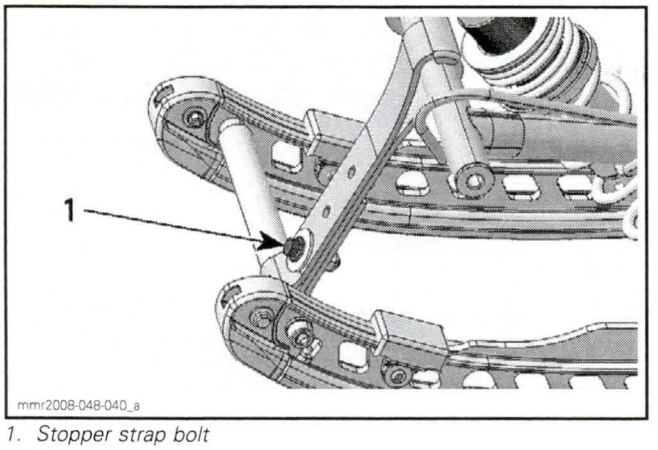
1. *Front arm*
2. *Lower bolt*
3. *LH runner*

4. Remove the shock absorber upper bolt.



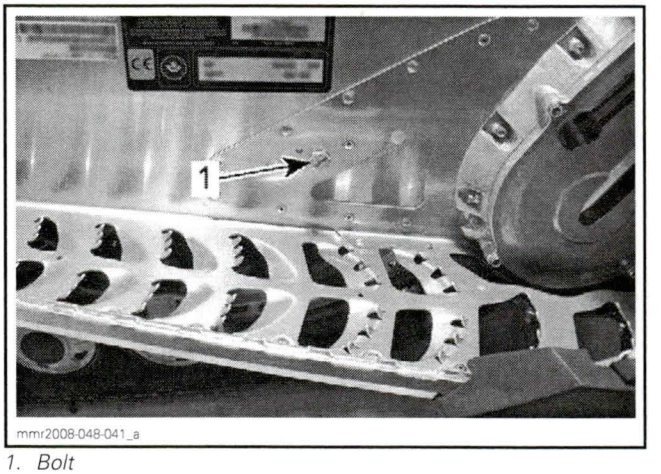
1. *Front arm*
2. *Shock absorber upper bolt*

5. Unfasten stopper strap.



1. *Stopper strap bolt*

6. Remove and discard front arm upper bolts.



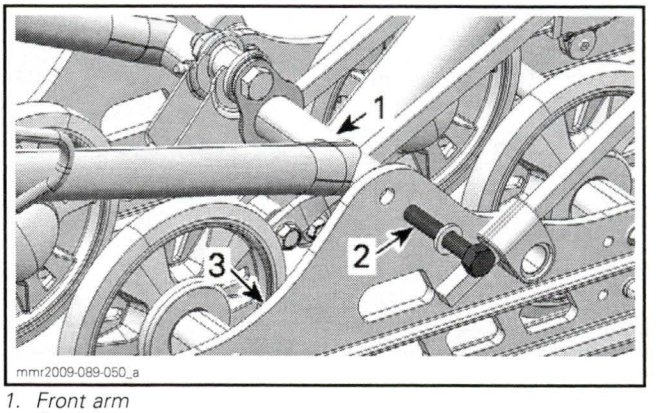
1. *Bolt*

7. Remove front arm.

Front Arm Installation

Installation is the reverse of removal procedure. Pay attention to the following.

1. Install **NEW** front arm lower bolts.



1. *Front arm*
2. *Front arm lower bolt (LH side)*
3. *Runner*

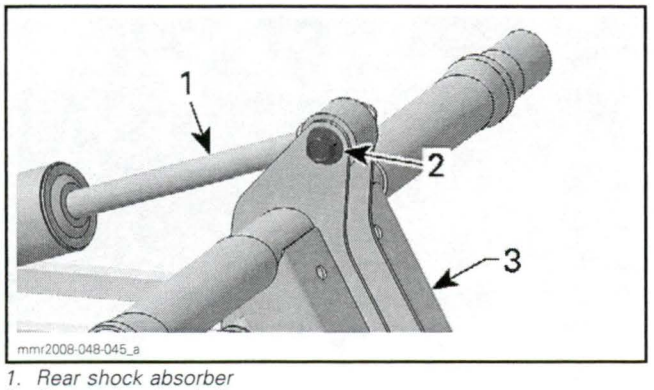
2. Tighten screws to the specified torque.

TIGHTENING TORQUE	
Front arm lower bolts	62.5 N•m ± 7.5 N•m (46 lbf•ft ± 6 lbf•ft)

REAR ARM

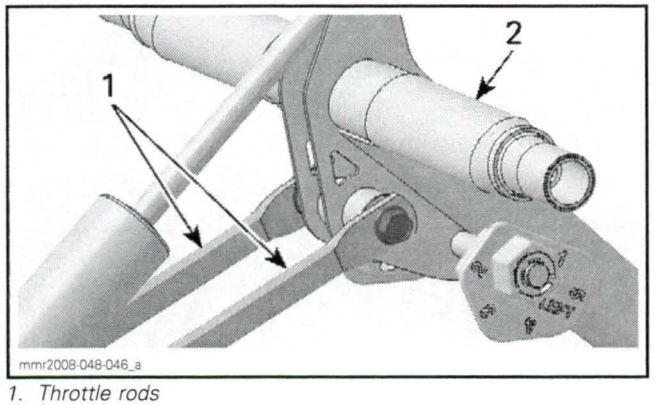
Rear Arm Removal

1. Lift rear of vehicle and support it off the ground.
2. Completely loosen track tension.
3. Proceed with *REAR SPRING REMOVAL*, see procedure in this subsection.
4. Remove the rear shock absorber upper bolt.



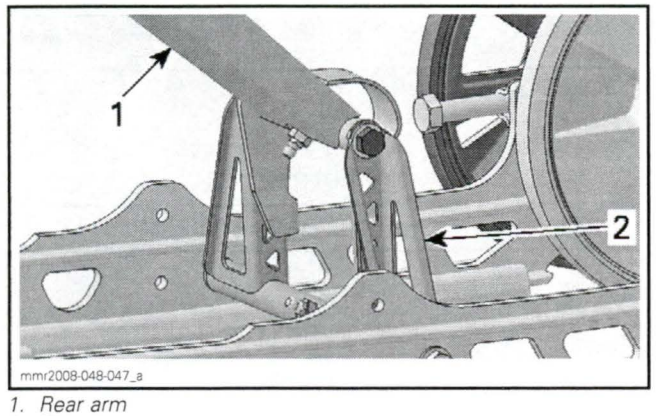
1. Rear shock absorber
2. Shock absorber bolt
3. Rear arm

5. Remove throttle rods from rear arm.



1. Throttle rods
2. Rear arm

6. Remove bolts and washers holding rear arm to pivot arm.



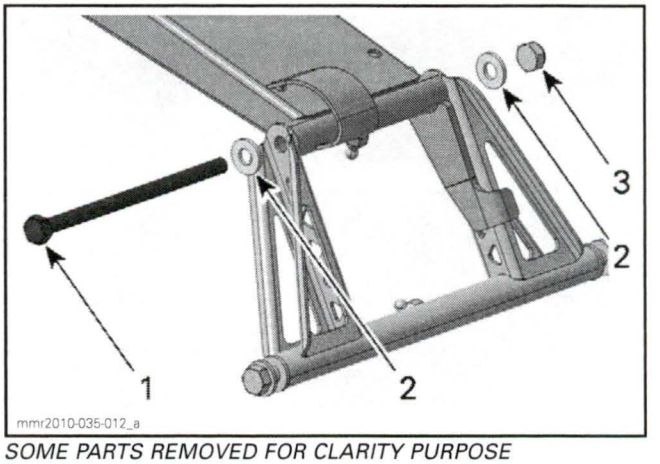
1. Rear arm
2. Pivot arm

Rear Arm Installation

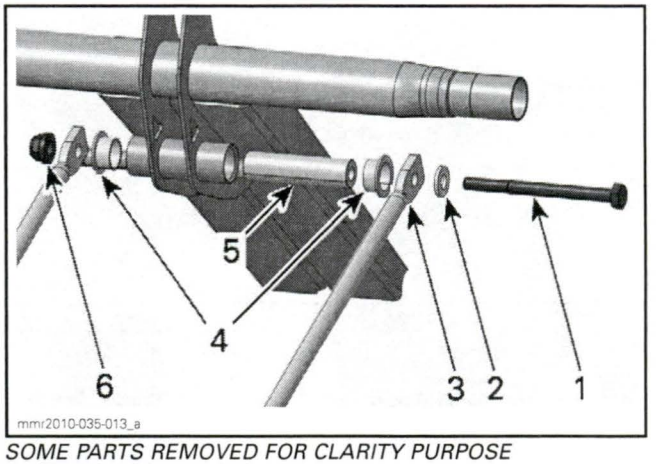
Installation is the reverse of removal procedure. Pay attention to the following.

1. Pivot arm grease fitting must be towards the front of the vehicle.
2. At installation, rear arm stroke limiter must be at rear.
3. Install **NEW** nuts and tighten to the specified torque.

Assemble rear arm fasteners as per following illustrations.



SOME PARTS REMOVED FOR CLARITY PURPOSE
1. Rear arm lower bolt
2. Washers
3. Rear arm lower nut



SOME PARTS REMOVED FOR CLARITY PURPOSE
1. Throttle rod upper bolt
2. Washer
3. Throttle rod
4. Bushings
5. Axle
6. Throttle rod upper nut

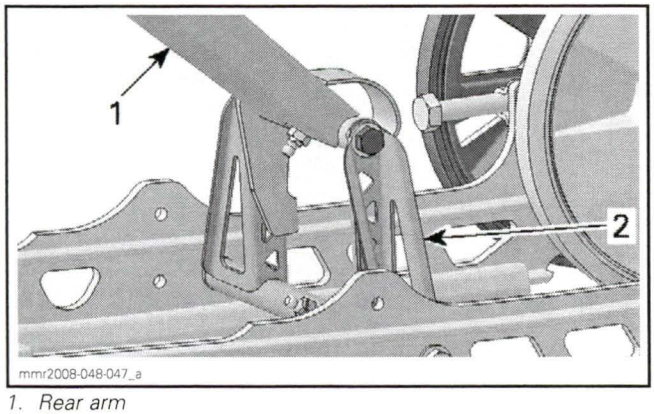
TIGHTENING TORQUE	
Rear shock absorber upper nut	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)
Throttle rods upper nut	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)
Pivot to rear arm nut	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)

PIVOT ARM

Pivot Arm Removal

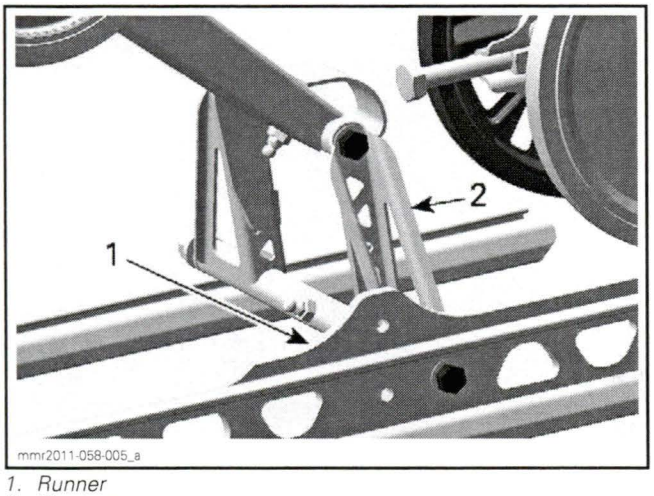
1. Lift rear of vehicle and support it off the ground.

2. Completely loosen track tension by unscrewing both adjustment screws.
3. Remove bolt and washers retaining rear arm to pivot arm.



1. Rear arm
2. Pivot arm

4. Remove bolt and washers retaining pivot arm to runners.



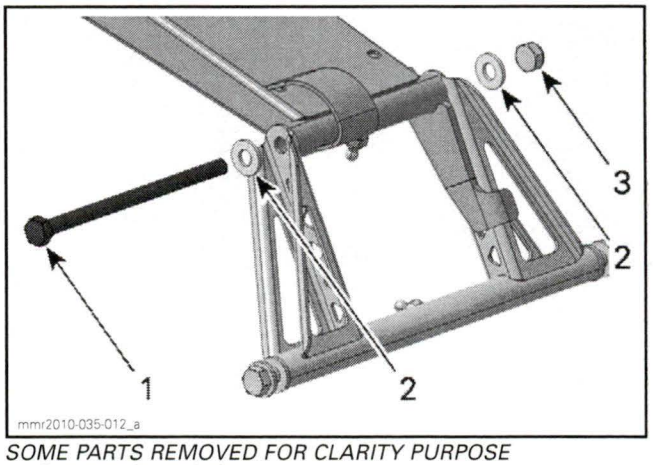
1. Runner
2. Pivot arm

5. Carefully remove pivot arm from rear arm.

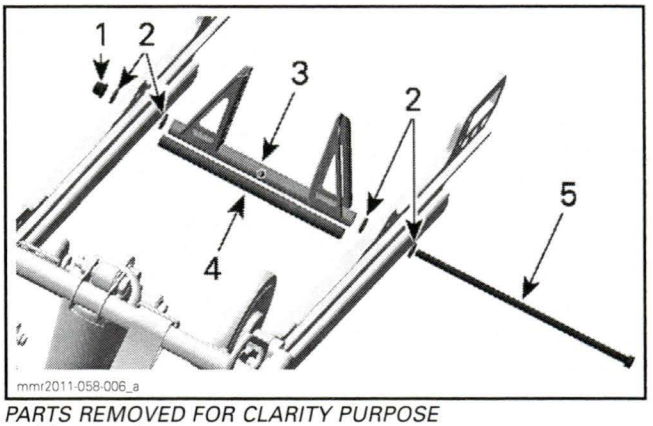
Pivot Arm Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Assemble pivot arm fastener as per following illustrations.



SOME PARTS REMOVED FOR CLARITY PURPOSE
1. Rear arm lower bolt
2. Washers
3. Rear arm lower nut



PARTS REMOVED FOR CLARITY PURPOSE
1. Pivot arm lower nut
2. Washers
3. Pivot arm
4. Axle
5. Pivot arm lower screw

Torque pivot arm lower nut to specification.

TIGHTENING TORQUE	
Pivot arm lower nut	24.5 N•m ± 3.5 N•m (18 lbf•ft ± 3 lbf•ft)

Lubricate pivot arm. Refer to *PERIODIC MAINTENANCE PROCEDURES* subsection.

IDLER WHEELS AND SUPPORTS

Refer to the exploded views at the beginning of this subsection for parts layout and fasteners tightening torque.

STOPPER STRAP

Refer to the exploded views at the beginning of this subsection for parts layout and fasteners tightening torque.

STEERING SYSTEM

SERVICE TOOLS – OTHER SUPPLIER

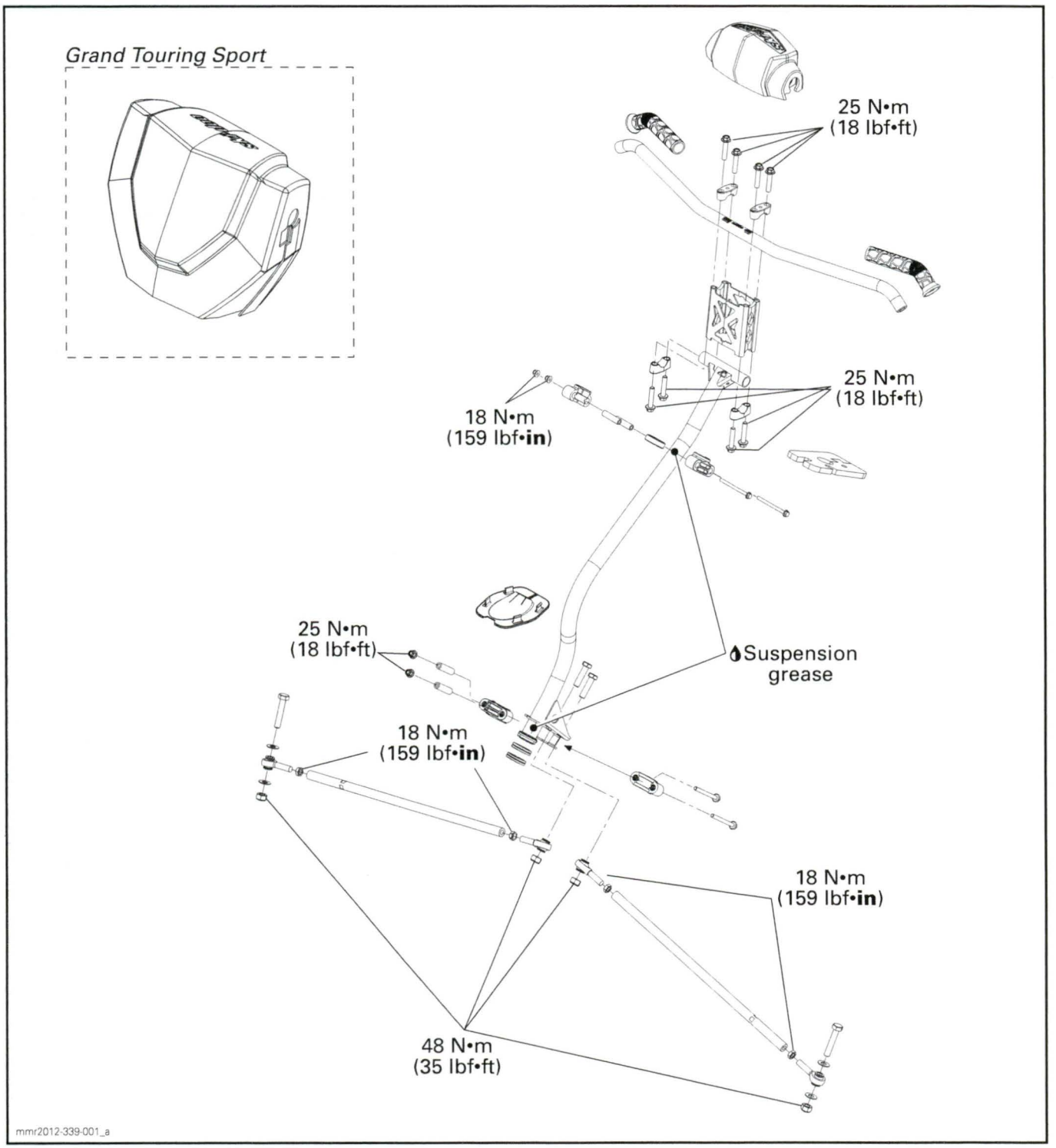
Description	Part Number	Page
MULTILOCK - TERMINAL EXTRACTION TOOL	755430-2	388

SERVICE PRODUCTS

Description	Part Number	Page
SUSPENSION GREASE	293 550 033	384, 394

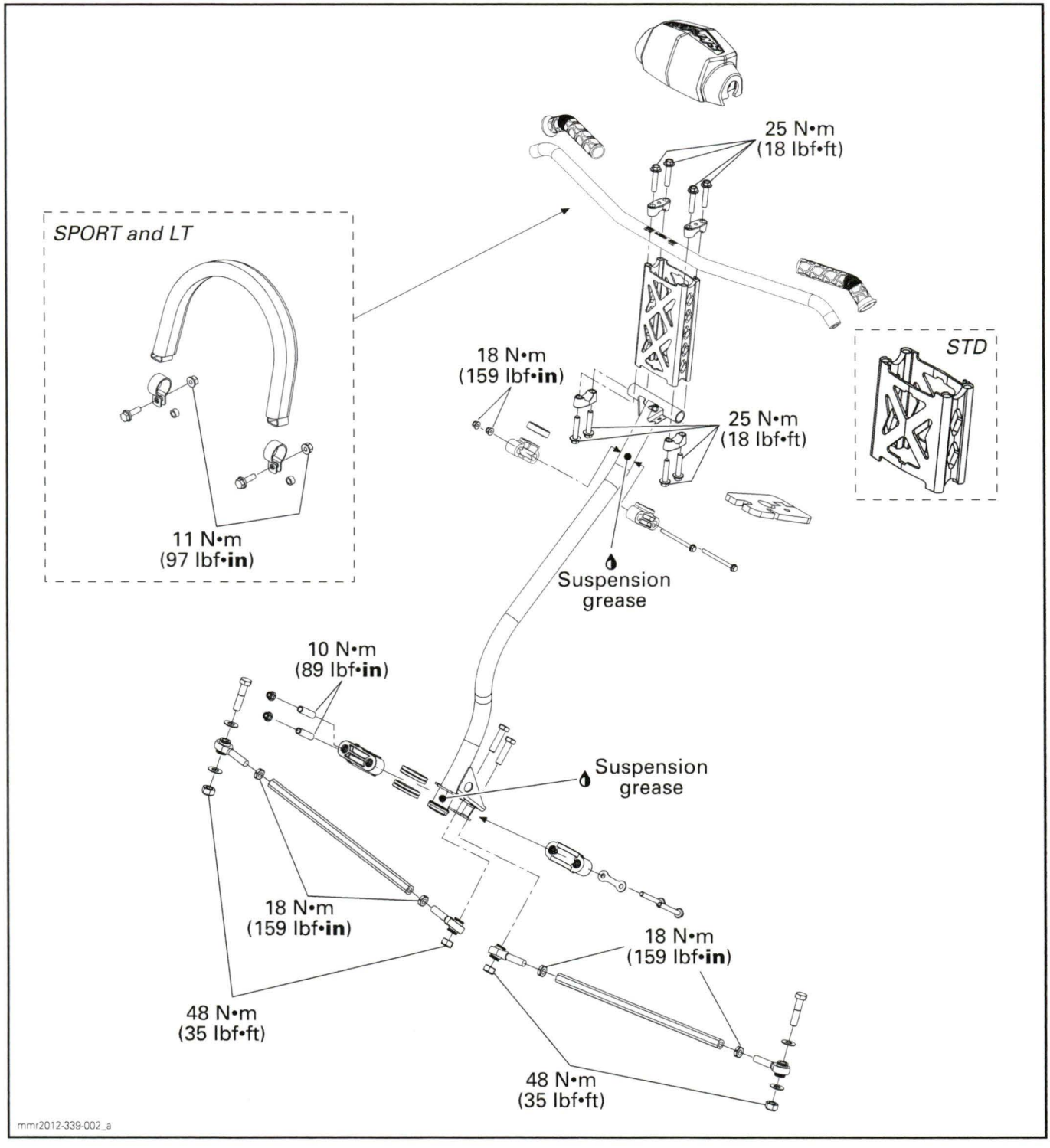
HANDLEBAR, STEERING COLUMN AND TIE-RODS

REV-XP 550F Series

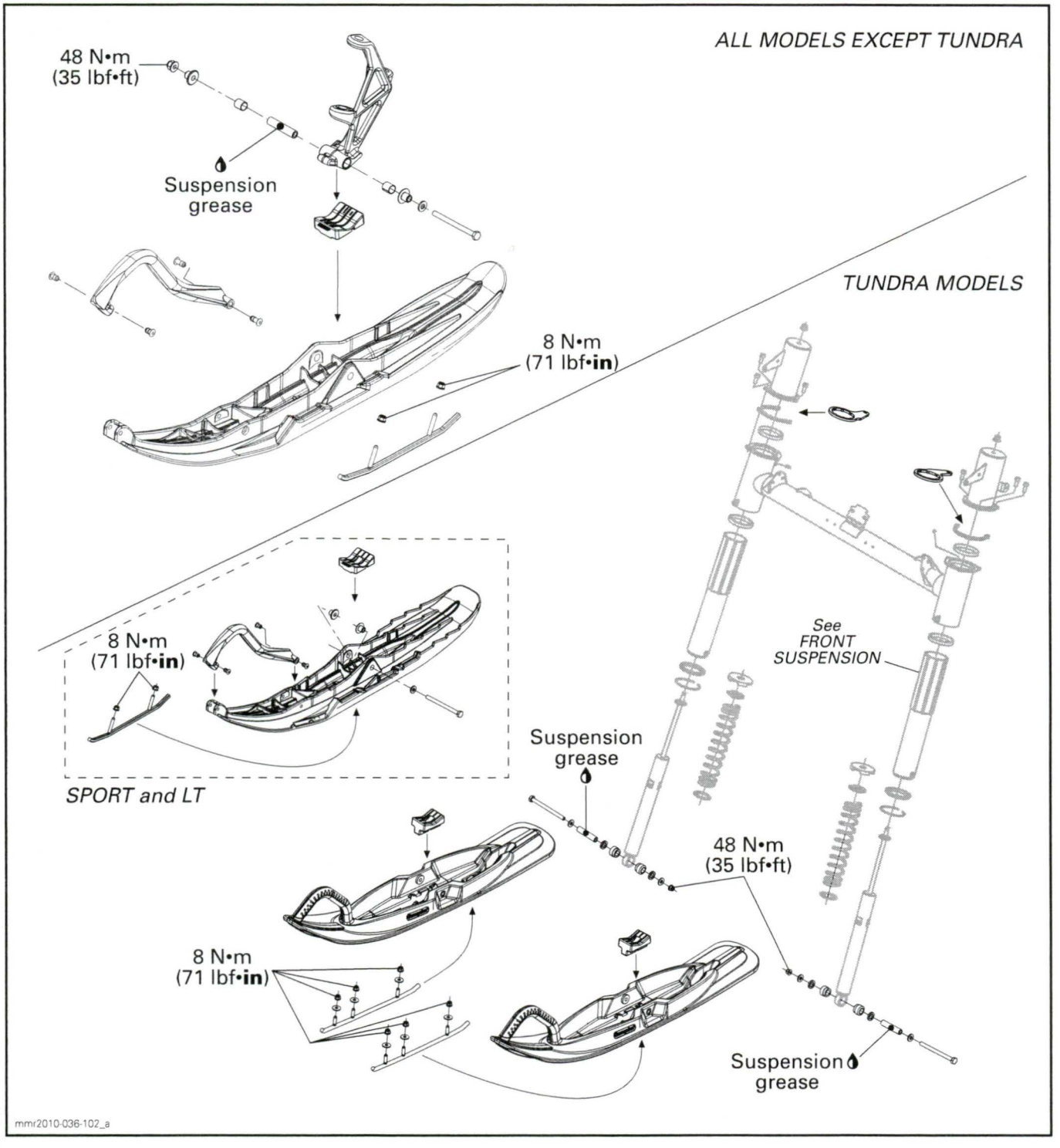


HANDLEBAR, STEERING COLUMN AND TIE-RODS

Tundra Series



SKIS


ALL MODELS EXCEPT TUNDRA
48 N•m
(35 lbf•ft)
Suspension
grease
TUNDRA MODELS
8 N•m
(71 lbf•in)
8 N•m
(71 lbf•in)
SPORT and LT
See
FRONT
SUSPENSION
Suspension
grease
48 N•m
(35 lbf•ft)
8 N•m
(71 lbf•in)
Suspension
grease
mmr2010-036-102_a

GENERAL

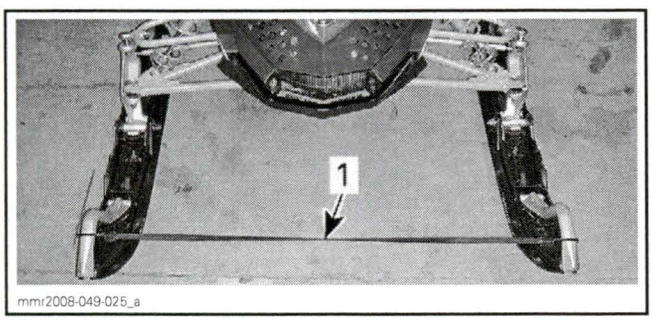
When removing or replacing a component of the steering system (except handle grips and handlebar), perform the steering alignment procedure, refer to *STEERING ALIGNMENT* in this subsection.

ADJUSTMENT

STEERING ALIGNMENT

NOTE: Steering alignment is performed by adjusting length of left and right tie-rods.

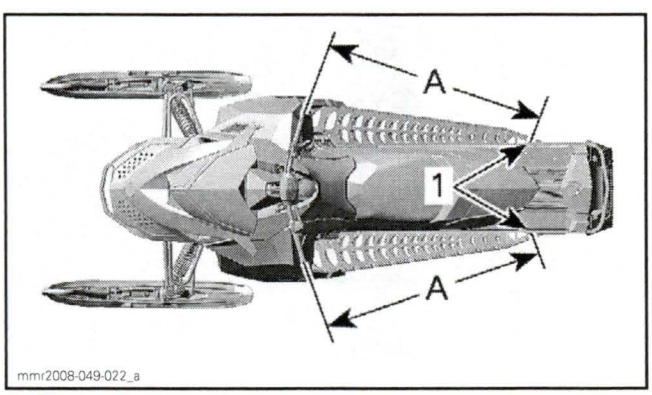
1. Leave the vehicle on the ground on its own weight.
2. Attach ski handles together with a bungee cord.



TYPICAL
1. Bungee cord

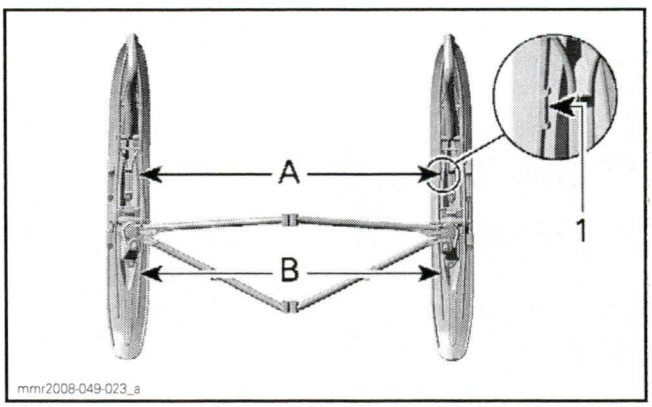
3. Position handlebar so that it is straight ahead position by measuring from the extremities of the grips to the rear most edge of the tunnel, as shown.

NOTE: The reference point must be the same to each side.



1. Same reference point
A. Equal distance on each side

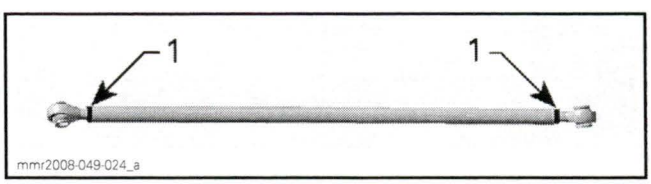
4. Verify if skis are in straight-ahead position by placing a straight edge against adjusted track and measuring distance between front and rear ski recesses and straight edge.
5. When skis are in straight ahead position, adjust the toe-out.
6. Measure the distance between front and rear ski recesses.
7. Use the following illustration and this equation to determine the perfect steering adjustment.



1. Recesses
A – B = 5 mm ± 1.5 mm (.197 in ± .059 in)

STEERING ALIGNMENT	
Toe-out	5 mm ± 1.5 mm (.197 in ± .059 in)

8. If adjustment is needed, loosen tie-rod jam nuts then turn tie-rods to change their length.
9. Tighten jam nuts and torque them to specification.

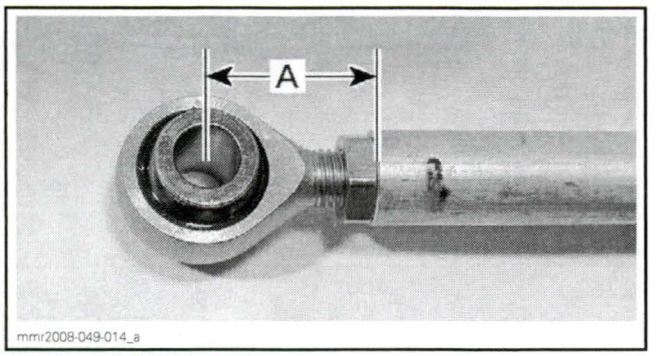


1. Jam nut

TIGHTENING TORQUE	
Tie rod end jam nuts	18 N•m (159 lbf•**in**)

NOTE: The maximum tie-rod end length not engaged in the tie rod must not exceed specification.

MAXIMUM LENGTH	
Tie rod end	34 mm (1.34 in)



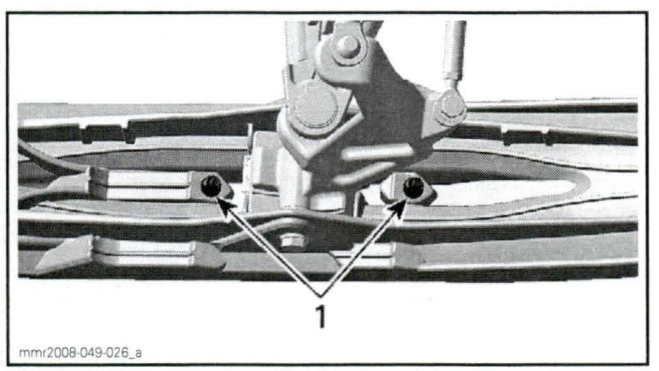
A. 34 mm (1.339 in) maximum

PROCEDURES

SKI RUNNER

Ski Runner Removal

1. Lift the front of vehicle and support it off ground.
2. Unscrew the ski runner nuts then remove ski runners.



TYPICAL
1. Ski runner nuts

Ski Runner Installation

The installation is the reverse of the removal procedure. Pay attention to the following.

Tighten ski runner retaining nuts to specification.

TIGHTENING TORQUE	
Ski runner retaining nuts	8 N•m (71 lbf•**in**)

SKI

Ski Removal

1. Lift front of vehicle and support it off ground.
2. Unscrew nut then pull ski bolt out.
3. Remove ski from vehicle.

Ski Installation

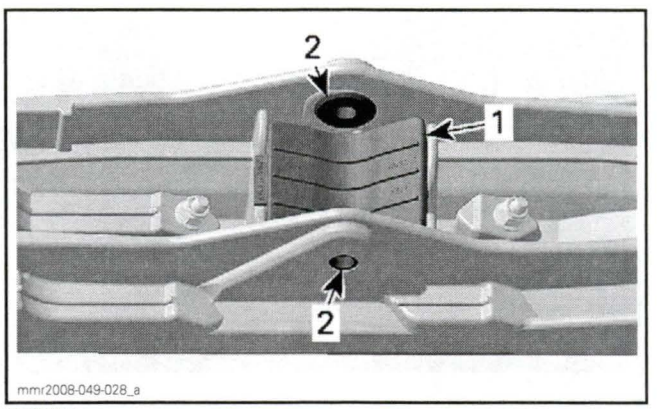
The installation is the reverse of the removal procedure. However, pay attention to the following.

Apply lubricant as indicated.

SERVICE PRODUCT	
Ski leg spacer	SUSPENSION GREASE (P/N 293 550 033)

Make sure bushings are installed in ski holes.

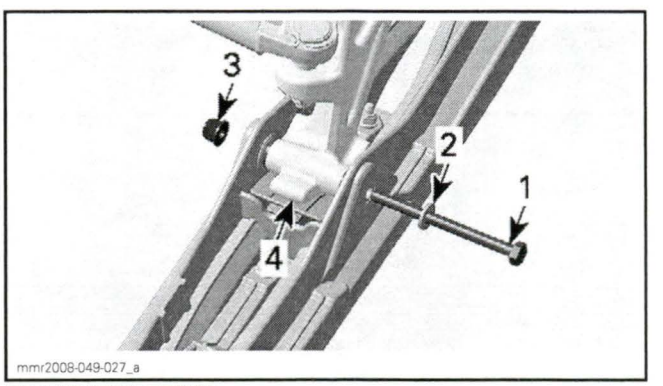
Position ski stopper indicator in front and make sure the bump in the ski is in the groove of the ski stopper.



TYPICAL
1. Ski stopper
2. Bushings

REV-XP 550F Series

Assemble ski fastener as per the following illustration.



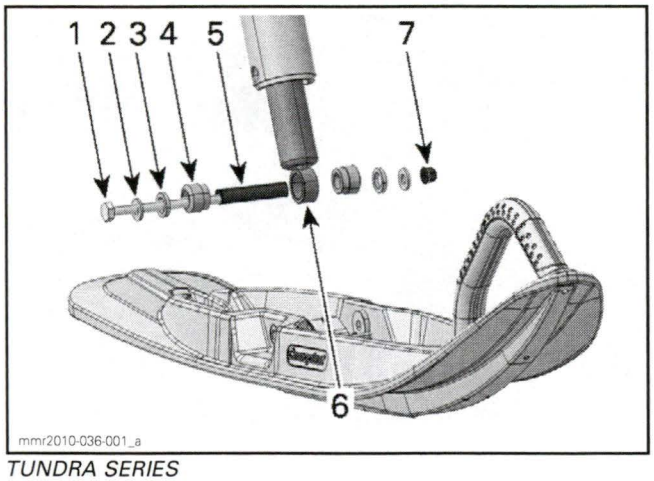
REV-XP 550F SERIES
1. Ski bolt
2. Washer
3. Nut
4. Ski leg

Tighten ski retaining nut to specification.

TIGHTENING TORQUE	
Ski retaining nut	48 N•m (35 lbf•ft)

Tundra Series

Assemble ski fastener as per the following illustration.



TUNDRA SERIES
1. *Bolt*
2. *Washer*
3. *Spacer*
4. *Cushion*
5. *Spacer*
6. *Shock absorber*
7. *Nut*

Tighten ski retaining nut to specification.

TIGHTENING TORQUE	
Ski retaining nut	48 N•m (35 lbf•ft)

SKI HANDLE

Ski Handle Removal

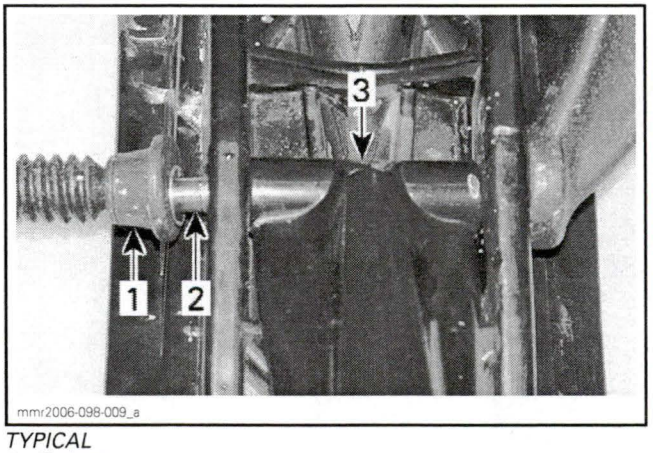
1. Remove ski from vehicle.
2. Using a 9 mm (3/8 in) drill bit, remove ski handle rivets.

NOTE: Drill only the head of rivet. Angle the drill bit to reduce the chance of spinning the rivet in the ski.

3. Remove handle from ski.
4. Place handle in hot water for 10 minutes then using a punch, drive the inner part of rivet out of handle.

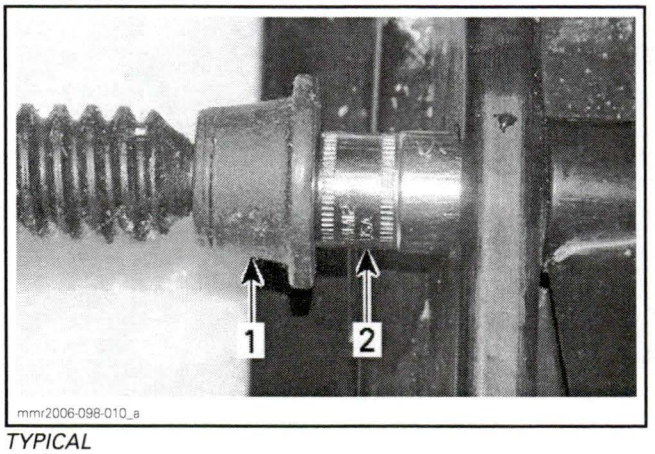
Ski Handle Installation

1. Use a C-clamp and a short 10 mm socket.
2. Place a rivet in position and insert it into ski and ski handle. Repeat the procedure for the other side.



TYPICAL
1. *C-clamp*
2. *Rivet*
3. *Handle*

3. When both rivets are installed, use the short 10 mm socket to push rivet heads against ski.



TYPICAL
1. *C-clamp*
2. *10 mm socket*

SKI LEG

Ski Leg Replacement

To replace a ski leg, refer to *FRONT SUSPENSION* subsection.

STEERING ARM (TUNDRA MODELS)

Steering Arm Removal

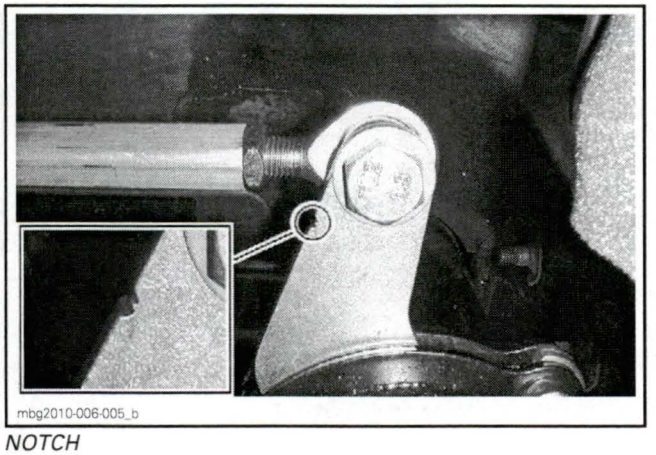
1. Proceed with *SHOCK ABSORBER COVER REMOVAL*, see procedure in *FRONT SUSPENSION (XP-LTS)* subsection.
2. Remove steering arm from ski leg.

Steering Arm Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Index steering arm on ski leg so that the arm is positioned towards the rear of vehicle.

Ensure steering arm is installed with the notch inwards.



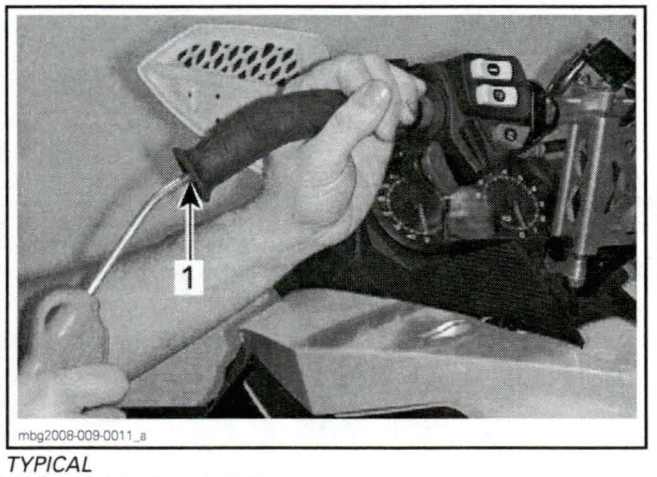
NOTCH

HANDLEBAR GRIP

NOTE: To verify or replace heating elements, refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

Handlebar Grip Removal

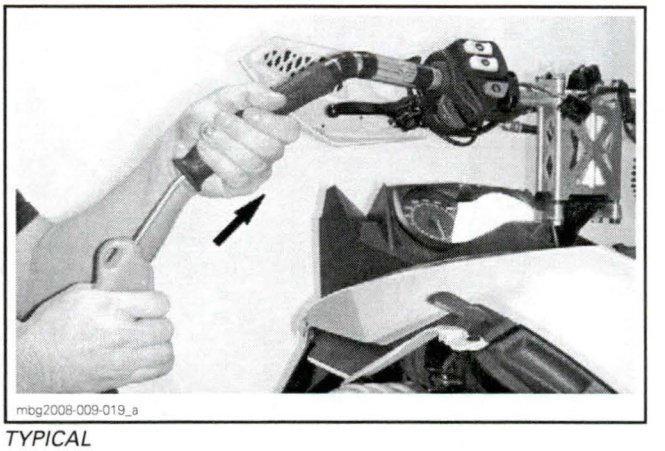
1. Remove grips by pulling while using compressed air, which will inflate or loosen the fit between the grip and handlebar, as shown on picture.



TYPICAL
1. Blow air in the grip hole

Handlebar Grip Installation

Insert the handlebar grip on handlebar while blowing compressed air to inflate or loosen the fit between grip and handlebar.

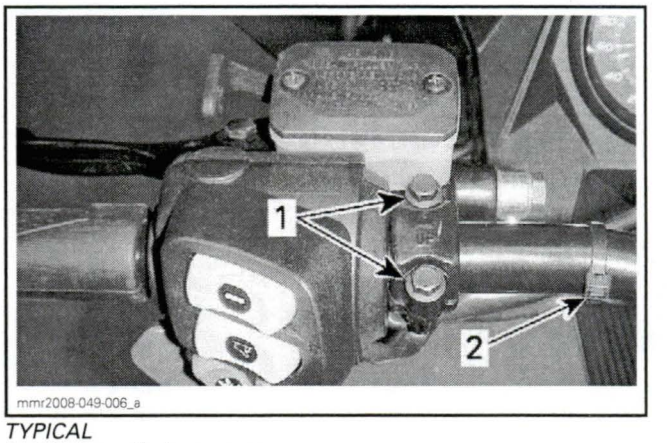


TYPICAL

MULTIFUNCTION SWITCH

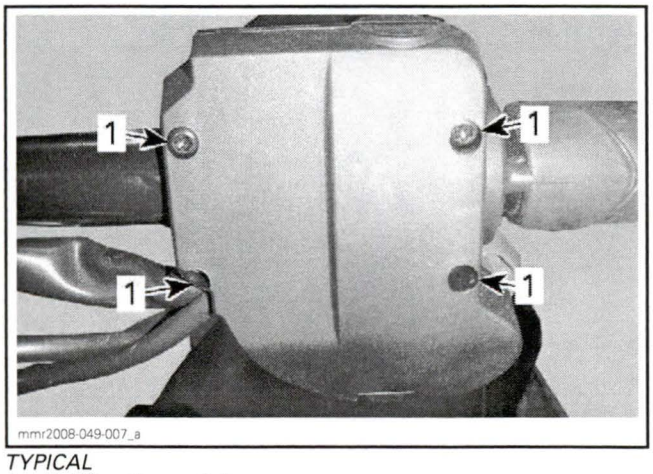
Multifunction Switch Removal

1. Cut locking tie securing multifunction switch harness.
2. Unscrew master cylinder from handlebar.



TYPICAL
1. Master cylinder screws
2. Cut this locking tie

3. Slide master cylinder toward the steering column.
4. Remove multifunction switch screws.



TYPICAL
1. Multifunction switch screws

5. Disconnect both multifunction switch connectors.
6. Remove multifunction switch from vehicle.

Multifunction Switch Installation

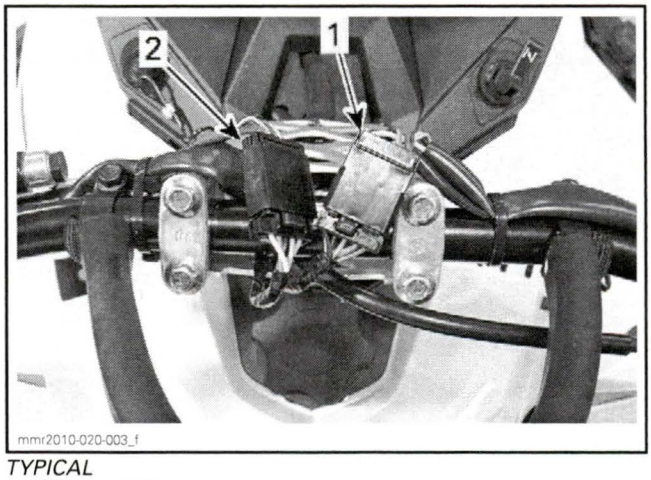
The installation is the reverse of the removal procedure. However, pay attention to the following.

Turn handlebar completely from side to side making sure it does not exert unwanted tension on handlebar wires.

THROTTLE LEVER HOUSING

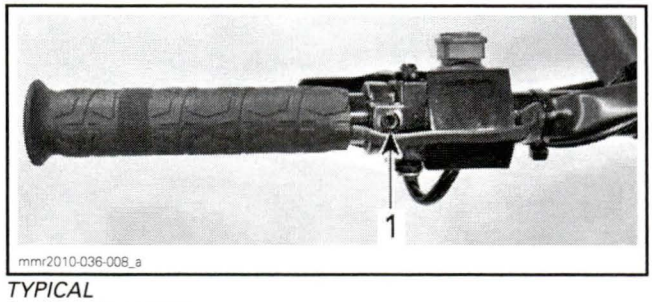
Throttle Lever Housing Removal

1. Proceed with RH *HANDLEBAR GRIP REMOVAL*, see procedure in this subsection.
2. Remove steering cover from handlebar.
3. Proceed with RH *HEATER ELEMENT REMOVAL*, see procedure in *LIGHTS, GAUGE AND ACCESSORIES* subsection.
4. Disconnect throttle cable from throttle lever.
5. Disconnect GD steering connector.



TYPICAL
1. GD connector
2. GG connector

6. Cut locking ties securing throttle lever housing harness.
7. Remove throttle lever housing retaining screw.



TYPICAL
1. Retaining screw

8. Slide throttle lever housing outwards to remove it from handlebar.
9. Remove circlip from throttle lever pin.
10. Remove throttle lever pin then throttle lever.

Throttle Lever Housing Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

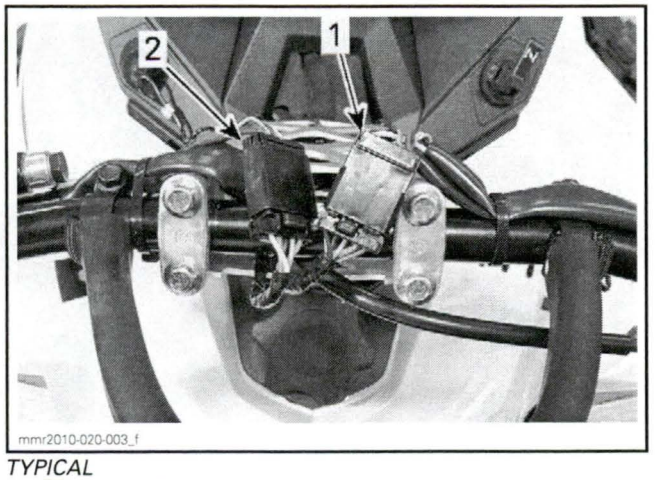
Turn handlebar completely from side to side making sure it does not exert unwanted tension on handlebar wires.

Install **NEW** circlip on throttle lever pin.

THROTTLE LEVER

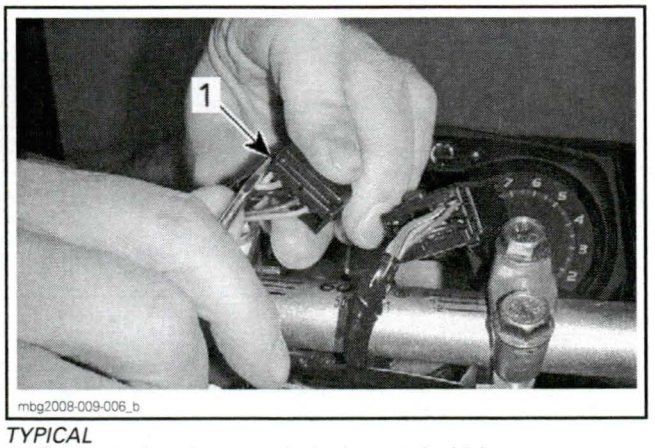
Throttle Lever Removal

1. Remove steering cover from handlebar.
2. Disconnect throttle cable from throttle lever.
3. Disconnect GD steering connector.



TYPICAL
1. *GD connector*
2. *GG connector*

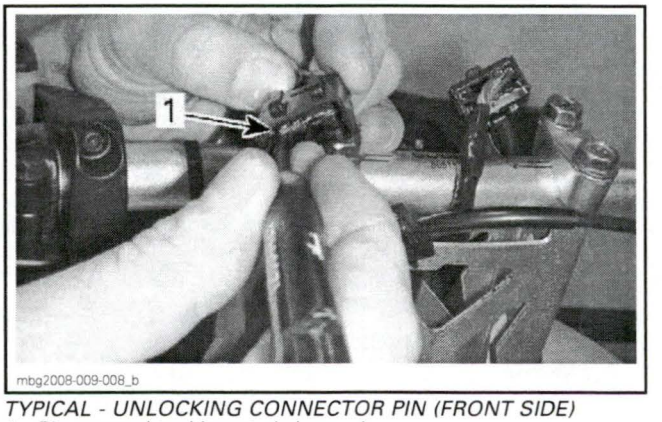
4. Open the cover on the back of the connector housing using a small screwdriver or a suitable tool.



TYPICAL
1. *Connector housing cover locks (one each side)*

5. Using an appropriate tool, unlock the heater wire terminals and pull them out of the connector housing.

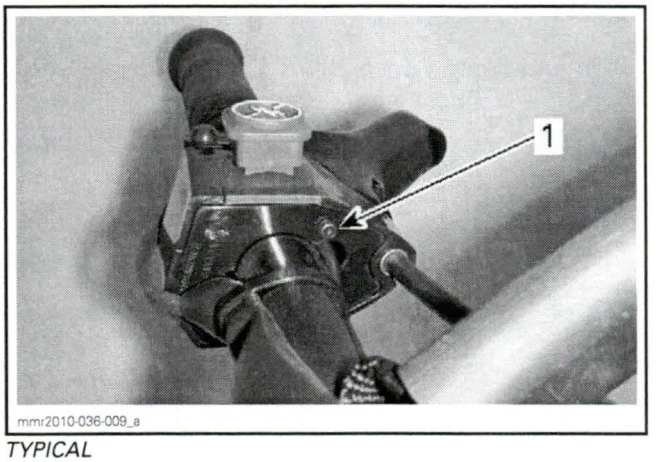
RECOMMENDED TOOL
MULTILOCK - TERMINAL EXTRACTION TOOL (P/N 755430-2)



TYPICAL - UNLOCKING CONNECTOR PIN (FRONT SIDE)
1. *Pin removal tool inserted above pin*

NOTICE **Be sure to take note of exact position of throttle lever heater wires before removing them from the connector.**

6. Cut locking ties securing heater wires to handlebars.
7. Remove throttle lever housing set screw.



TYPICAL
1. *Set screw*

8. Remove circlip from throttle lever pin.
9. Remove throttle lever pin then throttle lever.
10. Pull throttle lever wires from harness protective sheath and throttle lever housing.

Throttle Lever Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Turn handlebar completely from side to side making sure it does not exert unwanted tension on handlebar wires.

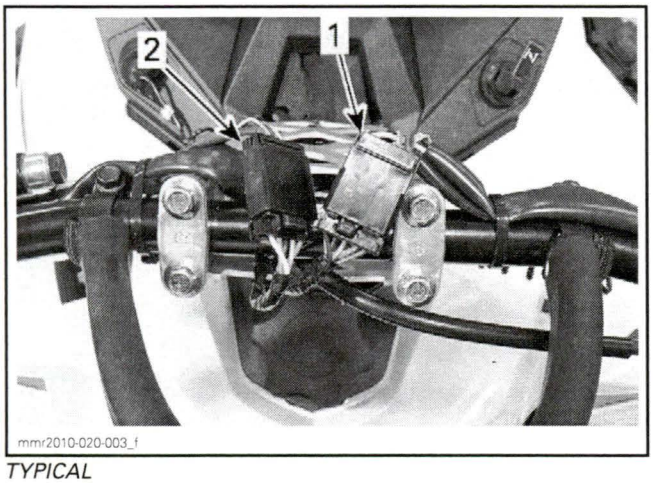
Install **NEW** circlip on throttle lever pin.

HANDLEBAR

Handlebar Removal

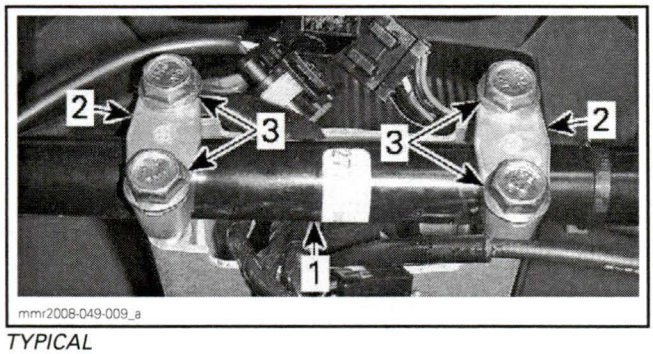
NOTE: If the handlebar must be changed, remove all components (handlebar grip, throttle lever housing, multifunction switch, etc.) before removing it from vehicle. See procedures in this subsection.

1. Remove steering cover.
2. Disconnect steering connectors.



TYPICAL
1. GD connector
2. GG connector

3. Remove handlebar retaining clamp screws.



TYPICAL
1. Handlebar
2. Retaining clamps
3. Screws

4. Remove handlebar from handlebar extension.

Handlebar Inspection

1. Inspect the handlebar for:
   - Damages
   - Cracks
   - Bending.
2. Replace if any of these problems is detected.

⚠ WARNING

Do not try to repair a defective handlebar.

3. Check handlebar clamps for cracks or distortion, replace if necessary.

Handlebar Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Tighten handlebar clamp retaining screws to specification.

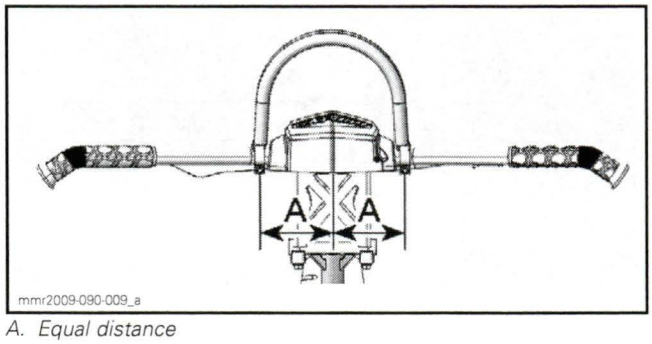
NOTE: Handlebar retaining screws should be tightened in steps so that when the final torque is obtained, the space between the extension and the handlebar retaining clamps is equal on both sides.

TIGHTENING TORQUE	
Handlebar clamp retaining screws	25 N•m (18 lbf•ft)

Turn handlebar completely from side to side making sure it does not exert unwanted tension on handlebar wires.

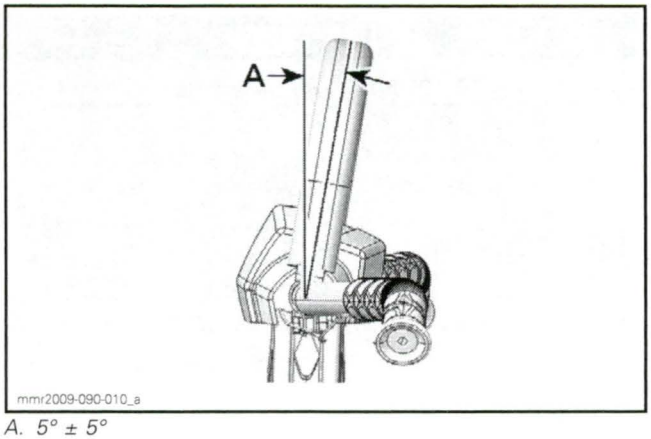
Tundra Sport and Tundra LT

Ensure to position strap symmetrically each side of handlebar retaining clamps.



A. Equal distance

Tilt strap 5° ± 5° towards driver relative to handlebar extension.

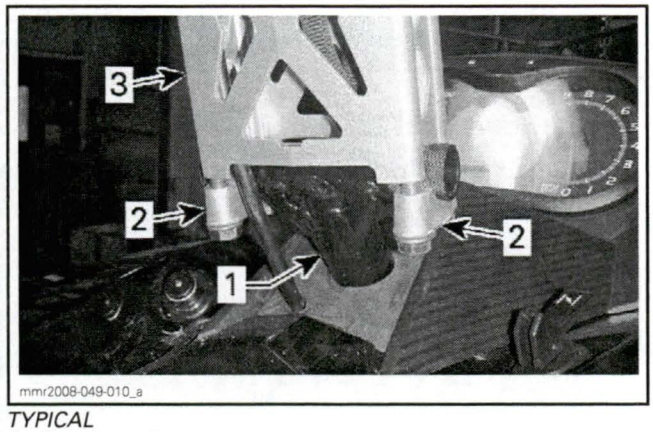


A. 5° ± 5°

HANDLEBAR EXTENSION

Handlebar Extension Removal

1. Proceed with *HANDLEBAR REMOVAL*, see procedure in this subsection.
2. Remove screws retaining the extension to steering column.



TYPICAL
1. *Steering column*
2. *Handlebar extension clamps*
3. *Handlebar extension*

3. Remove handlebar extension from vehicle.

Handlebar Extension Inspection

1. Check handlebar extension for:
   - Cracks
   - Bending
   - Other damages.
2. Replace if any of these problems is detected.

⚠ WARNING

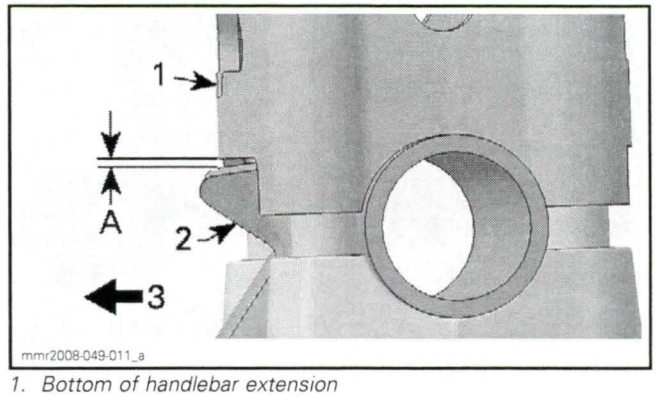
Do not try to repair a defective handlebar extension.

Handlebar Extension Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

When installing handlebar extension, ensure to leave a gap between handlebar extension and stop block on steering column.

NOTE: Extension retaining screws should be tightened in steps so that when the final torque is obtained, the space between the extension and its retaining clamps are equal on both sides.



1. *Bottom of handlebar extension*
2. *Steering column stop block*
3. *Front of vehicle*

A. 1 mm (.039 in) minimum

Tighten handlebar extension retaining screws to specification.

TIGHTENING TORQUE	
Handlebar extension retaining screws	25 N•m (18 lbf•ft)

TIE-ROD

NOTE: The same procedure is applied on RH and LH side.

Tie-Rod Inspection

Check tie-rod ends for looseness. If play is excessive, replace tie-rod.

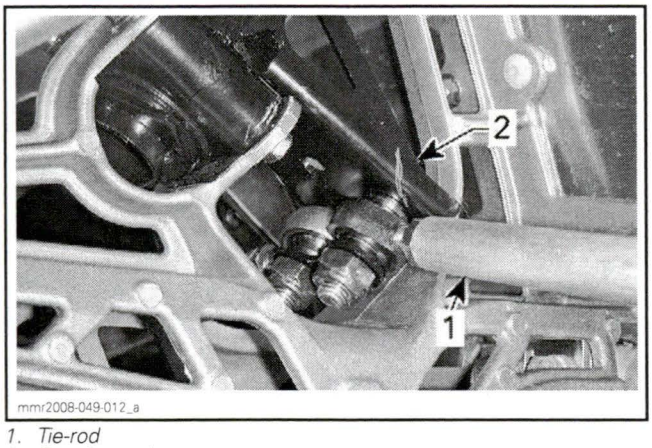
Check if the tie-rod is bend, crack or otherwise damage. Replace if necessary.

Tie-Rod Removal

1. Remove body parts as required to access tie-rod ends. Refer to *BODY* subsection.

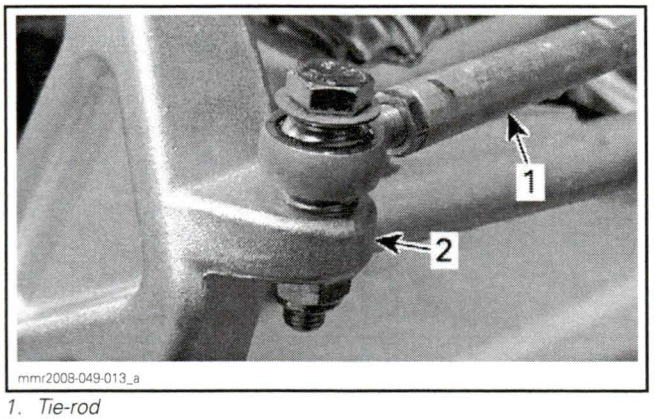
REV-XP 550F Series

2. Remove tie-rod end from steering column.



1. *Tie-rod*
2. *Steering column*

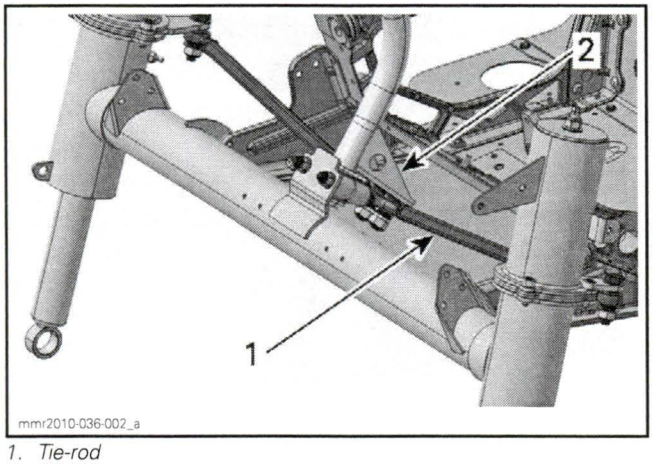
3. Remove tie-rod end from ski leg.



1. *Tie-rod*
2. *Ski leg*

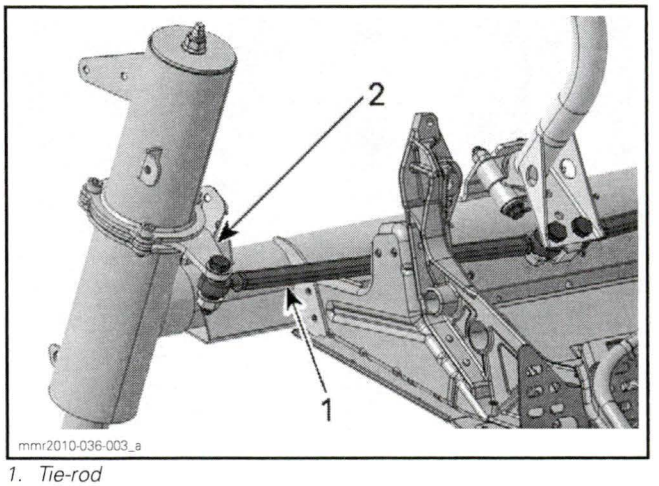
Tundra Series

4. Remove tie-rod end from steering column.



1. *Tie-rod*
2. *Steering column*

5. Remove tie-rod end from steering arm.



1. *Tie-rod*
2. *Steering arm*

All

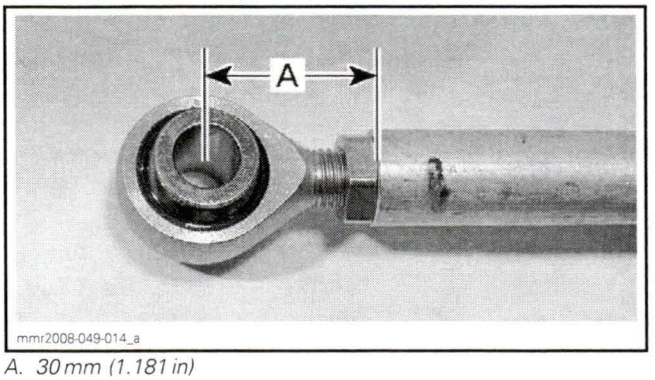
6. Remove tie-rod from vehicle.

Tie-Rod Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Adjust the length of all tie-rod ends to specification without tightening the jam nuts.

PRELIMINARY ADJUSTMENT	
Tie rod end adjustment length	30 mm (1.181 in)

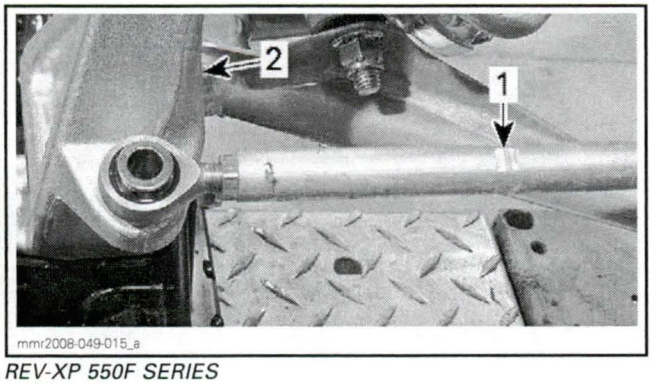


A. 30 mm (1.181 in)

⚠ WARNING

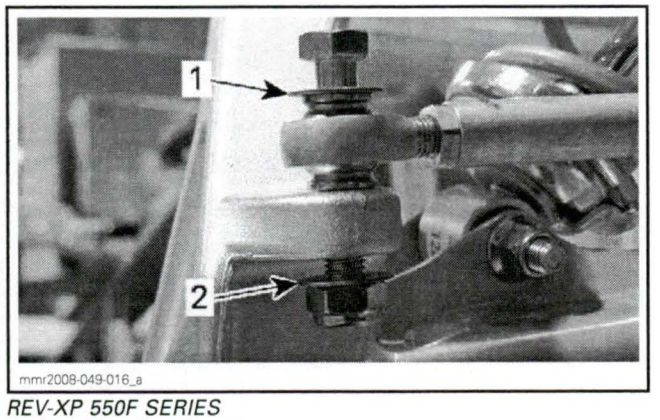
The maximum tie-rod end length not engaged in the tie rod must not exceed 34 mm (1.339 in).

On REV-XP 550F, install tie-rod with the groove on ski leg side.

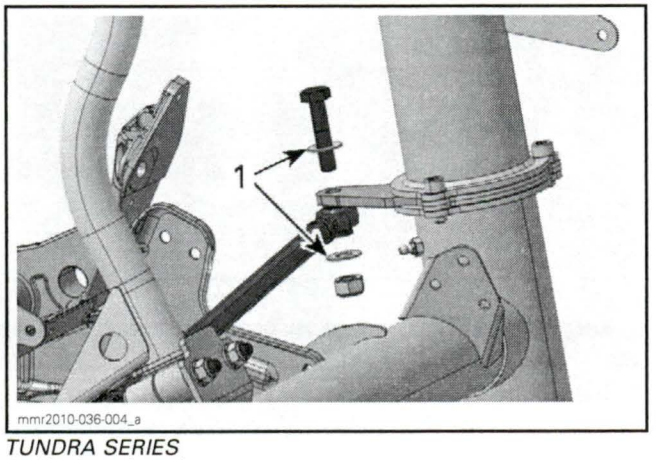


REV-XP 550F SERIES
1. *Tie-rod groove*
2. *Ski leg*

On ski leg or steering arm side, install hardened washers as shown.

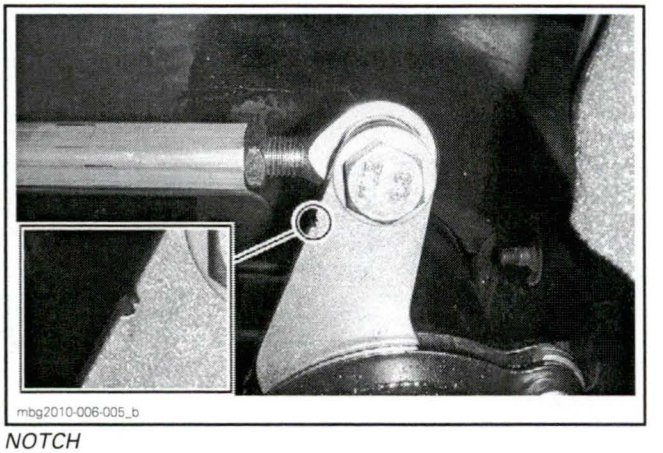


REV-XP 550F SERIES
1. *Large hardened washer*
2. *Small hardened washer*



TUNDRA SERIES
1. *Hardened washers*

On Tundra Series, ensure steering arm is positioned with the notch inwards.



NOTCH

Install nuts retaining tie-rod ends. Tighten them to specification.

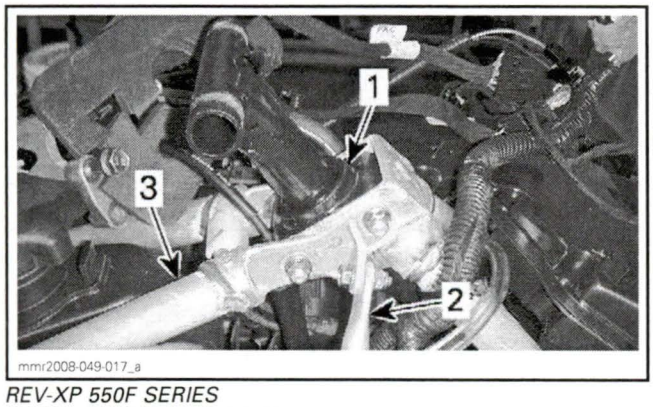
TIGHTENING TORQUE	
Tie-rod end retaining nuts	48 N•m (35 lbf•ft)

Perform the *STEERING ALIGNMENT*, see procedure in this subsection.

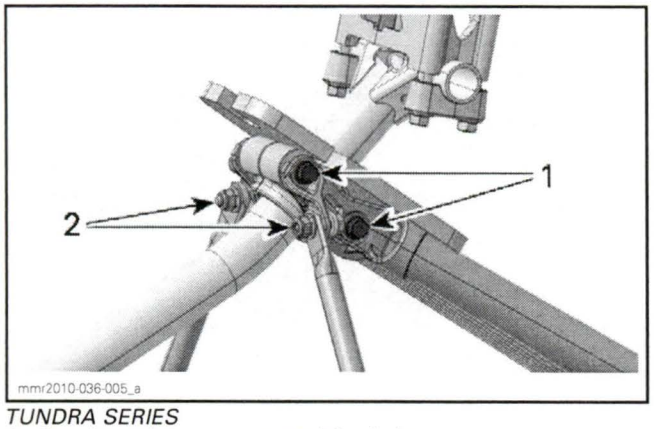
STEERING COLUMN

Steering Column Removal

1. Refer to *BODY* subsection to remove the following parts:
   - Seat
   - Trim panels
   - Side panels
   - Hood
   - Console.
2. Proceed with *SECONDARY AIR INTAKE SILENCER REMOVAL*. Refer to *AIR INTAKE SYSTEM* subsection.
3. Proceed with *TUNED PIPE REMOVAL*. Refer to *EXHAUST SYSTEM* subsection.
4. Proceed with *HANDLEBAR EXTENSION REMOVAL*, see procedure in this subsection.
5. Remove bolts securing steering column upper support.
6. Remove bolts securing side frame members to rear frame member.

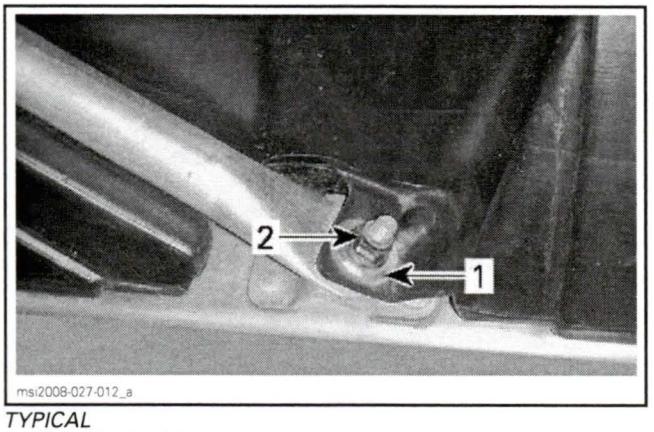


REV-XP 550F SERIES
1. *Steering column support*
2. *RH side frame member*
3. *Rear frame member*



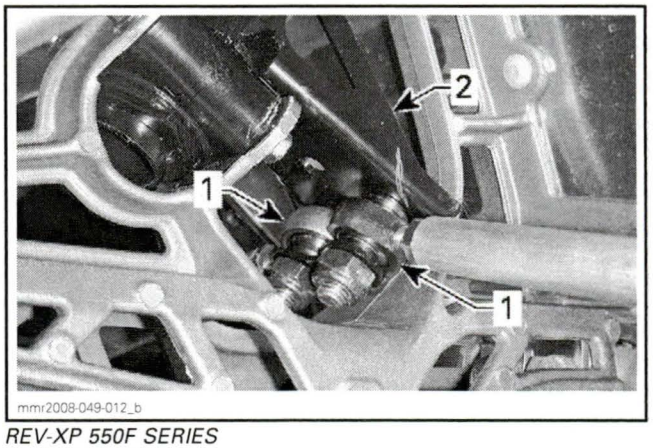
TUNDRA SERIES
1. *Steering column support retaining bolts*
2. *Frame members retaining nuts*

7. Remove elastic nut and shoulder bushing retaining the rear frame members (one each side) to the tunnel (discard nuts, keep shoulder bushings).

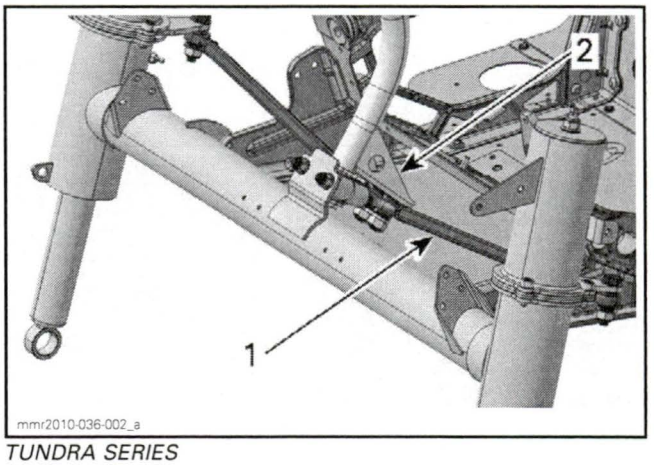


TYPICAL
1. *Shoulder bushing*
2. *Elastic nut*

8. Remove the tie-rod ends from the steering column.

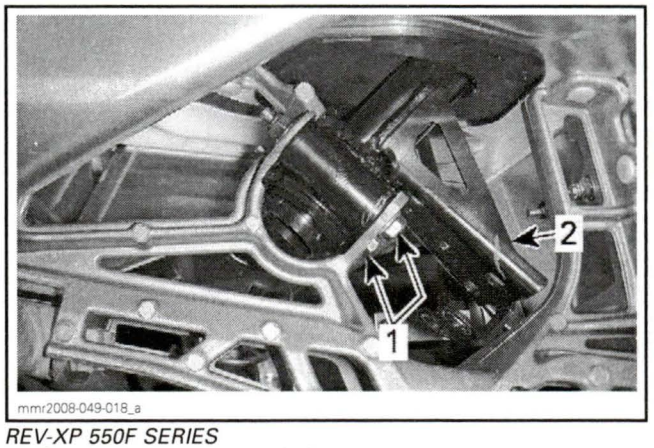


REV-XP 550F SERIES
1. *Tie-rod ends*
2. *Steering column*

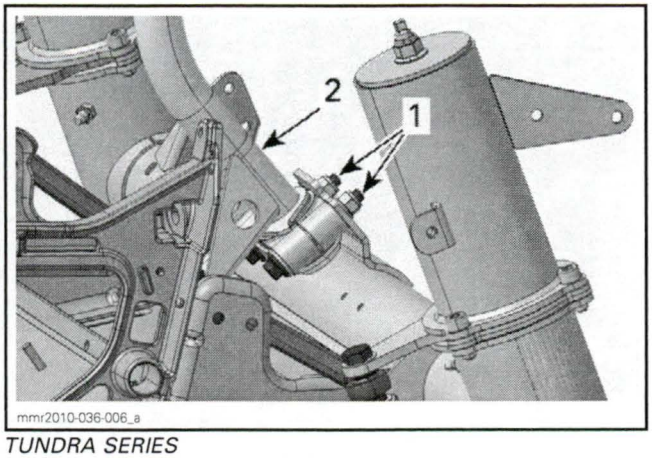


TUNDRA SERIES
1. *Tie-rod*
2. *Steering column*

9. Remove bolts securing the steering column lower support.

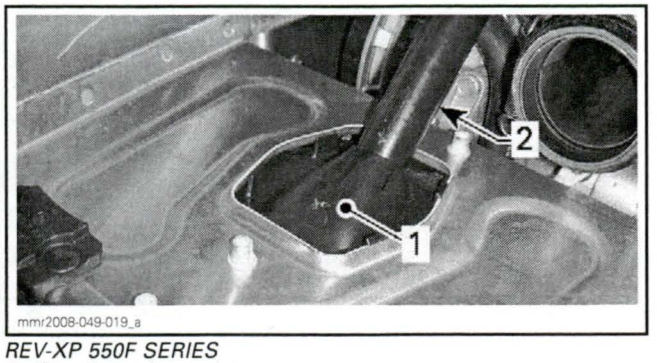


REV-XP 550F SERIES
1. *Steering column support bolts*
2. *Steering column*



TUNDRA SERIES
1. *Steering column support bolts*
2. *Steering column*

10. Remove lower support.
11. On REV-XP 550F, remove the steering column plate.



REV-XP 550F SERIES
1. *Steering column plate*
2. *Steering column*

12. Pull steering column from top.

Steering Column Inspection

Check if steering column is:
- Cracked
- Bent
- Twist
- Otherwise damaged.

Replace steering column if necessary.

⚠ WARNING

Do not try to repair a defective steering column.

Steering Column Installation

The installation is the reverse of the removal procedure. However, pay attention to the followings.

SERVICE PRODUCT	
Vibration dampers in upper and lower half bushings	SUSPENSION GREASE (P/N 293 550 033)

TIGHTENING TORQUE		
Upper steering column support		18 N•m (159 lbf•**in**)
Upper side frame member		14 N•m (124 lbf•**in**)
Lower steering column support	REV-XP	10 N•m (89 lbf•**in**)
	Tundra	25 N•m (18 lbf•ft)

Install shoulder bushings and **NEW** elastic nuts on the rear frame members (one each side).

TIGHTENING TORQUE	
Lower rear frame members	32 N•m (24 lbf•ft)

BODY

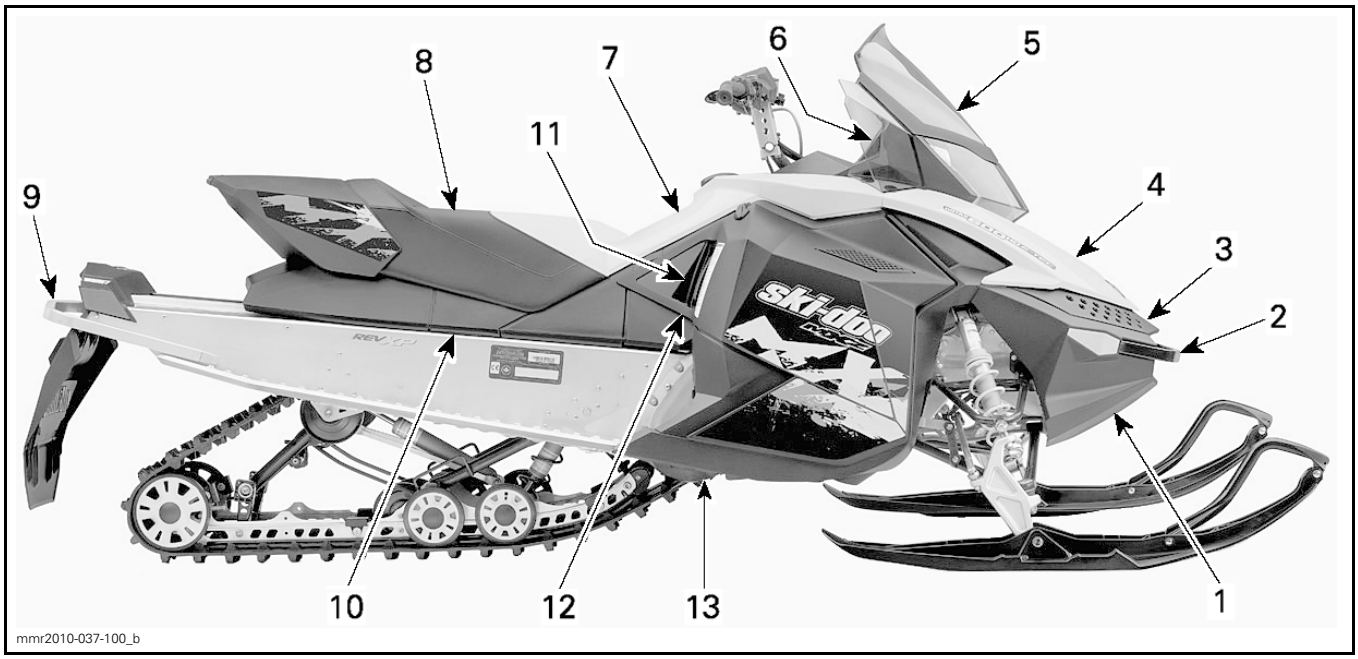
SERVICE TOOLS

Description	Part Number	Page
CONSOLE NUT WRENCH	529 036 183	406
SUPERTANIUM DRILL BIT 3/16"	529 031 800	402–405

SERVICE TOOLS – OTHER SUPPLIER

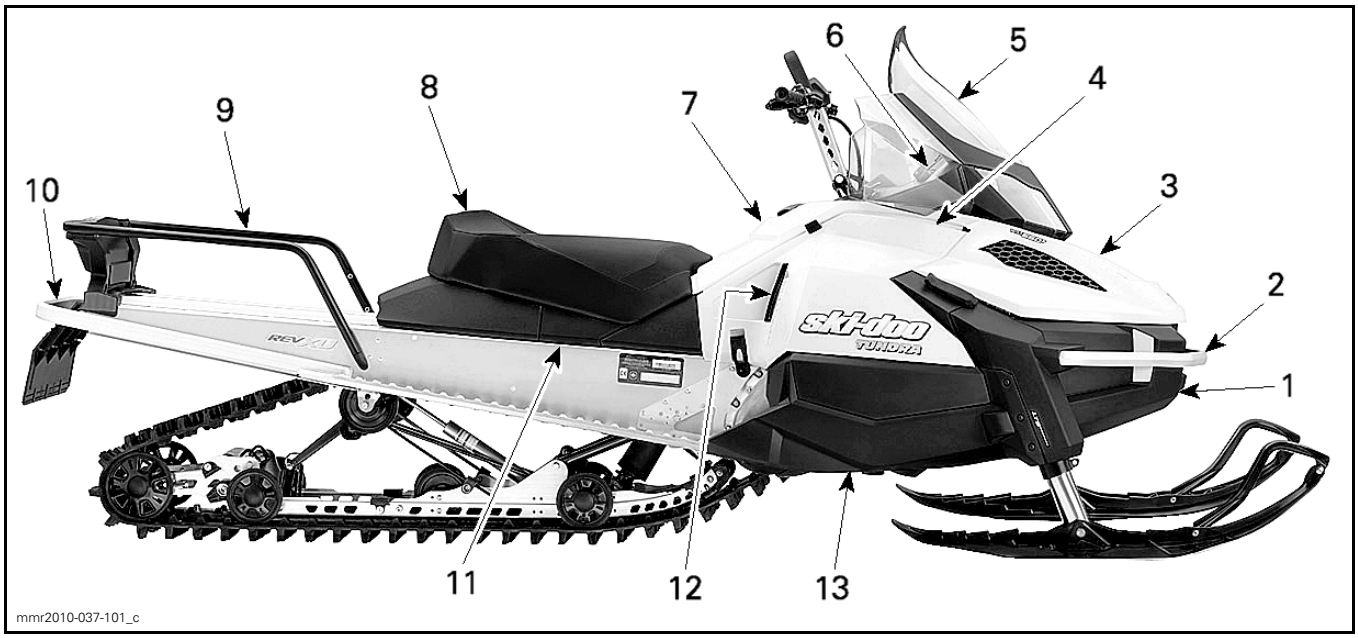
Description	Part Number	Page
ELECTRIC ARROW TACKER	ETN-50	407
MANUAL ARROW TACKER	T-50	407

BODY PARTS NOMENCLATURE - REV-XP (550F)



1. *Front bottom pan*
2. *Front bumper*
3. *Bottom pan cover*
4. *Hood*
5. *Windshield*
6. *Headlight/gauge module*
7. *Console*
8. *Seat*
9. *Rear bumper*
10. *Trim panel*
11. *Rewind starter handle housing*
12. *Side panel*
13. *Rear bottom pan*

BODY PARTS NOMENCLATURE - TUNDRA 550F SERIES



1. *Front bottom pan*
2. *Front bumper*
3. *Hood*
4. *Side panel*
5. *Windshield*
6. *Headlight/gauge module*
7. *Console*
8. *Seat*
9. *Rear rack*
10. *Rear bumper*
11. *Trim panel*
12. *Rewind starter handle housing*
13. *Rear bottom pan*

GENERAL

NOTICE Be careful when tightening plastic panels. Any deformation on the panel around the screw is an indication that it is too tight. Do not over torque panels in order to avoid damaging them.

VEHICLE CARE

Seat Cleaning

It is recommended to clean the seat with a solution of warm soapy water, using a soft clean cloth.

NOTICE Avoid use of harsh detergents such as strong soaps, degreasing solvents, abrasive cleaners, paint thinners, etc. that may cause damage to the seat cover.

Plastic Cleaning

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.

NOTICE Do not apply isopropyl alcohol or acetone directly on decals.

NOTICE The following products must not be applied on 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 a non abrasive wax on glossy finish only.

BODY PARTS MATERIAL

PARTS	MATERIAL TUNDRA SERIES	MATERIAL REV-XP 550F SERIES
Side panel	HDPE	Polypropylene
Console	HDPE	Surlyn/HDPE
Headlight/ gauge module	Polypropylene	Polypropylene
Hood	HDPE	Surlyn/HDPE
Front bottom pan	Polypropylene	Polypropylene
Rear bottom pan	Polypropylene	Polypropylene

BODY PARTS REPAIR

⚠ WARNING

Windshields must never be repaired.

For repair materials, refer to:

CREST INDUSTRIES, INC.
Trenton, MI 48183
Phone: 734 479-4141
Toll Free: 1 800 822-4100
Fax: 734 479-4040
E-Mail: info@crestauto.com
www.crestauto.com

PROCEDURES

DECALS

Decal Replacement

1. To remove a decal; heat old decal with a heat gun and peel off slowly.
2. Using isopropyl alcohol, clean the surface and dry thoroughly.
3. 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.

NOTICE Do not apply isopropyl alcohol or solvent directly on decals. Use only in a well ventilated area.

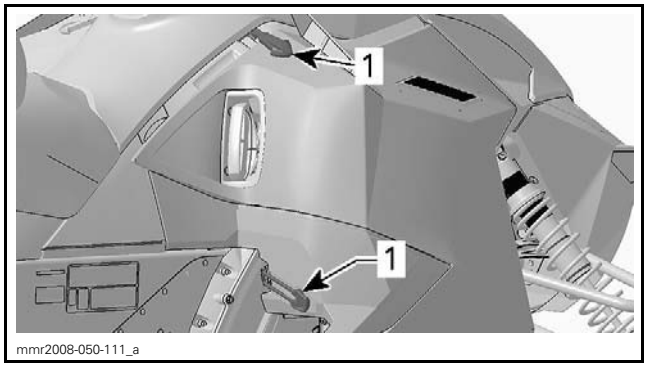
SIDE PANELS

NOTE: The procedures are the same for LH and RH side panels.

Side Panel Removal

REV-XP 550F Series

1. Stretch and unhook the latches.

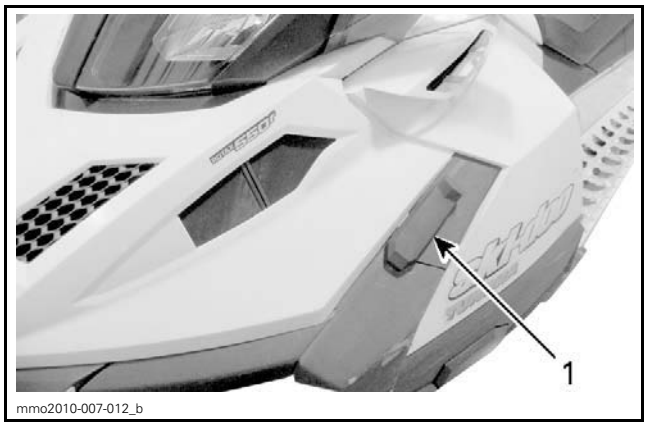


1. Latches

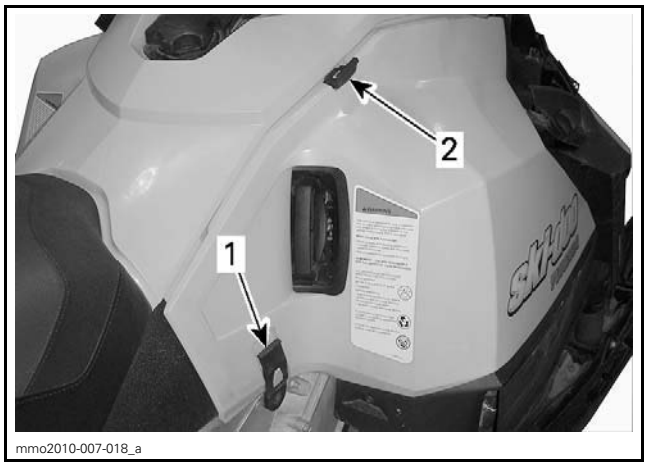
2. Open side panel.
3. Lift up the side panel and move the lower hinge out of its slot.
4. Free the upper hinge from its slot by lowering the side panel.

Tundra Series

1. Unhook front, upper and lower latches.



1. Front latch



1. Lower latch
2. Upper latch

2. Pull side panel backwards.

Side Panel Installation

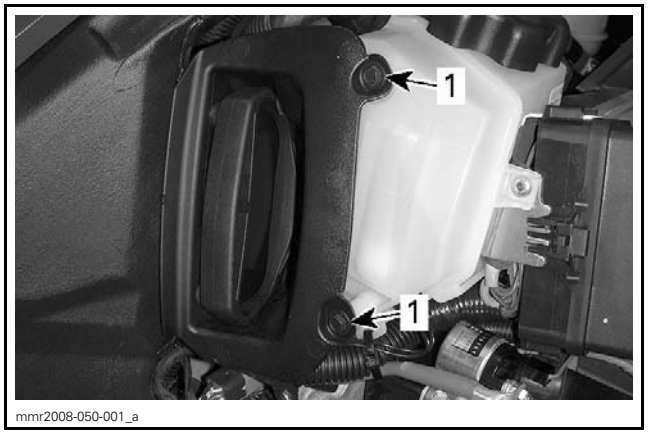
Installation is the reverse of the removal procedure. However, pay attention to the following.

For Tundra series, first insert lower front tab then, while pushing the panel towards front, insert rear lower tab and front upper tab into the bottom pan slots.

REWIND STARTER HANDLE HOUSING

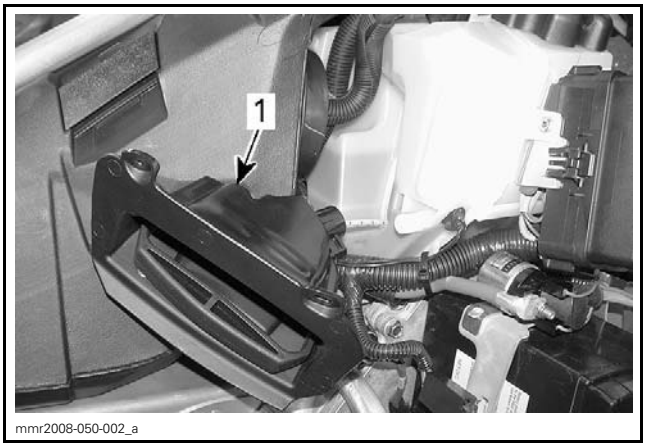
Rewind Starter Handle Housing Removal

1. Open RH side panel.
2. Remove screws retaining housing to oil reservoir.



1. Screws

3. Pull on housing to release it from oil reservoir.



1. Housing

4. Remove rewind starter handle. Refer to *REWIND STARTER* subsection.

Rewind Starter Handle Housing Installation

Installation is the reverse of removal procedure. However, pay attention to the following.

Rewind starter handle housing must be pushed vigorously into oil reservoir. Ensure it is properly set in place before installing hardware.

Tighten screws to specification.

TIGHTENING TORQUE	
Handle housing screws, rewind starter	1 N•m (9 lbf•**in**)

HOOD

Hood Removal

REV-XP 550F Series

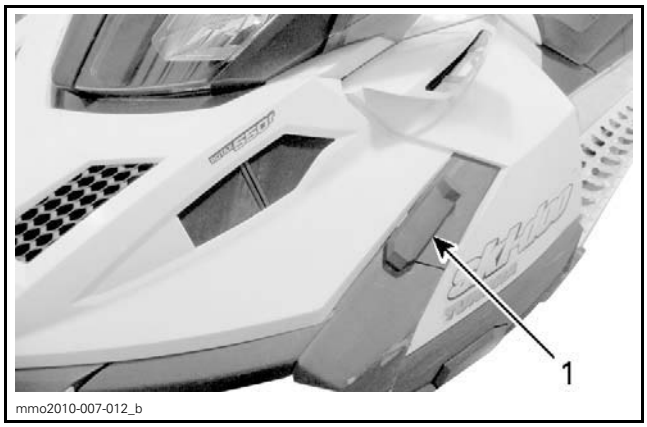
1. Stand in front of vehicle.
2. Pull outwards on both sides of hood aft section.



3. Slide hood forwards.
4. Remove hood from vehicle.

Tundra Series

1. Unhook both front latches.



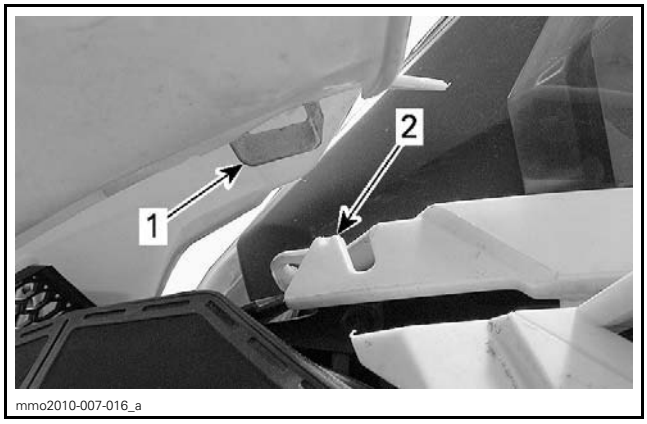
1. Front latch

2. Slide hood towards front.

Hood Installation

Installation is the reverse of removal procedure. However, pay attention to the following.

For Tundra series, position the rear hood slots over the console tabs, then push down.



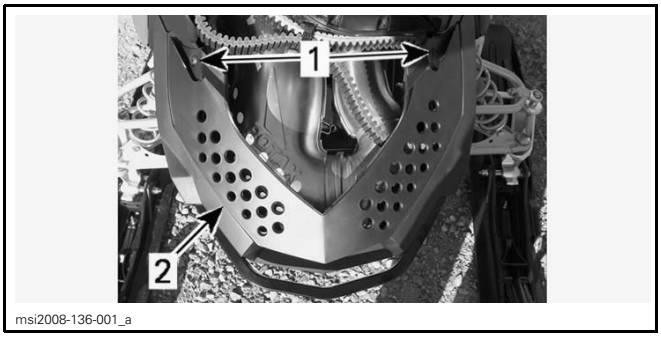
1. Rear hood slot
2. Console tab

BOTTOM PAN COVER

Bottom Pan Cover Removal

REV-XP 550F Series

1. Proceed with *HOOD REMOVAL*, see procedure in this subsection.
2. Remove screws that hold bottom pan cover.



1. Bottom pan cover screws
2. Bottom pan cover

3. Remove bottom pan cover from vehicle.

Bottom Pan Cover Installation

Installation is the reverse of the removal procedure.

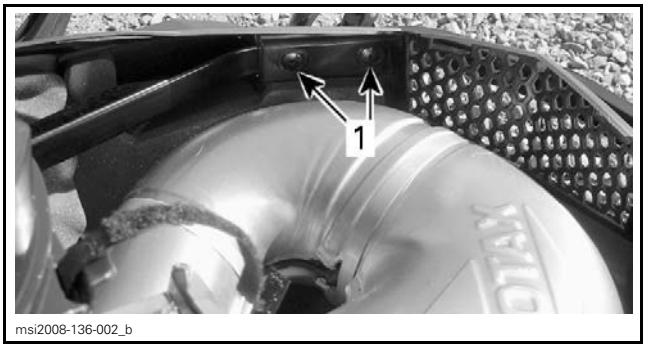
TIGHTENING TORQUE	
Bottom pan cover screws	2.5 N•m (22 lbf•**in**)

FRONT BUMPER

Front Bumper Removal

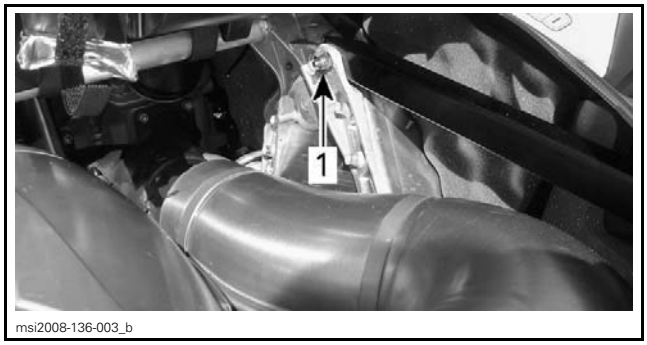
REV-XP 550F Series

1. Proceed with *HOOD REMOVAL*, see procedure in this subsection.
2. Proceed with *TUNED PIPE REMOVAL*, refer to *EXHAUST SYSTEM* subsection.
3. Proceed with *BOTTOM PAN COVER REMOVAL*, see procedure in this subsection.
4. Remove front bumper rivets by drilling them, refer to *FRAME* subsection for rivet removal procedures.



1. Front bumper rivets

5. Remove front bumper bolts.

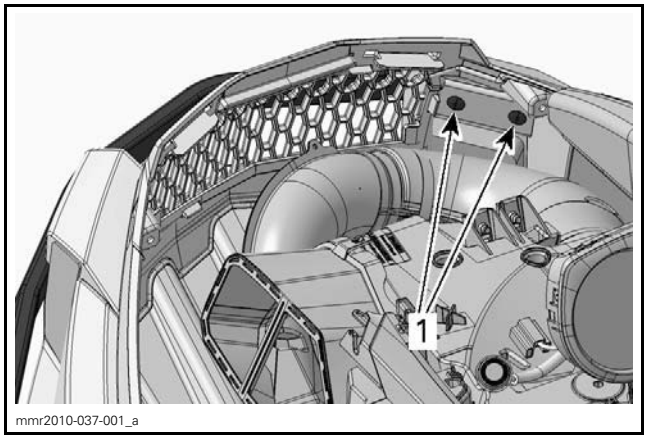


1. Front bumper bolt

6. Remove bumper from vehicle by pulling it toward the front.

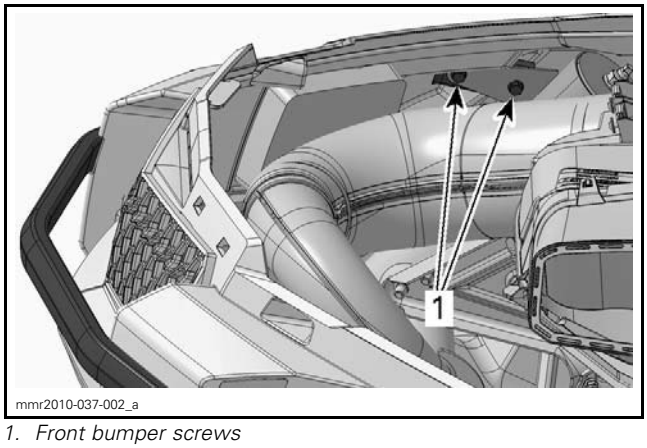
Tundra Series

1. Proceed with *HOOD REMOVAL*, see procedure in this subsection.
2. Proceed with *TUNED PIPE REMOVAL*, refer to *EXHAUST SYSTEM* subsection.
3. Remove existing rivets by drilling them.



1. Front bumper rivets

4. Remove front bumper screws.



1. Front bumper screws

5. Remove bumper from vehicle by pulling it toward the front.

Front Bumper Installation

Installation is the reverse of removal procedure. However, pay attention to the following.

Install NEW rivets.

Tighten front bumper screws to specification.

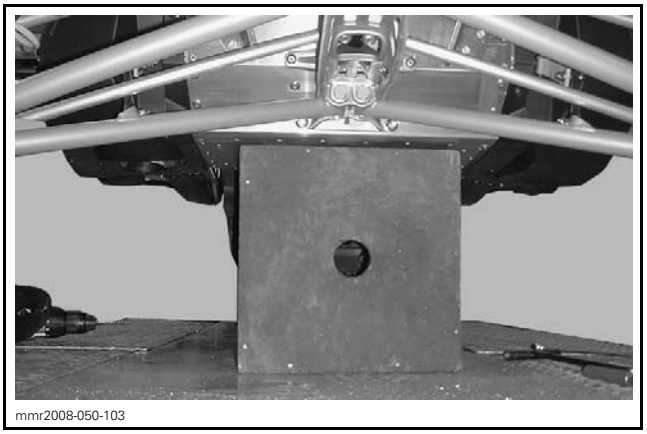
TIGHTENING TORQUE	
Front bumper screws	10 N•m (89 lbf•**in**)

FRONT BOTTOM PAN

Front Bottom Pan Removal

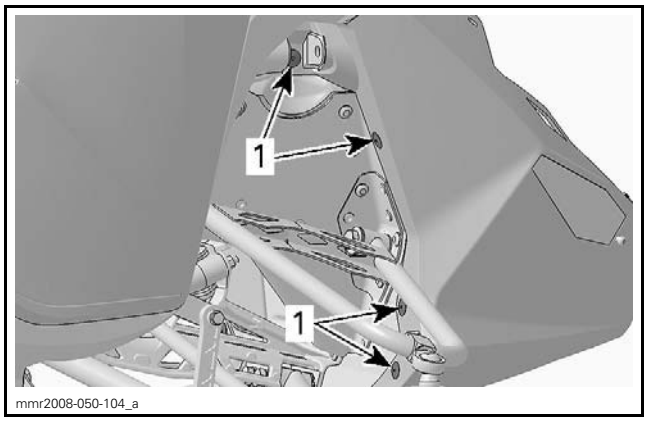
REV-XP 550F Series

1. Lift front of vehicle until skis are off the ground.
2. Place the front portion of the frame on a wooden box to support it securely.


mmr2008-050-103

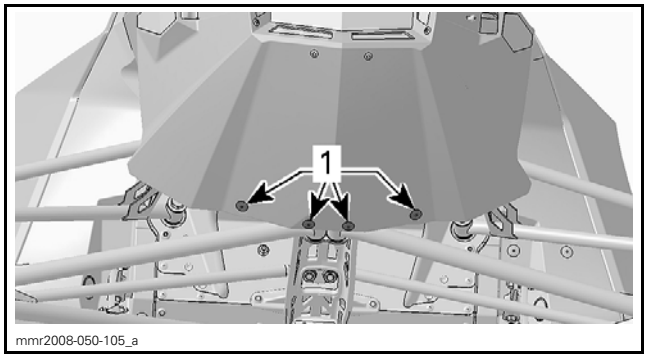
3. Proceed with *SIDE PANELS REMOVAL*, see procedure in this subsection.
4. Proceed with *FRONT BUMPER REMOVAL*, see procedure in this subsection.
5. Proceed with *MUFFLER REMOVAL* and *TUNED PIPE REMOVAL*. Refer to *EXHAUST SYSTEM* subsection.
6. Proceed with *FRONT SHOCK ABSORBERS REMOVAL*. Refer to *FRONT SUSPENSION* subsection.
7. Using an angle drill and a SUPERTANIUM DRILL BIT 3/16" (P/N 529 031 800), remove all rivets retaining bottom pan.

NOTE: Refer to *FRAME* for proper procedure when drilling rivets retaining plastic.



mmr2008-050-104_a

RH SIDE SHOWN
1. Drill these rivets



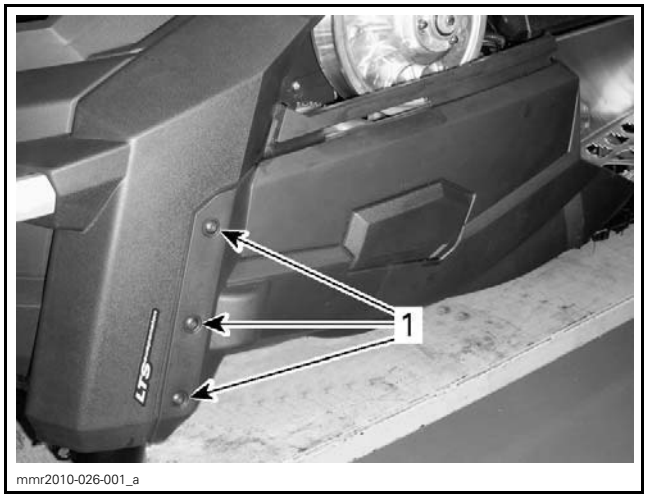
mmr2008-050-105_a

UNDERNEATH FRONT OF VEHICLE
1. Drill these rivets

8. Remove front bottom pan from vehicle.

Tundra Series

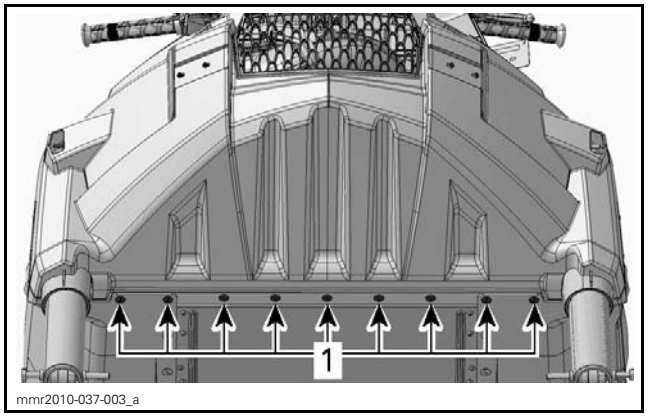
1. Lift front of vehicle until skis are off the ground.
2. Place the front portion of frame on a wooden box to support it securely.
3. Proceed with *SIDE PANELS REMOVAL*, see procedure in this subsection.
4. Proceed with *FRONT BUMPER REMOVAL*, see procedure in this subsection.
5. Remove screws retaining forward end of rear bottom pan (both sides).



LH SIDE SHOWN
1. Front retaining screws

6. Using an angle drill and a SUPERTANIUM DRILL BIT 3/16" (P/N 529 031 800), remove all rivets retaining front bottom pan.

NOTE: Refer to *FRAME* for proper procedure when drilling rivets retaining plastic.



UNDERNEATH OF VEHICLE
1. Drill these rivets (9x)

7. Remove bottom pan from vehicle by pulling it toward the front.

Front Bottom Pan Installation

The installation is the reverse of removal procedure. However, pay attention to the following.

Install NEW rivets.

TIGHTENING TORQUE	
Bottom pan cover screws	2.5 N•m (22 lbf•**in**)

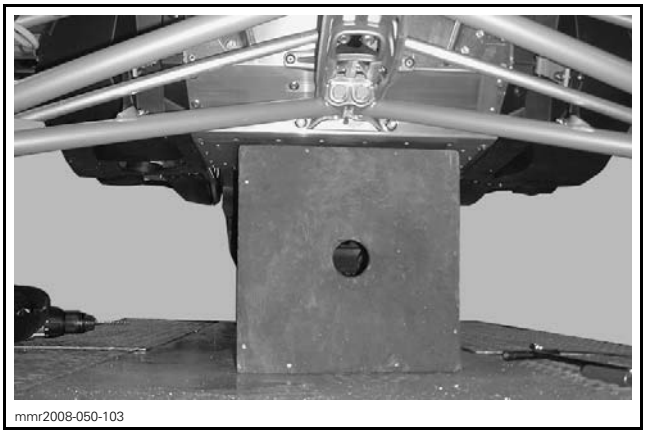
REAR BOTTOM PAN

NOTE: The procedure is the same for LH and RH rear bottom pans.

Rear Bottom Pan Removal

REV-XP 550F Series

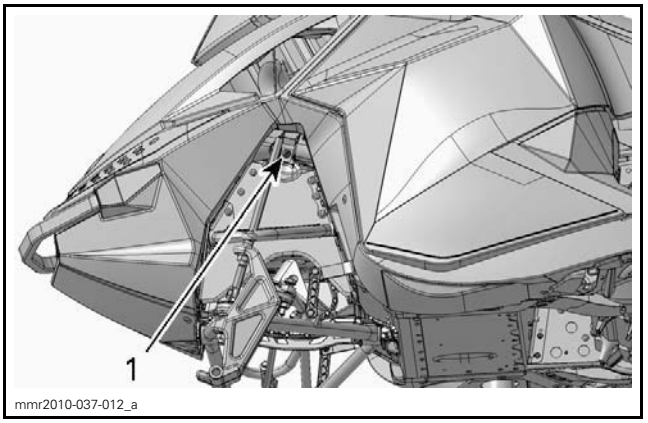
1. Proceed with *SIDE PANEL REMOVAL*, see procedure in this subsection.
2. Proceed with *HOOD REMOVAL*, see procedure in this subsection.
3. Proceed with *BOTTOM PAN COVER REMOVAL*, see procedure in this subsection.
4. Proceed with *MUFFLER REMOVAL* for RH side pan or *DRIVE PULLEY GUARD REMOVAL* for LH side pan.
5. Lift front of vehicle until skis are off the ground.
6. Place the front portion of frame on a wooden box to support it securely.



TYPICAL

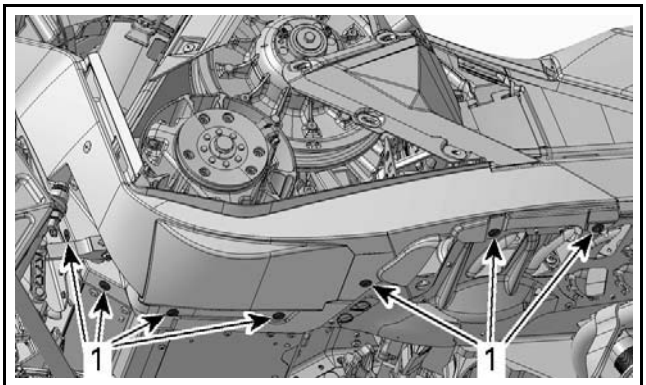
7. Remove upper shock absorber bolt and nut and move shock absorber outwards. Refer to *FRONT SUSPENSION* subsection.
8. Drill rivet retaining upper portion of bottom pan using SUPERTANIUM DRILL BIT 3/16" (P/N 529 031 800).

NOTE: Refer to *FRAME* for proper procedure when drilling rivets retaining plastic.

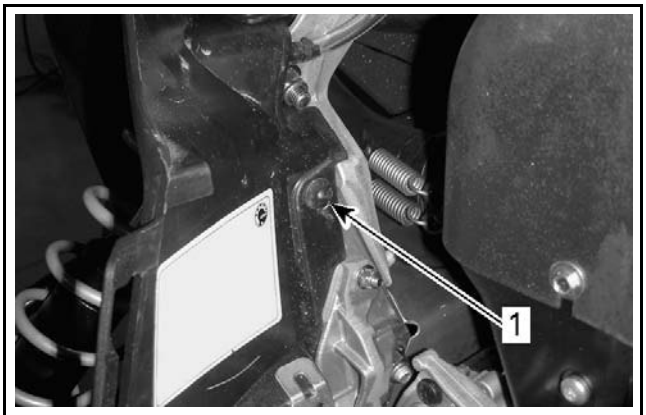


1. Upper retaining rivet

9. Drill all rivets retaining rear bottom pan using SUPERTANIUM DRILL BIT 3/16" (P/N 529 031 800). Refer to illustrations.

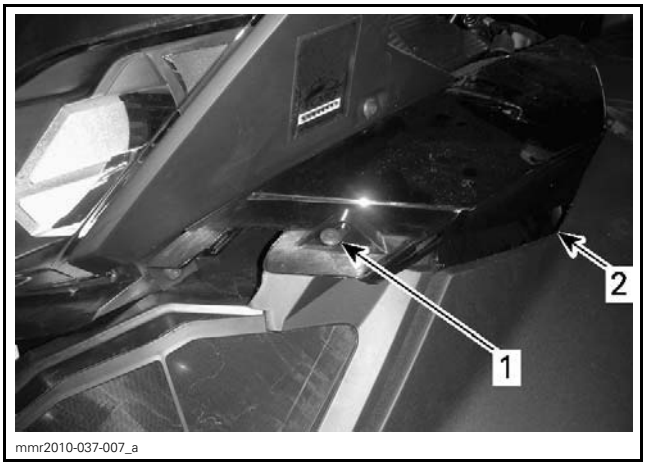


UNDERNEATH BOTTOM PAN
1. Retaining rivets (7x)



INSIDE BOTTOM PAN
1. Retaining rivet

10. Remove upper retaining screw securing console and rear bottom pan on vehicle.



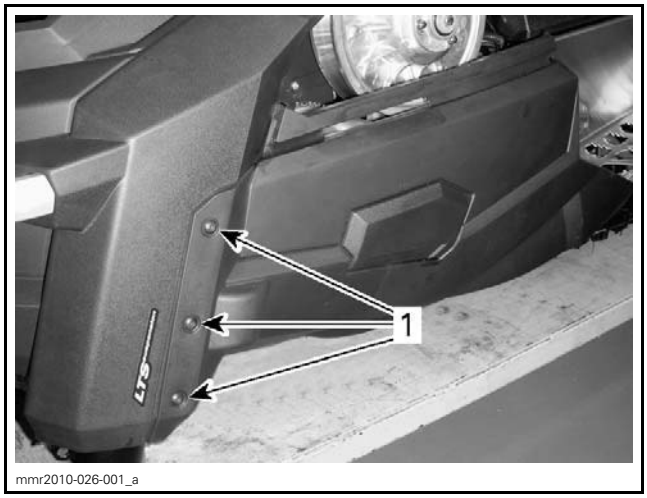
1. Upper retaining screw
2. Console

11. Remove rear bottom pan from vehicle.

NOTE: On LH side pan, remove drive pulley guard support by drilling rivets.

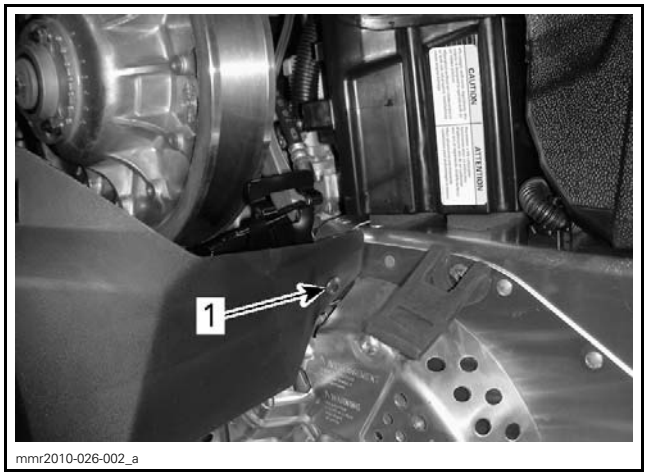
Tundra Series

1. Proceed with *SIDE PANELS REMOVAL*, see procedure in this subsection.
2. Remove front retaining screws of rear bottom pan.



LH SIDE SHOWN
1. Front retaining screws

3. Remove rear retaining screw of rear bottom pan.



LH SIDE SHOWN
1. Rear retaining screw

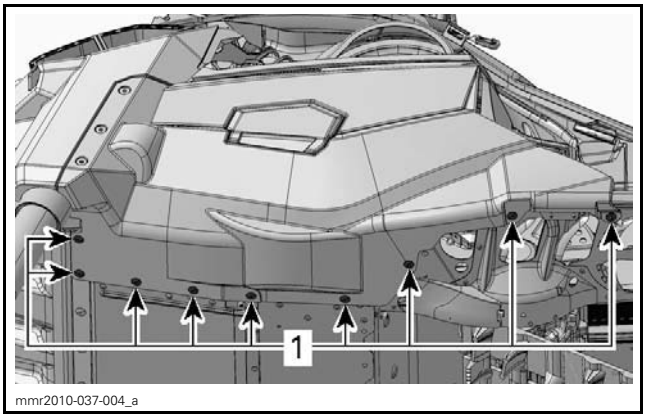
4. Detach upper tab of rear bottom pan.



LH SIDE SHOWN
1. Upper tab

5. Remove all rivets retaining rear bottom pan using an angle drill and a SUPERTANIUM DRILL BIT 3/16" (P/N 529 031 800).

NOTE: Refer to *FRAME* for proper procedure when drilling rivets retaining plastic.



UNDERNEATH OF VEHICLE
1. Drill these rivets (9x)

6. Remove rear bottom pan from vehicle.

Rear Bottom Pan Installation

The installation is the reverse of removal procedure. However, pay attention to the following.

Install **NEW** rivets.

Tighten rear bottom pan retaining screws to specification.

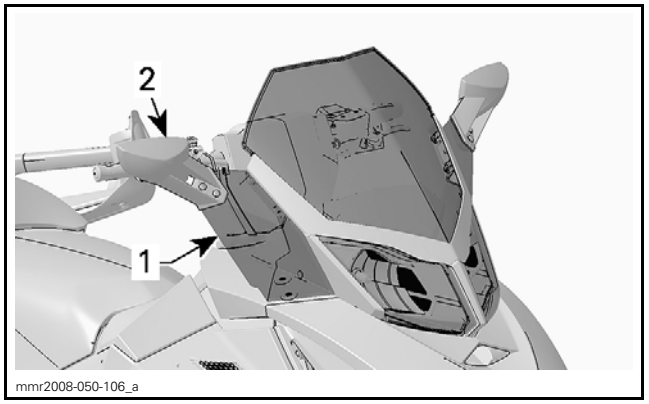
TIGHTENING TORQUE	
Bottom pan cover screws	2.5 N•m (22 lbf•**in**)

WINDSHIELD

Windshield Removal

1. Place your hands on each side of windshield.
2. Pull the windshield until its pins come out of rubber grommets.

NOTE: On applicable models, detach both deflectors first.



TYPICAL - MODELS WITH DEFLECTORS
1. Windshield deflector
2. Mirror

Windshield Installation

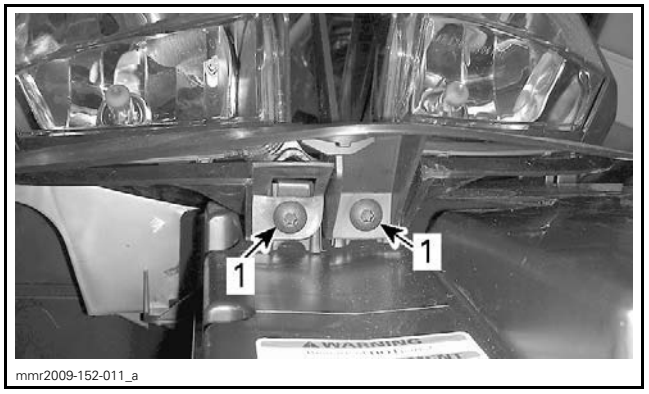
The installation is the reverse of removal procedure.

NOTE: Make sure not to push grommets through headlight/gauge module holes.

HEADLIGHT/GAUGE MODULE

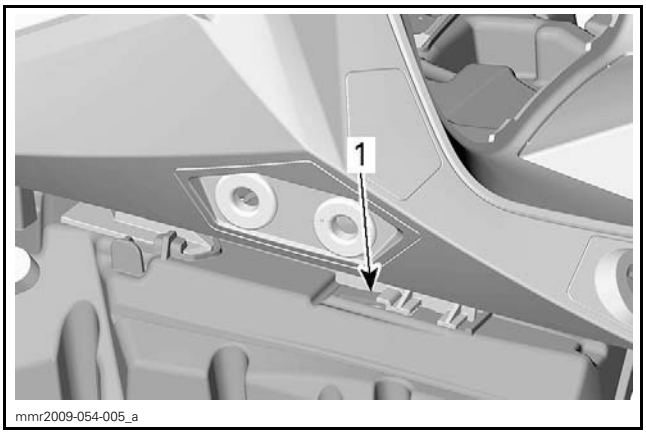
Headlight/Gauge Module Removal

1. Remove the secondary air intake silencer and headlight/gauge module as a unit, refer to *AIR INTAKE SYSTEM* subsection.
2. Remove both screws securing front of headlight/gauge module to secondary air intake silencer.

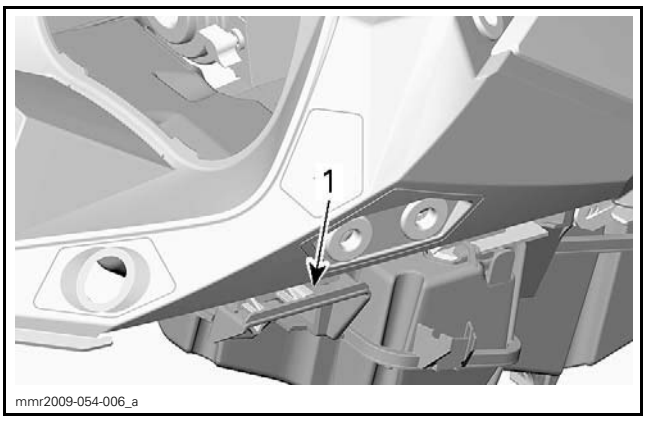


TYPICAL
1. Front retaining screws

3. On LH and RH sides of headlight/gauge module, press and hold the tabs securing headlight/gauge module to secondary air intake silencer.



TYPICAL -- LH SIDE SHOWN
1. Press this tab



TYPICAL - RH SIDE SHOWN
1. Press this tab

4. Slide the headlight/gauge module then lift its rear portion to separate it from secondary air intake silencer.

Headlight/Gauge Module Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

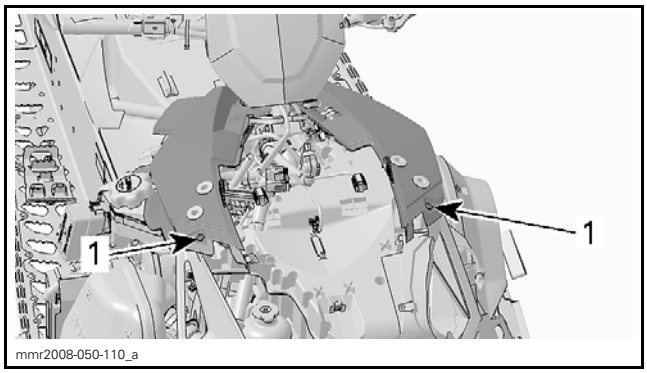
Check headlight beam aiming, refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.

CONSOLE

Console Removal

REV-XP 550F Series

1. Remove seat.
2. Proceed with *SIDE PANEL REMOVAL* (both sides), see procedure in this subsection.
3. Proceed with *HEADLIGHT/GAUGE MODULE REMOVAL*, see procedure in this subsection.
4. Remove screws securing both sides of console front section.



1. Remove these screws

5. Remove choke lever retaining nut.
6. Remove fuel tank cap.
7. Remove console retaining nut from fuel tank filler neck.

REQUIRED TOOL	
CONSOLE NUT WRENCH (P/N 529 036 183)	

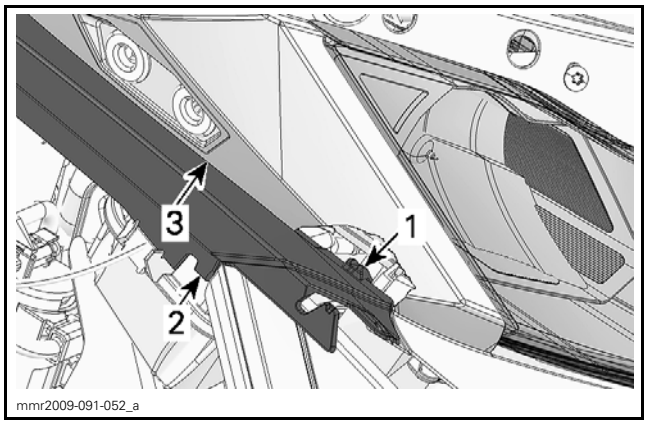
8. Lift up the console and disconnect the following
   – Engine cut-off switch
   – 12-volt power outlet (as applicable).
9. Install fuel tank cap.

Tundra Series

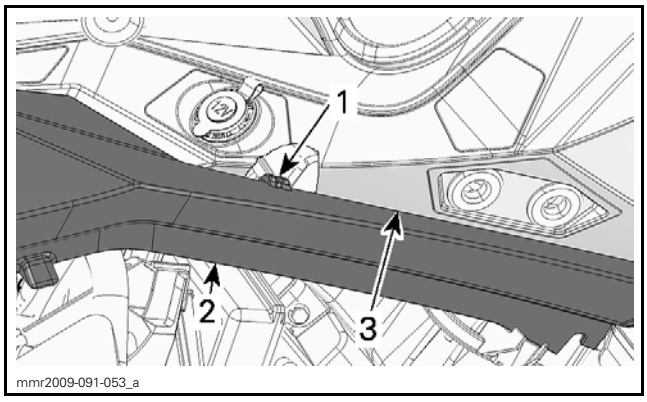
1. Remove seat.
2. Proceed with *SIDE PANEL REMOVAL*, see procedure in this subsection.
3. Remove fuel tank cap.
4. Remove console retaining nut from fuel tank filler neck.

REQUIRED TOOL	
CONSOLE NUT WRENCH (P/N 529 036 183)	

5. Unlock console retaining clips located under headlight/gauge module (two on each side).



1. Clip near the front of console
2. Console
3. Headlight/gauge module



1. Rear clip
2. Console
3. Headlight/gauge module

6. Lift up the rear of console and slide it toward the rear of the vehicle.
7. Install fuel tank cap.

Console Installation

The installation is the reverse of removal procedure.

Tighten retaining screws to specification.

TIGHTENING TORQUE		
REV-XP SERIES	Headlight/gauge module retaining screws	2.5 N•m (22 lbf•**in**)
REV-XP and Tundra SERIES	Console retaining nut	6 N•m (53 lbf•**in**)

Tundra Series

NOTE: Be sure to install the console trim panel over the console before installing the console retaining nut.

SEAT COVER

Seat Cover Replacement

Remove seat.

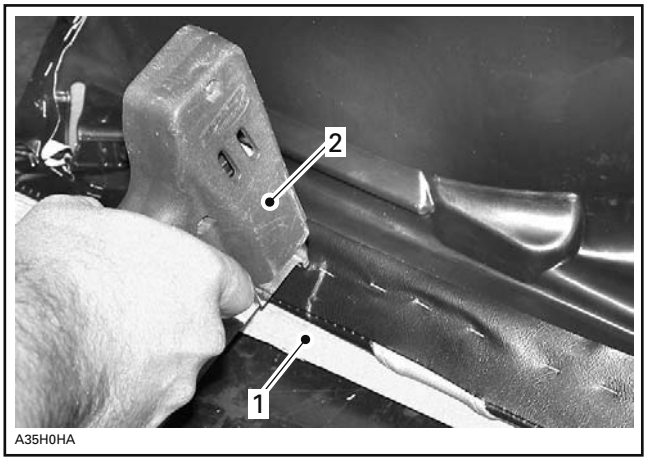
Remove the old seat cover. Check foam condition; replace it if necessary.

Install staples using either an ELECTRIC ARROW TACKER (P/N ETN-50) or the MANUAL ARROW TACKER (P/N T-50).

NOTICE **Be sure to use proper length staples. Extra long staples could pierce the exposed side of the leatherette.**

NOTE: For an easier installation, it is highly recommended to use an electric tacker.

Ensure the seat rest firmly against a hard surface, such as a piece of wood. This is done to get the staples completely pushed in place.



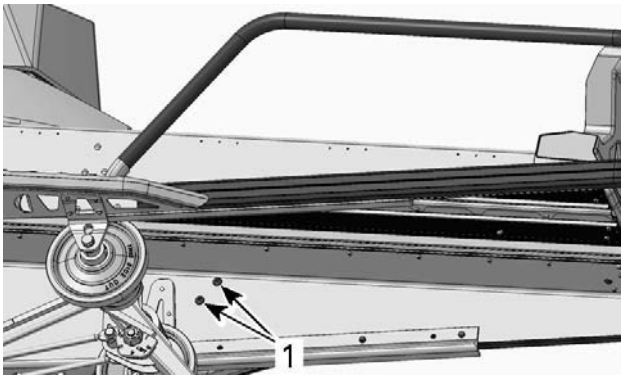
TYPICAL
1. Piece of wood
2. Tacker

After seat cover installation, cut off excess of material.

REAR RACK

Rear Rack Removal

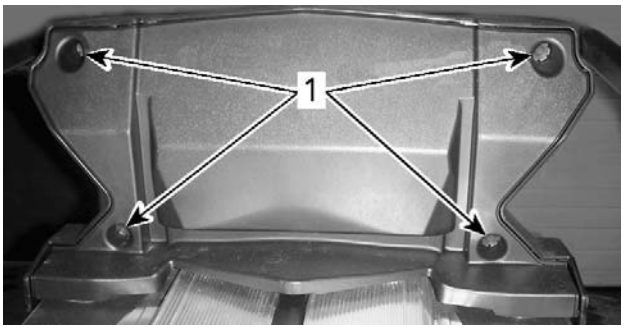
1. From underneath tunnel, remove side retaining screws.



mmr2010-037-006_a

TYPICAL
1. Side retaining screws

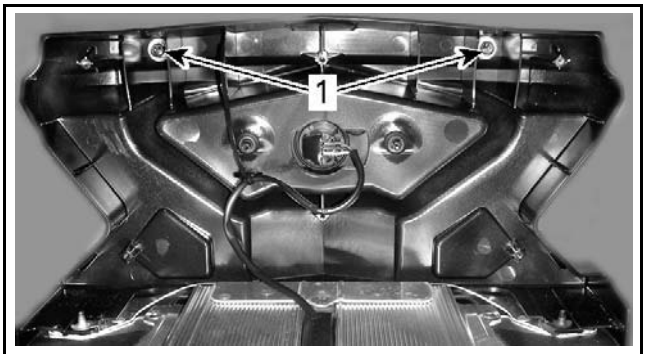
2. Remove rear rack support cover by unscrewing retaining screws.



mmr2010-037-016_b

1. Retaining screws

3. Remove rear retaining screws from rear rack.



mmr2010-037-015_a

1. Retaining screws

4. Remove rear rack from vehicle.

Rear Rack Installation

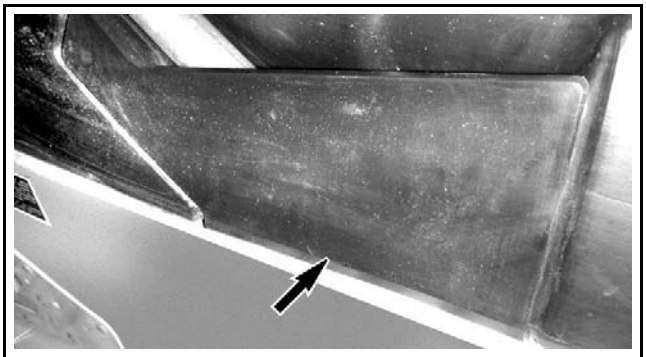
The installation is the reverse of removal procedure, however, pay attention to the following.

TIGHTENING TORQUE	
Rear rack retaining screws	14 N•m (124 lbf•**in**)
Cover retaining screws	2 N•m (18 lbf•**in**)

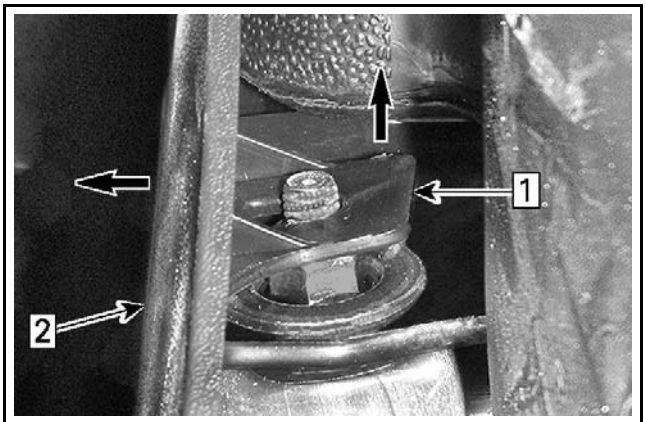
TRIM PANELS

Trim Panel Removal

1. Remove seat.
2. Remove trim panel as follows:
   2.1 Lift trim panel retaining tab upwards.
   2.2 Pull trim panel out.


msi2008-027-015_a

TYPICAL - TRIM PANEL



mmr2010-017-009_a

Step 1: Lift retaining tab
Step 2: Pull trim panel out

Trim Panel Installation

The installation is the reverse of removal procedure.

FRAME

SERVICE TOOLS

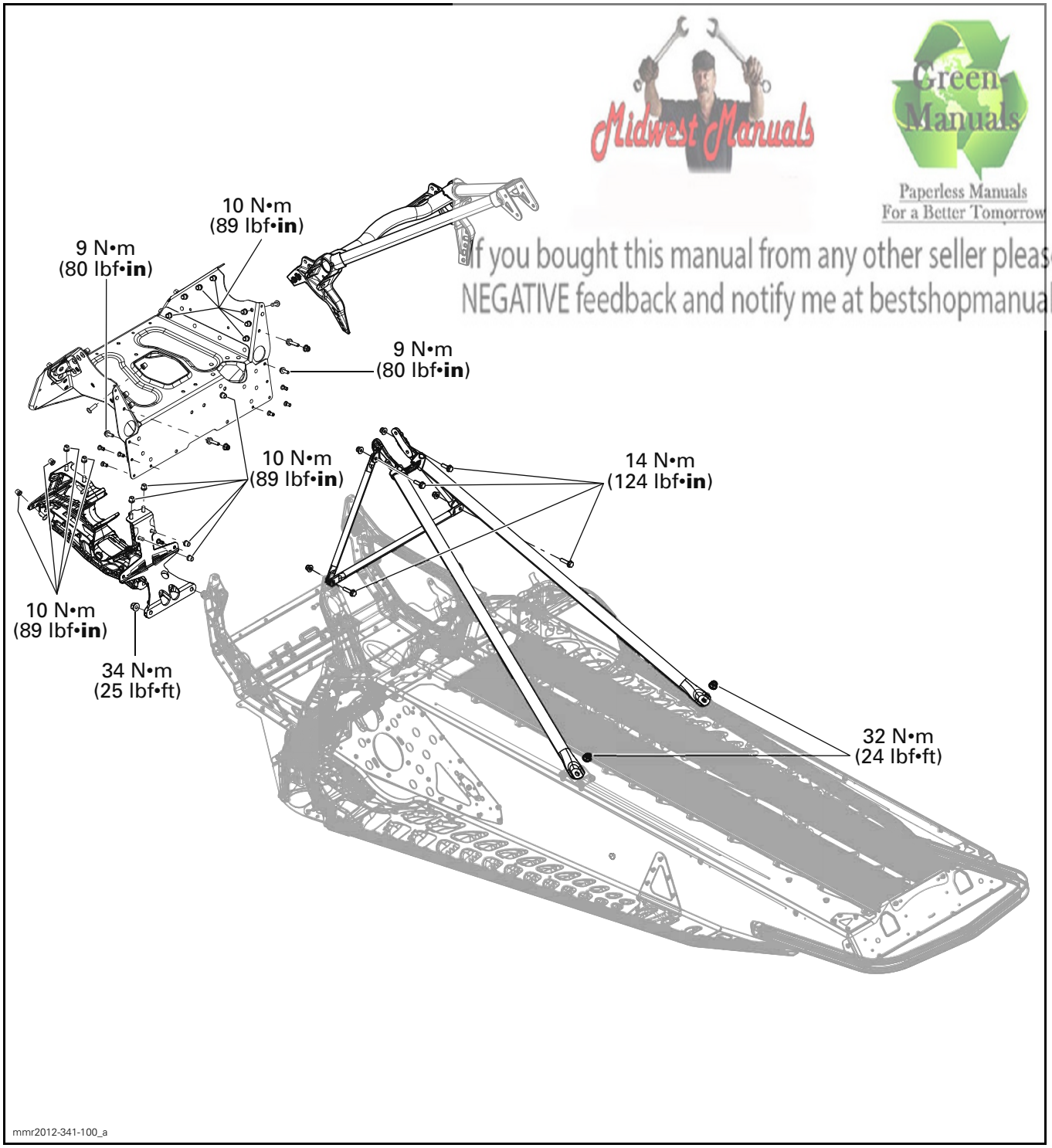
Description	Part Number	Page
SUPERTANIUM DRILL BIT 3/16"	529 031 800	415

SERVICE PRODUCTS

Description	Part Number	Page
XPS SYNTHETIC CHAINCASE OIL	413 803 300	415

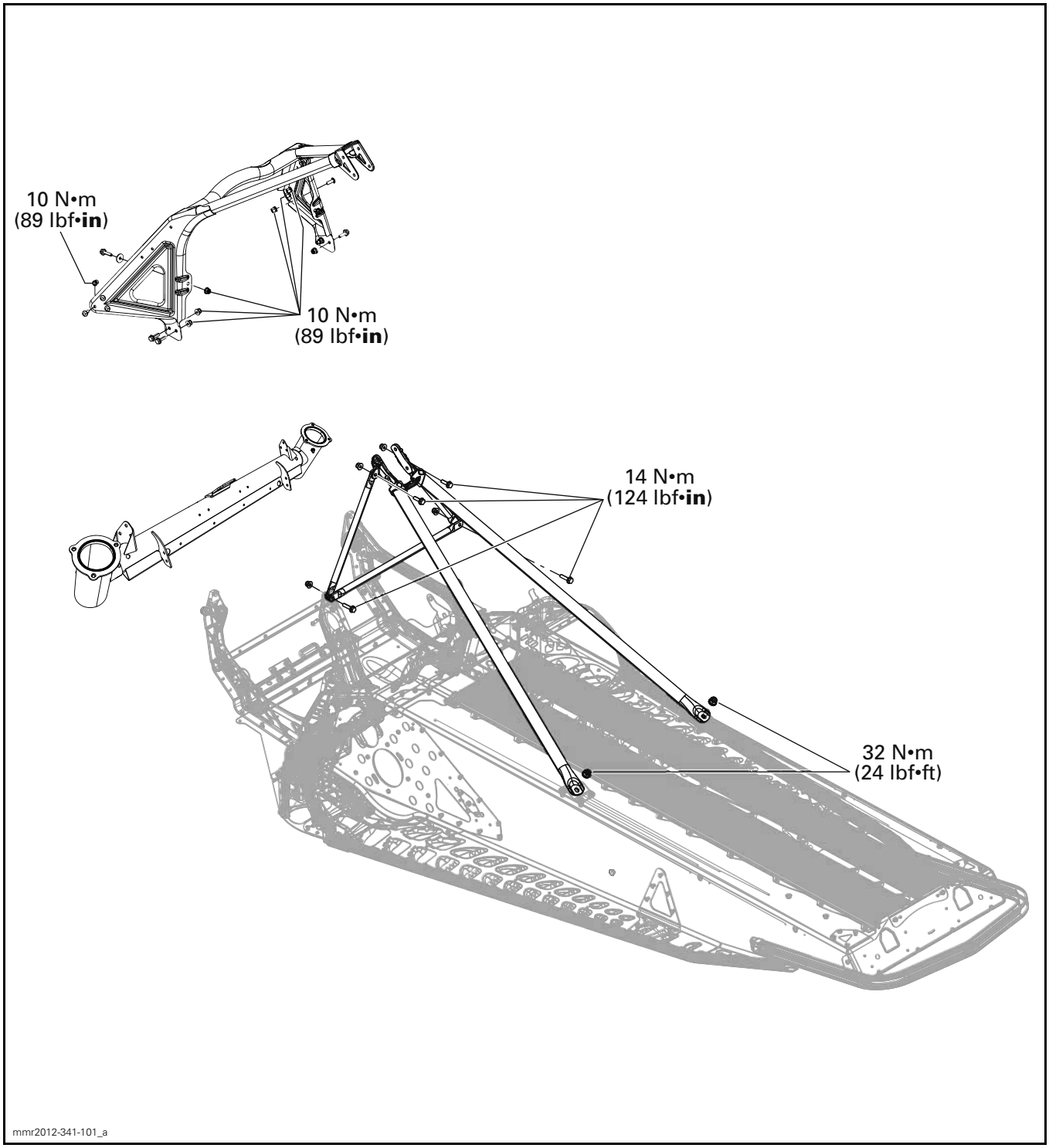
SUSPENSION MODULE AND FRAME MEMBERS

All Models Except Tundra



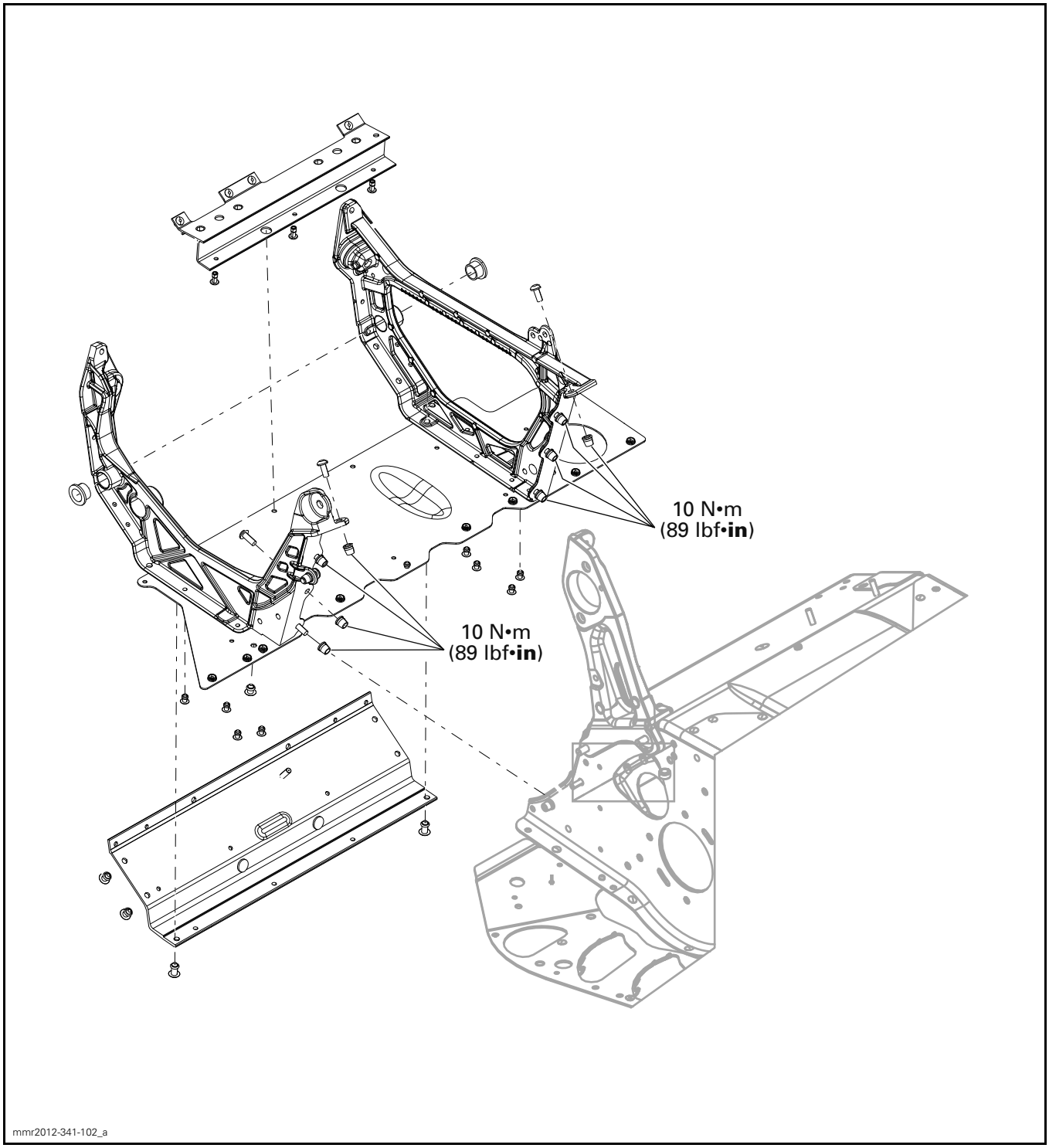
Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

Tundra and Tundra Sport

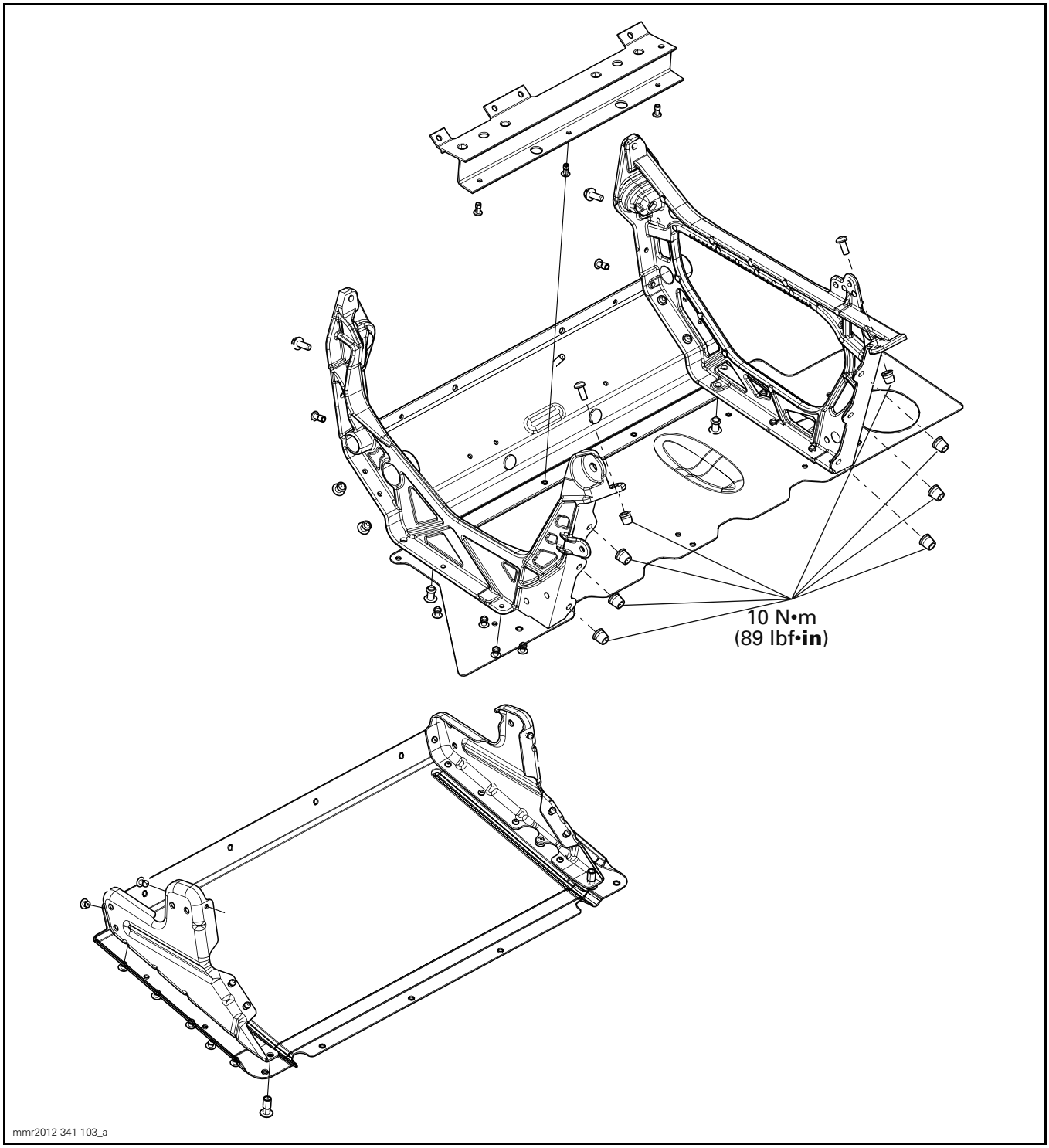


ENGINE MODULE

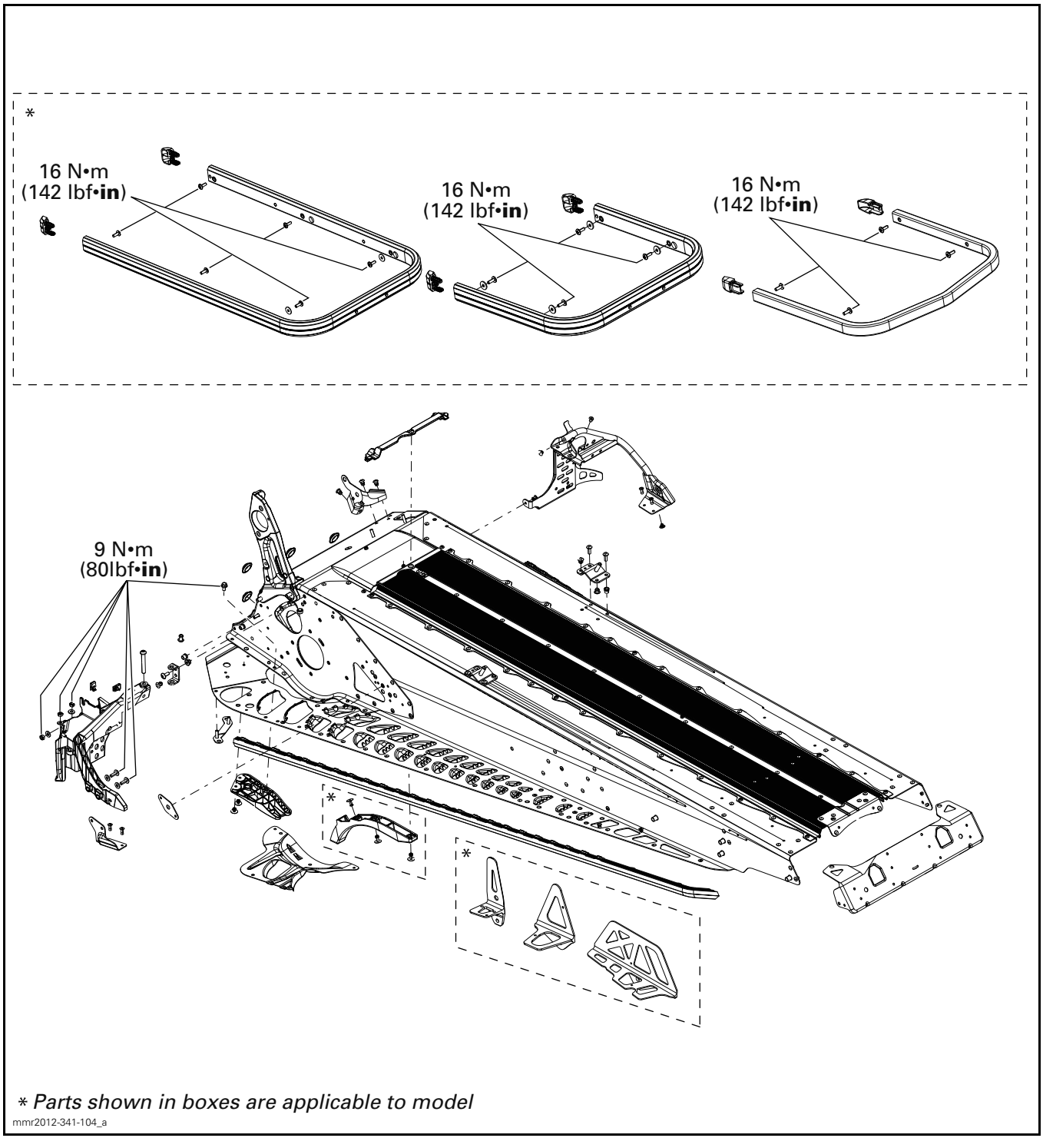
All Models Except Tundra



Tundra and Tundra Sport



TUNNEL AND REAR BUMPER



* *Parts shown in boxes are applicable to model*

mmr2012-341-104_a

PROCEDURES

RIVETS

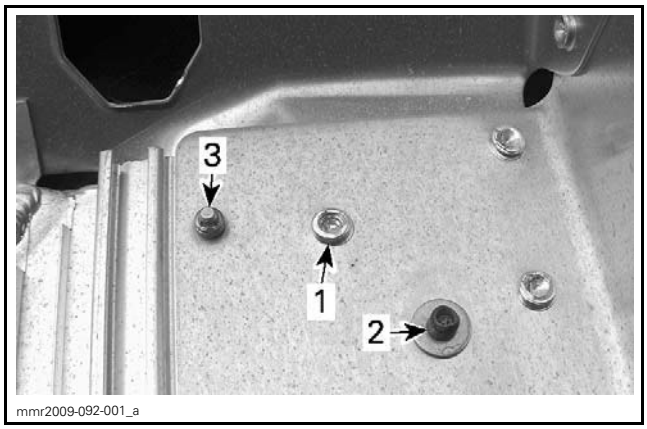
For proper drilling instructions and to prevent premature wear, follow the procedure below.

NOTICE When removing rivets, make sure do not enlarge or deform the holes.

Self-Percing Rivet Removal

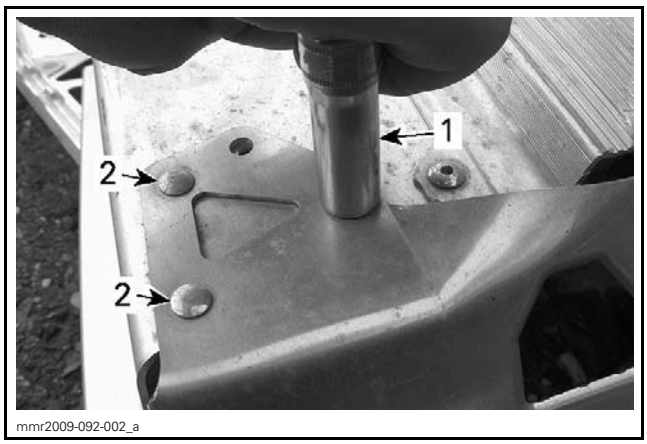
Recommended Method

1. Using a grinding disk, grind the rivet end.



1. Grind this side
2. Pop rivet
3. STAVEX rivet

2. Support the frame around the rivet head with a socket on the opposite side to avoid warpage.



1. 11 mm socket over a rivet head
2. Rivet heads

3. Drive out remaining rivet using a punch.

Alternative Method

1. Use the SUPERTANIUM DRILL BIT 3/16" (P/N 529 031 800), shipped in packs of 2.
2. Partially drill **rivet end — not the rivet head**.
3. Always use a variable speed drill.

NOTICE **High speed drilling will cause excessive heat which may destroy the cutting edge of the bit; therefore, avoid using pneumatic drills.**

4. 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 XPS SYNTHETIC CHAINCASE OIL (P/N 413 803 300) as a cutting oil.

5. Cut rivet using a chisel.
6. Remove riveted part.
7. Drive out remaining rivet head using a punch.

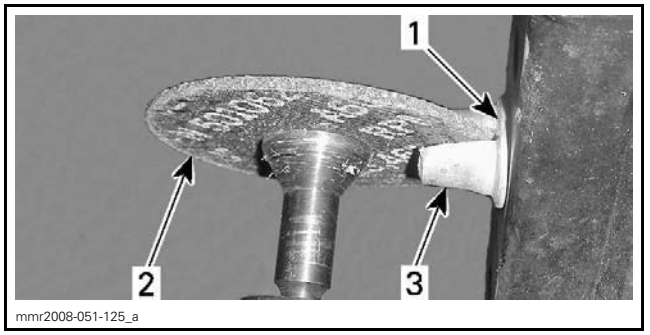
Pop Rivets Removal

1. Use the SUPERTANIUM DRILL BIT 3/16" (P/N 529 031 800), shipped in packs of 2.
2. Always use a variable speed drill.
3. Always drill **rivet head**.
4. Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.
5. When rivet is located on plastic part, use pliers to avoid rivet turning and heating plastic.
6. Use a small punch to push the rivet end.

HUCK Rivets Removal

Recommended Method

1. Using a cut-off tool, cut the rivet attachment without touching the shoulder.



1. Rivet attachment shoulder
2. Cutter wheel
3. Rivet attachment

NOTE: Apply a thin layer of grease on cutter wheel to increase its durability.

2. Break the rivet attachment shoulder using a chisel.
3. Use a small punch to push the rivet stem.

Alternative Method

1. Measure outside diameter of rivet stem and select appropriate drill bit.
2. Drill the **rivet stem — not the rivet head** until rivet attachment is freed.
3. Always use a variable speed drill.
4. Maintain a slow to medium speed at all times when drilling. The proper speed is attained when a constant chip is ejected.

NOTE: When possible, use an angle grinder to grind rivet head or use an air hammer to cut the rivet attachment.

FRAME

Frame Cleaning

Clean frame and tunnel with appropriate cleaners and rinse with high pressure hose.

NOTE: For bare aluminum frames use only aluminum cleaner and follow instructions on container.

NOTICE **Never direct high-pressure water jet towards decals. They will peel off.**

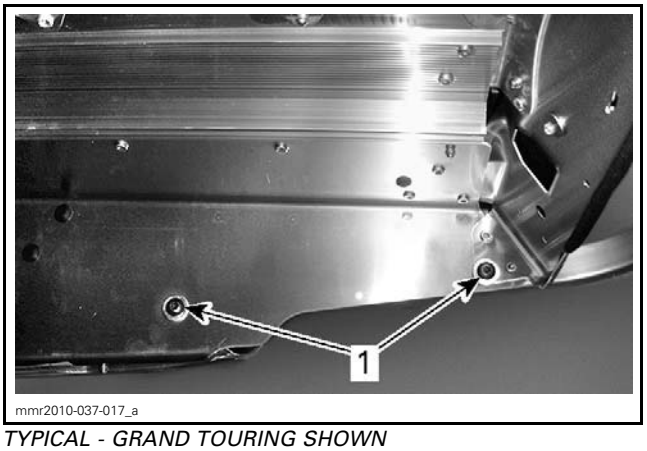
Frame Welding

No welds should be done on aluminum frame except if mentioned or required on a BRP bulletin.

REAR BUMPER

Rear Bumper Removal

1. From underneath tunnel, remove side retaining screws (on both sides).



TYPICAL - GRAND TOURING SHOWN
1. Side retaining screws

2. Remove bumper from vehicle.

Rear Bumper Installation

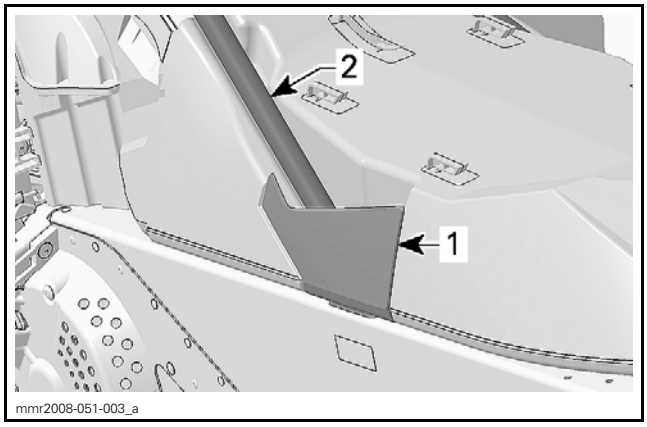
The installation is the reverse of removal procedure, however, pay attention to the following.

TIGHTENING TORQUE	
Bumper retaining screws	16 N•m (142 lbf•**in**)

REAR FRAME MEMBER

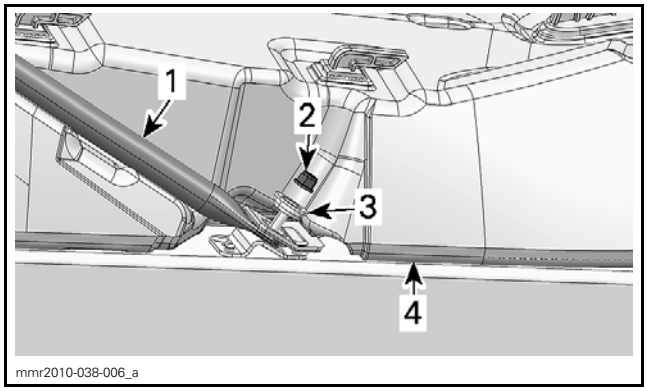
Rear Frame Member Removal

1. Refer to *BODY* subsection to remove the following:
   – Seat
   – Headlight/gauge module
   – Console.
2. Remove trim panel at the bottom of rear frame member (one each side).



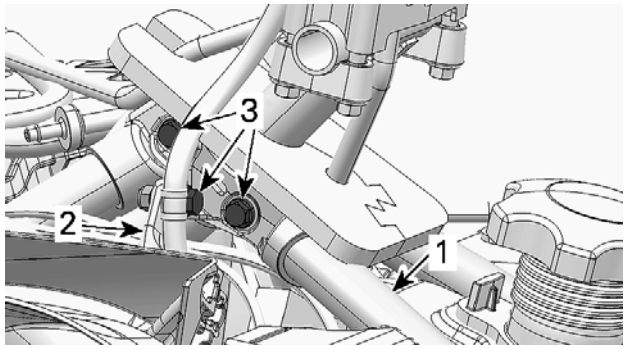
1. Trim panel
2. Rear frame member

3. Remove nut and shouldered washer securing rear frame member (one each side).



1. Rear frame member
2. Nut to remove
3. Shouldered washer
4. Fuel tank

4. Remove screws securing the rear frame member to steering column support and side frame members.



mmr2010-038-007_a

1. Rear frame member
2. LH side frame member
3. Bolts to remove

5. Remove rear frame member.

Rear Frame Member Installation

The installation is the reverse of the removal procedure.

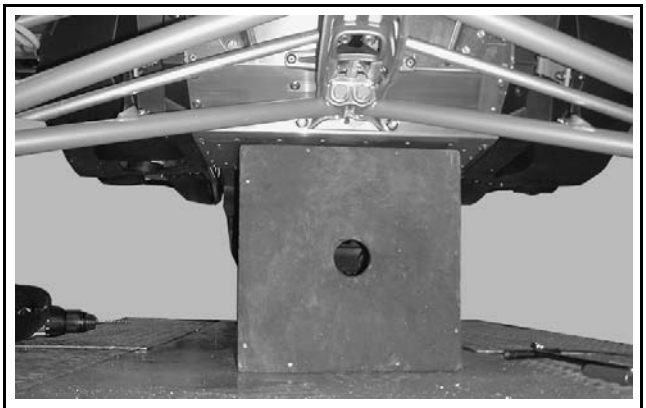
NOTE: Install all bolts and nuts before tightening them.

FRONT FRAME MEMBER

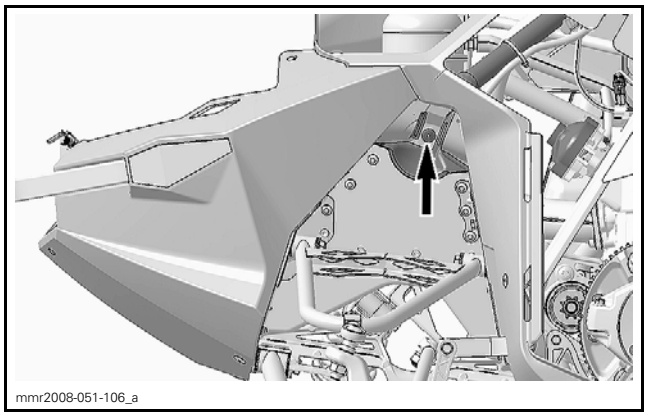
Front Frame Member Removal

REV-XP 550F Series

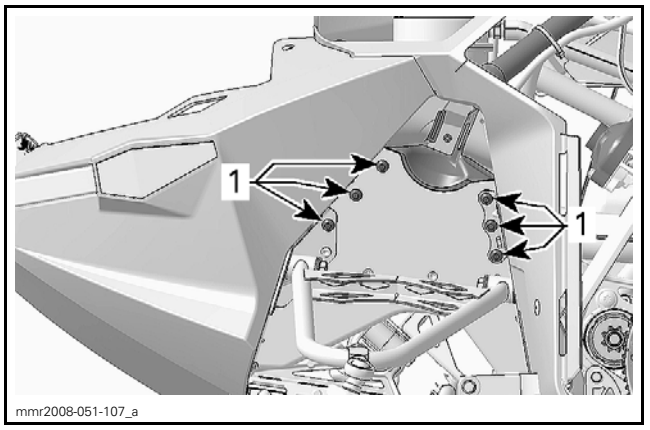
1. Refer to *BODY* subsection to remove the following:
   – Hood
   – Console
2. Remove the secondary air intake silencer and headlight/gauge module as a unit. Refer to *AIR INTAKE SYSTEM* subsection.
3. Remove the tuned pipe. Refer to *EXHAUST SYSTEM* subsection.
4. Lift front of vehicle until skis are off the ground.
5. Place the front portion of frame on a wooden box to support it securely.


mmr2008-050-103

6. Remove front shock absorbers.
7. Drill the rivet retaining the front bottom pan to front frame member (one each side).


mmr2008-051-106_a

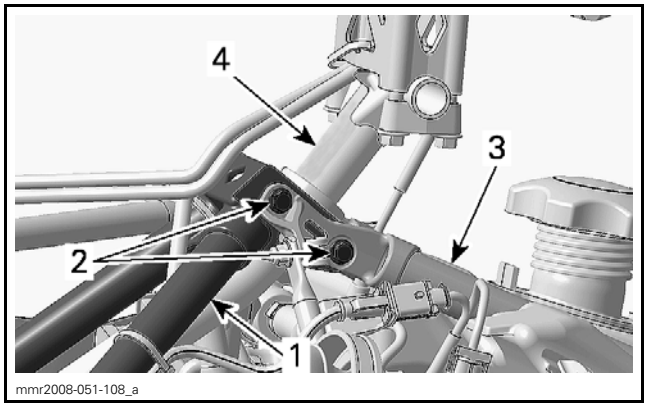
8. Remove HUCK rivets (six each side), see removal procedure at the beginning of this section.



mmr2008-051-107_a

1. HUCK rivets

9. Remove bolts securing front frame member, rear frame member and steering column support.



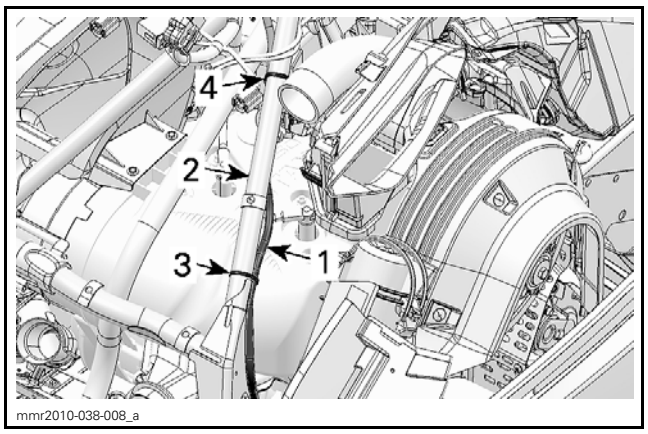
mmr2008-051-108_a

1. Front frame member
2. Bolts to remove
3. Rear frame member
4. Steering column

10. Remove the front frame member.

Tundra Series

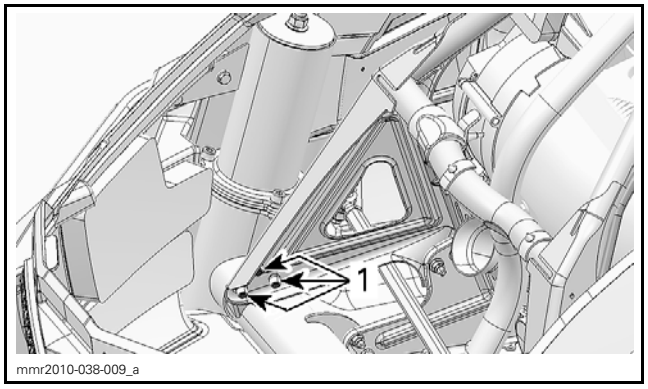
1. Refer to *BODY* subsection and remove the following parts.
   – Hood
   – Console
2. Remove the secondary air intake silencer and headlight/gauge module as a unit. Refer to *AIR INTAKE SYSTEM* subsection.
3. Refer to *AXIAL FAN* subsection and remove the upper inlet air duct.
4. Refer to *EXHAUST SYSTEM* subsection and remove the tuned pipe.
5. Cut locking ties securing the fuel tank vent hose to the front frame member.



mmr2010-038-008_a

1. Fuel tank vent hose
2. Front frame member
3. Locking tie
4. Locking tie

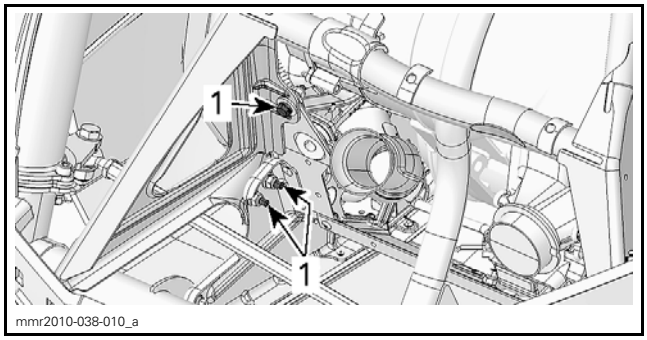
6. Using the procedure described at the beginning of this subsection, remove the HUCK rivets (3 on each side) securing the front frame member to the LTS module.



mmr2010-038-009_a

1. Huck rivets

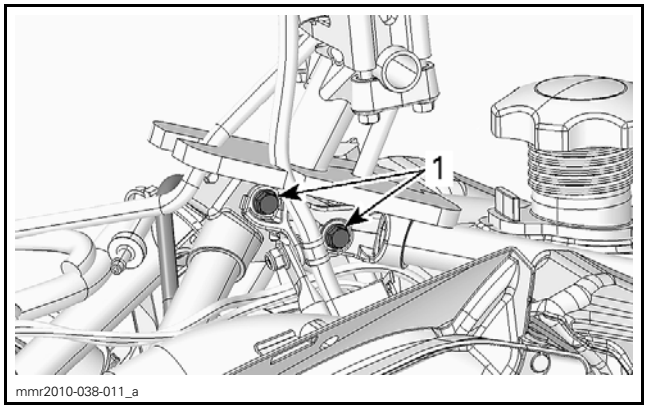
7. Remove bolts (3 on each side) retaining the front frame member to the front cross member and engine member.



mmr2010-038-010_a

1. Retaining bolts to remove

8. Remove bolts securing front frame member, rear frame member and steering column support.



mmr2010-038-011_a

1. Upper retaining bolts to remove

9. Remove the front frame member from vehicle.

Front Frame Member Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

1. Replace the HUCK rivets with the following parts.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 20	(P/N 207 662 044)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

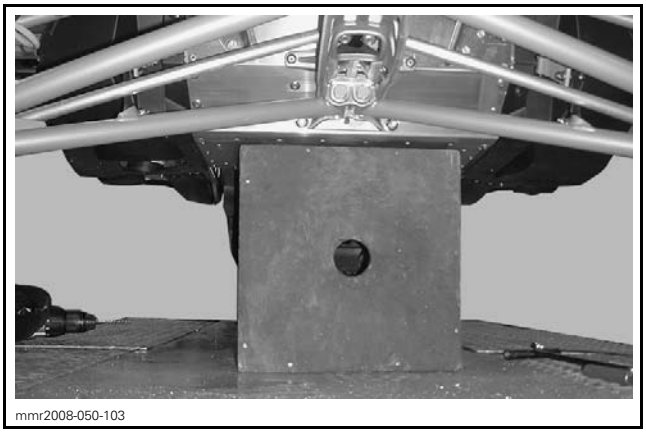
NOTE: Unless stated otherwise, install bolt heads toward outside of the vehicle.

2. Torque new fasteners to 10 N•m (89 lbf•**in**).

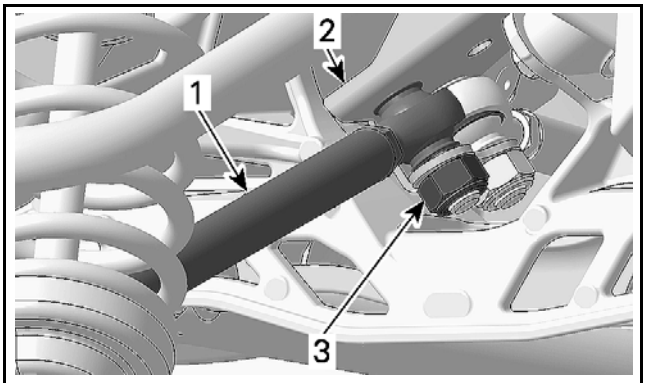
SUSPENSION MODULE (XP-ESR)

Suspension Module Removal

1. Lift front of vehicle until skis are off the ground.
2. Place the front portion of frame on a wooden box to support it securely.


mmr2008-050-103

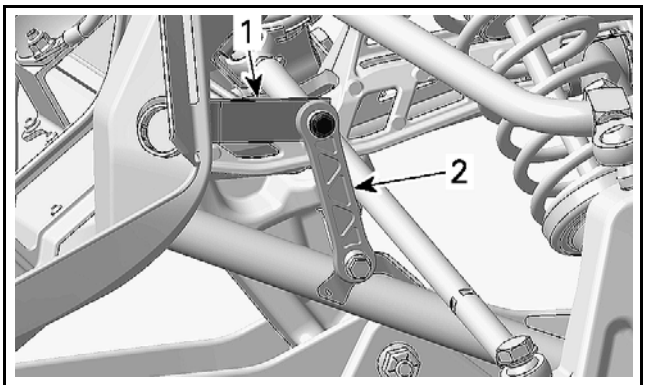
3. Remove the muffler and the tuned pipe. Refer to *EXHAUST SYSTEM* subsection.
4. Remove the RH front suspension assembly by doing the following:
   4.1 Detach tie-rod end from steering column.



mmr2008-051-109_a

1. Tie-rod
2. Steering column
3. Tie-rod end nut

   4.2 Remove shock absorber upper bolt.
   4.3 Remove bolt linking stabilizer link and stabilizer lever.



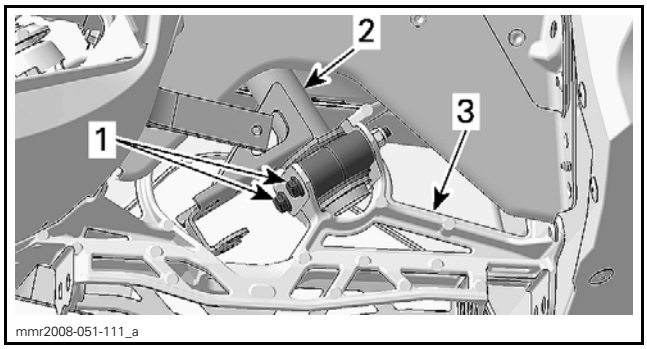
mmr2008-051-110_a

1. Stabilizer lever
2. Stabilizer link

   4.4 Remove upper and lower suspension arms bolts. Refer to *FRONT SUSPENSION* subsection.
   4.5 Pull suspension arms to remove the RH front suspension assembly.

   NOTE: Repeat same procedure for the LH front suspension.

5. Remove bolts securing the bottom of steering column.



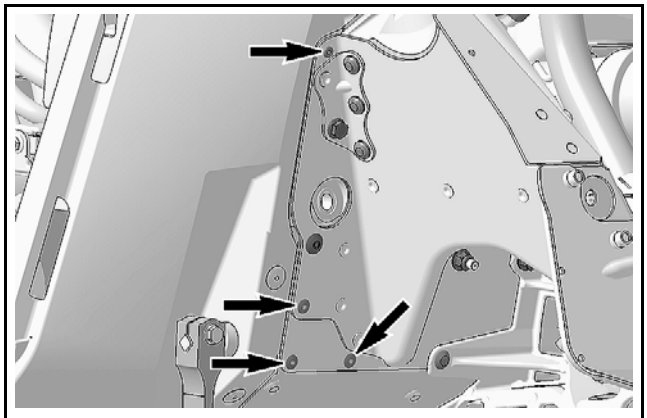
mmr2008-051-111_a

1. Steering column bolts
2. Steering column
3. Lower suspension arm support

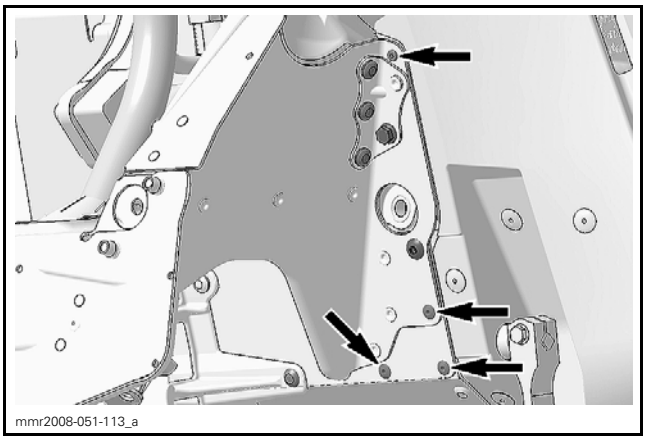
6. Remove the front bottom pan. Refer to *BODY* subsection.

NOTE: Keep the front bumper installed on front bottom pan.

7. Drill the following rivets.

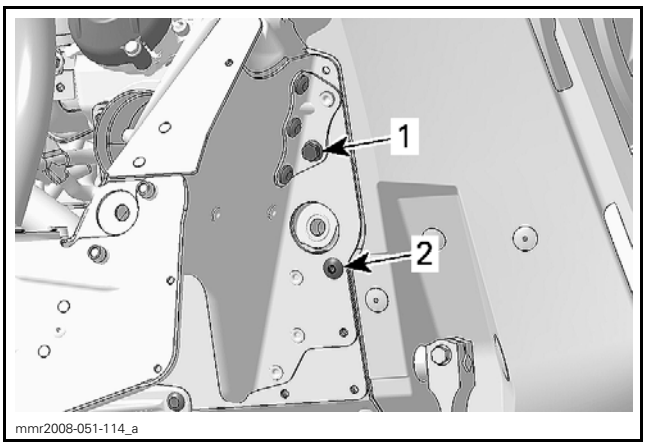

mmr2008-051-112_a

RH SIDE



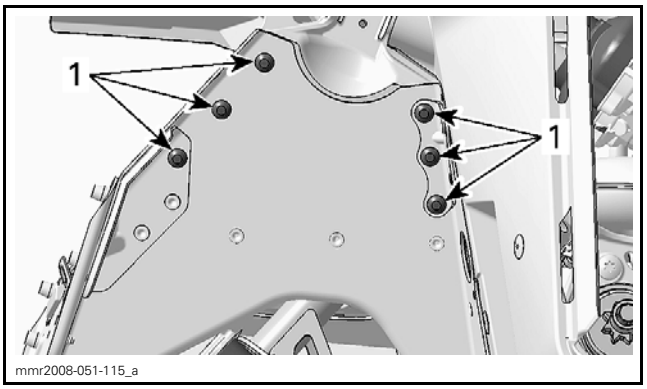
LH SIDE

8. Remove screws securing the suspension module to frame (2 each side).



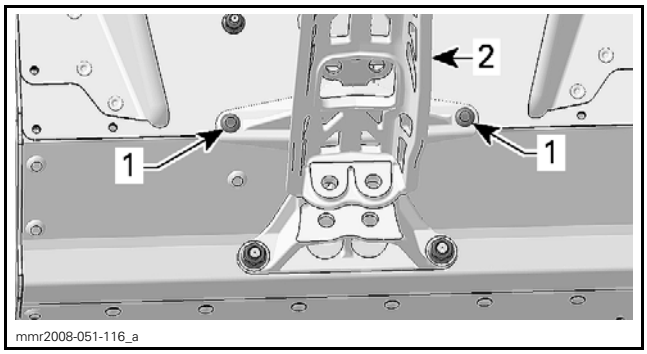
LH SIDE SHOWN
1. Hexagonal flanged bolt
2. Torx screw

9. Remove HUCK rivets (six each side), see removal procedure at the beginning of this subsection.



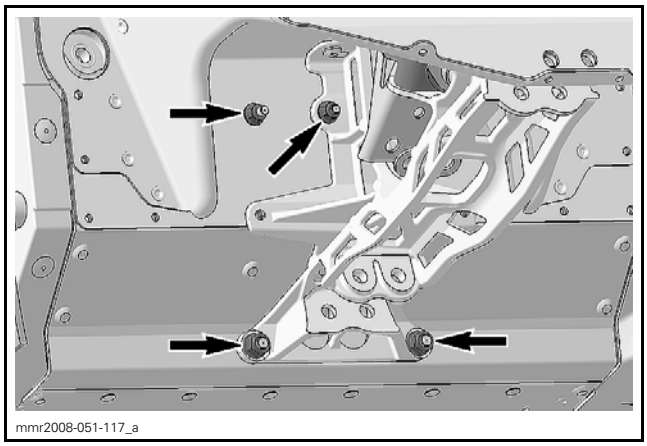
LH SIDE SHOWN
1. HUCK rivets

10. Grind rivets securing the lower suspension arm support to engine module.



1. Rivets
2. Lower suspension arm support

11. Remove the following nuts.



12. Remove the suspension module.

Suspension Module Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

1. Replace the HUCK rivets with the following parts.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 20	(P/N 207 662 044)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

NOTE: Unless stated otherwise, install bolt heads toward outside of the vehicle.

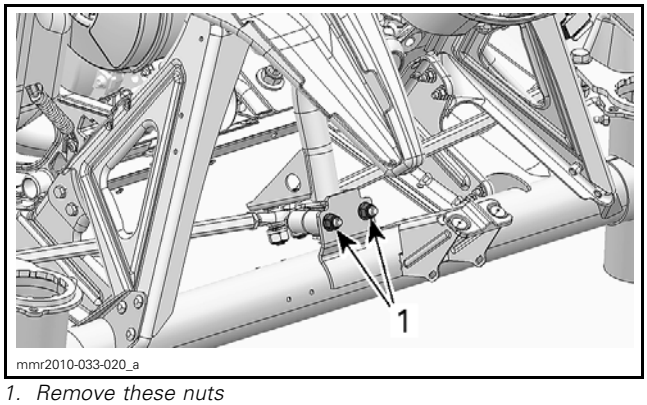
2. Torque new fasteners to 10 N•m (89 lbf•**in**).
3. Reinstall all removed parts by using the appropriate installation procedure.

SUSPENSION MODULE (XP-LTS)

Suspension Module Removal

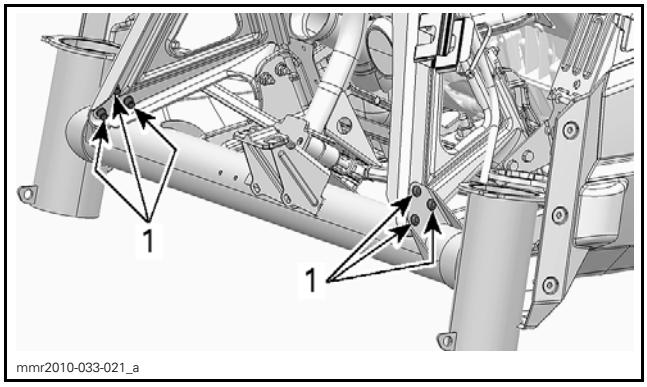
1. Lift the front of vehicle until skis are off the ground.

2. Place the front portion of frame on a wooden box to support it securely.
3. Remove skis. Refer to *STEERING SYSTEM* subsection.
4. Remove the front bottom pan. Refer to *BODY* subsection.
5. Remove tuned pipe. Refer to *EXHAUST SYSTEM* subsection.
6. Remove front shock absorbers and ski legs. Refer to *FRONT SUSPENSION (XP-LTS)* subsection.
7. Remove nuts securing the bottom of the steering column.



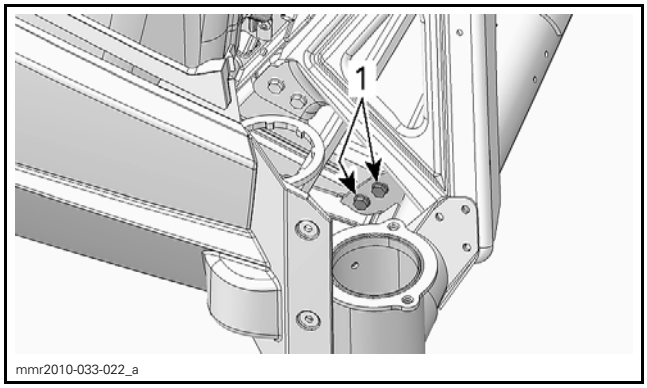
1. Remove these nuts

8. Using the procedure described at the beginning of this subsection, remove HUCK rivets (3 on each side).



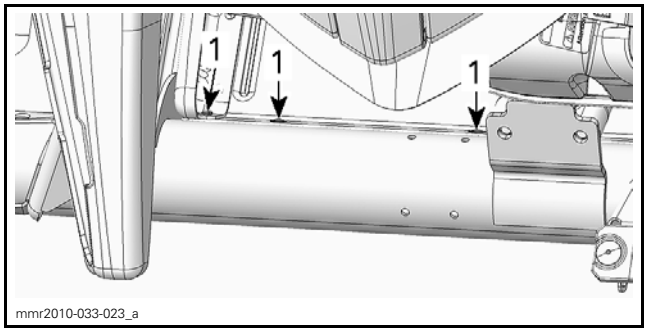
1. HUCK rivets

9. Remove the four bolts retaining the suspension module to front spars (2 each side).

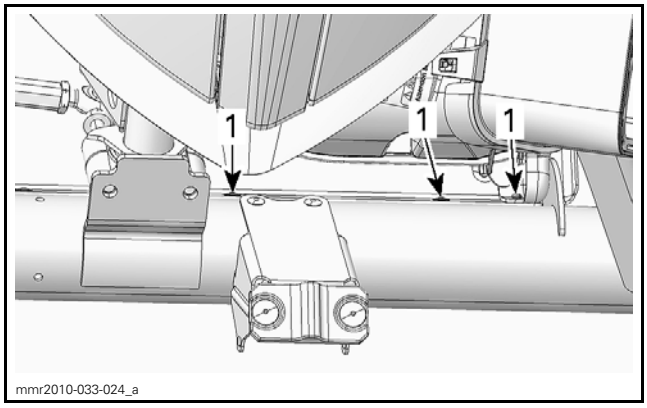


RH OF VEHICLE SHOWN
1. Remove these bolts

10. Using an angular drill, remove the six rivets retaining the front plate to the suspension module.

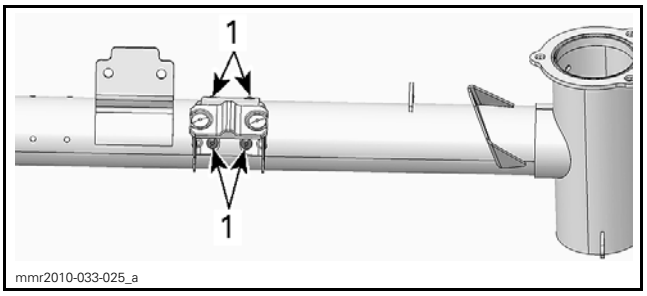


RH OF SUSPENSION MODULE
1. Rivets to be removed



LH OF SUSPENSION MODULE
1. Rivets to be removed

11. Remove the suspension module from the vehicle.
12. Remove the tuned pipe support by drilling retaining rivets.



1. Tuned pipe support retaining rivets

Suspension Module Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

Replace the HUCK rivets with the following parts.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 20	(P/N 207 662 044)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

NOTE: Install bolt heads toward outside of the vehicle.

Position the suspension module to the vehicle using bolts and nuts. Do not torque yet.

Replace all removed rivets.

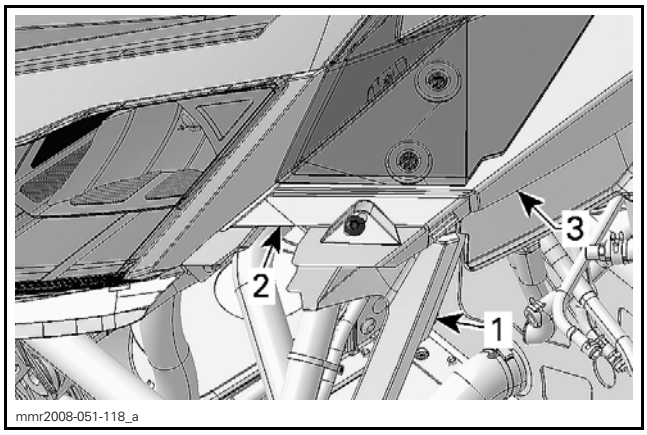
Tighten all nuts to 10 N•m (89 lbf•**in**).

ENGINE MODULE

Engine Module Removal

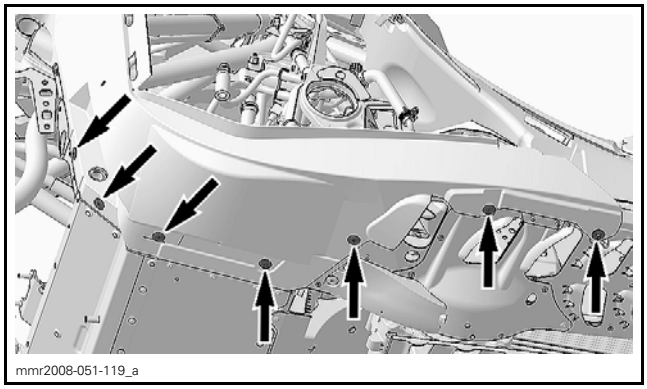
REV-XP 550F Series

1. Remove engine from vehicle. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.
2. Remove the suspension module, see procedure in this subsection.
3. Remove stabilizer bar (if applicable).
4. Remove screws retaining side bottom pan to headlight housing.

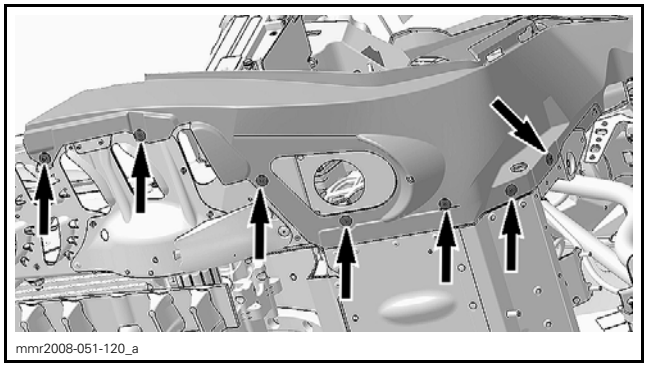


LH SIDE SHOWN
1. Side bottom pan
2. Headlight housing
3. Headlight/gauge module

5. Remove both side bottom pans by drilling the following rivets.

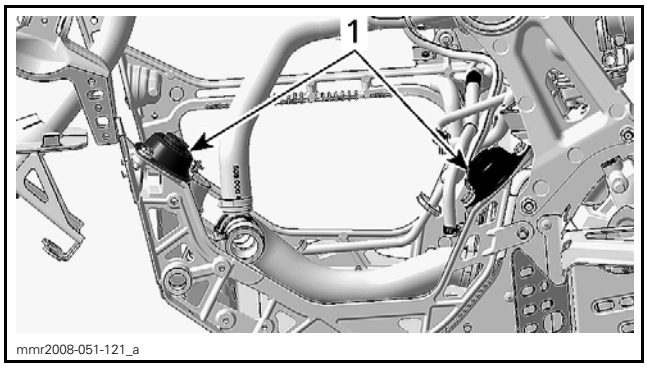


LH SIDE BOTTOM PAN



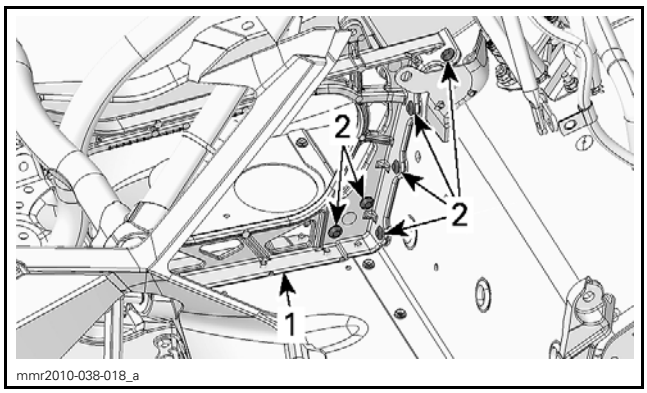
RH SIDE BOTTOM PAN

6. On LH side, remove front and rear engine rubber mounts.

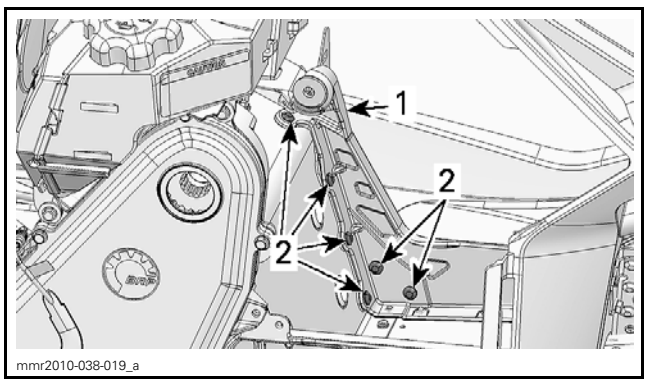


1. Engine rubber mounts

7. Remove HUCK rivets, see removal procedure at the beginning of this subsection.

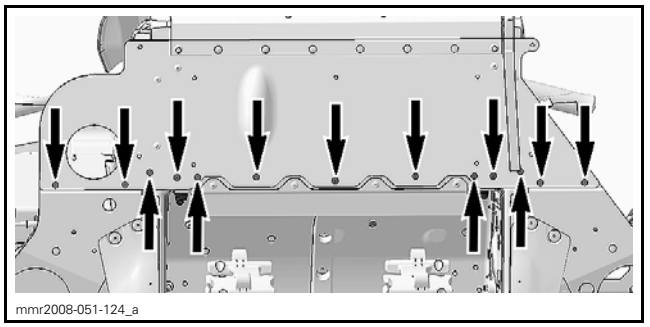


RH SIDE SHOWN
1. RH engine module member
2. HUCK rivets



LH SIDE SHOWN
1. LH engine module member
2. HUCK rivets

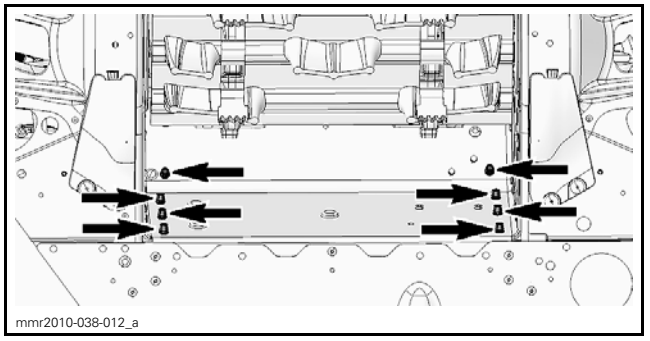
8. Drill or grind rivets securing engine module to frame.



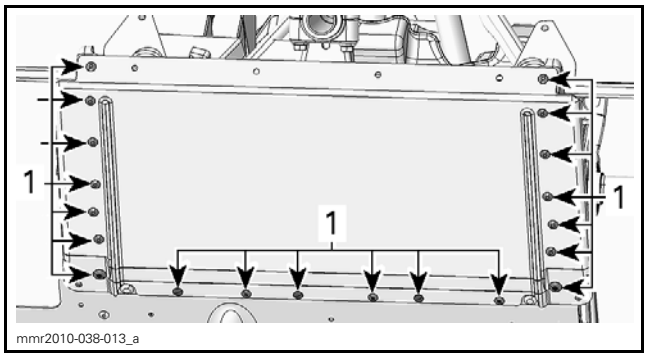
9. Remove the engine module.

Tundra Series

1. Refer to *BODY* subsection and remove the following parts:
   – Bottom pan
   – Rear bottom pans.
2. Remove the rear suspension. Refer to *REAR SUSPENSION* subsection.
3. Remove the *FRONT FRAME MEMBER*, see procedure in this subsection.
4. Remove the suspension module, see procedure in this subsection.
5. Remove engine from vehicle. Refer to *ENGINE REMOVAL AND INSTALLATION* subsection.
6. From underneath of vehicle, remove HUCK rivets securing engine members to front heat exchanger. See removal procedure at the beginning of this subsection.



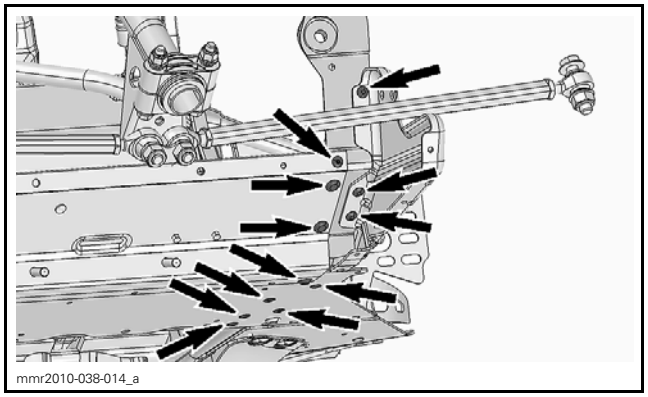
7. Drill or grind rivets securing front plate.



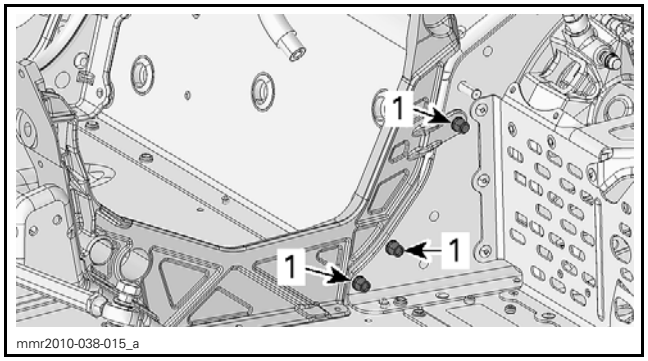
1. Rivets to remove

To remove the LH engine module member:

1. Drill or grind the following rivets retaining the engine plate, the front brace and the LH side member to the LH engine module member.



2. Remove the following HUCK rivets using the procedure described at the beginning of this subsection.

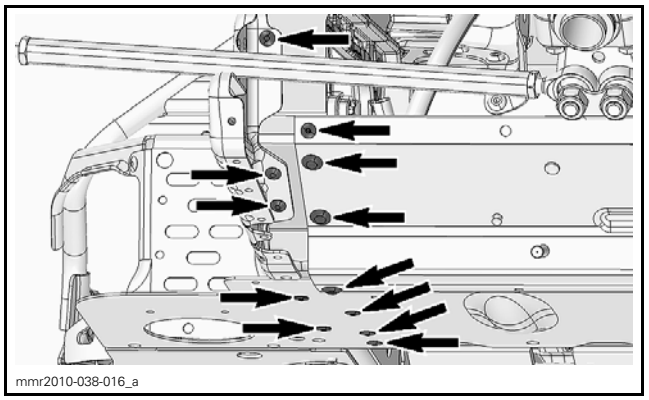


1. Huck rivets

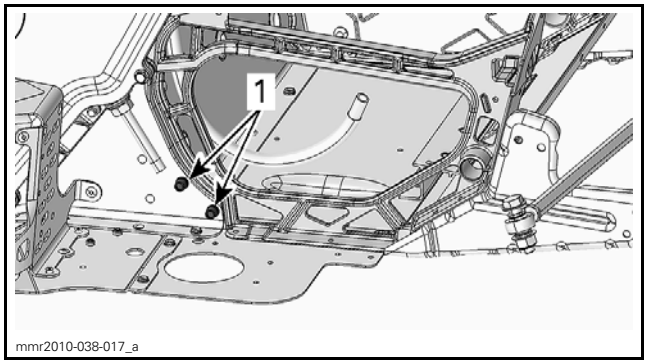
3. Remove the LH engine module member.

To remove the RH engine module member:

1. Drill or grind the following rivets retaining the engine plate, the front brace and the RH side member to the RH engine module member.



2. Remove the following HUCK rivets using the procedure described at the beginning of this subsection.



1. Huck rivets

3. Remove the RH engine module member.

Engine Module Installation

The installation is the reverse of the removal procedure. However, pay attention to the following.

1. Replace the HUCK rivets with the following parts.

NEW FASTENERS	
Hexagonal flanged bolt M6 x 20	(P/N 207 662 044)
Hexagonal flanged elastic stop nut M6	(P/N 233 261 414)

NOTE: Install bolt heads toward outside of the vehicle, except the one securing chaincase.

2. Torque new fasteners to 10 N•m (89 lbf•**in**).
3. Reinstall all removed parts by using the appropriate installation procedure.

REV-XP 550F SERIES

ENGINE			
Engine type			552, Fan cooled (axial fan), cylinder reed porting
Number of cylinder			2
Bore		Standard	76.01 mm (2.993 in)
		1st oversize	76.26 mm (3.002 in)
		2nd oversize	76.51 mm (3.012 in)
Stroke			61.00 mm (2.402 in)
Displacement			553.40 cm^3 (33.77 in^3)
Compression ratio			9.66 ± 0.54
Maximum power engine speed			6800 ± 100 RPM
Combustion chamber volume			30.98 to 33.58 cc
Piston ring type		1st	Semi-trapezoidal
		2nd	Rectangular
Ring end gap		New	0.400 mm to 0.55 mm (.016 in to .022 in)
		Wear limit	1.0 mm (.039 in)
Ring/piston groove clearance		New	0.037 mm to 0.077 mm (.0015 in to .003 in)
		Wear limit	0.200 mm (.0079 in)
Piston/cylinder wall clearance		New	0.157 mm ± 0.026 mm (.0062 in ± .001 in)
		Wear limit	0.200 mm (.0079 in)
Piston skirt wear		Wear limit	0.150 mm (.006 in)
Cylinder head warpage		Wear limit	0.150 mm (.006 in)
Cylinder taper		New (max.)	0.050 mm (.002 in)
		Wear limit	0.100 mm (.0039 in)
Cylinder out of round		New (max.)	0.010 mm (.0004 in)
		Wear limit	0.080 mm (.0031 in)
Maximum crankshaft end play		New (max.)	0.300 mm (.0118 in)
Crankshaft deflection	Maximum	PTO	0.060 mm (.0024 in)
		Center	0.080 mm (.0031 in)
		MAG	0.030 mm (.0012 in)
Connecting rod big end axial play		New	0.170 mm to 0.530 mm (.0067 in to .0209 in)
		Wear limit	1.200 mm (.0472 in)
AXIAL FAN			
Axial fan belt adjustment		Drive belt deflection	9.5 mm ± 1.5 mm (.374 in ± .059 in)
		Force	5.0 kgf (11 lbf)
LUBRICATION SYSTEM			
Injection oil		Type	XPS MINERAL INJECTION OIL (P/N 413 802 900)
		Quantity	3.7 L (125 U.S. oz)

FUEL SYSTEM		
Carburetor type	MAG	VM30-218 (Green dot)
	PTO	VM30-219 (Blue dot)
Main jet	MAG	190
	PTO	200
Needle jet		P-8
Pilot jet		35
Jet needle identification		6BFY46
Jet needle clip position	MAG	3
	PTO	4
Slide valve cut-away		2.5
Idle throttle valve height		1.6 mm ± 0.1 mm (.063 in ± .004 in)
Float level		23.9 mm ± 1 mm (.941 in ± .039 in)
Air screw adjustment	MAG	1.25 (reference only)
	PTO	1.0 (reference only)
Idle speed		1650 ± 200 RPM
Gas type		Unleaded
Minimum octane rating	Inside North America ((R+M)/2)	87
	Outside North America (RON)	92
Fuel tank capacity		40 L (10.57 U.S. gal.)
ELECTRICAL SYSTEM		
Magneto generator output		340 W @ 6000 RPM
Ignition type		CDI
Spark plug	Make and type	NGK BR9ECS (2)
	Gap	0.45 mm ± 0.05 mm (.018 in ± .002 in)
Ignition timing BTDC		2.77 mm ± 0.05 mm (.109 in ± .002 in) @ 3500 RPM
Trigger coils		160 to 180 Ω
Magneto stator windings	Ignition	6.5 to 8.5 Ω
	Charging/lighting	0 to 0.6 Ω
Ignition coil (integrated in ECM)	Primary	N.A.
	Secondary	900 to 1100 Ω (without spark plug wires)
Battery (if applicable)		12 V, 18 A•h
Headlamp		60/55 W (H4)
Taillight and stoplight		5/21 W
Fuse	Starter solenoid	30 A (if applicable)
DRIVE SYSTEM		
Chaincase oil	Type	XPS SYNTHETIC CHAINCASE OIL (P/N 413 803 300)
	Quantity	350 ml (11.8 U.S. oz)
Chain drive ratio	Grand Touring Sport	19/45
	Others	21/45
Chain	Pitch	9.53 mm (3/8 in)
	Type/links qty/width	Silent 102/13
Drive pulley type		eDrive

DRIVE SYSTEM (cont'd)			
Drive pulley calibration	Clutch engagement	Expedition Sport	2600 ± 100 RPM
		Others	3200 ± 100 RPM
	Spring color		Red/Yellow
	Spring free length		90.4 mm (3.56 in)
	Pin		N.A.
	Ramp	Expedition Sport	700
		Others	730
	Screw position		N.A.
Driven pulley	Type		QRS-SS
	Spring color		Brown
	Cam angle	Expedition Sport	44°
		Others	47° - 44°
Pulley distance (before break-in period)		Z	21.00 mm (.827 in)
Offset		X	37.20 mm ± 0.50 mm (1.465 in ± .02 in)
Drive belt		Part number	(P/N 414 860 700)
		Width	35.30 mm (1.39 in)
		Wear limit	32.9 mm (1.295 in)
Drive belt adjustment		Deflection	32 mm ± 0.5 mm (1.26 in ± .02 in)
		Force	11.3 kg (24.9 lb)
Track	Width	Expedition Sport Grand Touring Sport Renegade Sport EUR	406.4 mm (16 in)
		MX Z TNT/Sport Renegade Sport	381 mm (15 in)
	Length	MX Z TNT/Sport	3 051 mm (120 in)
		Renegade Sport Grand Touring Sport	3 486 mm (137 in)
		Expedition Sport	3 922 mm (154 in)
	Profile height	Expedition Sport	38.1 mm (1.5 in)
		Others	31.8 mm (1.25 in)
Track adjustment		Deflection	30 mm to 35 mm (1-3/16 in to 1-3/8 in)
		Force (1)	7.3 kgf (16 lbf)
BRAKE SYSTEM			
Brake pad thickness		Service limit	1 mm (.039 in)
Brake fluid		Type	DOT 4
		Quantity	60 ml (2.03 U.S. oz)
FRONT SUSPENSION			
Suspension type			Rev XP
Suspension maximum travel			229 mm (9 in)
Shock absorber type		MX Z TNT	HPG Plus
		All others	Motion control

REAR SUSPENSION			
Suspension type		Grand Touring Sport Renegade Sport	SC-5 M
		Expedition Sport	SC-5 U
		MX Z TNT/Sport	SC-5
Suspension maximum travel		Grand Touring Sport Renegade Sport Expedition Sport	34 cm (13.4 in)
		MX Z TNT/Sport	38 cm (15 in)
Shock absorber type	Center	MX Z TNT	HPG Plus
		Others	Motion control
	Rear	MX Z TNT	HPG Plus
		MX Z Sport	Motion control
		Others	HPG
Stroke limiter standard position			3
STEERING SYSTEM			
Ski type		Grand Touring Sport	Pilot 5.7 SL
		Expedition Sport	Pilot DS
		Others	Pilot 5.7
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Dry weight		Expedition Sport	234 kg (516 lb)
		Grand Touring Sport	225 kg (496 lb)
		MX Z Sport	192 kg (423 lb)
		MX Z TNT	186 kg (410 lb)
		Renegade Sport	199 kg (439 lb)
Length		Expedition Sport	3 329 mm (131.06 in)
		MX Z TNT/Sport	290.5 cm (114.37 in)
		Renegade Sport Grand Touring Sport	3 110 mm (122.4 in)
Width		Expedition Sport	1 159 mm to 1 204 mm (45.6 in to 47.4 in)
		Grand Touring Sport MX Z TNT/Sport Renegade Sport	121.7 cm (47.9 in)
Height		Expedition Sport	1 275 mm (50.2 in)
		MX Z	100 cm (39.37 in)
		Grand Touring	123 cm (48.43 in)
		Others	120 cm (47.2 in)
Ski width		Expedition Sport	165 mm (6.5 in)
		Grand Touring Sport (North America) MX Z TNT/Sport Renegade Sport (North America)	145 mm (5.7 in)
		Grand Touring Sport (Europe) Renegade Sport (Europe)	175 mm (6.9 in)

WEIGHT AND DIMENSIONS (cont'd)		
Ski stance (carbide to carbide)	Expedition Sport	975 mm to 1 018 mm (38.386 in to 40.079 in)
	Others	107.7 cm (42.4 in)
N.A.: Not Available		

(1) Measure gap between slider shoe and bottom inside track when exerting a downward pull to the track.

TUNDRA 550F SERIES

ENGINE			
Engine type			552, Fan cooled (axial fan), cylinder reed porting
Number of cylinder			2
Bore		Standard	76.01 mm (2.993 in)
		1st oversize	76.26 mm (3.002 in)
		2nd oversize	76.51 mm (3.012 in)
Stroke			61.00 mm (2.402 in)
Displacement			553.40 cm^3 (33.77 in^3)
Compression ratio			9.66 ± 0.54
Maximum power engine speed			6800 ± 100 RPM
Combustion chamber volume			30.98 to 33.58 cc
Piston ring type		1st	Semi-trapezoidal
		2nd	Rectangular
Ring end gap		New	0.400 mm to 0.55 mm (.016 in to .022 in)
		Wear limit	1.0 mm (.039 in)
Ring/piston groove clearance		New	0.037 mm to 0.077 mm (.0015 in to .003 in)
		Wear limit	0.200 mm (.0079 in)
Piston/cylinder wall clearance		New	0.157 mm ± 0.026 mm (.0062 in ± .001 in)
		Wear limit	0.200 mm (.0079 in)
Piston skirt wear		Wear limit	0.150 mm (.006 in)
Cylinder head warpage		Wear limit	0.150 mm (.006 in)
Cylinder taper		New (max.)	0.050 mm (.002 in)
		Wear limit	0.100 mm (.0039 in)
Cylinder out of round		New (max.)	0.010 mm (.0004 in)
		Wear limit	0.080 mm (.0031 in)
Maximum crankshaft end play		New (max.)	0.300 mm (.0118 in)
Crankshaft deflection	Maximum	PTO	0.060 mm (.0024 in)
		Center	0.080 mm (.0031 in)
		MAG	0.030 mm (.0012 in)
Connecting rod big end axial play		New	0.170 mm to 0.530 mm (.0067 in to .0209 in)
		Wear limit	1.200 mm (.0472 in)
AXIAL FAN			
Axial fan belt adjustment		Drive belt deflection	9.5 mm ± 1.5 mm (.374 in ± .059 in)
		Force	5.0 kgf (11 lbf)
LUBRICATION SYSTEM			
Injection oil		Type	XPS MINERAL INJECTION OIL (P/N 413 802 900)
		Quantity	3.7 L (125 U.S. oz)

FUEL SYSTEM		
Carburetor type	MAG	VM30-218 (Green dot)
	PTO	VM30-219 (Blue dot)
Main jet	MAG	190
	PTO	200
Needle jet		P-8
Pilot jet		35
Jet needle identification		6BFY46
Jet needle clip position	MAG	3
	PTO	4
Slide valve cut-away		2.5
Idle throttle valve height		1.6 mm ± 0.1 mm (.063 in ± .004 in)
Float level		23.9 mm ± 1 mm (.941 in ± .039 in)
Air screw adjustment	MAG	1.25 (reference only)
	PTO	1.0 (reference only)
Idle speed		1650 ± 200 RPM
Gas type		Unleaded
Minimum octane rating	Inside North America ((R+M)/2)	87
	Outside North America (RON)	92
Fuel tank capacity		40 L (10.57 U.S. gal.)
ELECTRICAL SYSTEM		
Magneto generator output		340 W @ 6000 RPM
Ignition type		CDI
Spark plug	Make and type	NGK BR9ECS (2)
	Gap	0.45 mm ± 0.05 mm (.018 in ± .002 in)
Ignition timing BTDC		2.77 mm ± 0.05 mm (.109 in ± .002 in) @ 3500 RPM
Trigger coils		160 to 180 Ω
Magneto stator windings	Ignition	6.3 to 7.7 Ω
	Charging/lighting	0.145 to 0.175 Ω
Ignition coil (integrated in ECM)	Primary	N.A.
	Secondary	900 to 1100 Ω (without spark plug wires)
Battery (if applicable)		12 V, 18 A•h
Headlamp		60/55 W (H4)
Taillight and stoplight		5/21 W
Fuse	Starter solenoid	30 A (if applicable)
DRIVE SYSTEM		
Chaincase oil	Type	XPS SYNTHETIC CHAINCASE OIL (P/N 413 803 300)
	Quantity	350 ml (11.8 U.S. oz)
Chain drive ratio		19/45
Chain	Pitch	9.53 mm (3/8 in)
	Type/links qty/width	Silent 102/13
Drive pulley type		eDrive

DRIVE SYSTEM (cont'd)			
Drive pulley calibration		Clutch engagement	2600 ± 100 RPM
		Spring color	Red/Yellow
		Spring free length	90.4 mm (3.56 in)
		Pin	N.A.
		Ramp	700
		Screw position	N.A.
Driven pulley		Type	QRS-SS
		Spring color	Brown
		Cam angle	44°
Pulley distance (before break-in period)		Z	21.00 mm (.827 in)
Offset		X	37.2 mm ± 0.50 mm (1.465 in ± .02 in)
Drive belt		Part number	(P/N 414 860 700)
		Width	35.30 mm (1.39 in)
		Wear limit	32.9 mm (1.295 in)
Drive belt adjustment		Deflection	32 mm ± 0.5 mm (1.26 in ± .02 in)
		Force	11.3 kg (24.9 lb)
Track	Width	Tundra	381 mm (15 in)
		Tundra Sport Tundra LT	406.4 mm (16 in)
	Length	Tundra Tundra Sport	345.6 cm (137 in)
		Tundra LT	392.3 cm (154 in)
	Profile height	Tundra Tundra Sport	31.8 mm (1.25 in)
		Tundra LT	38 mm (1.5 in)
Track adjustment	Deflection	Tundra Tundra Sport	30 mm to 35 mm (1-3/16 in to 1-3/8 in)
		Tundra LT	40 mm to 45 mm (1-1/2 in to 1-9/16 in)
	Force [1]		7.3 kgf (16 lbf)
BRAKE SYSTEM			
Brake pad thickness		Service limit	1 mm (.039 in)
Brake fluid		Type	DOT 4
		Quantity	60 ml (2.03 U.S. oz)
FRONT SUSPENSION			
Suspension type			LTS
Suspension maximum travel			150 mm (5.9 in)
Shock absorber type			Motion control

REAR SUSPENSION		
Suspension type	Tundra Tundra Sport	SC-5 M
	Tundra LT	SC-5 U
Suspension maximum travel	Tundra Tundra Sport	34 cm (13.4 in)
	Tundra LT	35.6 cm (14 in)
Shock absorber type	Center	Motion control
	Rear	HPG
Stroke limiter standard position		3
STEERING SYSTEM		
Ski type	Tundra	Blow mold (wide)
	Tundra Sport Tundra LT	Pilot DS
Toe-out		5 mm (.197 in)
Camber		0°
WEIGHT AND DIMENSIONS		
Dry weight	Tundra	196 kg (432 lb)
	Tundra Sport	210 kg (463 lb)
	Tundra LT	219 kg (483 lb)
Length	Tundra Tundra Sport	306.9 cm (120.83 in)
	Tundra LT	332.9 cm (131.1 in)
Width		100.2 cm (39.4 in)
Height	Tundra	111 cm (43.7 in)
	Tundra Sport	127.8 cm (50.3 in)
	Tundra LT	132.5 cm (52.2 in)
Ski width	Tundra	172 mm (6.7 in)
	Tundra Sport Tundra LT	165 mm (6.5 in)
Ski stance (carbide to carbide)		81.3 cm (32 in)
N.A.: Not Available		

(1) Measure gap between slider shoe and bottom inside track when exerting a downward pull to the track.

WIRING DIAGRAM INFORMATION

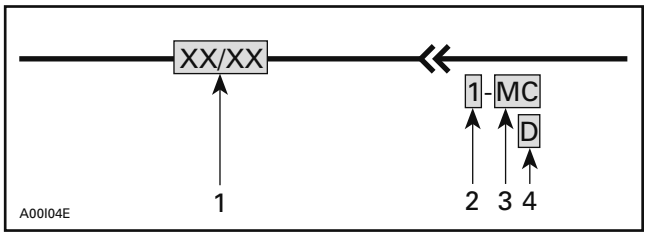
GENERAL

WIRING DIAGRAM LOCATION

Wiring diagrams are included in the *2012 WIRING DIAGRAM BOOKLET* (P/N 219 100 601).

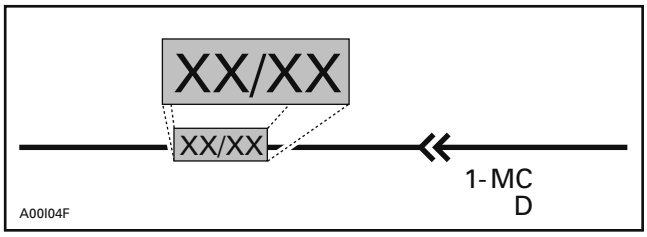
WIRING DIAGRAM CODES

The wiring diagrams use the following codes.



1. *Wire colors*
2. *Connector location*
3. *Connector code*
4. *Terminal position in connector*

Wire Colors



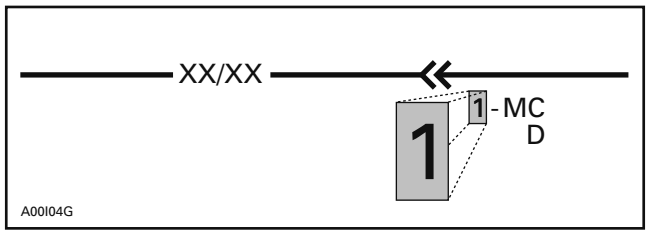
The first color of a wire is the main color, second color is the stripe.

Example: YL/BK is a YELLOW wire with a BLACK stripe.

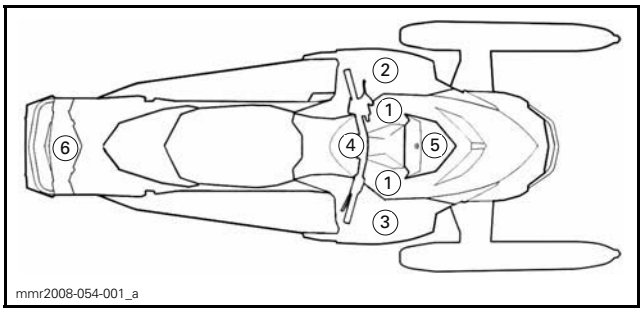
COLOR CODE					
BE	—	BEIGE	OR	—	ORANGE
BK	—	BLACK	RD	—	RED
BU	—	BLUE	VI	—	VIOLET
BR	—	BROWN	WH	—	WHITE
GN	—	GREEN	YL	—	YELLOW
GY	—	GRAY	PK	—	PINK

Connector Location

The first digit of the connector identification number presents the location of the connector on the vehicle. It may also describe the part removal that is required to reach the connector.



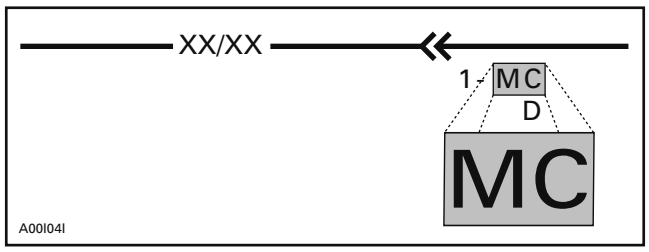
The location of the connectors are shown on the wiring diagram with a vehicle schematic as shown below.



VEHICLE SCHEMATIC FOR CONNECTOR LOCATION (SEE WIRING DIAGRAM)

Connector Code

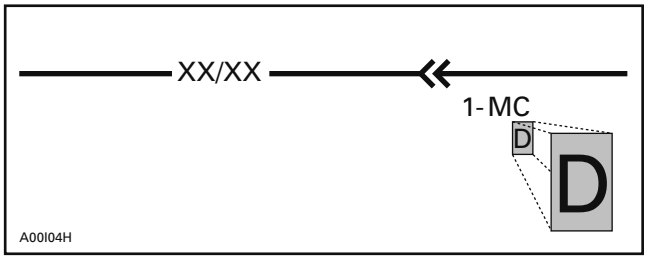
The next letters (up to 8 letters) of the connector identification number represents a connector reference. If there are many connectors in the same area this helps identify which wire is in which connector.



Terminal Position in Connector

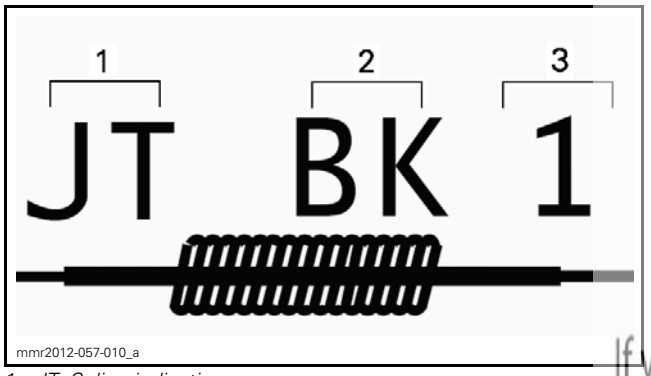
The third portion of the connector identification number represents the location of the terminal in the connector. This could be identified by either a number or by a letter depending on the type of connector used.

NOTE: The terminal position identification may be also at the right most position of the description.



SPLICES IN WIRING HARNESS

Splices in wiring harness are indicated on the wiring diagram as follows.



1. *JT: Splice indication*
2. *Spliced wire color*
3. *Splice number on the wire*

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

CONNECTOR INFORMATION

SERVICE TOOLS

Description	Part Number	Page
AMP DIE	529 035 908	440
CRIMPING TOOL (HEAVY GAUGE WIRE)	529 035 730	441
CRIMPING TOOL (KOSTAL)	529 035 909	440

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
AMP EXTRACTION TERMINAL TOOL	755430-2	439–440
SNAP ON TERMINAL TOOL	TT600-5	437, 439
SNAP-ON SCREWDRIVER	TT600-5	437

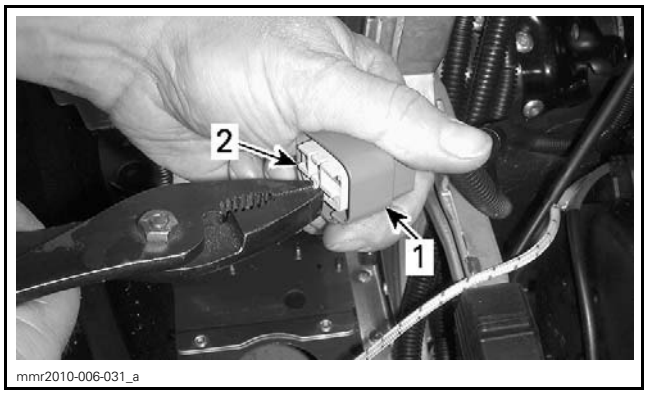
GENERAL

SUMITOMO CONNECTOR

Connector Disassembly

5-Pin Magneto Connector

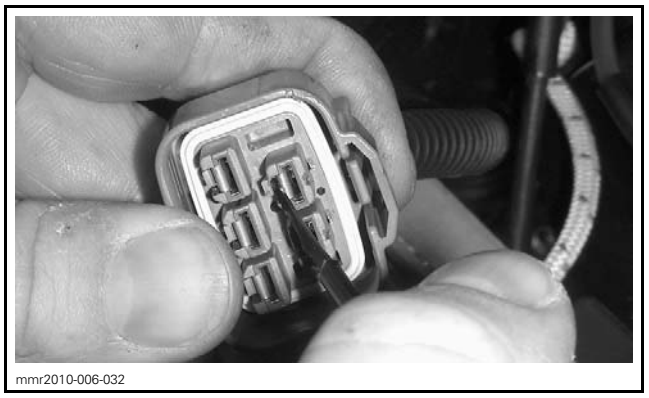
Remove the blue lock.



mmr2010-006-031_a

1. Voltage regulator/rectifier connector
2. Connector lock

Using a small screwdriver or a terminal tool such as the SNAP ON TERMINAL TOOL (P/N TT600-5), lift the terminal lock.


mmr2010-006-032

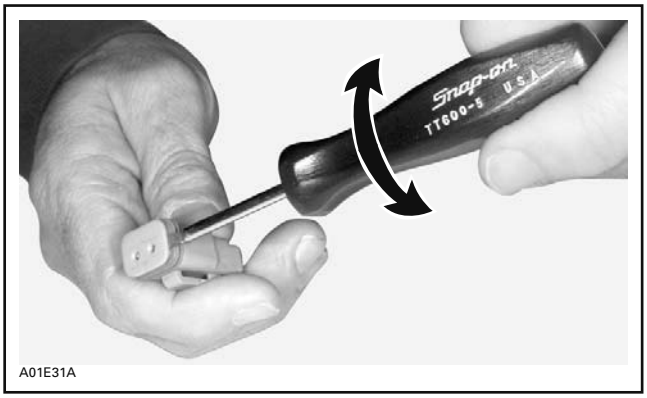
Extract the wire from the connector.

DEUTSCH CONNECTOR

Connector Disassembly

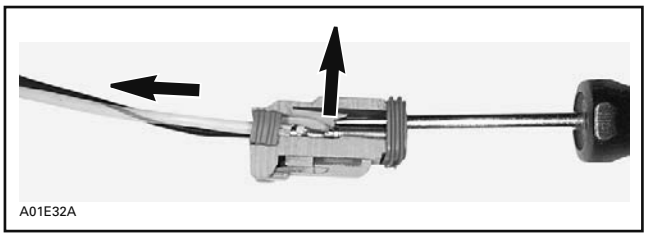
Male Housing

Insert SNAP-ON SCREWDRIVER (P/N TT600-5) under lock and twist to lift it.



A01E31A

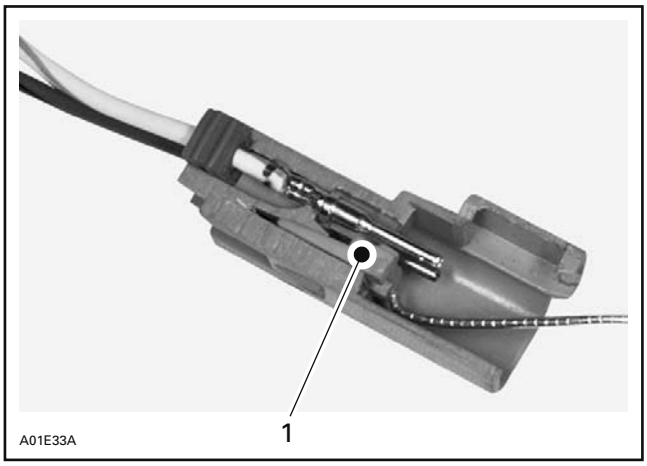
Pry tab to free connector then pull wire out of housing.



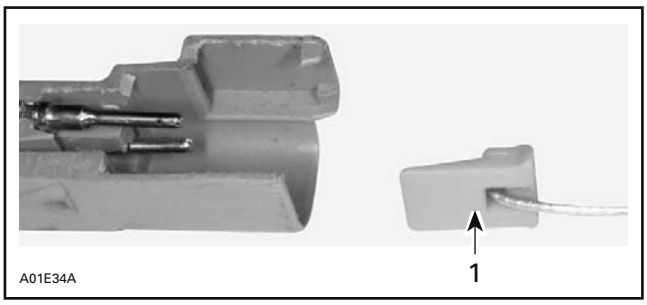
FEMALE CONNECTOR HOUSING — CUT-AWAY

Female Housing

Using a small hook, pull out the lock.

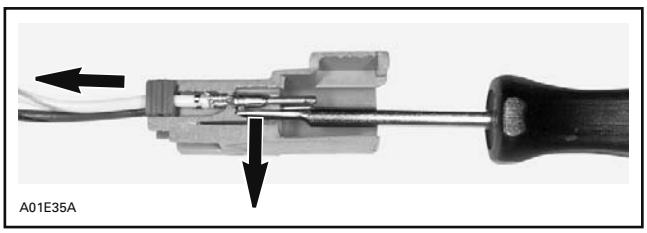


1. Lock



1. Lock

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



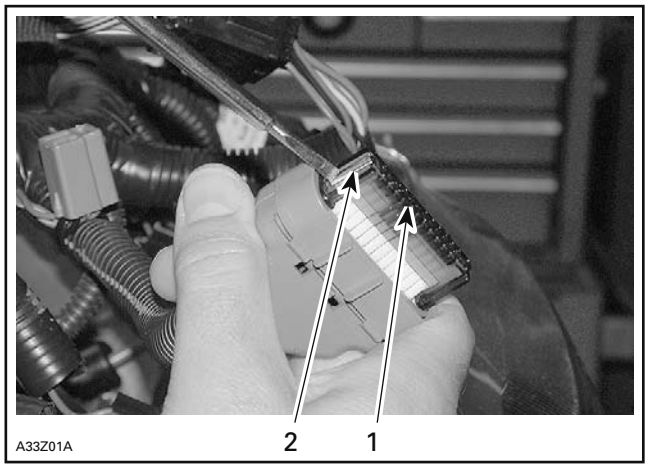
FEMALE HOUSING — CUT-AWAY

PACKARD CONNECTOR

Connector Disassembly

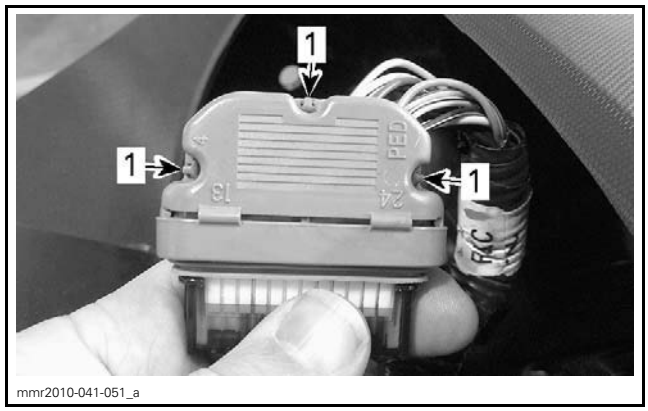
Multifunction Gauge Connector

Push on both tabs to remove retainer.



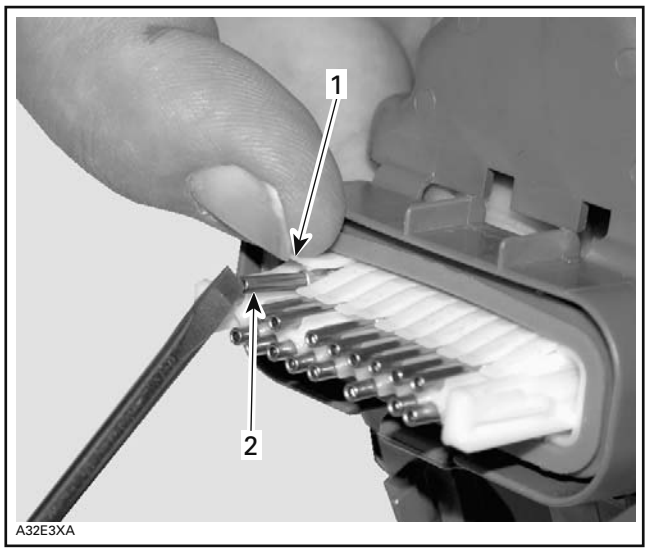
TYPICAL
1. Retainer
2. Tab (one on each side)

Open housing by lifting the locking 3 tabs.



TYPICAL
1. Locking tabs

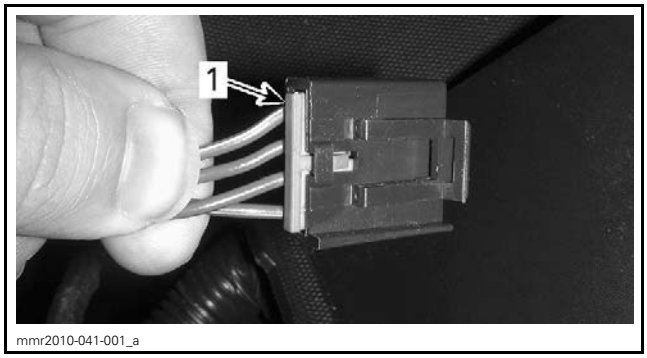
Lift the top plastic lock of the female terminal to be removed and hold in position. Lift the female terminal to unlock from the housing and push out of housing.



1. *Lift and hold plastic lock*
2. *Lift to unlock and push out*

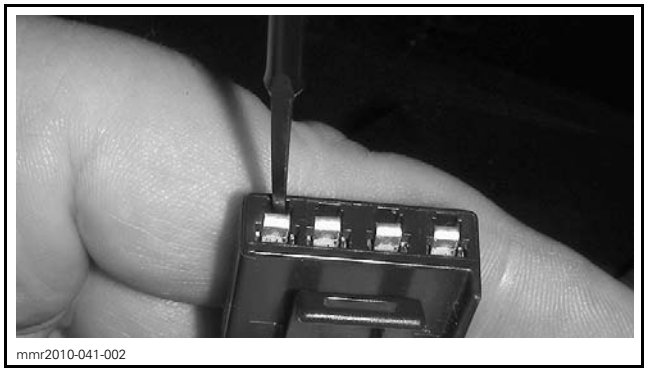
Ignition Switch Connector

Remove the terminal lock.



1. *Terminal lock*

Using a small screwdriver or a terminal tool such as the SNAP ON TERMINAL TOOL (P/N TT600-5), lift the terminal lock.



AMP CONNECTOR

Connector Disassembly

1-Pin Connector

Unplug the connector.

NOTICE **Always unplug connector by pulling on housing not on wires.**

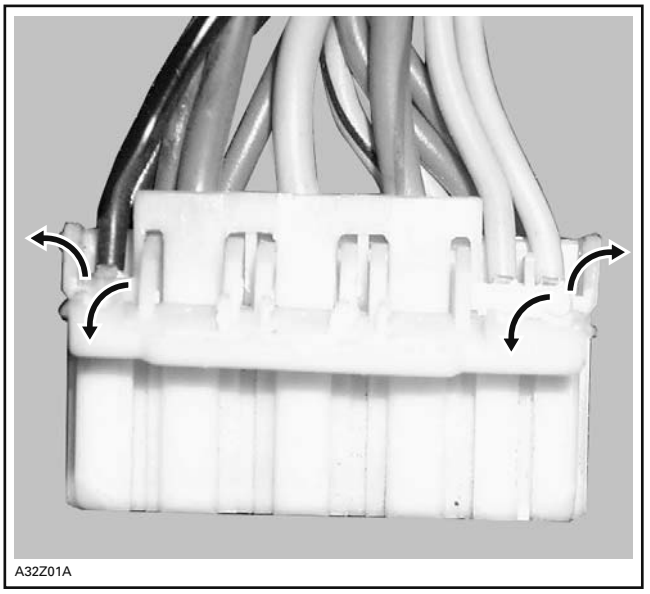
Insert a small screwdriver or a terminal tool such as the SNAP ON TERMINAL TOOL (P/N TT600-5) in access opening then pull housing toward wire side.



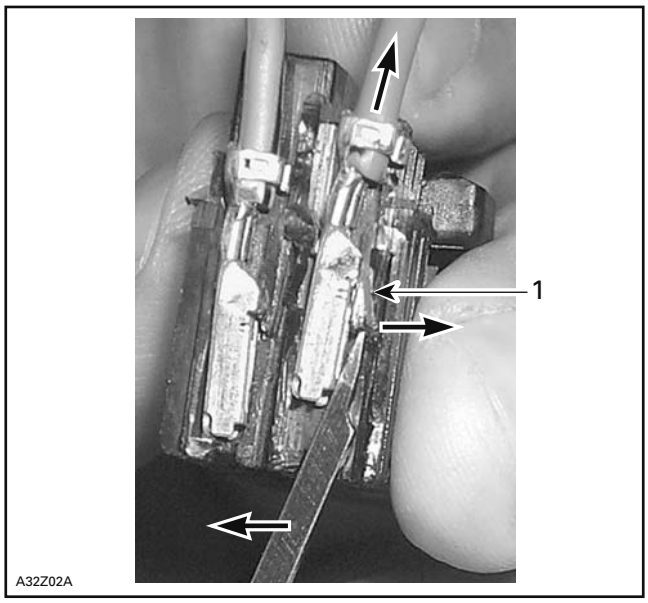
Multilock Connector

Male Housing

Open the housing lock.



Insert the AMP EXTRACTION TERMINAL TOOL (P/N 755430-2) under lock and twist to lift it.

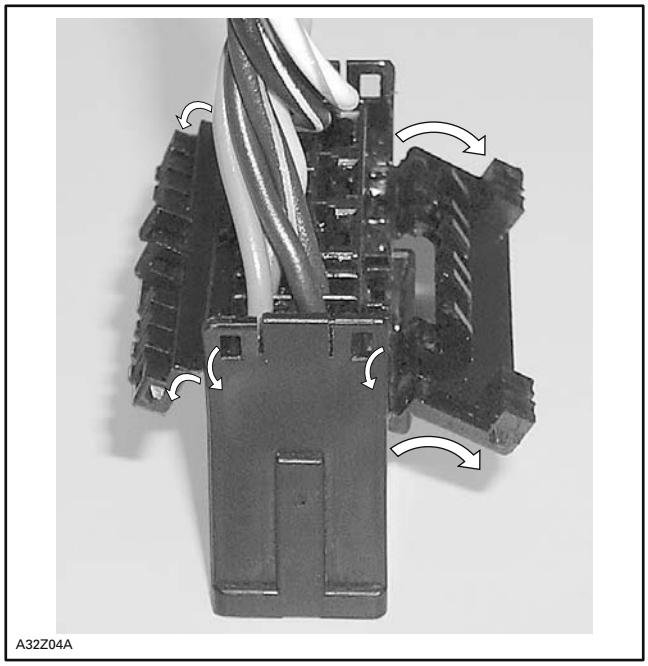


MALE HOUSING — CUT-AWAY
1. Lock

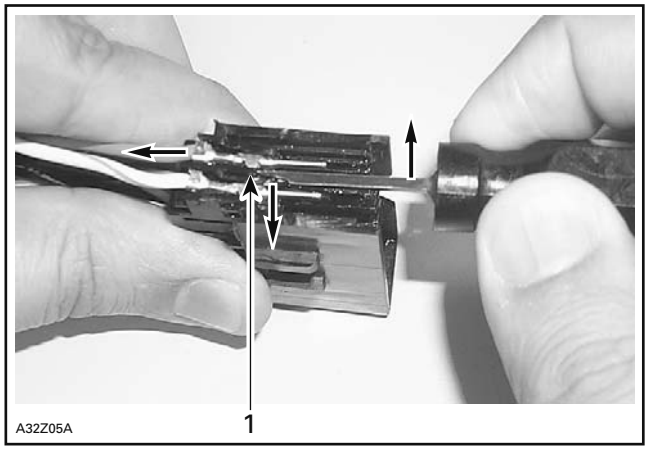
Female terminals can be removed from housing with sharp head pin.

Female Housing

Open the housing lock.



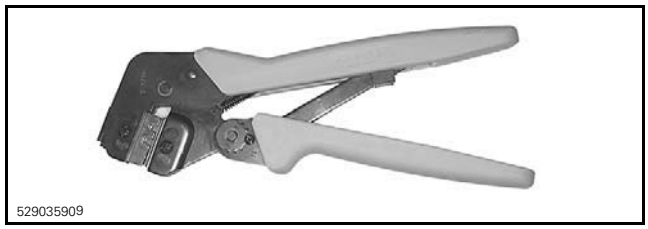
Insert the AMP EXTRACTION TERMINAL TOOL (P/N 755430-2) under lock and twist to lift it.



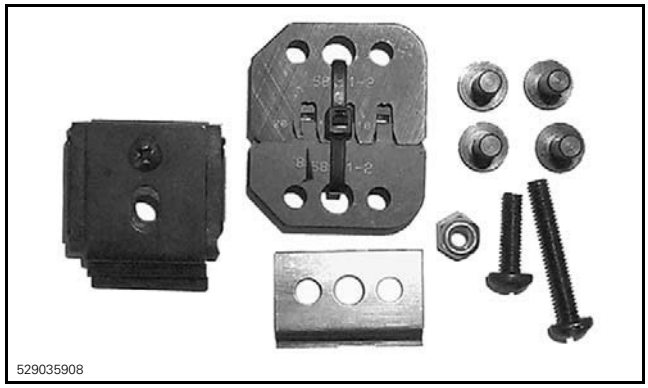
FEMALE HOUSING — CUT-AWAY
1. Lock

Terminal Crimping

To crimp a new connector terminal, use the CRIMPING TOOL (KOSTAL) (P/N 529 035 909) and the AMP DIE (P/N 529 035 908).



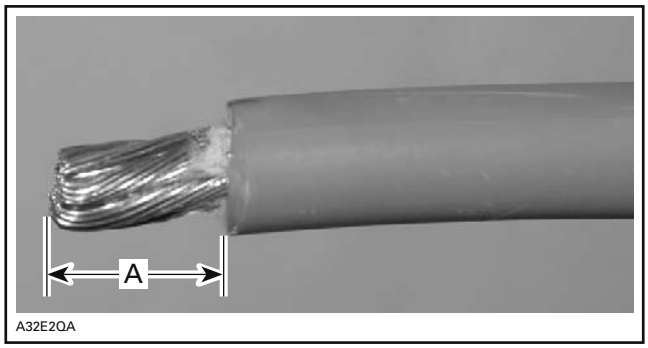
CRIMPING TOOL



AMP DIE

To properly crimp the wires, strictly follow this procedure.

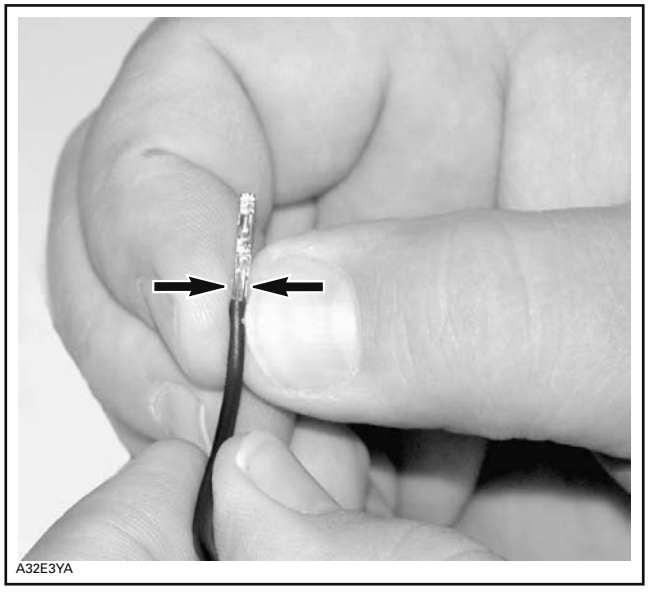
Strip the wire to a maximum of 3 mm (1/8 in).



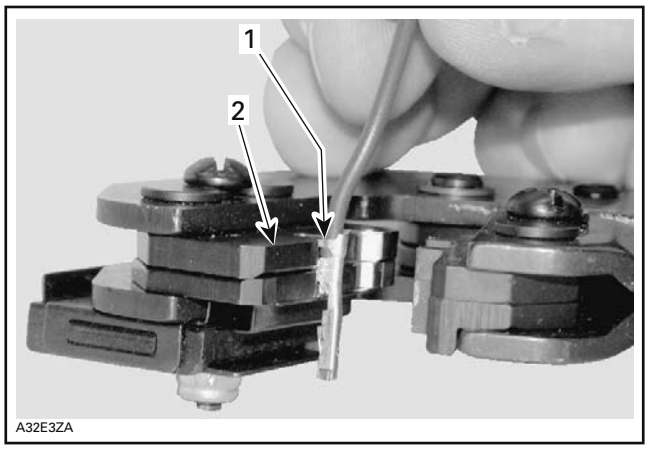
TYPICAL
A. 3 mm (1/8 in) maximum

Position wire in terminal.

Squeeze the terminal tabs with your fingers to temporarily retain terminal in place.



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.



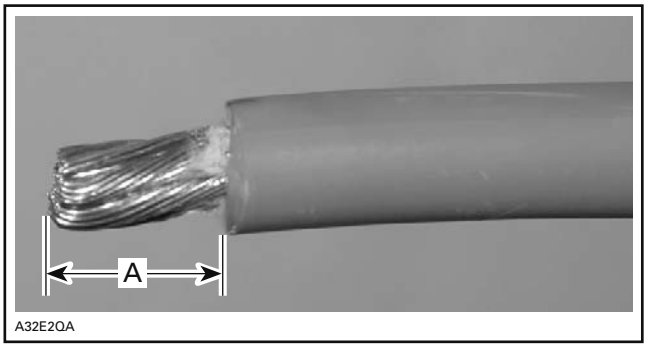
1. Top of terminal tabs
2. Align tabs with pliers edge

Crimp terminal. Ensure no tiny wire goes out of terminal. This might cause strange problems of the electrical system.

BATTERY CABLE TERMINAL

Terminal Installation

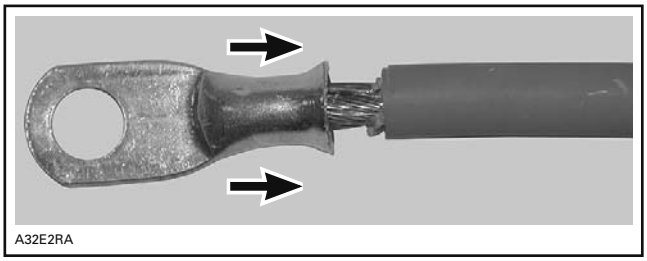
Carefully strip the wire approximately to 12 mm (1/2 in) in length, using a wire stripping tool or sharp blade/knife.



A. 12 mm (1/2 in)

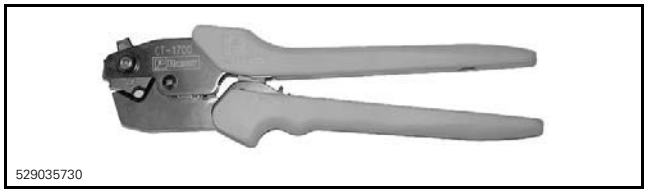
NOTE: Make sure not to cut wire strands while stripping the wire.

Install the appropriate terminal on the wire according to the requirement. Refer to appropriate *PARTS CATALOG*.

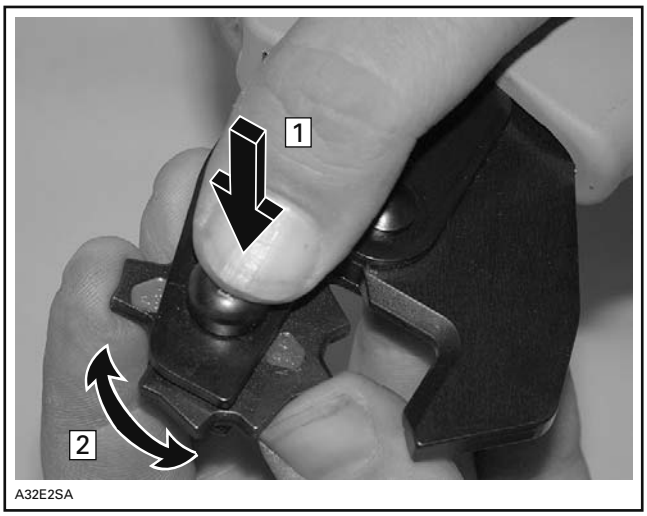


INSTALLATION OF TERMINAL

Follow the instructions provided with the CRIMPING TOOL (HEAVY GAUGE WIRE) (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.



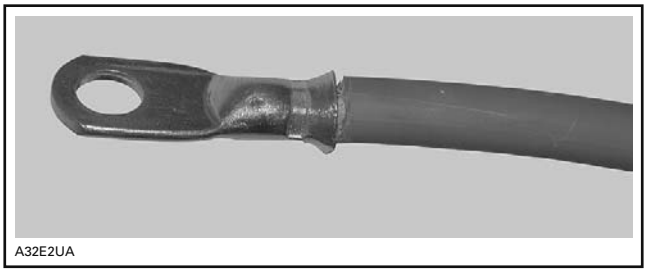
A32E2SA

POSITIONING THE CRIMP PLIERS
Step 1: Press
Step 2: Rotate

After positioning the crimp pliers, crimp the terminal already installed on wire.


A32E2TA

CRIMPING OF WIRE


A32E2UA

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.

NOTICE Never solder the wire to the terminal. Soldering can change the property of the wire and it can become brittle and break.

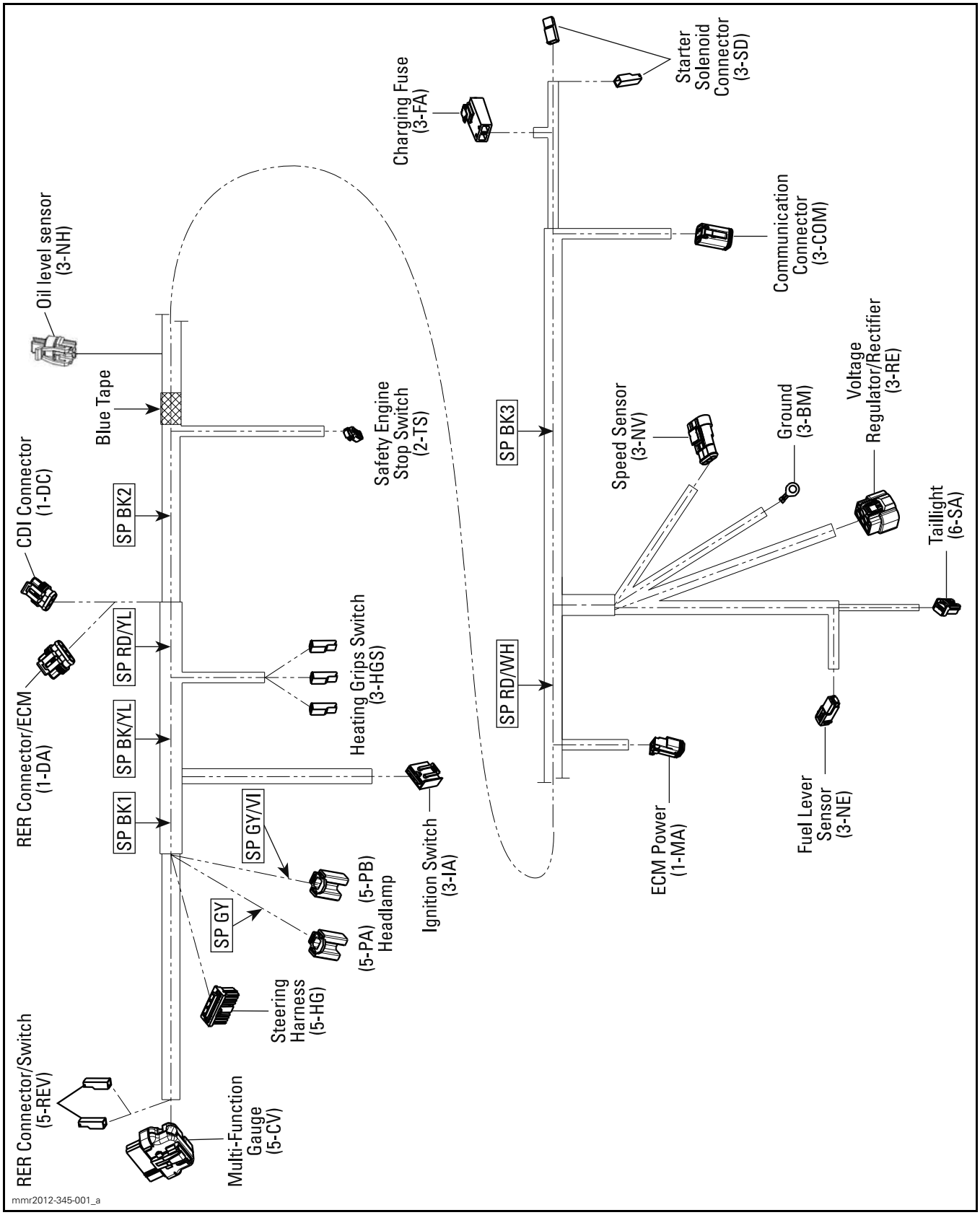
Install the protective heat shrink rubber tube on the terminal. Heat the heat shrink rubber tube using the heat gun so that it grasps the wire and the terminal.

NOTICE Make sure that the protective heat shrink rubber tube has been properly installed and no part of wire is exposed.

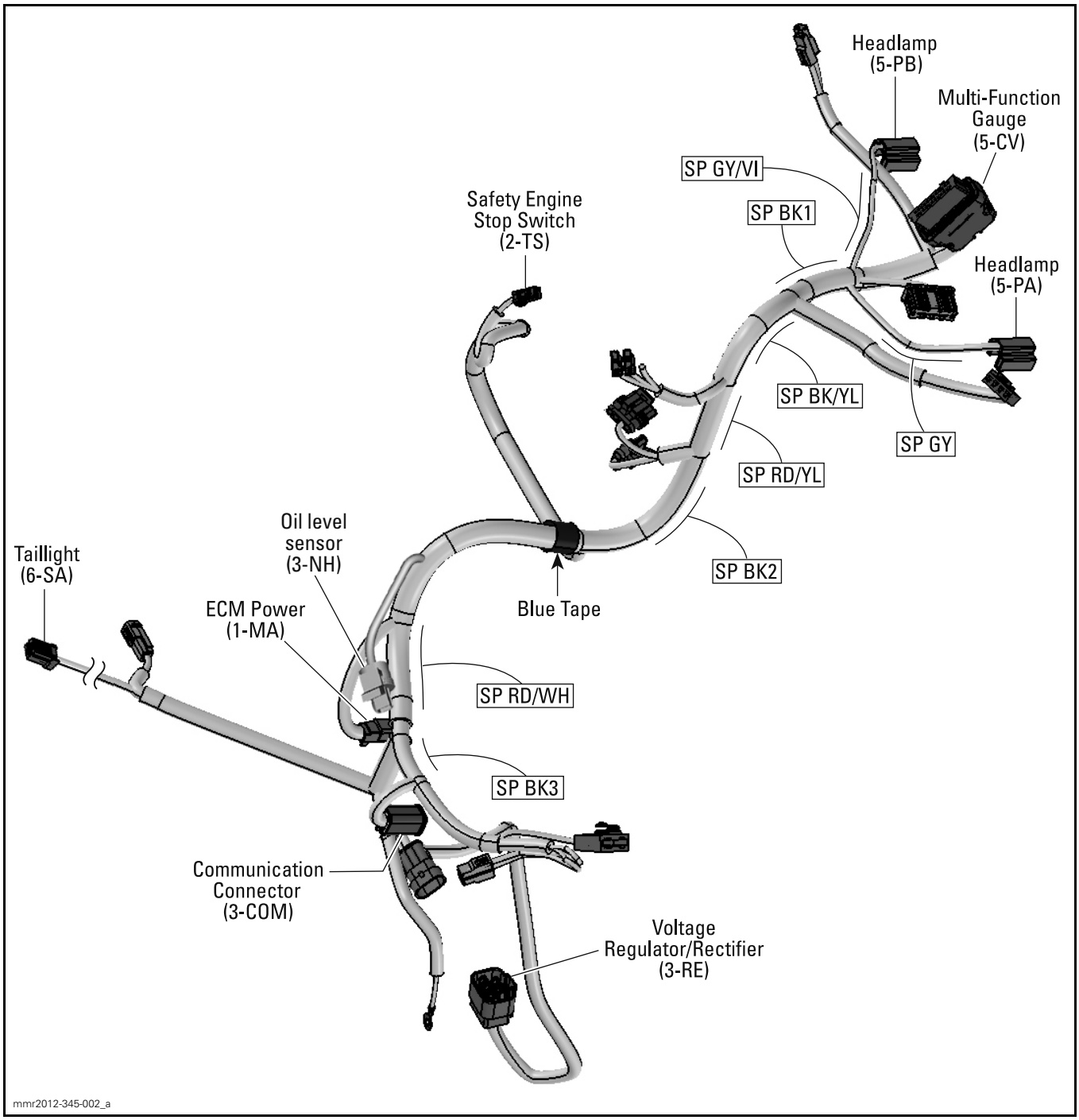
Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

SPLICE INFORMATION

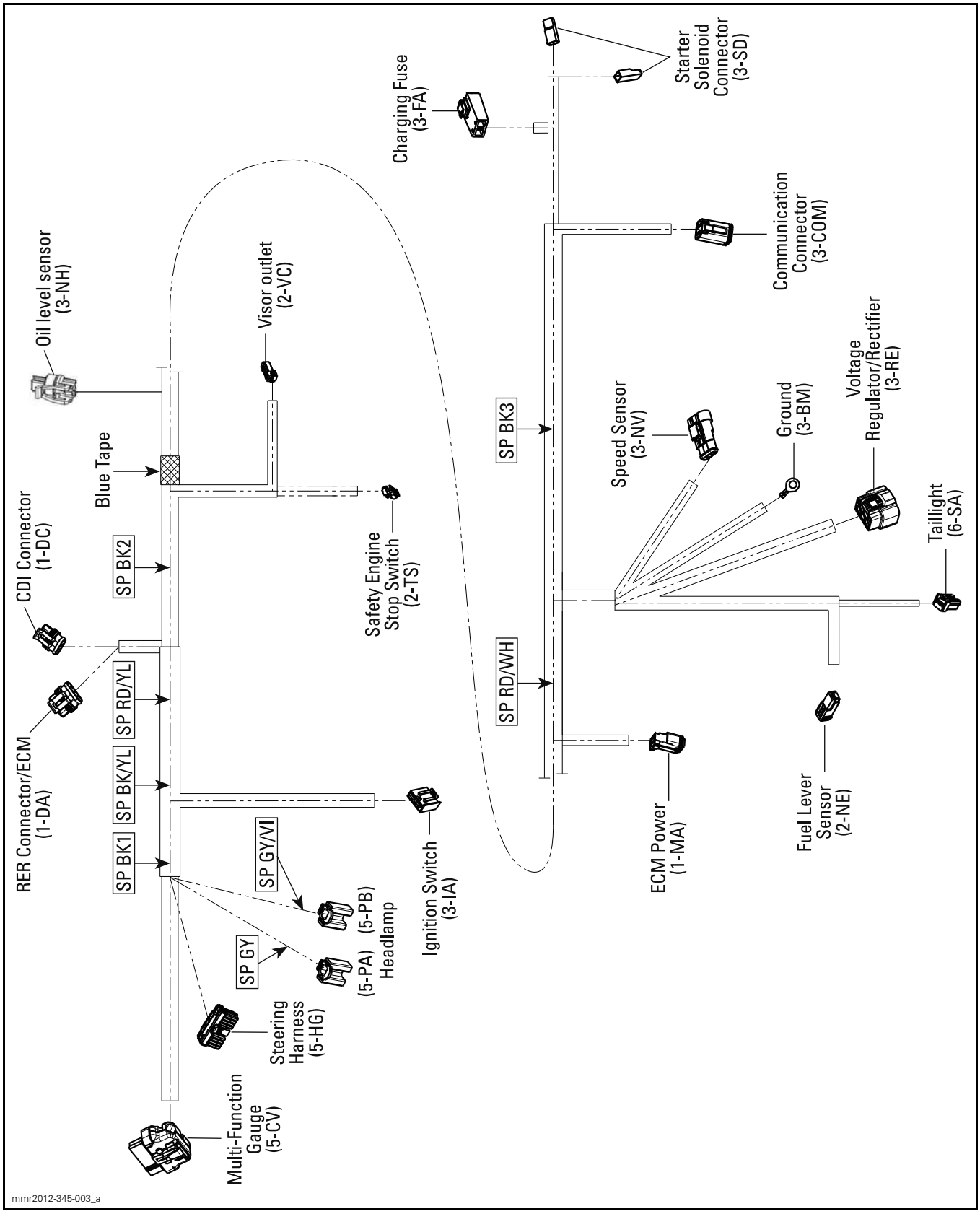
Tundra (2D View)



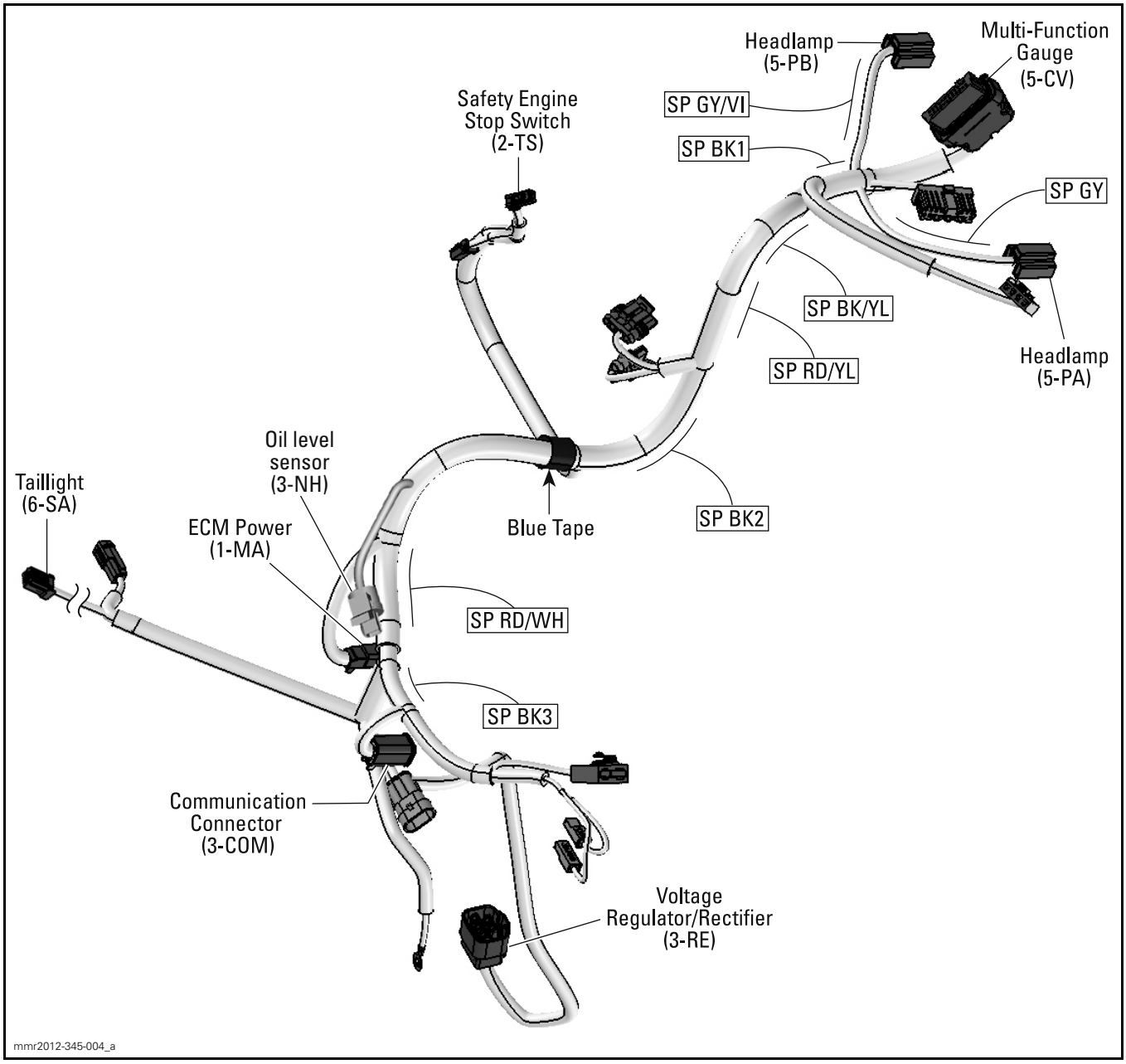
Tundra (3D View)



REV-XP 550F Series, Tundra Sport and Tundra LT (2D View)



REV-XP 550F Series, Tundra Sport and Tundra LT (3D View)



PROCEDURES

This section gives the procedures and the location diagrams in order to quickly repair electrical harness splices and should be used in conjunction with the *WIRING DIAGRAM INFORMATION* subsection.

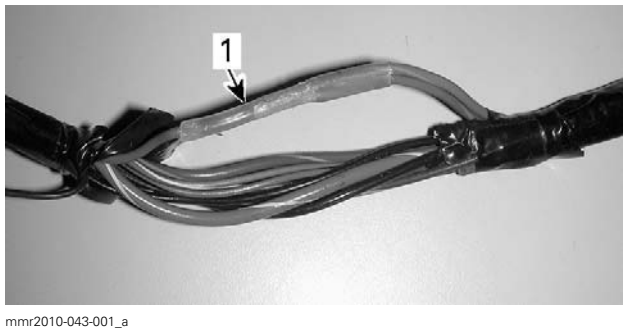
1. Make sure to perform the usual tests described in *ELECTRICAL SYSTEM* sections before investigating the harness splices.
2. If an electrical issue can not be found with the usual tests, locate the main harness splice that is involved in the faulty circuit and repair it as per the *SPLICES REPAIR PROCEDURE*.
3. To repair a splice, we recommend the use of a tin solder meeting the followings requirements or an equivalent.

TIN SOLDER REQUIREMENTS
SN 60
PB 40
DIA 0.062
FLUX RA 2%

SPLICES REPAIR PROCEDURE

CASE 1: Wire Detached from Splice

1. Locate splice. Refer to splices location diagrams.
2. Remove wires from protector tube.
3. Locate the shrink tube protecting the defective splice.



mmr2010-043-001_a

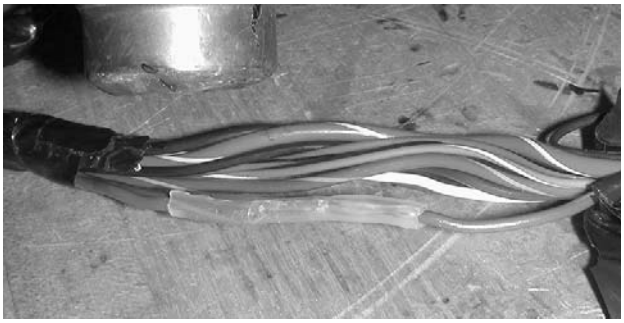
1. Shrink tube

4. Remove the shrink tube.
   4.1 Using a blade, cut the shrink tube.


mmr2010-043-002

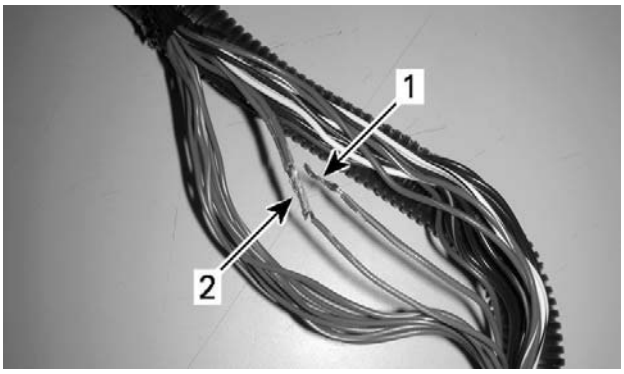
NOTICE Be careful with the blade to avoid cutting wires insulation.

   4.2 Slightly heat the shrink tube using a heat gun.


mmr2010-043-003

   4.3 Remove the shrink tube with long nose pliers.

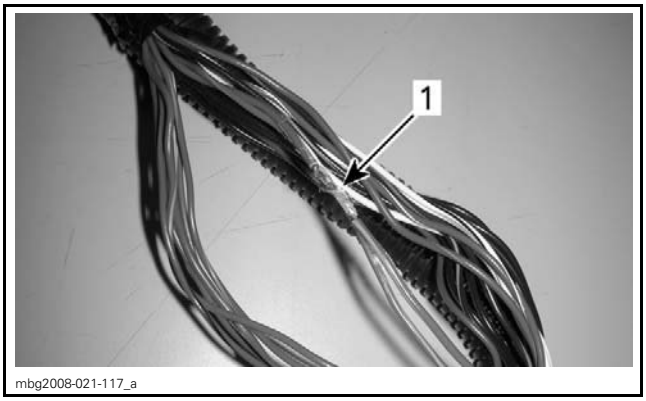
5. Locate detached wire from splice.



mbg2008-021-116_a

1. Detached wire
2. Splice

6. Twist detached wire around splice.

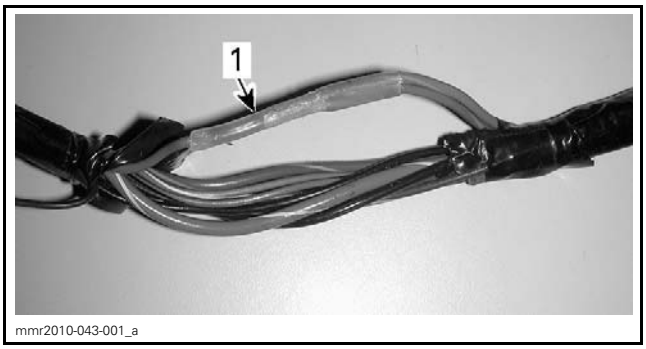


1. Twisted wire

7. Perform a tin solder on twisted wire.
8. Apply electrical tape to cover splice.
9. Reinstall wires into protector tube.

CASE 2: Wire Broken from Splice

1. Locate splice. Refer to splices location diagrams.
2. Remove wires from protector tube.
3. Locate the shrink tube protecting the defective splice.



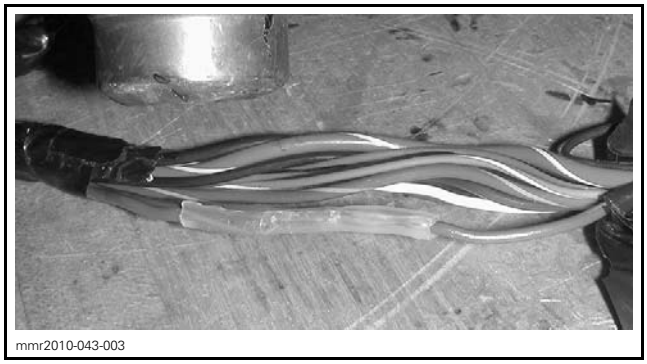
1. Shrink tube

4. Remove the shrink tube.
   4.1 Using a blade, cut the shrink tube.



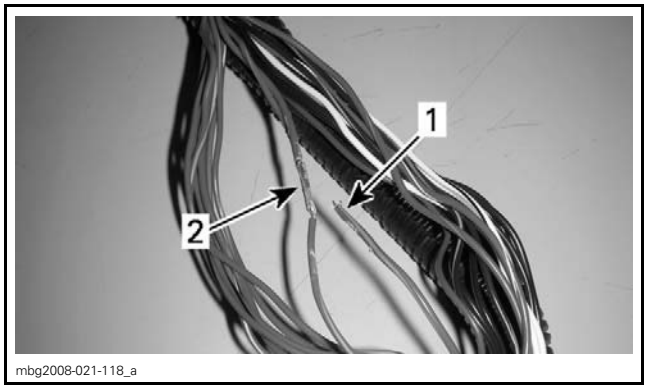
NOTICE Be careful with the blade to avoid cutting wires insulation.

   4.2 Slightly heat the shrink tube using a heat gun.



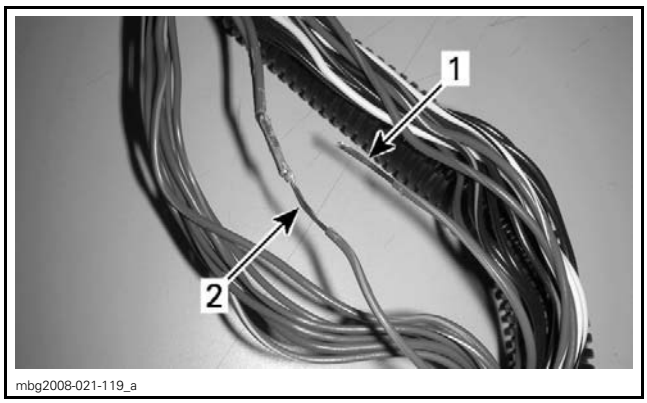
   4.3 Remove the shrink tube with long nose pliers.

5. Locate broken wire from splice.



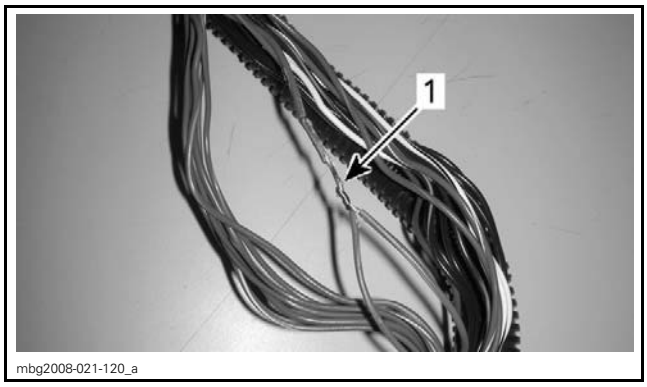
1. Broken wire
2. Splice

6. Strip wire insulation at the end of broken wire.
7. Strip wire insulation below the splice.



1. Broken wire stripped
2. Splice wire stripped

8. Twist wire around stripped wire.

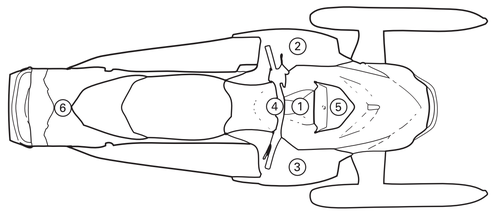


1. Twisted wire

9. Perform a tin solder on twisted wire.
10. Apply electrical tape to cover splice.
11. Reinstall wires into protector tube.

NOTE: Always perform a solder on a bigger wire (lower gage).

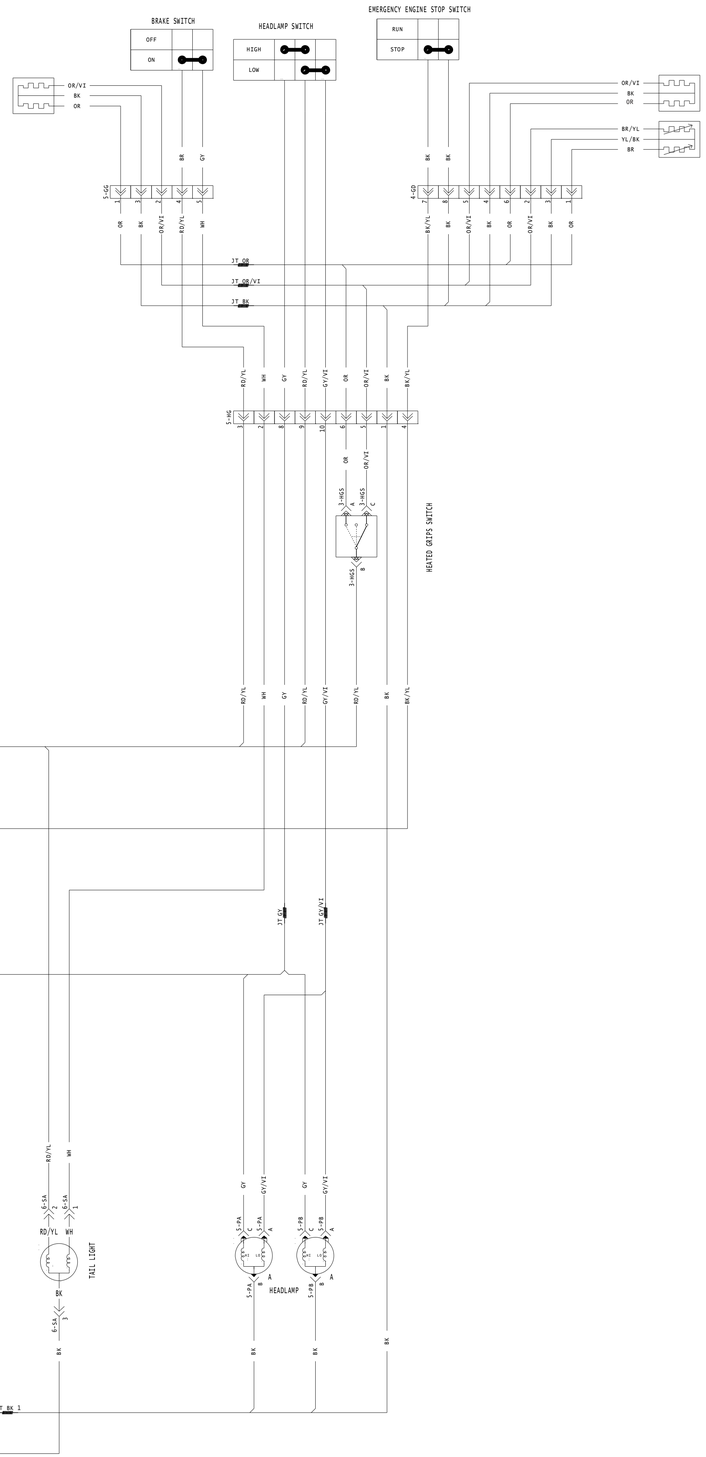
2012 TUNDRA 550 FC



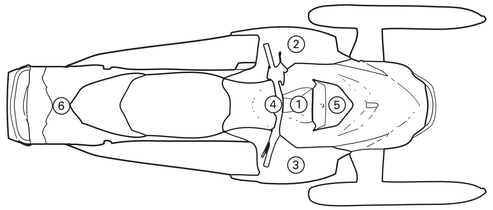
CONNECTOR LOCATION	
1	ENGINE RELATED CONNECTORS
2	LH SIDE PANEL
3	RH SIDE PANEL
4	HANDLEBAR AREA
5	BEHIND MULTI-FUNCTION GAUGE
6	REAR PART OF FRAME

COLOR CODE	
BE	BEIGE
BK	BLACK
BR	BROWN
BU	BLUE
GN	GREEN
GY	GRAY
OR	ORANGE
PK	PINK
RD	RED
VI	VIOLET
WH	WHITE
YL	YELLOW
LT	LIGHT COLOR
JT	JUNCTION/SPLICE

Midwest Manuals
Green-Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

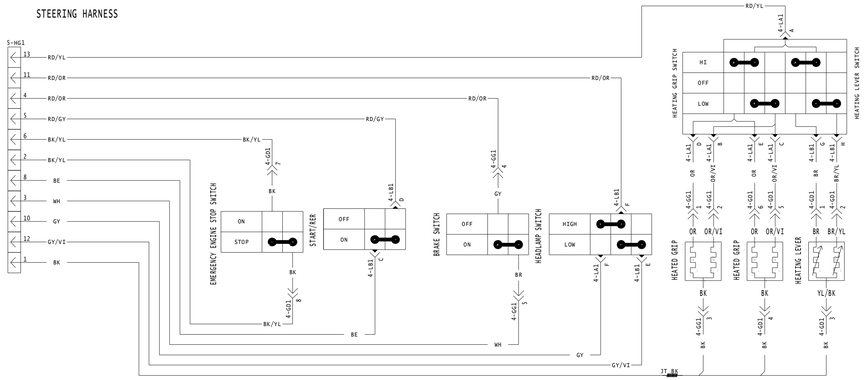


2012 REV-XP 550FC (MX Z, RENEGADE, EXPEDITION, GRAND TOURING)
2012 TUNDRA LT 550 FC
2012 TUNDRA SPORT 550 FC

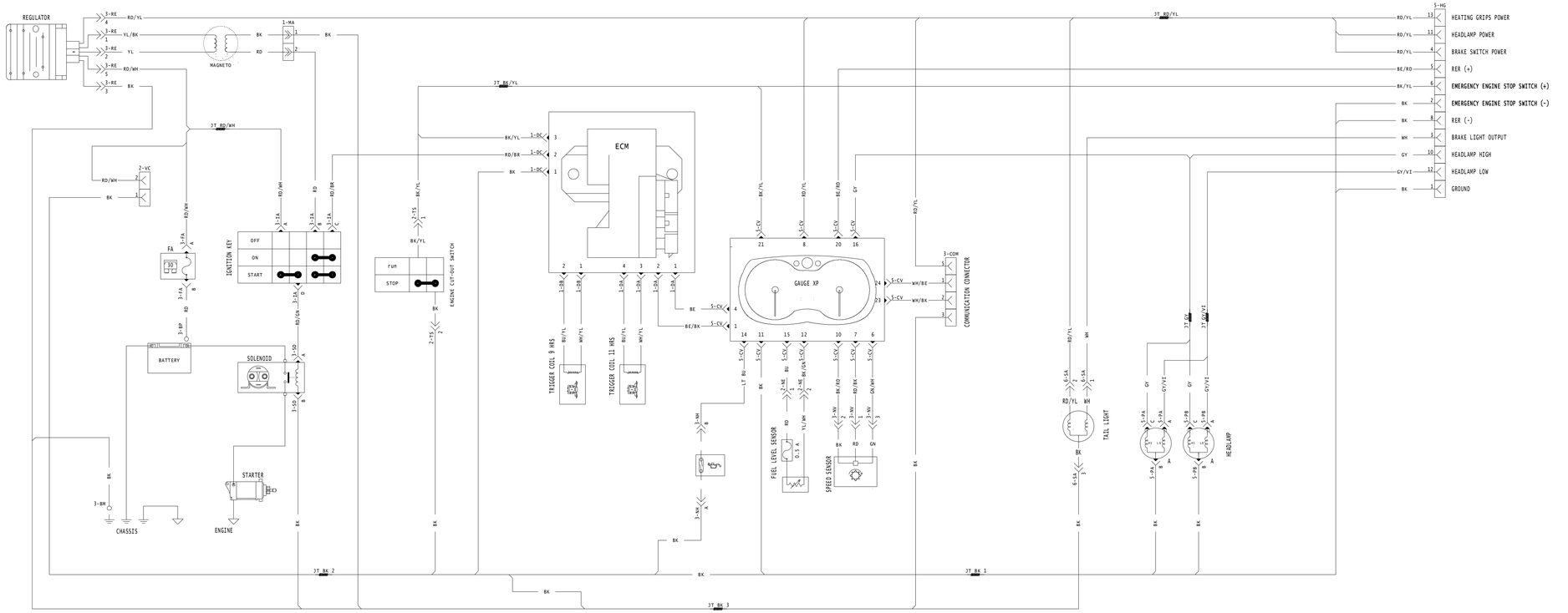


CONNECTOR LOCATION	
1	ENGINE RELATED CONNECTORS
2	LH SIDE PANEL
3	RH SIDE PANEL
4	HANDLEBAR AREA
5	BEHIND MULTI-FUNCTION GAUGE
6	REAR PART OF FRAME

COLOR CODE	
BE	BEIGE
BK	BLACK
BR	BROWN
BU	BLUE
GN	GREEN
GY	GRAY
OR	ORANGE
PK	PINK
RD	RED
VI	VIOLET
WH	WHITE
YL	YELLOW
LT	LIGHT COLOR
JT	JUNCTION/SPLICE



Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



mdd2012-003-003



219 100 599 CA

2012 MX Z, RENEGADE, GTX 550F/SKANDIC TUNDRA/EXPEDITION 550F SHOP MANUAL / ENGLISH
MANUEL DE RÉP. RENEGADE, GTX 550F/SKANDIC TUNDRA/EXPEDITION 550F 2012 / ANGLAIS

FAIT AU / MADE IN CANADA U/M:P.C.

®™ AND THE BRP LOGO ARE TRADEMARKS OF BOMBARDIER RECREATIONAL PRODUCTS INC. OR ITS AFFILIATES.
©2011 BOMBARDIER RECREATIONAL PRODUCTS INC. ALL RIGHTS RESERVED. PRINTED IN CANADA.
† TRADEMARK OF CASTROL LIMITED USED UNDER LICENSE.

2013 Ski-Doo 550F REV-XP, Tundra Sport/LT Series

This manual may cover later years than listed above.

This manual uses a base manual and a supplemental manual.
Always refer to the supplemental manual in blue FIRST, then refer to the base manual for anything not contained within it.

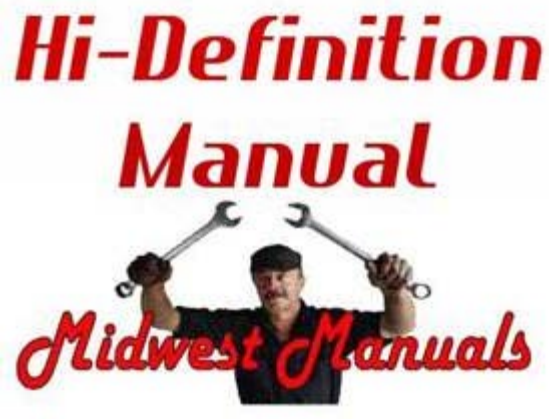
If you bought this manual from any other seller, they are reselling my work.

Please leave them negative feedback & email me at bestshopmanuals@gmail.com.

Our goal is to be one of the BEST sellers on eBay and the internet by providing you with the BEST customer service and the BEST manuals on the market.

Thank you for choosing us.





Midwest Manuals

Green Manuals
Paperless Manuals
For a Better Tomorrow

If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

ski-doo®

BRP

2013

Shop Manual Supplement

REV-XP™
REV-XR™
REV-XU™

(All Engines)

219 100 732

2013
Shop Manual Supplement

Midwest Manuals

Green-Manuals
Paperless Manuals
For a Better Tomorrow

If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

REV-XP®/REV-XR™/REV-XU™

550F
600
600 ACE™
600 HO E-TEC™
800R Power TEK™
800R E-TEC™
1200 4-TEC™

ski-doo® | BRP

TABLE OF CONTENTS

SAFETY NOTICE V

INTRODUCTION VII

01 MAINTENANCE

01 – BREAK-IN INSPECTION 3
02 – PERIODIC MAINTENANCE SCHEDULE 5
03 – PERIODIC MAINTENANCE PROCEDURES 7
PROCEDURES 7
ELECTRICAL SYSTEM (IGNITION) 7
IN-LINE FUEL FILTER REPLACEMENT 7

02 ENGINE

03 – ENGINE MEASUREMENT 9
PROCEDURES 9
PISTON PROJECTION MEASUREMENT 9
05 – EXHAUST SYSTEM 11
PROCEDURES 12
MUFFLER 12
EGTS SENSOR 12
TUNED PIPE TEMPERATURE SENSOR 12
07 – LUBRICATION SYSTEM 15
08 – COOLING SYSTEM 17
09 – MAGNETO SYSTEM 19
PROCEDURES 19
STATOR INSTALLATION(ALL E-TEC ENGINES) 19

03 ELECTRONIC MANAGEMENT SYSTEMS

02 – ENGINE MANAGEMENT SYSTEM (600 HO E-TEC AND 800R E-TEC) 21
GENERAL 23
SYSTEM FEATURES 23
04 – COMMUNICATION PROTOCOLS 25
GENERAL 25
CONTROLLER AREA NETWORK (CAN) 25
LOCAL INTERCONNECT NETWORK (LIN) 25
05 – COMMUNICATION TOOLS AND B.U.D.S. 27
GENERAL 27
TROUBLESHOOTING 27
COMMUNICATION PROBLEMS 27
PROCEDURES 29
MULTI-PURPOSE INTERFACE-2 (MPI-2) 29
B.U.D.S. 32

04 FUEL SYSTEM

01 – FUEL TANK AND FUEL PUMP 35
GENERAL 41
SYSTEM DESCRIPTION 41
INSPECTION 43
FUEL SYSTEM PRESSURIZATION AND LEAK TEST 43
FUEL TANK LEAK TEST 44
FUEL PUMP PRESSURE TEST 45
PROCEDURES 46
FUEL HOSE AND OETIKER CLAMPS 46
FUEL TANK 47
FUEL PUMP 50

TABLE OF CONTENTS

04 FUEL SYSTEM (cont'd)

01 – FUEL TANK AND FUEL PUMP (cont'd)

PROCEDURES (cont'd)

FUEL PUMP INLET FILTER 52
STEEL MESH FILTER 54
FUEL PRESSURE REGULATOR 54
FUEL LEVEL SENSOR 55

04 – E-TEC DIRECT FUEL INJECTION 57

GENERAL 57
SYSTEM DESCRIPTION 57

ADJUSTMENT 60
IDLE SPEED 60
CLOSED THROTTLE RESET (TPS) 60

TROUBLESHOOTING 61
DIAGNOSTIC TIPS 61

PROCEDURES 62
FUEL HOSES AND OETIKER CLAMPS 62
THROTTLE CABLE 63
FUEL INJECTOR 65
ECM (ENGINE CONTROL MODULE) 79
THROTTLE BODY 90
TPS (THROTTLE POSITION SENSOR) 92
CPS (CRANKSHAFT POSITION SENSOR) 96
ATS (AIR TEMPERATURE SENSOR) 97
CTS (COOLANT TEMPERATURE SENSOR) 100
APS (AIR PRESSURE SENSOR) 102
THCM (THERMOCOUPLE MODULE) 102
EXHAUST GAS TEMPERATURE SENSOR (EGTS) 104
KNOCK SENSOR (KS) 105

05 ELECTRICAL SYSTEM

01 – POWER DISTRIBUTION (E-TEC) 109

GENERAL 109
OVERVIEW 109
SYSTEM VOLTAGE (12 VDC) 110
POWER DISTRIBUTION SUMMARY 111

02 – IGNITION SYSTEM 113

GENERAL 113
SYSTEM DESCRIPTION 113

TROUBLESHOOTING 113
IGNITION SYSTEM TESTING SEQUENCE 113

03 – CHARGING SYSTEM 115

PROCEDURES 115
CAPACITOR 115
BATTERY 119

04 – STARTING SYSTEM 121

GENERAL 121
STARTING SYSTEM BASICS 121

TROUBLESHOOTING 121
TROUBLESHOOTING TIPS 121

PROCEDURES 121
FUSES 121
ELECTRIC STARTER 121
START/RER SWITCH 124
STARTER SOLENOID 124

05 ELECTRICAL SYSTEM (cont'd)
06 – ROTAX ELECTRONIC REVERSE (RER) 127
TROUBLESHOOTING 127
DIAGNOSTIC TIPS 127
PROCEDURES 127
RER FUSE 127
07 – LIGHTS, GAUGE AND ACCESSORIES 129
TROUBLESHOOTING 129
LIGHTING AND ACCESSORIES SYSTEM TESTING 129
PROCEDURES 129
FUSES 129
HEATED HANDLEBAR GRIPS 129

06 DRIVE SYSTEM AND BRAKE
01 – DRIVE BELT 131
02 – DRIVE PULLEY (eDRIVE II) 133
GENERAL 135
TROUBLESHOOTING 135
PROCEDURES 135
DRIVE PULLEY 135
03 – DRIVEN PULLEY AND COUNTERSHAFT 145
04 – BRAKE 147
PROCEDURES 148
MASTER CYLINDER 148

07 CHASSIS
03 – REAR SUSPENSION (rMOTION) 149
PROCEDURES 149
SPRING PRELOAD QUICK ADJUSTER SYSTEM 149
SHOCK ABSORBERS 155

TABLE OF CONTENTS

08 TECHNICAL SPECIFICATIONS

01 – ENGINE (550F) 159
02 – ENGINE (600) 161
03 – ENGINE (600 HO E-TEC) 163
04 – ENGINE (600 ACE) 165
05 – ENGINE (800R POWER TEK) 167
06 – ENGINE (800R E-TEC) 169
07 – ENGINE (1200 4-TEC) 171
08 – CHASSIS SYSTEMS REV-XP (550F), EXPEDITION (550F) 175
09 – CHASSIS SYSTEMS REV-XP (600) 179
10 – CHASSIS SYSTEMS REV-XP/REV-XR (600 HO E-TEC) 183
11 – CHASSIS SYSTEMS REV-XP/ EXPEDITION (600 ACE) 189
12 – CHASSIS SYSTEMS REV-XP (800R POWER TEK) 193
13 – CHASSIS SYSTEMS REV-XP/REV-XR (800R E-TEC) 197
14 – CHASSIS SYSTEMS REV-XR (1200 4-TEC) 203
15 – CHASSIS SYSTEMS EXPEDITION (600 HO E-TEC) 209
16 – CHASSIS SYSTEMS EXPEDITION (1200 4-TEC) 213
17 – CHASSIS SYSTEMS TUNDRA (550F) 217
18 – CHASSIS SYSTEMS TUNDRA XTREME (600 HO E-TEC) 221
19 – CHASSIS SYSTEMS TUNDRA (600 ACE) 225
20 – CHASSIS SYSTEMS SKANDIC WT/SWT 229

09 WIRING DIAGRAM

01 – WIRING DIAGRAM INFORMATION 235
GENERAL 235
WIRING DIAGRAM LOCATION 235
WIRING DIAGRAM CODES 235

SAFETY NOTICE

This manual has been prepared as a guide to correctly service and repair 2013 Ski-Doo® snowmobiles described in the list in the *INTRODUCTION*.

This *SHOP MANUAL SUPPLEMENT* must be used in conjunction with the appropriate SHOP MANUEL. Refer to the proper manual when a particular system is not covered in this supplement.

ENGINE	PLATEFORM	PART NUMBER
550F	REV-XP®	219 100 599 (2012)
	Tundra® Sport/LT	219 100 599 (2012)
	Skandic® WT	219 100 597 (2012)
600	REV-XP	219 100 599 (2012)
600 ACE™	REV-XP	219 100 472(2011)
	Tundra Sport/LT	219 100 528 (2011)
	Skandic WT/SWT	219 100 597 (2012)
600 HO E-TEC®	REV-XP	219 100 599 (2012)
	REV-XR™	219 100 599 (2012)
	Tundra Extreme	219 100 599 (2012)
	Skandic WT/SWT	219 100 597 (2012)
	Expedition® LE/SE	219 100 522 (2011)
800R Power TEK®	REV-XP	219 100 599 (2012)
800R E-TEC®	REV-XP	219 100 599 (2012)
1200 4-TEC®	REV-XR	219 100 472 (2011)
		219 100 603 (2012)

This edition was primarily published to be used by technicians who are already familiar with service procedures relating to Bombardier Recreational Products Inc. (BRP) products. Mechanical technicians should attend continuous training courses given by BRPTI.

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

The content of this manual depicts parts and procedures applicable to the particular product at time of writing. Service and Warranty Bulletins may be published to update the content of this manual. Dealer modifications that were carried out after manufacturing of the product, wether or not authorized by BRP, are not included.

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 BRP 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.

It is understood that certain modifications may render use of the vehicle illegal under existing federal, provincial and state regulations.

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

⚠ WARNING

Indicates a potential hazard which, if not avoided, could result in serious injury or death.

⚠ CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE **Indicates an instruction which, if not followed, could result in severely damaged vehicle components or other property.**

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

SAFETY NOTICE

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

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

BRP disclaims liability for all damages and/or injuries resulting from the improper use of the contents.

Unless otherwise indicated, engine must be OFF and tether cord removed prior to perform any services.

We strongly recommend that any services be carried out and/or verified by a highly skilled professional mechanic.

INTRODUCTION

ENGINE	PLATEFORM
550F	REV-XP®
	Tundra® Sport/LT
	Skandic® WT
600	REV-XP
600 ACE™	REV-XP
	Tundra Sport/LT
	Skandic WT/SWT
600 HO E-TEC®	REV-XP
	REV-XR™
	Tundra Extreme
	Skandic WT/SWT
	Expedition® LE/SE
800R Power TEK®	REV-XP
800R E-TEC®	REV-XP
1200 4-TEC®	REV-XR

The information and component/system descriptions contained in this manual are correct at time of writing. BRP 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, there may be some differences between the manufactured product and the description and/or specifications in this document.

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

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

SERVICE TOOLS INDEX

12 V BATTERY SUPPLY CABLE
(P/N 529 035 997)



Page: 28, 30–31, 129

BUSHING PULLER/INSTALLER
(P/N 529 031 200)



Page: 141

BUSHING REMOVER/INSTALLER
(P/N 529 035 931)



Page: 141

CLUTCH HOLDER
(P/N 529 036 235)



Page: 135

DRIVE PULLEY HOLDER (CVT)
(P/N 529 006 400)



Page: 137

DRIVE PULLEY PULLER
(P/N 529 000 064)



Page: 135

EXTRACTOR ADAPTOR
(P/N 529 036 136)



Page: 73

FLUKE 115 MULTIMETER
(P/N 529 035 868)



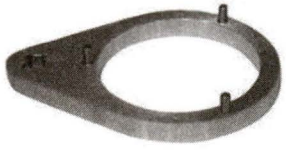
Page: 55, 69–70, 82, 94–95, 99, 101, 116

FUEL HOSE ADAPTER
(P/N 529 036 023)



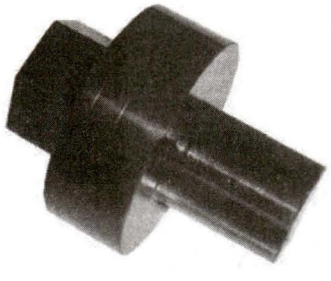
Page: 45

FUEL PUMP NUT TOOL
(P/N 529 036 214)



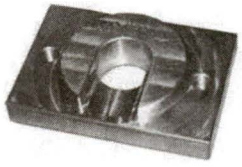
Page: 51

HYDRAULIC ADJUSTER SOCKET
(P/N 529 036 241)



Page: 150–151

INJECTOR RETAINER PLATE
(P/N 529 036 137)



Page: 67

LEAK TEST KIT
(P/N 529 033 100)



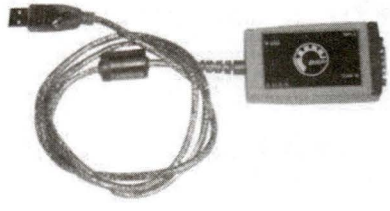
Page: 44

MPI-2 DIAGNOSTIC CABLE
(P/N 710 000 851)



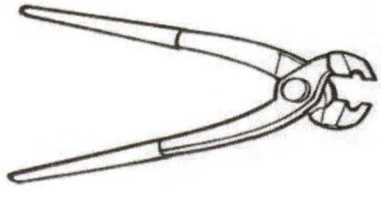
Page: 28, 30–31

MPI-2 INTERFACE CARD
(P/N 529 036 018)



Page: 28–29

OETIKER PLIERS
(P/N 295 000 070)



Page: 7, 47, 62

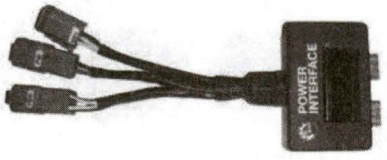
SERVICE TOOLS INDEX

PISTON PROJECTION
(P/N 529 036 215)



Page: 9

POWER INTERFACE
(P/N 515 177 223)



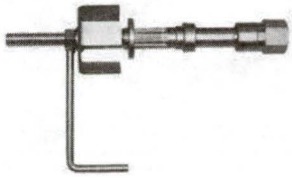
Page: 28–31, 113, 115, 121, 127, 129

PRESSURE GAUGE
(P/N 529 035 709)



Page: 45

PULLEY SPRING COMPRESSOR TOOL
(P/N 529 036 012)



Page: 137, 141

RMOTION MASTER CYLINDER KEY
(P/N 529 036 254)



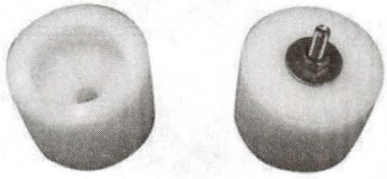
Page: 152

RMOTION SOCKET
(P/N 529 036 255)



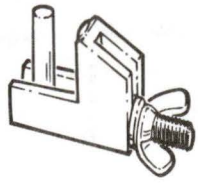
Page: 153

SHOCK ABSORBER SUPPORTS
(P/N 529 036 186)



Page: 156

SMALL HOSE PINCHER
(P/N 295 000 076)



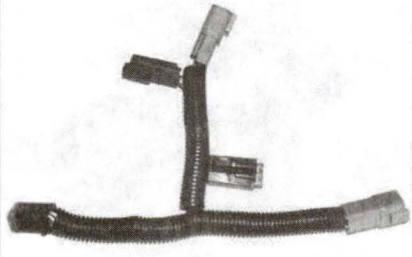
Page: 44, 91

SUCTION PUMP
(P/N 529 035 880)



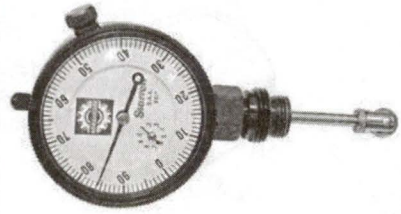
Page: 47

T-HARNESS
(P/N 529 035 869)



Page: 113, 121, 127

TDC DIAL INDICATOR
(P/N 295 000 143)



Page: 9

VACUUM/PRESSURE PUMP
(P/N 529 021 800)



Page: 44–45

BREAK-IN INSPECTION

BREAK-IN INSPECTION
Inspect rear suspension (including stopper straps and slider shoes).

PERIODIC MAINTENANCE SCHEDULE

Procedures are detailed in *PERIODIC MAINTENANCE PROCEDURES* subsection.

EVERY 3 000 KM (2,000 MI) OR 1 YEAR (WHICHEVER COMES FIRST)
Inspect rear suspension (including stopper straps and slider shoes).

PERIODIC MAINTENANCE PROCEDURES

SERVICE TOOLS

Description	Part Number	Page
OETIKER PLIERS	295 000 070	7

PROCEDURES

ELECTRICAL SYSTEM (IGNITION)

Spark Plug Replacement (E-TEC)

⚠ WARNING

Always electrically disconnect both fuel injectors prior to testing for ignition spark. Otherwise, fuel vapors may ignite in presence of a spark creating a fire hazard.

IN-LINE FUEL FILTER REPLACEMENT

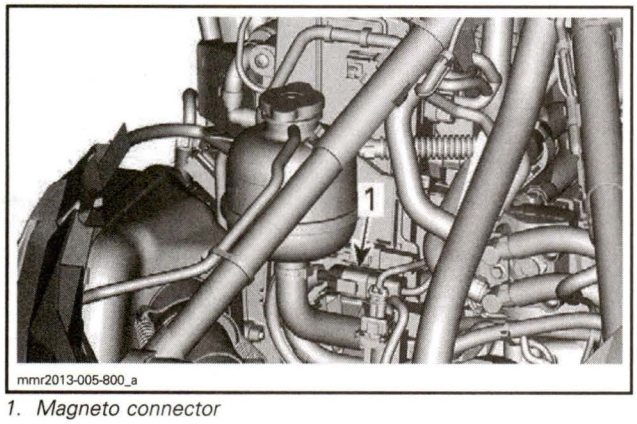
Break-In	Scheduled Maintenance	Storage	Preseason
	✔		

In-line Fuel Filter Removal

⚠ WARNING

Work in a well ventilated area. Wipe up all spilled fuel.

1. Release fuel pressure in the system. Refer to *FUEL TANK AND FUEL PUMP* subsection.
2. Remove the upper body module. Refer to *BODY* subsection.
3. Disconnect magneto connector.

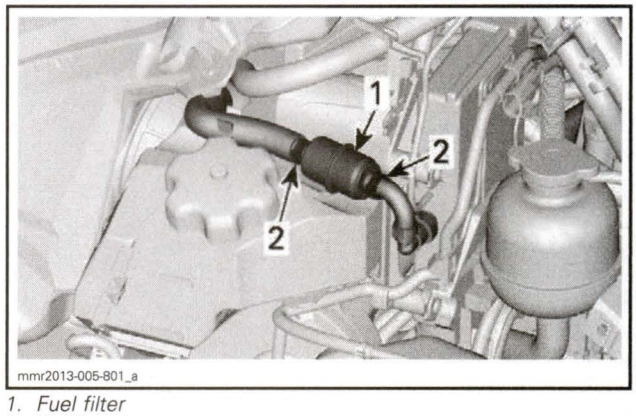


1. Magneto connector

⚠ WARNING

The magneto connector must be disconnected to prevent any spark in the engine compartment and to remove power from the fuel pump. Otherwise, if the engine is cranked, fuel vapors may ignite in presence of a spark creating a fire hazard.

4. Place a rag between fuel filter and oil injection tank.
5. Cut both Oetiker clamps securing the fuel filter.



1. Fuel filter
2. Oetiker clamps

6. Remove fuel filter from vehicle.

Dispose fuel filter as per your local environmental regulations.

In-Line Fuel Filter Installation

The installation is the reverse of the removal procedure however, pay attention to the following.

Insert new Oetiker clamps on both hoses.

Install the new filter. Make sure printed arrow pointed towards the ECM.

Using OETIKER PLIERS (P/N 295 000 070), close Oetiker clamps to secure the fuel filter.

⚠ WARNING

Ensure hose clamp is tight and that hose cannot turn on the fitting.

When installation is complete, carry out a fuel system leak test, refer to *FUEL SYSTEM PRESSURIZATION* in *FUEL TANK AND FUEL PUMP* subsection.

⚠ WARNING

After working on the fuel system, carry out a fuel system pressurization test to check for leaks. Failure to carry out a fuel system leak test could result in severe injury or a life threatening situation should a leak occur.

Reinstall all removed parts.

ENGINE MEASUREMENT

SERVICE TOOLS

Description	Part Number	Page
PISTON PROJECTION	529 036 215	9
TDC DIAL INDICATOR	295 000 143	9

All engines
- Precision about dial indicator reading.

PROCEDURES

PISTON PROJECTION MEASUREMENT

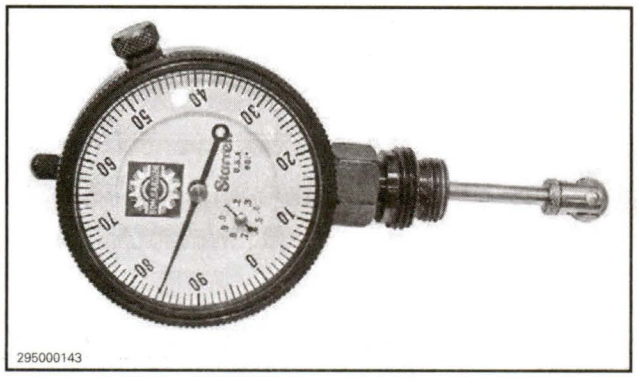
NOTE: The piston projection measurement is used to determine the correct cylinder base gasket thickness when engine components are replaced.

Measurement

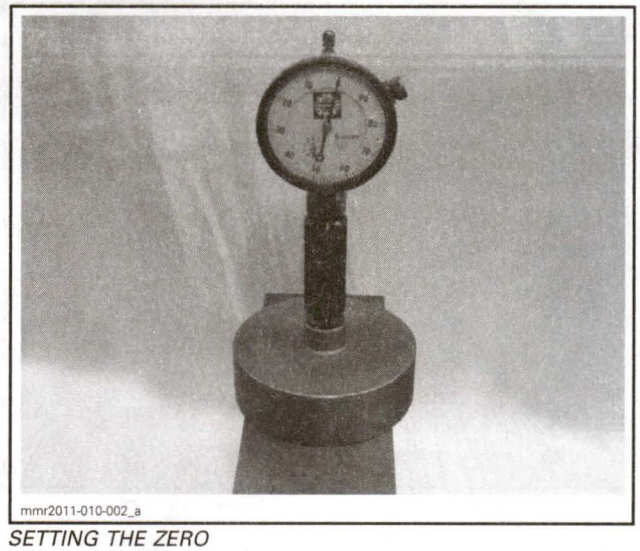
1. Use the PISTON PROJECTION (P/N 529 036 215) tool.



2. Install the TDC DIAL INDICATOR (P/N 295 000 143) on the piston projection tool.

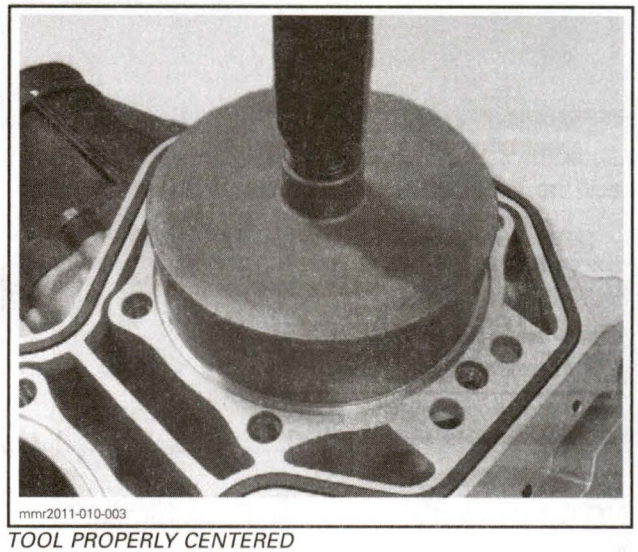


3. Place piston projection tool on a flat steel surface.
4. Rotate dial indicator face to position the **0** in line with needle.



SETTING THE ZERO

5. Install tool on PTO cylinder.
6. Center tool with cylinder to ensure that dial indicator reads piston dome.



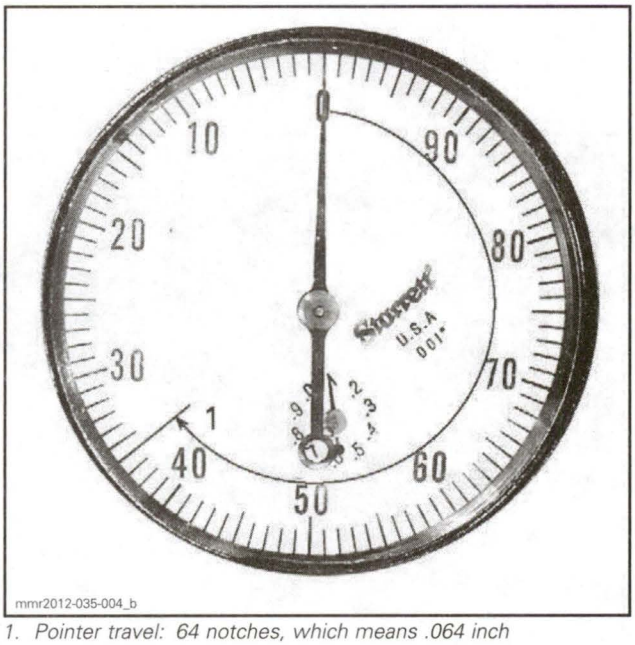
TOOL PROPERLY CENTERED

7. Ensure that PTO piston is set to TDC.
8. Read dial indicator a follows:
   8.1 Calculate the number of notches the pointer traveled.

   NOTE: The gauge pointer will move clockwise. Read the pointer travel, NOT the number where the pointer stops.

   8.2 Note measurement.

Example:

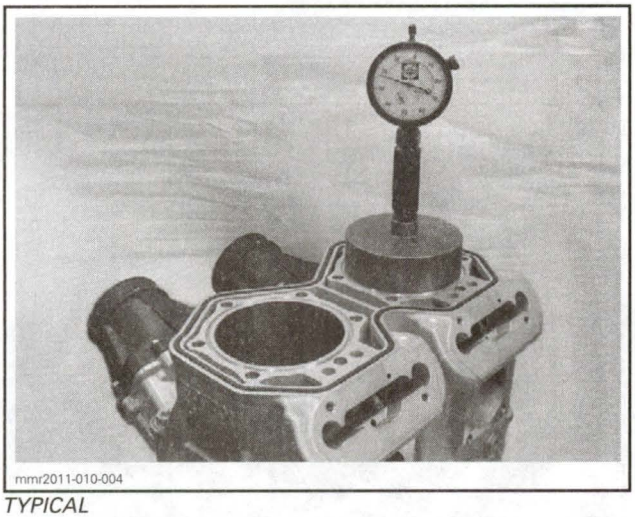


mmr2012-035-004_b

1. Pointer travel: 64 notches, which means .064 inch

NOTE: In the example above, the correct measure is **.064 inch**, (NOT .036 inch).

9. Read dial indicator then note measurement.


mmr2011-010-004

TYPICAL

NOTE: Convert dial indicator measurement to millimeter.

10. Check if piston projection is according to specification. Refer to *TOP END* subsection.

NOTICE Take care to use the proper specification according to the type of engine and the model of vehicle.

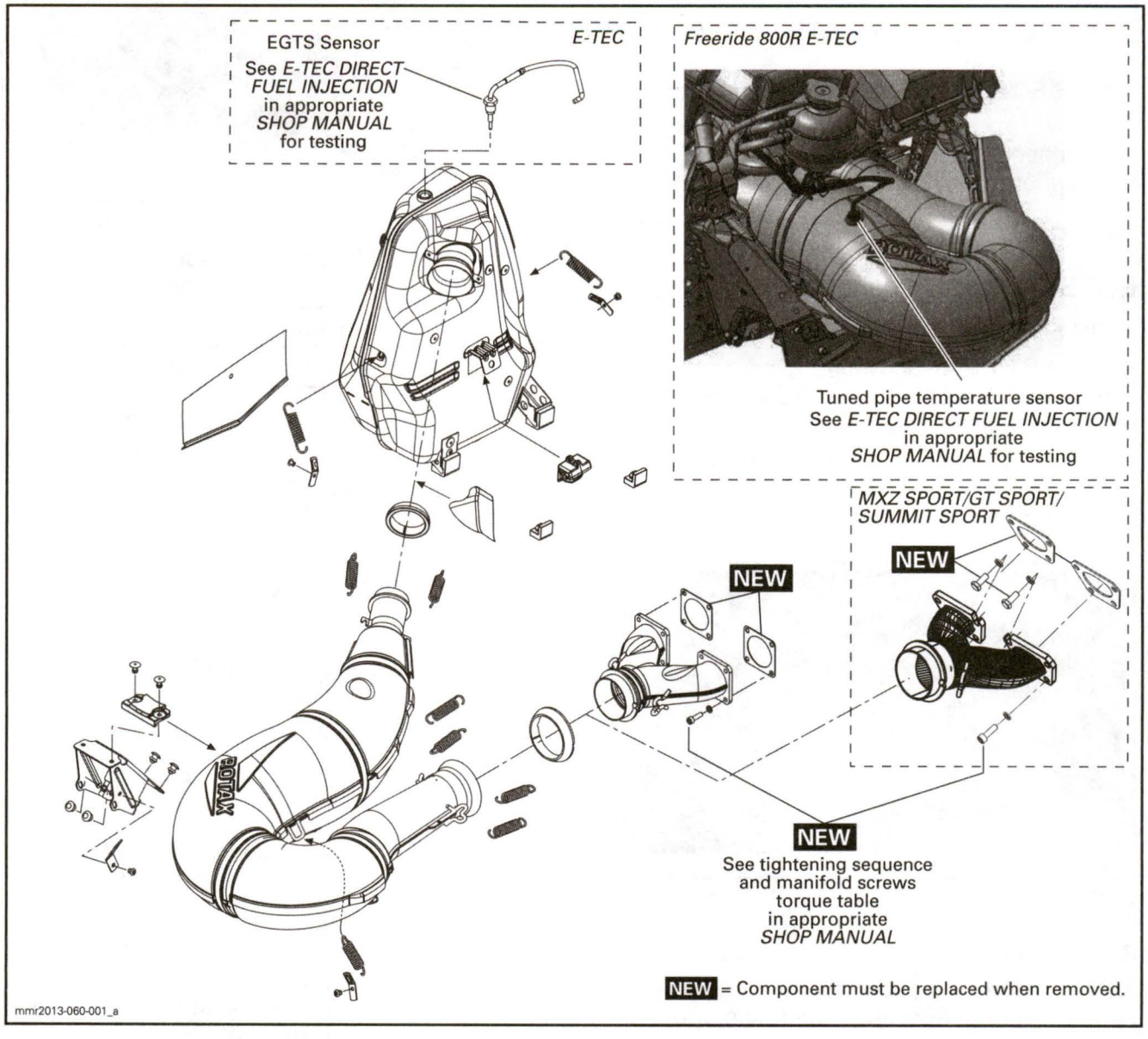
11. Repeat procedure for MAG cylinder.
12. If piston projection is out of specification, replace base gasket.

NOTE: A thicker base gasket will lower the piston projection measurement.

EXHAUST SYSTEM

Freeride 800R E-TEC

– Tuned pipe temperature sensor and EGTS sensor are no longer available separately. They must be replaced as an assembly with the THCM module.



PROCEDURES

MUFFLER

Muffler Removal

For vehicle servicing:

- **600 HO E-TEC**: Unplug EGTS connector and remove muffler.
- **800R E-TEC**: Unscrew the EGTS from the muffler.

For muffler replacement: unscrew the EGTS from the muffler.

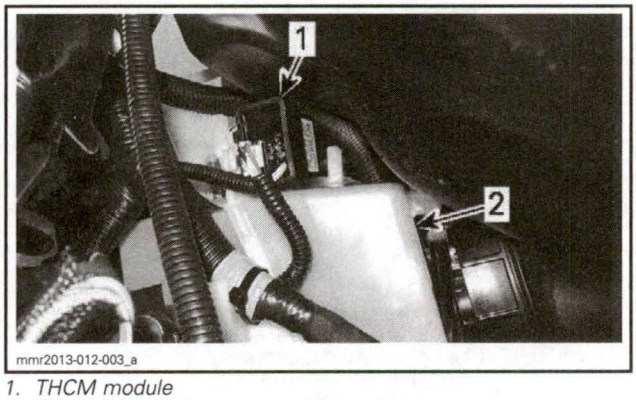
EGTS SENSOR

EGTS Sensor Replacement

800R E-TEC

NOTE: EGTS sensor, tuned pipe temperature sensor (if so equipped) and THCM module must be replaced as an assembly.

1. Remove the primary air intake silencer, refer to *AIR INTAKE SYSTEM*.
2. Unclip THCM module from oil injection tank.



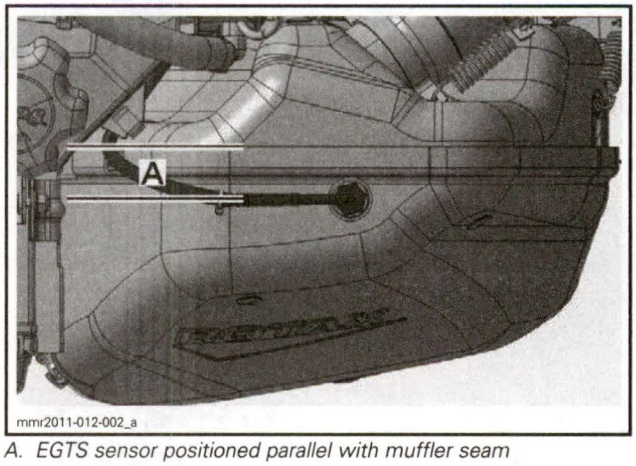
1. THCM module
2. Oil injection tank

3. Remove EGTS sensor from muffler.

NOTE: On **Freeride**, unscrew the tuned pipe temperature sensor from the tuned pipe. Both sensors must be replaced at the same time with the THCM module.

4. Install **NEW** EGTS sensor in the following specific position for optimum efficiency.

NOTICE **Do not use an impact wrench for installation or if it was dropped.**



A. EGTS sensor positioned parallel with muffler seam

5. Tighten EGTS sensor to specification while holding sensor to prevent turning.

TIGHTENING TORQUE	
EGTS sensor	45 N•m (33 lbf•ft)

6. Install muffler as the reverse of removal.
7. Clip the THCM module to oil injection tank.
8. Install the primary air intake silencer.
9. Install RH side panel.

TUNED PIPE TEMPERATURE SENSOR

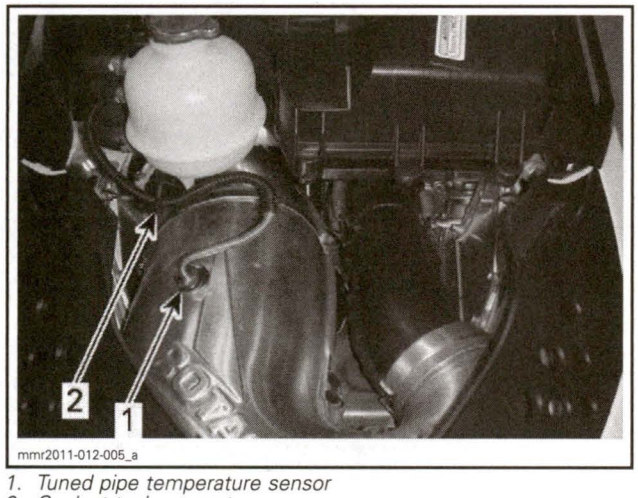
Tuned Pipe temperature Sensor Test

Refer to *E-TEC DIRECT FUEL INJECTION* for tuned pipe temperature sensor testing.

Tuned Pipe Temperature Sensor Replacement

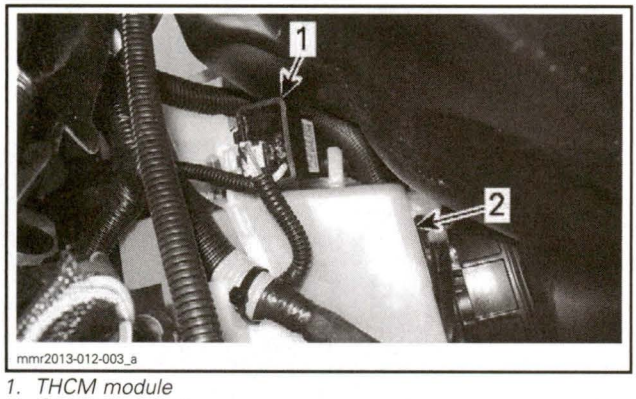
NOTE: EGTS sensor, tuned pipe temperature sensor and THCM module must be replaced as an assembly.

1. Remove tuned pipe temperature sensor from tuned pipe.
2. Detach tuned pipe temperature sensor wires from coolant tank support.



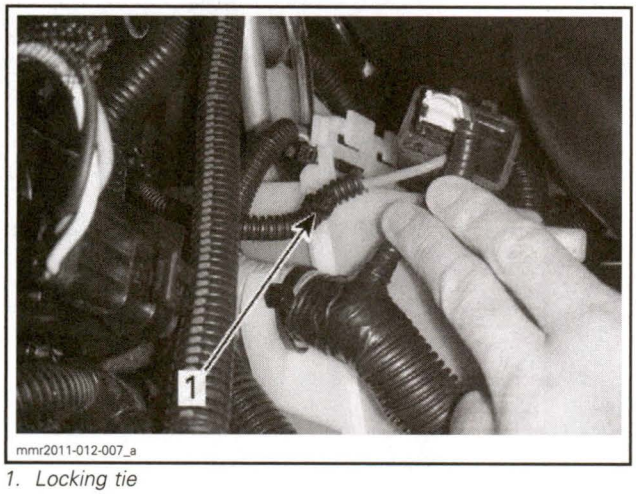
1. *Tuned pipe temperature sensor*
2. *Coolant tank support*

3. Remove the primary air intake silencer, refer to *AIR INTAKE SYSTEM*.
4. Unclip THCM module from oil injection tank.



1. *THCM module*
2. *Oil injection tank*

5. Cut locking tie that secure tuned pipe temperature sensor wires to oil injection tank.



1. *Locking tie*

6. Remove THCM module and sensors (EGTS and tuned pipe temperature sensor) as an assembly by carefully moving them towards LH side.
7. Install **NEW** THCM module and sensors as the reverse of removal.

NOTICE **Do not use an impact wrench for installation.**

8. Tighten tuned pipe temperature sensor to specification while holding sensor to prevent turning.

TIGHTENING TORQUE	
Tuned pipe temperature sensor	45 N•m (33 lbf•ft)

9. Install body panels as the reverse of removal.

NOTE: Ensure that tuned pipe temperature sensor is properly configured using B.U.D.S. Refer to *E-TEC DIRECT FUEL INJECTION* subsection.

LUBRICATION SYSTEM

600 HO E-TEC and 800R E-TEC Equipped Models

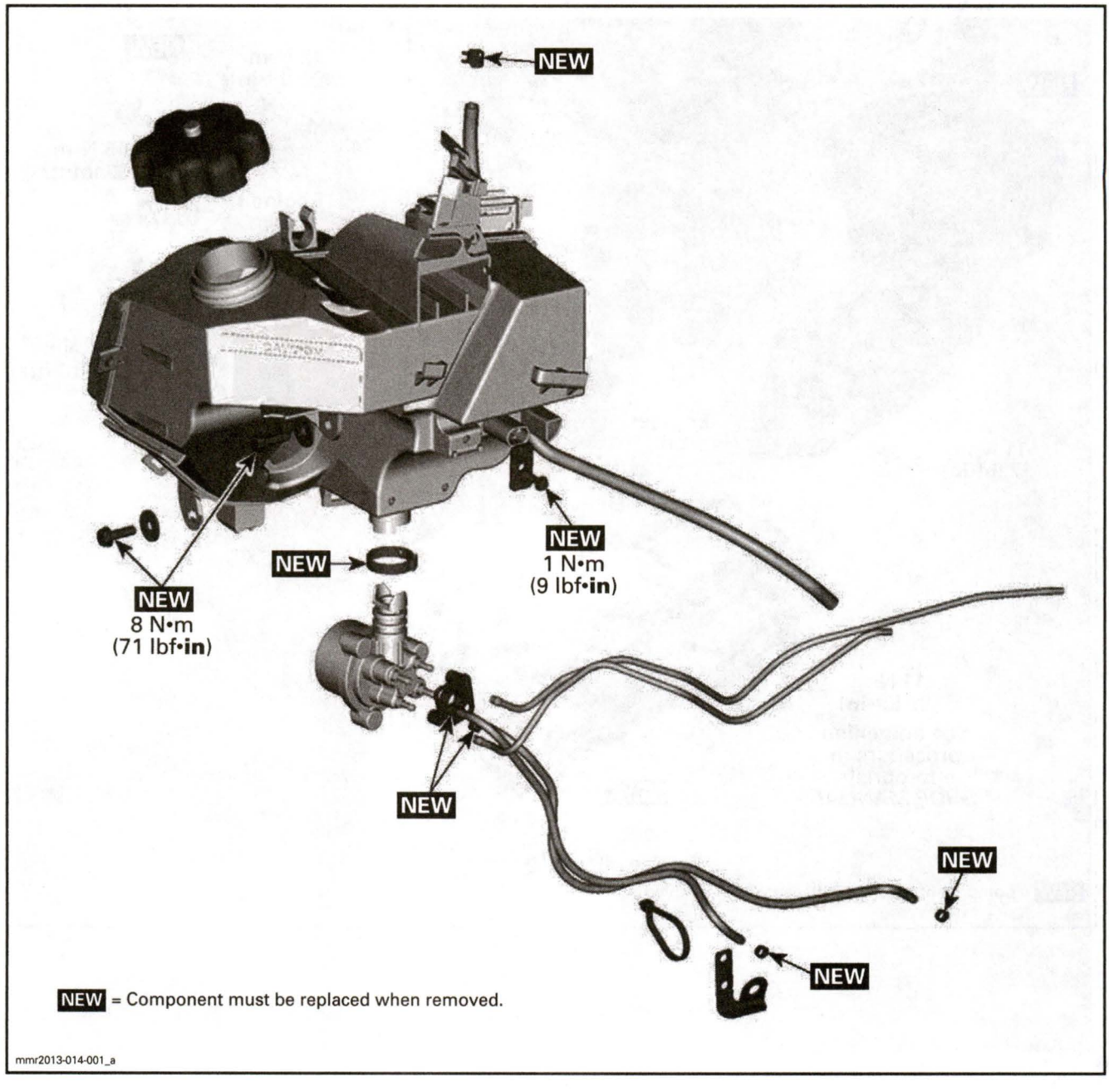
- These models have a new oil injection tank and a new vented oil injection tank cap. For servicing, no change.
- The oil injection pump from the 800R E-TEC is also used on the 600 HO E-TEC. Same oil injection pump for all E-TEC models.

1200 4-TEC Engines

- Only one oil cooler is now available for this engine, oil cooler without support plate.

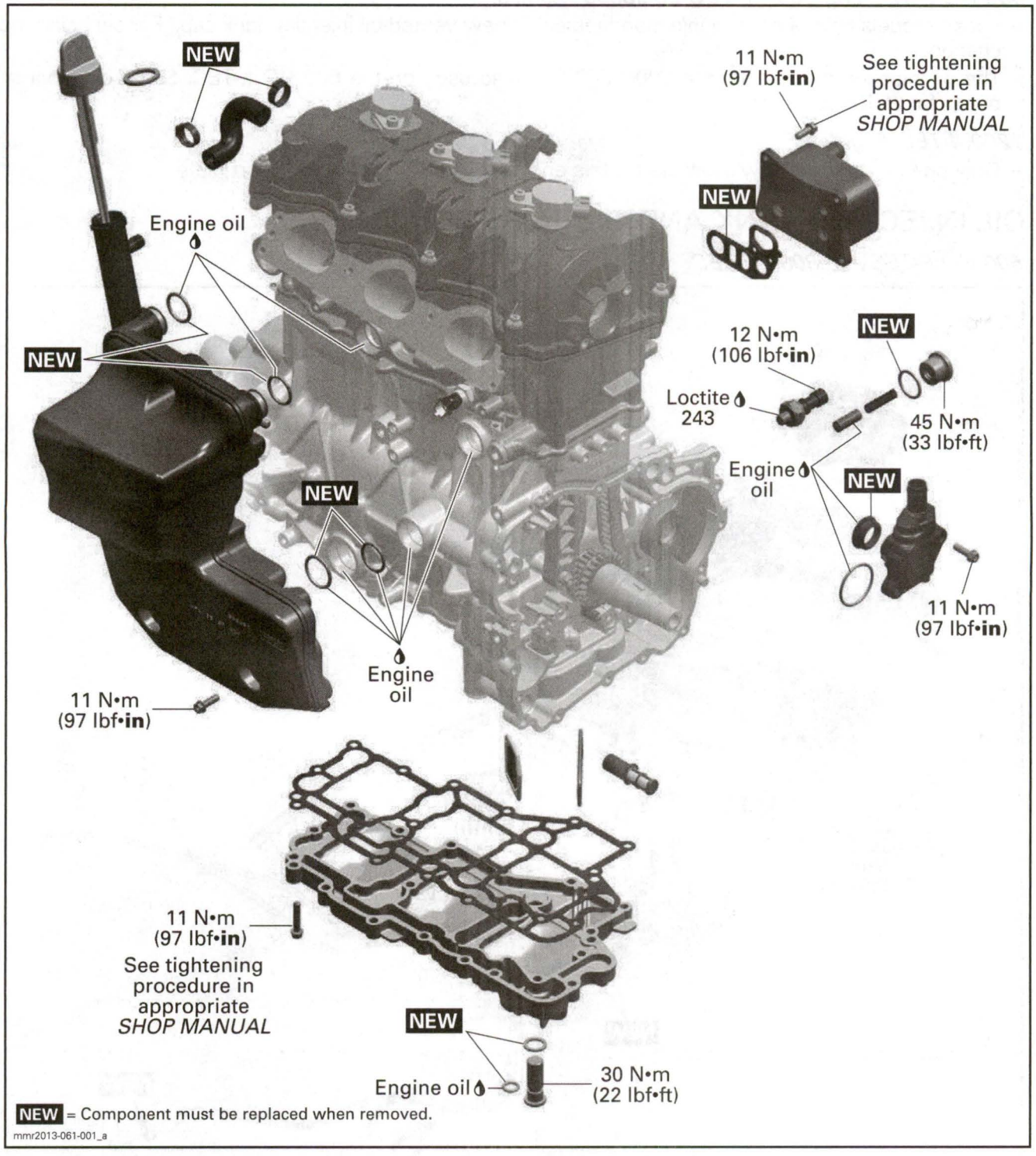
OIL INJECTION TANK AND OIL INJECTION PUMP

600 HO E-TEC and 800R E-TEC



OIL RESERVOIR AND OIL COOLER

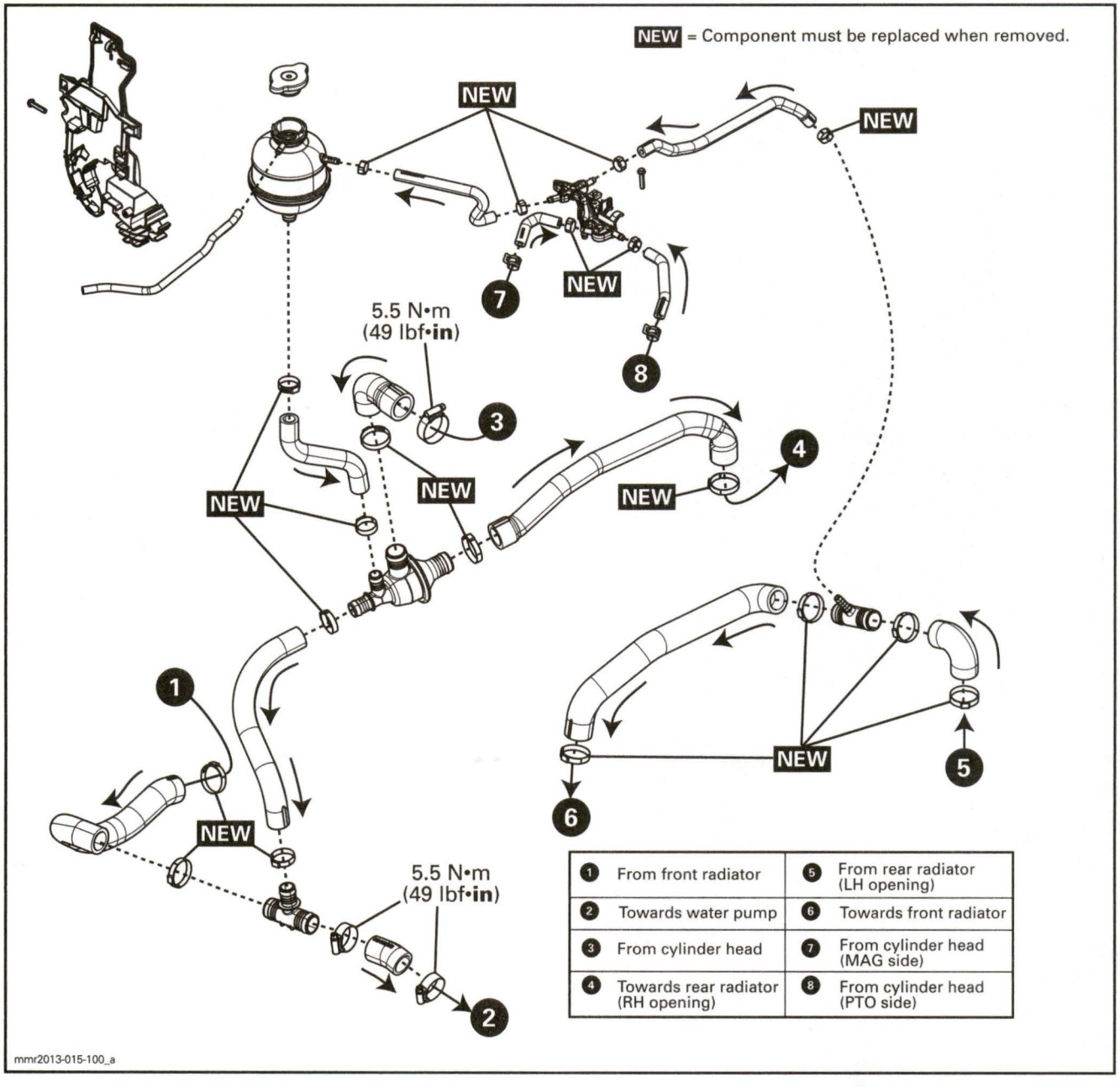
1200 4-TEC



COOLING SYSTEM

600 HO E-TEC Engines:

– New cylinder head with two bleeding nipples. To improve cooling system efficiency. Same configuration for 600 HO E-TEC and 800R E-TEC.



MAGNETO SYSTEM

SERVICE PRODUCTS

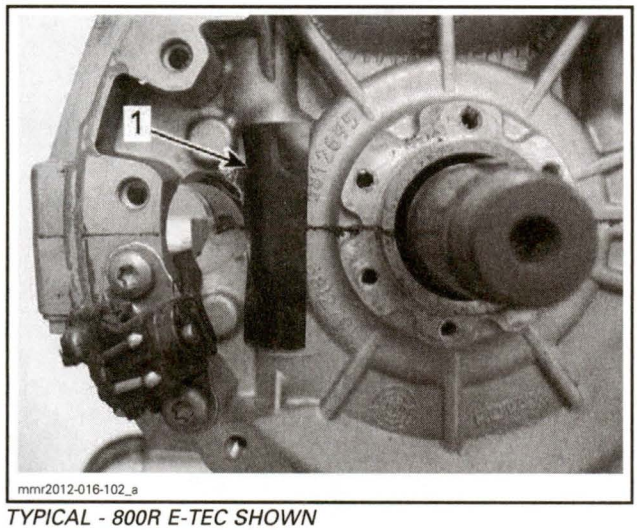
Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	19
LOCTITE 5910	293 800 081	19

All E-TEC engines
- New adhesive pad on all E-TEC engines.
- Modification of sealant application.

PROCEDURES

STATOR INSTALLATION (ALL E-TEC ENGINES)

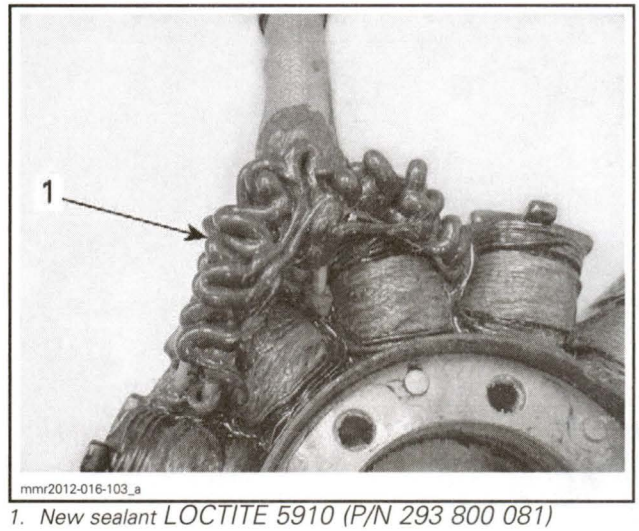
1. Install adhesive pad on crankcase as illustrated.



TYPICAL - 800R E-TEC SHOWN
MAGNETO HOUSING REMOVED FOR CLEARNESS PURPOSE
1. Adhesive pad to install

NOTE: It is important to remove the old sealant behind the LH side of the stator then apply new sealant specified on stator wires.

STATOR WIRES	
Service product	LOCTITE 5910 (P/N 293 800 081)



1. New sealant LOCTITE 5910 (P/N 293 800 081)

2. Insert stator connector through the crankcase and grommet.
3. Install grommet on crankcase.

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

4. Tighten stator retaining screws to specification.

STATOR RETAINING SCREWS	
Service product	LOCTITE 243 (BLUE) (P/N 293 800 060)
Tightening torque	9 N•m (80 lbf•**in**)

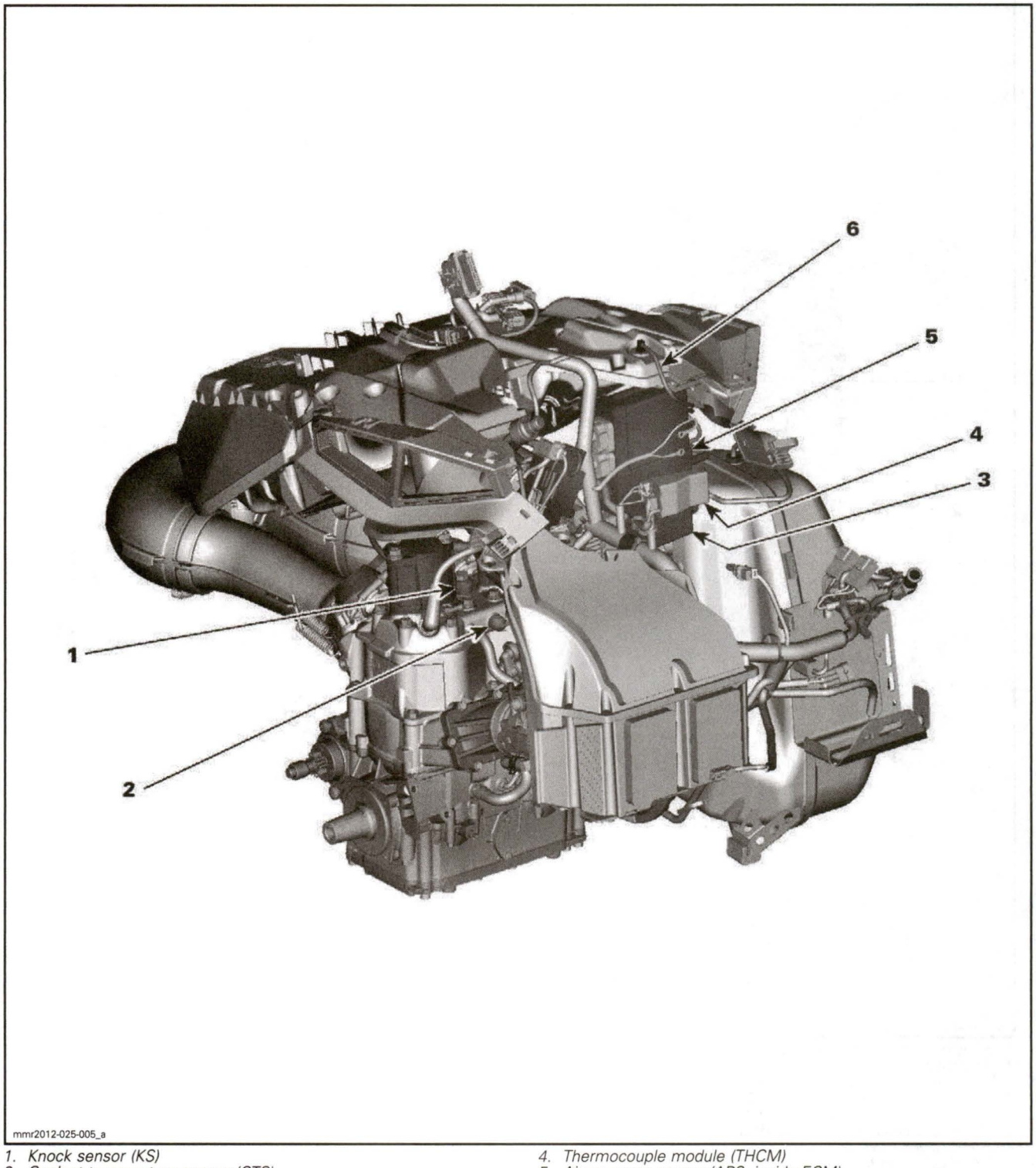
5. Tie the string on the connector used during removal of the stator connector, then pull on him to route the harness up to his original locations.

NOTICE **Before installing the magneto cover, make sure there is a minimum of 3 mm (1/8 in) between stator and its wires.**

6. Reinstall all other removed parts.

ENGINE MANAGEMENT SYSTEM (600 HO E-TEC AND 800R E-TEC)

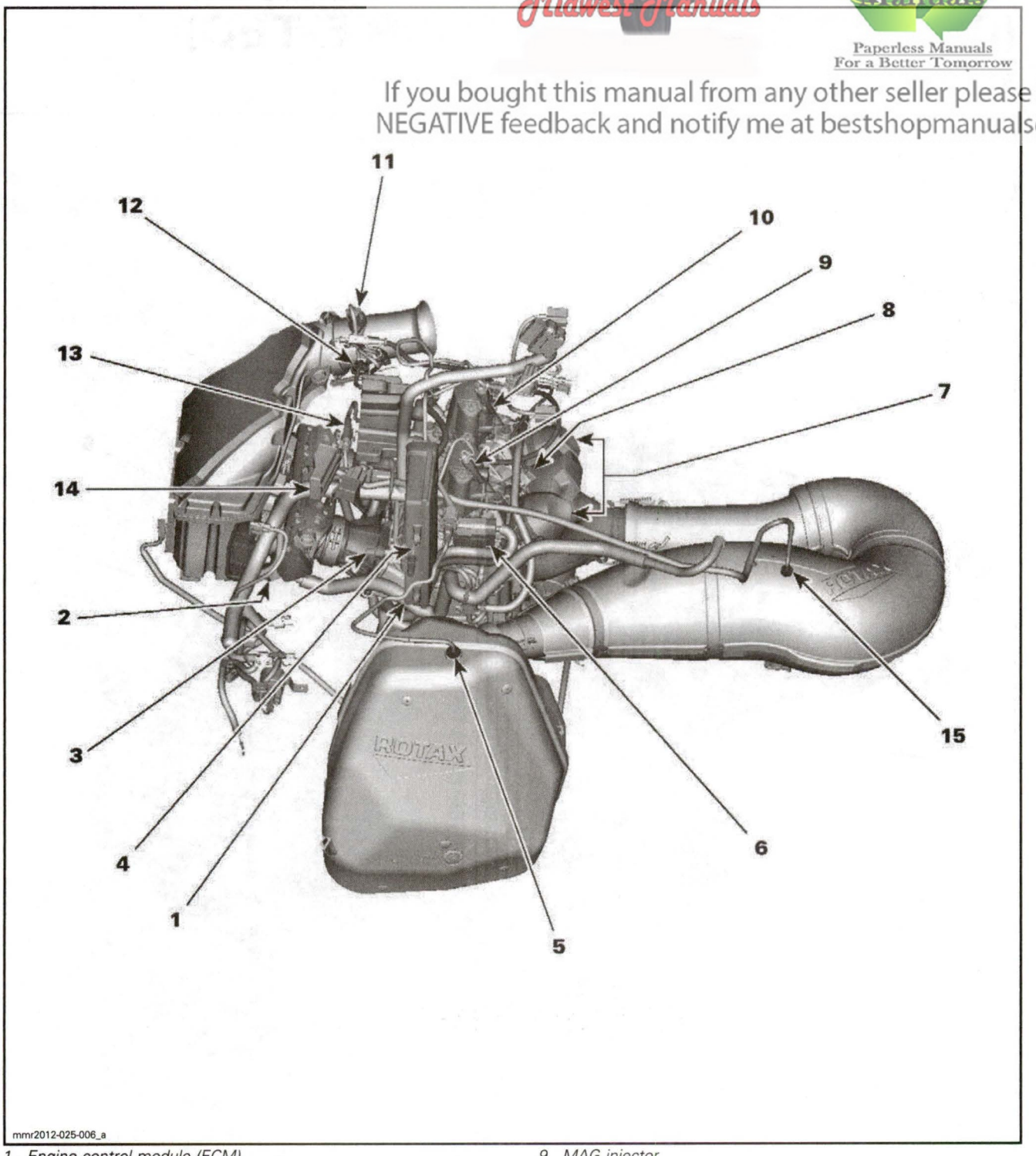
800R E-TEC



1. *Knock sensor (KS)*
2. *Coolant temperature sensor (CTS)*
3. *Engine control module (ECM)*
4. *Thermocouple module (THCM)*
5. *Air pressure sensor (APS, inside ECM)*
6. *Air pressure sense line*

800R E-TEC

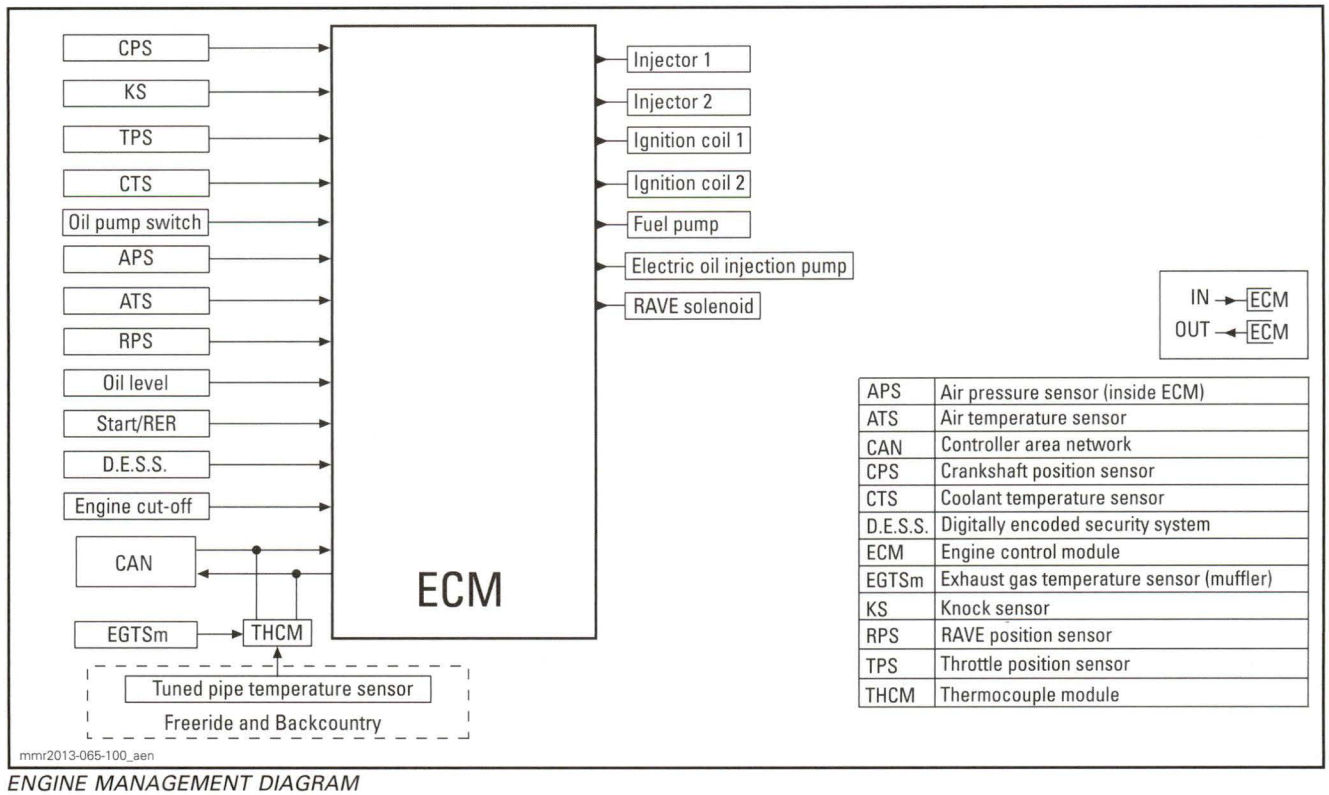
Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



mmr2012-025-006_a

1. *Engine control module (ECM)*
2. *Throttle position sensor (TPS)*
3. *Oil level sensor connector (OLS)*
4. *Air pressure sensor (APS, inside ECM)*
5. *Exhaust gas temperature sensor muffler (EGTSm)*
6. *Crankshaft position sensor connector (CPS)*
7. *RAVE valves*
8. *RAVE valve position sensor (RPS)*
9. *MAG injector*
10. *PTO injector*
11. *Air temperature sensor (ATS)*
12. *MAG ignition coil*
13. *PTO ignition coil*
14. *Thermocouple module (THCM)*
15. *Tuned pipe temperature sensor (Freeride and Backcountry)*

800R E-TEC Models



APS	Air pressure sensor (inside ECM)
ATS	Air temperature sensor
CAN	Controller area network
CPS	Crankshaft position sensor
CTS	Coolant temperature sensor
D.E.S.S.	Digitally encoded security system
ECM	Engine control module
EGTSm	Exhaust gas temperature sensor (muffler)
KS	Knock sensor
RPS	RAVE position sensor
TPS	Throttle position sensor
THCM	Thermocouple module

ENGINE MANAGEMENT DIAGRAM

GENERAL

SYSTEM FEATURES

Warm-Up Protection

The engine's RPM is limited until the desired engine and injection oil temperatures are obtained.

WARM-UP PROTECTION	ENGINE WARM-UP TEMPERATURE	INJECTION OIL WARM-UP
600 HO E-TEC	20°C (68°F)	Oil viscosity
800R E-TEC	30°C (86°F)	

Engine Warm-Up

During the engine warm-up period, the RAVE valves will be limited to the MID position which, limits the engine to a maximum of 7500 ± 200 RPM.

Injection Oil Warm-Up

The injection oil warm-up period is based on oil viscosity.

This is accomplished by measuring the time it takes for the electric oil pump to complete a stroke (oil pump switch signal) from the time at which is was commanded. This provides an indication of the oil viscosity, and therefore temperature and flow capacity.

COMMUNICATION PROTOCOLS

GENERAL

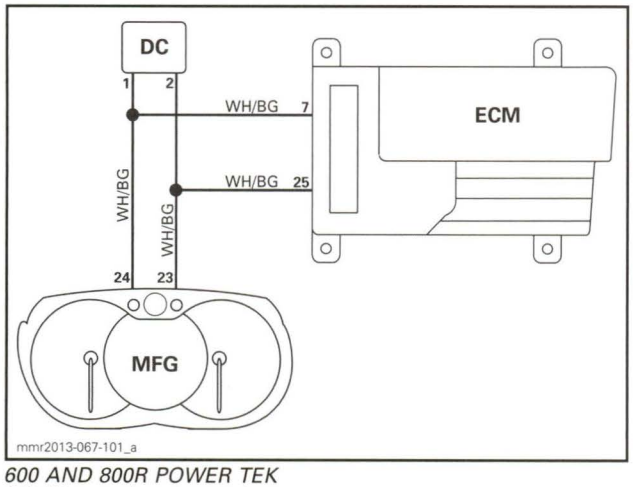
CONTROLLER AREA NETWORK (CAN)

The CAN protocol is an ISO standard for serial data communication.

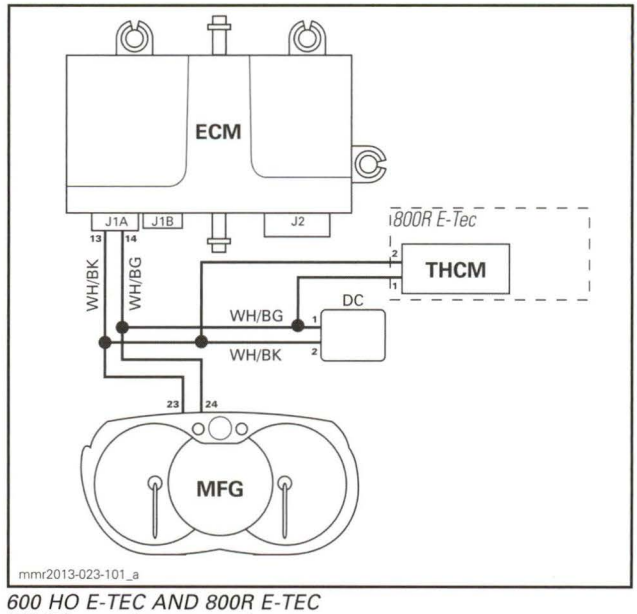
The ECM forms a network with other components linked with the CAN bus.

The CAN bus (or CAN lines) consist of a pair of wires (WHITE/BEIGE and WHITE/BLACK) that connect every component to each other. The electronic modules are in constant communication within the network.

The network is comprised of the:
- ECM
- Multifunction gauge
- Diagnostic connector
- THCM (thermocouple module) on 800R E-TEC
- CAN bus.



600 AND 800R POWER TEK
DC (Diagnostic connector)
ECM (Engine control module)
MFG (Multifunction gauge)
WH/BG (White/beige)
WH/BK (White/black)



600 HO E-TEC AND 800R E-TEC
DC (Diagnostic connector)
ECM (Engine control module)
MFG (Multifunction gauge)
THCM (Thermocouple module)
WH/BG (White/beige)
WH/BK (White/black)

NOTE: Fault codes are broadcasted through the CAN bus.

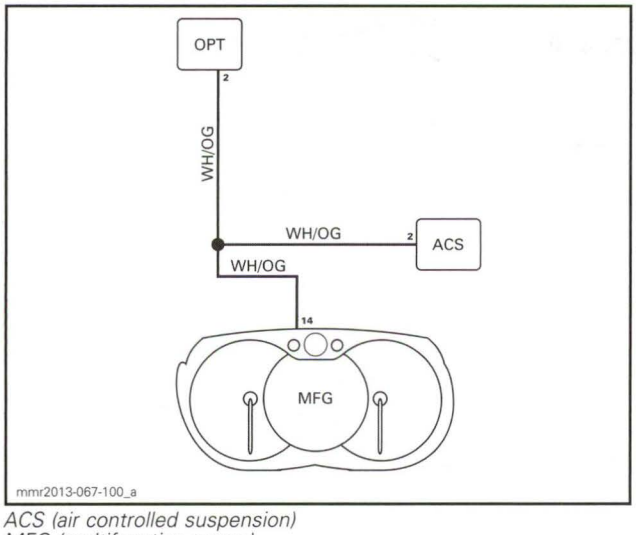
LOCAL INTERCONNECT NETWORK (LIN)

The LIN bus is a simple broadcast serial network comprising one master and up to 16 slaves. It is used as a complement to the CAN network to integrate the following devices.

MASTER	SLAVES
Multifunction gauge	ACS (air controlled suspension)
	Optional premium module (compass, engine temperature, lap recorder)
	Optional engine temperature module

The master communicates to one slave at a time which supplies the requested information. The gauge can then display the related data (engine temperature for example).

One wire connects each component. The LIN line consists of a WHITE/ORANGE wire.



ACS (air controlled suspension)
MFG (multifunction gauge)
OPT (optional modules: compass, engine temperature, lap recorder)
WH/OG: WHITE/ORANGE

COMMUNICATION TOOLS AND B.U.D.S.

SERVICE TOOLS

Description	Part Number	Page
12 V BATTERY SUPPLY CABLE	529 035 997	28, 30–31
MPI-2 DIAGNOSTIC CABLE	710 000 851	28, 30–31
MPI-2 INTERFACE CARD	529 036 018	28–29
POWER INTERFACE	515 177 223	28–31

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
OPTIONAL MALE-FEMALE EXTENSION SERIAL CABLE	(DB9)	29

GENERAL

Refer to *PROCEDURES* in this subsection for instructions on the communication tools.

If communication problems occur, refer to *TROUBLESHOOTING*.

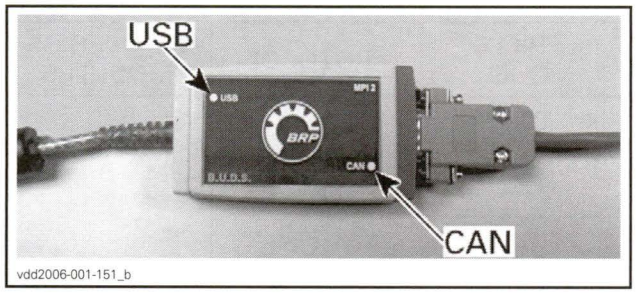
TROUBLESHOOTING

COMMUNICATION PROBLEMS

MPI-2 Connection Troubleshooting

MPI-2 Status Lights

The MPI-2 includes 2 status lights to show the connection conditions: USB and CAN. **Both lights must be GREEN** for the MPI-2 to function properly. Otherwise, refer to the following charts.



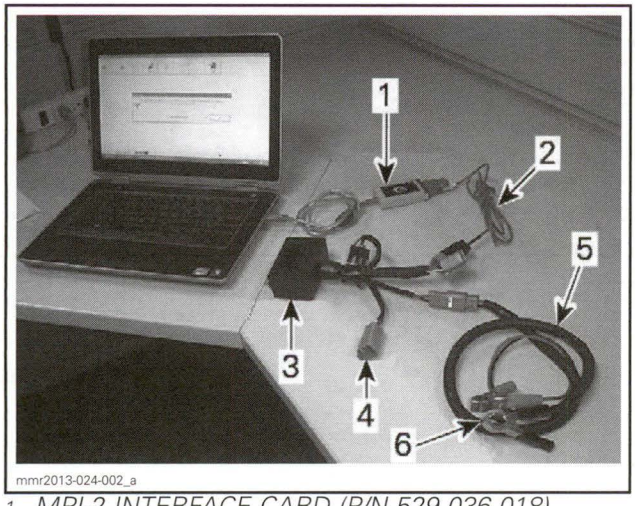
Prerequisite for USB Communication:

- PC Computer turned ON
- MPI-2 connected to PC computer.

COMMUNICATION PROBLEM (USB)	
STATUS	WHAT TO DO
USB light is OFF	– Check USB connection between MPI-2 and PC computer. – Check USB operation on PC computer (hardware or Windows drivers).
USB light is GREEN	– Connections are GOOD. Communication can take place on USB side.

Prerequisite for CAN Communication:

1. MPI-2 connected to diagnostic connector.
2. The tether cord cap (D.E.S.S. key) is installed on the engine cut-off switch.
3. B.U.D.S. started and logged.
4. ECM is powered.



1. *MPI-2 INTERFACE CARD (P/N 529 036 018)*
2. *MPI-2 DIAGNOSTIC CABLE (P/N 710 000 851)*
3. *POWER INTERFACE (P/N 515 177 223)*
4. *To vehicle diagnostic connector.*
5. *12 V BATTERY SUPPLY CABLE (P/N 529 035 997)*
6. *To 12 V battery*

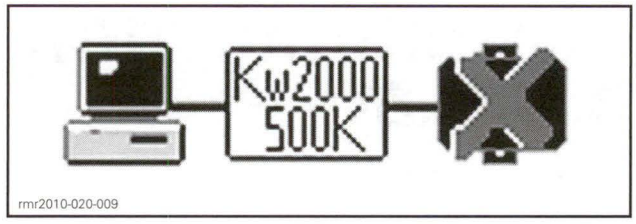
COMMUNICATION PROBLEM (CAN)	
STATUS	WHAT TO DO
CAN Light is OFF	– BUDS does not communicate with the vehicle. – Check connections from computer to vehicle. – Check if BUDS is started. – Check if vehicle is powered: is cluster turned ON. If it is not ON, install the tether cord cap (D.E.S.S. key) on the engine cut-off switch.
CAN Light is RED	This occurs when BUDS looses communication with vehicle. – Check connections from computer to vehicle. – Check if vehicle is powered: is cluster turned ON? If not, install the tether cord cap (D.E.S.S. key) on the engine cut-off switch.
CAN Light is GREEN	– Connections are GOOD. BUDS communicates normally with the vehicle.

Communication Problems with B.U.D.S.

Vehicle not Detected in B.U.D.S.

Make sure both USB and CAN lights on the MPI-2 are GREEN.

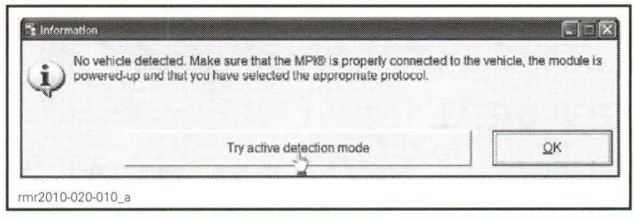
If an "X" is shown in the status bar and the protocol indication is blinking between Kw2000 500K and KW2000, it means that no ECU is communicating with the MPI-2.



Check the following:

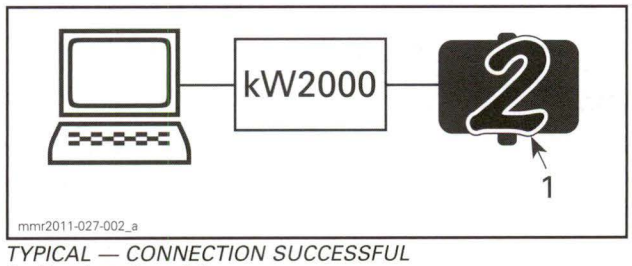
– Connections between the PC computer and the vehicle.
– The multifunction gauge is powered up.

If B.U.D.S. does not automatically exit the following message box, click the **Try active detection mode** button. This will manually establish the communication with the vehicle.



One or More ECU is not Communicating with the MPI-2

Ensure the status bar shows the Kw2000 and the appropriate number of modules to its right according to the vehicle model.

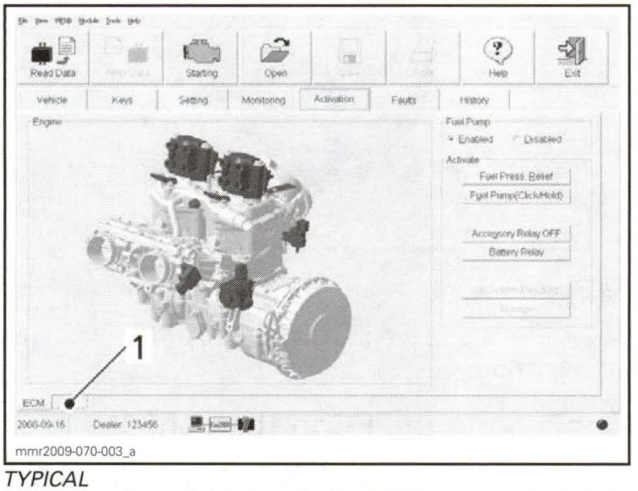


TYPICAL — CONNECTION SUCCESSFUL
1. *Number of modules*

VEHICLE MODEL	PROTOCOL	NUMBER OF MODULES
600	Kw2000	2 (ECM and gauge)
800R Power TEK		
600 HO E-TEC		
800R E-TEC	Kw2000	3 (ECM, gauge and THCM)

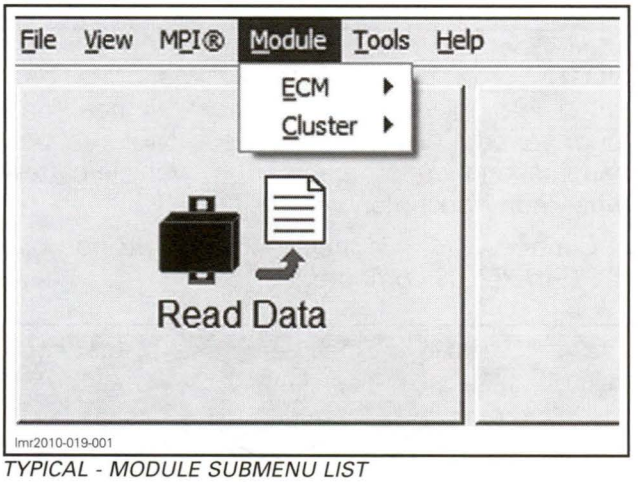
If one or more "ECU" is (are) not communicating with the MPI-2, a module may not be properly connected, powered, or is defective. To check which module is missing in B.U.D.S., look for its

page tab at the bottom of the B.U.D.S. window. It will not be visible. Then check the wiring and power supply to that module.



TYPICAL
1. Cluster tab not visible meaning this ECU is not communicating

NOTE: The module submenu will also provide a list of modules that are communicating with B.U.D.S.

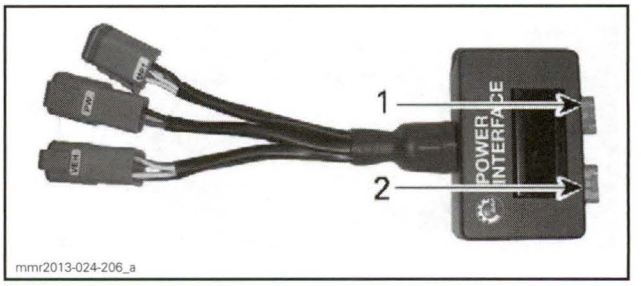


TYPICAL - MODULE SUBMENU LIST

Power Interface Test

When the POWER INTERFACE (P/N 515 177 223) is connected to the vehicle diagnostic connector, the multifunction gauge and the headlight should turn on. Otherwise, check the following and repair or replace Power interface if any test failed.

1. Power interface fuses.



1. Fuse 1
2. Fuse 2

2. Vehicle battery voltage should be displayed on Power interface.
   2.1 Ensure battery charge is high enough to keep the vehicle ON for the duration of the maintenance.

   NOTE: This is especially **IMPORTANT** if you are updating vehicle software. In case of doubt, charge battery for at least 15 minutes; disconnect it prior to updating software.

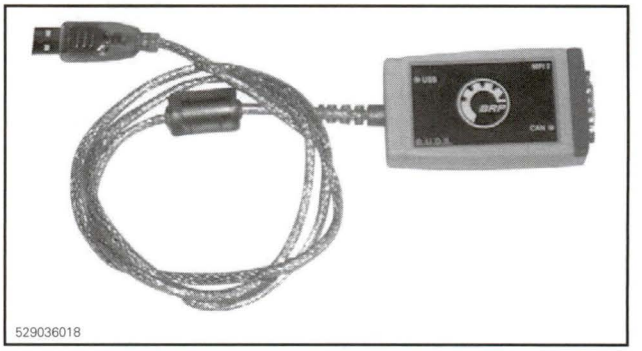
PROCEDURES

MULTI-PURPOSE INTERFACE-2 (MPI-2)

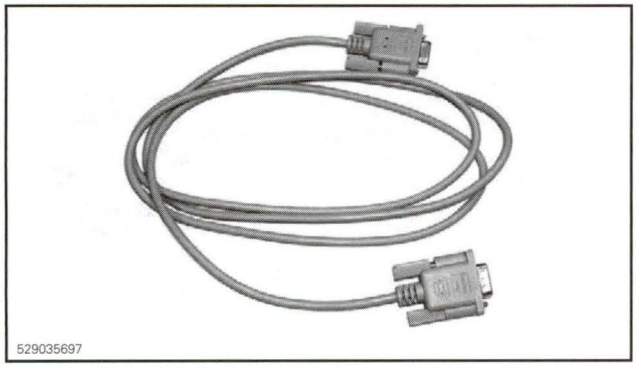
The MPI-2 (Multi-Purpose Interface-2) is used with B.U.D.S. to communicate with vehicle electronic module.

Parts Required for Connecting the PC to the Vehicle

MPI-2 INTERFACE CARD (P/N 529 036 018)

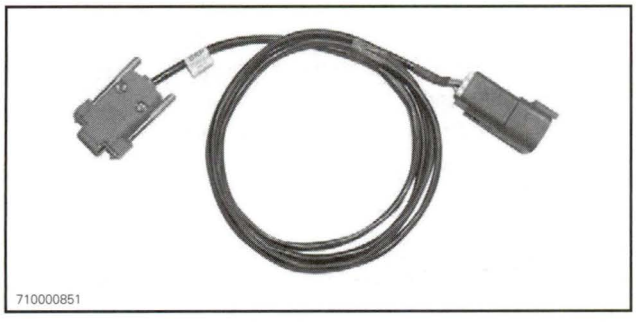


OPTIONAL MALE-FEMALE EXTENSION SERIAL CABLE (P/N (DB9))

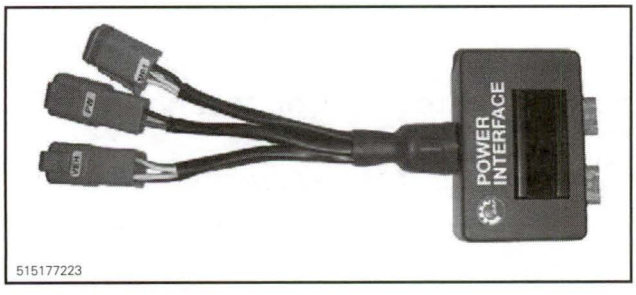


NOTE: The extension cable is available at electronic retail outlets. Do not exceed 7.6 m (25 ft).

MPI-2 DIAGNOSTIC CABLE (P/N 710 000 851)



POWER INTERFACE (P/N 515 177 223)



12 V BATTERY SUPPLY CABLE (P/N 529 035 997)



MPI-2 Power

The MPI-2 uses the PC computer USB port for its power supply.

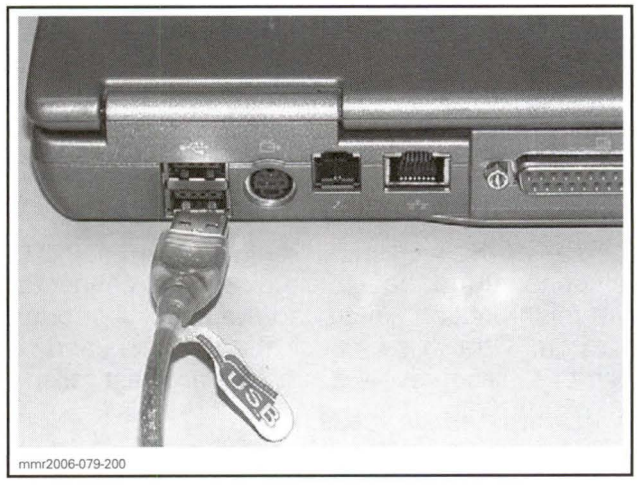
Connecting the PC to the Vehicle

⚠ WARNING

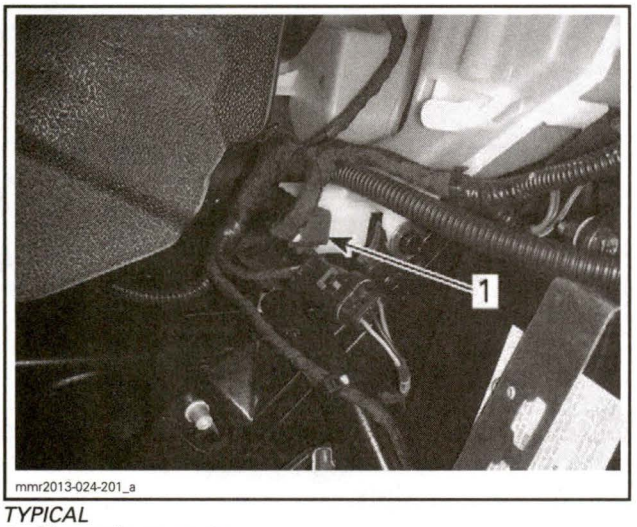
If the computer you are using is connected to a power outlet, there is a potential risk of electrocution when working in contact with water. Be careful not to touch water while working with the computer.

NOTE: Some components will generate heat when leaving vehicle in diagnostic mode for a long period. Always disconnect MPI-2 supply harness and supply cable from vehicle/battery when not working on vehicle.

1. Connect MPI-2 connector to the USB port of a PC (personal computer).

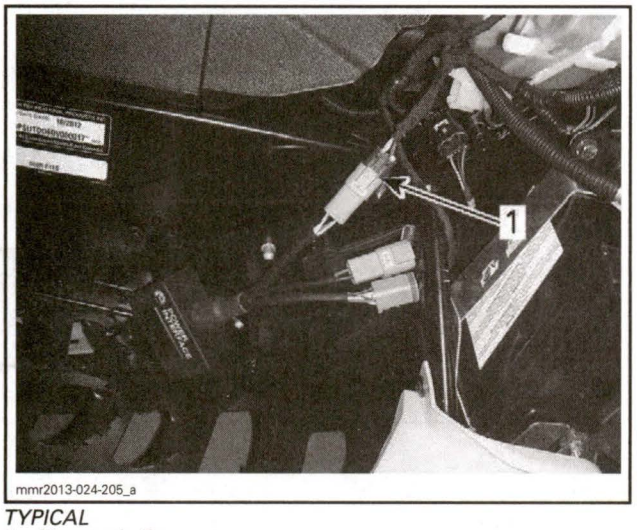


2. Remove the diagnostic connector from the protective cap on the right side of the vehicle.



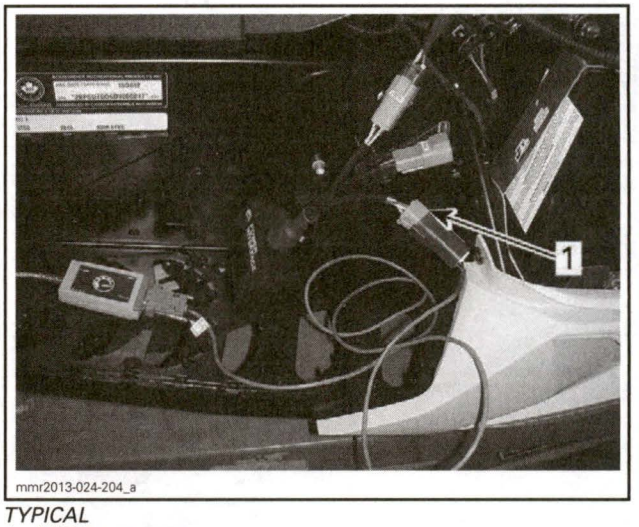
TYPICAL
1. Diagnostic connector

3. Connect the POWER INTERFACE (P/N 515 177 223) to the diagnostic connector.



TYPICAL
1. Diagnostic Connector

4. Connect the MPI-2 DIAGNOSTIC CABLE (P/N 710 000 851) to the Power interface connector.

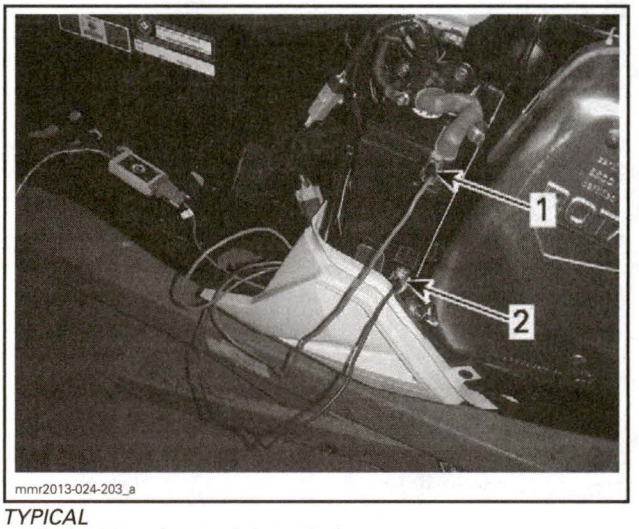


TYPICAL
1. MPI-2 connector

NOTICE **Connecting MPI-2 directly to diagnostic connector (without Power interface) may prevent proper communication. Always use the Power interface.**

5. Connect the battery supply cable to a 12 V battery.

NOTE: Connect cable clips to vehicle battery **if so equipped**.



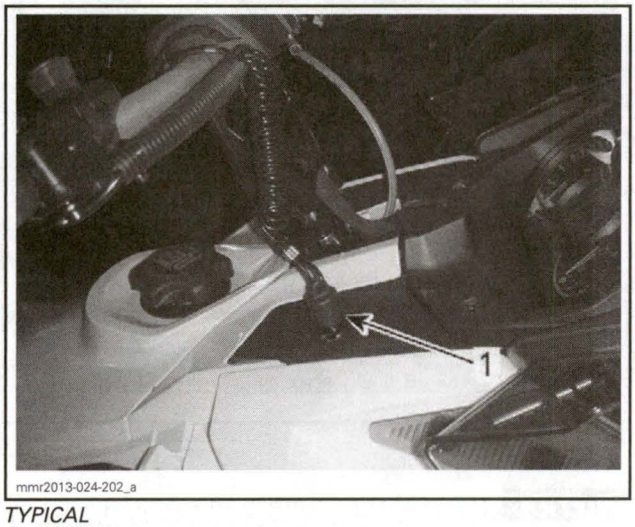
TYPICAL
1. Red cable to battery "+" terminal
2. Black cable to battery "-" terminal

6. Connect the 12 V BATTERY SUPPLY CABLE (P/N 529 035 997) to the Power interface.

NOTICE **Always use the proper supply harness and cables. Make sure to respect polarity when connecting cable clips to battery. Match RED cables together.**

7. Set headlights to low beam to reduce battery discharge rate.

8. Connect DESS key.



TYPICAL
1. DESS key

9. Use B.U.D.S. as described further in *B.U.D.S.*

600/800R Power TEK

NOTE: Engine cannot be started in diagnostic mode. Battery supply cable must be disconnected from battery to allow engine starting.

B.U.D.S.

B.U.D.S. (BRP Utility and Diagnostic Software) is designed to allow:

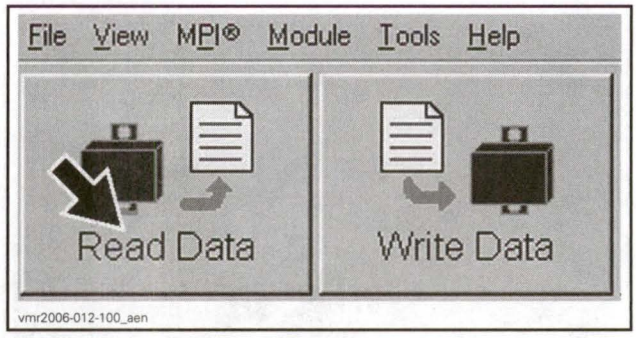
- Electrical and electronic component monitoring
- Making setting changes (such as the Closed throttle reset)
- Diagnostics
- Update electronic module software
- Reading fault codes.

Use the latest applicable B.U.D.S. version available on BOSSWeb.

IMPORTANT: Make sure all connections have been made **before starting B.U.D.S.** to allow proper communication initialization and operation.

Reading Data from a Vehicle using the B.U.D.S. Software

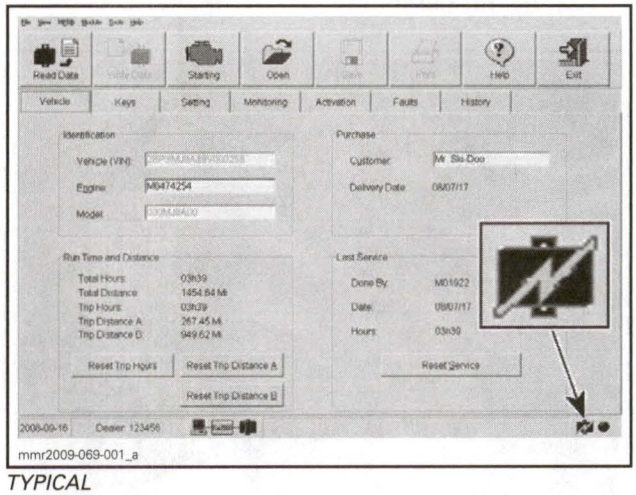
1. Install the tether cord cap (D.E.S.S. key) on the engine cut-off switch.
2. Start B.U.D.S. and logon.
3. Read ECM by clicking the **Read Data** button.



Electronic Modules (ECU) Update

NOTICE **Failure to strictly follow a procedure when updating a module may permanently damage the module.**

Whenever B.U.D.S. is started, check for an update icon in the B.U.D.S. status bar.

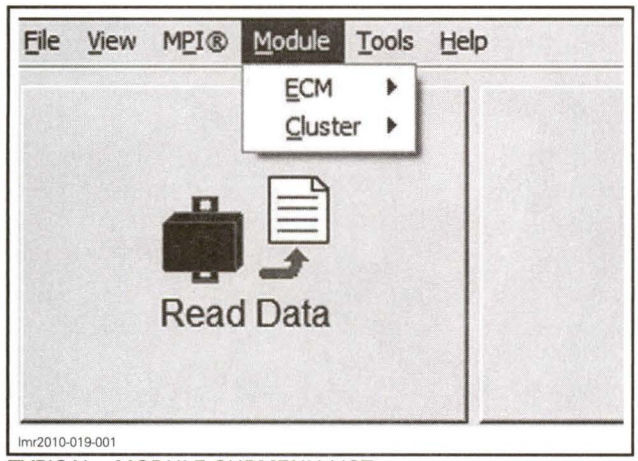


TYPICAL

The icon indicates that a file is available in B.U.D.S. to update any of the electronic modules.

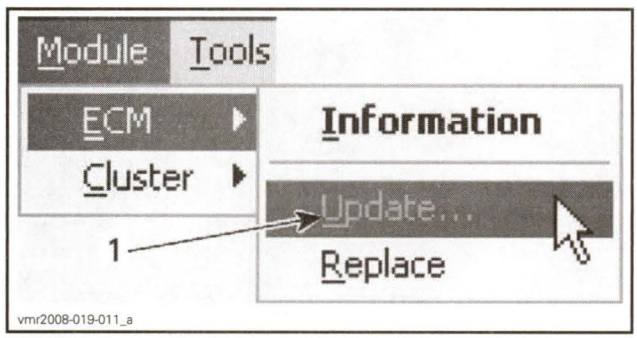
NOTE: If an update file is available on BOSSWeb but the B.U.D.S. software being used is not up to date, the update icon will not appear. Refer to the *SERVICE BULLETINS* to see if there is an update available.

Use the **Module** submenu and check all modules one at a time to see which module(s) can be updated.



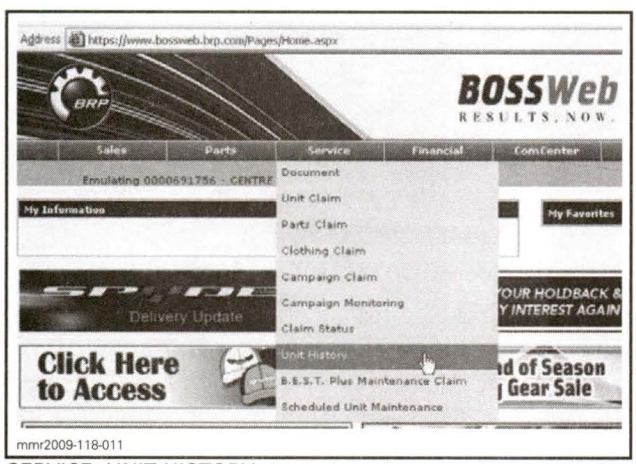
TYPICAL - MODULE SUBMENU LIST

1. If the **Update** option is **greyed out**, no update file is available for this module.
2. If the **Update** option is **black**, an update file is available for this module. Select the update option and load the proper file.



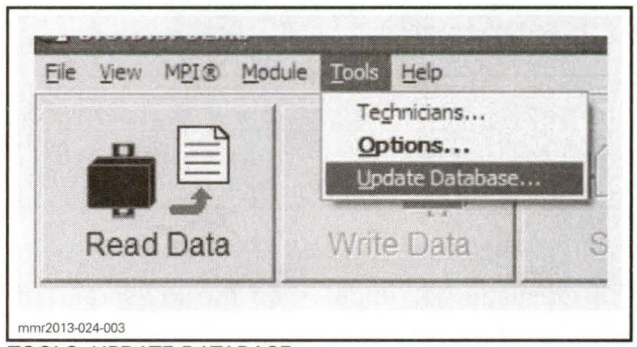
TYPICAL
1. Greyed out: No update to perform
Black: Update file available

Before applying an update, log onto BOSSWeb and look in the **Service** menu for the **Unit history** to find out if any information or publication related to the vehicle is available. If so, carefully follow the given instructions.

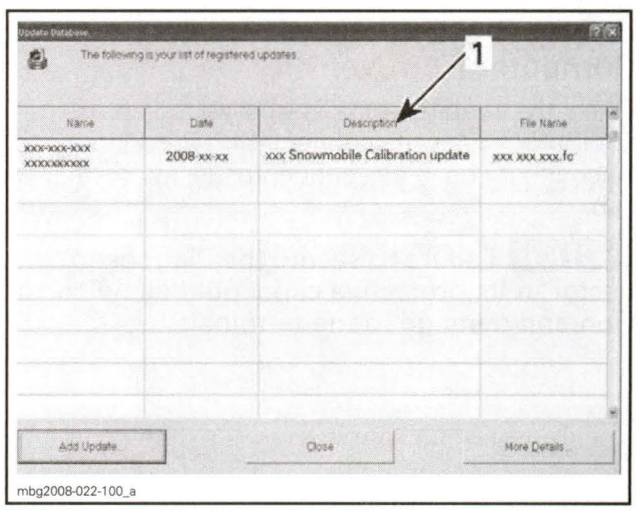


SERVICE, UNIT HISTORY

NOTE: When selecting the update database in B.U.D.S. (menu Tools - >Update Database), a dialog box will appear and the update file description may provide some clue to finding the vehicle-related information in BOSSWeb.



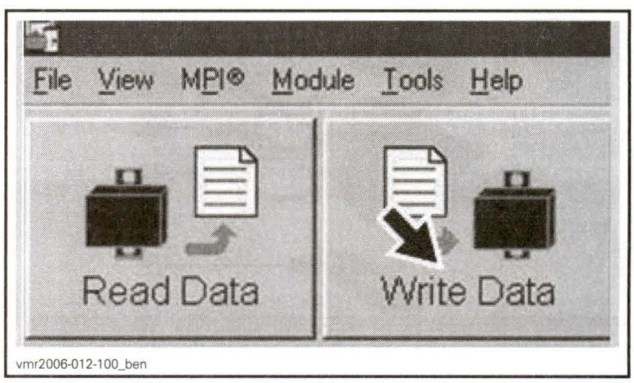
TOOLS, UPDATE DATABASE



TYPICAL
1. File description

Writing Changes (Saving) in a Module

When making a data or setting change in a module using B.U.D.S., save the new data (or setting) in the module by clicking the **Write Data** button.



If the word **Modified** appears in the vehicle file identification number at the top of the B.U.D.S. page, then a change has been made that requires selecting the **Write Data** to save the change.



TYPICAL
1. Indicate setting or data modified; Write Data to save

If a message box appears on the PC screen after clicking the **Write Data** button, follow the on screen instructions.

Exiting B.U.D.S and Disconnecting Computer from Vehicle

Once the maintenance is completed, press the EXIT button and disconnect MPI-2 connections. Reconnect the 6-pin connector in its protective cap.

NOTICE **Failure to secure the diagnostic connector in its protective cap would allow corrosion and damage to the terminals.**

FUEL TANK AND FUEL PUMP

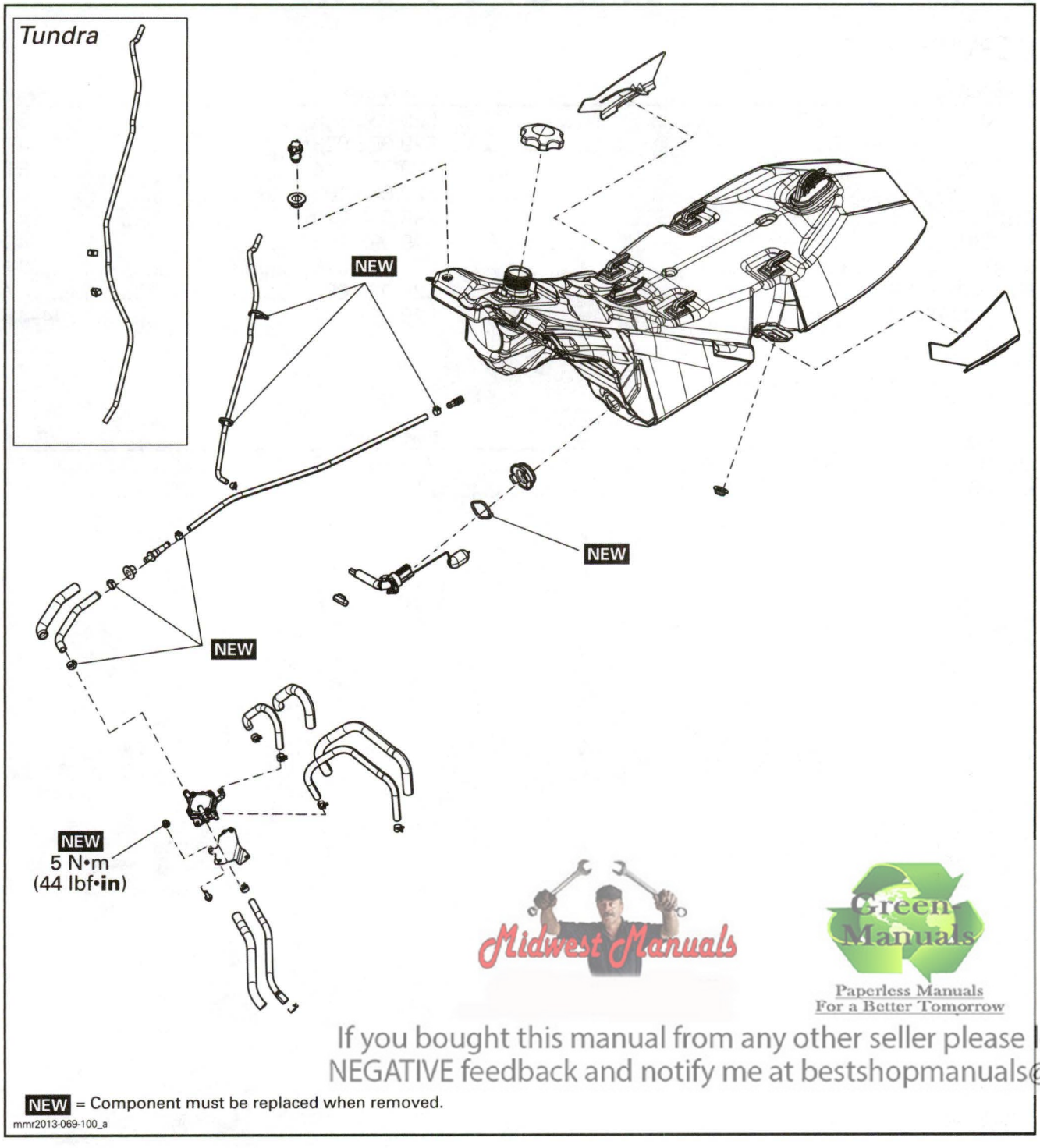
SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	55
FUEL HOSE ADAPTER	529 036 023	45
FUEL PUMP NUT TOOL	529 036 214	51
LEAK TEST KIT	529 033 100	44
OETIKER PLIERS	295 000 070	47
PRESSURE GAUGE	529 035 709	45
SMALL HOSE PINCHER	295 000 076	44
SUCTION PUMP	529 035 880	47
VACUUM/PRESSURE PUMP	529 021 800	44–45

SERVICE PRODUCTS

Description	Part Number	Page
XPS BRAKES AND PARTS CLEANER (CAN)	219 701 776	54
XPS BRAKES AND PARTS CLEANER (USA)	219 701 705	54

550F

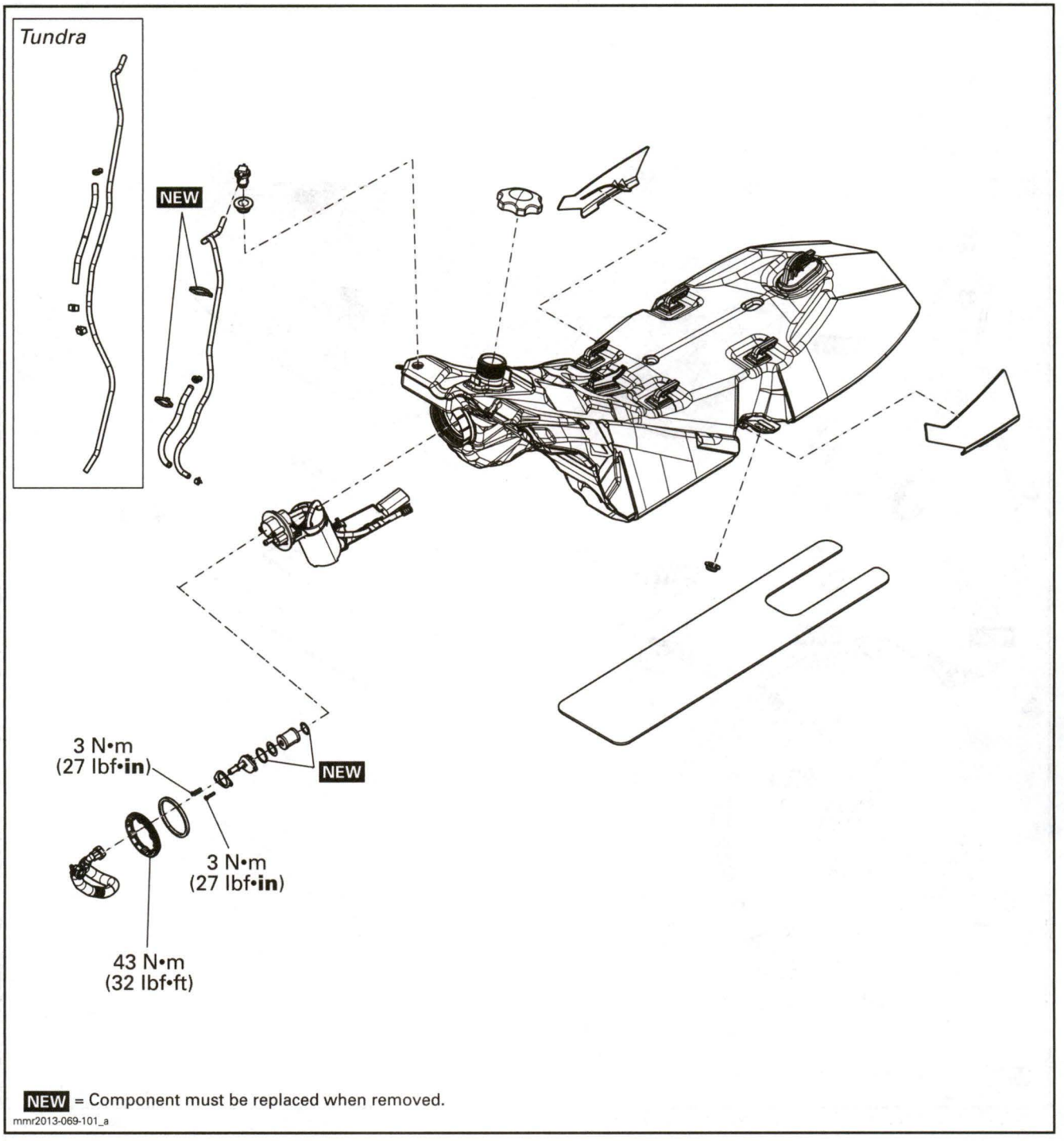


Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

NEW = Component must be replaced when removed.

mmr2013-069-100_a

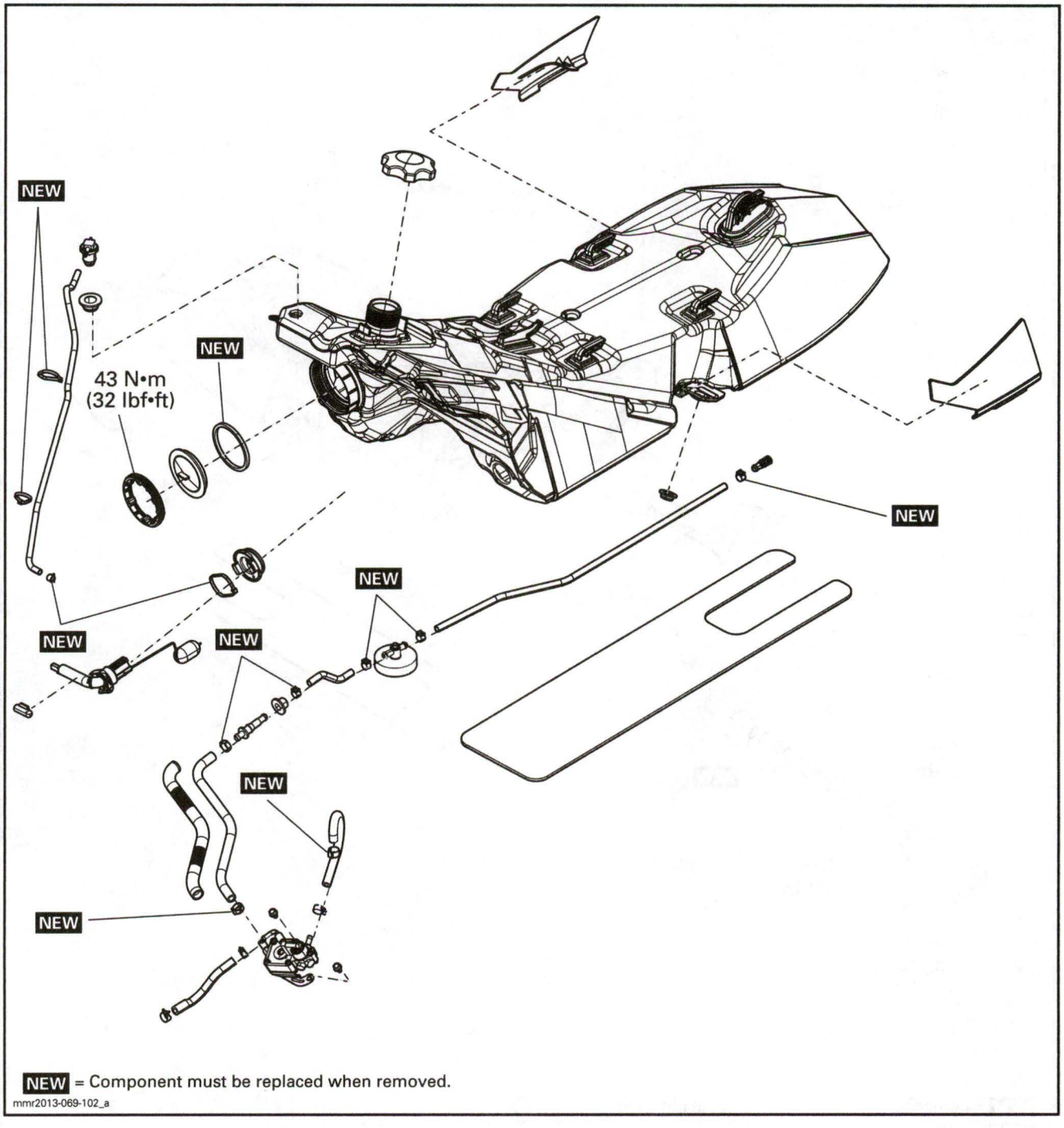
600 ACE



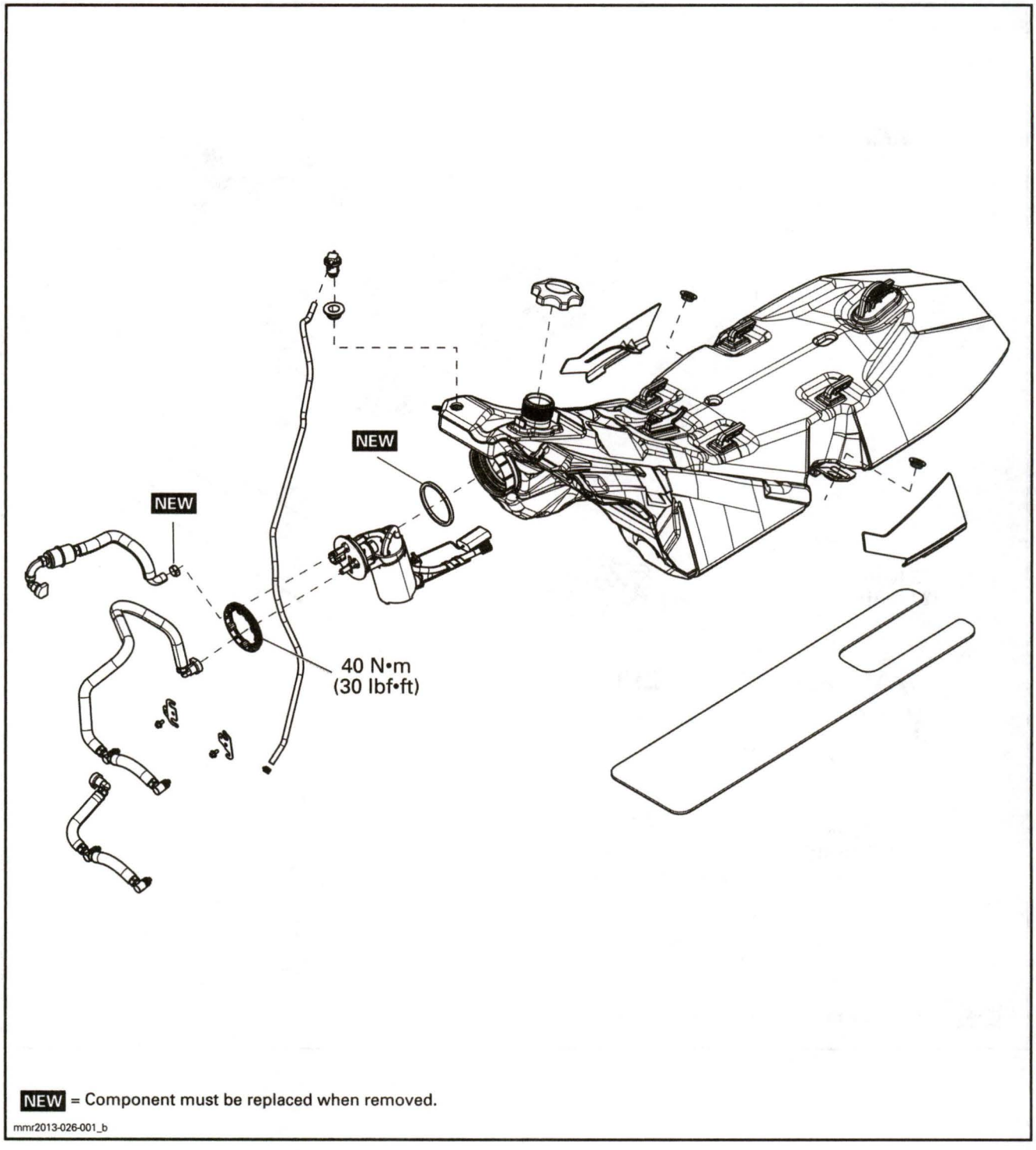
NEW = Component must be replaced when removed.

mmr2013-069-101_a

600 and 800R Power TEK



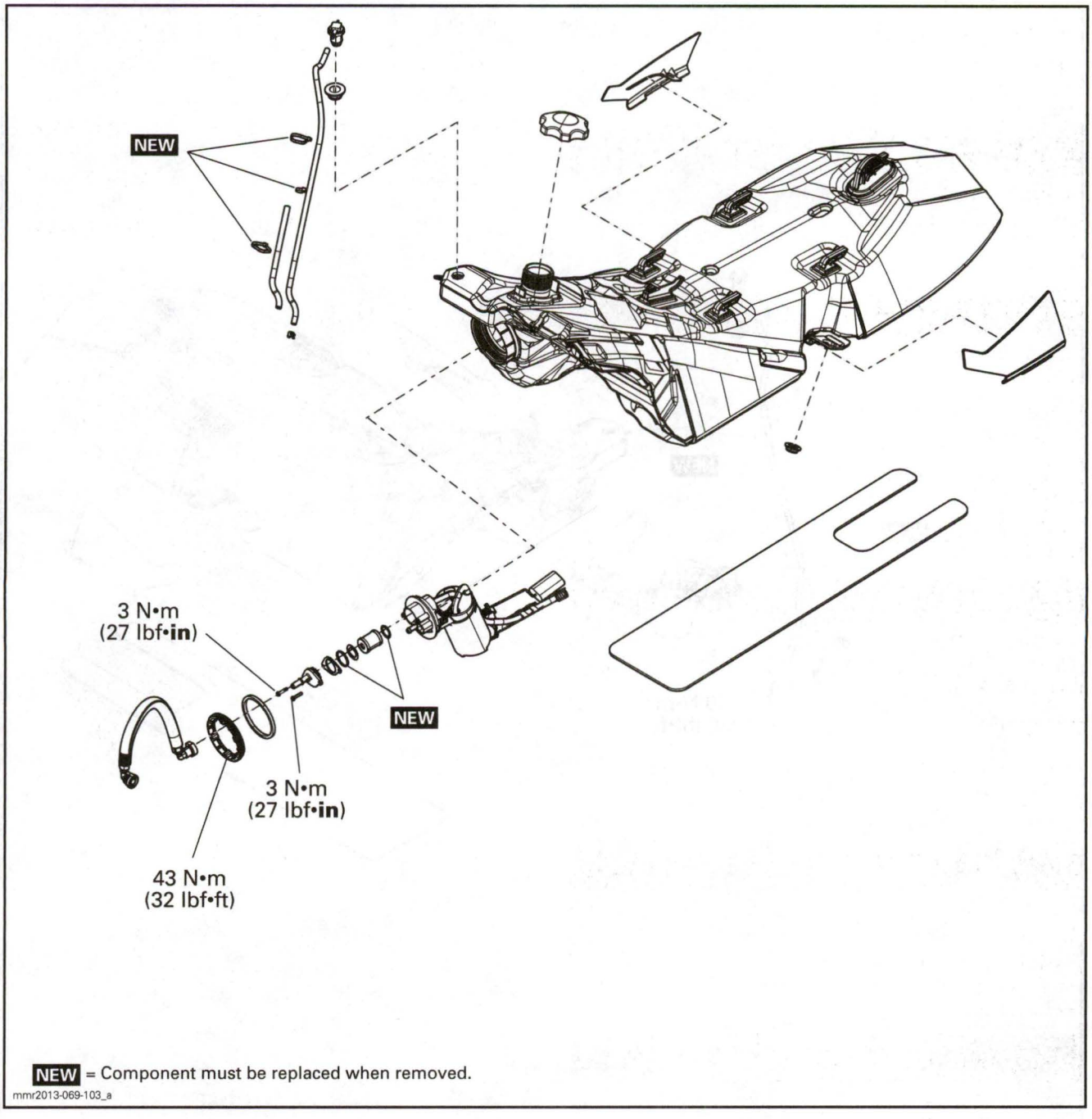
600HO E-TEC and 800R E-TEC



NEW = Component must be replaced when removed.

mmr2013-026-001_b

1200 4-TEC



NEW = Component must be replaced when removed.

mmr2013-069-103_a

GENERAL

NOTE: It is a good practice to check for fault codes using B.U.D.S. software as a first troubleshooting step. Refer to *DIAGNOSTIC AND FAULT CODES*.

⚠ WARNING

Always disconnect battery prior to working on the fuel system.

E-TEC

⚠ WARNING

Always disconnect the magneto connector prior to:
– Disconnecting any fuel hose.
– Removing a fuel injector.
– Removing a spark plug cable or spark plug.
Otherwise, if the engine is cranked, fuel vapors may ignite in presence of a spark creating a fire hazard.

⚠ WARNING

Proceed with care and use appropriate safety equipment when working on the fuel system. Wear safety glasses and work in a well ventilated area.

When disconnecting a fuel line, cover the connection with an absorbent shop rag and proceed slowly to minimize spilling.

⚠ WARNING

Do not allow fuel to spill on hot engine parts and/or on electrical connectors. Wipe off any fuel spillage in the engine compartment. Fuel is flammable and explosive under certain conditions.

⚠ WARNING

After working on the fuel system, always carry out a fuel system pressurization test to check for leaks.

SYSTEM DESCRIPTION

Electric Fuel Pump

An electric fuel pump is mounted in the upper RH front part of the fuel tank.

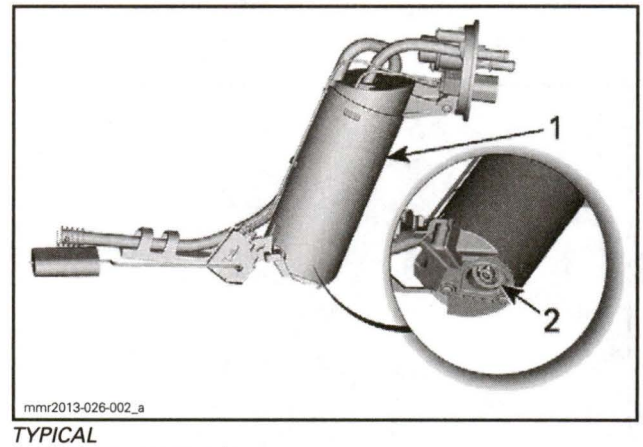
A 12 Vdc high pressure fuel pump with an integrated jet pump is used.

NOTE: Although the fuel pump is connected to the 55/60 Vdc system, the ECM modulates the voltage (Pulse Width Modulation) between 9 and 16 Vdc depending on the engine RPM. The fuel pump output will change as voltage changes.

As soon as the START/RER button is depressed, the electric fuel pump turns on for a few seconds to pressurize the fuel system in preparation for the engine start. When the engine runs, the fuel pump is ON continuously to provide a constant fuel pressure to the injectors.

To ensure a constant delivery of fuel to the engine for all riding conditions when the fuel level is low, a rear pickup and a fuel pump reservoir is used.

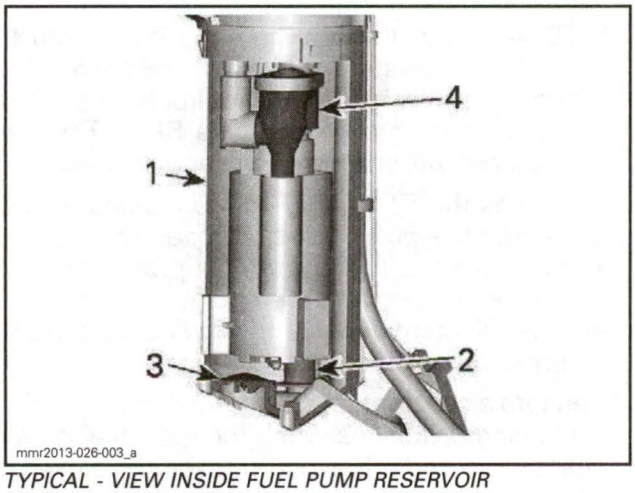
The fuel pump reservoir is actually the housing of the fuel pump module in which the fuel pump is located. A check valve at the bottom of the housing allows the fuel in the tank to enter the fuel pump reservoir.



TYPICAL
1. Fuel pump reservoir
2. Check valve

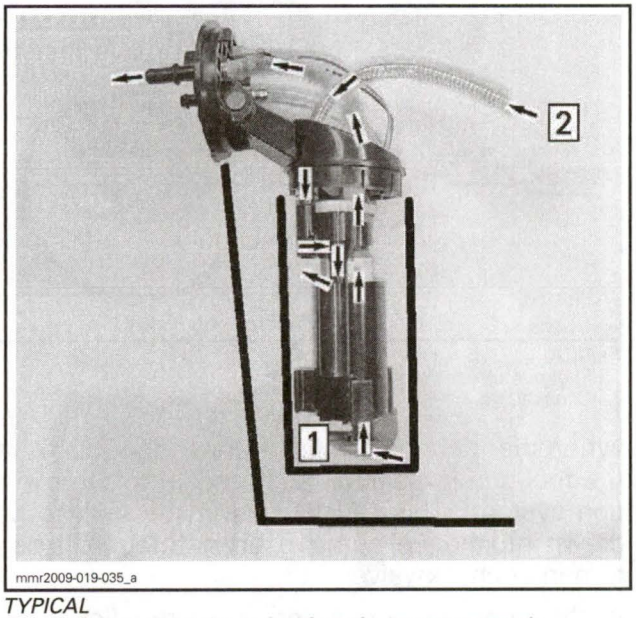
When the fuel pump runs, it draws the fuel from the fuel pump reservoir and feeds it to the injection system. This causes fuel in the tank to be drawn into the fuel pump reservoir through its bottom inlet check valve.

At the same time, a portion of the fuel flow from the electric fuel pump flows through a jet pump that contains a venturi.



TYPICAL - VIEW INSIDE FUEL PUMP RESERVOIR
1. *Fuel pump reservoir*
2. *Bottom inlet*
3. *Check valve (open upwards)*
4. *Venturi*

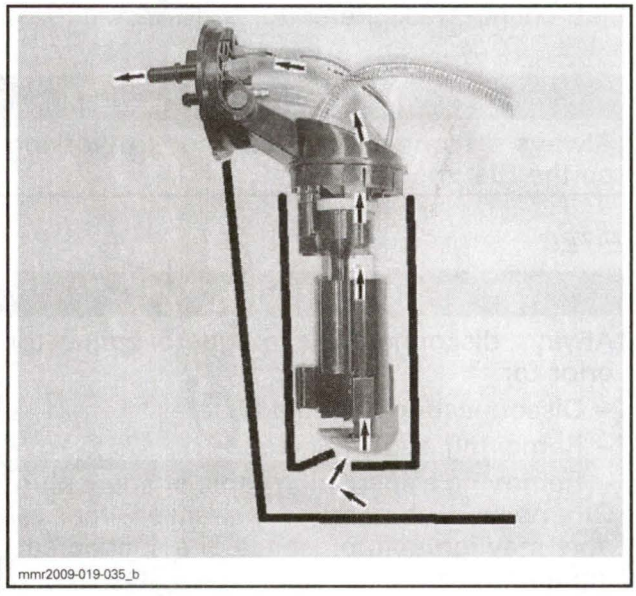
As the fuel accelerates through the venturi, it generates a low pressure area at a connection to the remote pickup, which draws fuel into the fuel pump reservoir from the remote pickup.



TYPICAL
Step 1: Bottom inlet draws fuel from fuel pump reservoir
Step 2: Low pressure from venturi draws fuel from rear pickup into fuel pump reservoir

When riding the vehicle on a level surface, fuel is drawn into the fuel pump reservoir through its check valve and through the remote pickup simultaneously, as long as there is enough fuel in the tank to cover the remote pickup.

When riding downhill with a low amount of fuel in the tank, the fuel moves towards the front of fuel tank. The check valve opens and fuel enters the fuel pump reservoir from the fuel tank through the check valve only as there is no fuel at the remote pickup.



When riding uphill with a low amount of fuel in the tank, the fuel moves towards the rear of the fuel tank. The check valve closes and traps the fuel in the pump reservoir. The fuel pump continues to draw fuel from the fuel pump reservoir, which is now only fed by the jet pump using the rear pickup. This prevents air from being drawn into the fuel lines from the fuel tank.

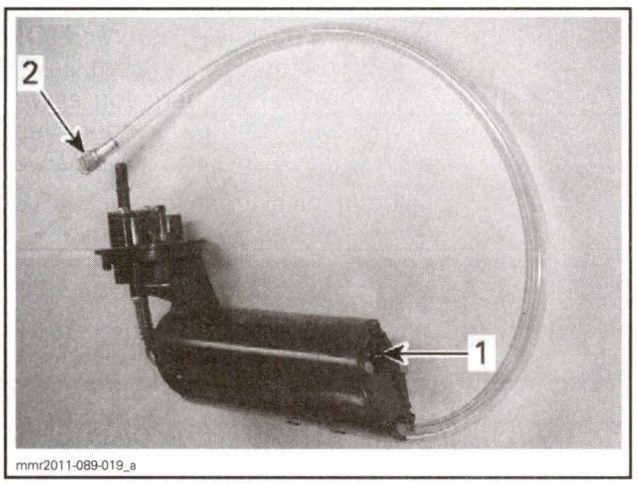
The continuous fuel flow cools down the fuel pump, the injectors and the ECM. To cool these components, the fuel circulates as follows:
- Out of fuel pump
- Through the ECM
- To the injectors (around the voice coils)
- Through the pressure regulator
- Back to fuel tank.

NOTE: The hose loop between the MAG injector outlet and the ECM dampens the engine torque reaction movement.

Fuel Pickup

Fuel enters the fuel pump reservoir from either a check valve at the bottom of the fuel pump reservoir, or from a remote pickup in the rear portion of the fuel tank.

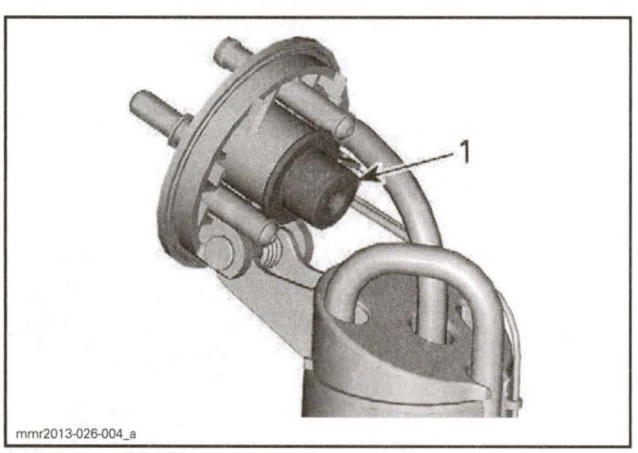
The remote pickup uses a replaceable steel mesh strainer to filter out relatively large dirt particles and prevent clogging of the jet pump. The fuel entering the fuel pump reservoir through the check valve will be filtered by the fuel pump prefilter.



1. *Fuel pump reservoir check valve*
2. *Remote pickup with steel mesh strainer*

Fuel Pressure Regulator

An integrated fuel pressure regulator is mounted on the fuel pump flange. It is basically a spring loaded valve that opens and closes the path of fuel returning to the tank, thus maintaining a constant fuel pressure in the system.



1. *Integrated fuel pressure regulator*

FUEL PRESSURE
Approximately 303 kPa (44 PSI) at 2000 RPM (will be lower at idle)

Fuel Tank Vent

The fuel tank is vented through a combination type check valve that allows ambient air pressure to enter fuel tank at all times.

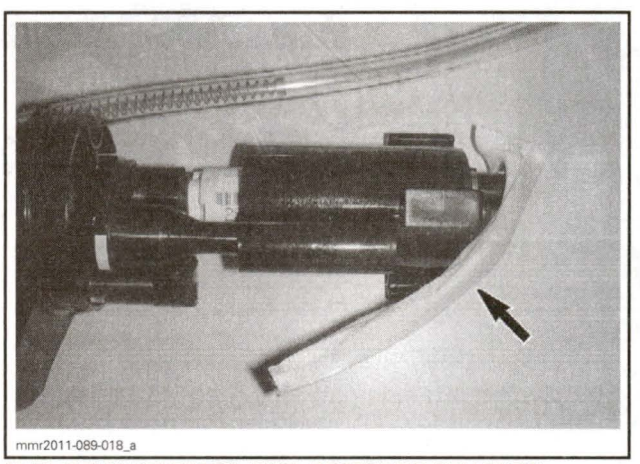
As fuel is consumed by the engine, a negative pressure would occur in the fuel tank. This could eventually prevent the fuel pump from drawing enough fuel. The **negative pressure relieve function** of the valve allows the higher outside air pressure in.

If pressure builds up and exceeds 2.0 kPa to 4.8 kPa (.3 PSI to .7 PSI) in the fuel tank, the check valve opens and lets the excess pressure vent out of the tank.

Fuel Filters

Fuel Pump Pre-Filter

A fuel pump prefilter is used at the electric fuel pump inlet. It is a replaceable nylon mesh filter located within the fuel pump module housing (fuel pump reservoir).



FUEL PUMP PREFILTER (FUEL RESERVOIR REMOVED)

The fuel pump prefilter protects the fuel pump and prevents clogging of the fuel passages within the fuel pump module.

In-Line Fuel Filter

An in-line filter on the supply side is located at front of the fuel tank, above the oil tank.

It is a replaceable metallic canister type filter used to deliver dirt-free fuel to the injectors.

Fuel Level Indication

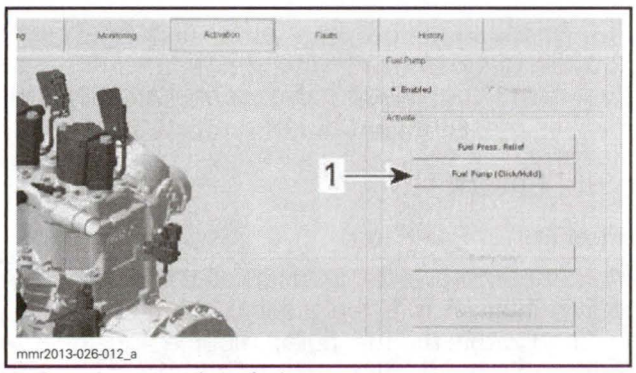
A float type fuel level sensor varies its resistance with fuel level thus providing a signal to the multifunction gauge for fuel level indication.

INSPECTION

FUEL SYSTEM PRESSURIZATION AND LEAK TEST

Using B.U.D.S., active the fuel pump to apply a pressure in the fuel system. Check to detect any leak.

- Select **Activation** and **ECM** tabs.
- Click on the **Fuel Pump (CLick/Hold)** button in the **Activate** field.



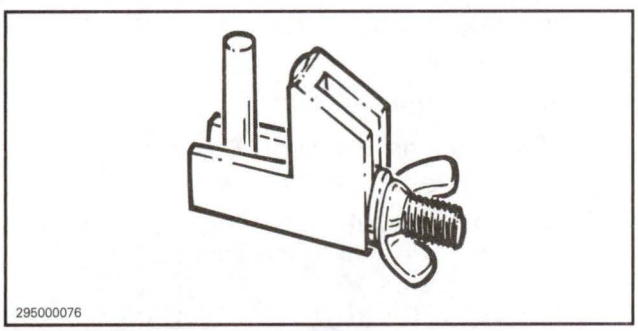
1. Press here to activate fuel pump

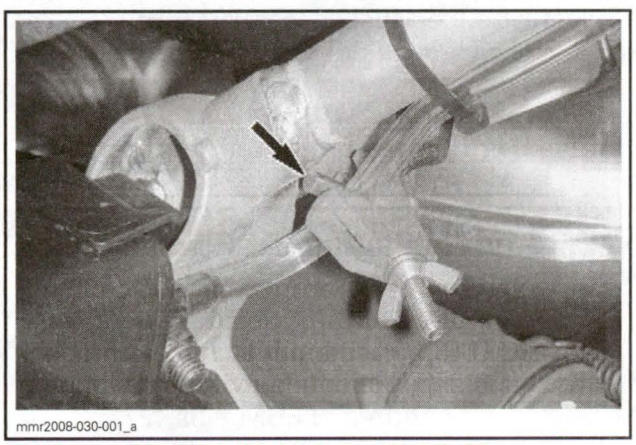
⚠ WARNING

After working on the fuel system, carry out a fuel system pressurization test to check for leaks. Failure to carry out a fuel system pressurization test could result in severe injury or a life threatening situation should a leak occur.

FUEL TANK LEAK TEST

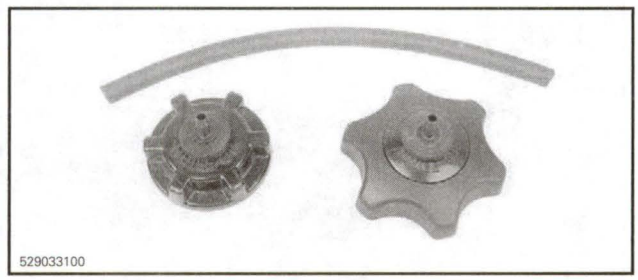
1. Fill up fuel tank.
2. Open the left side panel to access the fuel vent tube.
3. Install a SMALL HOSE PINCHER (P/N 295 000 076) on the vent tube.



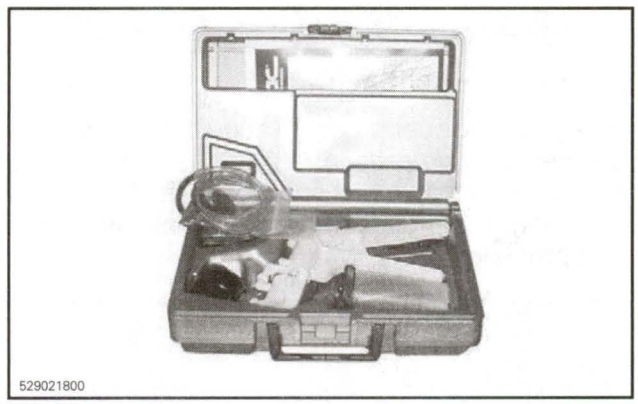


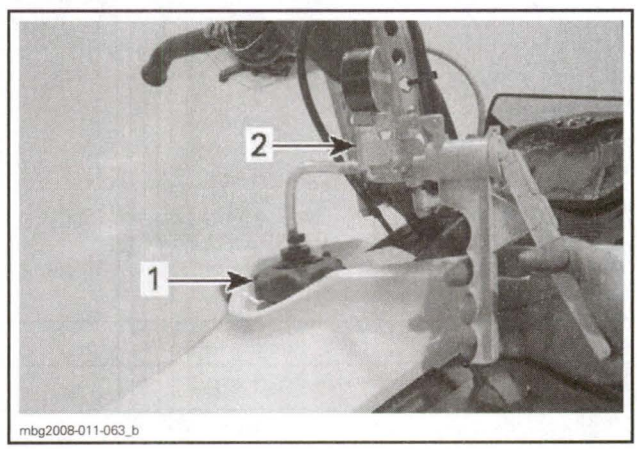
TYPICAL - HOSE PINCHER ON FUEL VENT TUBE

4. Install the appropriate test cap from the LEAK TEST KIT (P/N 529 033 100) on fuel tank inlet.



5. Install VACUUM/PRESSURE PUMP (P/N 529 021 800) on pressure test fuel cap.





TYPICAL
1. Pressure test fuel cap
2. Vacuum/pressure pump

6. Set pump selector to pressure.
7. Pressurize fuel tank as follows.

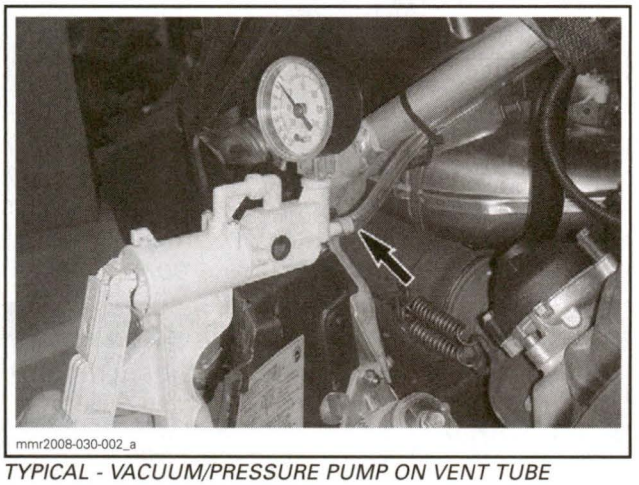
PRESSURE	TIME WITHOUT PRESSURE DROP
21 kPa (3 PSI)	3 minutes

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

To ease locating leak(s), spray soapy water on components; bubbles will indicate leak location(s).

Fuel Tank Vent Valve Test

1. While the fuel tank is still pressurized as in the previous test, carry out the following:
2. Place a finger over the vent hose outlet.
3. When removing hose pincher, alternately touch and release vent hose outlet. You should feel pressurized air flowing out indicating the pressure relief valve function is working.
4. Release any remaining pressure in the fuel tank by slowly unscrewing fuel tank cap.
5. Remove the pressure test fuel cap.
6. Remove the fuel tank vent tube from its fitting on the lower left front body panel.
7. Install the VACUUM/PRESSURE PUMP (P/N 529 021 800) on the vent tube and apply air pressure through the vent valve. Air must flow freely towards the fuel tank neck.


mmr2008-030-002_a

TYPICAL - VACUUM/PRESSURE PUMP ON VENT TUBE

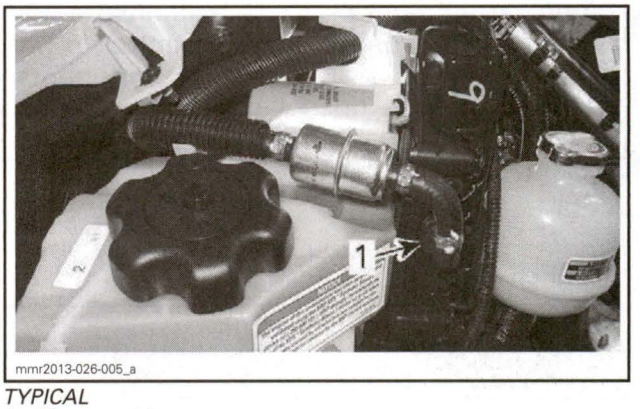
NOTE: If fuel vent check valve does not function as indicated in test, replace vent valve.

8. Remove vacuum/pressure pump.
9. Install vent tube on its fitting.
10. Install normal fuel tank cap.

FUEL PUMP PRESSURE TEST

The pressure test provides an indication of the available fuel pressure at the fuel pump outlet. It validates the pressure regulator and the fuel pump.

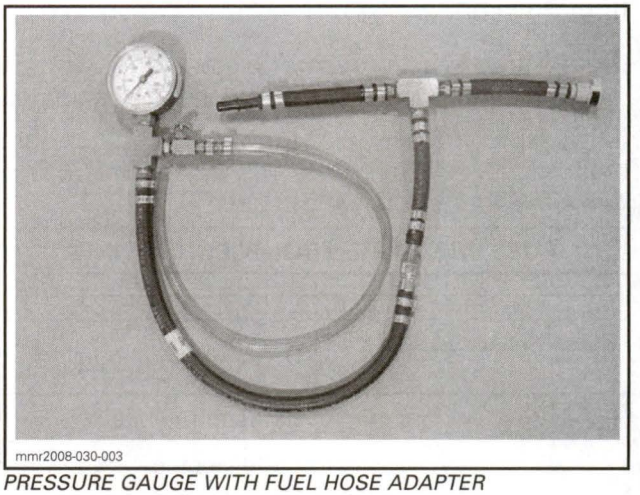
1. Ensure there is enough gas in fuel tank.
2. Install a rag under the ECM hose quick connect to catch fuel spillage.
3. Disconnect fuel pressure hose from ECM.



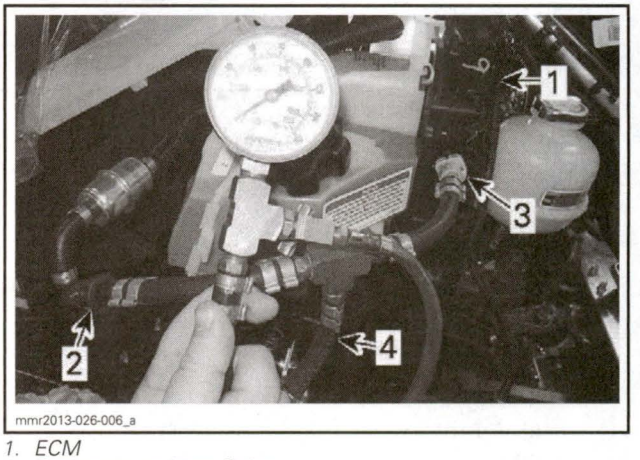
mmr2013-026-005_a

TYPICAL
1. Disconnect here

4. Install the FUEL HOSE ADAPTER (P/N 529 036 023) and the PRESSURE GAUGE (P/N 529 035 709) between fuel pressure hose and ECM.


mmr2008-030-003

PRESSURE GAUGE WITH FUEL HOSE ADAPTER



mmr2013-026-006_a

1. ECM
2. Fuel pressure hose fitting
3. Fuel hose adapter to ECM fitting
4. Fuel hose adapter to pressure gauge

⚠ WARNING

When carrying out pressure test, ensure fuel is not leaking from test equipment onto hot exhaust system or electrical components. Ensure fuel hose do not come into contact with hot engine parts or hot exhaust system.

5. Start engine.
6. Run engine above 2000 RPM and observe the fuel pressure.

FUEL PRESSURE
303 kPa (44 PSI)

If pressure is lower than specified, momentarily block the return hose while monitoring the pressure gauge.

NOTICE **Do not block the fuel return for more than 2 seconds.**

If pressure rises to reach or exceed specification with the fuel return blocked, replace fuel regulator.

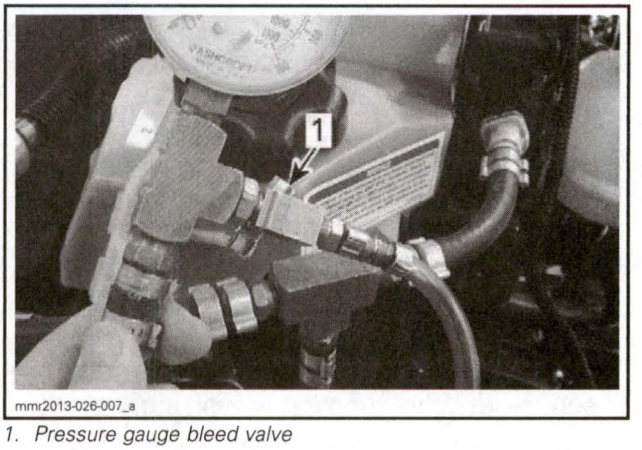
If pressure does not rise with the fuel return blocked, refer to *PRESSURE BELOW SPECIFICATIONS* in the following table.

FUEL PRESSURE TROUBLESHOOTING	
RESULT	POSSIBLE CAUSE
Pressure above specifications	Defective fuel regulator
Pressure below specifications	Clogged fuel filter
	Poor electrical connection
	Defective fuel regulator
	Defective fuel pump
	Leak in the fuel system circuit

7. Stop engine.

Fuel pressure should remain stable.

8. If fuel pressure drops, check the following for leaks:
   - Tools
   - Hoses
   - Fuel injectors
   - Fuel pressure regulator
   - Fuel pump.
9. Bleed away any remaining fuel in the pressure gauge and fuel hose adapter using the bleed valve on the fuel hose adapter.



1. Pressure gauge bleed valve

10. Remove pressure gauge and fuel hose adapter.
11. Reinstall the fuel pressure hose on ECM and gently but firmly pull on hose to ensure quick disconnect fitting is properly locked and secure on the ECM.
12. Reinstall all remaining removed parts.

PROCEDURES

FUEL HOSE AND OETIKER CLAMPS

Fuel Hose Replacement

When replacing fuel hoses, be sure to use hoses as available from BRP parts department. This will ensure continued proper and safe operation.

⚠ WARNING

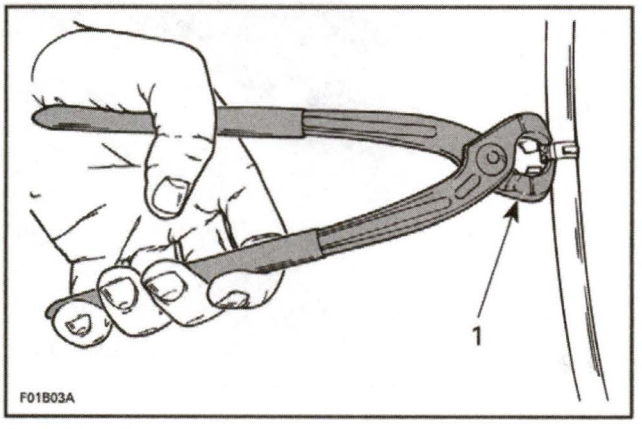
Use of fuel lines other than those recommended by BRP may compromise fuel system integrity.

⚠ WARNING

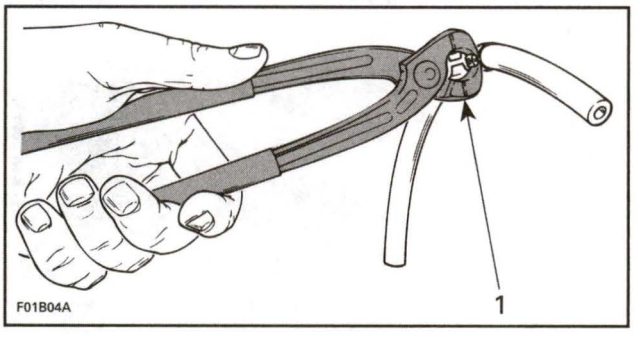
- Never use a hose pincher on high pressure hoses.
- Never change the routing of a fuel hose.
- Always reinstall the corrugated protective tubing on fuel hoses.
- Secure fuel hoses using the appropriate locking tie or fastener to prevent contact with sharp edges or hot, rotating and moving parts.
- After connecting a hose or a quick connect fitting, pull on the hose near the fitting to make sure it is securely locked.
- Always validate fuel system tightness by performing a *FUEL SYSTEM PRESSURIZATION AND LEAK TEST*.

Oetiker Clamp Replacement

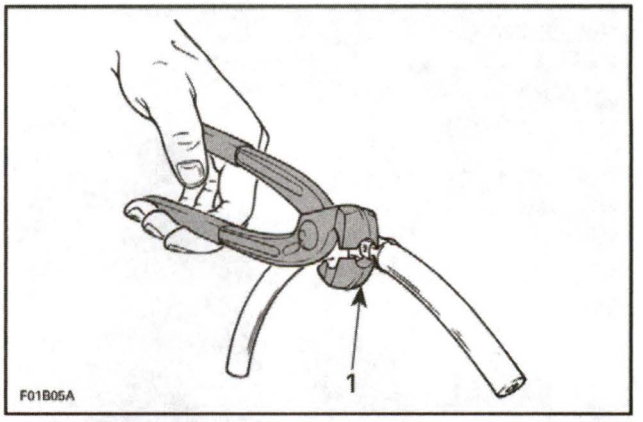
To secure or cut Oetiker clamps on fuel lines, use OETIKER PLIERS (P/N 295 000 070).



1. Cutting clamp



1. Securing clamp



1. Securing clamp in limited access

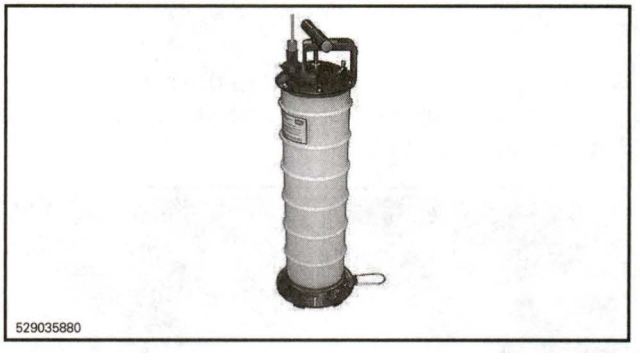
⚠ WARNING

Whenever removing a hose in the fuel system, always use new Oetiker clamps at assembly.

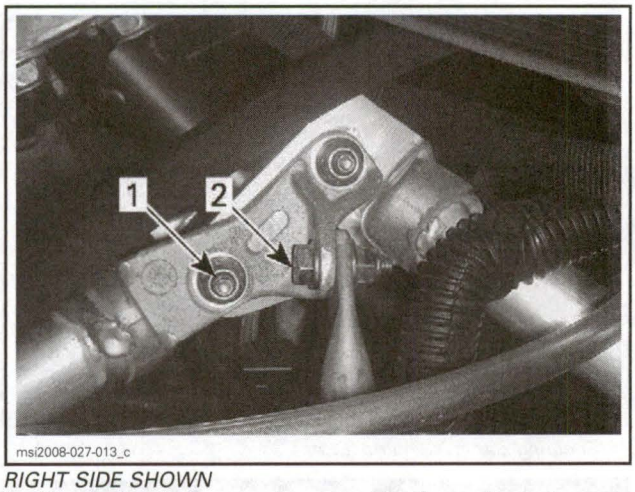
FUEL TANK

Fuel Tank Removal

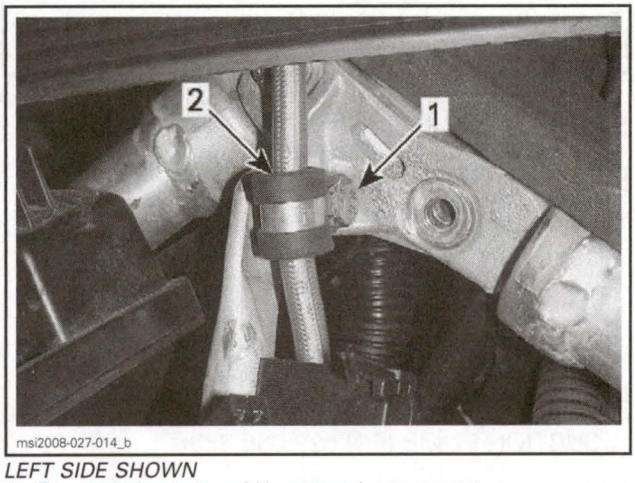
1. Remove the following items, refer to *BODY* section:
   - Seat
   - Upper body module
   - Console.
2. Drain fuel tank as much as possible using the SUCTION PUMP (P/N 529 035 880).



3. Remove the aft mounting bolt from the rear frame member forward mount, and the top mounting bolts from upper column support as indicated on the illustration. Discard the elastic nuts.

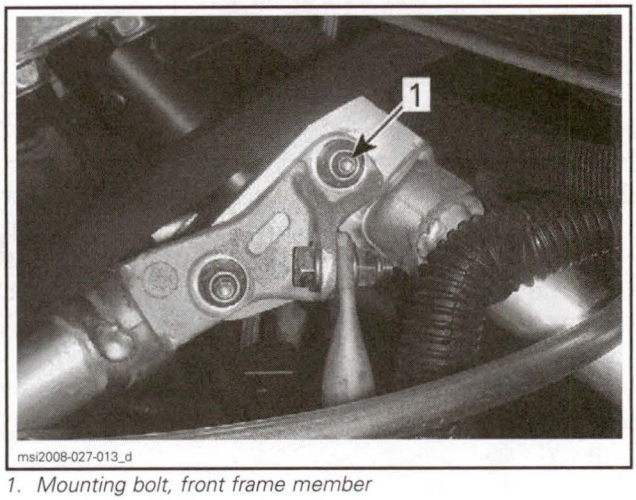


RIGHT SIDE SHOWN
1. *At mounting bolt on rear frame member forward mount*
2. *RH top mounting bolt on upper column support*



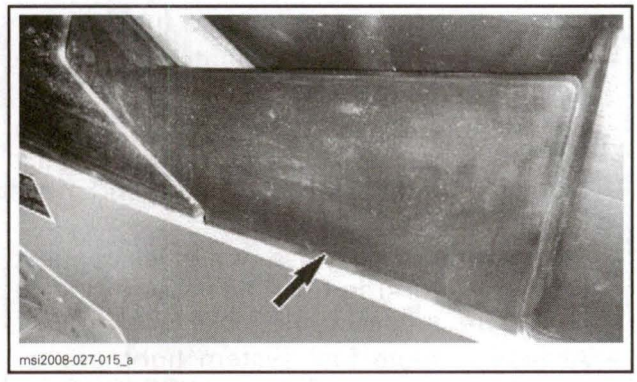
LEFT SIDE SHOWN
1. *Top mounting bolt on LH upper column support*
2. *Brake hose retaining clamp*

4. Release the torque applied to the mounting bolt on the front frame member, but do not remove bolt and elastic nut.

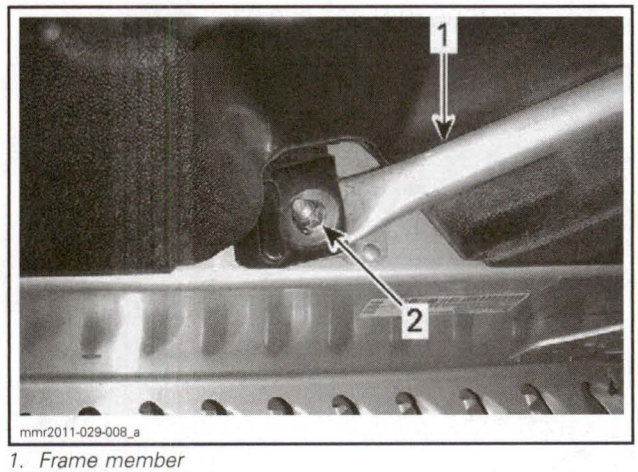


1. *Mounting bolt, front frame member*

5. Remove trim panels covering the aft end of the rear frame members by pulling upwards, then pulling out (one each side).

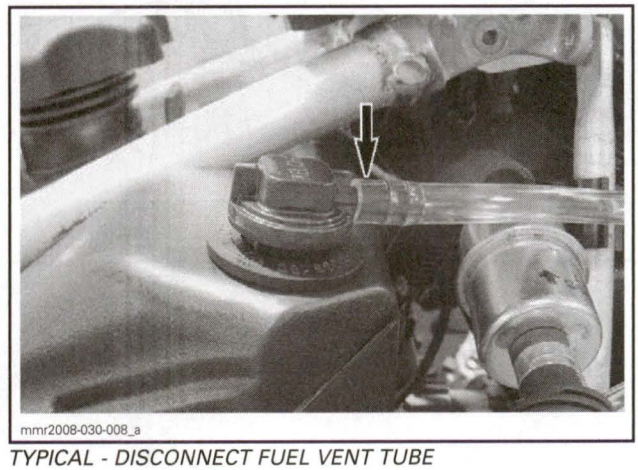


6. Remove elastic nut and shoulder bushing retaining the rear frame members (one each side) to the tunnel (discard nuts, keep shoulder bushings).



1. *Frame member*
2. *Elastic nut*

7. Disconnect the fuel tank vent tube at the check valve.



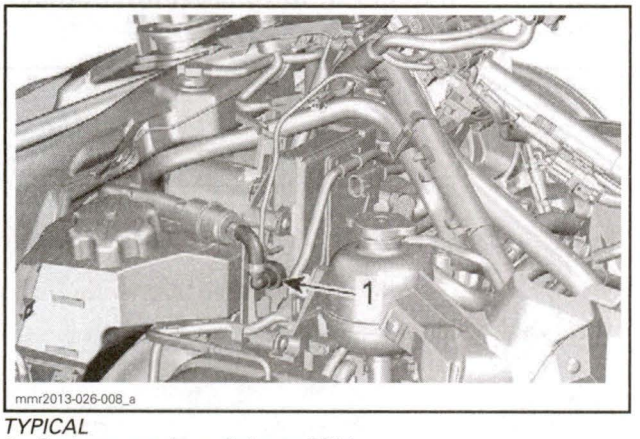
TYPICAL - DISCONNECT FUEL VENT TUBE

8. Disconnect the magneto connector.

⚠ WARNING

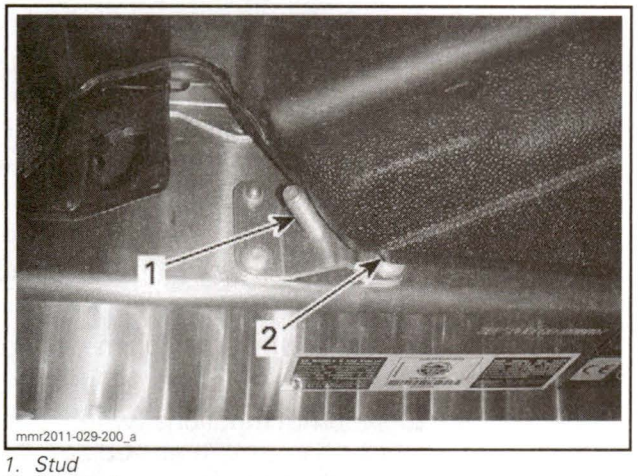
The magneto connector must be disconnected to prevent any spark in the engine compartment and to remove power from the fuel pump. Otherwise, if engine is cranked, fuel vapors may ignite in presence of a spark creating a fire hazard.

9. Install a rag around the ECM hose quick connect to catch fuel spillage.
10. Disconnect fuel pressure hose from ECM.



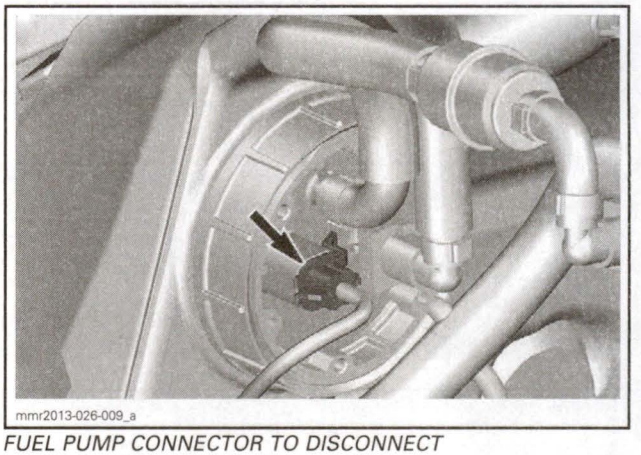
TYPICAL
1. Fuel pressure hose fitting at ECM

11. Move the fuel tank backwards until it contacts the studs.



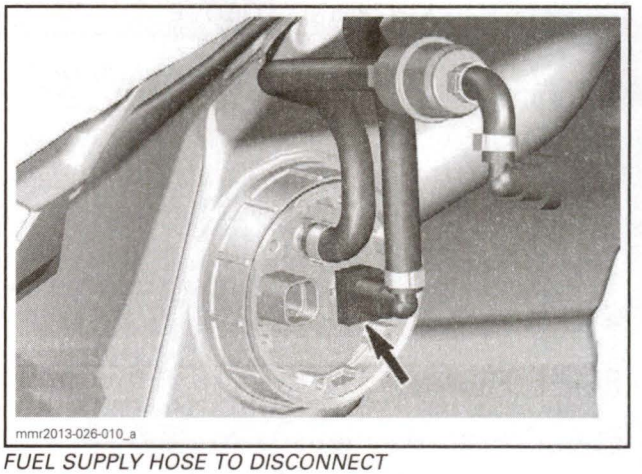
1. Stud
2. Fuel tank

12. Disconnect fuel pump electrical connector.



FUEL PUMP CONNECTOR TO DISCONNECT

13. Carefully disconnect fuel return hose from fuel pump.



FUEL SUPPLY HOSE TO DISCONNECT

NOTE: Place a container under the return hose end to recover the fuel remaining in the system.

14. Carefully and slowly lift the aft end of the fuel tank from the side frame mounting studs and remove it from vehicle.

Fuel Tank Installation

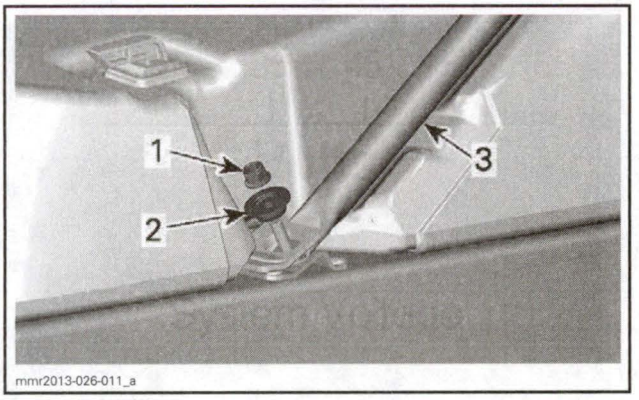
Installation is the reverse of the removal procedure however, pay attention to the following.

Connect return hose to fuel pump. Pull on hose to ensure it is properly locked and secure.

When installing vent hose, ensure it is not kinked or pinched.

Secure the rear frame member using new elastic nuts and previously removed shoulder bushings.

TIGHTENING TORQUE	
Rear frame member retaining nuts	31 N•m (23 lbf•ft)



1. New elastic nut
2. Previously removed shoulder bushing
3. Rear member frame

Secure all frame members at the top of pyramid using new elastic nuts.

TIGHTENING TORQUE	
Frame member upper bolts	14 N•m (124 lbf•**in**)

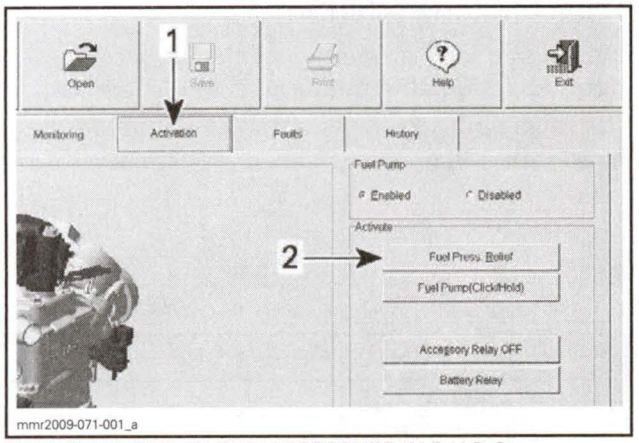
Validate fuel system tightness by performing a *FUEL SYSTEM PRESSURIZATION AND LEAK TEST*. Refer to *INSPECTION* at the beginning of this subsection.

Reinstall all other removed parts and refill the fuel tank.

FUEL PUMP

Fuel Pressure Release

1. Connect vehicle to the latest applicable B.U.D.S. software, refer to the *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Select the **Activation** and **ECM** tabs.
3. Click on the **Fuel Press. Relief** button in the **Activate** field.

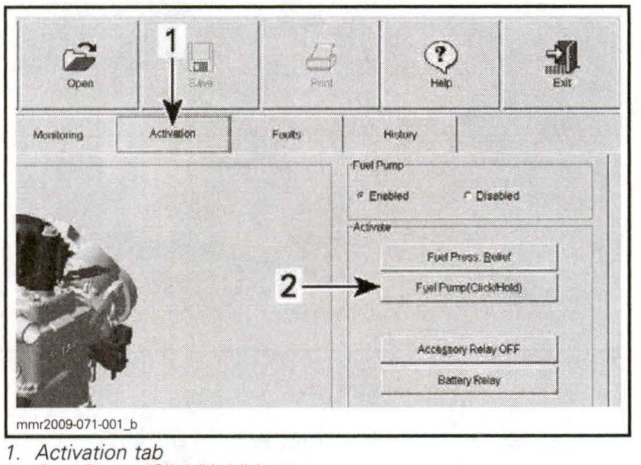


RELEASING FUEL SYSTEM PRESSURE IN B.U.D.S.
1. Activation tab
2. Fuel Press. Relief button on ECM page

Electric Fuel Pump Test with B.U.D.S.

NOTE: Activating the fuel pump as described in this procedure can be used for purging air from the fuel system whenever a fuel hose has been disconnected and reconnected. The pump should be activated for 15 seconds to ensure proper purging of the system.

1. Connect vehicle to the latest B.U.D.S. software, refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Select the **Activation** and **ECM** tabs.
3. Click on the **Fuel Pump (Click/Hold)** button in the **Activate** field.



1. Activation tab
2. Fuel Pump (Click/Hold) button

4. Listen for fuel pump operation.

NOTE: The fuel pump should run as long as you hold the **Fuel Pump (Click/Hold)** button in B.U.D.S.

If you do not hear the pump come ON, select the **Faults** tab in B.U.D.S. and check for fault codes.

If there is no fault code, connect a known good fuel pump to the vehicle harness (in parallel) and repeat the test.

NOTE: No voltage test can be done when the fuel pump is disconnected.

If the second fuel pump functions when connected to the vehicle harness, then replace the fuel pump installed in the vehicle.

Electric Fuel Pump Pressure Test

Refer to *INSPECTION* in this subsection.

Electric Fuel Pump Removal

1. Release the fuel pressure in the system. Refer to *ELECTRIC FUEL PUMP (E-TEC)* in this subsection.
2. Disconnect magneto connector.

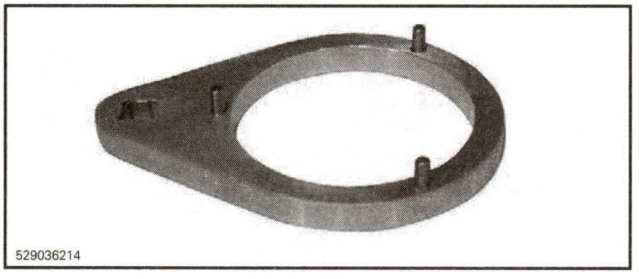
⚠ WARNING

The magneto connector must be disconnected to prevent any spark in the engine compartment and to remove power from the fuel pump. Otherwise, if engine is cranked, fuel vapors may ignite in presence of a spark creating a fire hazard.

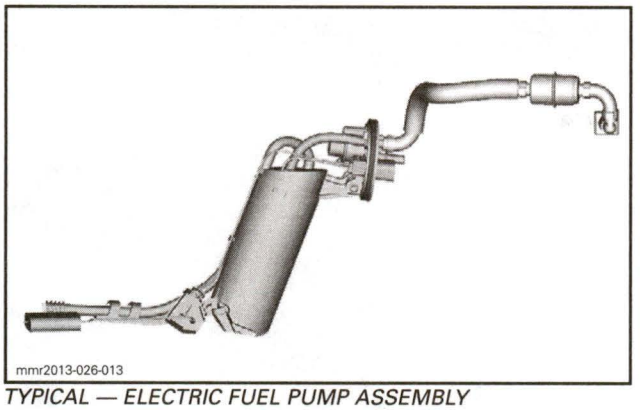
Follow procedures for removing fuel tank and move fuel tank back for access to fuel pump. Refer to *FUEL TANK REMOVAL* in this subsection.

3. Disconnect fuel pump as described in the *FUEL TANK REMOVAL* procedure in this section.
4. Remove fuel pump spanner nut.

REQUIRED TOOL
FUEL PUMP NUT TOOL (P/N 529 036 214)

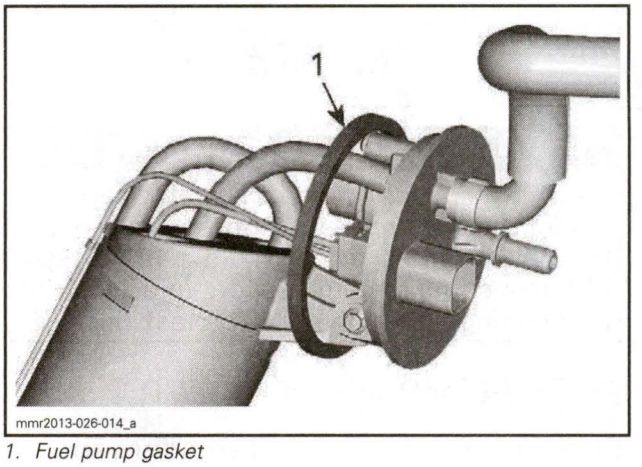


5. Remove fuel pump assembly from fuel tank.



TYPICAL — ELECTRIC FUEL PUMP ASSEMBLY

6. Remove and discard fuel pump gasket.



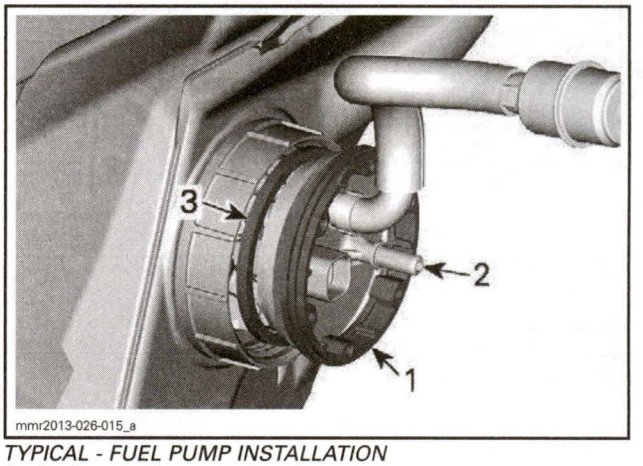
1. Fuel pump gasket

Electric Fuel Pump Installation

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

1. Make sure the rear pick-up is inserted all the way to the rear of fuel tank and does not interfere with the fuel level sensor float.
2. Install a **NEW** gasket on the fuel pump prior to installing the pump in the tank.

NOTE: The gasket must be installed on the fuel tank side so it is located between the pump and the fuel tank.



TYPICAL - FUEL PUMP INSTALLATION
1. Fuel pump spanner nut
2. Fuel pump face plate
3. Fuel pump gasket

3. Install a torque wrench perpendicularly (90°) to FUEL PUMP NUT TOOL (P/N 529 036 214).

TIGHTENING TORQUE	
Fuel pump spanner nut	40 N•m (30 lbf•ft)

4. To reconnect fuel pump and install fuel tank, refer to the *FUEL TANK INSTALLATION* procedure in this subsection.

5. Carry out a *FUEL TANK LEAK TEST* and a *FUEL SYSTEM PRESSURIZATION AND LEAK TEST* as detailed in this subsection.

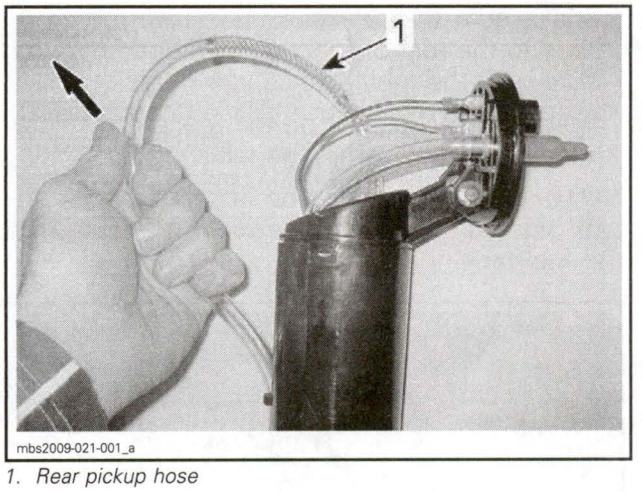
⚠ WARNING

After working on the fuel system, carry out a fuel system pressurization test to check for leaks. Failure to carry out a fuel system leak test could result in severe injury or a life threatening situation should a leak occur.

FUEL PUMP INLET FILTER

Fuel Pump Inlet Filter Replacement

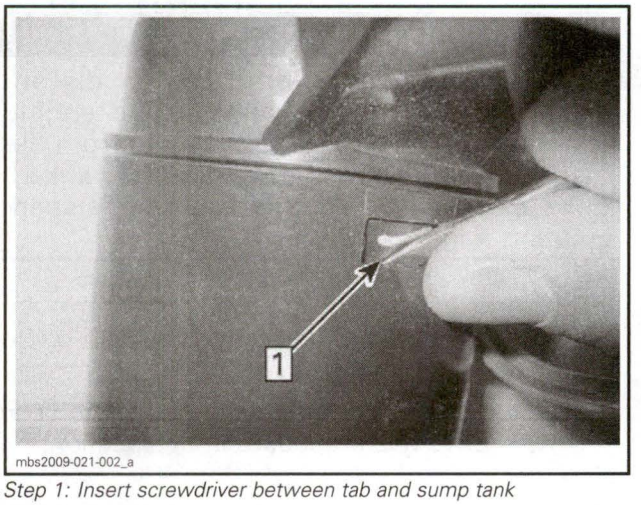
1. Remove fuel pump assembly from fuel tank. Refer to procedure in this subsection.
2. Pull rear pickup hose to make room.



1. Rear pickup hose

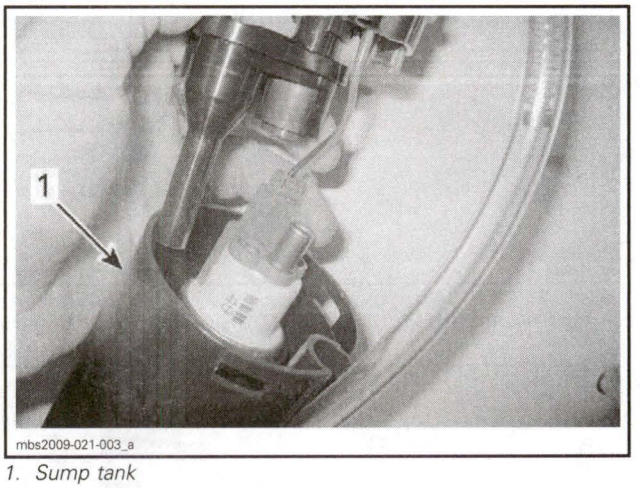
3. Unlock sump tank by carefully inserting a small screwdriver between the tab and the sump tank.

NOTICE Be careful not to damage tabs while pushing them.

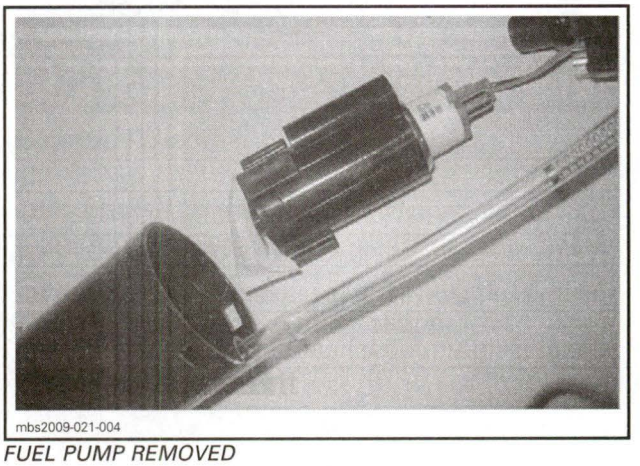


Step 1: Insert screwdriver between tab and sump tank

4. Completely remove sump tank from pump by pulling it carefully.

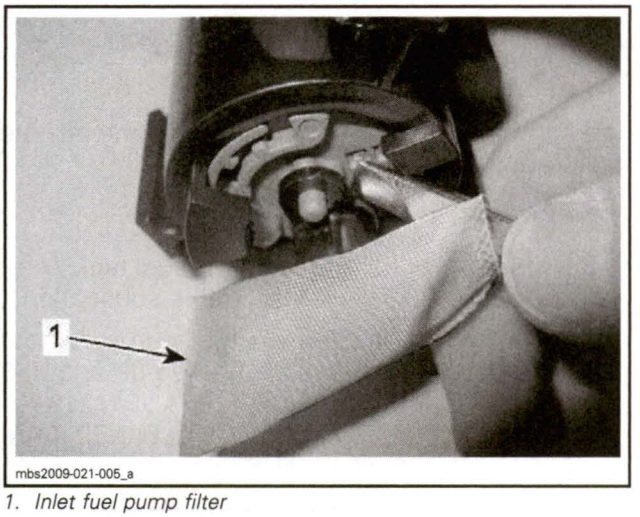


1. Sump tank



FUEL PUMP REMOVED

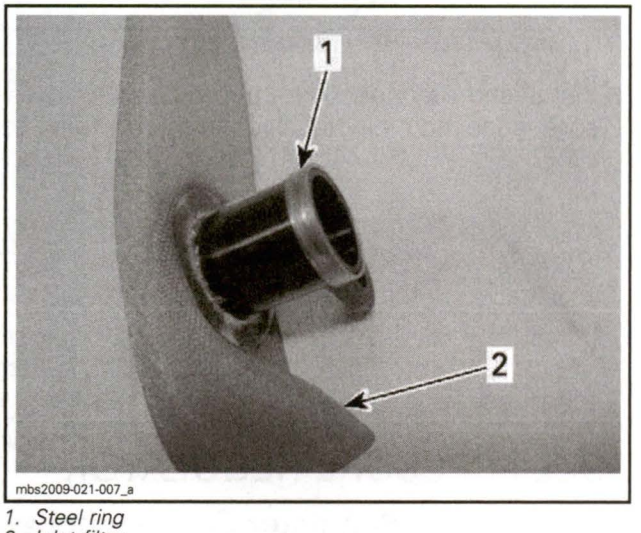
5. Remove inlet fuel pump filter using a small screwdriver.



1. Inlet fuel pump filter

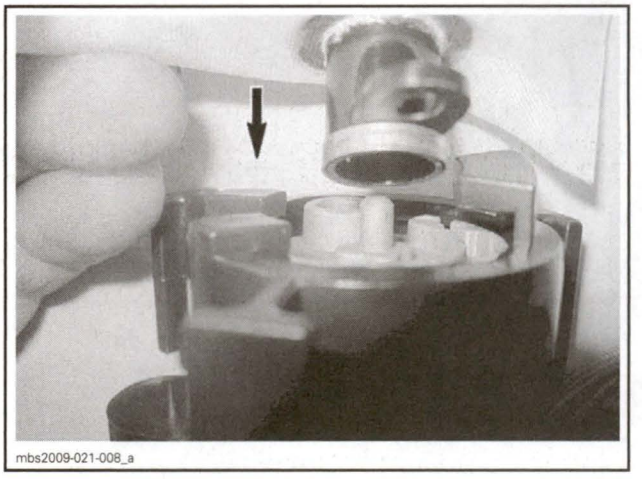
6. Discard inlet fuel pump filter and steel ring.
7. Install **NEW** steel ring on **NEW** inlet filter.

NOTE: Steel ring can be installed on both sides. If steel ring is loose during installation, it will tighten when plastic will contact fuel, the plastic will swell.

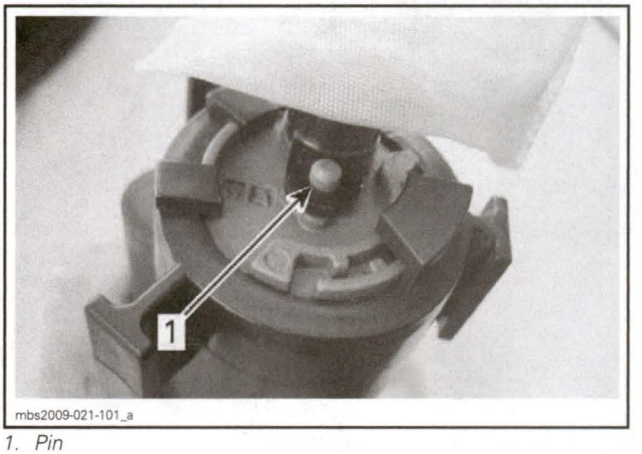


1. Steel ring
2. Inlet filter

8. Insert inlet filter into fuel pump by pressing it downward.

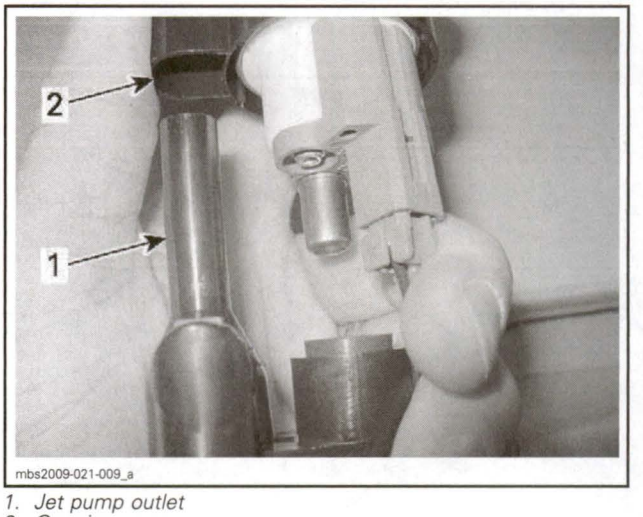


9. Ensure that the filter hole is properly positioned into the pin.



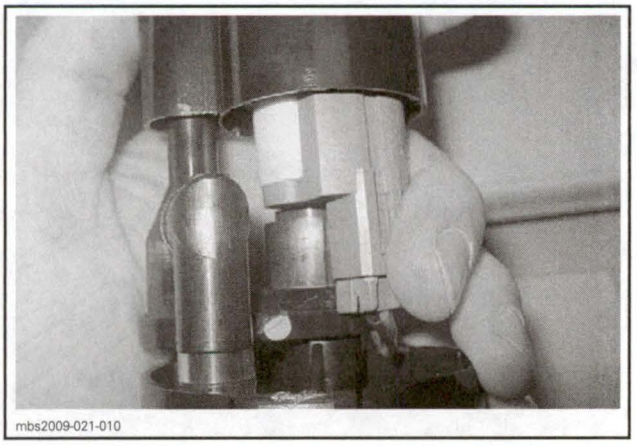
1. Pin

10. Align jet pump outlet into its opening.

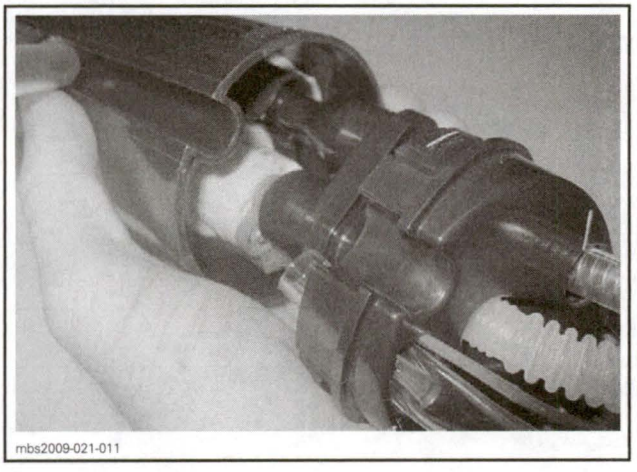


1. Jet pump outlet
2. Opening

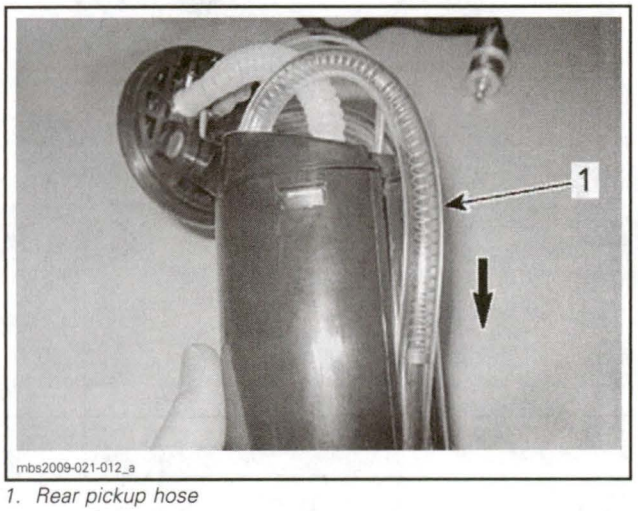
11. Install motor into jet pump.


mbs2009-021-010

12. Install sump tank carefully and ensure that all parts are properly positioned.


mbs2009-021-011

13. Ensure that sump tank tabs are properly locked.
14. Position rear pickup hose by pulling it downward.



mbs2009-021-012_a

1. Rear pickup hose

15. Reinstall fuel pump from fuel tank. Refer to procedure in this subsection.

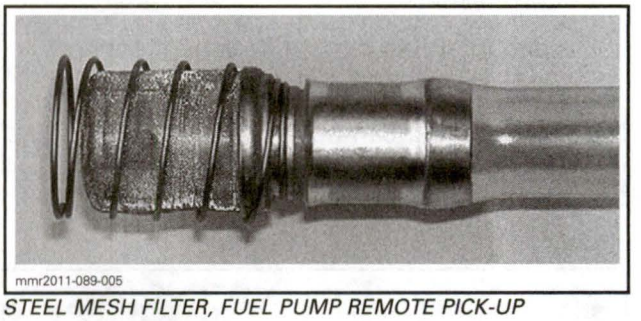
STEEL MESH FILTER

Steel Mesh Filter Location

The steel mesh fuel filter is located on the remote pickup of the fuel pump module.

Steel Mesh Filter Cleaning

1. Remove fuel pump module from fuel tank, refer to *FUEL PUMP REMOVAL* in this subsection.
2. Clean steel mesh filter on fuel pump remote pickup using low pressure filtered air and XPS BRAKES AND PARTS CLEANER (USA) (P/N 219 701 705) or XPS BRAKES AND PARTS CLEANER (CAN) (P/N 219 701 776).


mmr2011-089-005

STEEL MESH FILTER, FUEL PUMP REMOTE PICK-UP

3. Install and reconnect fuel pump module (pressure hose and electrical connector), refer to *FUEL PUMP INSTALLATION* in this subsection.
4. Carry out a *FUEL TANK LEAK TEST* and a *FUEL SYSTEM PRESSURIZATION AND LEAK TEST* as detailed in this subsection.
5. Install remaining parts in the reverse order of removal, refer to *FUEL TANK INSTALLATION* in this subsection.

FUEL PRESSURE REGULATOR

Fuel Pressure Regulator Replacement

Remove fuel pump from fuel tank. Refer to *ELECTRIC FUEL PUMP REMOVAL* in this subsection.

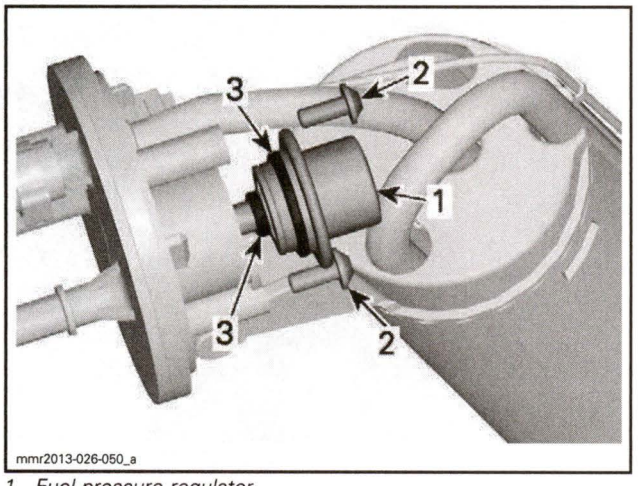
Remove screws securing fuel pressure regulator on fuel pump.

Discard fuel pressure regulator with its O-rings.

Install new O-rings on the new fuel pressure regulator.

Install the regulator on fuel pump and secure it using previously removed screws.

TIGHTENING TORQUE	
Fuel pressure regulator screws	Hand-tight



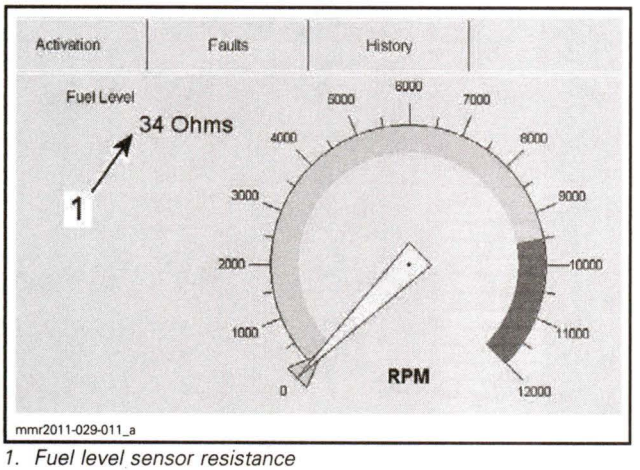
1. *Fuel pressure regulator*
2. *Retaining screws*
3. *New O-rings*

FUEL LEVEL SENSOR

NOTE: Verify the gauge functions related to the fuel level sensor before testing the sensor. Refer to *GAUGE* in *LIGHTS, GAUGE AND ACCESSORIES* subsection.

Fuel Level Sensor Test with B.U.D.S.

1. Connect vehicle to the latest applicable B.U.D.S. version.
2. Select the **Monitoring** and **Cluster** tabs.
3. Monitor the fuel level sensor resistance under **Fuel Level** and compare to the table below.



1. *Fuel level sensor resistance*

FUEL LEVEL SENSOR RESISTANCE TABLE	
Full level resistance value	7 Ω ± 3 Ω
Empty level resistance value	95 Ω ± 5 Ω

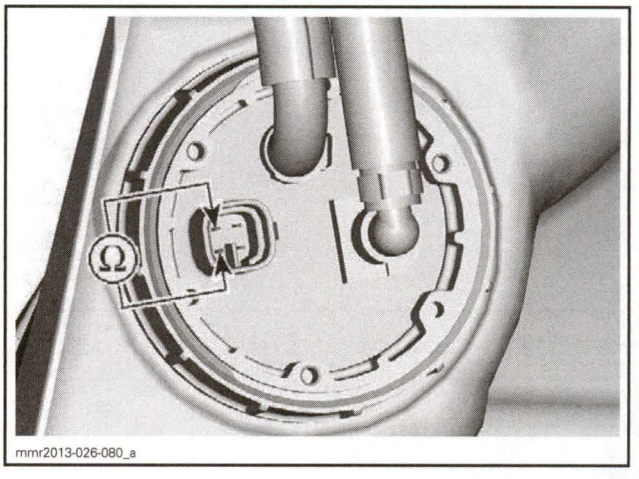
If resistance is within specifications, the fuel level sensor, wiring and fuse are ok.

If resistance is not within specifications, carry out the *FUEL LEVEL SENSOR RESISTANCE TEST.*

Fuel Level Sensor Resistance Test

1. Move fuel tank back to obtain access to the fuel pump connector. Refer to *FUEL TANK REMOVAL* in this subsection.
2. Disconnect fuel level pump.
3. Connect the FLUKE 115 MULTIMETER (P/N 529 035 868) between the two pins in the sensor connector and set it to Ω.
4. Test resistance of sensor as follows.

FUEL LEVEL SENSOR RESISTANCE TABLE	
Full level resistance value	7 Ω ± 3 Ω
Empty level resistance value	95 Ω ± 5 Ω



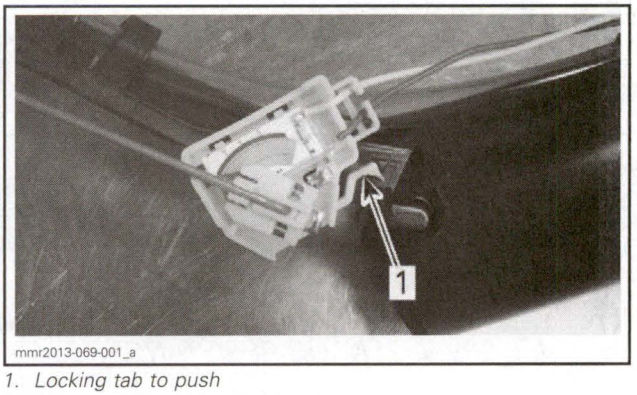
NOTE: Lift the rear of fuel tank to change fuel level.

If resistance is within specifications, check the wiring between the pump connector and gauge.

If resistance is not within specifications, replace fuel level sensor.

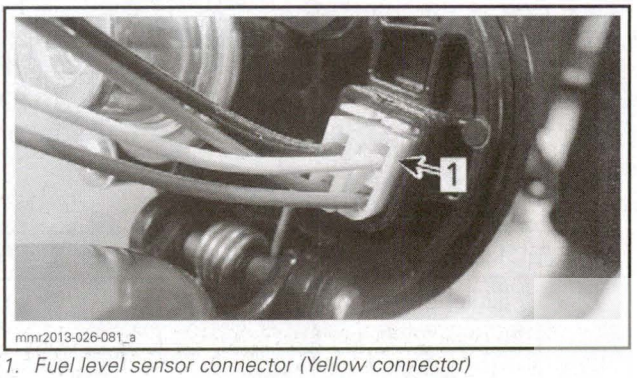
Fuel Level Sensor Replacement

Push locking tab and slide out.



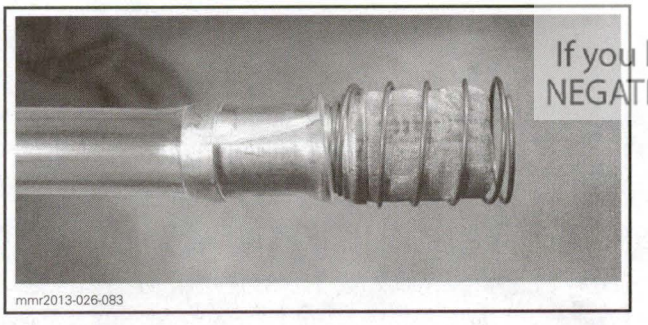
1. Locking tab to push

Disconnect the fuel level sensor connector from the pump module.



1. Fuel level sensor connector (Yellow connector)

Remove the fuel level sensor.



Reinstall the new one by reversing the procedure.

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

E-TEC DIRECT FUEL INJECTION

SERVICE TOOLS

Description	Part Number	Page
EXTRACTOR ADAPTOR	529 036 136	73
FLUKE 115 MULTIMETER	529 035 868	69–70, 82, 94–95, 99, 101
INJECTOR RETAINER PLATE	529 036 137	67
OETIKER PLIERS	295 000 070	62
SMALL HOSE PINCHER	295 000 076	91

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SNAP-ON HAMMER	CJ125-6	73
SNAP-ON SCREW	CJ93-1	73

SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	76
PULLEY FLANGE CLEANER	413 711 809	92

GENERAL

⚠ WARNING

Always disconnect the magneto connector prior to:
- Disconnecting any fuel hose.
- Removing a fuel injector.
- Removing a spark plug cable or spark plug.

Otherwise, fuel vapors may ignite in presence of a spark creating a fire hazard.

⚠ WARNING

The fuel system is under high pressure. Proceed with care when working on the fuel system. Wear safety glasses and work in a well ventilated area.

Release fuel system pressure prior to removing fuel system components. Refer to *ELECTRIC FUEL PUMP (E-TEC)* in *FUEL TANK AND FUEL PUMP* subsection.

⚠ WARNING

Perform a fuel pressure test each time a component from the fuel system is removed. Prior to starting the engine when a fuel hose was disconnected or a fuel injector removed:
- Ensure all fuel lines are properly connected.
- Crank engine to pressurize fuel system. Do not let engine run. If it starts, stop it right away.
- Inspect engine compartment to detect any fuel leakage or an abnormally strong fuel odor which may be an indication of a fuel leak that is not readily visible.

SYSTEM DESCRIPTION

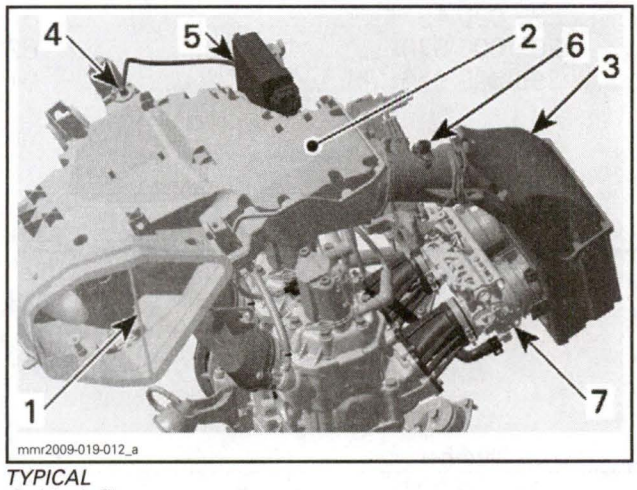
The ECM reads the input signals from different sensors which indicate engine operating conditions at micro-second intervals.

The ECM calculates the proper air/fuel ratio and activates the output to fuel injectors.

Signals from sensors are used by the ECM to determine the injection parameters (fuel maps required for optimum air-fuel ratio).

The crankshaft position sensor (CPS), the throttle position sensor (TPS) are the primary sensors used to control the injection. Other sensors (like temperature sensors, etc.) are used as secondary input.

Air Induction



TYPICAL
1. *Mesh filter*
2. *Secondary air intake silencer*
3. *Primary air intake silencer*
4. *Air pressure fitting and hose*
5. *Air pressure sensor in ECM*
6. *Air temperature sensor*
7. *Throttle body*

Air flows through a mesh filter in the secondary air intake silencer mounted on top of engine. The mesh filter prevents snow from being drawn into the engine.

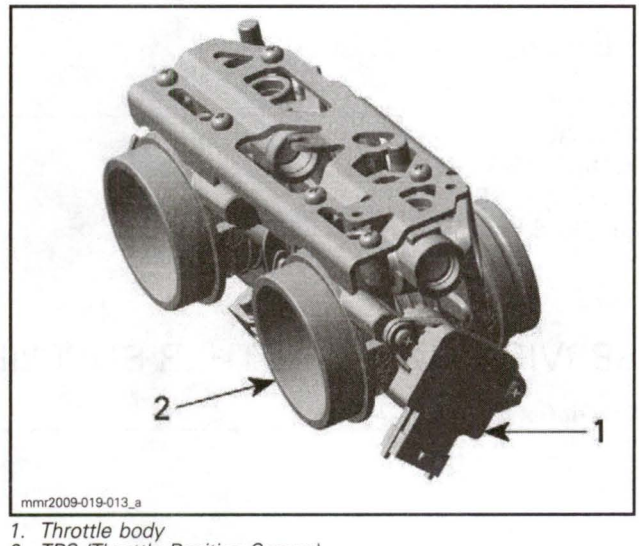
Air pressure is measured in the secondary air intake silencer through a tube connected to the ECM.

Air then flows through the primary air intake silencer.

Air temperature is measured at the entry point of the primary air intake silencer.

Air is then drawn in through a dual throttle body mounted on the engine intake side.

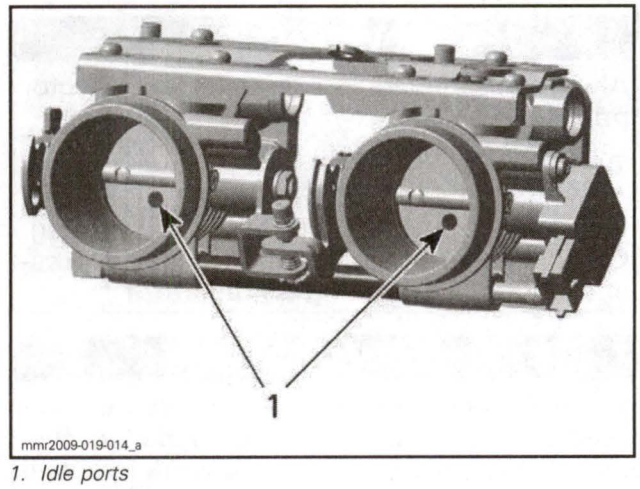
Throttle Body



1. *Throttle body*
2. *TPS (Throttle Position Sensor)*

A Dell'Orto dual throttle body assembly is directly mounted on the intake flange of each cylinder (46 mm for the 600 HO and 52 mm for the 800R).

The air flow is controlled by two throttle plates. Each throttle plate has a 6.8 mm (.268 in) idle port in it.

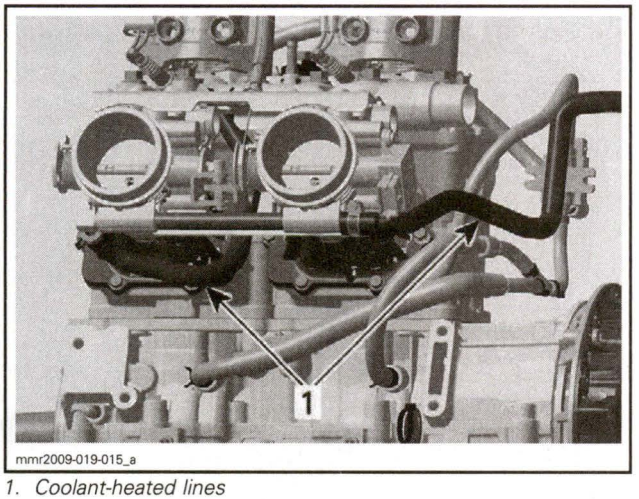


1. *Idle ports*

Since there is a constant airflow through the idle ports of the throttle plates, the idle speed is controlled by the ECM by varying the amount of fuel injected in the combustion chamber and by controlling the injection timing.

The TPS (Throttle Position Sensor) is fitted on the throttle body. The TPS sends throttle angle position to the ECM.

Engine coolant flows through the throttle body to prevent potential freezing of throttle plates due to the temperature drop naturally created by the venturi.



1. Coolant-heated lines

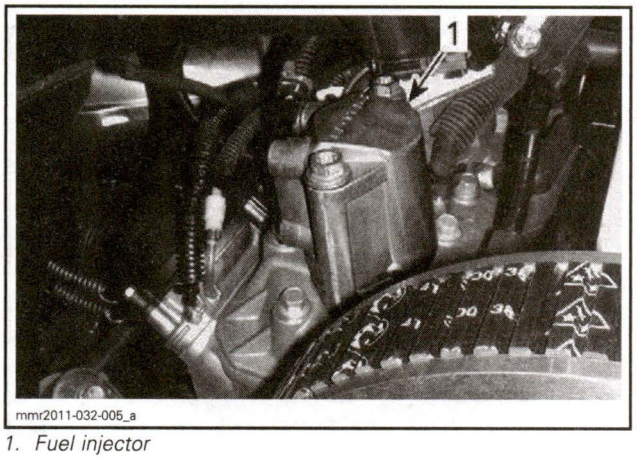
The air then continues through the reed valves into the cylinder base then into the crankcase.

Fuel Injector

The fuel injectors are powered from the 55/60 Vdc system.

One fuel injector per cylinder is used.

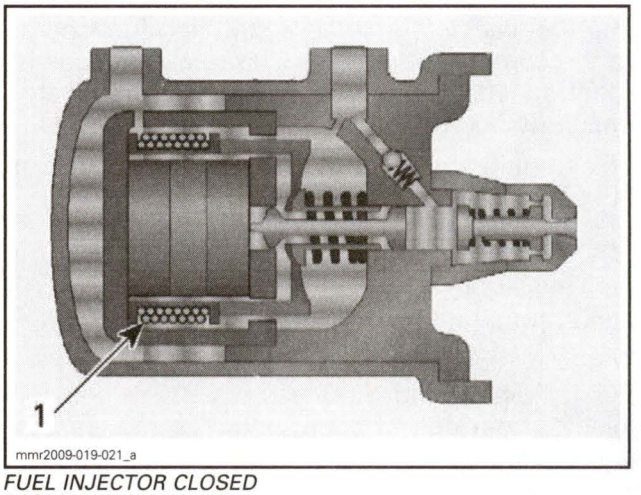
The E-TEC fuel injector is mounted directly on top of the cylinder head.



1. Fuel injector

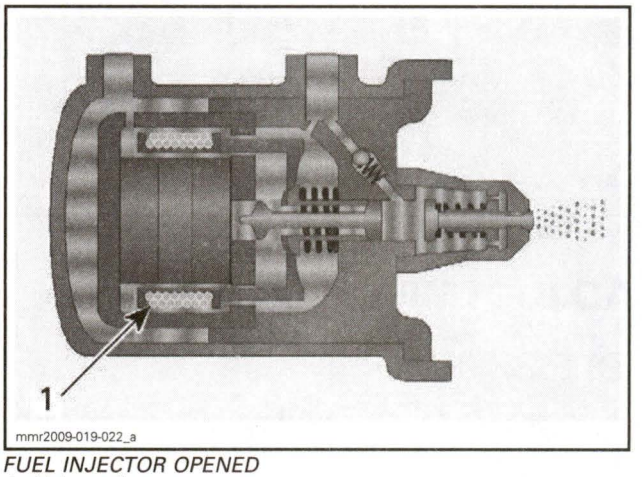
The fuel injector achieves a direct injection right into the combustion chamber. This keeps the piston cooler with less fuel.

A voice coil type is used to open and close the fuel injector nozzle. This allows for quick operation of the fuel injector; opening stage as well as the closing stage. This results in the ability to operate the engine at a higher RPM and lowers unburned fuel to the exhaust port.



FUEL INJECTOR CLOSED
1. Voice coil

When a positive current is supplied to the coil by the ECM, the fuel injector plunger moves towards the spring loaded injector needle. As the injector plunger moves, this builds up a pressure in the fuel injector chamber. When the pressure reaches approximately 1724 kPa (250 PSI), the injector needle spring is overcome and the needle opens. Fuel injection then takes place while the pressure peaks at 3103 kPa (450 PSI).



FUEL INJECTOR OPENED
1. Voice coil

Swirl channels are used in the fuel injector to better atomize the fuel charge.

The quantity of injected fuel is controlled by varying the injector plunger stroke.

To bring the injector plunger backward to its rest position, the current is reversed and the return springs close the injector needle and plunger. Near the end of the return stroke, a brief positive current is applied to "brake" the injector plunger. This results in a quieter operation of the fuel injectors.

The fuel injectors provide a stratified fuel charge to the combustion chamber up to clutch engagement speed. Beyond this RPM, the fuel charge becomes homogeneous.

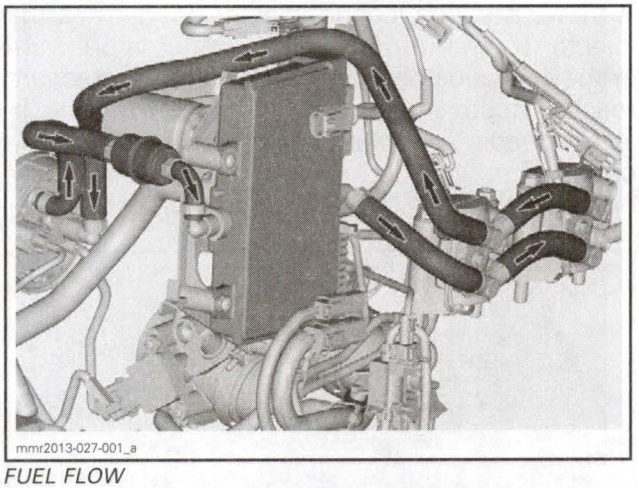
The stratified fuel charge provides a cleaner combustion, better idling and less smoke.

Fuel Injector Cooling

Fuel is used to maintain proper fuel injector operating temperature.

The flow starts from the fuel pump, through the ECM, then around the voice coil inside the fuel injector housings to cool down the fuel injector components.

Fuel enters the inlet port located at the bottom of the fuel injector housing and exits through the outlet port on top of the fuel injector.



FUEL FLOW

ADJUSTMENT

IDLE SPEED

Idle speed is controlled by the EMS (Engine Management System) and is not adjustable with an idle screw.

If idle speed is not as per specification (refer to *TECHNICAL SPECIFICATIONS*), perform the *CLOSED THROTTLE RESET (TPS).*

CLOSED THROTTLE RESET (TPS)

General Information

This operation performs a reset of the TPS (throttle position sensor) values in the ECM when the throttle is closed. This reset is very important as the setting of the TPS will determine the basic parameters for all fuel mapping and several ECM calculations for idle speed control of the engine.

The closed throttle reset must be carried out **only** if the:

- Idle speed is not as per specification.
- TPS is loosen, removed or replaced.
- TPS is out of tolerance or sets a fault code.
- Throttle body is replaced.
- ECM is replaced.

NOTE: Do not reset TPS needlessly. See *TPS CLOSED THROTTLE VERIFICATION.*

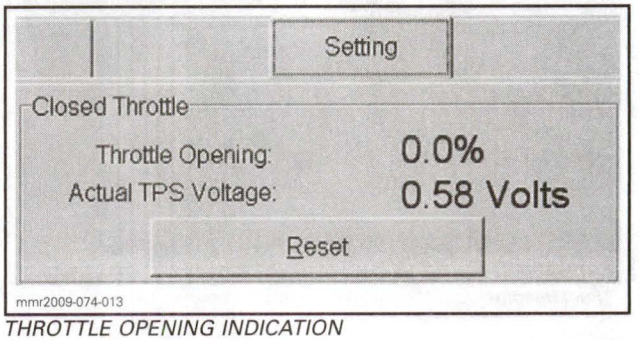
NOTICE An improperly set TPS may lead to poor engine performance.

TPS Closed Throttle Verification

1. Connect vehicle to the latest applicable B.U.D.S. version. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. In B.U.D.S., select the **Setting** and **ECM** page tabs.
3. Activate and release throttle lever 2 - 3 times to settle throttle plates.
4. Look for the throttle opening indication in the **Close Throttle** area.

NOTE: The **Throttle Opening** indication must be within the following specification.

THROTTLE OPENING SPECIFICATION
(0 % ± 0.2)



THROTTLE OPENING INDICATION

If the throttle opening is within the % specification, DO NOT carry out the **Closed Throttle Reset** unless the following parts were replaced:

- Engine control module (ECM)
- Throttle body
- Throttle position sensor (TPS).

If TPS is not within specification, carry out the **Closed Throttle** reset procedure that follows.

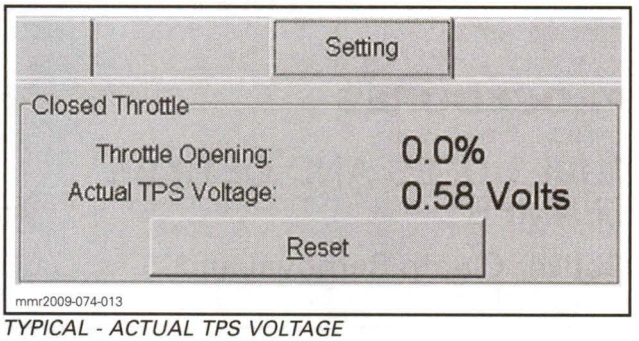
Closed Throttle Reset Procedure (TPS)

1. **Ensure** throttle cable is properly adjusted, refer to *THROTTLE CABLE ADJUSTMENT* in this subsection.
2. Activate throttle lever 2 - 3 times to settle throttle plate.

NOTICE **Proper throttle cable adjustment must be verified before proceeding with the Closed Throttle reset.**

3. In B.U.D.S.
   - 3.1 Select the **Setting** tab.
   - 3.2 Select the **ECM** tab.
4. In the **Closed Throttle** area, confirm the **Actual TPS Voltage** is within specification.

ACTUAL TPS VOLTAGE SPECIFICATION
0.3 to 0.7 Volts

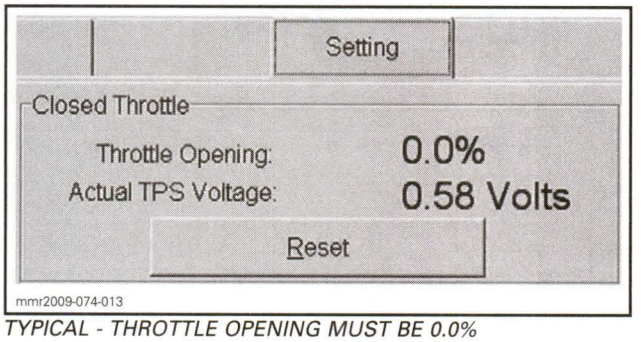


TYPICAL - ACTUAL TPS VOLTAGE

NOTE: If the **Actual TPS Voltage** is out of specification, the TPS cannot be reset. The cause must be found. See *TROUBLESHOOTING ACTUAL TPS VOLTAGE OUT OF RANGE.*

5. Press on the **Reset** button.
6. Confirm **Throttle Opening** value indicates 0.0%.

NOTE: A throttle opening of 0.0% after reset indicates the operation is successful.



TYPICAL - THROTTLE OPENING MUST BE 0.0%

Troubleshooting Actual TPS Voltage Out of Range

If the **Actual TPS Voltage** is out of specification, check the following.

- Fault codes related to TPS
- Throttle cable adjustment
- TPS properly installed
- TPS connector and terminal condition.

TROUBLESHOOTING

DIAGNOSTIC TIPS

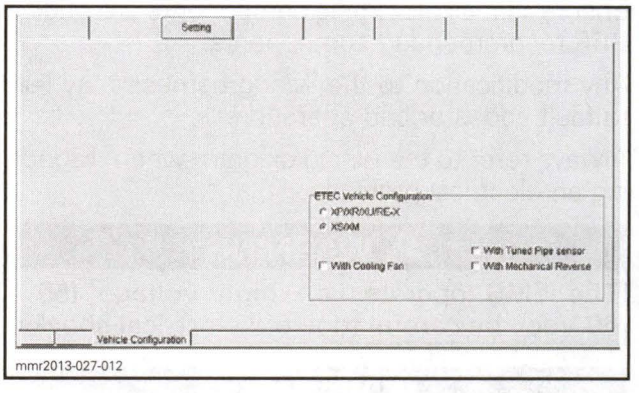
Engine problems are not necessarily related to the injection system.

It is important to ensure the mechanical integrity of the engine is present.

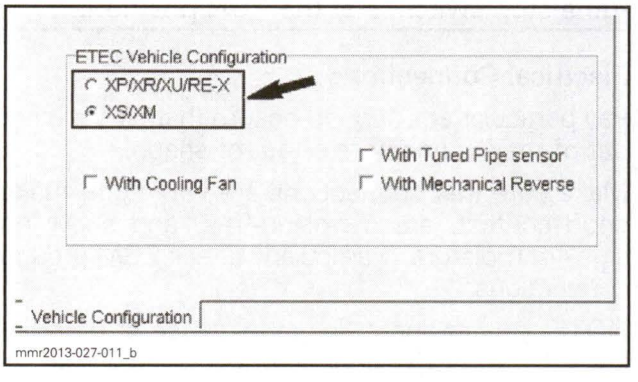
No Engine Acceleration, No Throttle Response

If this occurs, use B.U.D.S. and check the following.

1. Select the **Setting** tab then **Vehicle Configuration.**



2. In the **Vehicle Configuration** page:
   - 2.1 Ensure the proper vehicle platform is selected in the **ETEC Vehicle Configuration** area.



Spark Plugs

800R E-TEC Only

Improper spark plug indexing may lead to engine misfiring. Check if BRP spark plugs are installed or if spark plugs are properly indexed. Refer to *IGNITION SYSTEM* subsection.

3D RAVE Valves

Improper position of RAVE valves may lead to engine misfiring. Check RAVE valves. Refer to *RAVE (600 HO E-TEC AND 800R E-TEC)* subsection.

Crankshaft Position Sensor (CPS)

Confirm that ECM receives the CPS signal. Refer to *CRANKSHAFT POSITION SENSOR (CPS)* in this subsection.

Electrical System

It is important to check that the electrical system is functioning properly:

- 55/60V system voltage
- Capacitor (refer to *CHARGING SYSTEM*)
- Ground connections
- Wiring and connectors.

Ensure that all electronic components are original BRP recommended components.

Any modification to the wiring harness may lead to fault codes or bad operation.

Always refer to the wiring diagram when diagnosing an electrical problem.

⚠ WARNING

The EMS operates on high voltage (55 - 60 Vdc), be careful to avoid electrical shocks.

⚠ WARNING

All electrical actuators (example: fuel injectors, fuel pump, ignition coils and electronic oil injection pump) are powered as soon as engine is cranked when the emergency engine stop switch is at the RUN position.

Electrical Connections

Pay particular attention to ensure that pins are not out of their connectors or out of shape.

Make sure that connections are very tight, make good contact, are corrosion-free, and show no signs of moisture. Particularly check ECM ground connections.

NOTE: Do not apply dielectric grease or other lubricant in the ECM connectors.

Check if wiring harness shows any signs of scoring.

Resistance Measurement

When measuring the resistance with an ohmmeter, all values are given for a temperature of 20°C (68°F). The value of a resistor varies with the temperature. The value for common resistor or windings (such as solenoid) increases as the temperature increases. However, our temperature sensors are NTC types (Negative Temperature Coefficient) except for the EGTS, which means that the value decreases as the temperature increases. Use the provided tables for sensor resistive values at given temperature.

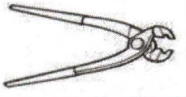
The resistive value of a temperature sensor may test good at a certain temperature but may be defective at other temperatures.

A good test is to put the sensor in a container filled with ice and water and measure resistance. Then, heat the water and read the resistance at different temperatures.

PROCEDURES

FUEL HOSES AND OETIKER CLAMPS

Oetiker Clamp Removal and Installation

REQUIRED TOOL	
OETIKER PLIERS (P/N 295 000 070)	

Always use a shop rag when disconnecting a fuel hose.

⚠ CAUTION Fuel system is under high pressure.

⚠ WARNING

- Never use a hose pincher on high pressure hoses.
- Never change the routing of a fuel hose.
- Always reinstall the corrugated protective tubing on fuel hoses.
- Secure fuel hoses using the appropriate locking tie or fastener to prevent contact with sharp edges or hot, rotating and moving parts.
- After connecting a hose or a quick connect fitting, pull on the hose near the fitting to make sure it is securely locked.

Use of improper fuel lines could compromise fuel system integrity.

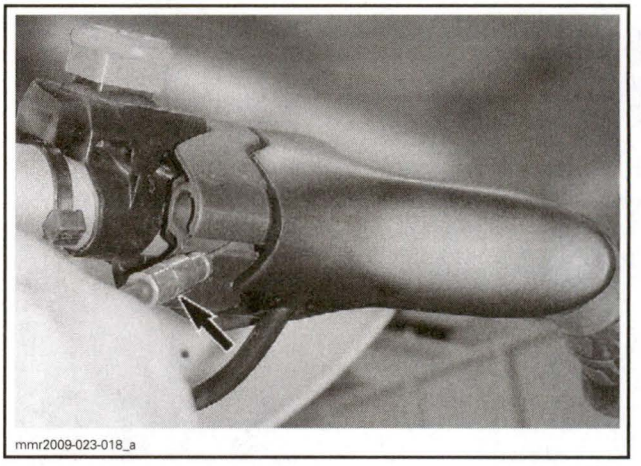
THROTTLE CABLE

Throttle Cable Removal

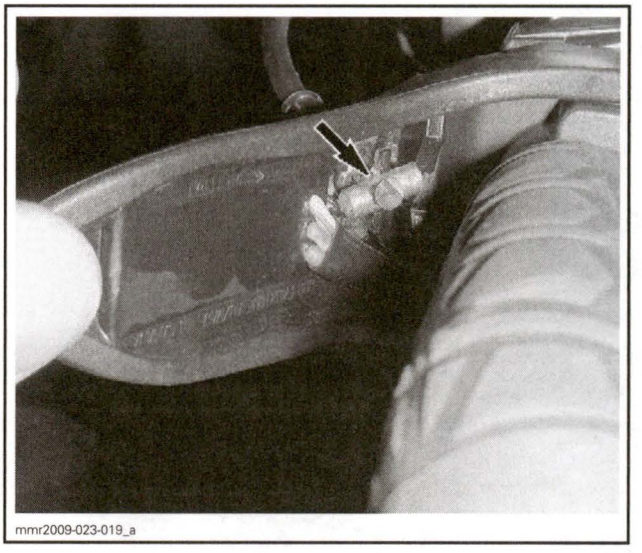
1. Remove handlebar cover.
2. Depress and hold throttle lever.
3. Pull out circlip using long nose pliers. Keep circlip for re-use.


mmr2009-023-017_a

4. Pull throttle cable out of the throttle lever housing.

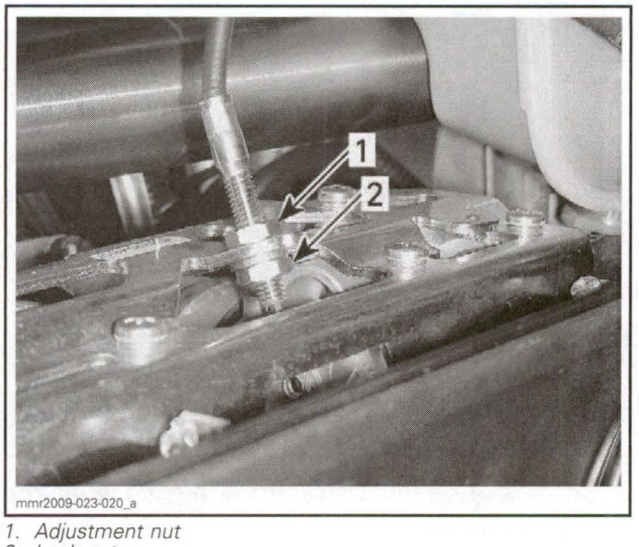

mmr2009-023-018_a

5. Unhook cable end barrel from throttle lever and remove cable.


mmr2009-023-019_a

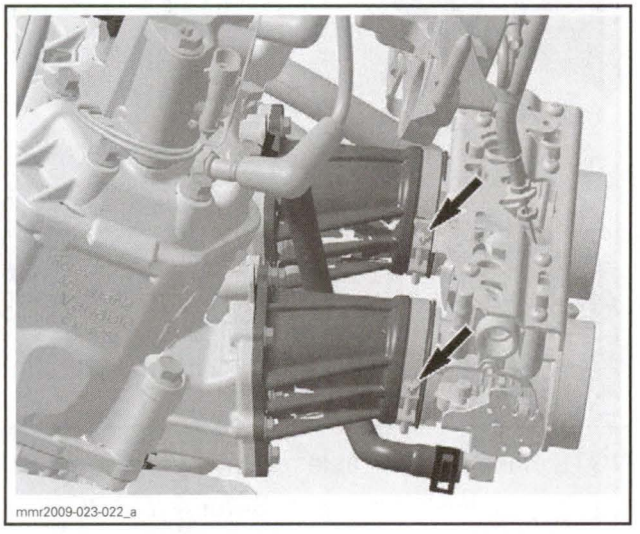
NOTE: Take note of cable routing before removal.

6. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
7. Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
8. At throttle body, fully unscrew cable adjuster lock nut.



1. Adjustment nut
2. Lock nut

9. Loosen throttle body retaining clamps and remove throttle body from air intake adapters.



10. Pull out throttle body sufficiently to unhook throttle cable end.



11. Remove throttle cable.

Throttle Cable Installation

Reverse removal procedure however, pay attention to the following.

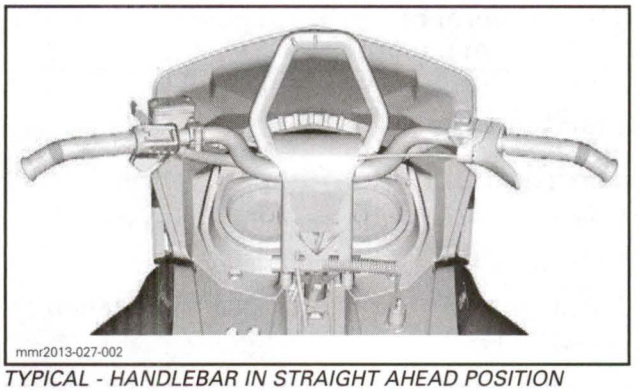
Route cable as noted prior to removal.

Ensure that cable ends are properly secured in their levers.

Proceed with throttle cable adjustment.

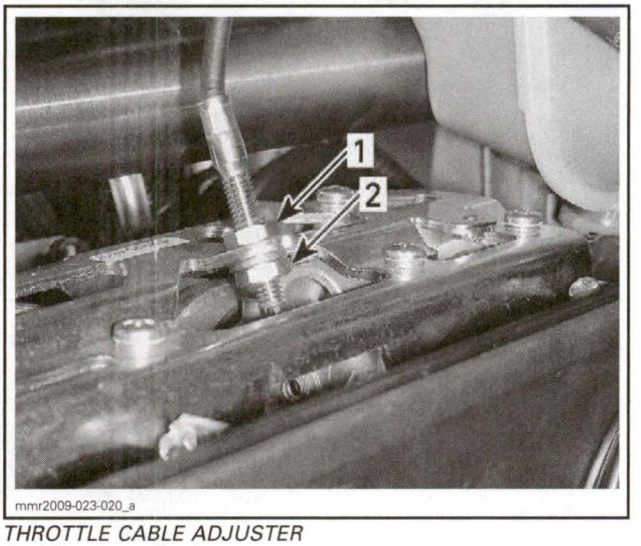
Throttle Cable Adjustment

1. Position handlebar straight and level.

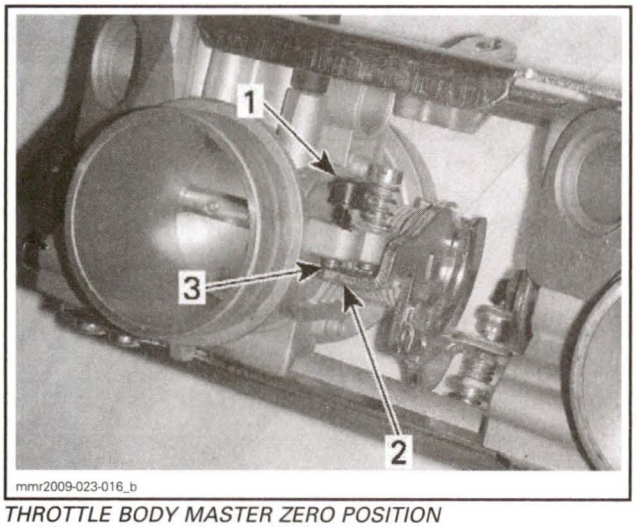


TYPICAL - HANDLEBAR IN STRAIGHT AHEAD POSITION

2. Turn throttle cable adjuster nut until the following is observed:
   - Throttle plate stopper is in contact with master zero position screw
   - Throttle cable is slightly loose (cable free play).



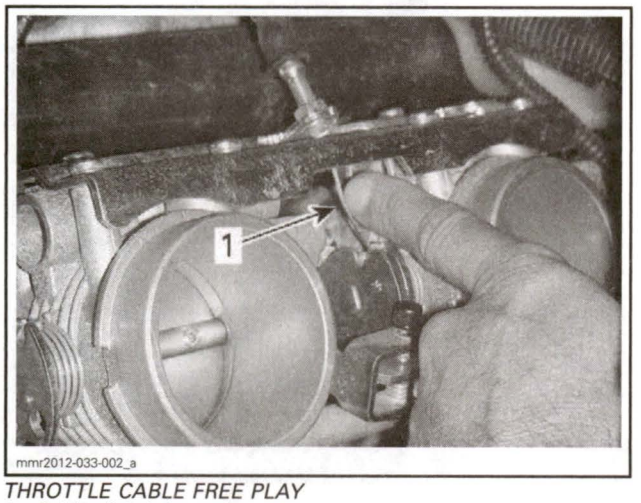
THROTTLE CABLE ADJUSTER
1. Adjuster nut (top)
2. Adjuster lock nut (Bottom)



THROTTLE BODY MASTER ZERO POSITION
1. *Master zero position screw (black)*
2. *Throttle plate stopper*
3. *Contact here*

NOTICE **Do not tamper with any throttle body adjustment screws. Otherwise, throttle body must be replaced.**

NOTE: To ensure cable free play, lightly press on throttle cable as in following illustration.



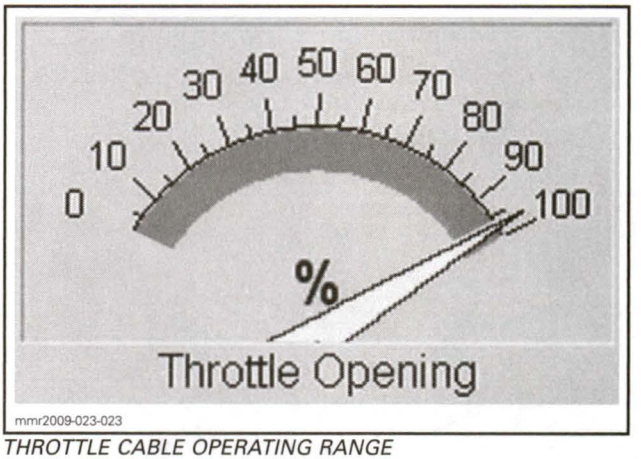
THROTTLE CABLE FREE PLAY
1. *Cable slightly loose here*

3. Activate and release throttle lever 2 - 3 times to settle throttle plate.
4. Confirm throttle plate stopper is STILL in contact with master zero position screw.
5. Readjust throttle cable if necessary.
6. Carry out the *THROTTLE CABLE OPERATING RANGE INSPECTION WITH B.U.D.S.*

Throttle Cable Operating Range Inspection with B.U.D.S.

1. In B.U.D.S.
   1.1 Select the **Monitoring** tab.
   1.2 Select the **ECM** tab.
2. Fully depress throttle lever and hold.
   2.1 Confirm throttle opening is within specification.

THROTTLE OPENING SPECIFICATION (WIDE OPEN THROTTLE)
95% to 100%

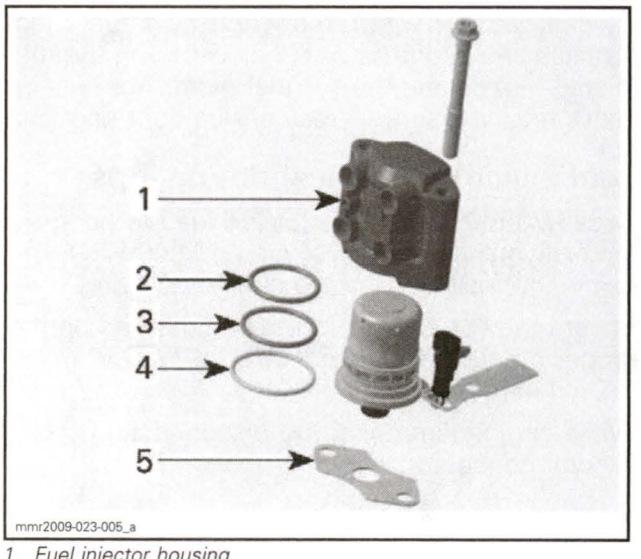


THROTTLE CABLE OPERATING RANGE

3. If throttle opening is out of specification, readjust as follows.

THROTTLE OPENING OUT OF SPECIFICATION	
Above specification	Loosen throttle cable
Below specification	Tighten throttle cable

FUEL INJECTOR



1. *Fuel injector housing*
2. *Top O-ring*
3. *Bottom O-ring*
4. *Crush ring*
5. *Thermal insulator*

Every fuel injector is bench tested. Its electrical and flow characteristics are registered throughout all its operating range in a calibration file.

NOTICE **When a fuel injector is replaced, the matching calibrated file must be loaded in the ECM using B.U.D.S. so that the ECM properly controls the fuel injector.**

Fuel Injector Visual Inspection

1. Open LH panel.
2. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
3. Visually inspect the fuel injector area.



1. Fuel injector

If a fuel leak is noticed in the hoses area, inspect hoses and connections.

If a fuel leak is noticed in fuel injector base area, it indicates a leak of the lower O-ring of fuel injector.

If a dark carbon sooted area is noticed in fuel injector base area, it indicates a leak between the fuel injector nozzle and the cylinder head. The fuel injector retaining screws may not be tight enough.

Fuel Injector Troubleshooting Tips

Usually, a faulty fuel injector will lead to poor engine idling and a low RPM (around 800 RPM and below). It may also lead to engine misfiring.

Ensure the correct fuel injector is installed on the proper cylinder. Refer to *FUEL INJECTOR POSITION VALIDATION*.

While engine is running, try disconnecting a fuel injector connector:

⚠ WARNING

Be careful while working close to rotating parts.

- If engine RPM does not change, the fuel injector could be faulty.
- If engine RPM decreases, the other fuel injector could be faulty.

If one injector is thought to be faulty, proceed with the injector tests.

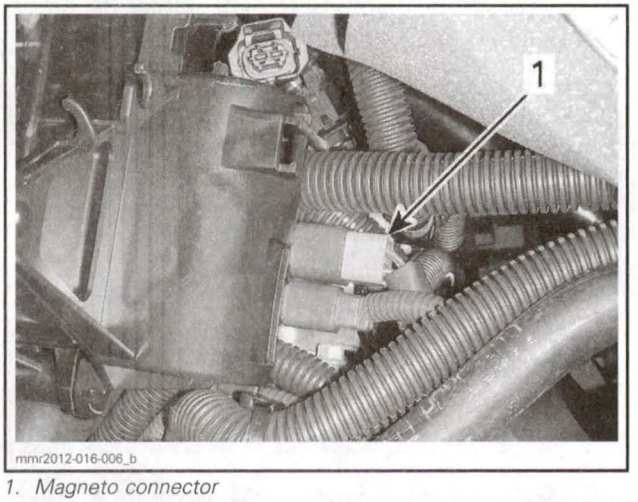
Fuel Injector Leak Test

Test Preparation

1. First make sure fuel pressure is within specifications. Refer to *FUEL TANK AND FUEL PUMP* subsection.

NOTE: Keep the pressure gauge installed for the leak test.

2. Disconnect the magneto connector.



1. Magneto connector

⚠ WARNING

The magneto connector must be disconnected to prevent any spark in the engine compartment should the engine be cranked. Fuel vapors may ignite in presence of a spark creating a fire hazard.

3. Release fuel pressure. Refer to *FUEL TANK AND FUEL PUMP*.

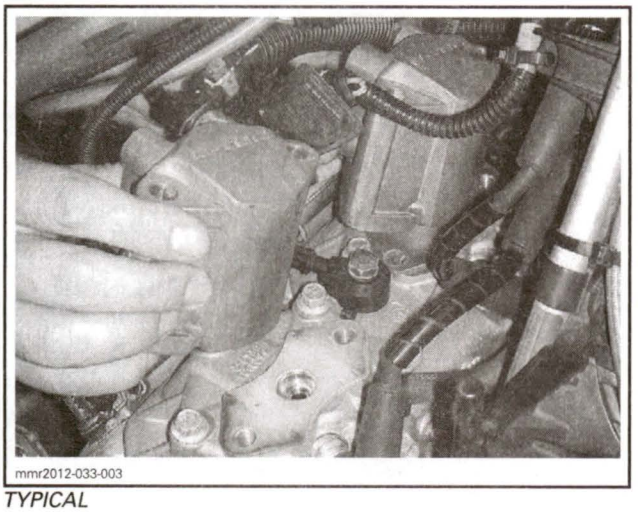
NOTICE **If the fuel pressure is not released, the pressure will push the fuel injector out of its housing when removing the fuel injector from the engine. This could damage the fuel injector and lead to an important fuel spill.**

4. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
5. Remove secondary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
6. Unlock ECM support to move ECM as necessary to lift fuel injectors.

NOTE: Fuel injector leak test can be done on one injector at a time or on both injectors simultaneously.

7. Unscrew both fuel injectors. Refer to *FUEL INJECTOR REMOVAL* in this subsection.
8. Carefully lift both fuel injectors. Be careful not to pry hoses against their plastic fittings.

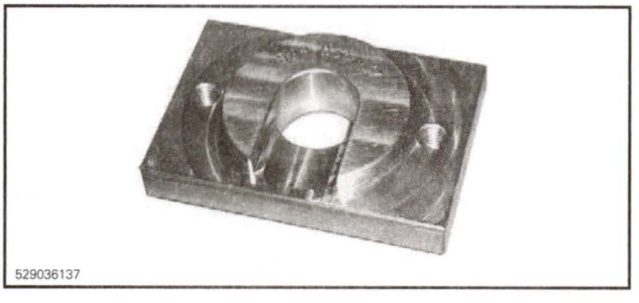
⚠ CAUTION If both fuel injectors are not carefully lifted from the engine together, the strain on the injector fuel fittings may cause them to crack and leak fuel when pressurized, resulting in a fire hazard.

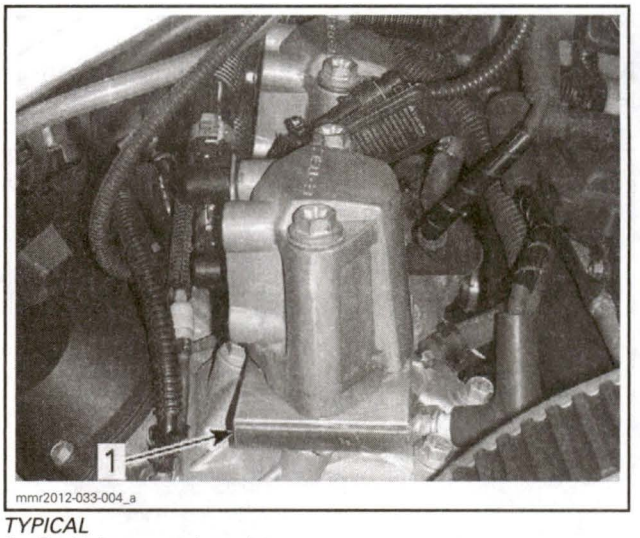

mmr2012-033-003

TYPICAL

NOTE: Do not install the thermal insulators against fuel injectors.

9. Secure each fuel injector to an INJECTOR RETAINER PLATE (P/N 529 036 137).


529036137



mmr2012-033-004_a

TYPICAL
1. Fuel injector retainer plate

NOTICE Ensure to position machined groove in the retainer plate on the fuel injector wiring side.

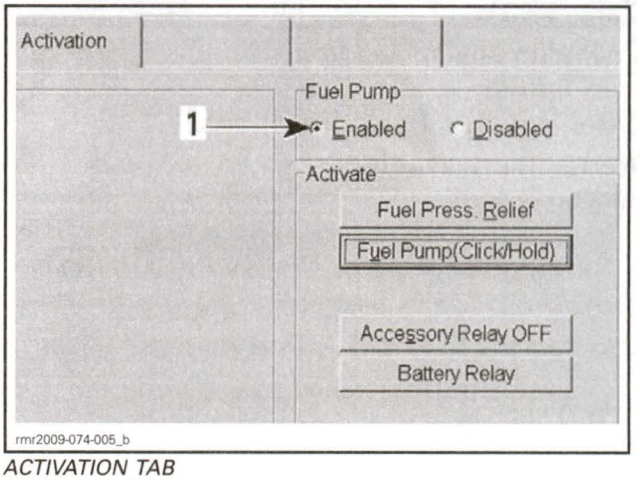
⚠ WARNING

Fuel injector must be secured during the leak test to avoid the fuel injector to be projected.

10. Place an appropriate container under the fuel injectors.
11. Ensure spark plug caps are installed on spark plugs.
12. Ensure there is enough fuel in fuel tank.
13. Connect vehicle to latest applicable B.U.D.S. version. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.

Leak Test

1. In B.U.D.S., select the **Activation** tab.
2. Ensure fuel pump is enabled.

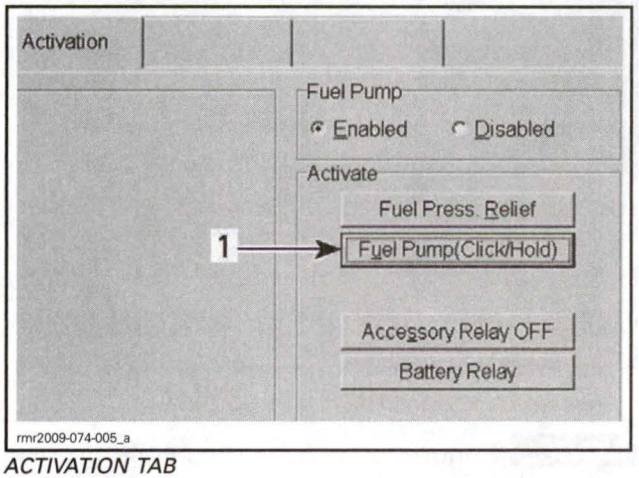


rmr2009-074-005_b

ACTIVATION TAB
1. Pump enabled

3. Click and hold the **Fuel Pump** button.

NOTE: Fuel pump will operate as long as button is held depressed in B.U.D.S.



ACTIVATION TAB
1. Click and hold

4. Check for fuel leakage from the fuel injector nozzle.
5. Monitor fuel pressure at fuel pressure gauge. If pressure drops below 275 kPa (40 PSI) during the test, re-activate fuel pump as necessary.

FUEL INJECTOR LEAKAGE	
TEST DURATION	SPECIFICATION
2 minutes	2 drops per minute maximum

6. If test is not within specification, replace the faulty fuel injector.
7. Properly reinstall fuel injectors. Refer to *FUEL INJECTOR INSTALLATION* in this subsection.
8. Reinstall remaining removed components.
9. Connect magneto connector.

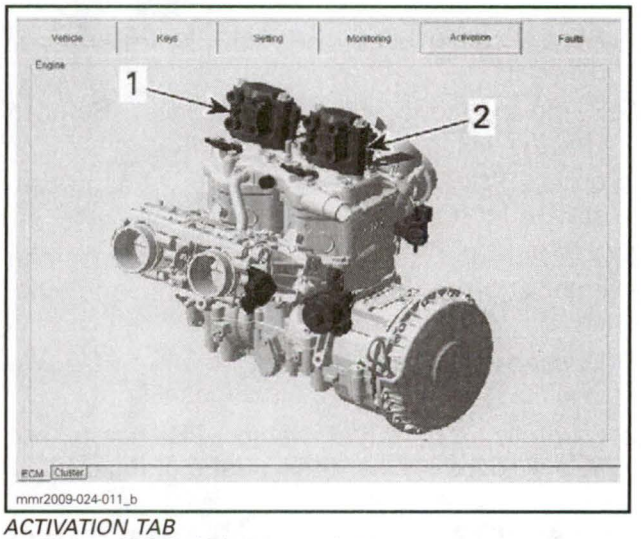
⚠ WARNING

Wipe up any spilled fuel.

Fuel Injector Functional Test

NOTE: This test is valid if one of the fuel injectors functions normally when activated.

1. Connect vehicle to latest applicable B.U.D.S. version. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Select the **ECM** and **Activation** tabs.
3. Activate the fuel injector by clicking on it in B.U.D.S.



ACTIVATION TAB
1. Click on PTO fuel injector to activate
2. Click on MAG fuel injector to activate

NOTE: The fuel injector action should be felt. If the fuel injector does not function, connect it to the opposite fuel injector connector, then test again.

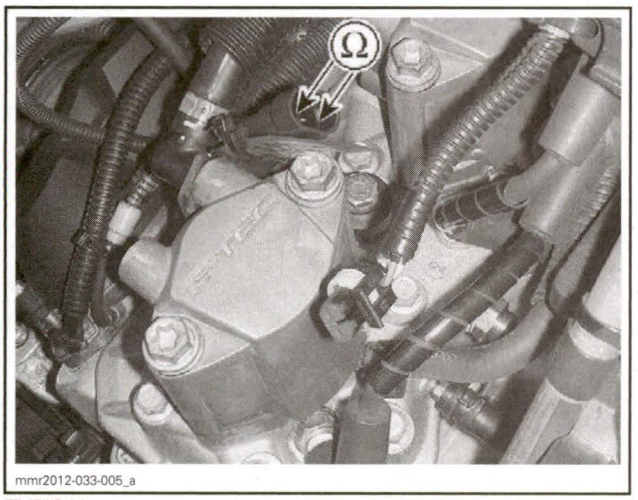
If the suspected fuel injector functions normally with the opposite fuel injector connector, carry out the *FUEL INJECTOR INPUT VOLTAGE TEST* in this subsection.

If the fuel injector still does not function, carry out the *FUEL INJECTOR RESISTANCE TEST.*

Fuel Injector Resistance Test

1. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
2. Disconnect the fuel injector connector.
3. Measure fuel injector resistance directly on its terminals.

FUEL INJECTOR		MEASUREMENT @ 22°C (72°F)
Pin 1	Pin 2	Below 2.7 Ω



TYPICAL

If measurement is out of specification, replace fuel injector.

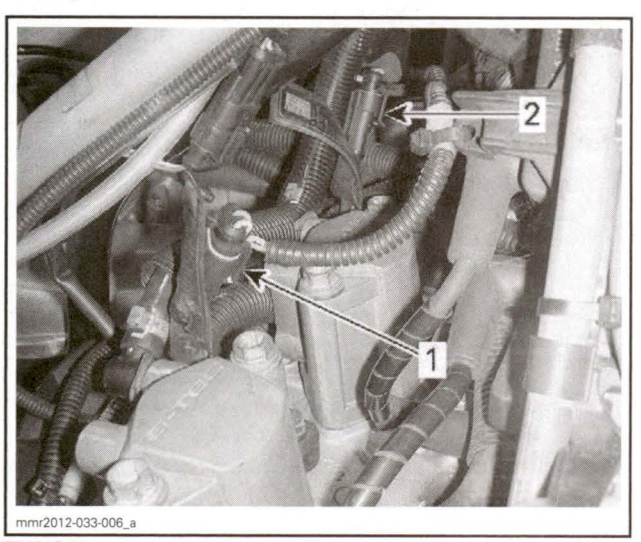
Fuel Injector Input Voltage Test

600 HO E-TEC Engine

1. Set emergency engine stop switch to RUN to enable ignition and injection.

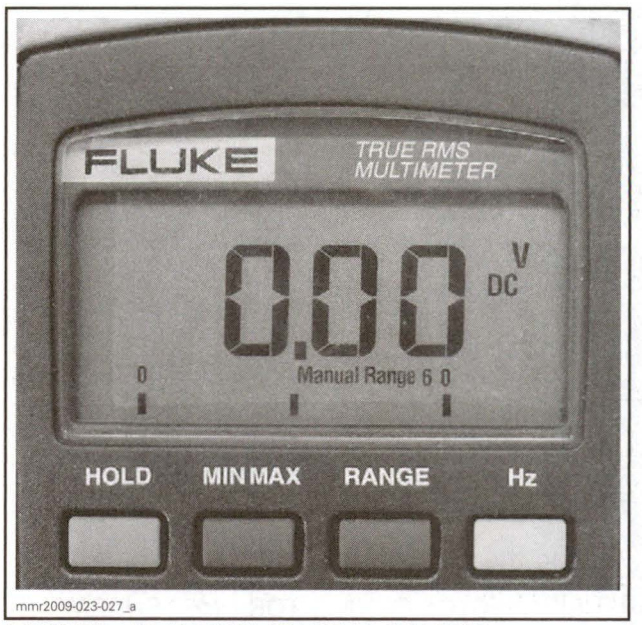
NOTE: Ensure magneto connector is properly connected.

2. Disconnect both electrical connectors from the fuel injectors.



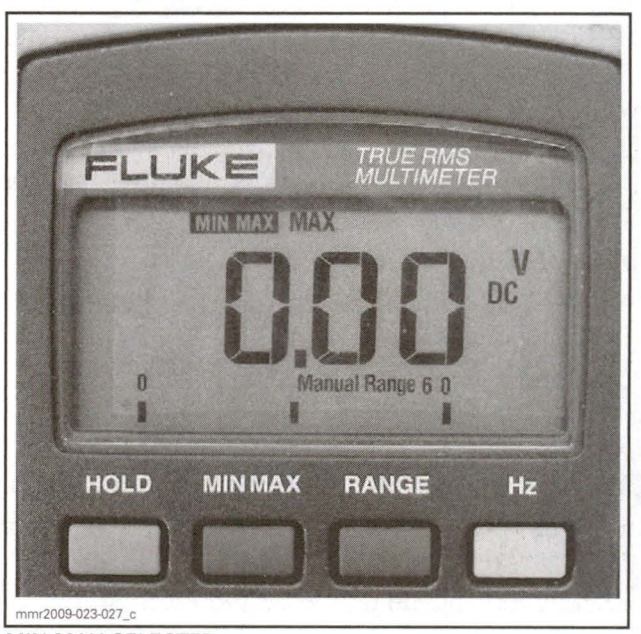
TYPICAL
1. PTO fuel Injector connector
2. MAG fuel injector connector

3. Use the FLUKE 115 MULTIMETER (P/N 529 035 868) and set it to **Vdc**.
4. Repeatedly press the **RANGE** button until the display shows Manual Range 6 0.



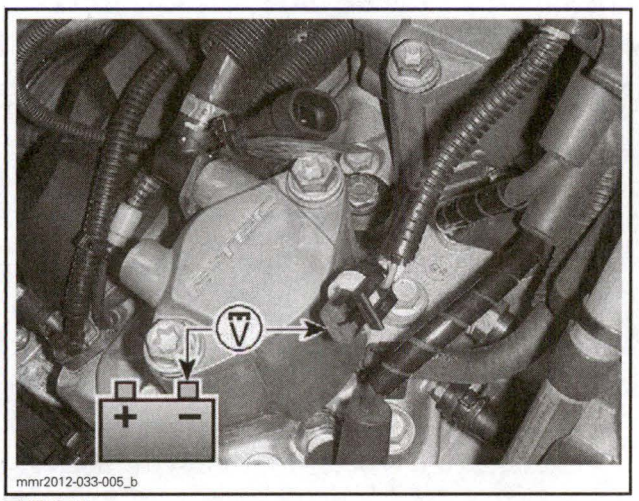
DC VOLTS AND MANUAL RANGE 6.0 SELECTED

5. Press the **MIN MAX** button so that the display shows MIN MAX.



MIN MAX SELECTED

6. Measure voltage while cranking engine.



mmr2012-033-005_b

TYPICAL

7. Read the MAX value.

FUEL INJECTOR CONNECTOR		MEASUREMENT
Pin 1	Battery ground	30 Vdc minimun

NOTE: Reset multimeter by pressing and holding **MIN MAX** button until meter beeps.

If voltage test is as per specification, carry out the *FUEL INJECTOR CONTROL CIRCUIT SIGNAL TEST.*

If voltage test is not as per specification, check wire continuity between ECM and fuel injector connector.

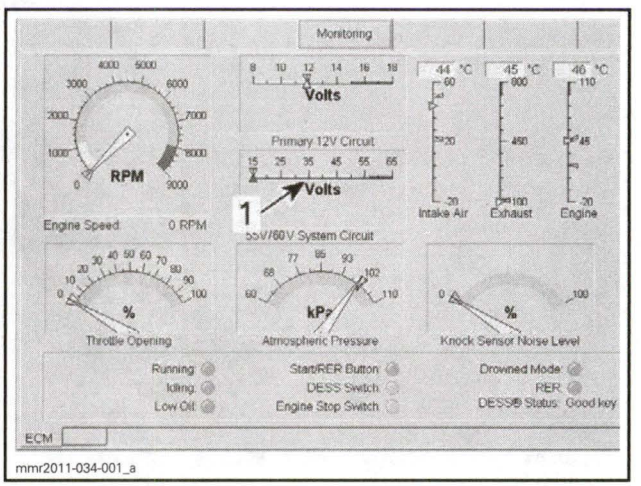
800R E-TEC Engine

NOTE: This test can also be used on the **600 HO E-TEC** engine.

1. Connect vehicle to latest applicable B.U.D.S. version. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.

In B.U.D.S., select **Monitoring** tab, then**ECM** tab.

2. Press and hold the START/RER button for a few seconds.
3. Read the voltage on the **55 V/60 V System Circuit** meter in B.U.D.S. as the engine is being cranked.



mmr2011-034-001_a

1. 55 V/60 V System circuit

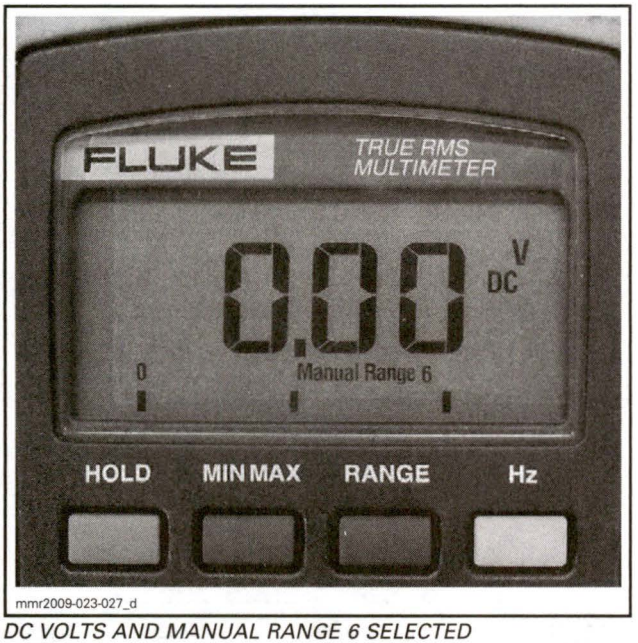
55 V/60 V SYSTEM CIRCUIT VALUE
30 Vdc minimun

If voltage test is as per specification, carry out the *FUEL INJECTOR CONTROL CIRCUIT SIGNAL TEST.*

If voltage test is not as per specification, check wire continuity between ECM and fuel injector connector.

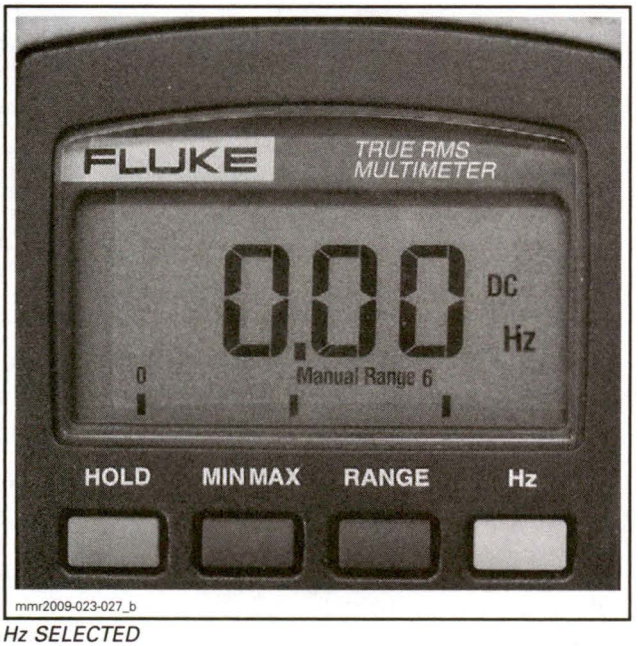
Fuel Injector Control Circuit Signal Test

1. Connect vehicle to the latest applicable B.U.D.S. version. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Use the FLUKE 115 MULTIMETER (P/N 529 035 868) and set it to **Vdc (Hz)**.
3. Repeatedly press the **RANGE** button until the display shows Manual Range 6.



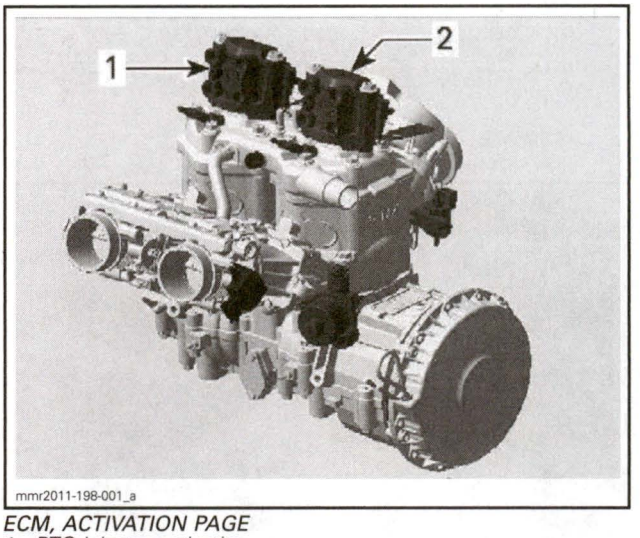
DC VOLTS AND MANUAL RANGE 6 SELECTED

4. Press the **Hz** button so that the display shows Hz.



Hz SELECTED

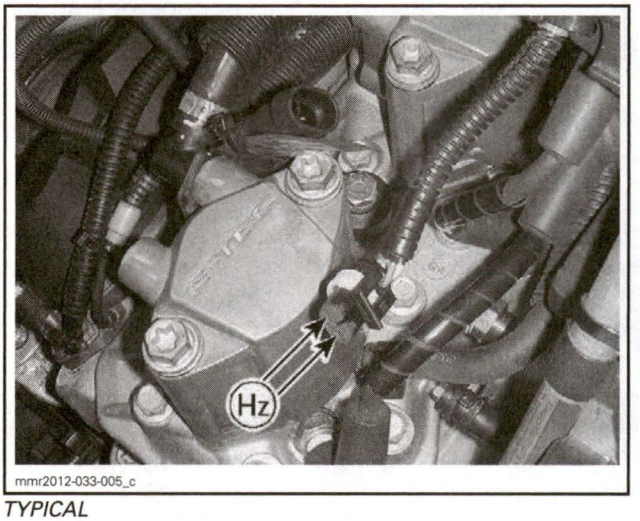
5. In B.U.D.S., select the **Activation** and **ECM** tabs.
6. Activate fuel injector and read the frequency on the multimeter.



ECM, ACTIVATION PAGE
1. *PTO injector activation*
2. *MAG injector activation*

NOTE: The multimeter counts the pulses per minute (Hertz) of current the ECM sends to the fuel injector.

FUEL INJECTOR CONNECTOR		MEASUREMENT
Pin 1	Pin 2	Approximately 2 Hz



TYPICAL

If there is no reading, check continuity of wiring between ECM and fuel injector connector.

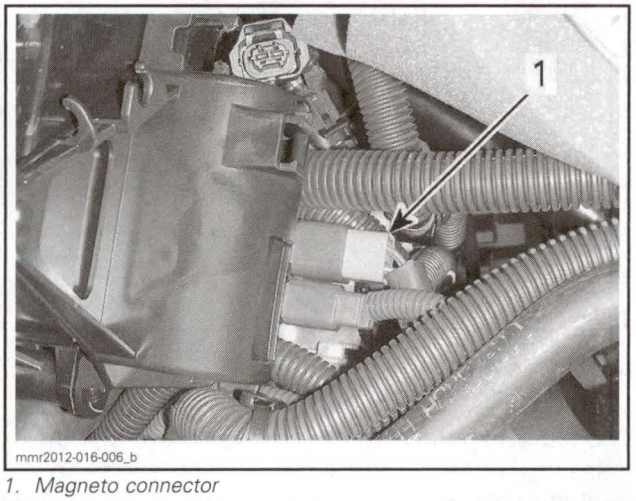
If reading is good, the control circuit is functional.

Fuel Injector Removal

IMPORTANT: NEW O-rings and crush ring must be installed if fuel injector is removed (fuel injector disassembly required). Otherwise, leakage or damage to fuel injector/cylinder head might occur.

1. Remove drive belt guard. Refer to *DRIVE BELT* subsection.

2. Remove primary and secondary air intake silencers. Refer to *AIR INTAKE SYSTEM* subsection.
3. Disconnect magneto connector.



1. Magneto connector

⚠ WARNING

The magneto connector must be disconnected to prevent any spark in the engine compartment should the engine be cranked. Fuel vapors may ignite in presence of a spark creating a fire hazard.

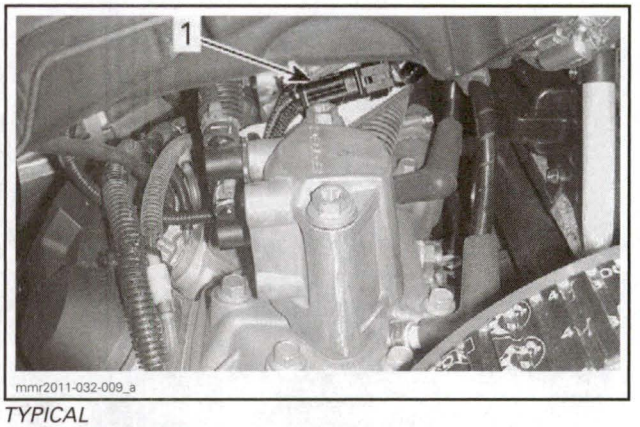
4. Clean fuel injector area.
5. Release the fuel pressure in the system. Refer to *FUEL TANK AND FUEL PUMP* subsection.

NOTICE **If fuel pressure is not released, the pressure will push the fuel injector out of its housing when removing the fuel injector. This could damage the fuel injector and lead to an important fuel spill.**

⚠ WARNING

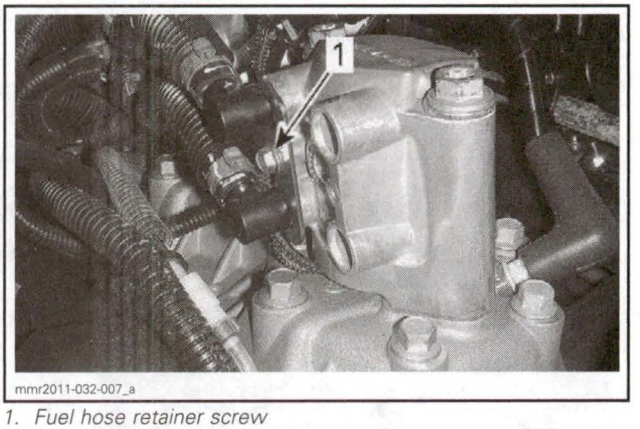
Fuel vapors in the engine compartment could be lit by a spark. This might create a fire.

6. Disconnect fuel injector connector.



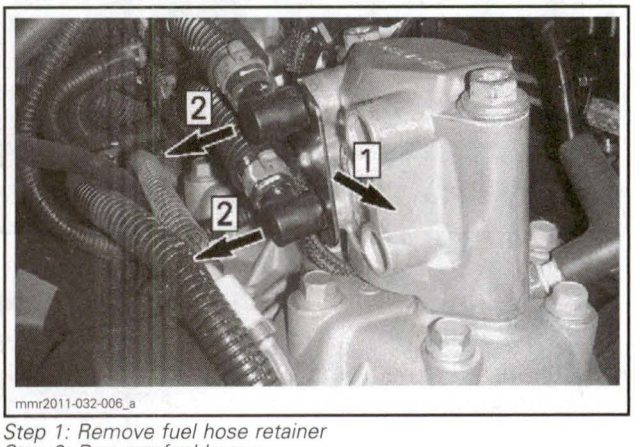
TYPICAL
1. Fuel injector connector

7. Install a rag under the hose ends to catch fuel spillage.
8. Remove fuel hose retainer screw.



1. Fuel hose retainer screw

9. Slide the fuel hose retainer out and disconnect fuel hoses from fuel injector.



Step 1: Remove fuel hose retainer
Step 2: Remove fuel hoses

⚠ WARNING

More fuel than usual will flow out of the fuel injectors. Work in a well ventilated area and wipe up spilled fuel.

10. Remove fuel injector screws.
11. Gently pull up on the fuel injector to remove it.

NOTE: If a fuel injector is to be reinstalled, mark it (MAG or PTO) to reinstall it in the same cylinder position.

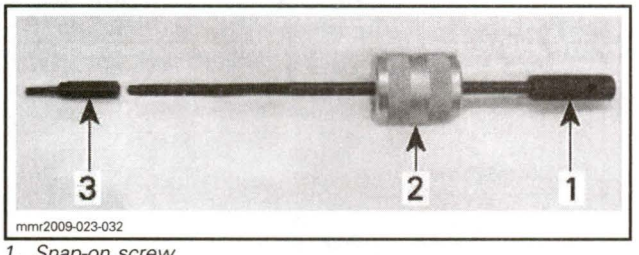
NOTICE **Use caution when handling fuel injector. Never hold injector by its electrical wires. Prevent dirt and debris from entering fuel inlet and outlet ports of fuel injectors or fuel hoses. Cover the fuel injector nozzle port in cylinder head to prevent contamination of combustion chamber.**

Fuel Injector Disassembly

To remove fuel injector from its housing, use a Snap-on slide hammer puller including:

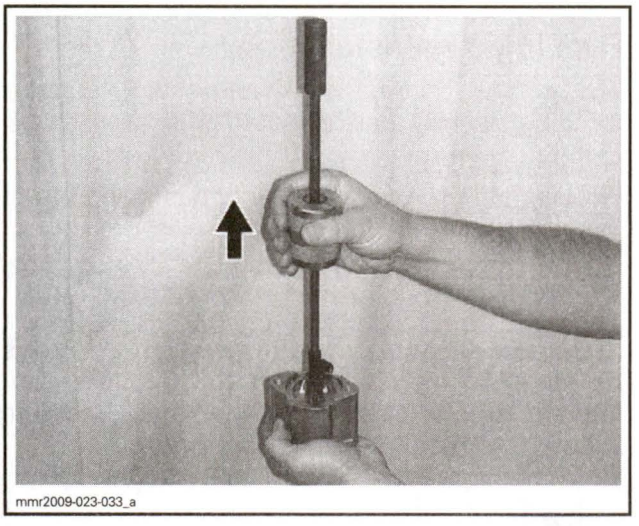
- SNAP-ON SCREW (P/N CJ93-1)
- SNAP-ON HAMMER (P/N CJ125-6).

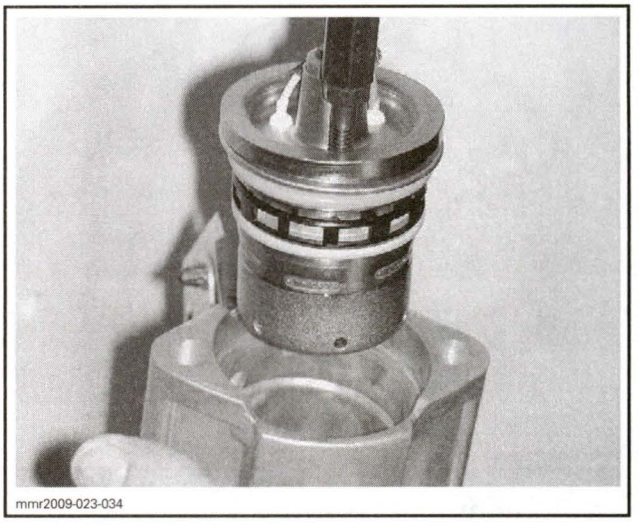
1. Install the EXTRACTOR ADAPTOR (P/N 529 036 136) on the Snap-on screw.



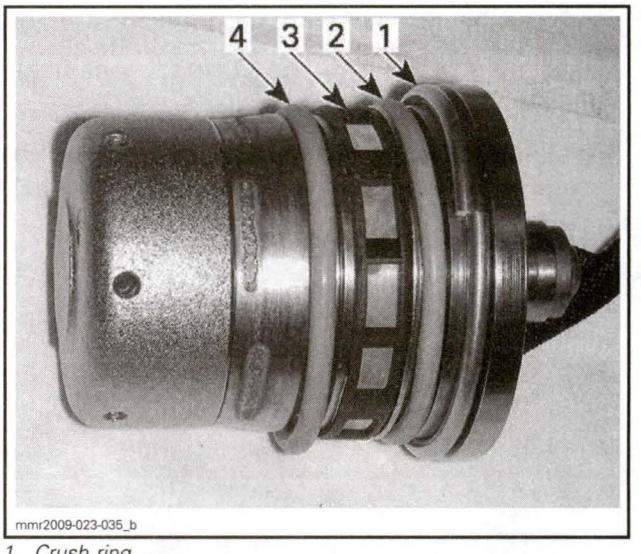
1. Snap-on screw
2. Snap-on hammer
3. Extractor adapter (P/N 529 036 136)

2. Thread the extractor adapter into the fuel injector.
3. Securely hold the fuel injector housing upside down to avoid dropping it.
4. Work slide hammer to pull the fuel injector out.



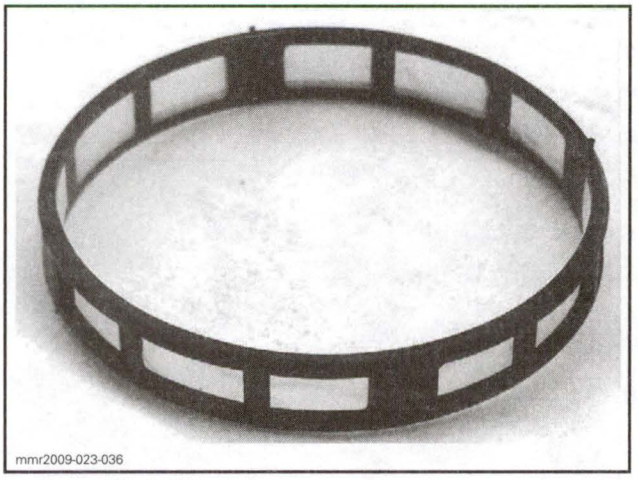


5. Remove the extractor adaptor from the fuel injector.
6. Remove O-rings, crush ring and filter from the fuel injector.



1. Crush ring
2. ORANGE O-ring
3. Filter
4. BLUE O-ring

7. Inspect and clean fuel injector filter.


mmr2009-023-036

Fuel Injector Assembly

The assembly procedure is the reverse of disassembly. However, pay attention to the following:

IMPORTANT: Apply injection oil on O-rings.

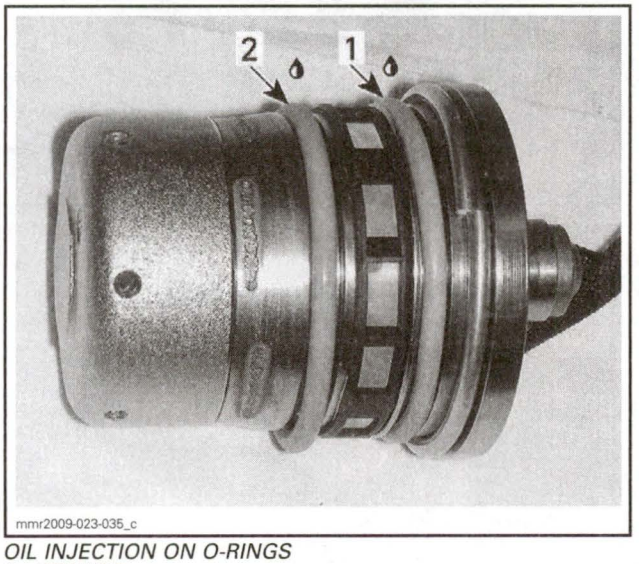
Install a new crush ring.

Install a new orange O-ring on top.

NOTICE **Always use the O-rings specifically designed for these fuel injectors.**

Install filter. Ensure filter is retained firmly on fuel injector. Otherwise, remove it, invert it half a turn, then reinstall. If it still not retained securely, install a new one.

Install a new blue O-ring at bottom.



mmr2009-023-035_c

OIL INJECTION ON O-RINGS
1. *ORANGE*
2. *BLUE*

Reinstall fuel injector in its housing.

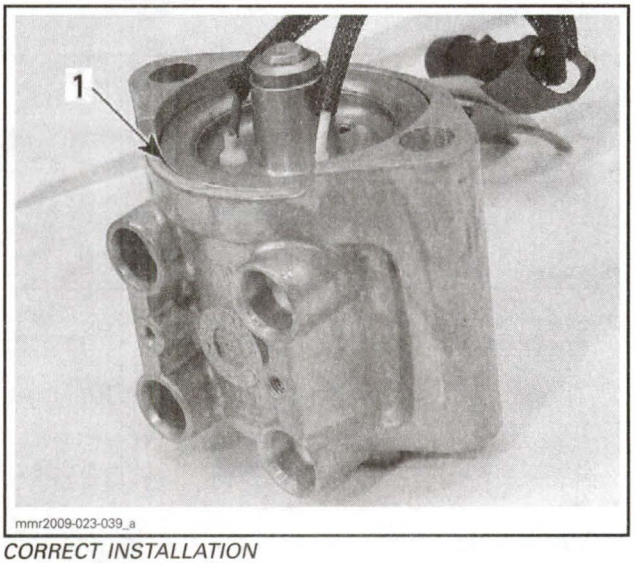
NOTE: Be sure to fully insert fuel injector in the housing with the wire outlets towards the fuel ports.

NOTICE Never press or tap the fuel injector tip.



mmr2009-023-038_a

WRONG INSTALLATION
1. *Fuel injector not fully inserted in its housing*



mmr2009-023-039_a

CORRECT INSTALLATION
1. *Fuel injector fully inserted in its housing*

Fuel Injector Installation

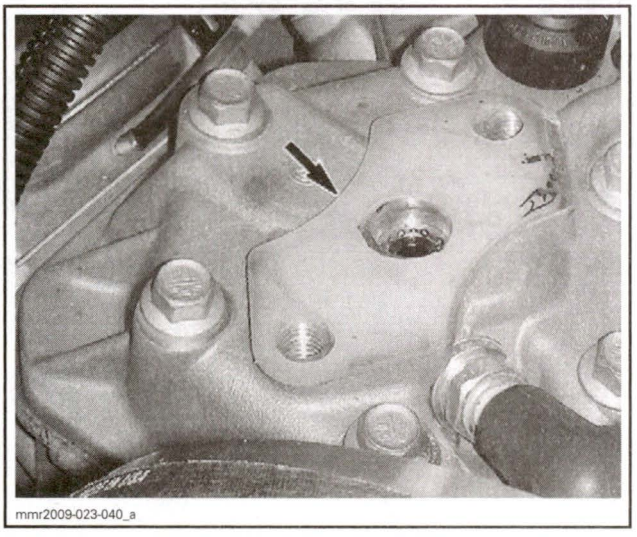
The following items and their mating surfaces must be cleaned and inspected prior to assembly:

- Fuel Injector
- Cylinder head: fuel injector housing and fuel injector tip contact surfaces
- Fuel injector screw threads and cylinder head threads (**must be dry**).

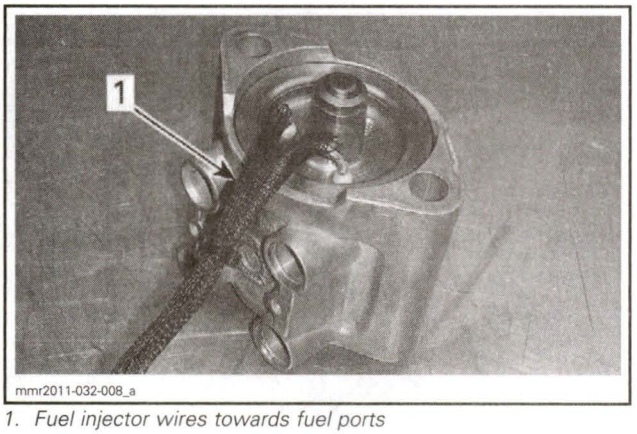
NOTICE **All fuel injector components must be clean to ensure correct torque tightening specifications and to avoid leakage. Carefully follow the installation instructions.**

NOTE: When installing a **used** fuel injector, re-install the fuel injector in the same location. If it was not marked at removal, verify the correct fuel injector-cylinder match using B.U.D.S. Refer to *FUEL INJECTOR POSITION VALIDATION*.

1. Position the thermal insulator on cylinder head.


mmr2009-023-040_a

2. Route the fuel injector wires towards the fuel ports.



mmr2011-032-008_a

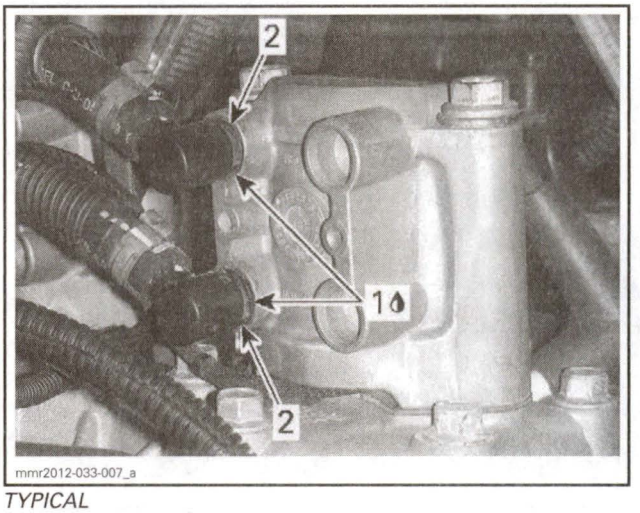
1. Fuel injector wires towards fuel ports

3. Place the fuel injector on the cylinder head, then thread in NEW screws with NEW washers.

NOTICE Torque fuel injector retaining screws prior to installing fuel hoses.

4. Tighten both injector retaining screws alternately in the following sequence:
   - 4.1 Hand tighten until the screw heads contact the fuel injector housing
   - 4.2 5 N•m (44 lbf•**in**)
   - 4.3 25 N•m (18 lbf•ft)
   - 4.4 60 N•m (44 lbf•ft).

5. Check condition of fuel hose O-rings and plastic flange on hose fittings.
6. Apply injection oil on O-rings.
7. Insert fuel hoses in fuel injector housing.

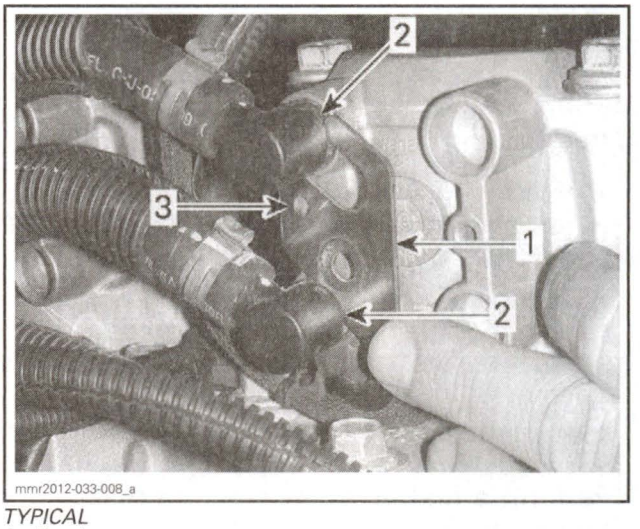


mmr2012-033-007_a

TYPICAL
1. Injection oil on O-rings
2. Hose fittings fully inserted here

NOTE: Both hose fittings must be fully seated in the fuel injector housing.

8. Insert the hose retainer so that it engages the groove in the fuel injector fittings.



mmr2012-033-008_a

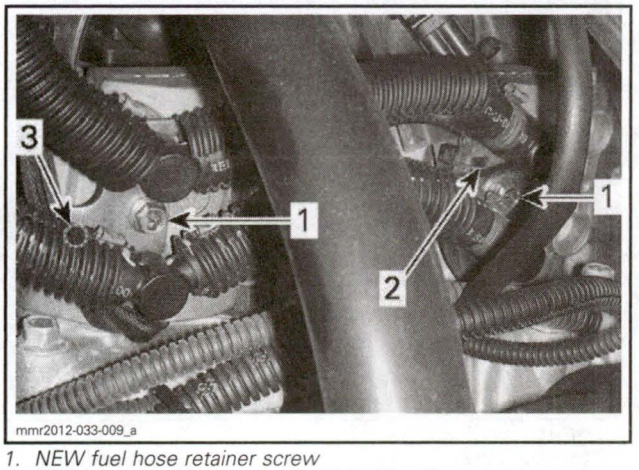
TYPICAL
1. Retainer
2. Retainer engagement in fuel injector fitting groove
3. Hole for securing injector wiring (up on PTO side)

NOTE: Ensure open end of retainer that locks in the fuel hoses faces inboard. The hole in the hose retainer used to secure the injector wiring must be on top for the PTO injector, and on the bottom for the MAG injector.

9. Install a NEW screw to secure hose retainer.

NOTICE The screw features a scotch grip threadlocker coating that is destroyed when loosening screw. Always replace screw with a new one each time it is loosened.

10. Torque fuel hose retainer screw to 5 N•m (44 lbf•**in**).



mmr2012-033-009_a

1. NEW fuel hose retainer screw
2. PTO injector wiring secured with locking tie
3. MAG injector wiring secured with locking tie (not visible)

11. Secure fuel injector wiring using a new locking tie.
12. Apply some DIELECTRIC GREASE (P/N 293 550 004) in fuel injector connector.
13. Reconnect fuel injector connector.

NOTICE Never fasten the electrical connector to the fuel injector. The connector must be "free floating".

14. If installing a **NEW** fuel injector, use B.U.D.S. to configure it in the ECM. Refer to *SETTING A FUEL INJECTOR TO A CYLINDER.*

NOTE: The engine will be able to run with an improperly matched fuel injector. However, the engine may misfire, run rough at idle, have poor fuel economy or run lean.

⚠ WARNING

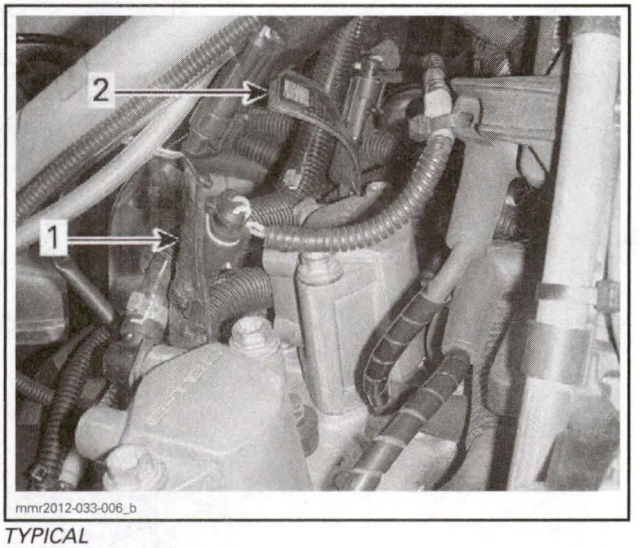
Perform a fuel pressure test and make sure there is no leak.

Fuel Injector Position Validation

When troubleshooting or reinstalling a fuel injector, the correct matching of the fuel injector and cylinder must be confirmed using B.U.D.S. An incorrect match between the fuel injector and cylinder may lead to engine misfiring, improper idling or poor fuel economy.

NOTE: To configure a new fuel injector at installation, refer to *SETTING A FUEL INJECTOR TO A CYLINDER.*

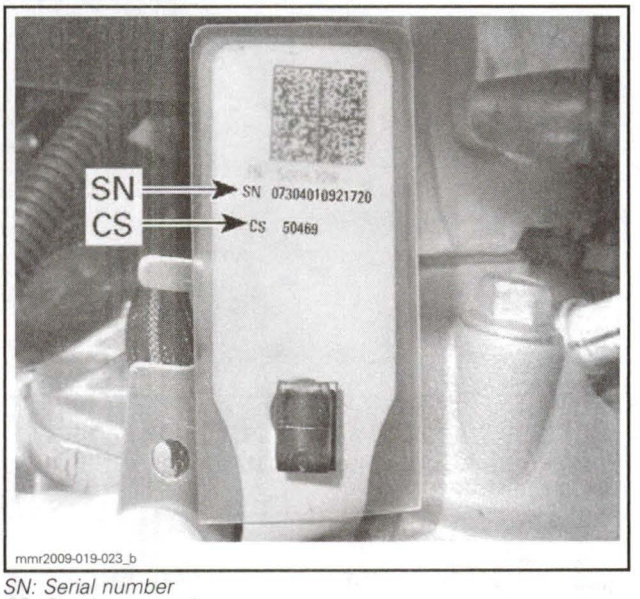
1. Look for the fuel injector identification tag.



mmr2012-033-006_b

TYPICAL
1. PTO fuel injector tag
2. MAG fuel injector tag

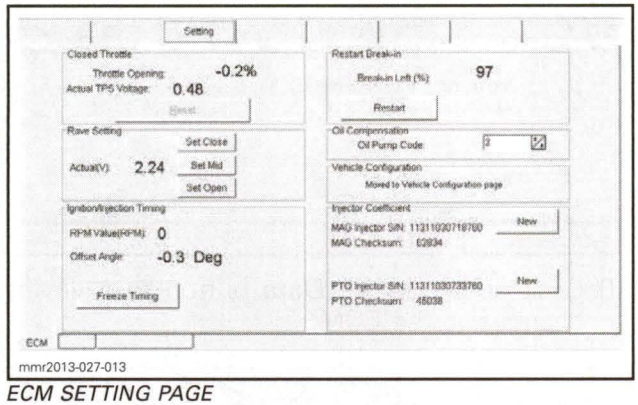
2. Note the fuel injector serial number (SN) on the tag of the fuel injector you wish to validate.



mmr2009-019-023_b

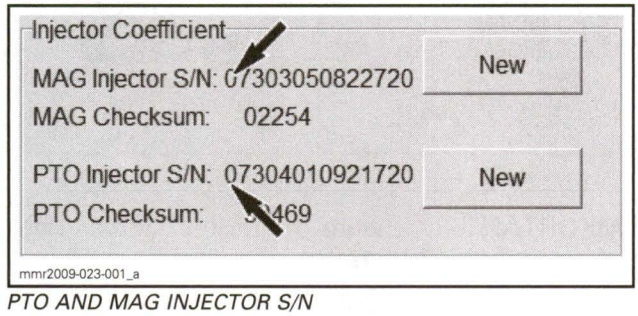
SN: Serial number
CS: Checksum number

3. In B.U.D.S., select **Setting** and **ECM** tabs.



ECM SETTING PAGE

4. In the **Injector Coefficient** box, look for the fuel injector serial numbers (S/N) that are registered in the ECM.



PTO AND MAG INJECTOR S/N

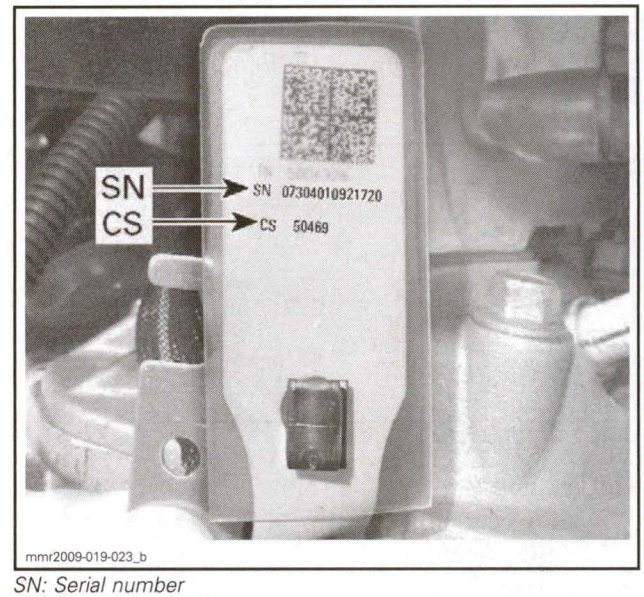
5. Compare the **MAG** or **PTO Injector S/N** that is configured in the ECM with the fuel injector SN installed on the engine.

NOTICE **The actual fuel injector number (SN) must match the number in B.U.D.S. (Injector S/N). If not, check if fuel injectors have been installed in the wrong position (or replaced).**

If numbers do not match, configure the fuel injector in B.U.D.S. Refer to *SETTING A FUEL INJECTOR TO A CYLINDER.*

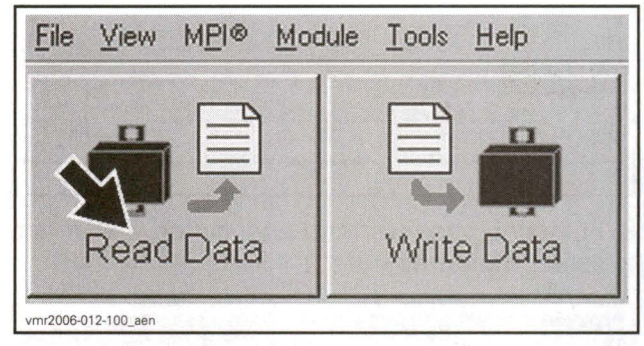
Setting a Fuel Injector to a Cylinder

1. Note the serial number (SN) and the checksum number (CS) on the fuel injector tag.

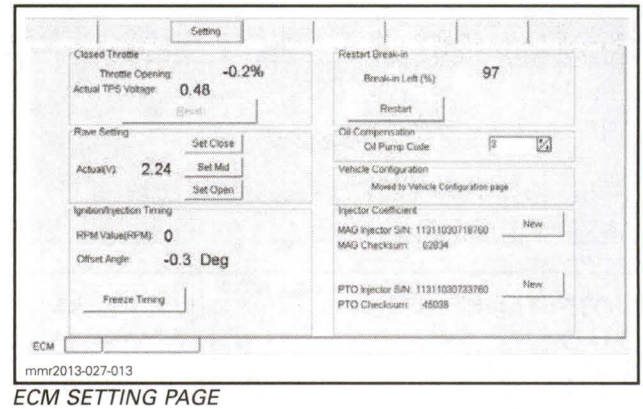


SN: Serial number
CS: Checksum number

2. Using BOSSWeb, download the matching calibration file.
3. Save the calibration file to your PC computer in the folder:
   C:\Program Files\BRP\BUDSCommon\InjectorCoefficients.
4. Start B.U.D.S. and click on the **Read Data** button.

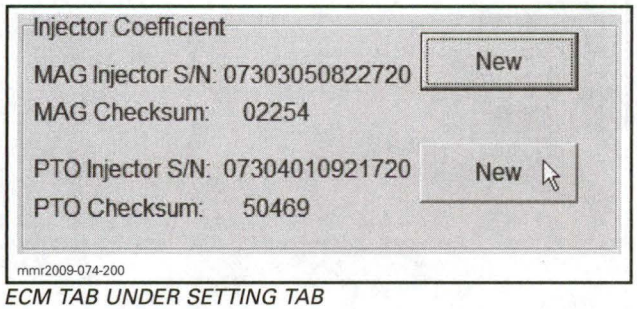


5. Select **Setting** and **ECM** tabs.



ECM SETTING PAGE

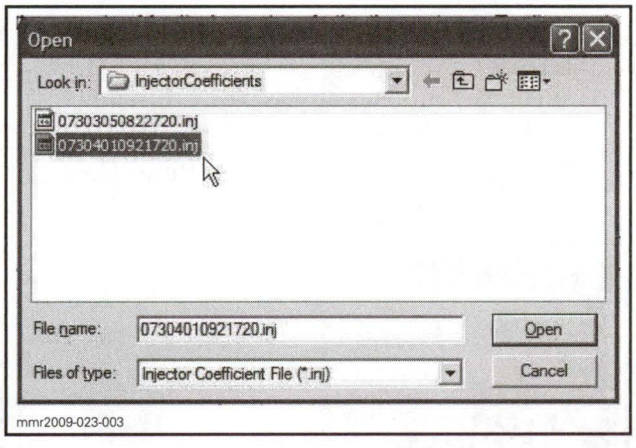
6. In the **Injector Coefficient** box, click on the **New** button of the fuel injector you want to replace (MAG or PTO).



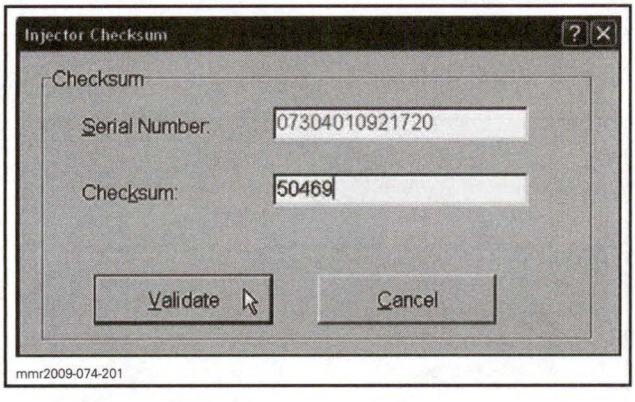
ECM TAB UNDER SETTING TAB

NOTE: Every time the **New** button is clicked, B.U.D.S. will automatically open the **Injector Coefficients** folder.

7. Select and open the fuel injector serial number file that matches the fuel injector installed on the engine.

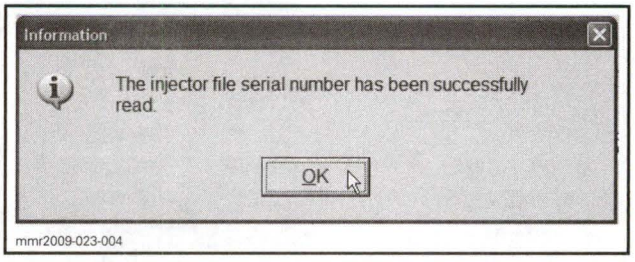


8. Enter the checksum number noted earlier and select **Validate**.

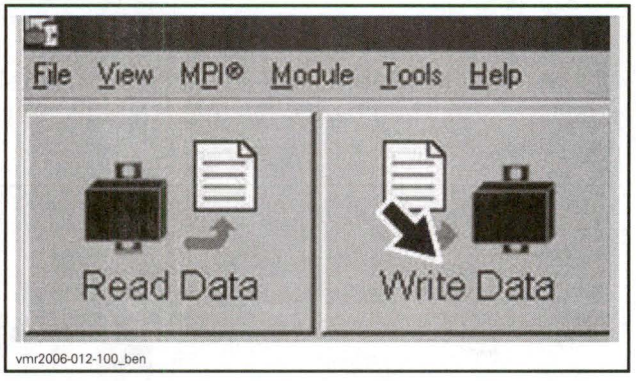


NOTE: The file will be quickly read and loaded in B.U.D.S.

9. Click the **OK** button when the confirmation box appears.

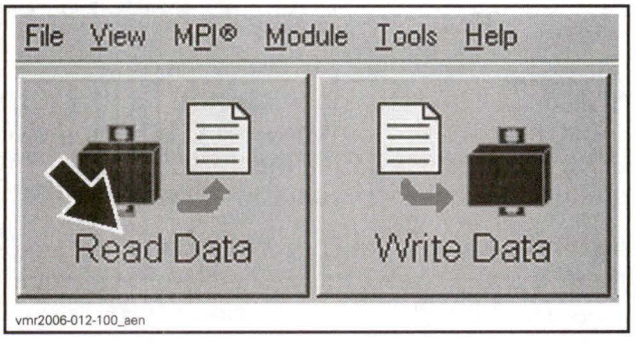


10. Click on the **Write Data** button to save the changes to the ECM.

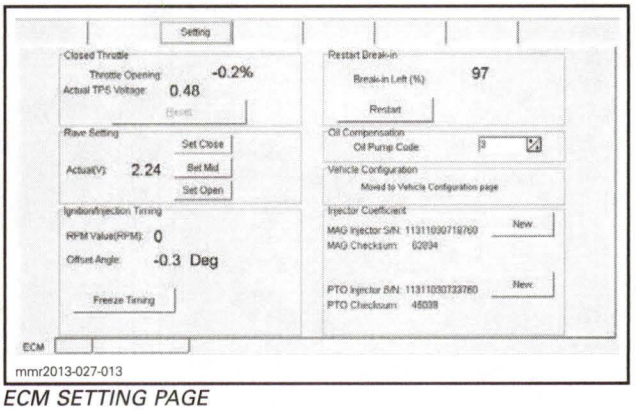


IMPORTANT: To ensure the proper file has been saved in the ECM, do the following:

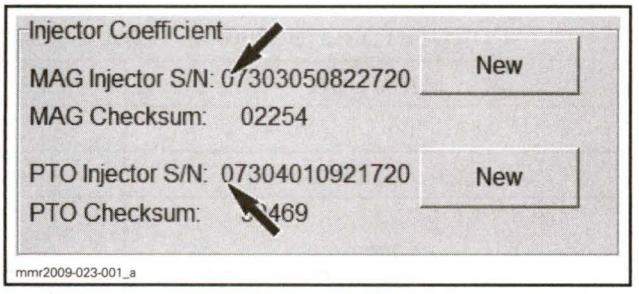
11. Click on the **Read Data** button again in B.U.D.S.



12. Look in the **Injector Coefficient** field in the ECM **Setting** page.



ECM SETTING PAGE



13. Ensure the S/N in B.U.D.S. matches the SN of the fuel injector installed on the engine and the PTO/MAG numbers are not inverted.
14. If there is a mismatch, reload the proper configuration file. Write data and read it again to recheck.

NOTE

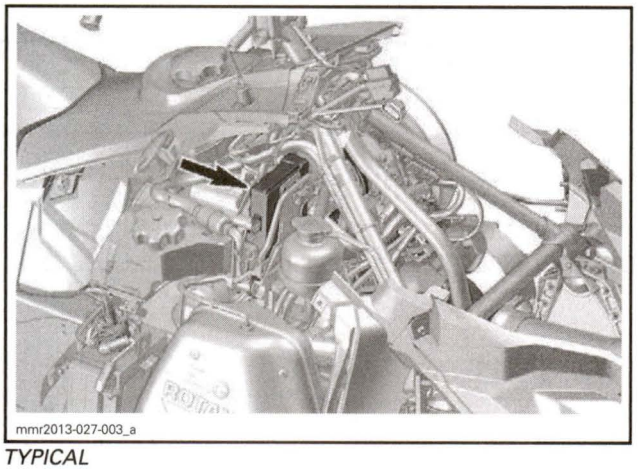
Every time an ECM is read or when an **.mpem** file is opened, the fuel injector calibration files (example: 07303050822720 and 07304010921720.inj) are automatically stored on your PC computer under a folder that will be common to all versions of B.U.D.S.:

C:\Program Files\BRP\BUDSCommon\ InjectorCoefficients.

If B.U.D.S. is uninstalled, the files won't be deleted.

If you ever replace an ECM from which you were not able to read the data, you could load its latest **.mpem** file, look at the fuel injector serial numbers stored in the ECM and then read the matching calibration files from the common files without the need to download the file from BOSSWeb.

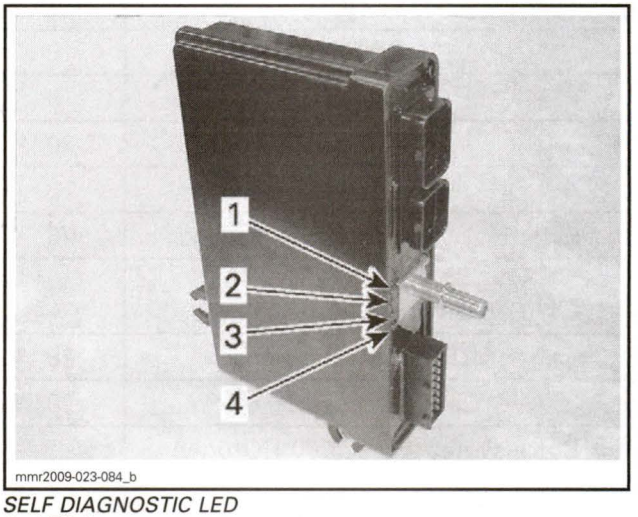
ECM (ENGINE CONTROL MODULE)



TYPICAL

NOTE: Prior to replacing an ECM, carry out all testing procedures.

ECM Self Diagnostic LEDs



SELF DIAGNOSTIC LED
1. LED 1
2. LED 2
3. LED 3
4. LED 4

LED ON	ENGINE STARTING	ENGINE RUNNING
1	Charging OK	Charging fault
2	CPS signal OK	Fuel injection or ignition fault
3	Sensors OK	Sensor fault
4	Emergency and engine cut-off switch OK	No oil or engine overheat

ECM Wire Identification

CONNECTOR J1A (ALL E-TEC)	
FUNCTION	PIN
TPS in	1
Oil injection pump feedback switch + (600 HO only)	4
D.E.S.S. ground	5
CPS +	6
CPS	7
Emergency engine stop switch	9
TPS/RAVE position sensor +	10
D.E.S.S. signal	11
EGTS signal	12
CAN LO	13
CAN HI	14
ECM 12Vpower	15

CONNECTOR J1A (ALL E-TEC)	
FUNCTION	PIN
RAVE signal feedback	18
CTS signal	19
ATS signal	20
D.E.S.S. switch	23
TPS/RAVE position sensor ground	26
ATS/CTS ground EGTS ground (**600 HO only**)	27
START/RER switch signal	28
Oil level sensor +	29
Brake switch signal (**600 HO only**) Not used (**800R only**)	30
Not used (**600 HO only**) Oil injection pump feedback switch + (**800R only**)	32
Knock sensor +	33
Knock sensor ground	34

CONNECTOR J1B (600 HO E-TEC)	
FUNCTION	PIN
PTO fuel injector control	1
MAG fuel injector control	8
Starter solenoid control	9
ECM 12V power from diagnostic connector	10
Ground (fuel injectors)	14
PTO ignition coil control	19
Ground (fuel injectors)	20
Ground (fuel injectors)	21
E-RAVE solenoid control	22
Oil injection pump control	23
MAG ignition coil control	26

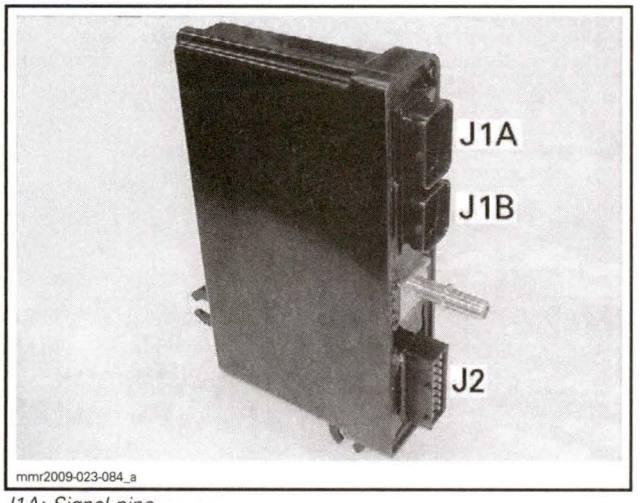
CONNECTOR J1B (800R E-TEC)	
FUNCTION	PIN
MAG fuel injector -	1
PTO fuel injector +	2
60V supply	3
60V supply	4
PTO fuel injector -	7

CONNECTOR J1B (800R E-TEC)	
FUNCTION	PIN
MAG fuel injector +	8
Starter solenoid control	9
ECM 12V power from diagnostic connector	10
Ground (fuel injectors)	14
PTO ignition coil control	19
Ground (fuel injectors)	20
Ground (fuel injectors)	21
E-RAVE solenoid control	22
Oil injection pump control	23
Brake switch signal	25
MAG ignition coil control	26

CONNECTOR J2 (ALL E-TEC)	
FUNCTION	PIN
Magneto winding	1
Magneto winding	2
Magneto winding	3
Fuel pump control	4
Ground	5
Secondary 12V supply (battery charging)	6
Ground	7
Ground	8
Magneto winding	9
Magneto winding	10
Magneto winding	11
Fuel pump flyback diode supply	12
55/60V power	13
Secondary 12V supply (battery charging)	14
Primary 12V supply	15
Primary 12V supply	16

ECM Connectors

ECM Connector Identification

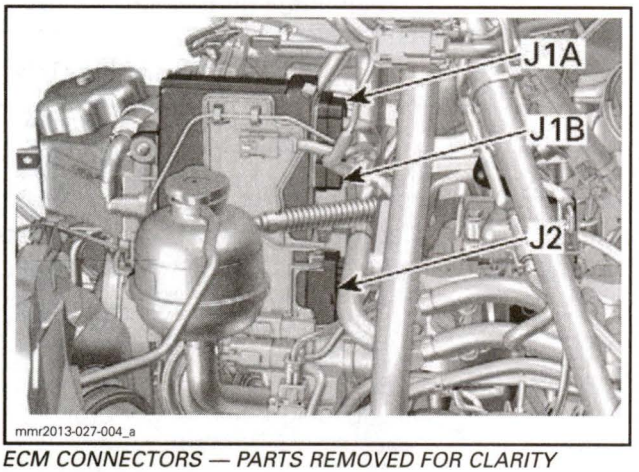


J1A: Signal pins
J1B: Signal pins
J2: Power terminals

ECM Connector Access

To access ECM connectors:

1. Open LH side panel.
2. Remove secondary air intake silencer. Refer to *AIR INTAKE SYSTEM*.
3. Unlock ECM support to move ECM as necessary.

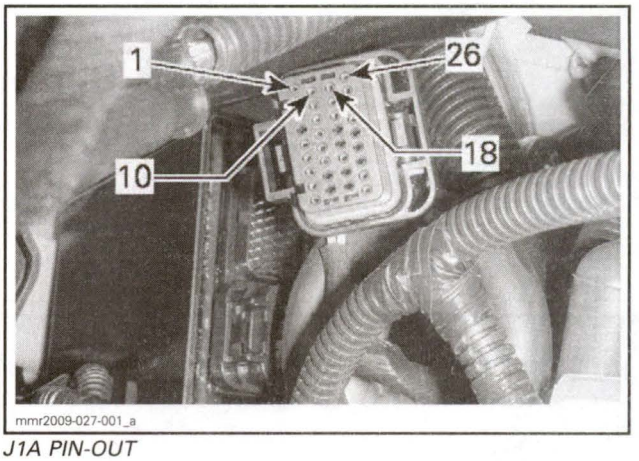


ECM CONNECTORS — PARTS REMOVED FOR CLARITY

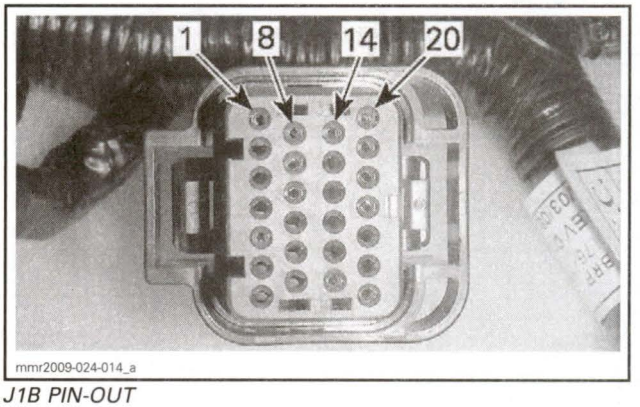
ECM Connector Removal

Refer to *CONNECTOR INFORMATION* subsection.

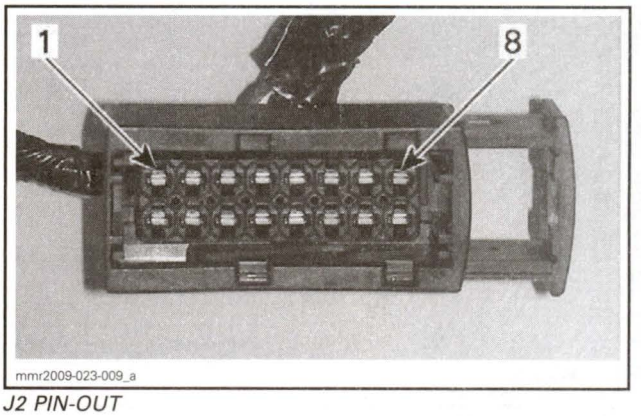
ECM Connector Pin-Outs



J1A PIN-OUT



J1B PIN-OUT



J2 PIN-OUT

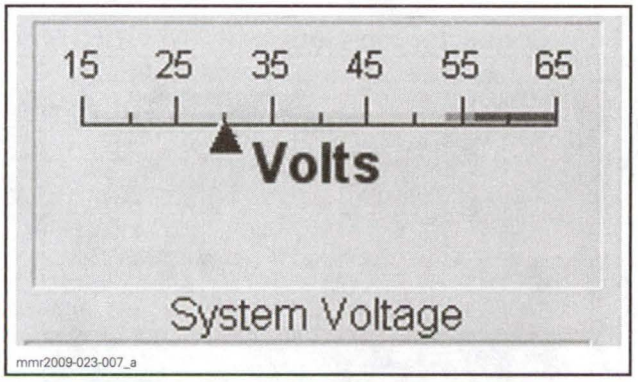
ECM Power Supply Troubleshooting

System Voltage Verification

Connect vehicle to latest applicable B.U.D.S. version. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.

In B.U.D.S., select **Monitoring** tab, then**ECM** tab.

Crank engine while viewing **System Voltage**.



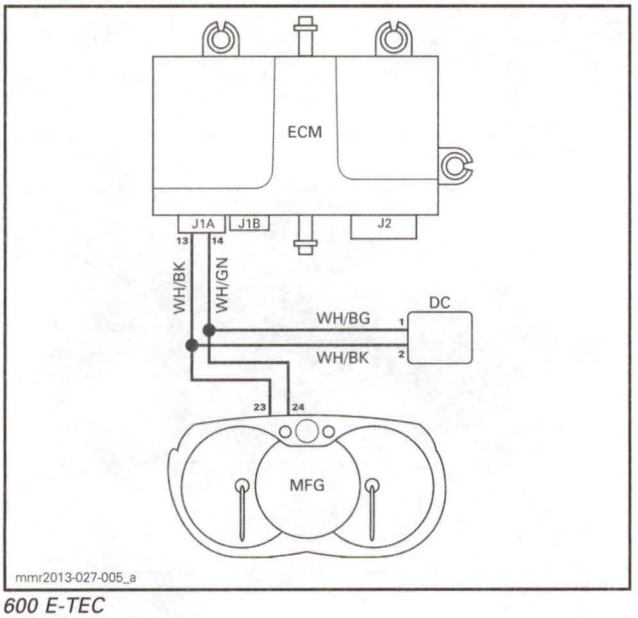
TEST CONDITION	VOLTAGE
Manual crank speed	30 Vdc min.

If voltage is as per specification, ECM is properly powered.

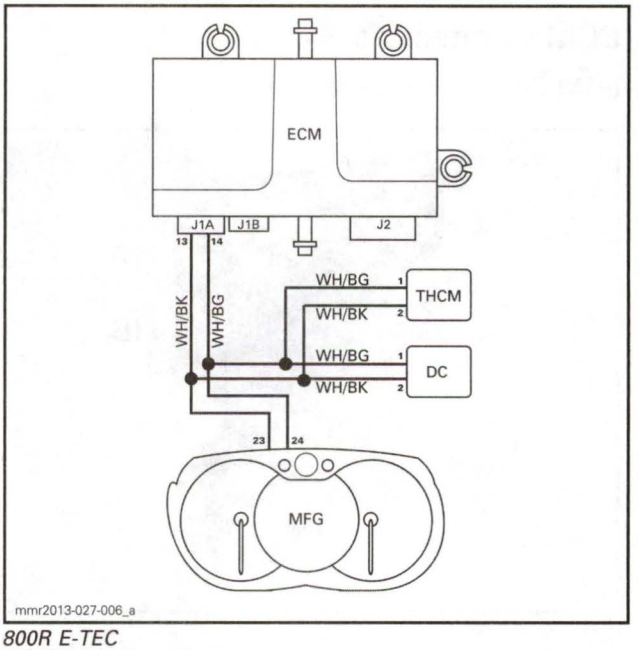
If voltage is out of specification, refer to *CHARGING SYSTEM*.

CAN Line Test

CAN lines link the ECM, multifunction gauge and vehicle diagnostic connector.



600 E-TEC
DC: Diagnostic connector
ECM: Electronic control module
MFG: Multifunction gauge



800R E-TEC
DC: Diagnostic connector
ECM: Electronic control module
MFG: Multifunction gauge
THCM: Thermocouple module

Test CAN wire continuity as follows.

1. Disconnect ECM connector J1A.
2. Disconnect multifunction gauge connector. Refer to *LIGHTS, GAUGE AND ACCESSORIES* subsection.
3. Using the FLUKE 115 MULTIMETER (P/N 529 035 868), read wire resistance as follows.

ECM ADAPTER	GAUGE CONNECTOR	MEASUREMENT
Pin 13	Pin 23	Close to 0 Ω
Pin 14	Pin 24	

If continuity is out of specification, repair or replace wiring harness between ECM and multifunction gauge.

If continuity is as per specification, carry out the following test.

4. Disconnect vehicle diagnostic connector from its protective cap.
5. Read wire resistance as follows.

DIAGNOSTIC CONNECTOR	GAUGE CONNECTOR	MEASUREMENT
Pin 2	Pin 23	Close to 0 Ω
Pin 1	Pin 24	

If continuity is out of specification, repair or replace wiring harness between diagnostic connector and multifunction gauge.

800R E-TEC Only

6. Disconnect THCM connector.
7. Read wire resistance as follows.

If continuity is as per specification, carry out the following test.

DIAGNOSTIC CONNECTOR	THERMOCOUPLE MODULE	MEASUREMENT
Pin 2	Pin 2	Close to 0 Ω
Pin 1	Pin 1	

All Models

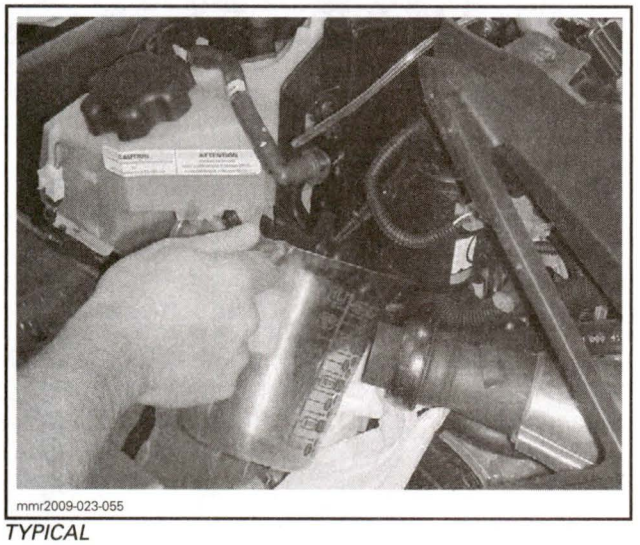
If continuity is as per specification, CAN lines are functional.

8. Reconnect connectors and reinstall removed parts.

ECM Removal

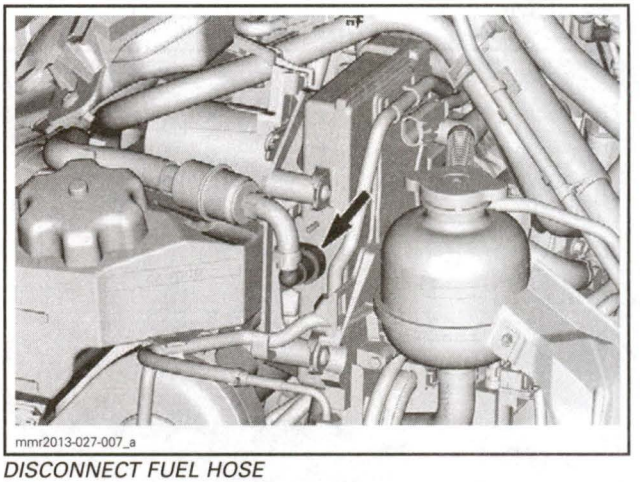
NOTE: If a new ECM is to be installed, read *ECM REPLACEMENT* in this subsection **before** removing the ECM.

1. Remove tether cord cap (D.E.S.S. key) from engine cut-off switch.
2. Set emergency engine stop switch to STOP.
3. Remove muffler. Refer to *EXHAUST SYSTEM* subsection.
4. Remove the acoustic panel.
5. Remove console. Refer to *BODY* subsection.
6. Install a rag under the ECM fuel hose quick connect to catch fuel spillage.
7. Place a container under the hose connector to recover fuel.


mmr2009-023-055

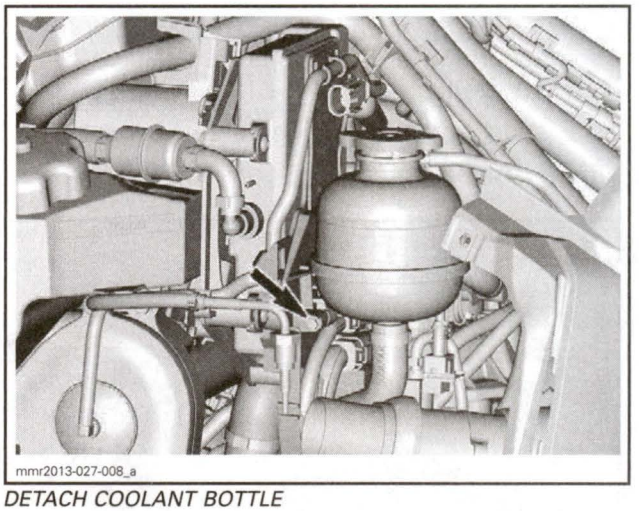
TYPICAL

8. Slowly disconnect fuel hose from ECM and drain fuel.


mmr2013-027-007_a

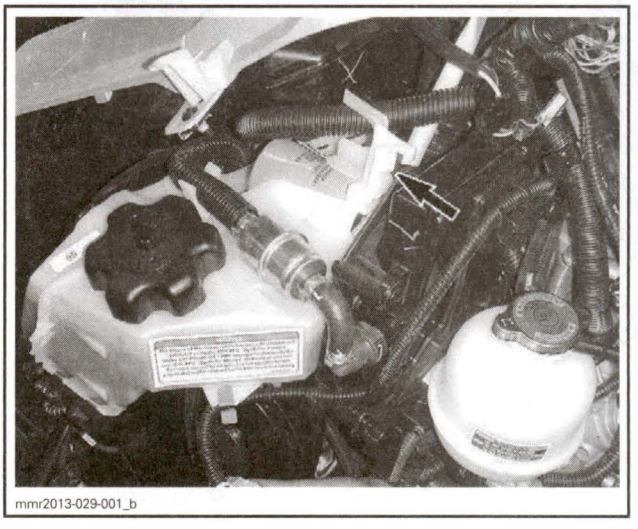
DISCONNECT FUEL HOSE

9. Detach coolant tank from its support.

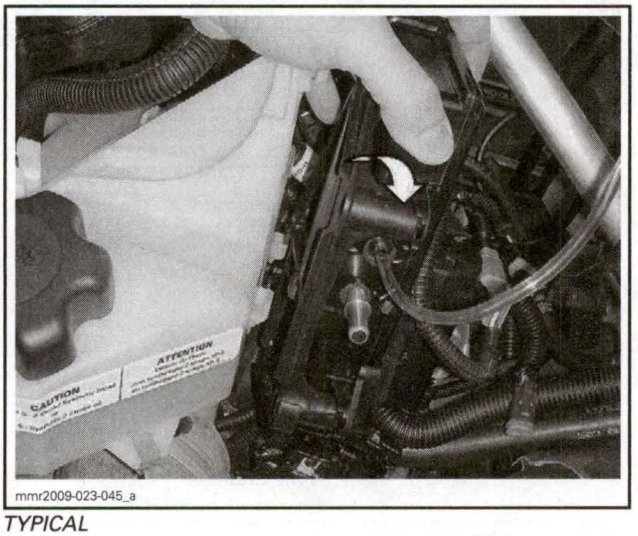

mmr2013-027-008_a

DETACH COOLANT BOTTLE

10. Unlock ECM support and slide toward right.


mmr2013-029-001_b

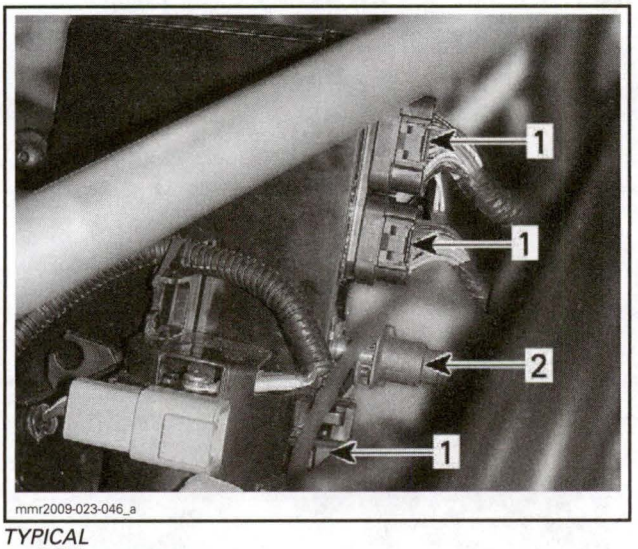
11. Slightly pull ECM out.
12. Tilt ECM in order to drain fuel remaining in ECM.



mmr2009-023-045_a

TYPICAL

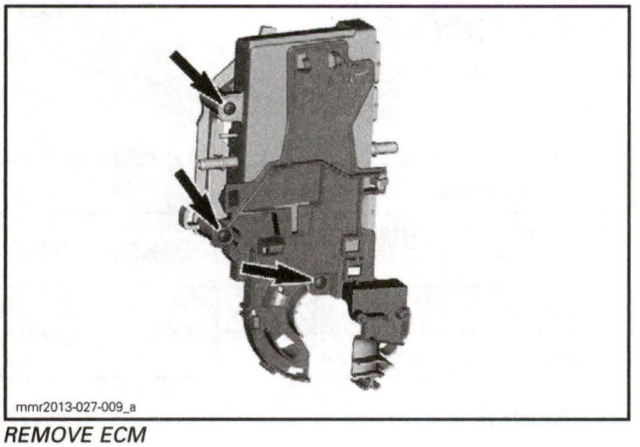
13. Disconnect APS tube (air pressure sensor) from the ECM.
14. Disconnect ECM connectors.
15. Disconnect remaining fuel hose from ECM.



mmr2009-023-046_a

TYPICAL
1. ECM connectors
2. Fuel hose

16. Remove ECM from its support.

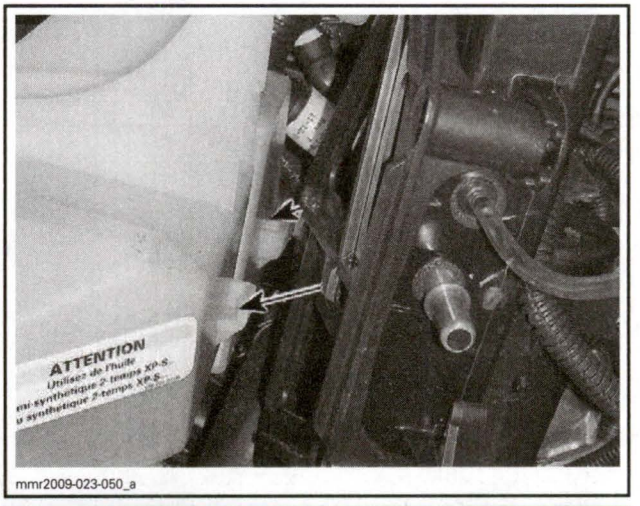

mmr2013-027-009_a

REMOVE ECM

ECM Installation

Reverse removal procedure however, pay attention to the following.

Ensure the ECM tabs are properly engaged on the oil injection reservoir.



mmr2009-023-050_a

⚠ WARNING

Wipe up all spilled fuel.

Set engine stop switch to RUN.

Install tether cord cap on engine cut-off switch.

Transfer or enter data in new ECM. Refer to *ECM REPLACEMENT* in this subsection.

ECM Replacement

When installing a new ECM, data must be transferred manually and several resets are required to be carried out in B.U.D.S. Refer to *ECM MANUAL DATA ENTRY*.

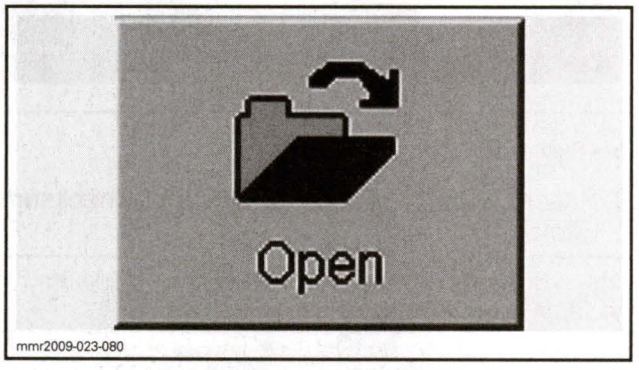
ECM Manual Data Entry

There are 2 possible methods to manually collect the required information. The 1st being the easiest.

- Use B.U.D.S. software and obtain the data from a saved .mpem file on your PC computer.
- Collect the information from the vehicle and obtain the fuel injector coefficient files from BOSSWeb.

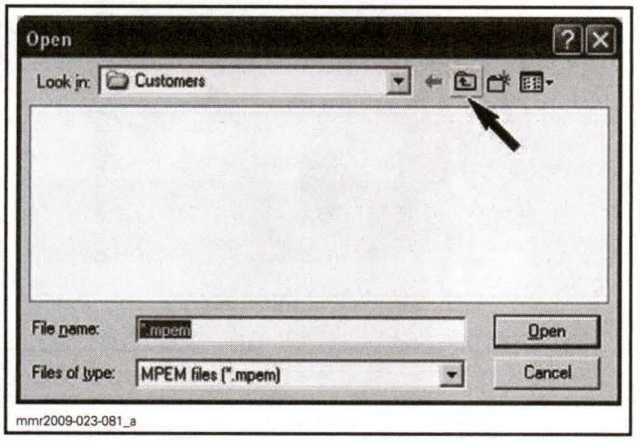
1st Collecting Method: Get the Data from a Saved .mpem File

1. Remove the faulty ECM, refer to *ECM REMOVAL* in this subsection.
2. Install and connect the new ECM, refer to *ECM INSTALLATION* in this subsection.
3. Connect vehicle to latest applicable B.U.D.S. version and log on. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
4. Click on the **Open** button.



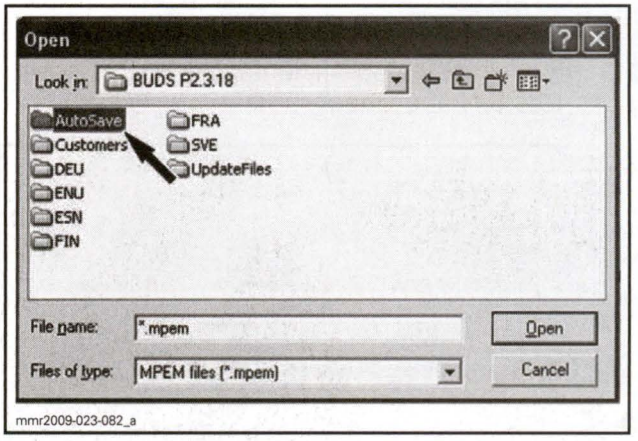
mmr2009-023-080

5. Click once on the **Folder Up** button in the **Open** box.



mmr2009-023-081_a

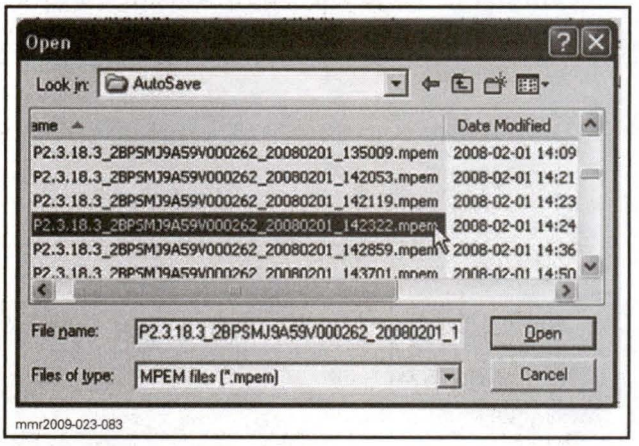
6. Double click on the **AutoSave** folder.



mmr2009-023-082_a

NOTE: You may have to go to another **AutoSave** folder from a previous version of B.U.D.S.

7. Choose the latest file saved for this specific vehicle.



mmr2009-023-083

IMPORTANT: Ensure to use the file that specifically matches the vehicle you are servicing.

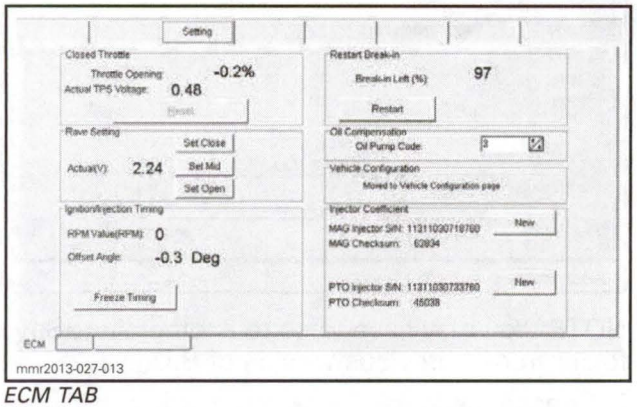
NOTE: The file name structure is as follows:
BUDS version_VIN_date read (yyyymmdd)_hour read (hhmmss).mpem
Example: P2.3.18.3_2BPSMJ9A59V000262_ 20080201_142322.mpem

8. In the **Vehicle** tab, record the following information;
   - Engine number (without the leading "M")
   - Customer name.

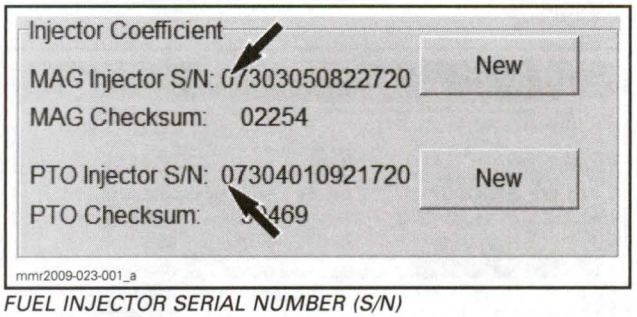
NOTE: It is not necessary to record the vehicle (VIN) and model numbers. They will be transferred later.

9. Select the **ECM** and **Setting** tabs and record the following information;
   - Ignition/Injection timing: Offset angle

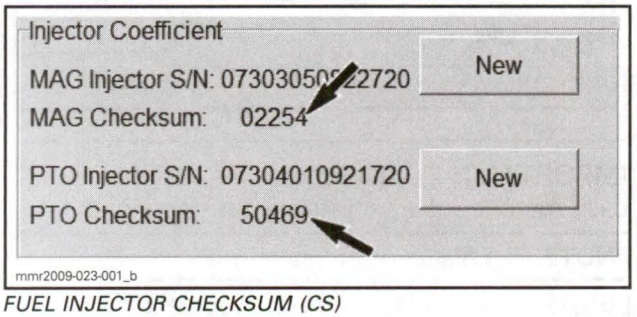
- Oil compensation: Oil pump code
- Fuel injector coefficients: MAG/PTO injectors S/N and Checksums.



ECM TAB



FUEL INJECTOR SERIAL NUMBER (S/N)

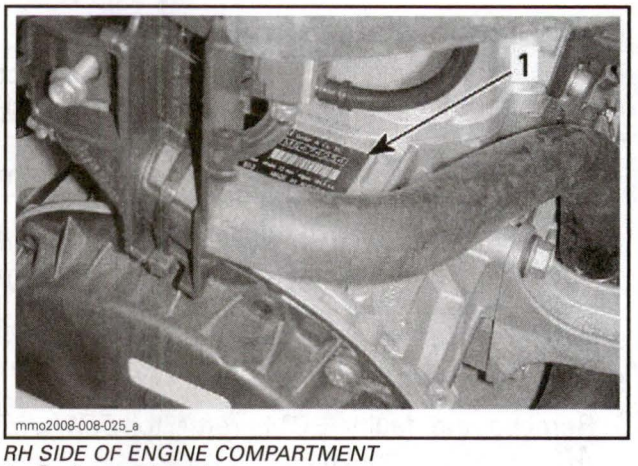


FUEL INJECTOR CHECKSUM (CS)

10. Enter data in ECM as detailed in *ENTERING THE COLLECTED INFORMATION INTO THE ECM.*

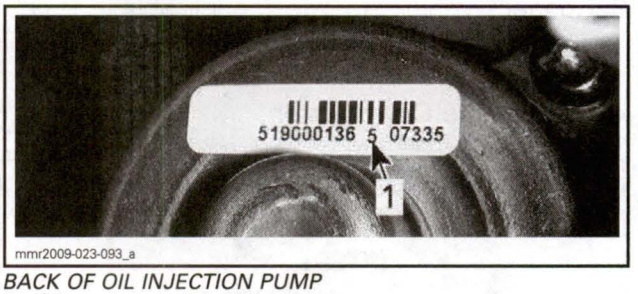
2nd Collecting Method: Collect the Information from the Vehicle

1. Record engine serial number.



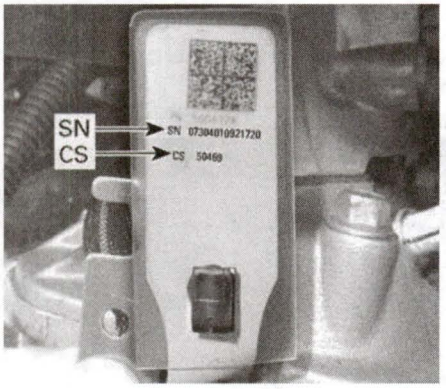
RH SIDE OF ENGINE COMPARTMENT
1. Engine serial number

2. Record oil injection pump code.



BACK OF OIL INJECTION PUMP
1. Oil pump code (0 to 9)

3. Record MAG/PTO injector S/N and Checksum numbers.

Record the serial number (SN) and the checksum (CS) on the fuel injector tag.
 SN: Serial number CS: Checksum number
Use BOSSWeb to get the matching calibration file.
Save the calibration file to your PC computer in the folder: C:\Program Files\BRP\BUDSCommon\InjectorCoefficients.

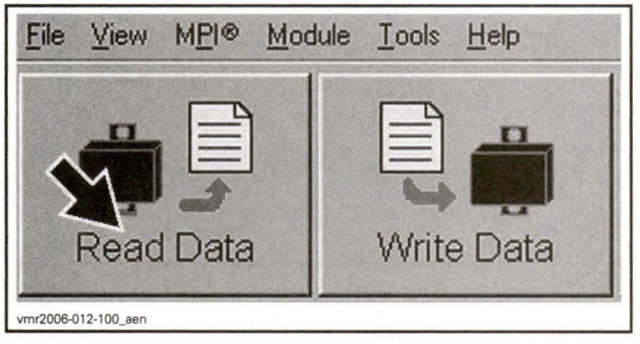
Enter data in ECM as detailed in *ENTERING THE COLLECTED INFORMATION INTO THE ECM.*

Entering the Collected Information Into the ECM

1. Ensure B.U.D.S. is properly connected to the vehicle and logged on.

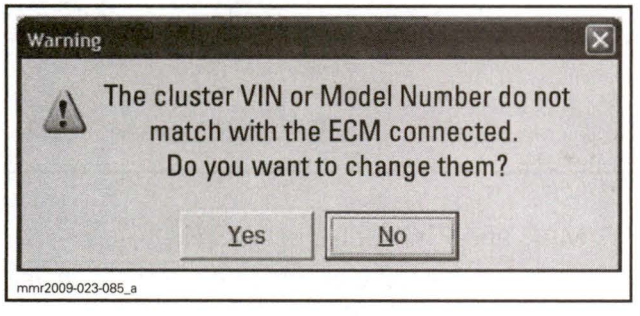
NOTE: The beeper will continuously sound a sequence of 11 beeps meaning that the D.E.S.S. key is not programmed. To stop the beeps, remove key.

2. In B.U.D.S., click the **Read Data** button to read the new "empty" ECM.



vmr2006-012-100_aen

Then, a message will appear saying that the cluster (multifunction gauge) does not recognize the ECM.

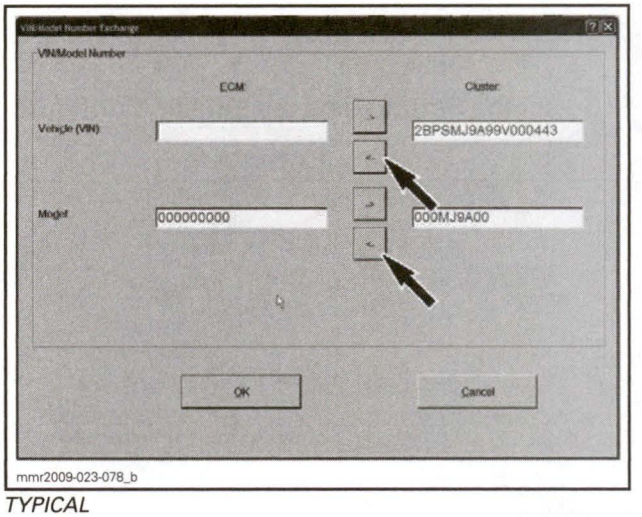


mmr2009-023-085_a

3. Click **Yes**.

NOTE: If the numbers are not matched, the gauge will stop operating within 10 seconds of engine operation. Only its D.E.S.S. LED will be turned ON.

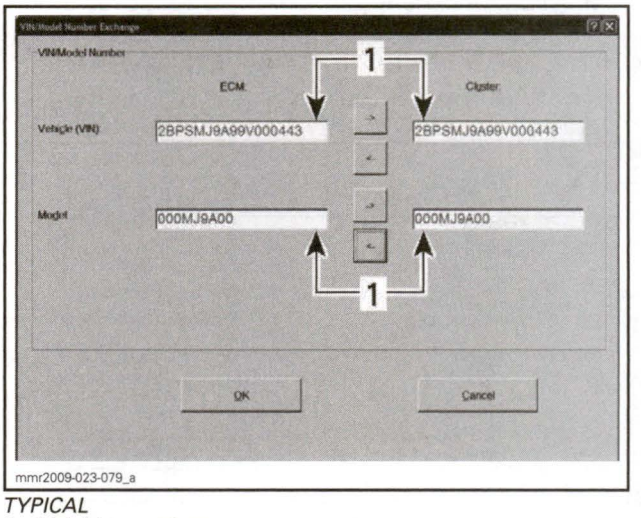
4. Click on the arrows to transfer the numbers from the **Cluster** column to the **ECM** column.



mmr2009-023-078_b

TYPICAL

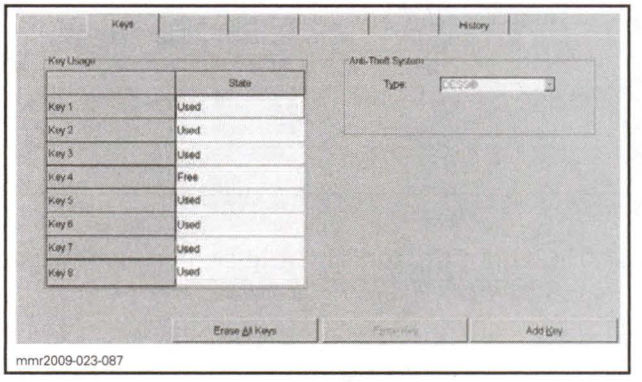
Ensure the **VIN** and **Model** numbers in the ECM and cluster are exactly matched.



mmr2009-023-079_a

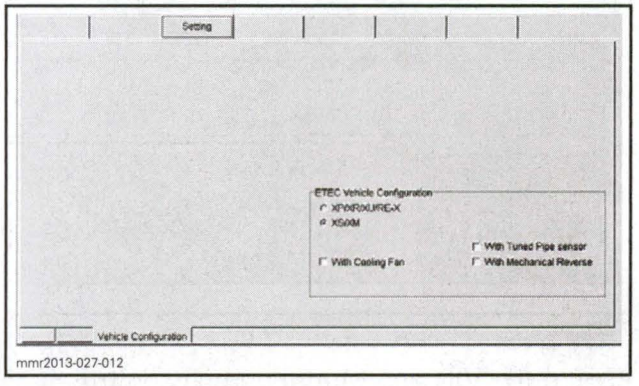
TYPICAL
1. Matching numbers

5. On the **Vehicle** page, enter the information you recorded previously:
   - Engine number (do not enter the leading "M")
   - Customer name.
6. In the **Keys** page, select **Erase All Keys**.

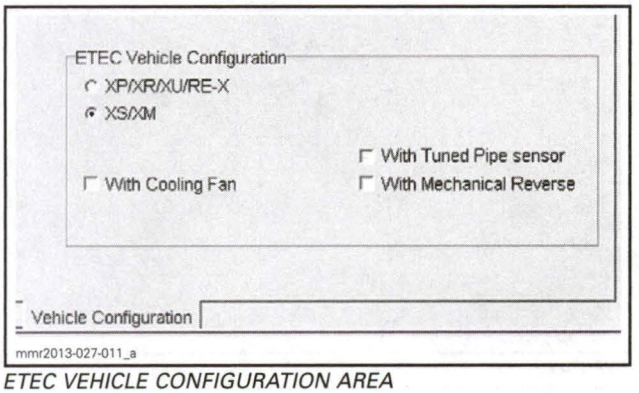


mmr2009-023-087

7. Program the desired key(s). Refer to *D.E.S.S. SYSTEM* subsection.
8. Select the **Setting** tab then **Vehicle Configuration**.

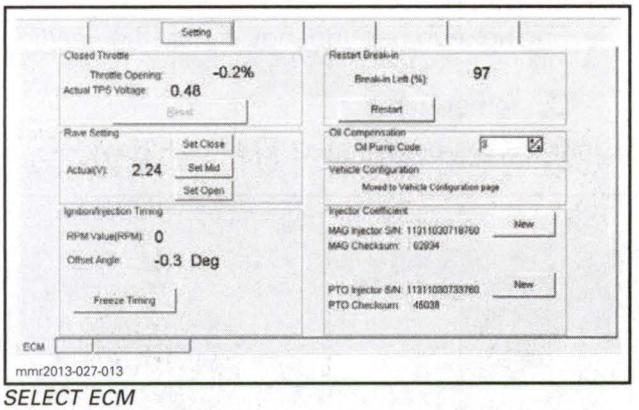


9. In the **Vehicle Configuration** page:
   9.1 Ensure the check boxes reflect the vehicle connected to B.U.D.S. in the **ETEC Vehicle Configuration** area. Otherwise, check the required boxes.



ETEC VEHICLE CONFIGURATION AREA

10. Select the **Setting** tab then **ECM**.

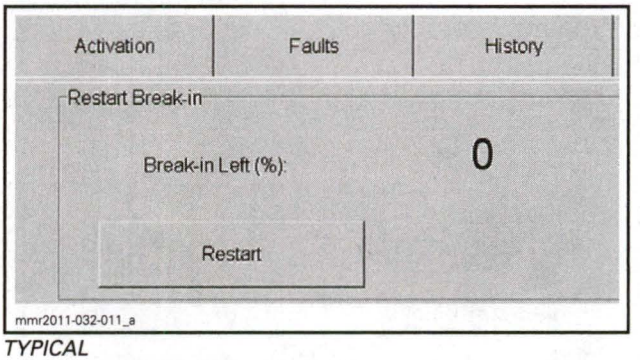


SELECT ECM

11. Reset the **Closed Throttle** setting as detailed in *CLOSED THROTTLE RESET (TPS)*.

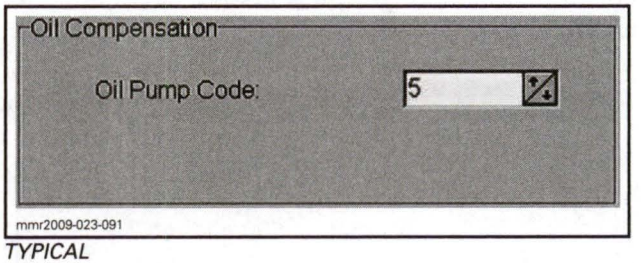
NOTICE **The Closed Throttle Reset must be carried out as described in the specific procedure or engine damage may occur.**

12. Carry the **3D Rave Valves Position Sensor Setting**. Refer to *RAVE (600 HO E-TEC AND 800R E-TEC)* subsection.
13. Set the **Ignition/Injection Timing**. Refer to *IGNITION SYSTEM* subsection.
14. **Restart Break-In**. Click **Restart** button if the actual engine hours are less than 5 hours.



TYPICAL

15. **Oil Compensation**. Enter the previously recorded **Oil Pump Code**.



TYPICAL

16. MAG and PTO fuel injector S/N.
   16.1 If the data was obtained from a saved .mpem file, refer to table A.
   16.2 If the fuel injector calibration file was obtained from BOSSWeb, refer to table B.

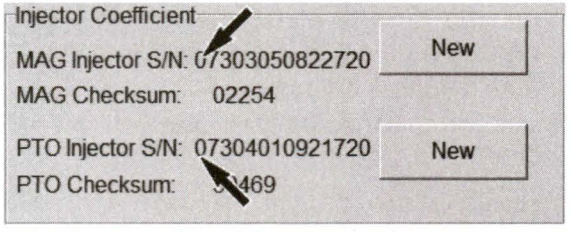
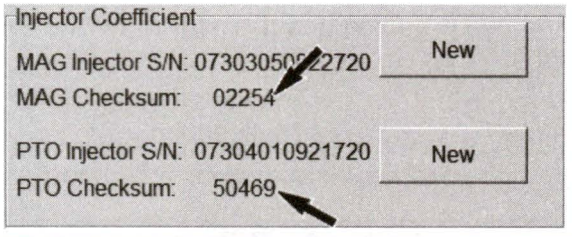
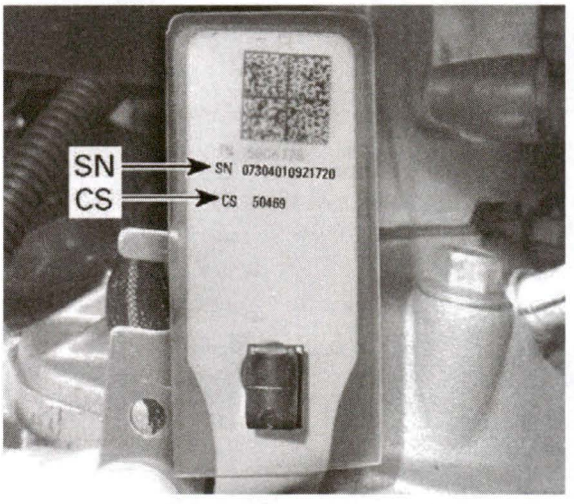
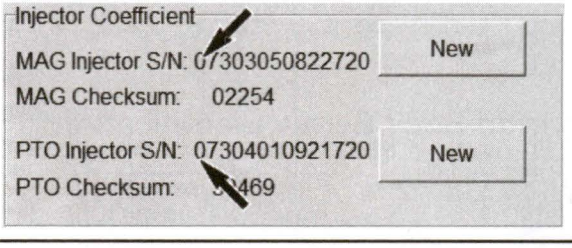
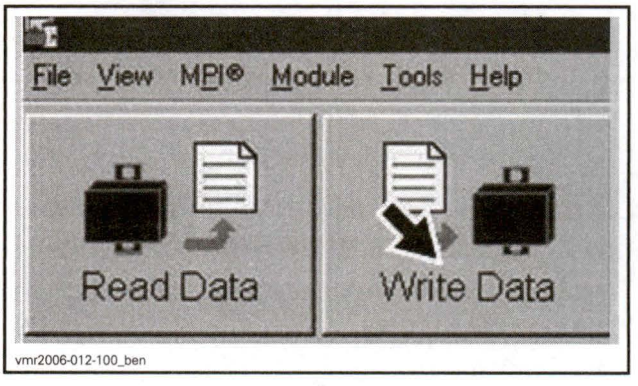
TABLE A (DATA FROM A SAVED .MPEM FILE)
Click on the **New** button and open the file that matches the previously recorded serial number.

Ensure the PTO and MAG side injector S/N correctly match those on the engine.
Once the file has been read, ensure the checksum number (CS) displayed in B.U.D.S. matches the CS previously recorded.

If the numbers do not match, the wrong file was read. Repeat the procedure to record the correct file.

TABLE B (CALIBRATION FILE FROM BOSSWEB)
Click on the **New** button and open the file that you previously saved on your PC computer in the folder: **C:\Program Files\BRP\BUDSCommon\InjectorCoefficient**
Ensure to correctly match the PTO and MAG side injector serial numbers.
Once the file has been read, ensure the fuel injector tag SN and CS matches those shown in B.U.D.S.
 SN: Serial Number CS: Checksum number

If the numbers do not match, the wrong file was read. Repeat the procedure to record the correct file.

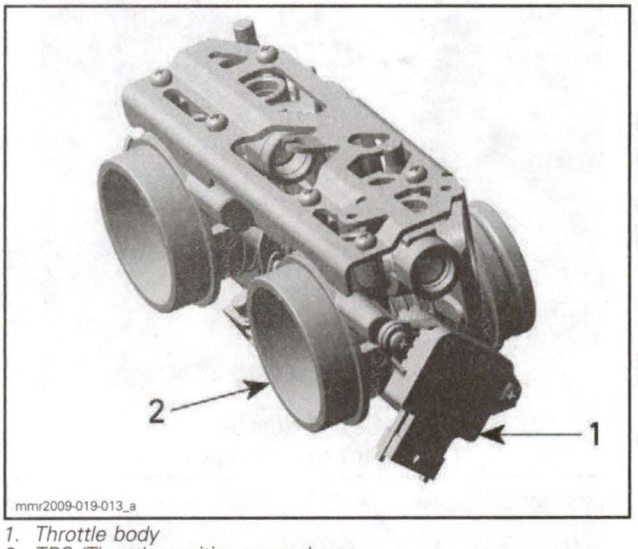
17. Click on the **Write Data** button to save the data to the ECM.



18. Lift rear of vehicle and safely support.

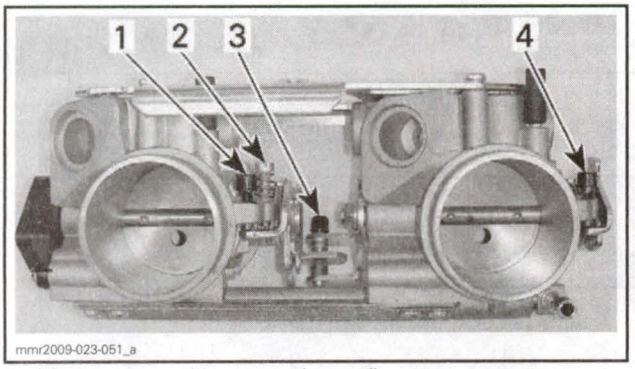
19. Start the engine and increase engine speed above 6000 RPM to be sure no fault codes appear.
20. Let engine idle to ensure idle is adequate.
21. If engine does not run as expected, ensure that the fuel injector calibration files are valid. Check with the tag of the fuel injectors installed on the engine.
22. Reinstall remaining removed parts.

THROTTLE BODY



1. *Throttle body*
2. *TPS (Throttle position sensor)*

Throttle Body Screw Identification



1. *Master zero position screw (capped)*
2. *Idle screw (not used on E-TEC engine)*
3. *Synchronizing screw (capped)*
4. *Slave zero position screw (capped)*

NOTICE Do not tamper with any capped screw. Otherwise, throttle body may have to be replaced.

Throttle Body Inspection

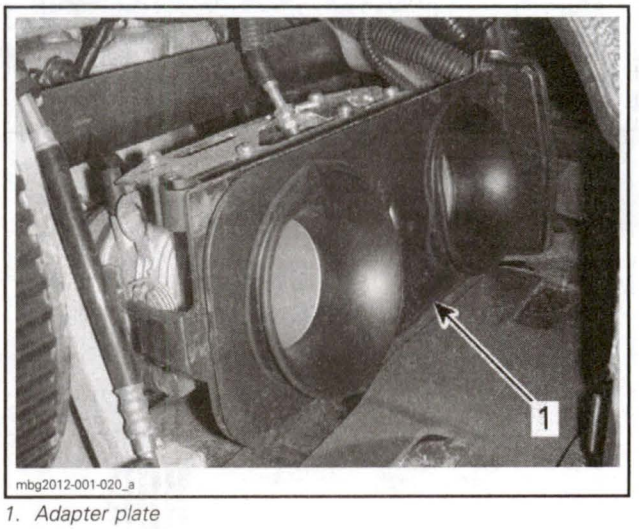
- Ensure throttle plates move freely and smoothly when depressing throttle lever.
- Ensure throttle body master zero position screw is **NOT** loose. If so, replace throttle body.
- Ensure that the master zero position screw stops the throttle plate, **not** the idle screw. There **must** be a gap under the idle screw.
- Ensure TPS is **NOT** loose.
- Check for corroded or damaged wiring or connectors.

Throttle Body Removal

⚠ WARNING

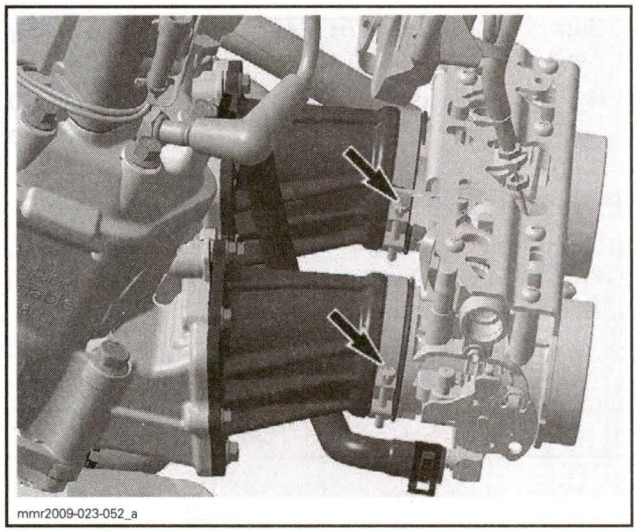
Always remove tether cord cap (D.E.S.S. key) and disconnect battery before removing the throttle body.

1. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
2. Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
3. Remove adapter plate from throttle body.

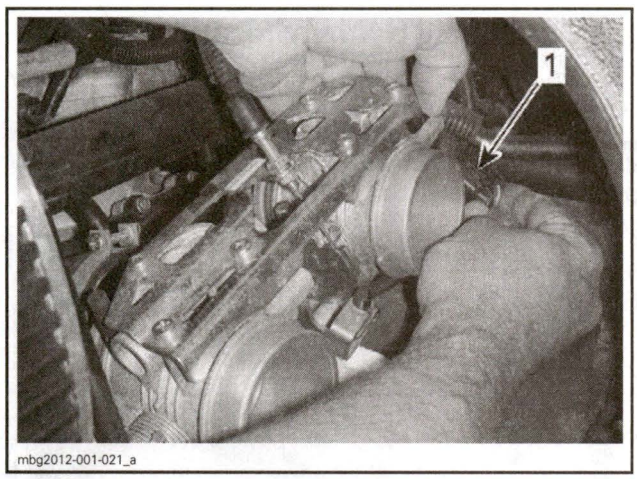


1. *Adapter plate*

4. Loosen clamps retaining throttle body.

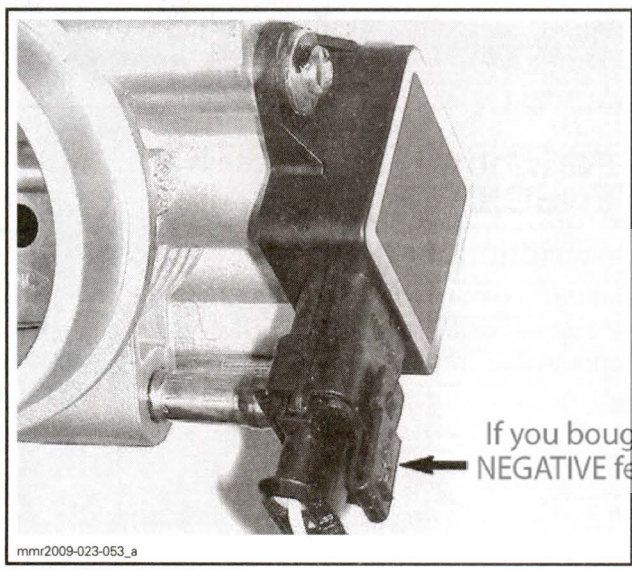

mmr2009-023-052_a

5. Pull out throttle body sufficiently to access coolant hoses and TPS connector.
6. Disconnect TPS connector.



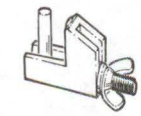
mbg2012-001-021_a

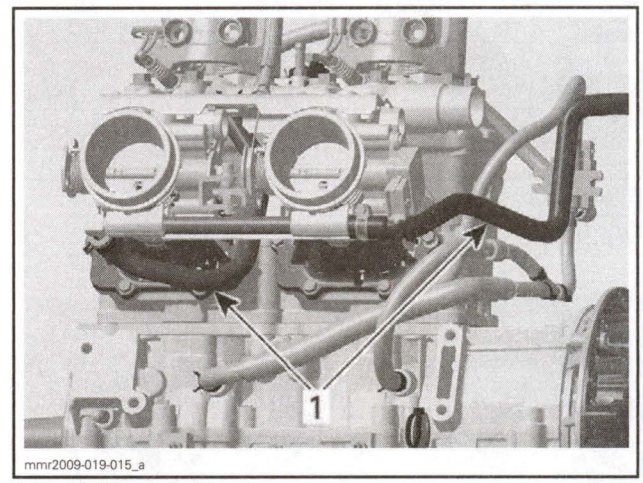
1. TPS connector


mmr2009-023-053_a

PUSH TAB TO UNLOCK

7. Install a small hose pincher on coolant hoses connected to throttle body.

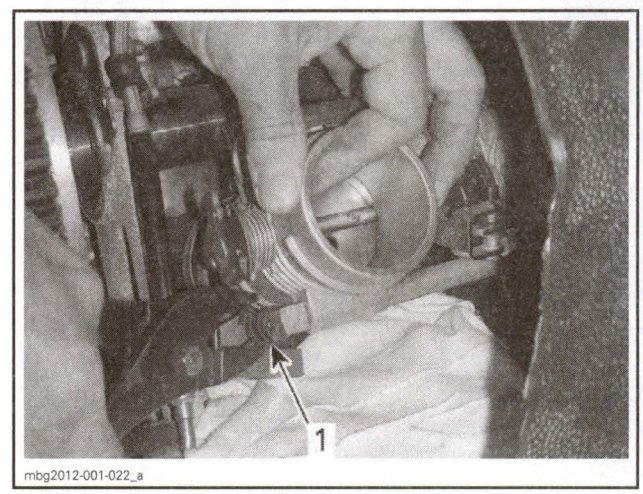
REQUIRED TOOL	
SMALL HOSE PINCHER (P/N 295 000 076)	



mmr2009-019-015_a

1. Install hose pinchers here

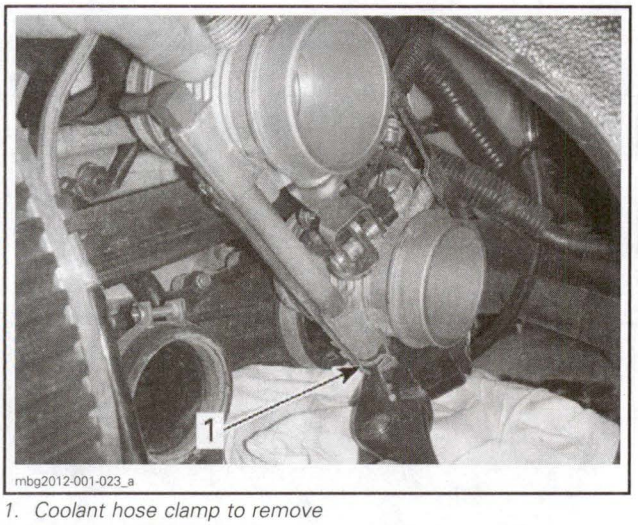
8. Remove coolant hoses from throttle body.



mbg2012-001-022_a

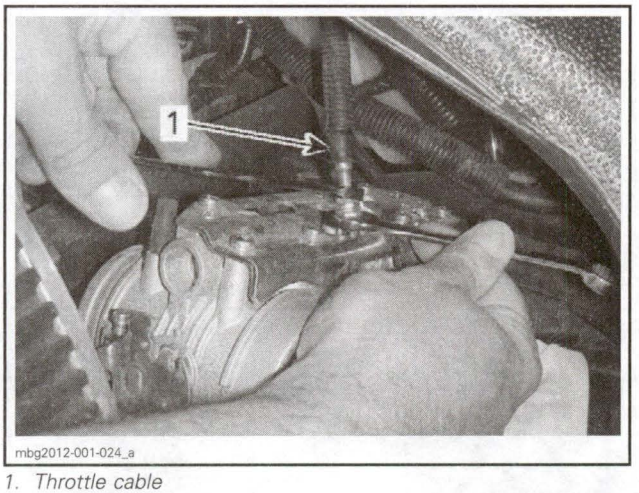
1. Coolant hose clamp to remove

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



1. Coolant hose clamp to remove

9. Disconnect throttle cable.



1. Throttle cable

10. Remove throttle body from vehicle.

Throttle Body Installation

1. If installing the removed throttle body, clean throttle plates and bores using PULLEY FLANGE CLEANER (P/N 413 711 809) before installation.
2. Install cooling hoses on throttle body.
3. Remove hose pinchers.
4. Connect TPS connector.

NOTICE **Ensure TPS connector tab is properly locked.**

5. Install throttle body on intake adapters.
6. Tighten throttle body clamps to specification.

TIGHTENING TORQUE	
Throttle body clamps	1.4 N•m ± 0.2 N•m (12 lbf•**in** ± 2 lbf•**in**)

7. Install throttle cable loosely.
8. Carry out the *THROTTLE CABLE ADJUSTMENT* as detailed in this subsection.
9. If a new throttle body or TPS is installed, carry out the *CLOSED THROTTLE RESET (TPS)* as detailed in this subsection.
10. Refill engine coolant.

NOTE: If an important quantity of coolant was spilled, bleed cooling system. Refer to *COOLING SYSTEM* subsection.

11. Install adapter plate (primary air intake silencer) on throttle body.

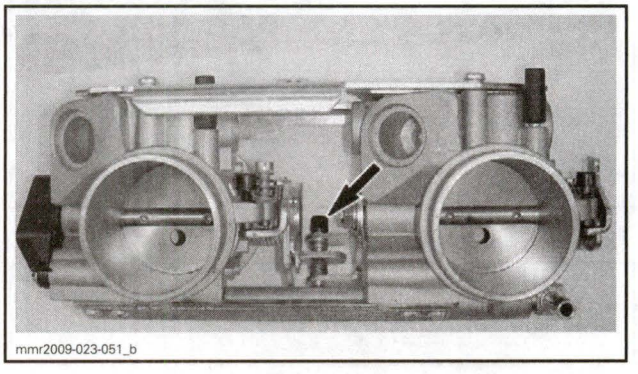
TIGHTENING TORQUE	
Adapter plate clamps	0.7 N•m ± 0.2 N•m (6 lbf•**in** ± 2 lbf•**in**)

12. Install primary air intake silencer, refer to *AIR INTAKE SYSTEM* subsection.
13. Install all remaining removed parts.

Throttle Body Synchronization

No synchronization is required as it has already been done at the factory.

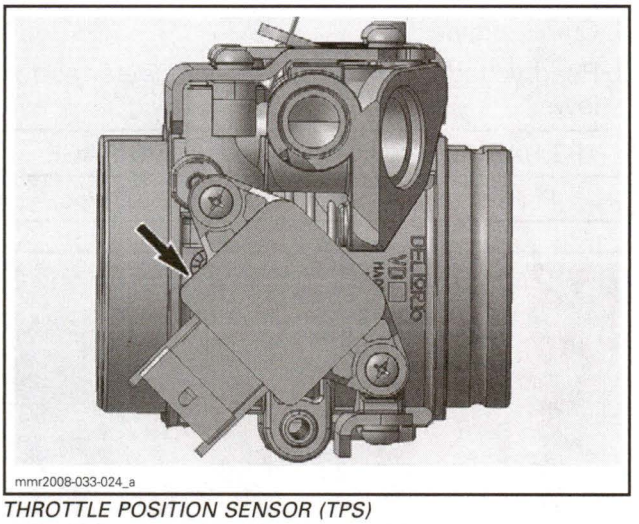
NOTICE **Do not alter synchronization screw setting. Otherwise throttle body must be replaced.**



TPS (THROTTLE POSITION SENSOR)

Description

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)

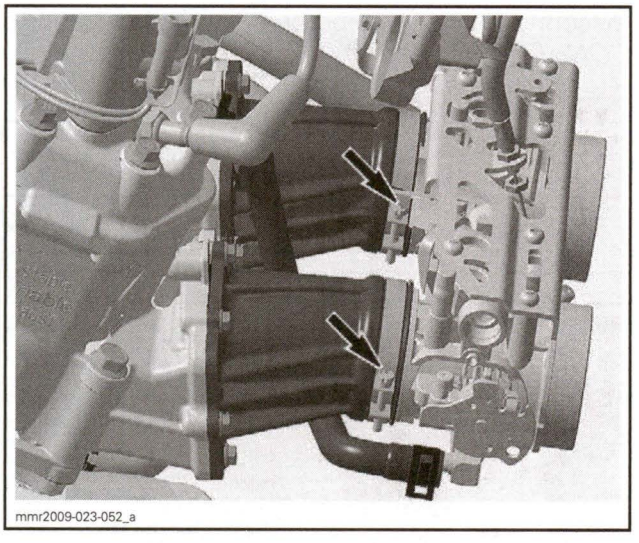
TPS Connector Access

1. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
2. Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.

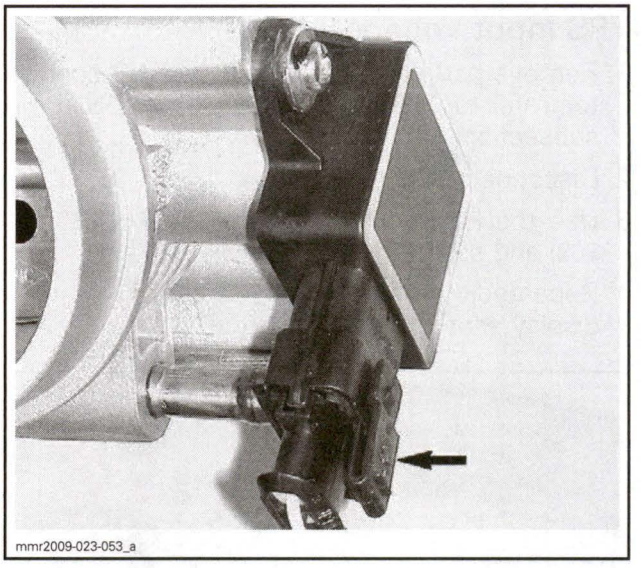
⚠ WARNING

Always remove tether cord cap (D.E.S.S. key) and disconnect battery before removing the throttle body.

3. Loosen clamps retaining throttle body.

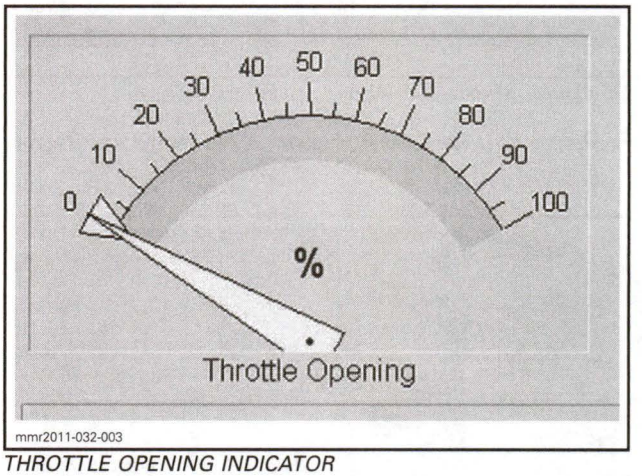


4. Pull out throttle body for access to TPS connector.
5. Disconnect TPS connector.



TPS Wear Test

1. Ensure TPS connector is properly connected.
2. While engine is not running, activate throttle and pay attention for smooth operation without physical stops of the cable.
3. Use B.U.D.S. software.
4. Select the **Monitoring** and **ECM** tabs. Monitor the TPS using the **Throttle Opening** indicator.



THROTTLE OPENING INDICATOR

5. Slowly and regularly depress the throttle. Observe the needle movement.

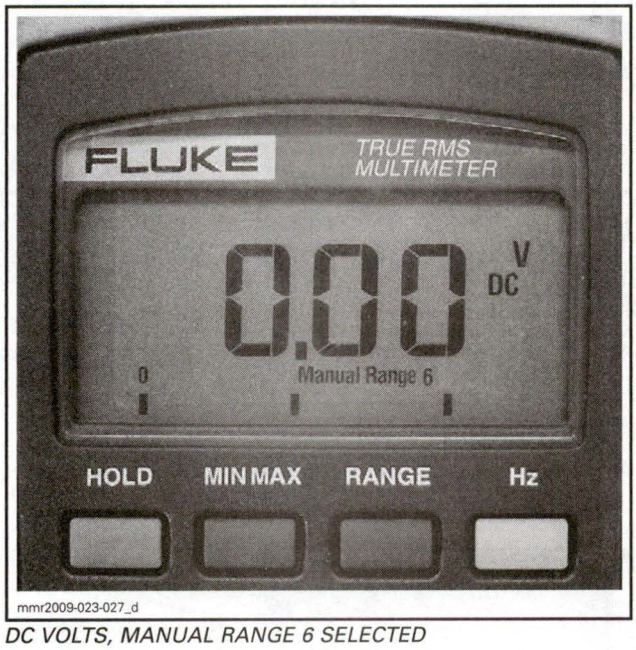
The needle must change gradually and regularly as the throttle is activated. If the needle "sticks", bounces, suddenly drops off or if any discrepancy between the throttle movement and the needle movement is noticed, it indicates a worn TPS that needs to be replaced.

TPS Reset (Closed Throttle)

Refer to *CLOSED THROTTLE RESET (TPS)* in the *ADJUSTMENT* topic of this subsection.

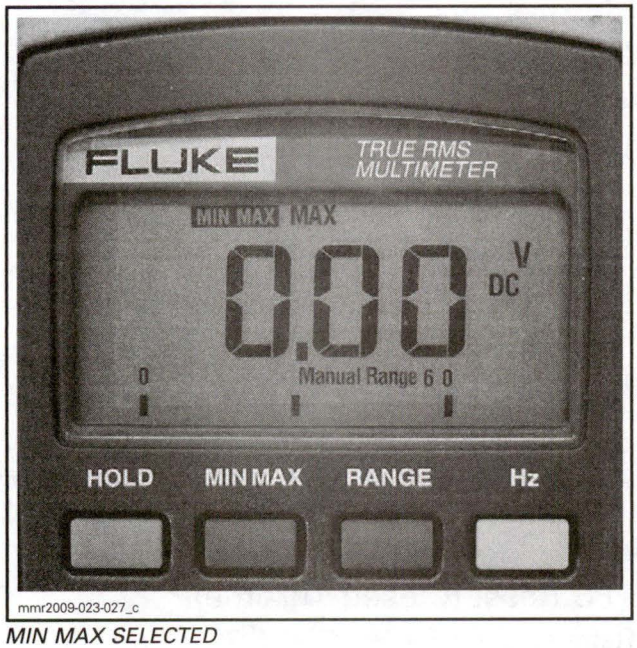
TPS Input Voltage Test

1. Remove parts required to access TPS connector, refer to *TPS CONNECTOR ACCESS* in this subsection.
2. Disconnect TPS connector.
3. Use the FLUKE 115 MULTIMETER (P/N 529 035 868) and set it to Vdc.
4. Repeatedly press the **RANGE** button until the display shows Manual Range 6.



DC VOLTS, MANUAL RANGE 6 SELECTED

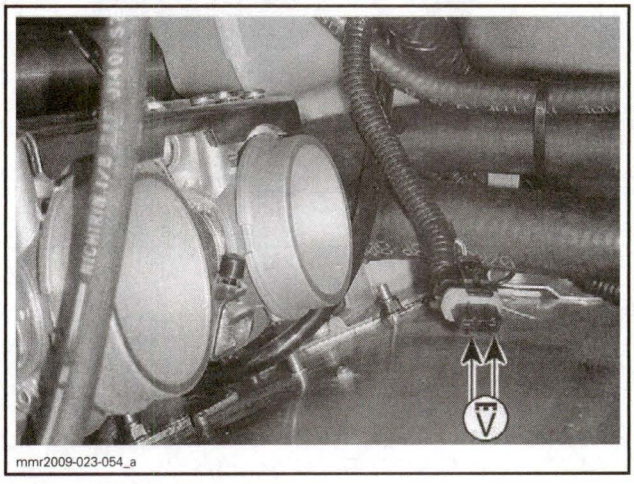
5. Press the **MIN MAX** button so that the display shows MIN MAX.



MIN MAX SELECTED

6. Crank engine.
7. Read voltage at TPS harness connector as follows.

TPS HARNESS CONNECTOR		VOLTAGE
Pin 1	Pin 2	5.0 Vdc



8. Read the MAX value.

NOTE: Reset multimeter by pressing and holding **MIN MAX** button until meter beeps.

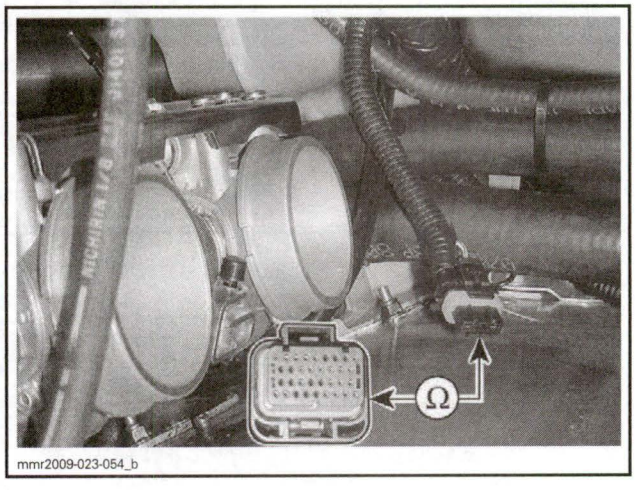
If voltage is good, carry out the *TPS SIGNAL WIRE TEST*.

TPS Signal Wire Test

Disconnect J1A connector from ECM, refer to *CONNECTOR INFORMATION* subsection.

Check the wiring continuity as follows.

TPS HARNESS CONNECTOR	ECM J1A CONNECTOR	RESISTANCE
Pin 3	Pin 18	Close to 0 Ω (continuity)



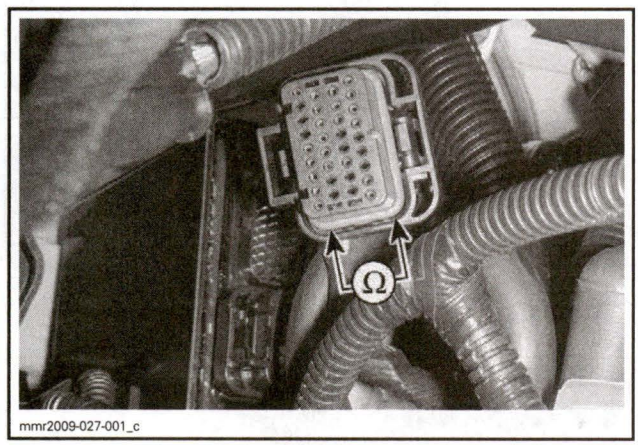
If tests are good, replace the TPS.

If tests are not good, continue to check the resistance of the remainder of the TPS circuit.

TPS Resistance Test

1. Reconnect the TPS.
2. Disconnect connector J1A from the ECM.
3. Using the FLUKE 115 MULTIMETER (P/N 529 035 868), check resistive value as per following table.

ECM CONNECTOR		THROTTLE IDLE POSITION	WIDE OPEN THROTTLE POSITION
PIN		RESISTANCE Ω	
J1A-18	J1A-26	1000	2500
J1A-26	J1A-10	1600 - 2400	1600 - 2400
J1A-18	J1A-10	2500	1000



NOTE: The resistive value should change smoothly and proportionally to the throttle movement. Otherwise, replace TPS.

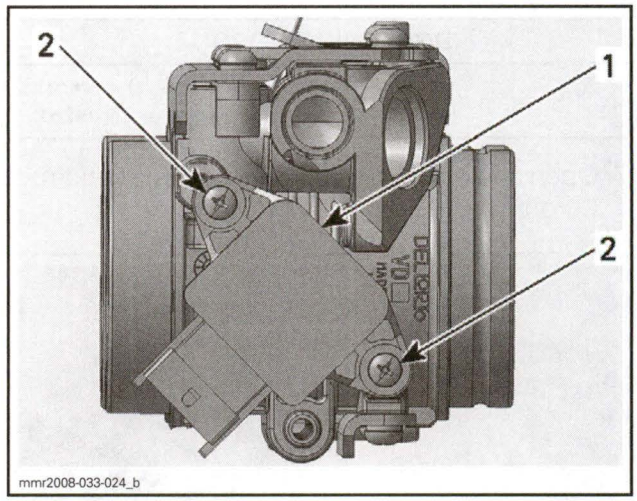
If resistive values are correct, try a new ECM. Refer to *ENGINE CONTROL MODULE (ECM)* elsewhere in this subsection.

If resistive values are incorrect:

- Repair/replace wiring/connectors.
- Replace TPS.

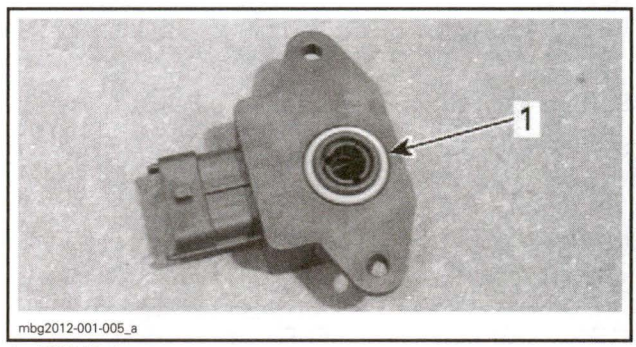
TPS Replacement

1. Remove the throttle body, refer to *THROTTLE BODY REMOVAL* in this subsection.
2. Remove TPS retaining screws.



1. Throttle position sensor (TPS)
2. Screws

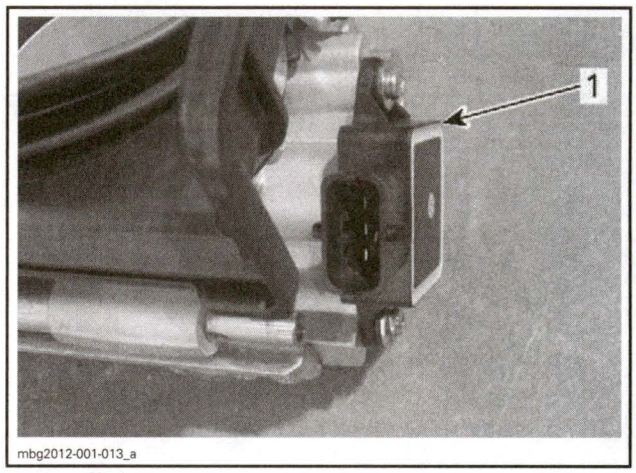
3. Remove TPS.
4. Ensure O-ring is still positioned on TPS after removal.



1. TPS O-ring

NOTE: If O-ring is missing, remove it from throttle body shaft.

5. Install new TPS.

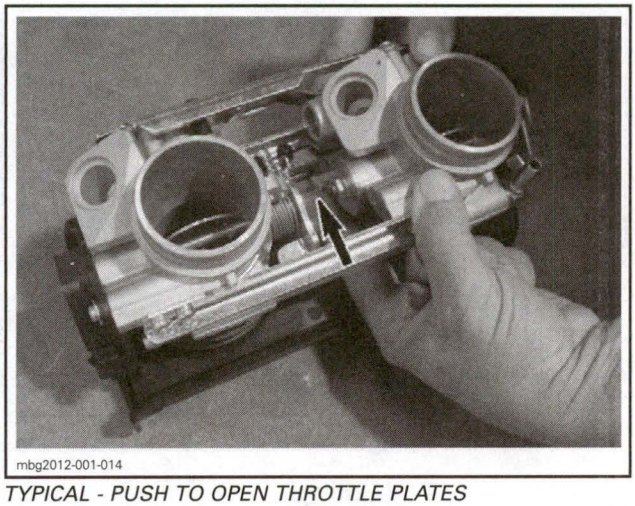


1. New TPS

6. Tighten TPS retaining screws to specification.

TIGHTENING TORQUE	
TPS retaining screws	2.0 N•m ± 0.4 N•m (18 lbf•**in** ± 4 lbf•**in**)

7. Open and quickly release throttle plates 6 times (throttle plates must snap shut).


mbg2012-001-014

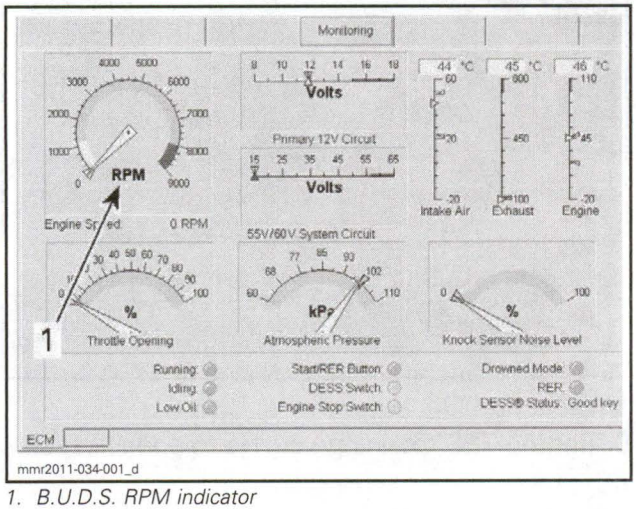
TYPICAL - PUSH TO OPEN THROTTLE PLATES

8. Reinstall remaining removed parts.
9. Reset TPS, refer to *CLOSED THROTTLE RESET (TPS)* in this subsection.

CPS (CRANKSHAFT POSITION SENSOR)

CPS Test with B.U.D.S.

1. Connect vehicle to the latest applicable B.U.D.S. version.
2. In B.U.D.S., select the **Monitoring** and **ECM** tabs.
3. Monitor the **Engine Speed** (RPM) indicator while cranking engine.



mmr2011-034-001_d

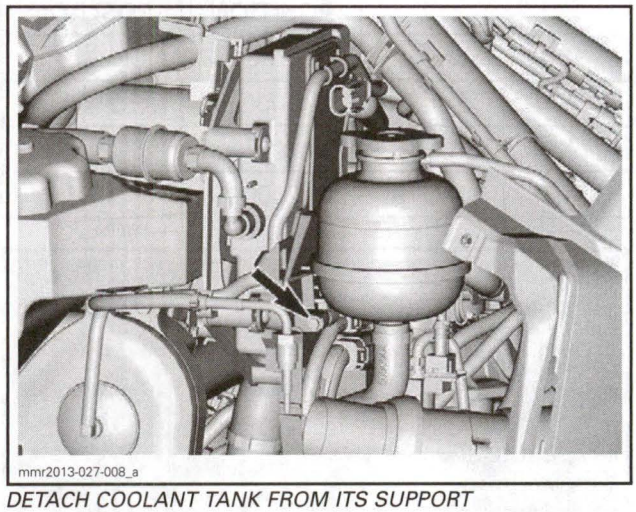
1. B.U.D.S. RPM indicator

The needle should move proportionally to the cranking RPM. If no needle movement is observed, carry out the *CPS OUTPUT VOLTAGE TEST.*

NOTE: A loose CPS or CPS connector can send an intermittent signal that can prevent the engine from starting.

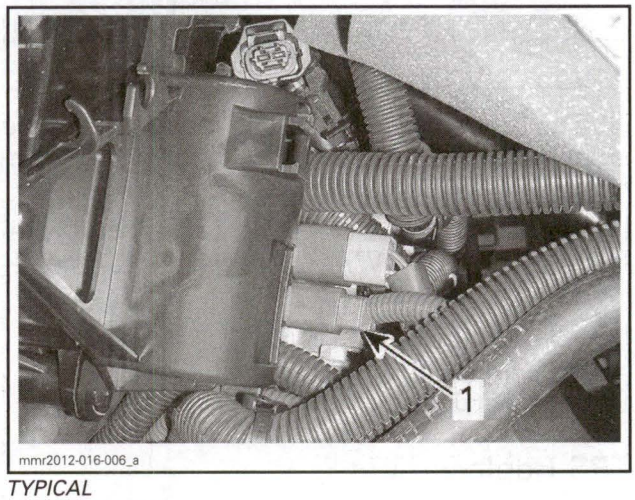
CPS Output Voltage Test

1. Remove muffler. Refer to *EXHAUST SYSTEM* subsection.
2. Detach coolant tank from its support.


mmr2013-027-008_a

DETACH COOLANT TANK FROM ITS SUPPORT

3. Disconnect CPS connector (2-pin connector).

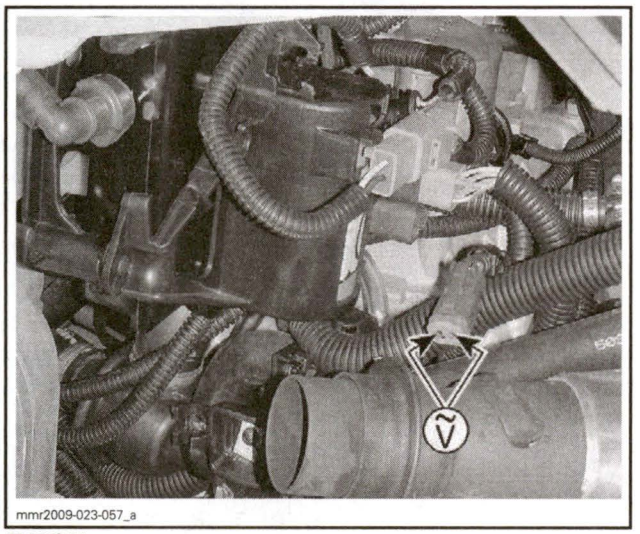


mmr2012-016-006_a

TYPICAL
1. CPS connector

4. Probe terminals coming from CPS while cranking engine.

CPS CONNECTOR		VOLTAGE
Pin 1	Pin 2	1 - 2 Vac min.



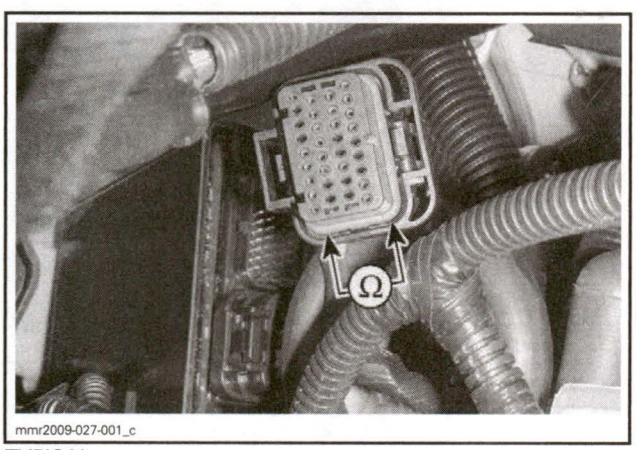
TYPICAL

If voltage is out of specification, inspect wiring/connectors. Replace CPS if wiring is good.

CPS Resistance Test

1. Disconnect connector J1A from ECM.
2. Measure the resistance of the sensor through its wiring.

ECM J1A CONNECTOR		RESISTANCE @ 20°C (68°F)
Pin 6	Pin 7	190 - 290 Ω

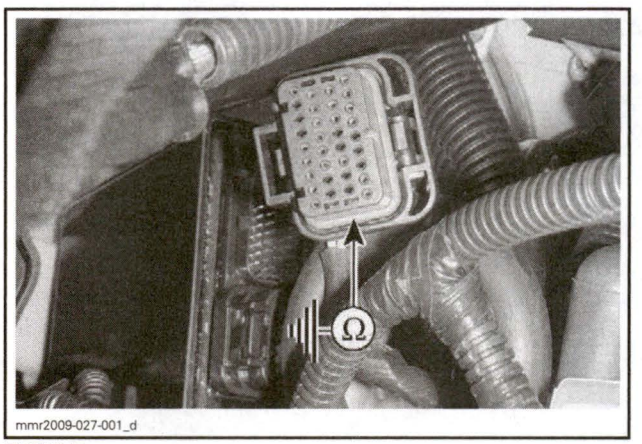


TYPICAL

If measurement is out of specification, check wiring continuity between ECM and CPS.

3. Also check for a shorted connection to ground as per table.

ECM J1A CONNECTOR		RESISTANCE @ 20°C (68°F)
Pin 6	Engine ground	Open circuit (OL)
Pin 7	Engine ground	



TYPICAL

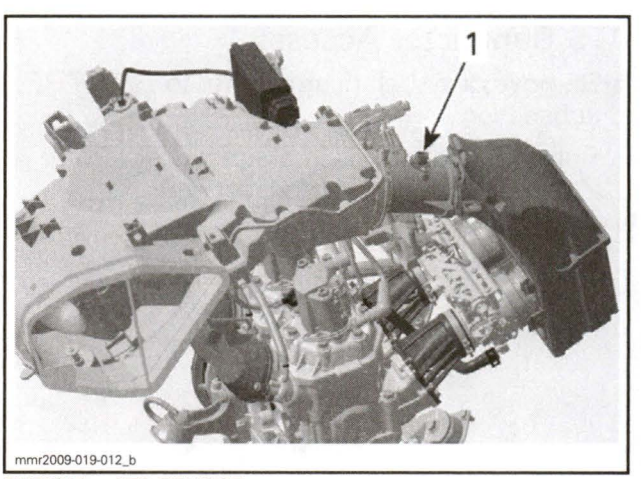
If the previous tests were good, replace CPS.

CPS Replacement

Refer to *MAGNETO SYSTEM* subsection.

ATS (AIR TEMPERATURE SENSOR)

ATS Location



TYPICAL - ATS SENSOR
1. Air temperature sensor (ATS)

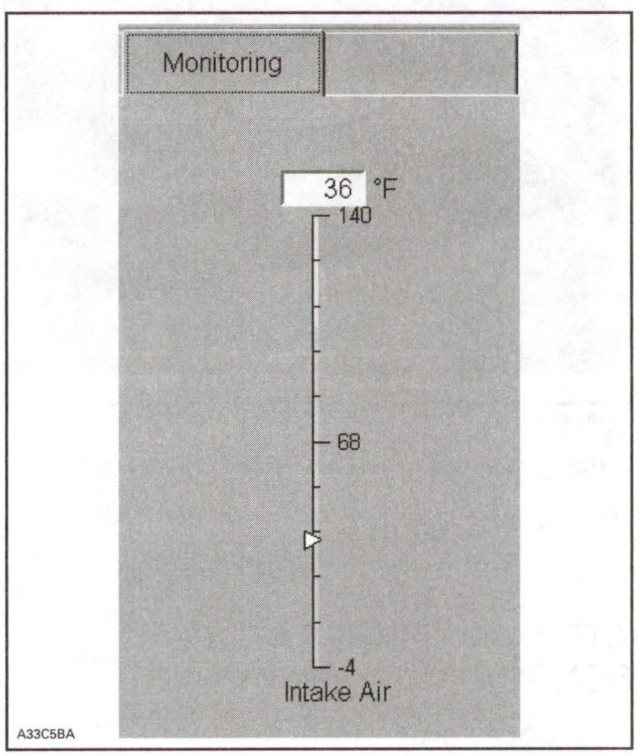
ATS Access

Remove drive belt guard. Refer to *DRIVE BELT* subsection.

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.

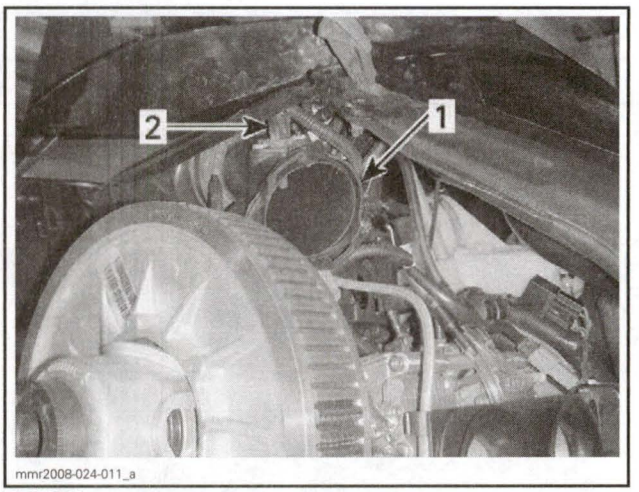
ATS Test with B.U.D.S.

1. Connect vehicle to latest applicable B.U.D.S. version.
2. Select the **Monitoring** and **ECM** tabs.
3. Monitor the **Intake Air** temperature indicator. It should indicate ambient temperature. Otherwise, perform the *ATS RESISTANCE TEST*.



ATS Connector Access

1. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
2. Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
3. Rotate intake adapter to disconnect ATS sensor connector.

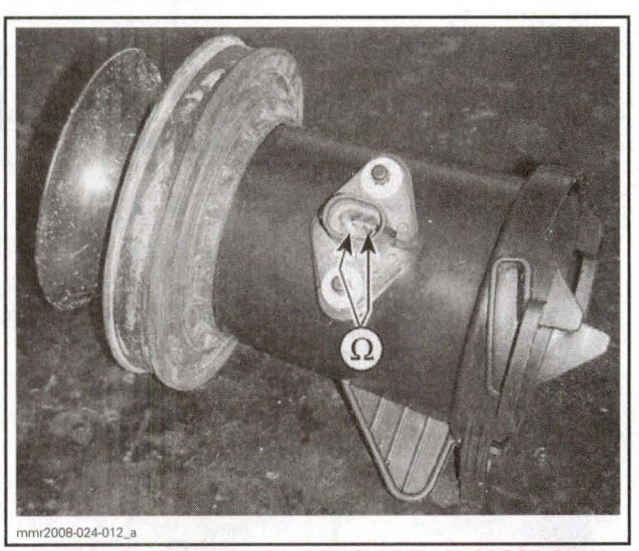


TYPICAL
1. *Rotate intake adapter*
2. *Disconnect sensor connector*

ATS Resistance Test

1. Remove parts required for access to ATS connector, refer to *ATS CONNECTOR ACCESS* in this subsection.
2. Measure sensor resistance.

ATS		MEASUREMENT
Pin 1	Pin 2	Refer to *SENSOR TEMPERATURE TABLE*



INTAKE ADAPTER REMOVED FOR CLARITY PURPOSE ONLY

SENSOR TEMPERATURE TABLE		
TEMPERATURE		RESISTANCE (OHMS)
°C	°F	ATS
- 40	- 40	43610
- 30	- 22	25090

SENSOR TEMPERATURE TABLE		
TEMPERATURE		RESISTANCE (OHMS)
°C	°F	ATS
- 20	- 4	14900
- 10	14	9102
0	32	5705
10	50	3680
20	68	2436
25	77	2000
30	86	1651
40	104	1144
50	122	808
60	140	580
70	158	424
80	176	316
90	194	238
100	212	182
110	230	141
120	248	111
130	266	88
140	284	70
150	302	57
160	320	47
170	338	39
180	356	32
190	374	27
200	392	23

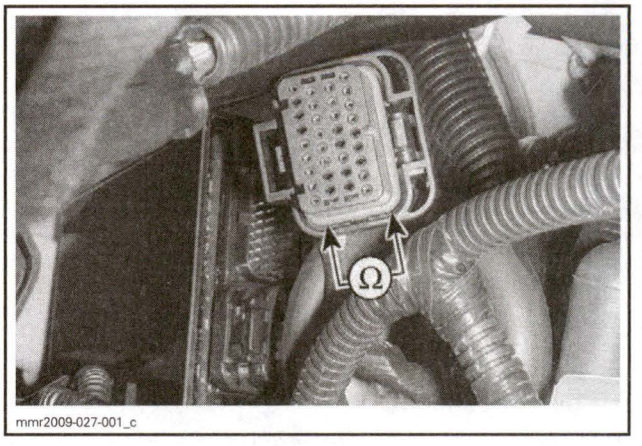
If resistance is out of specifications, replace sensor.

If resistance tests good, carry out the following steps.

3. Reconnect the ATS connector.
4. Disconnect the J1A connector from ECM.
5. Using the FLUKE 115 MULTIMETER (P/N 529 035 868), measure sensor circuit resistance value as follows.

IMPORTANT: Move wiring harness back and forth near the sensor connector while measuring the resistance. If the resistance value varies as the harness is moved, check sensor connections.

J1A CONNECTOR		MEASUREMENT
Pin J1A-20	Pin J1A-27	Refer to *SENSOR TEMPERATURE TABLE*

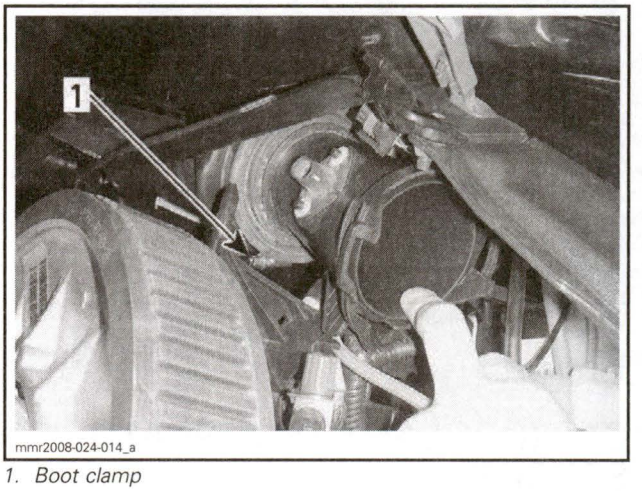


If resistance value is incorrect, repair the connectors or replace the wiring harness between ECM connector and the ATS.

6. Reinstall removed parts. Ensure intake adapter boot is properly installed on the adapter. See below in *ATS REPLACEMENT.*

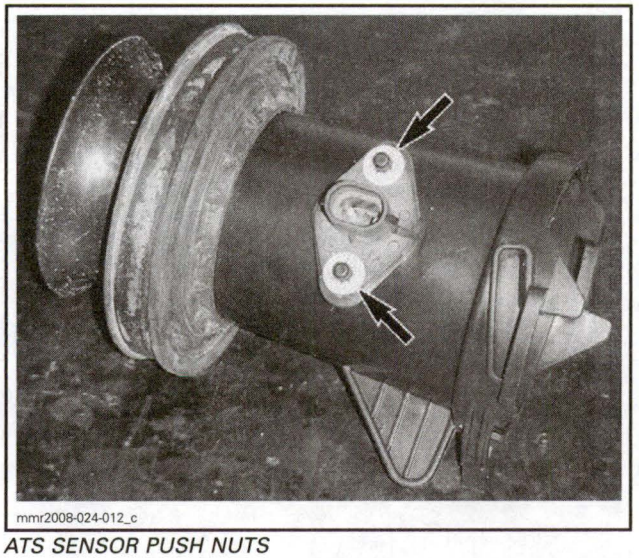
ATS Replacement

1. Remove parts required for access to ATS, refer to *ATS ACCESS* in this subsection.
2. Loosen clamp retaining adapter boot seal.



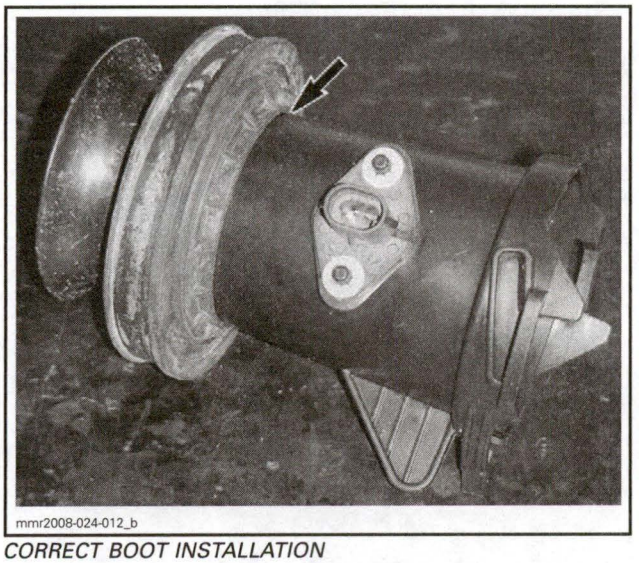
1. Boot clamp

3. Disconnect ATS connector.
4. Pull out intake adapter.
5. Remove sensor push nuts.



ATS SENSOR PUSH NUTS

6. Pull out sensor.
7. Using new push nuts, secure the new sensor to the adapter.
8. Reconnect ATS.
9. Ensure adapter boot is properly installed as shown.



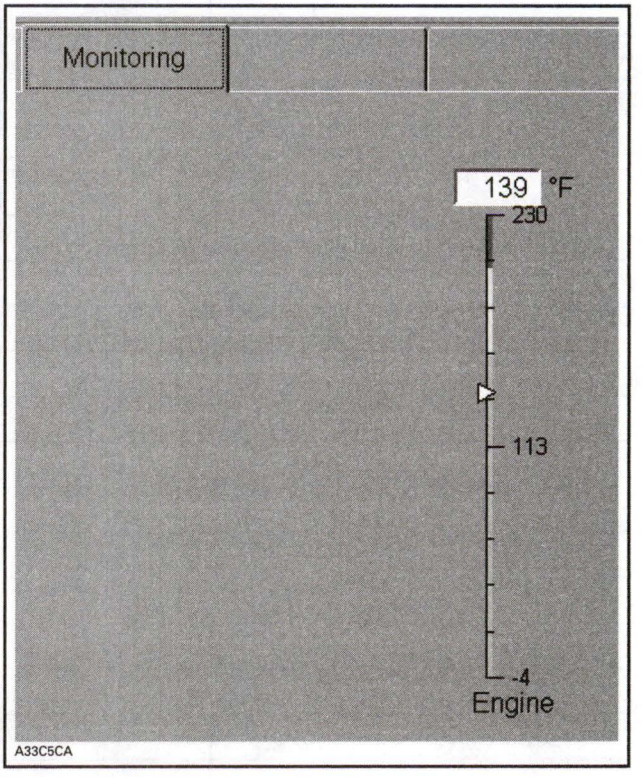
CORRECT BOOT INSTALLATION

10. Reinstall removed parts.

CTS (COOLANT TEMPERATURE SENSOR)

CTS Test with B.U.D.S.

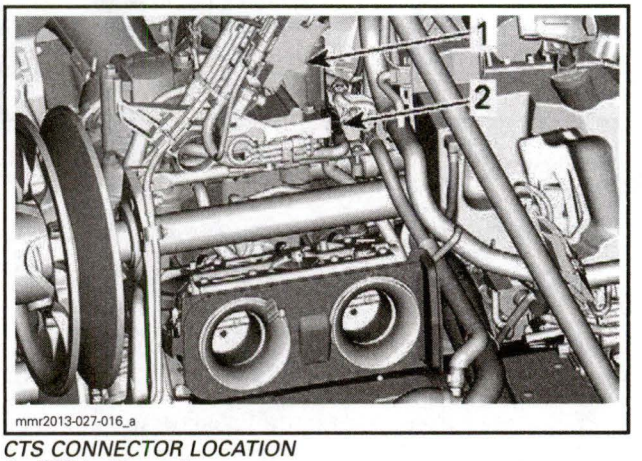
1. Connect vehicle to latest applicable B.U.D.S. version.
2. Select the **Monitoring** and **ECM** tabs.
3. Monitor the **Engine** temperature indicator. It should show the coolant temperature. Otherwise, perform the following *CTS RESISTANCE TEST.*



CTS Connector Access

Remove drive belt guard. Refer to *DRIVE BELT* subsection.

Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.

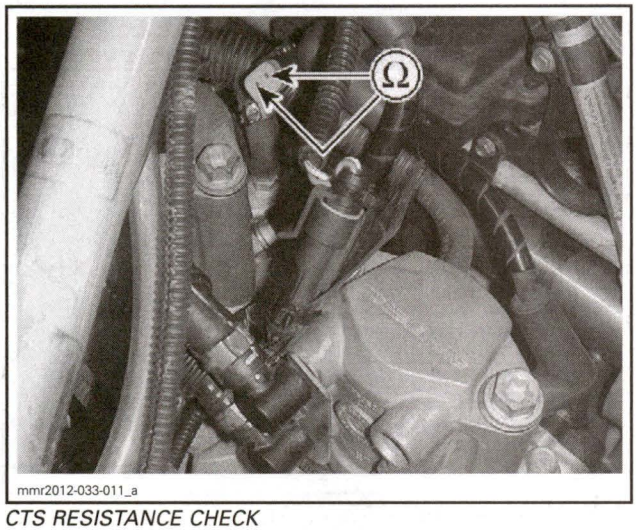


CTS CONNECTOR LOCATION
1. PTO ignition coil
2. CTS connector

CTS Resistance Test

1. Disconnect CTS sensor connector, refer to *CTS CONNECTOR ACCESS*.
2. Use the FLUKE 115 MULTIMETER (P/N 529 035 868) and set it to Ω.
3. Measure resistance between sensor terminals.

CTS		MEASUREMENT
Pin 1	Pin 2	Refer to *CTS SENSOR TEMPERATURE TABLE (E-TEC)*
Pin 1 or 2	Engine ground	Open circuit (OL)



mmr2012-033-011_a

CTS RESISTANCE CHECK

CTS SENSOR TEMPERATURE TABLE (E-TEC)		
TEMPERATURE		RESISTANCE (OHMS)
°C	°F	ATS
- 40	- 40	72412
- 30	- 22	38681
- 20	- 4	21529
- 10	14	12431
0	32	7418
10	50	4582
20	68	2919
30	86	1912
40	104	1284
50	122	883
60	140	622
70	158	448
80	176	328

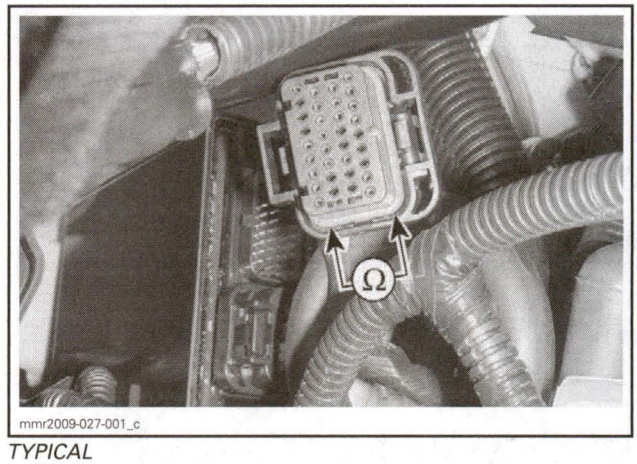
CTS SENSOR TEMPERATURE TABLE (E-TEC)		
TEMPERATURE		RESISTANCE (OHMS)
°C	°F	ATS
90	194	245
100	212	186
110	230	143
120	248	112
130	266	88
135	275	79
140	284	71
145	293	64
150	302	57

If resistance is out of specifications, replace CTS.

If resistance tests good, carry out the following steps.

4. Reconnect the CTS.
5. Disconnect the J1A connector from ECM.
6. Measure CTS circuit resistance as follows.

J1A CONNECTOR		MEASUREMENT
Pin 19	Pin 27	Refer to *CTS SENSOR TEMPERATURE TABLE (E-TEC)*



mmr2009-027-001_c

TYPICAL

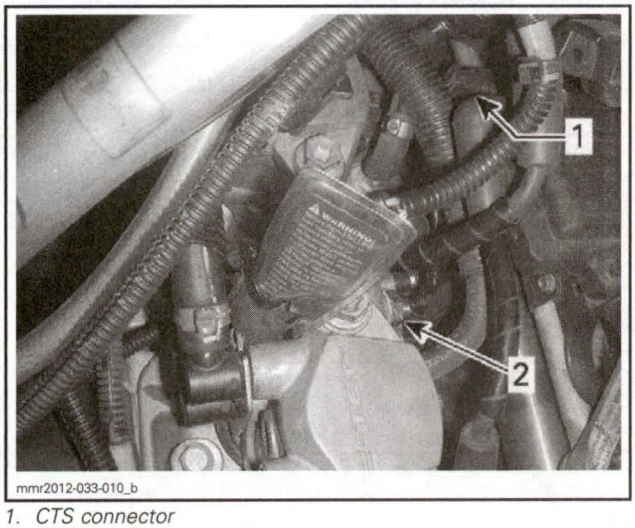
If resistance value is correct, sensor and wiring/connectors are good.

If resistance value is incorrect, repair/replace wiring/connectors between ECM and CTS.

CTS Replacement

1. Remove parts required to access CTS, refer to *CTS ACCESS* in this subsection.

2. Lift rear of vehicle to minimize coolant spillage.
3. Disconnect CTS connector.
4. Remove CTS.

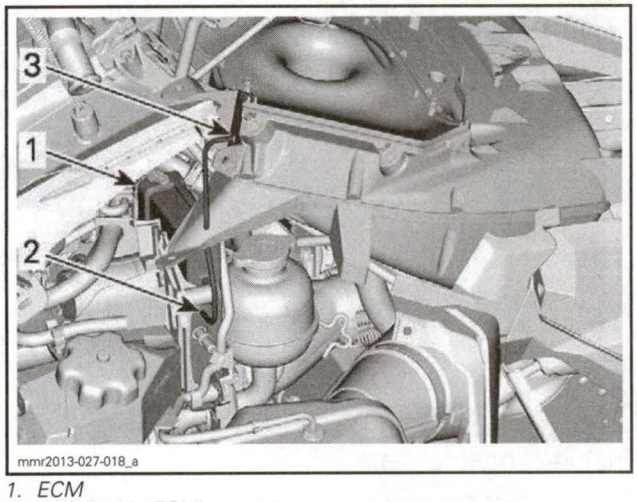


1. CTS connector
2. CTS

5. Install new CTS and torque to 12 N•m (106 lbf•**in**).
6. Reinstall removed parts.
7. Refill engine coolant. If an important quantity of coolant spilled from the engine, bleed cooling system. Refer to *COOLING SYSTEM* subsection.

APS (AIR PRESSURE SENSOR)

APS Location

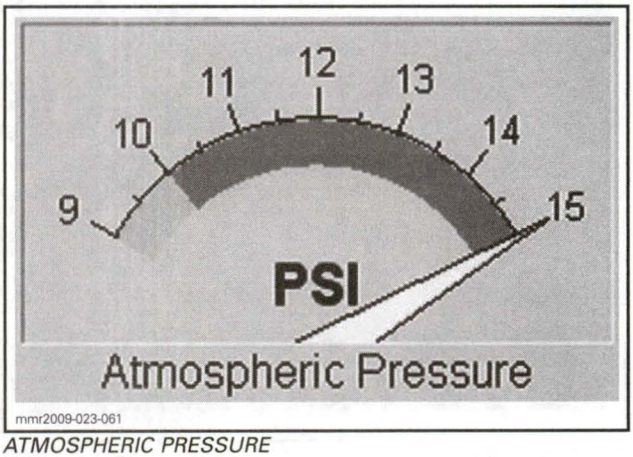


1. ECM
2. APS (inside ECM)
3. APS tube to secondary air intake silencer

APS Inspection

1. Open RH side panel. Refer to *BODY* subsection.
2. Ensure sensor hose is correctly connected on secondary air intake silencer and on ECM.
3. Check inside hose for cleanliness, water, or ice. Ensure it is not bent, kinked or burnt.
4. Connect to latest applicable B.U.D.S. version. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
5. Select the **Monitoring** and **ECM** tabs.
6. In B.U.D.S., monitor the **Atmospheric Pressure** indicator. The gauge should read the local atmospheric pressure of the day.

NOTE: At sea level, the atmospheric pressure gauge should read around 101.3 kPa (14.7 PSI) and less as altitude increases.

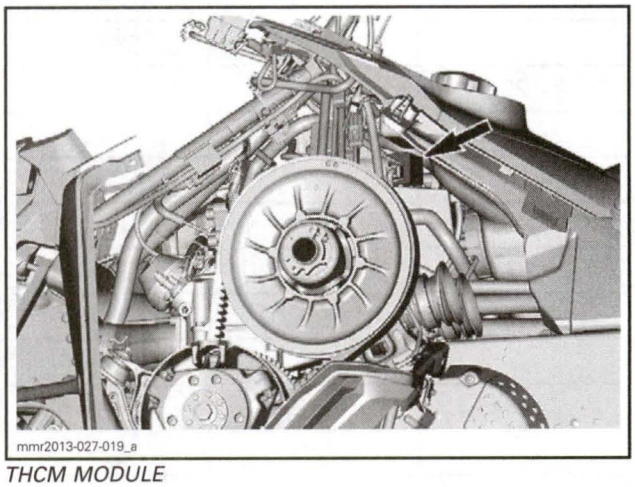


ATMOSPHERIC PRESSURE

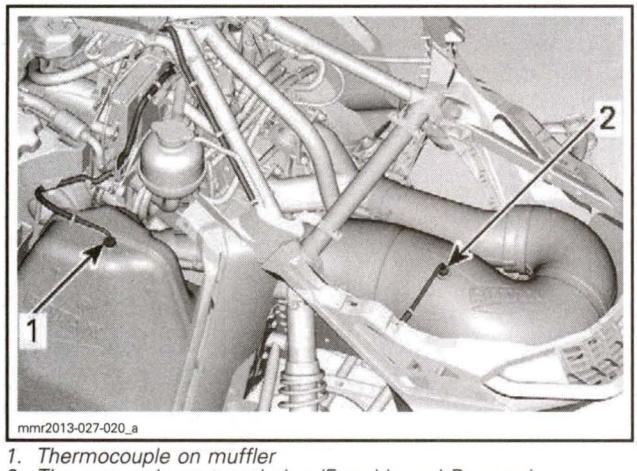
Otherwise, replace ECM.

THCM (THERMOCOUPLE MODULE)

800R E-TEC



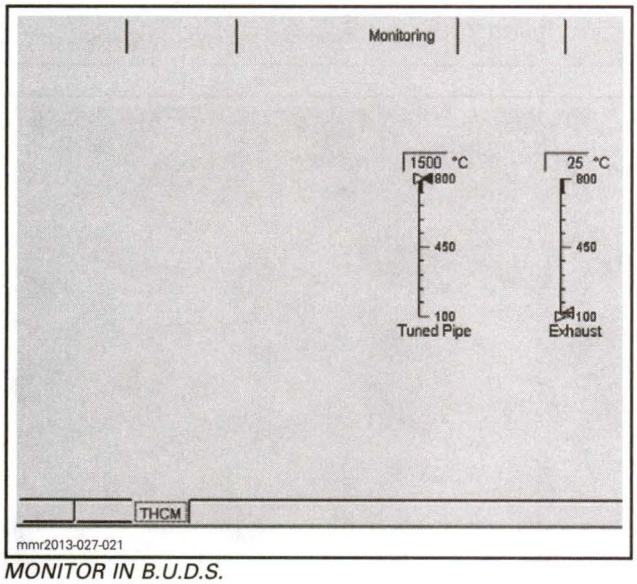
THCM MODULE



1. *Thermocouple on muffler*
2. *Thermocouple on tuned pipe (Freeride and Renegade Backcountry)*

THCM Test with B.U.D.S.

1. Connect vehicle to latest applicable B.U.D.S. version.
2. Select the **Monitoring** tab then **THCM** page tabs.
3. In B.U.D.S., monitor the **Exhaust** (Muffler) and **Tuned Pipe** temperature indicators (as applicable).



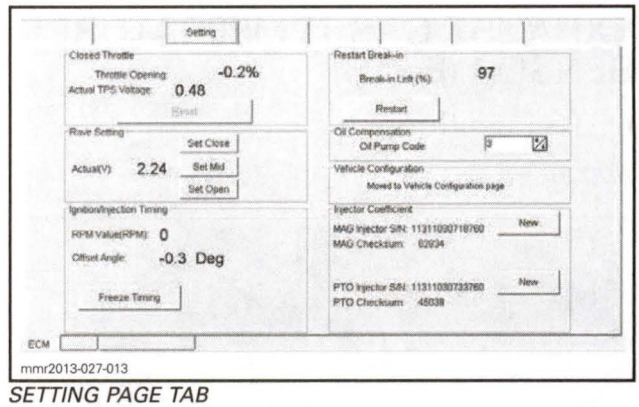
MONITOR IN B.U.D.S.

If sensor temperature continuously read(s), 1 500°C (2,732°F)then the sensor is defective (open circuit). Replace THCM.

If sensor temperature is(are) read, THCM operates normally.

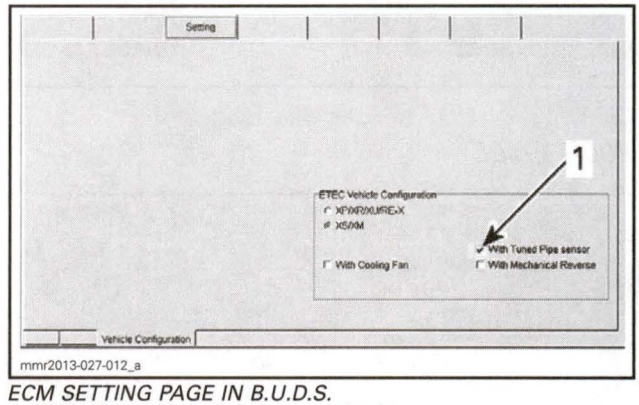
If sensor temperature is(are) not read, carry out the following steps.

4. In B.U.D.S., select the **Setting** and **ECM** page tabs.



SETTING PAGE TAB

5. Ensure the **With Tuned Pipe Sensor** selection box is checked in the **Vehicle Configuration**area (on Freeride and Renegade Backcountry). Otherwise, the THCM will not be monitored by the ECM..



ECM SETTING PAGE IN B.U.D.S.
1. **With Tuned Pipe Sensor** *selection box*

6. Check for an applicable fault code (P0428, P1427, P1428).

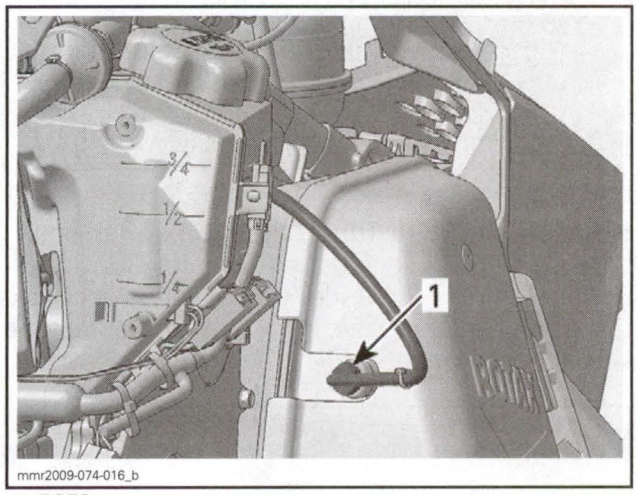
If configuration is Ok, carry out service action as suggested by fault code.

If the THCM or thermocouple requires replacement, refer to *EXHAUST SYSTEM* subsection.

EXHAUST GAS TEMPERATURE SENSOR (EGTS)

EGTS Location

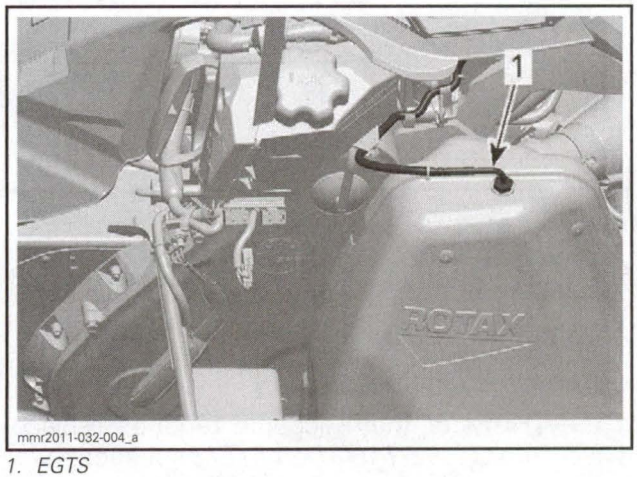
600 HO E-TEC



mmr2009-074-016_b

1. EGTS

800R E-TEC



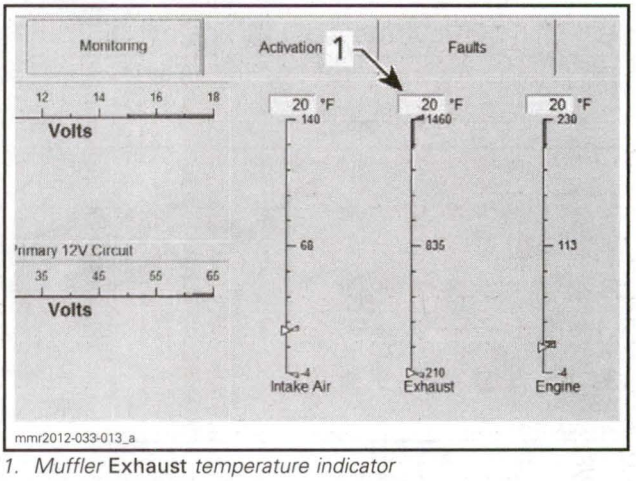
mmr2011-032-004_a

1. EGTS

EGTS Test with B.U.D.S.

In B.U.D.S., select the **Monitoring** and **ECM** page tabs.

Monitor the **Exhaust** temperature indicator. It should show the exhaust temperature, otherwise carry out the *EGTS RESISTANCE TEST*.



mmr2012-033-013_a

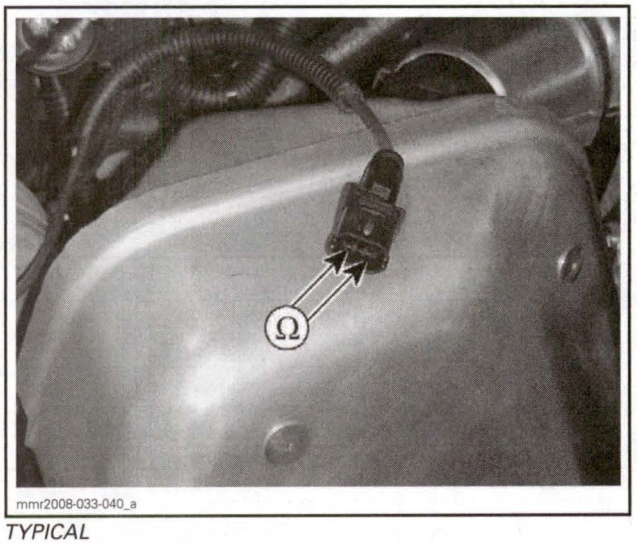
1. Muffler **Exhaust** *temperature indicator*

NOTE: If engine runs with the EGTS connected but not installed in the muffler, the reading will be 710°C (1,310°F) steady.

EGTS Resistance Test

1. Remove RH side panel. Refer to *BODY*.
2. Disconnect EGTS connector.
3. Measure sensor resistance as follows.

EGTS		MEASUREMENT
Pin 1	Pin 2	Refer to *EGTS SENSOR TEMPERATURE TABLE*



mmr2008-033-040_a

TYPICAL

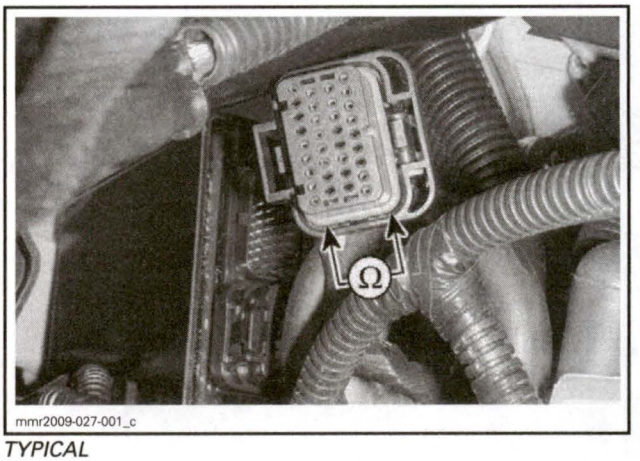
EGTS SENSOR TEMPERATURE TABLE		
TEMPERATURE		RESISTANCE (OHMS)
°C	°F	ATS
- 40	- 40	170
- 20	- 4	185
0	32	201
25	77	220
50	122	239
100	212	276
150	302	313
200	392	349
250	482	385
300	572	420
350	662	454
400	752	488
450	842	521
500	932	554
600	1112	618
700	1292	679
800	1472	738
900	1652	795
1000	1832	849

If resistance is out of specification, replace the sensor.

If resistance is as per specification, carry out the following steps.

4. Reconnect the EGTS.
5. Disconnect the J1A connector from ECM.
6. Measure resistance as follows.

J1A CONNECTOR		MEASUREMENT
Pin 12	Pin 27	Refer to *EGTS SENSOR TEMPERATURE TABLE*



TYPICAL

If resistive value is correct, try a new ECM. Refer to *ENGINE CONTROL MODULE (ECM)* in this subsection.

If resistive value is incorrect, repair the connector or replace the wiring harness between ECM connector and the EGTS.

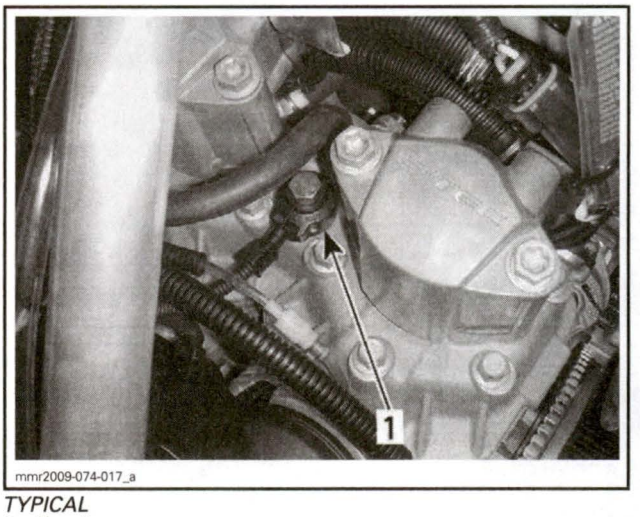
EGTS Replacement

Refer to *EXHAUST SYSTEM* subsection.

KNOCK SENSOR (KS)

Knock Sensor Location

The knock sensor is located on top of the cylinder head, between the fuel injectors.

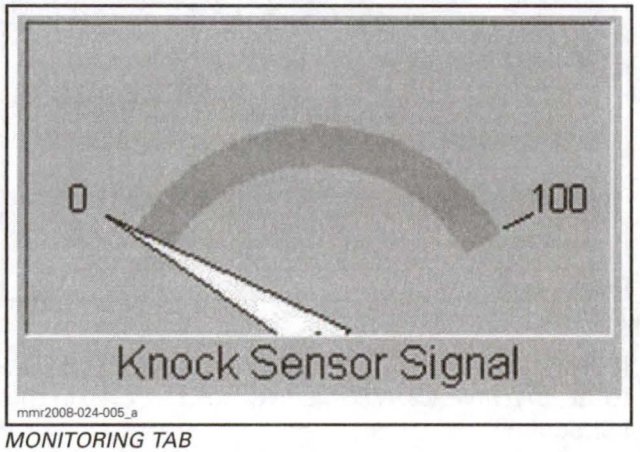


TYPICAL
1. Knock sensor

KS Test with B.U.D.S.

1. Lift rear of vehicle off the ground and support it with a wide-base mechanical stand.
2. Use the latest applicable B.U.D.S. version.

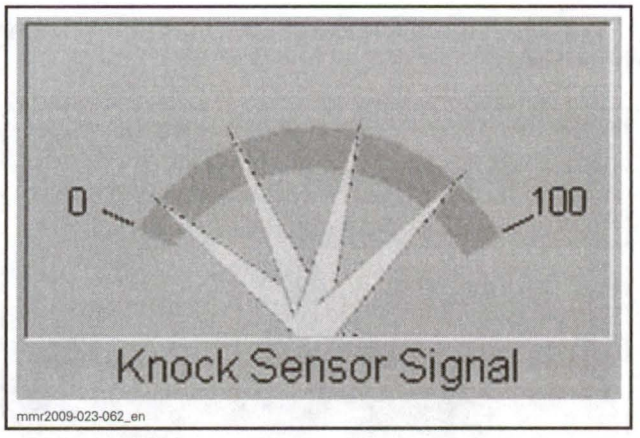
3. Monitor the knock sensor using the **Knock Sensor Signal** indication in the **ECM Monitoring** page of B.U.D.S.



MONITORING TAB

4. Start the engine.
5. Bring engine speed above 5200 RPM and vary engine RPM above 5200 RPM.

The needle of the **Knock Sensor Signal** gauge should move between 0 and 100. The needle movement pattern is of no importance as long as it moves indicating the knock sensor senses the engine vibrations.



If the needle moves as described, the knock sensor should be good.

If the needle sticks either at 0 or 100, there is a problem.

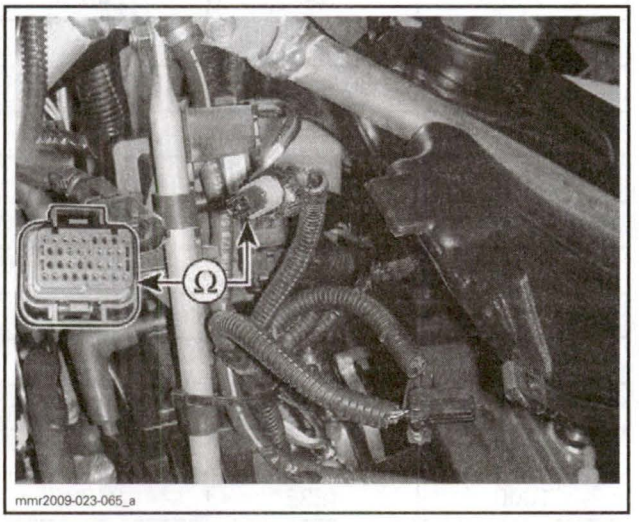
NOTE: Ensure ignition coil cables are not close to knock sensor harness. If so, this might generate a false fault code.

Carry out the *KS CIRCUIT CONTINUITY TEST.*

KS Circuit Continuity Test

1. Ensure sensor and cylinder head contact surfaces are clean and mounting bolt and washer are correct and properly torqued down.
2. Disconnect knock sensor connector (DT). Refer to *KNOCK SENSOR REPLACEMENT.*
3. Disconnect J1A connector from ECM.
4. Check wire continuity of circuit as per following table.

J1A CONNECTOR	KS CONNECTOR	MEASUREMENT
J1A-34	Pin 1	Close to 0 Ω (continuity)
J1A-33	Pin 2	

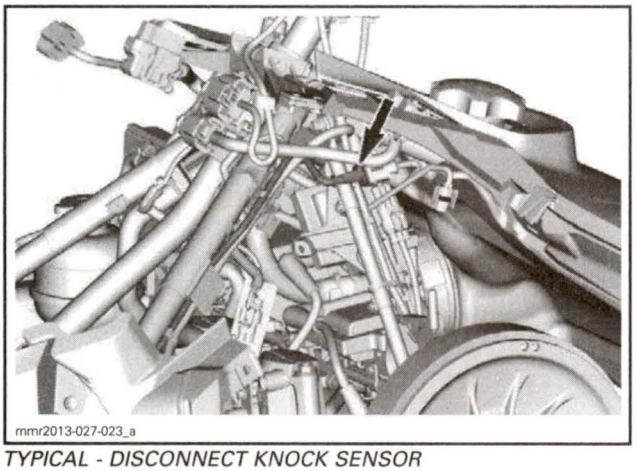


If test is not good, repair/replace wiring/connectors between ECM and knock sensor.

If test is good, try a new knock sensor.

KS Replacement

1. Unscrew and remove knock sensor from cylinder head.
2. Remove drive belt guard. Refer to *DRIVE BELT* subsection.
3. Remove primary air intake silencer. Refer to *AIR INTAKE SYSTEM* subsection.
4. Disconnect knock sensor connector located near ATS.



TYPICAL - DISCONNECT KNOCK SENSOR

5. Clean contact surfaces on cylinder head, then install the new knock sensor.
6. Torque knock sensor screw to 29 N•m (21 lbf•ft).

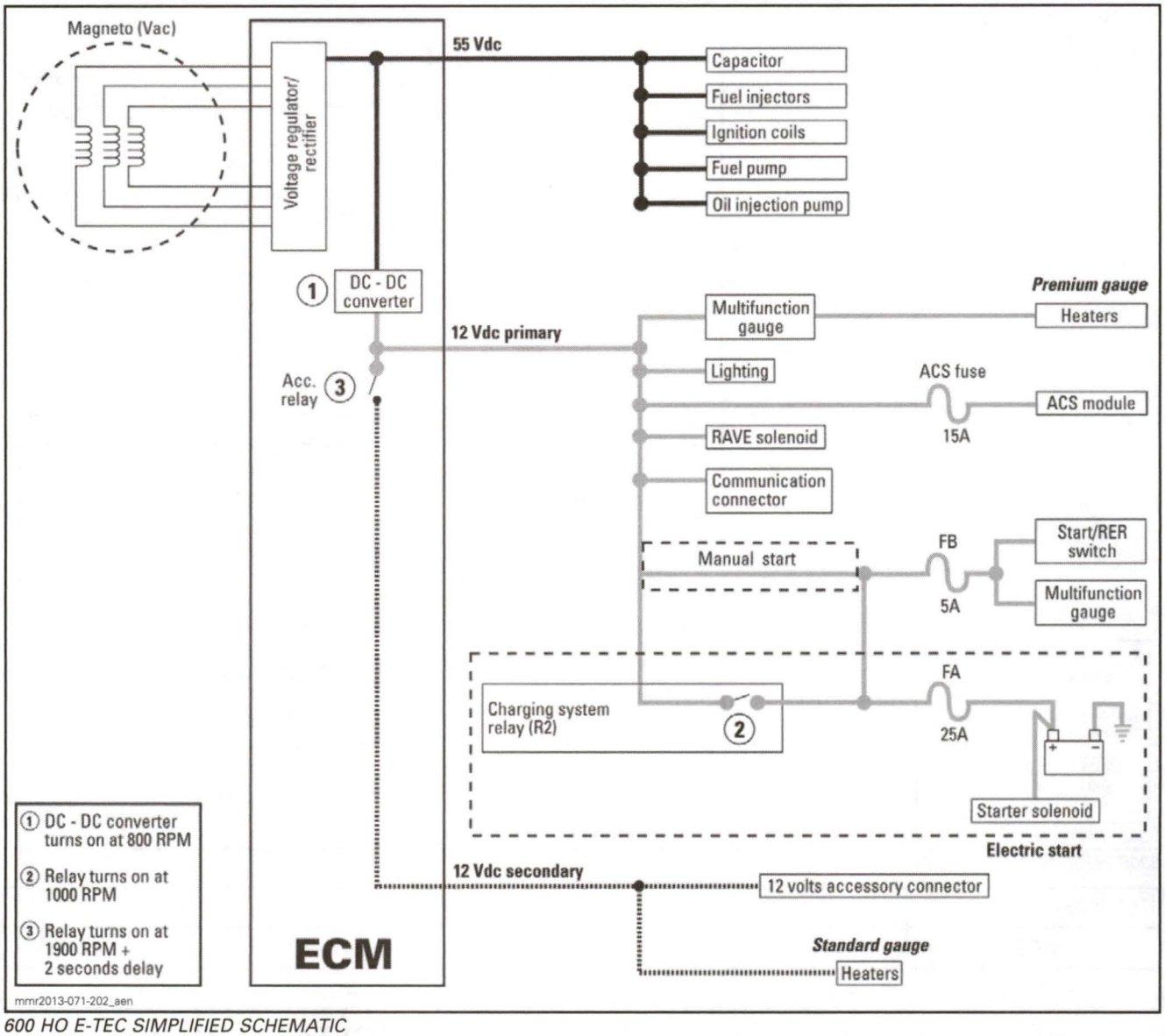
NOTICE **Improper torque may prevent sensor from functioning properly possibly leading to severe internal engine component damage.**

7. Reconnect connector.
8. Reinstall remaining parts.

POWER DISTRIBUTION (E-TEC)

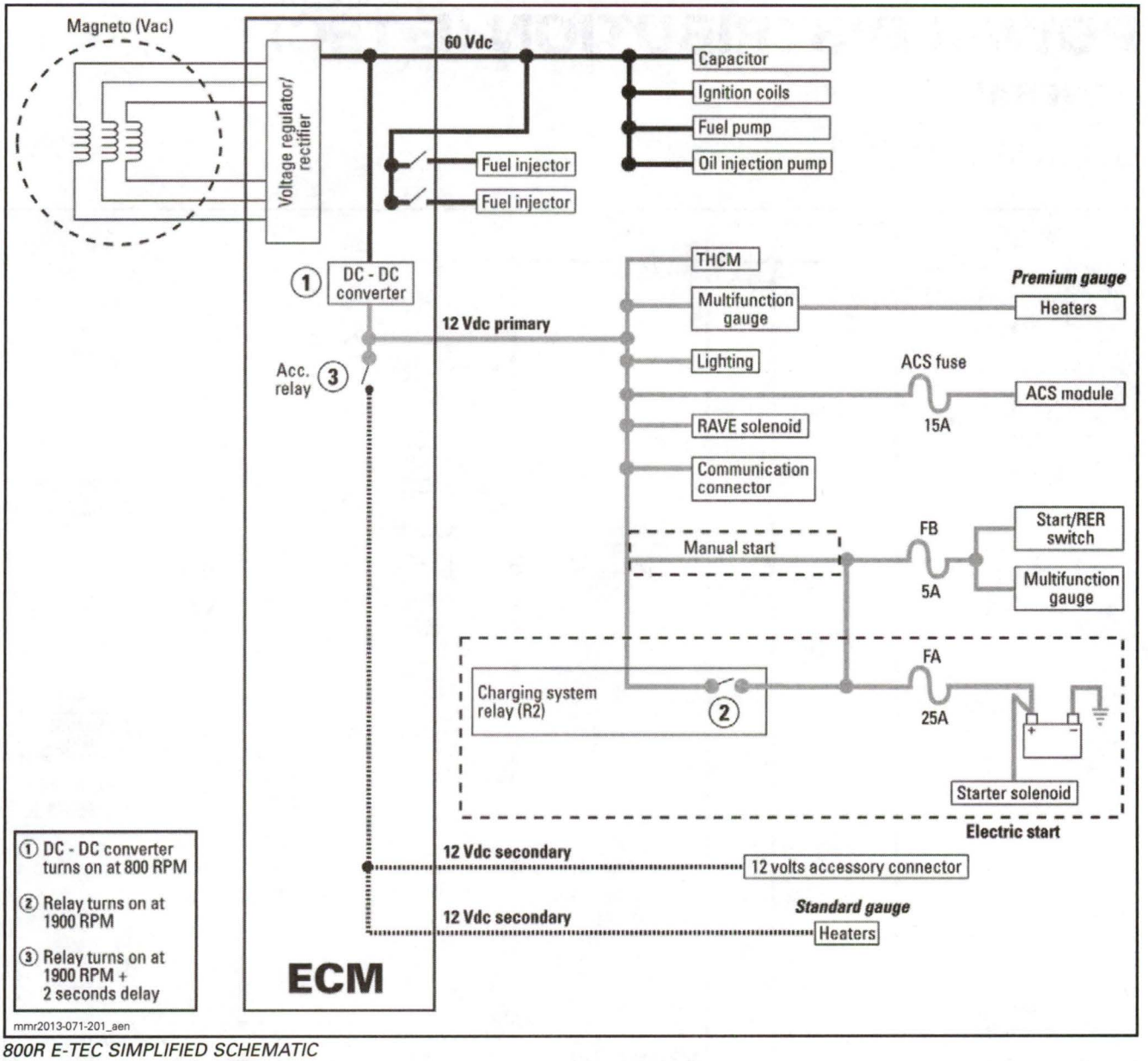
GENERAL

OVERVIEW



600 HO E-TEC SIMPLIFIED SCHEMATIC

Acc. relay	Accessory relay
ACS	Air controlled suspension



800R E-TEC SIMPLIFIED SCHEMATIC

Acc. relay	Accessory relay
ACS	Air controlled suspension
THCM	Thermocouple module

The vehicle requires the highest possible voltage at low RPM (to quickly supply the fuel pump, injectors and ignition coils) and the highest possible current at higher RPM (to properly supply the engine electrical loads that increase with RPM and all the other components like RAVE valves, gauge, lights and heaters). To achieve this, the stator windings are connected in series at low RPM to meet the voltage requirements and then connected in parallel at higher RPM to meet the current requirements. This series-parallel switch is done in the ECM.

SYSTEM VOLTAGE (12 VDC)

Primary Voltage (12 Vdc)

Since the available power is not at its maximum at the early stage of engine starting, the ECM supplies 12 Vdc to the components that are critical for the engine and vehicle when engine reaches 800 RPM.

- THCM (thermocouple module) on some models
- RAVE solenoid
- Communication connector

- Lighting system
- Multifunction gauge (and heaters on Premium gauge models).
- ACS (air controlled suspension).

Secondary Voltage (12 Vdc)

When the conditions indicated in the chart are met, the accessory relay inside the ECM closes and power is delivered to the vehicle accessories (heaters on Standard gauge models) 12 V power outlet and other accessories).

POWER DISTRIBUTION SUMMARY

ENGINE OPERATION	VOLTAGE DELIVERED	COMPONENT SUPPLIED
Any engine speed	55/60 Vdc	– ECM (internally powered) – Fuel pump – Fuel injectors – Ignition coils – Electronic oil injection pump
When engine reaches 800 RPM	12 Vdc	– THCM (thermocouple module) on some models – RAVE solenoid – Communication connector – Lighting system – Multifunction gauge (and heaters on Premium gauge models) – ACS (air controlled suspension)
When engine reaches 1000 RPM	12 Vdc	– Battery charging on electric start models
When engine reaches 1900 RPM + 2 second delay	12 Vdc	– (and heaters on Standard gauge models) – 12 V power outlet – Other accessories

IGNITION SYSTEM

SERVICE TOOLS

Description	Part Number	Page
POWER INTERFACE	515 177 223	113
T-HARNESS	529 035 869	113

Wiring diagrams are found in the *WIRING DIAGRAM BOOKLET.*

For electrical tests, use the POWER INTERFACE (P/N 515 177 223) instead of the T-HARNESS (P/N 529 035 869).

GENERAL

SYSTEM DESCRIPTION

Spark Plugs

800R E-TEC

The OEM spark plug used is specially indexed for optimum engine operation and efficiency.

If using a non OEM spark plug, a specific installation procedure must be followed. Refer to *PERIODIC MAINTENANCE PROCEDURE* subsection.

TROUBLESHOOTING

IGNITION SYSTEM TESTING SEQUENCE

800R E-TEC

If engine idles roughly or shows signs of increased emissions, the spark plugs may be incorrectly indexed. Refer to *PERIODIC MAINTENANCE PROCEDURE* subsection.

CHARGING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
FLUKE 115 MULTIMETER	529 035 868	116
POWER INTERFACE	515 177 223	115

SERVICE PRODUCTS

Description	Part Number	Page
DIELECTRIC GREASE	293 550 004	120

Wiring diagrams are found in the *WIRING DIAGRAM BOOKLET*.

For electrical tests, use the POWER INTERFACE (P/N 515 177 223) instead of the T-harness 529 035 869.

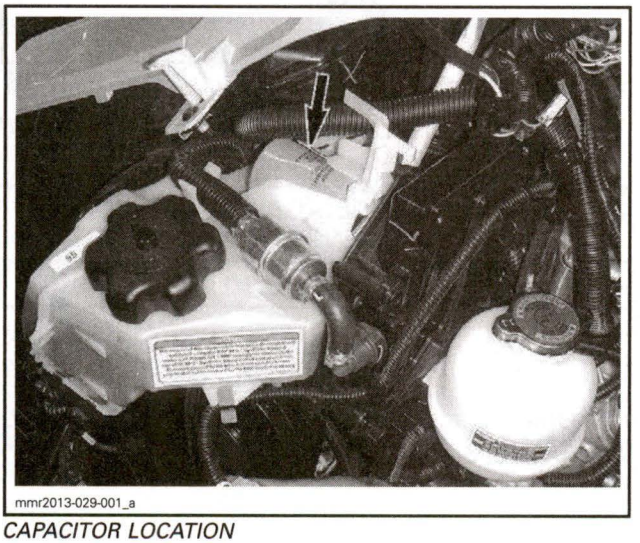
PROCEDURES

CAPACITOR

E-TEC Models

The fuel injectors, which require a stable 55/60 Vdc for their operation, are particularly sensitive to voltage variations. A capacitor is connected to the 55/60 Vdc electrical system to stabilize the system voltage.

The capacitor is located on the RH side of the vehicle, just on top of oil injection reservoir.



CAPACITOR LOCATION

Quick Troubleshooting

A faulty capacitor will lead to the following symptoms:

- Unstable, low, or no system voltage (55/60 V).
- Engine will not start
- Engine hard to start
- Poor idling
- Engine misfiring.

NOTE: A defective capacitor is likely to give off a burn like odor.

Discharging Capacitor

⚠ WARNING

The capacitor remains charged approximately 10 seconds after engine is stopped. A high energy could suddenly be discharged if capacitor terminals were shorted. Always discharge capacitor before servicing.

To properly discharge capacitor, leave it connected for at least 10 seconds after engine has been stopped, or after engine was last cranked before carrying out any maintenance procedure on the capacitor or 55/60 volt electrical system.

Capacitor Charge Hold Test

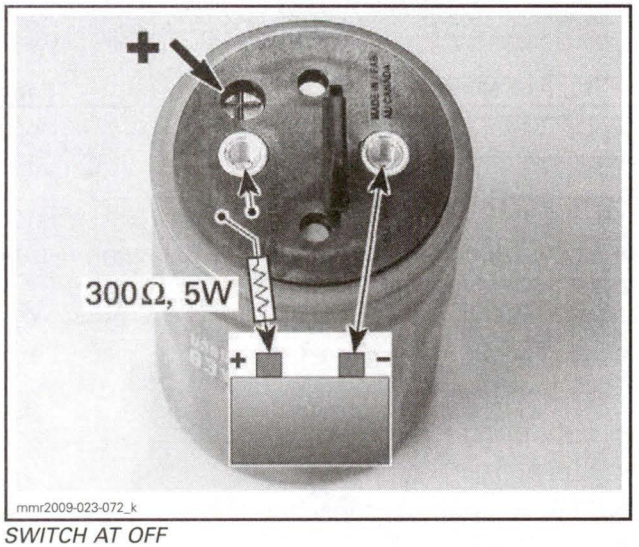
Procedure Setup

1. Remove capacitor from vehicle. Refer to *CAPACITOR REMOVAL* in this subsection
2. Work on a non metallic workbench.
3. Connect the following items to the capacitor. See following illustration.
   - A switch
   - Resistor (300 Ω/5 W)
   - 12 V battery (fully charged).

NOTICE Ensure the test switch is in the OFF position when connecting the battery to the capacitor to prevent sparking or electrical shock.

⚠ WARNING

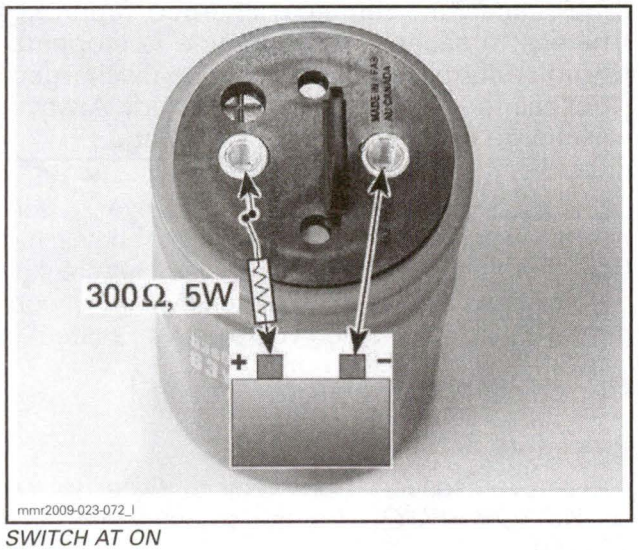
Connect the battery POSITIVE post to the capacitor POSITIVE terminal.



SWITCH AT OFF

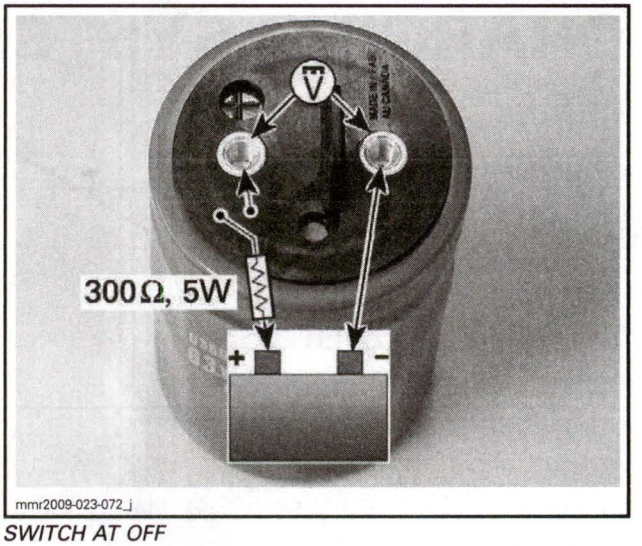
Test Procedure

1. Turn switch to **ON** and read capacitor voltage. Wait until voltage reaches 12 V.



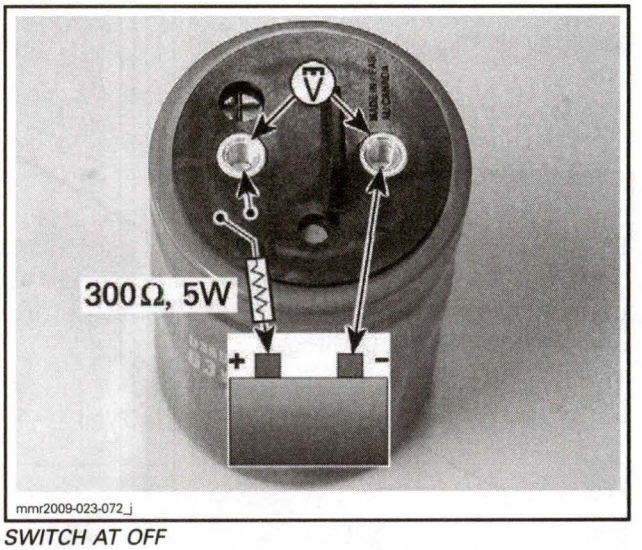
SWITCH AT ON

2. Turn test switch to **OFF**.
3. Use the FLUKE 115 MULTIMETER (P/N 529 035 868) set to Vdc.
4. Read capacitor voltage.



SWITCH AT OFF

5. Wait 5 minutes.
6. Read capacitor voltage again.



SWITCH AT OFF

7. The difference between the readings should not exceed the specification.

ALLOWED VOLTAGE DIFFERENCE BETWEEN READINGS
0.5 Vdc

If readings are out of specification, replace capacitor.

Reinstall capacitor. Refer to *CAPACITOR INSTALLATION* in this subsection.

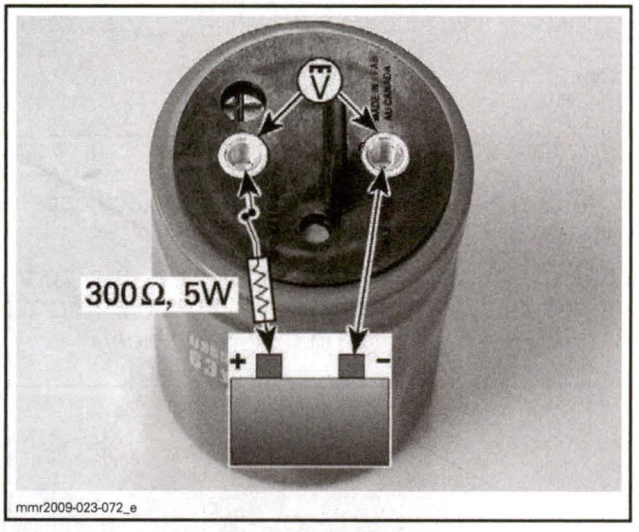
Capacitor Residual Voltage Test

Procedure Setup

Follow the same steps as described in Procedure Setup of *CAPACITOR CHARGE HOLD TEST* above.

Test Procedure

1. Turn switch to **ON** and read capacitor voltage. Wait until voltage reaches 12 V to ensure the capacitor is fully charged.

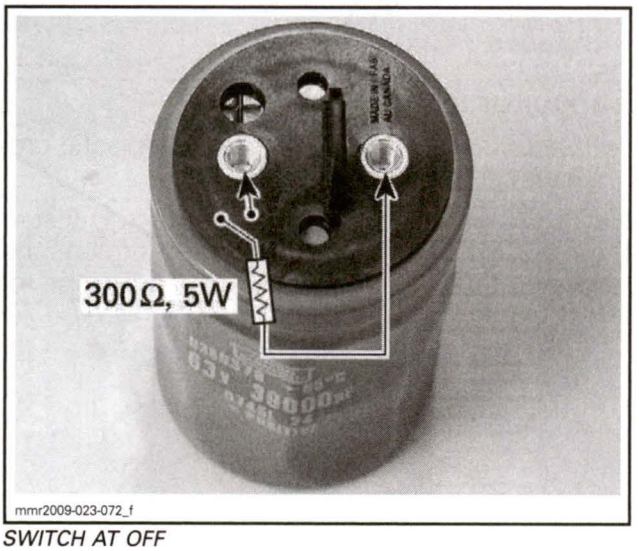


2. Turn test switch to **OFF**.

NOTE: Carry out the following steps **within one minute** to ensure the capacitor does not begin to discharge before the test.

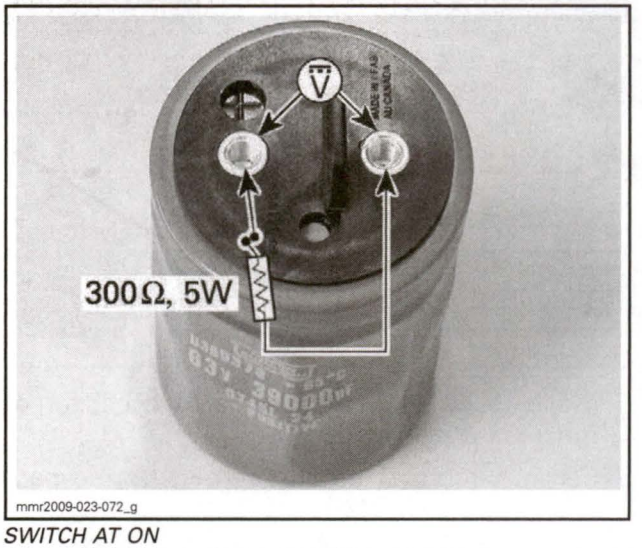
3. Remove battery from circuit and connect the resistor and switch across capacitor terminals.

NOTICE **Ensure test switch is in the OFF position during the circuit configuration change.**



SWITCH AT OFF

4. Turn test switch to the **ON** position for 12 seconds ± 1 second to slowly discharge capacitor.
5. Read capacitor voltage.



SWITCH AT ON

CAPACITOR RESIDUAL VOLTAGE
Must be above 2.6 Vdc

If voltage is out of specification, replace capacitor.

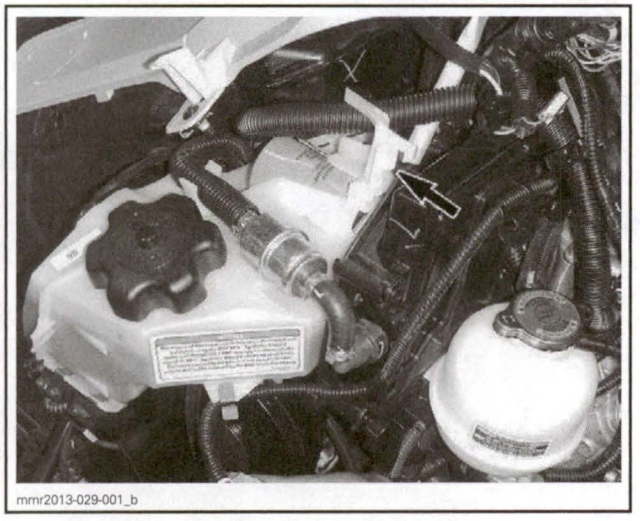
Capacitor Removal

1. Disconnect magneto connector.

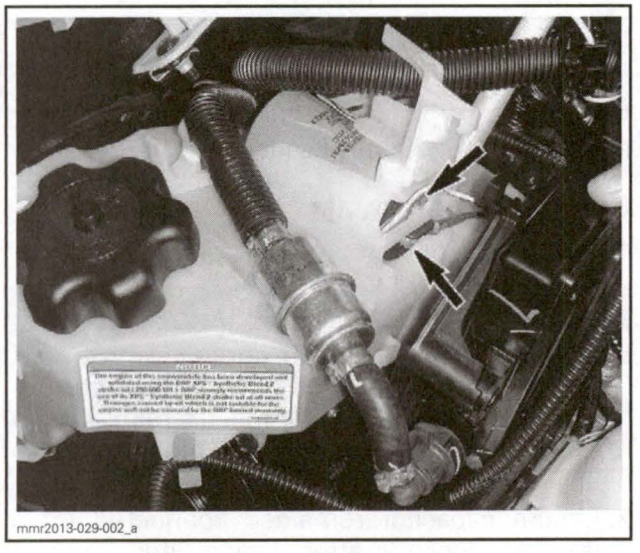
⚠ WARNING

Disconnect the magneto connector. Should the engine be made to rotate with magneto connected, a spark may occur resulting in electrical shock, a fire or an explosion.

2. Ensure capacitor remained connected for at least 10 seconds after engine shut down, or after engine was last cranked. This ensures capacitor is fully discharged.
3. Remove upper body module. Refer to *BODY* subsection.
4. Release fuel hose from oil injection tank clip.
5. Unlock ECM support and slide toward right.


mmr2013-029-001_b

6. Move ECM support away from capacitor as much as possible.
7. Carefully remove terminal screws from capacitor.

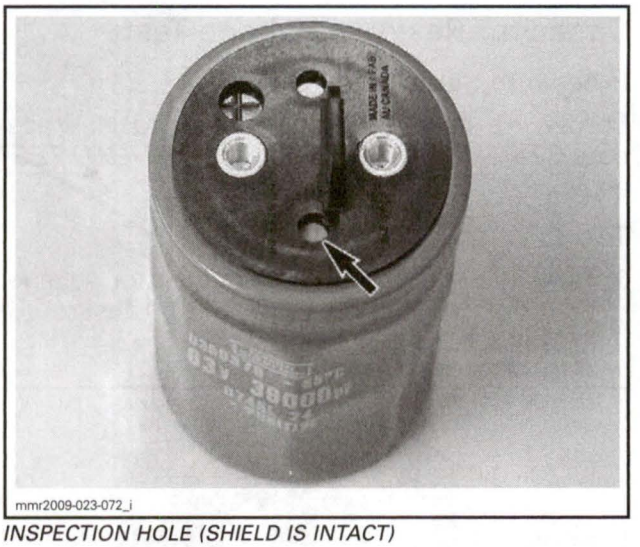

mmr2013-029-002_a

8. Pull out capacitor toward rear.

⚠ WARNING

Do not remove plastic protector from top of capacitor unless the capacitor is to be replaced. The cover prevents the two capacitor contacts from being easily shorted together which may cause a spark, possibly resulting in a fire.

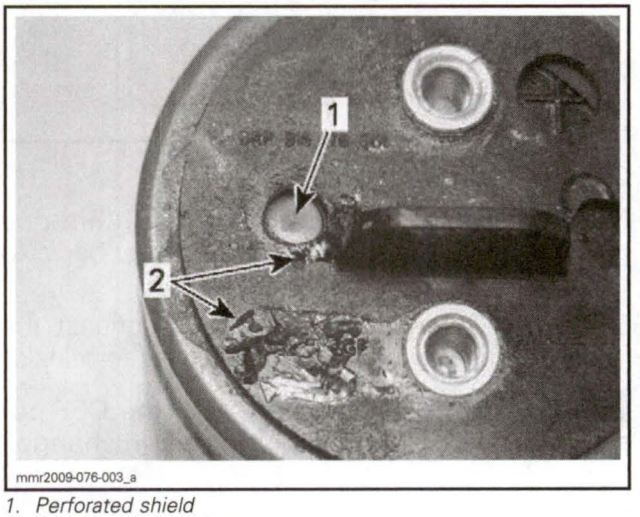
9. Check inspection hole on top of capacitor.


mmr2009-023-072_i

INSPECTION HOLE (SHIELD IS INTACT)

If the top shield is open (pierced), replace capacitor.

NOTE: The following illustration shows a perforated shield with capacitor fluid leakage. This capacitor was connected in reverse polarity.



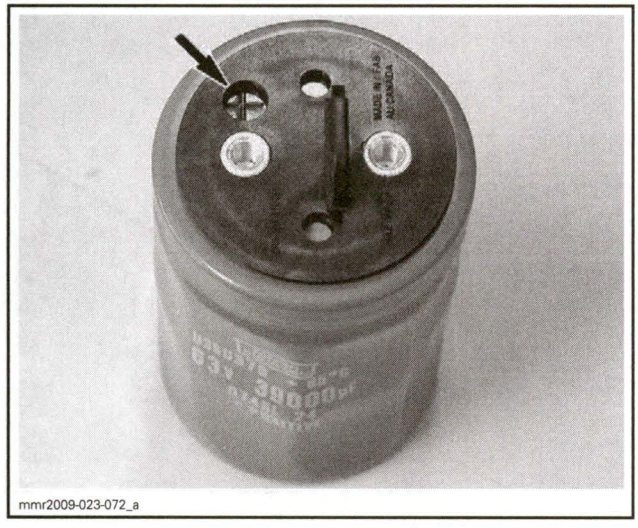
mmr2009-076-003_a

1. *Perforated shield*
2. *Capacitor fluid leakage*

Capacitor Installation

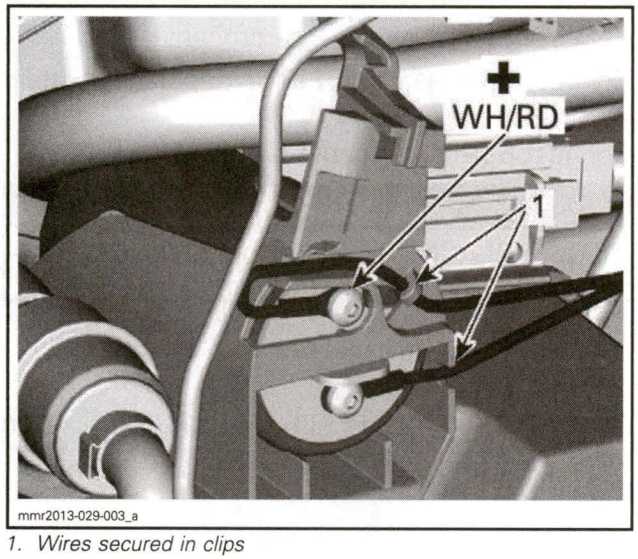
1. If capacitor was replaced, install a plastic protector cap on new capacitor.

NOTE: When reinstalling plastic protector, ensure the + sign on top of capacitor is visible through the hole in protector. Otherwise, pull off protector, rotate it one half turn, then reinstall it.


mmr2009-023-072_a

2. Route capacitor wires as per illustration and connect wire terminals to capacitor. Connect the WH/RD wire to the + terminal.

NOTICE **Improper polarity could destroy the capacitor while in operation.**



mmr2013-029-003_a

1. Wires secured in clips

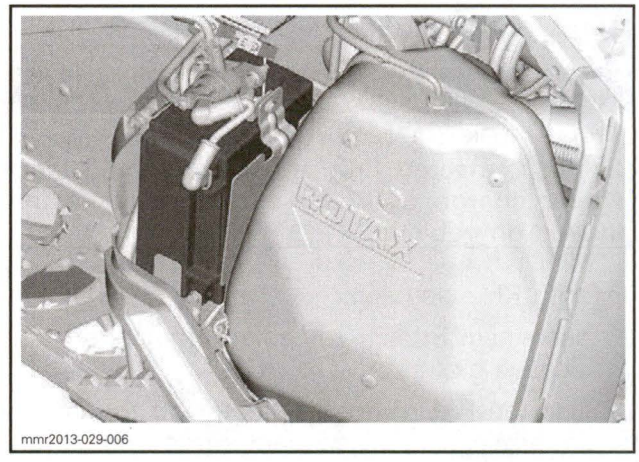
NOTICE **Be careful not to damage threads when tightening capacitor screws.**

3. Torque screws to 2 N•m (18 lbf•**in**).
4. Complete assembly of remaining parts in the reverse order of removal.

BATTERY

E-TEC Models

Electric start models are equipped with a sealed valve regulated lead acid (VRLA) battery. It is a non-spillable, maintenance-reduced type (no electrolyte level to be checked and readjusted). No ventilation tube is attached to the battery.


mmr2013-029-006

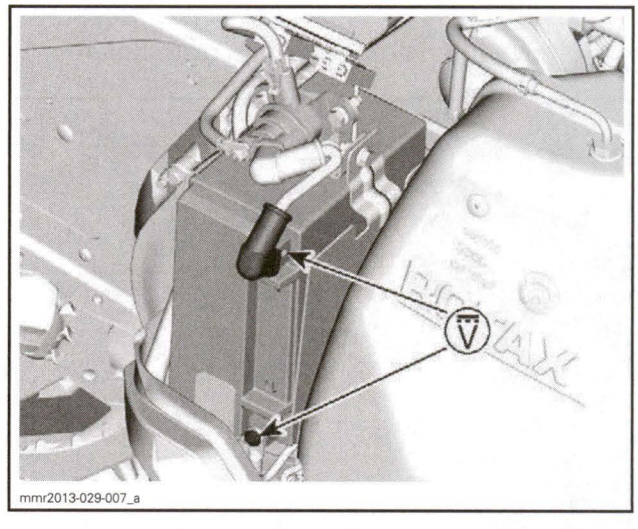
Battery Testing

Battery Voltmeter Test (No Load Applied)

NOTE: An unloaded voltmeter test is carried out on a battery without discharging current. It is the simplest and most commonly used. However, be aware that a voltage test can indicate that the battery is in good condition even though the battery does not have enough power to crank the engine. A voltage reading provides an instant indication of the state of charge of the battery, not of its current storage capacity. A battery load test gives a more accurate indication of the battery condition.

If the battery has just received a charge, allow it to rest for 1 - 2 hours before taking a voltage reading.

Set multimeter to Vdc and connect to battery terminals. Always respect polarity.


mmr2013-029-007_a

Batteries with a voltage above 12.8 V do not need to be charged.

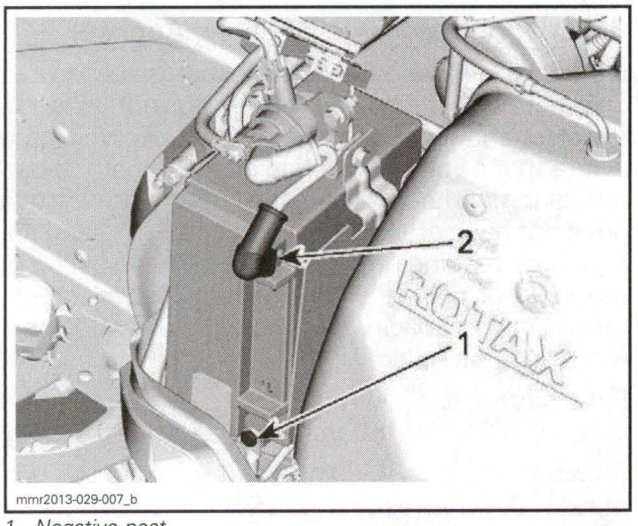
Batteries with a voltage of 12.8 V and below need to be charged. Refer to *BATTERY CHARGING* in this subsection.

Battery Removal

⚠ WARNING

The BLACK (–) battery cable must always be disconnected first and reconnected last. Never charge or boost a battery while installed on vehicle.

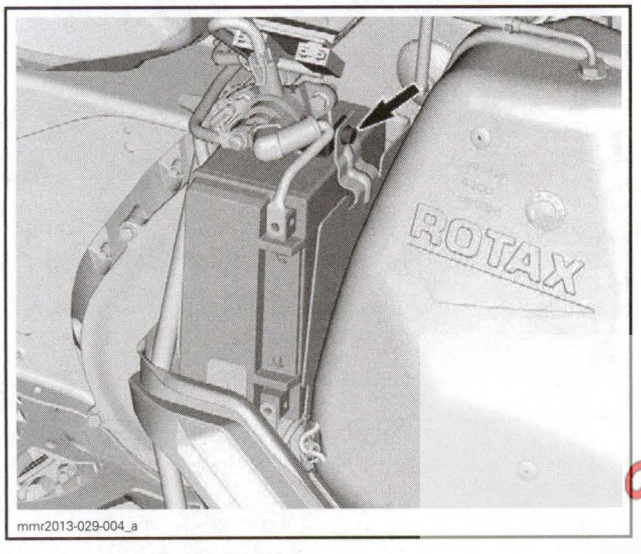
1. Open RH side panel.
2. Disconnect BLACK (–) cable terminal from the negative battery post.
3. Slide the RED rubber protector off the (+) cable terminal and disconnect it from the battery post.



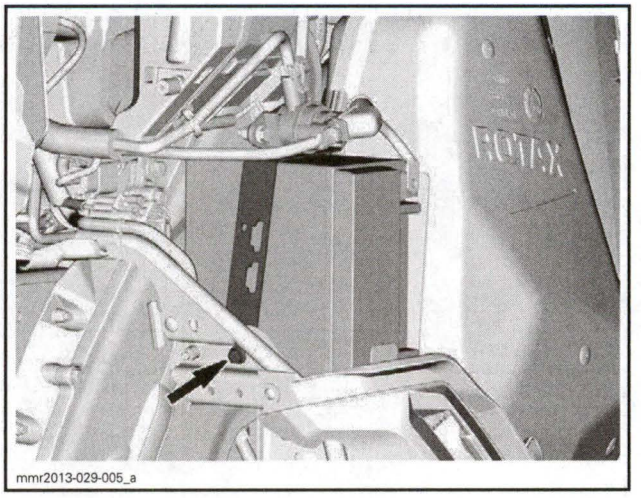
mmr2013-029-007_b

1. Negative post
2. RED rubber protector on positive post

4. Remove the battery retaining plate bolts.



mmr2013-029-004_a



mmr2013-029-005_a

5. Remove battery.

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

Battery Installation

Reinstall battery and secure properly.

Connect **RED (+) cable FIRST** to positive battery terminal.

Connect **BLACK (–) cable LAST**.

⚠ WARNING

Battery BLACK (–) cable must always be disconnected first and reconnected last.

Cover the RED (+) cable terminal with the protective rubber boot.

Apply DIELECTRIC GREASE (P/N 293 550 004) on battery posts and connectors.

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

STARTING SYSTEM

SERVICE TOOLS

Description	Part Number	Page
POWER INTERFACE	515 177 223	121
T-HARNESS	529 035 869	121

Wiring diagrams are found in the *WIRING DIAGRAM BOOKLET*.

For electrical tests, use the POWER INTERFACE (P/N 515 177 223) instead of the T-HARNESS (P/N 529 035 869).

GENERAL

STARTING SYSTEM BASICS

Conditions for Engine Cranking

- Emergency engine stop switch set to RUN
- Tether cord cap installed
- START/RER button depressed.

Starting System Operation

1. The START/RER switch:
   1.1 Supplies starter solenoid
   1.2 Sends a 12-volt signal to the ECM
2. ECM grounds starter solenoid pin B.
3. Starter solenoid contacts close and supply the starter motor with battery power.

In case of starter malfunction, first ensure the problem is not related to an engine mechanical component.

TROUBLESHOOTING

TROUBLESHOOTING TIPS

It is good practice to check for fault codes using B.U.D.S. as a first troubleshooting step. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.

Refer to *POWER DISTRIBUTION AND GROUNDS* for relay information.

Always refer to the *WIRING DIAGRAM* when troubleshooting an electrical circuit.

NOTICE Never force a multimeter probe into an electrical terminal.

PROCEDURES

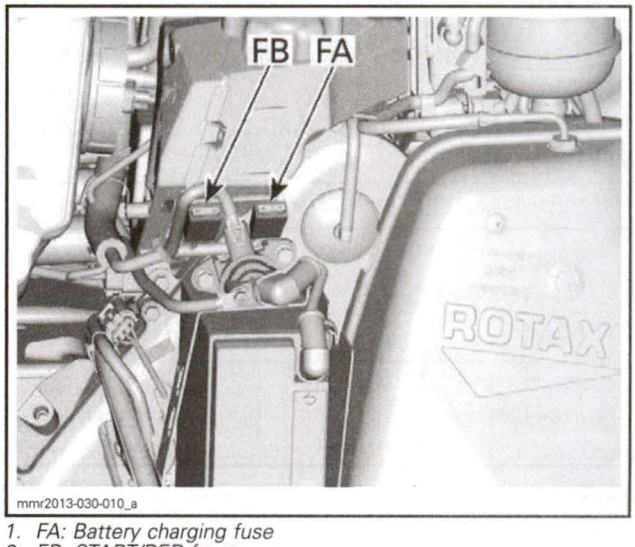
FUSES

Fuse Inspection

Fuses are located behind the RH side panel above battery.

Check Start/RER (FB) fuse condition and replace as necessary.

NOTE: When a burnt fuse is found, always identify the cause before replacing it.



1. *FA: Battery charging fuse*
2. *FB: START/RER fuse*

ELECTRIC STARTER

Starter Operation Test

1. Apply parking brake.
2. Disconnect injector connectors to prevent engine from starting.
3. Crank engine.
4. The starter should rotate powerfully and regularly.
5. If it does not, try the following:
   5.1 Set emergency engine stop switch to STOP.

5.2 Remove tether cord cap from the engine cut-off switch.

5.3 Manually rotate the engine using the drive pulley.

5.4 If the engine cannot be rotated, check engine.

⚠ WARNING

When manually rotating engine, the emergency engine stop switch MUST BE set to STOP and tether cord cap MUST NOT be installed or severe injury may occur.

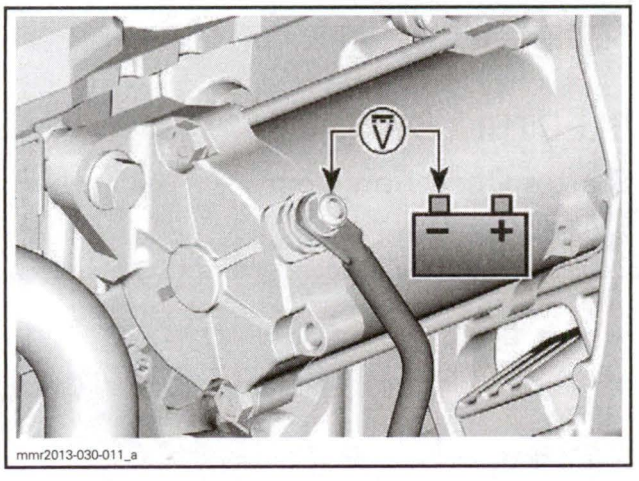
5.5 If the engine can be rotated, carry out a *STARTER INPUT VOLTAGE TEST.*

Starter Input Voltage Test

1. Set multimeter to Vdc.
2. Disconnect injector connectors to prevent engine from starting.
3. Measure voltage as per table while cranking engine.

NOTE: Battery voltage will drop and fluctuate with starter cranking load.

STARTER INPUT VOLTAGE TEST		
TEST PROBES		RESULT (WHILE PRESSING START/RER BUTTON)
Starter terminal	Battery negative post	Battery voltage



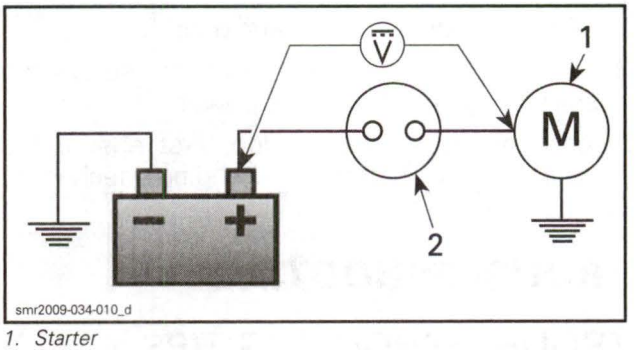
TEST RESULTS	
READING	WHAT TO DO
No voltage	Check Start/RER switch using B.U.D.S.
Voltage is low	Carry out a *STARTER CABLE VOLTAGE DROP TEST.*
Voltage is good	Carry out a *GROUND CIRCUIT VOLTAGE DROP TEST.*

Starter Cable Voltage Drop Test

This test confirms if there is parasitic resistance in the cable, solenoid or connections.

1. Set multimeter to Vdc.
2. Connect multimeter probes to the starter terminal and battery positive post.
3. Disconnect injector connectors to prevent engine from starting.
4. Measure voltage drop as follows while cranking engine.

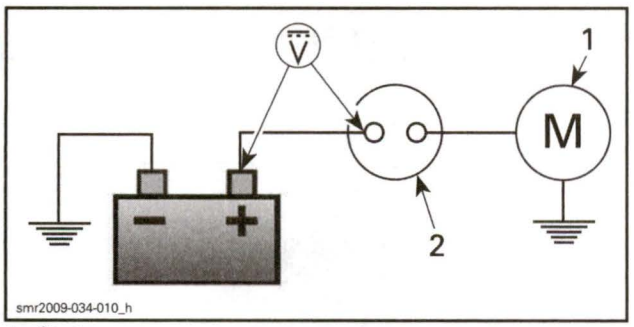
STARTER CABLE VOLTAGE DROP TEST		
PROBES		RESULT (WHILE STARTING)
Battery positive post	Starter terminal	1 Vdc maximum



1. Starter
2. Solenoid

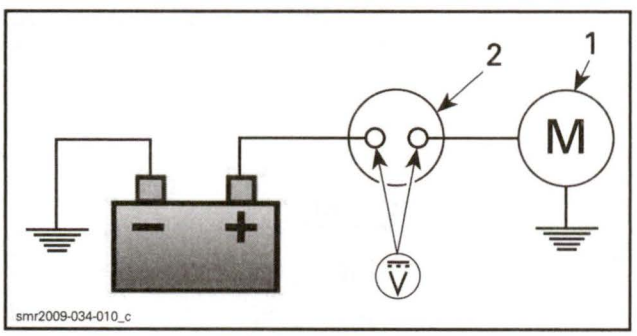
5. If voltage exceeds the specification, test voltage drop between the following points using the same method to determine what part of the circuit is at fault:

5.1 Battery positive post and starter solenoid post (cable from battery).

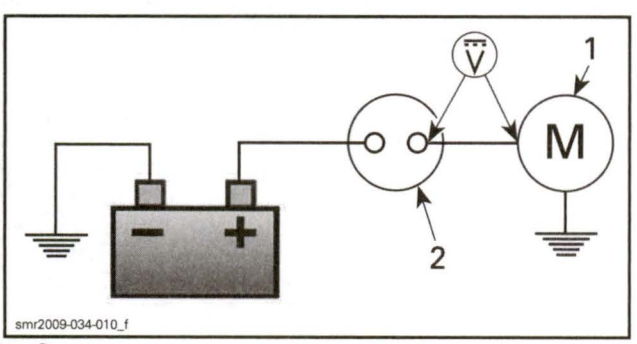


1. *Starter*
2. *Solenoid*

5.2 Both starter solenoid posts.



5.3 Starter solenoid post (to starter) and starter terminal.



1. *Starter*
2. *Solenoid*

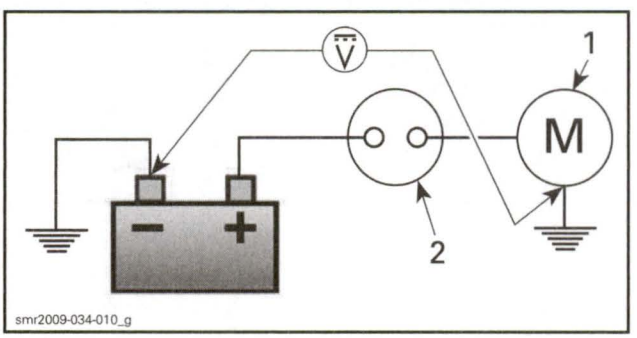
5.4 Replace cable(s) or solenoid if necessary.

Starter Ground Circuit Voltage Drop Test

This test confirms if there is parasitic resistance in the ground cables or connections.

1. Set multimeter to Vdc.
2. Connect multimeter probes to the starter housing and battery negative post.
3. Disconnect injector connectors to prevent engine from starting.
4. Measure voltage drop as follows while cranking engine.

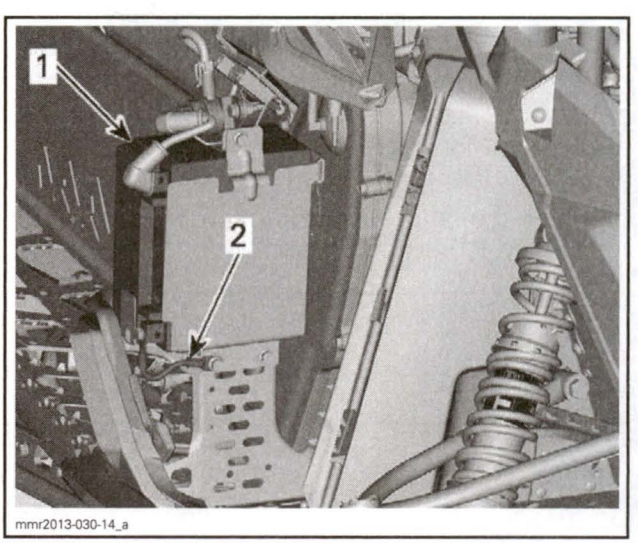
STARTER GROUND CIRCUIT VOLTAGE DROP TEST		
PROBES		RESULT (WHILE STARTING)
Starter housing	Battery negative post	0.8 Vdc maximum



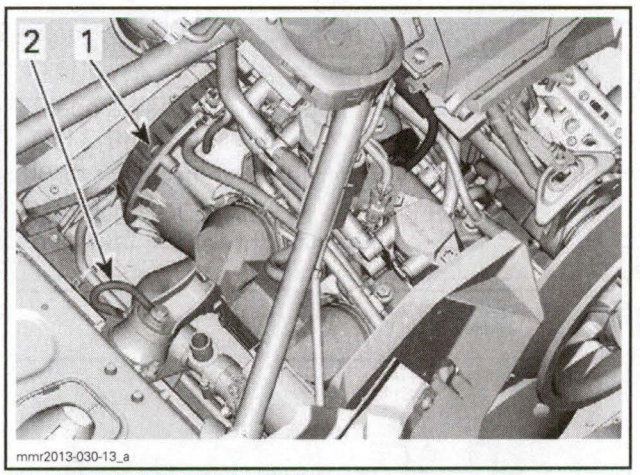
1. *Starter*
2. *Solenoid*

If voltage exceeds the specification, check ground cables and connections:

- from battery to chassis
- from engine support to chassis



RH SIDE, VIEWED FROM FRONT
1. *Battery*
2. *Battery ground*



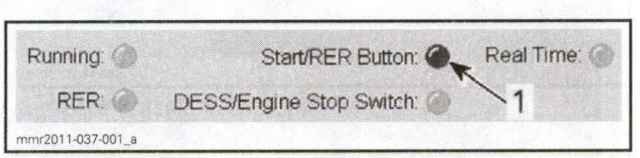
LH SIDE, VIEWED FROM FRONT
1. *Rewind starter*
2. *Engine ground*

If voltage is as per specification, test starter.

START/RER SWITCH

Start/RER Switch Test with B.U.D.S.

1. Connect the vehicle diagnostic connector to a computer with the appropriate version of the B.U.D.S. software. Refer to *COMMUNICATION TOOLS AND B.U.D.S.* subsection.
2. Select the **Read Data** button.
3. Select the **Monitoring** and **ECM** tabs.
4. Set emergency engine stop switch to RUN and install tether cord cap on engine cut-off switch.
5. Press the start/RER button and look at the **Start/RER Button** indicator.



1. *Should turn ON*

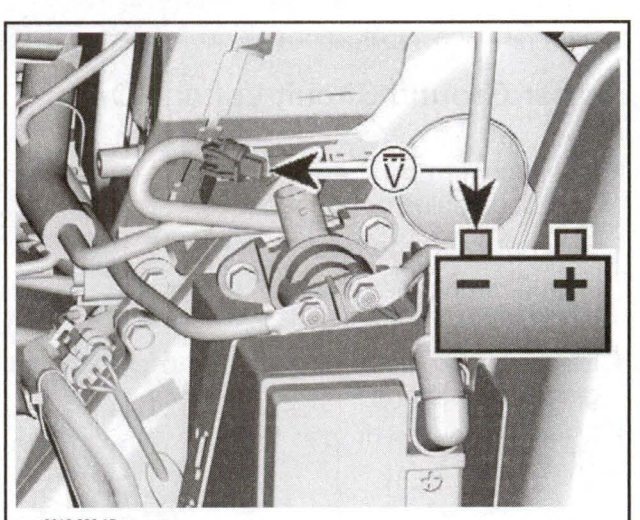
TEST RESULTS	
START/RER BUTTON INDICATOR IN B.U.D.S.	WHAT TO DO
Comes ON while start/RER button is pressed in	The starting system input side is functioning normally (start button, ECM, wiring and connections). Make sure engine stop switch tests good (see *IGNITION SYSTEM* subsection), then proceed with *STARTER SOLENOID TESTS*.
Does not come ON while start/RER button is pressed in	Check for an open circuit or defective start/RER switch. Refer to *WIRING DIAGRAM*.

STARTER SOLENOID

Starter Solenoid Input Voltage Test

1. Disconnect connector from solenoid and test voltage as follows.
2. Set emergency engine stop switch to RUN and install tether cord cap on engine cut-off switch.
3. Read voltage while start/RER button is pressed in.

STARTER SOLENOID INPUT VOLTAGE TEST		
TEST PROBES		RESULT (WHILE PRESSING START/RER BUTTON)
Terminal "A" (RD/GN)	Battery negative post	Battery voltage



If there is no voltage, check for an open circuit.

If voltage is as specified, carry out a *STARTER SOLENOID CONTROL CIRCUIT TEST.*

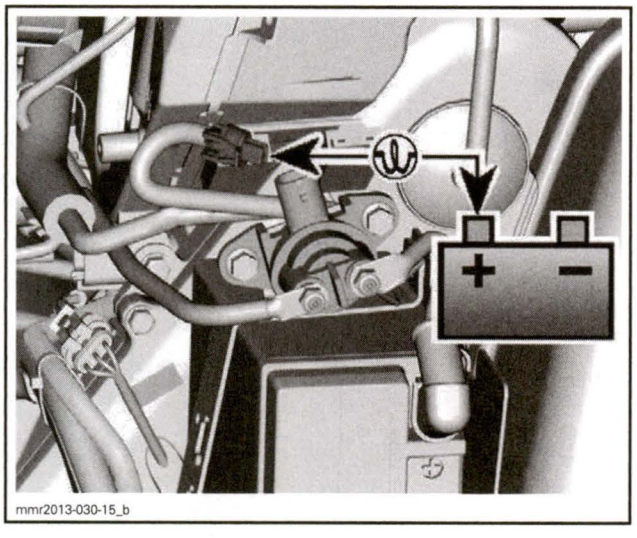
Starter Solenoid Control Circuit Test

1. Disconnect connector from solenoid.
2. Use a 12 Vdc test light and probe as per table.

IMPORTANT: Using a voltmeter could lead to false results.

3. Observe test light while start button is pressed in.

STARTER SOLENOID CONTROL CIRCUIT TEST		
TEST PROBES		RESULT (WHILE PRESSING START/RER BUTTON)
Terminal "B" (OR/BK)	Battery positive terminal	Test light should be bright



If test light does not turn on or is dimmed while cranking, check for an open circuit.

If test light is bright, the solenoid gets a proper ground signal. Carry out a *STARTER SOLENOID STATIC TEST: CONTINUITY.*

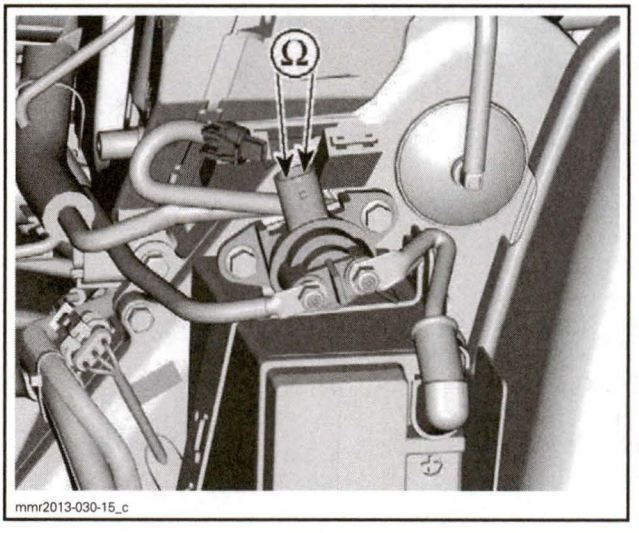
Starter Solenoid Static Test: Continuity

Disconnect battery.

Disconnect connector from solenoid.

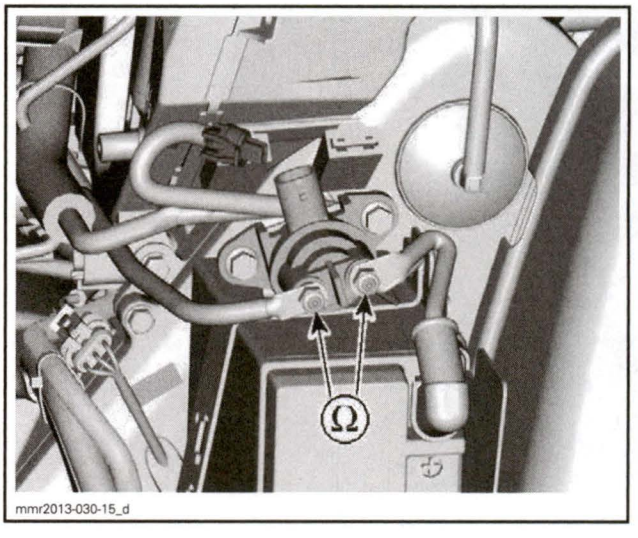
With a multimeter, measure the primary winding resistance as follows.

SOLENOID WINDING CONTINUITY TEST		
SOLENOID TERMINALS		MEASUREMENT
		RESISTANCE @ 20°C (68°F)
A	B	Approximately 5 Ω



Test for a stuck solenoid plunger as follows.

SOLENOID CONTACTS CONTINUITY TEST		
SOLENOID CONNECTOR		MEASUREMENT
Battery terminal	Starter terminal	Open circuit



If any measurement is out of specification, replace solenoid.

Reconnect battery and starter solenoid terminals.

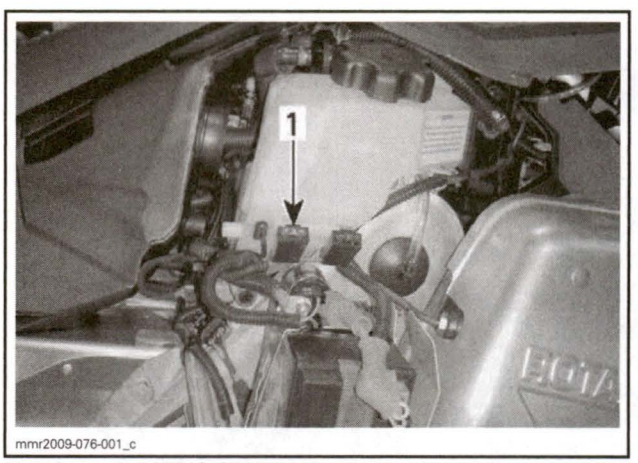
ROTAX ELECTRONIC REVERSE (RER)

SERVICE TOOLS

Description	Part Number	Page
POWER INTERFACE	515 177 223	127
T-HARNESS	529 035 869	127

Wiring diagrams are found in the *WIRING DIAGRAM BOOKLET*.

For electrical tests, use the POWER INTERFACE (P/N 515 177 223) instead of the T-HARNESS (P/N 529 035 869).



TYPICAL - ELECTRIC START MODEL ILLUSTRATED
1. RER fuse (FB)

TROUBLESHOOTING

DIAGNOSTIC TIPS

RER Does Not Respond When Depressing RER Button

Check the following:
- 5 A RER fuse condition
- Check if the ECM is properly configured in B.U.D.S.: The option **With Mechanical Reverse** check box must be NOT selected.
- *RER SWITCH SIGNAL TEST WITH B.U.D.S.*

PROCEDURES

RER FUSE

E-TEC Models

RER Fuse Location

The RER fuse is attached to the bottom of the oil tank.

To access fuse, open RH side panel. Refer to *BODY* subsection.

LIGHTS, GAUGE AND ACCESSORIES

SERVICE TOOLS

Description	Part Number	Page
12 V BATTERY SUPPLY CABLE	529 035 997	129
POWER INTERFACE	515 177 223	129

NOTE: Wiring diagrams are found in the *WIRING DIAGRAM BOOKLET*.

TROUBLESHOOTING

LIGHTING AND ACCESSORIES SYSTEM TESTING

600 and 800R Power TEK

To provide power to the lighting, accessories and heaters for testing, install the following items.

- POWER INTERFACE (P/N 515 177 223)
- 12 V BATTERY SUPPLY CABLE (P/N 529 035 997)
- 12-volt battery (for manual start)

OR

- Start engine.

E-TEC Models

To provide power to specific circuits, refer to the following chart to meet the required conditions.

SYSTEM	CONDITIONS REQUIRED
Lights	POWER INTERFACE (P/N 515 177 223) 12 V BATTERY SUPPLY CABLE (P/N 529 035 997)) 12-volt battery (for **manual start**)
Gauge	
Heaters (models with Premium gauge)	
Heaters (models with Standard gauge)	Start engine and rev above 2000 RPM for at least 2 seconds OR Use B.U.D.S. and activate the Accessory Relay
Accessories (power outlet)	

PROCEDURES

FUSES

Fuse Location

Fuel Level Sensor Fuse

E-TEC Models

There is no fuse in the fuel level sensor circuit.

Fuse Description

E-TEC Models

MODEL	FUSE	DESCRIPTION	LOCATION
Electric start	25 A	Battery charging (FA)	Attached to oil tank

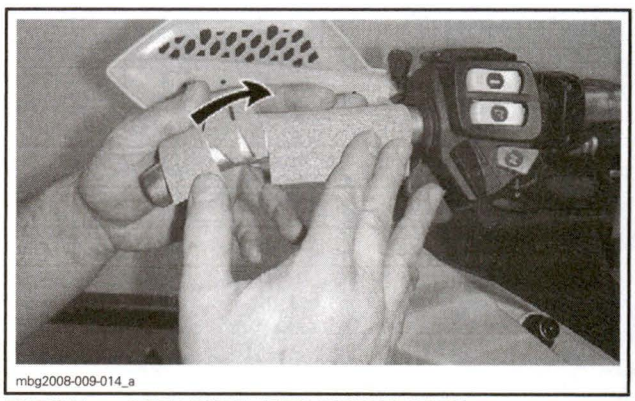
HEATED HANDLEBAR GRIPS

Heater Element Installation

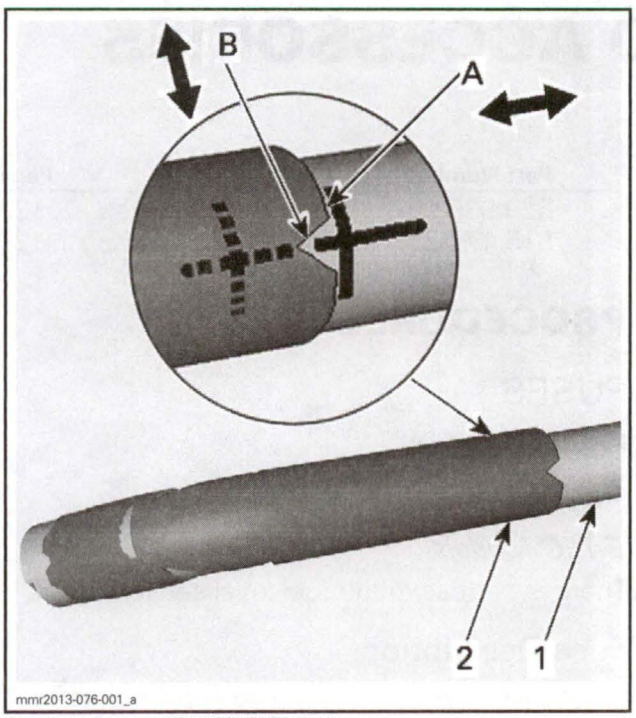
Models with Adhesive Film Heaters (Aluminum and Curved Steel Handlebars)

1. Align the "V" in the cork insulator as shown.

NOTE: On some models, a dot is used instead of a cross.



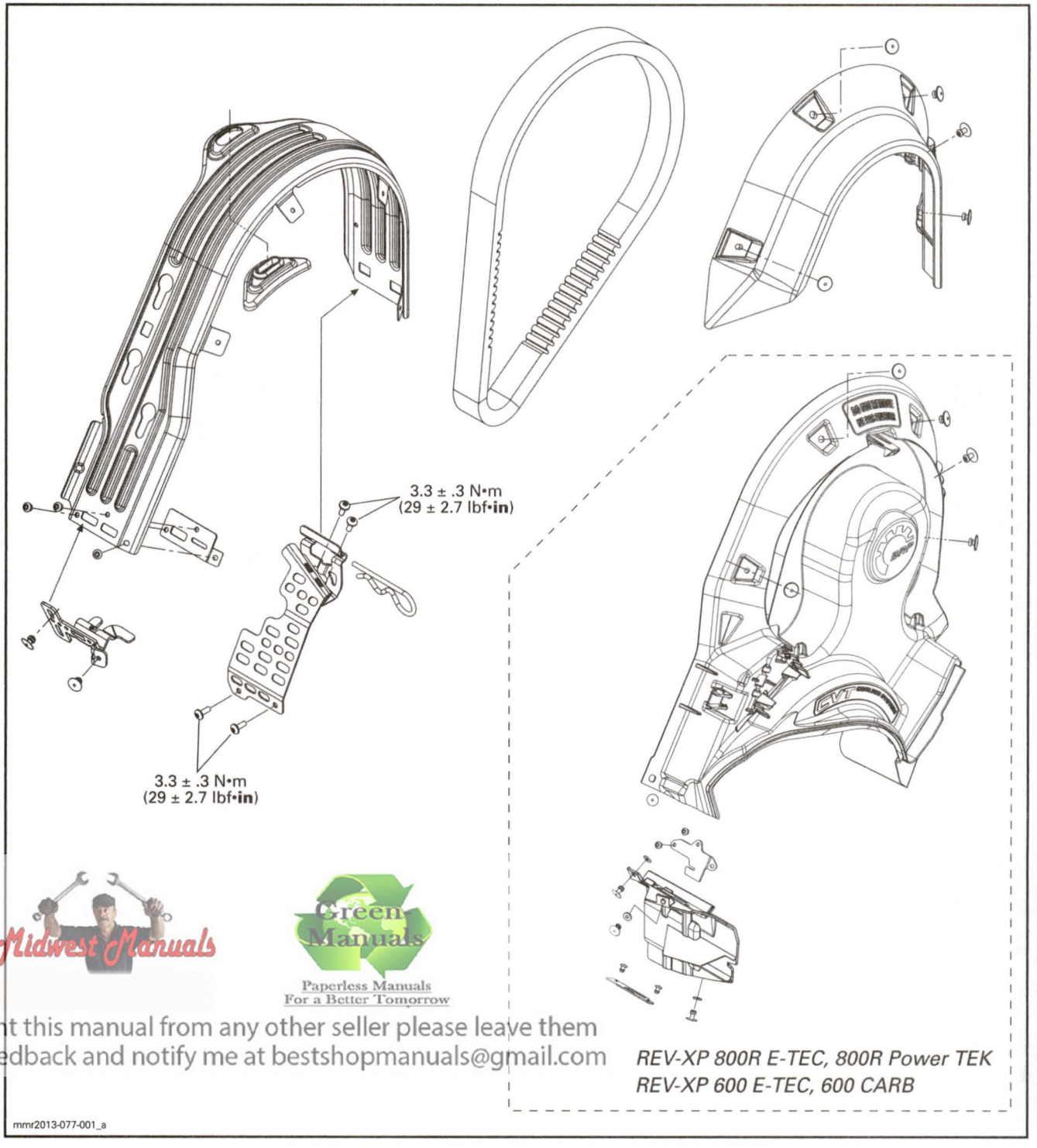
TYPICAL — CORK INSULATOR INSTALLATION



CORK INSULATOR POSITIONING
1. *Handlebar*
2. *Cork insulator*

A. Align the edge of insulator with innermost cross (or dot)
B. Align the "V" of insulator with the cross line (or dot)

DRIVE BELT



REV-XP 800R E-TEC, 800R Power TEK
REV-XP 600 E-TEC, 600 CARB

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them
NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

DRIVE PULLEY (eDRIVE II)

SERVICE TOOLS

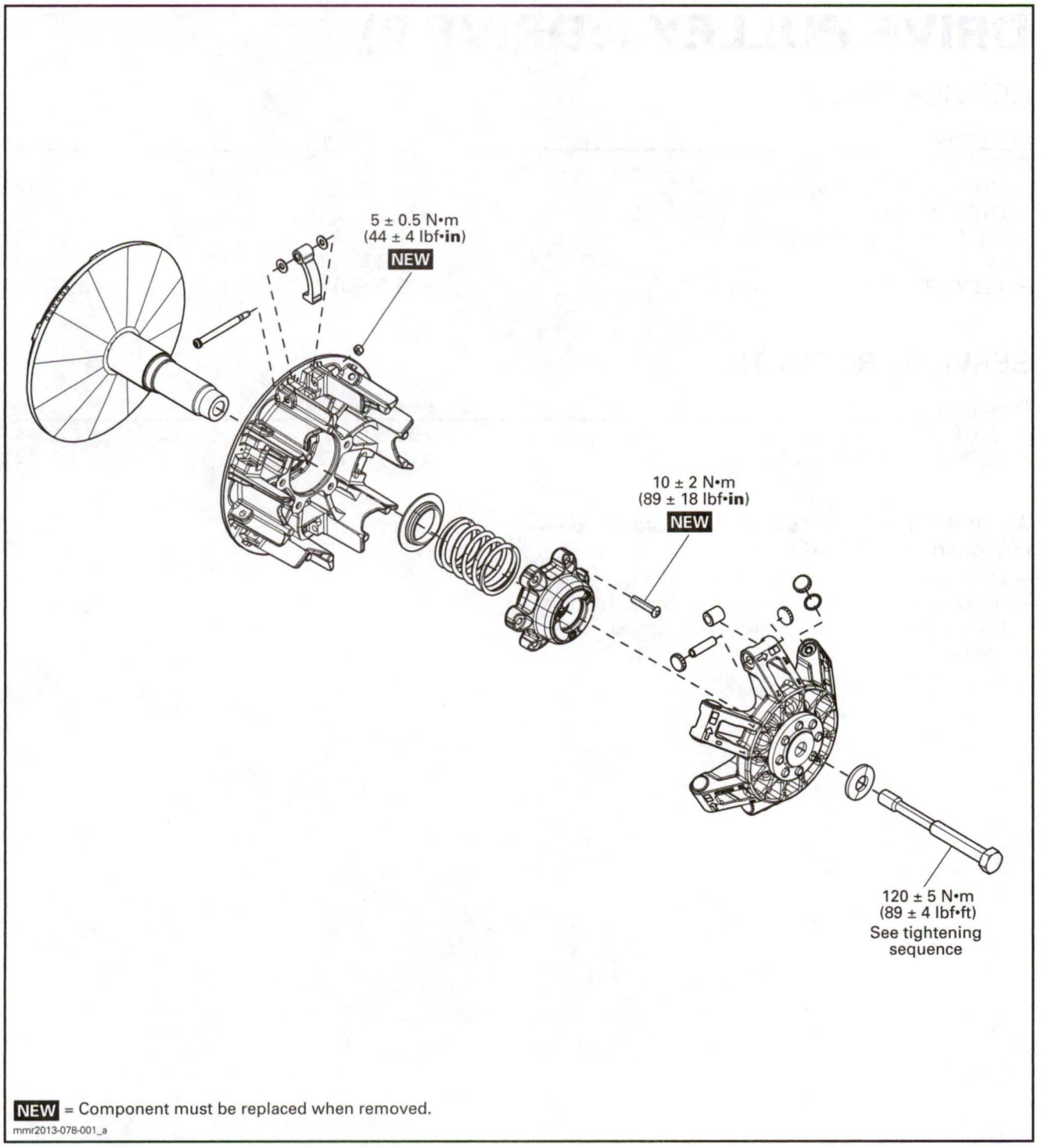
Description	Part Number	Page
BUSHING PULLER/INSTALLER	529 031 200	141
BUSHING REMOVER/INSTALLER	529 035 931	141
CLUTCH HOLDER	529 036 235	135
DRIVE PULLEY HOLDER (CVT)	529 006 400	137
DRIVE PULLEY PULLER	529 000 064	135
PULLEY SPRING COMPRESSOR TOOL	529 036 012	137, 141

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 680	293 800 118	141
PULLEY FLANGE CLEANER	413 711 809	138, 141

All REV-XR 1200 4-TEC and Tundra models equipped with 600 ACE

– New drive pulley. Resemble to eDrive pulley used last year and this year on Sport models (Expedition, Grand Touring, MX Z and Renegade).



NEW = Component must be replaced when removed.

mmr2013-078-001_a

GENERAL

This drive pulley is lubrication free. Never lubricate any components.

Some drive pulley calibration components (spring, ramps) can be changed to adapt to different altitudes. Refer to appropriate Service Bulletin.

⚠ WARNING

Any drive pulley repairs must be performed by an authorized Ski-Doo dealer. Subcomponent installation and assembly tolerances require strict adherence to procedures detailed.

⚠ WARNING

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.

NOTICE **This pulley has metric threads. Do not use a puller with ANS or IS type threads. Always tighten puller by hand to ensure that the drive pulley has the same type of threads (metric vs ANS or IS) prior to fully tightening.**

TROUBLESHOOTING

ERRATIC DRIVE PULLEY PERFORMANCE

1. **Damaged slider shoe O-ring.**
   - *Install new O-rings, refer to DRIVE PULLEY ASSEMBLY.*
2. **Missing slider shoe O-ring.**
   - *Install new O-rings, refer to DRIVE PULLEY ASSEMBLY.*
3. **Excessive wear on slider shoes.**
   - *Inspect slider shoes, refer to DRIVE PULLEY INSPECTION.*
4. **Excessive wear on rollers.**
   - *Inspect rollers, refer to DRIVE PULLEY INSPECTION.*

PROCEDURES

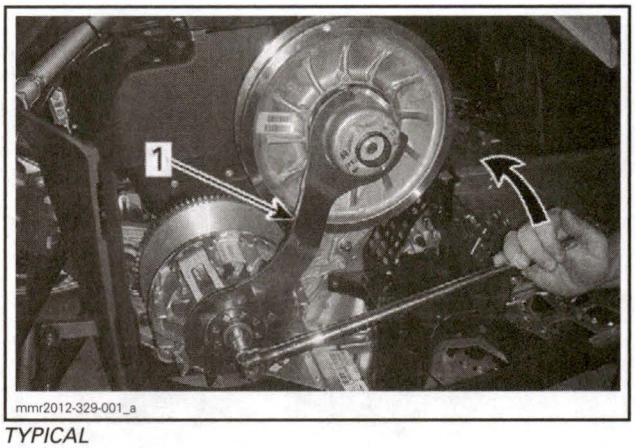
DRIVE PULLEY

Drive Pulley Removal

1. Remove drive belt. Refer to *DRIVE BELT* subsection.
2. Remove the drive pulley from engine.

REQUIRED TOOLS	
CLUTCH HOLDER (P/N 529 036 235)	
DRIVE PULLEY PULLER (P/N 529 000 064)	

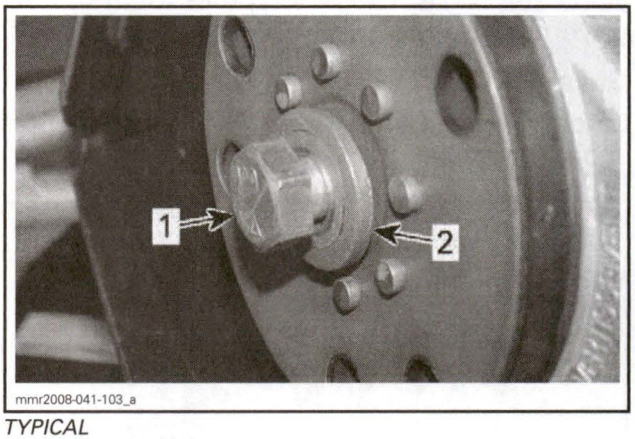
2.1 Using the clutch holder, hold the drive pulley in place.



TYPICAL
1. Clutch holder

2.2 Remove the drive pulley screw. Discard the conical spring washer.

NOTICE **Never use any type of impact wrench for drive pulley removal.**



TYPICAL
1. Drive pulley retaining screw
2. Conical spring washer

2.3 Using the drive pulley puller, remove the drive pulley from crankshaft end.

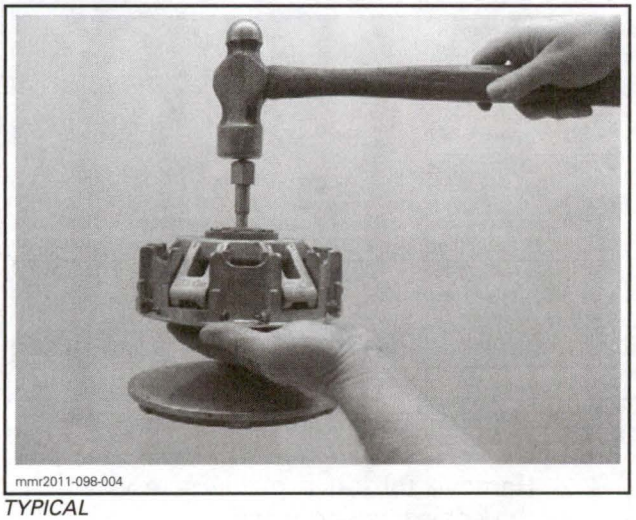
NOTICE **Always use the specified tool to avoid damaging crankshaft.**

Drive Pulley Disassembly

Fixed Sheave Removal

Separate fixed sheave from sliding sheave as follows:

- Screw puller into fixed sheave shaft (about 13 mm (1/2 in).
- Hold drive pulley in your hand by the sliding sheave as illustrated.
- Tap on puller head to disengage fixed sheave.



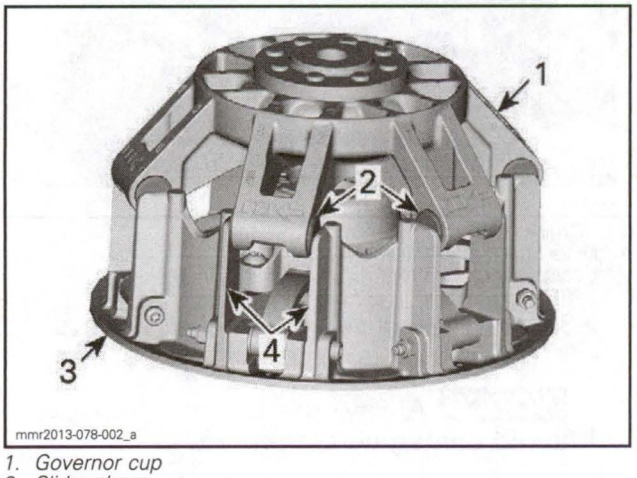
TYPICAL

NOTE: If necessary, use a heat gun to slightly heat the governor cup to ease disassembly.

NOTICE **Never use any type of torch to heat governor cup.**

Governor Cup Removal

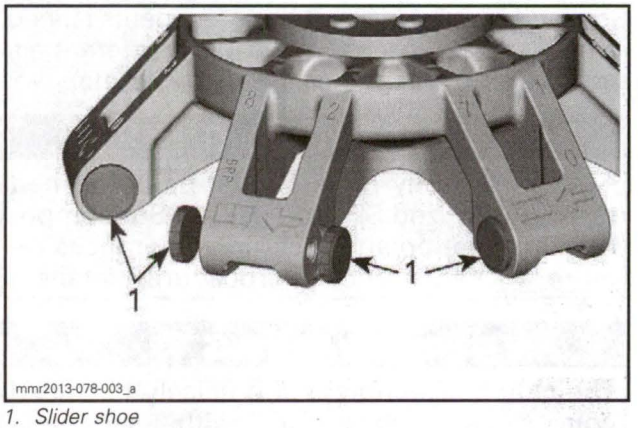
Carefully pull up on governor cup until the slider shoes are at their highest position in the guides.



1. *Governor cup*
2. *Slider shoes*
3. *Sliding sheave*
4. *Guides*

Slider Shoes and Roller Removal

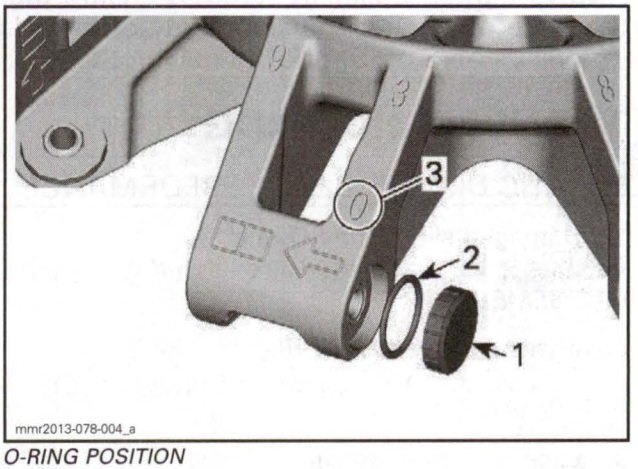
1. Remove slider shoes from governor cup using a flat screwdriver.



1. *Slider shoe*

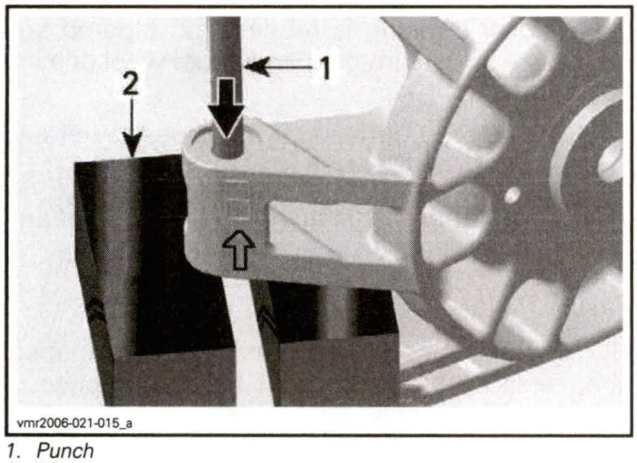
2. Remove O-ring from slider shoes.

NOTE: The O-rings are positioned on the slider shoes identified by an O on the governor cup (total of 3 slider shoes with O-rings).

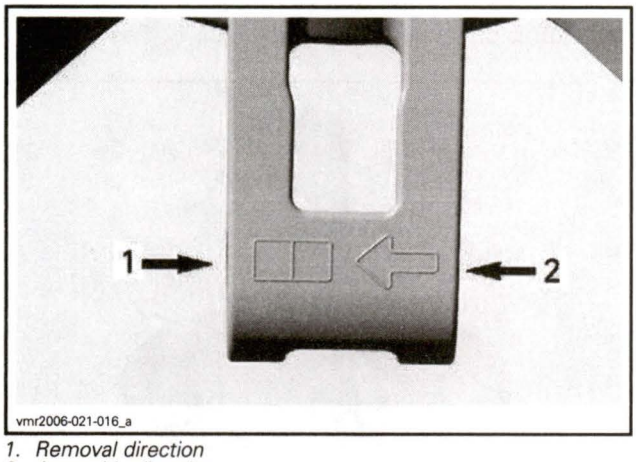


O-RING POSITION
1. *Slider shoe*
2. *O-ring*
3. O *on governor cup*

3. Place governor cup **on** a vice using protection plates.
4. Remove bearing sleeve using a punch by pushing it towards the opposite direction of the arrow.



1. *Punch*
2. *Vice*

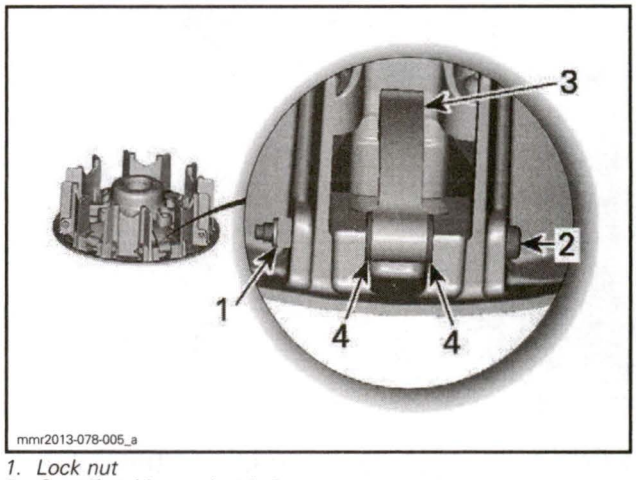


1. *Removal direction*
2. *Assembly direction*

NOTICE **Do not clamp governor cup in the vice to avoid damaging it.**

Centrifugal Lever Removal

1. Unscrew lock nut and remove centrifugal lever pivot bolt.
2. Remove centrifugal lever and both thrust washers.



1. *Lock nut*
2. *Centrifugal lever pivot bolt*
3. *Centrifugal lever*
4. *Thrust washers*

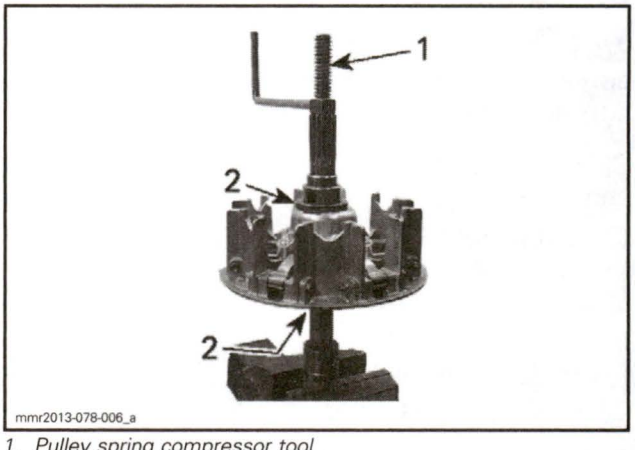
Spring Cover Removal

⚠ WARNING

The spring cover is under high clutch spring preload. Never attempt to remove the spring cover without the recommended tool.

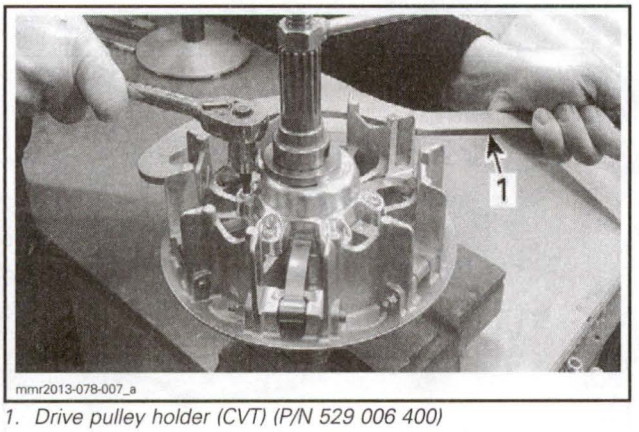
REQUIRED TOOL	
PULLEY SPRING COMPRESSOR TOOL (P/N 529 036 012)	
DRIVE PULLEY HOLDER (CVT) (P/N 529 006 400)	

1. Install tool in a vice with the sliding sheave between the washers.



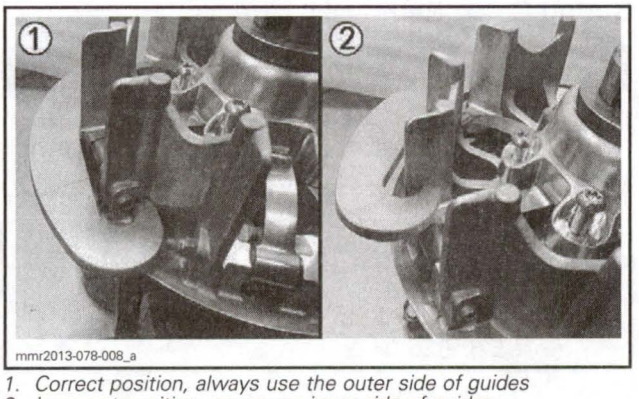
1. *Pulley spring compressor tool*
2. *Washers*

2. Remove the spring cover screws. Hold the sliding sheave using the DRIVE PULLEY HOLDER (CVT) (P/N 529 006 400) while breaking screw torque.



1. Drive pulley holder (CVT) (P/N 529 006 400)

NOTICE To avoid damaging the sliding sheave guides, make sure to place the drive pulley holder correctly.



1. Correct position, always use the outer side of guides
2. Incorrect position, never use inner side of guides

3. Unscrew pulley spring compressor tool to disengage spring cover from sliding sheave.

Drive Pulley Cleaning

NOTICE Always use the specified cleaning solvent and abrasive type to avoid damaging components.

Clean pulley faces and shaft using fine steel wool and dry cloth.

Clean the following components using a paper towel with PULLEY FLANGE CLEANER (P/N 413 711 809).

- Crankshaft tapered end
- Crankshaft threads
- Fixed sheave shaft
- Inside the fixed sheave taper
- Drive pulley screw threads.

NOTICE Avoid contact between cleaner and crankshaft seal.

If additional cleaning is required on tapered surfaces, use a medium or coarse steel wool or a no. 600 sand paper.

Reclean tapered surfaces with paper towel and PULLEY FLANGE CLEANER (P/N 413 711 809).

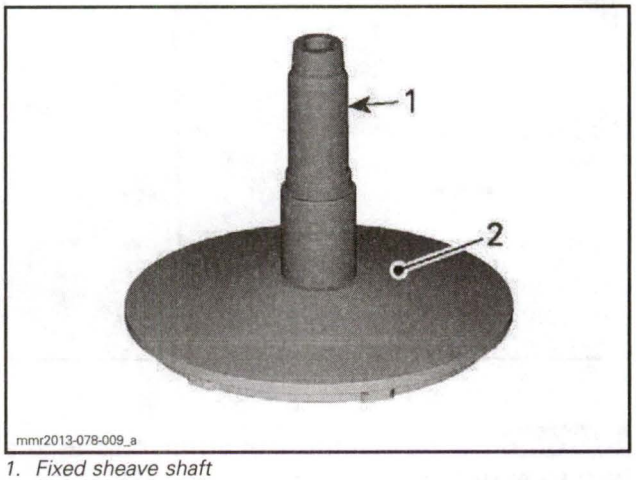
NOTICE Tapered surfaces must be free of any foreign particles.

Drive Pulley Inspection

NOTE: Unless otherwise noted, during inspection, replace any component found defective or out of specifications.

Fixed Sheave Inspection

Check fixed sheave shaft and surface for scratches or other damage.



1. Fixed sheave shaft
2. Fixed sheave surface

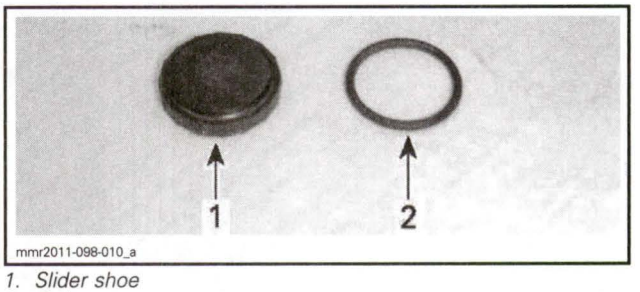
Governor Cup Inspection

Check governor cup for cracks or other visible damage.

Slider Shoes and Roller Inspection

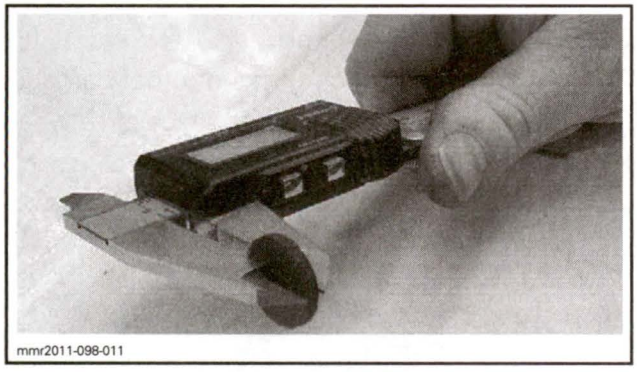
Check if O-rings of slider shoes are cracked, cut or crushed.

Check slider shoes for visible wear.



1. Slider shoe
2. O-ring

Measure the thickness of the slider shoes.


mmr2011-098-011

NOTE: Take measurement at the center of slider shoe.

SLIDER SHOE	
Service Limit	3.80 mm (.15 in)

Check each roller for roundness of external diameter.

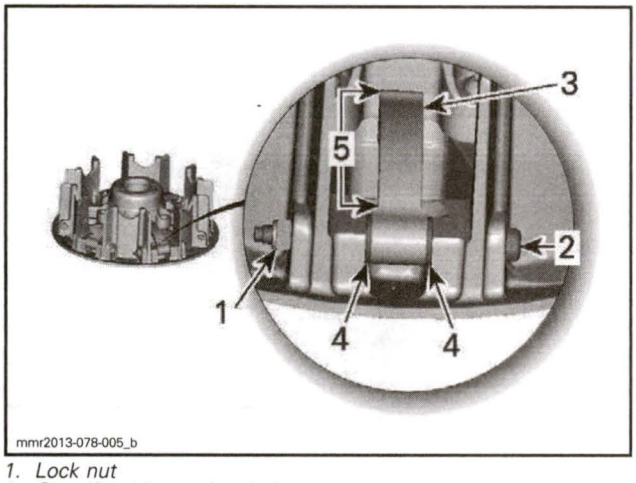
Check if rollers move freely.

NOTICE **Whenever replacing rollers and slider shoes, always replace all rollers and slider shoes at the same time.**

Centrifugal Lever Inspection

Check contact surfaces of centrifugal lever for visible wear.

If major wear is visible, replace the following:
- Centrifugal levers
- Thrust washers
- Centrifugal lever pivot bolts
- Centrifugal lever pivot lock nuts.



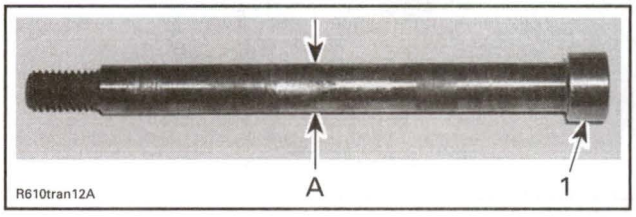
mmr2013-078-005_b

1. *Lock nut*
2. *Centrifugal lever pivot bolt*
3. *Centrifugal lever*
4. *Thrust washers*
5. *Contact surface to the roller*

⚠ WARNING

Whenever replacing centrifugal levers, always replace all levers at the same time. Otherwise, drive pulley imbalance will occur.

Measure diameter of centrifugal lever pivot bolt.



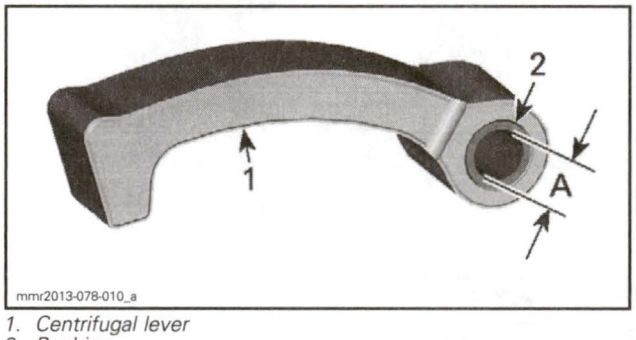
R610tran12A

1. *Centrifugal lever pivot bolt*

A. *Measure diameter here*

CENTRIFUGAL LEVER PIVOT BOLT	
SPECIFICATION	**DIAMETER**
NOMINAL	6.063 mm to 6.091 mm (.239 in to .24 in)
SERVICE LIMIT	6.00 mm (.236 in)

Measure diameter of centrifugal lever bushing.



mmr2013-078-010_a

1. *Centrifugal lever*
2. *Bushing*

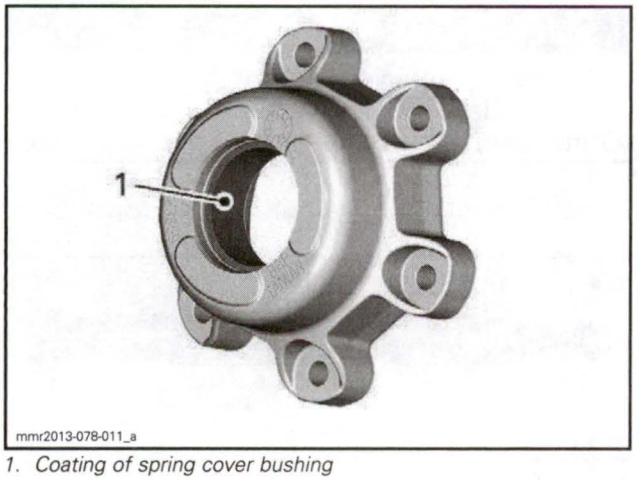
A. *Bushing inner diameter*

CENTRIFUGAL LEVER BUSHING	
SPECIFICATION	**INNER DIAMETER**
NOMINAL	6.00 mm to 6.12 mm (.236 in to .241 in)
SERVICE LIMIT	6.200 mm (.244 in)

Spring Cover Inspection

Check spring cover for cracks or wear.

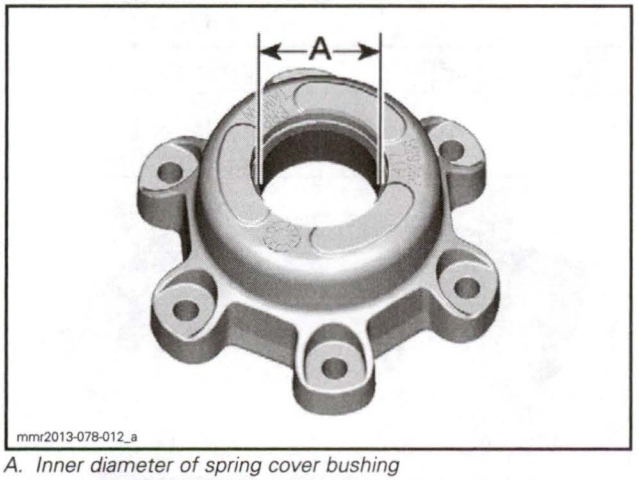
Check coating of spring cover bushing for wear.



1. Coating of spring cover bushing

Using a bore gauge, measure the inner diameter of spring cover bushing.

NOTE: Measuring point must be at least 6 mm (1/4 in) from bushing edge.



A. Inner diameter of spring cover bushing

SPRING COVER BUSHING	
Service Limit	40.3 mm (1.587 in)

If bushing is out of specification, replace spring cover.

Spring Inspection

Check spring free length.

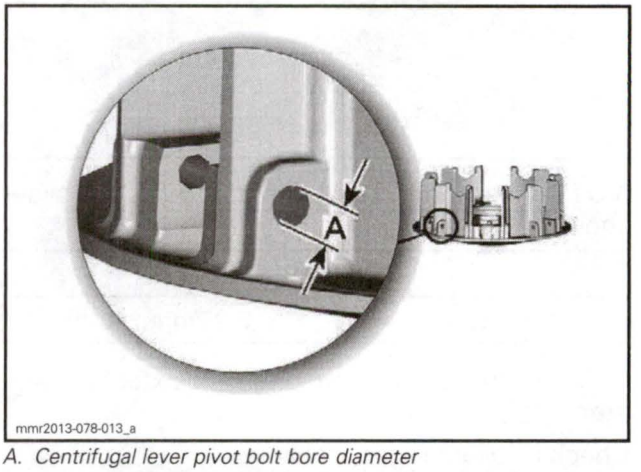
SPRING FREE LENGTH		
MODELS	COLOR CODE	FREE LENGTH
Tundra 600 ACE	RED/WHITE	108 mm (4-1/4 in)
Expedition 1200 4-TEC	YELLOW/RED	120 mm (4-23/32 in)
REV-XR 1200 4-TEC	YELLOW/ORANGE	105.4 mm (4-5/32 in)

Sliding Sheave Inspection

Check sliding sheave for cracks or other damage.

Check sliding contact surface for excessive wear.

Measure centrifugal lever pivot bolt bores.



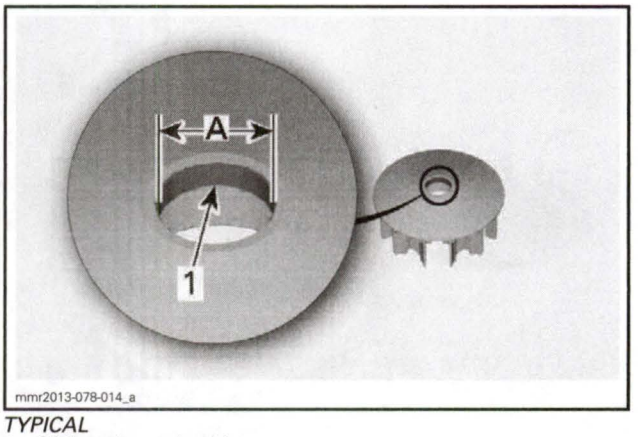
A. Centrifugal lever pivot bolt bore diameter

CENTRIFUGAL LEVER PIVOT BOLT	
SPECIFICATION	BORE DIAMETER
NOMINAL	6.113 mm to 6.171 mm (.241 in to .243 in)
SERVICE LIMIT	6.300 mm (.248 in)

Check coating of sliding sheave bushing for wear.

Measure bushing diameter of sliding sheave.

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



TYPICAL
1. Sliding sheave bushing
A. Inner diameter of bushing

SLIDING SHEAVE BUSHING	
Service Limit	40.3 mm (1.587 in)

If bushing is out of specification, replace sliding sheave.

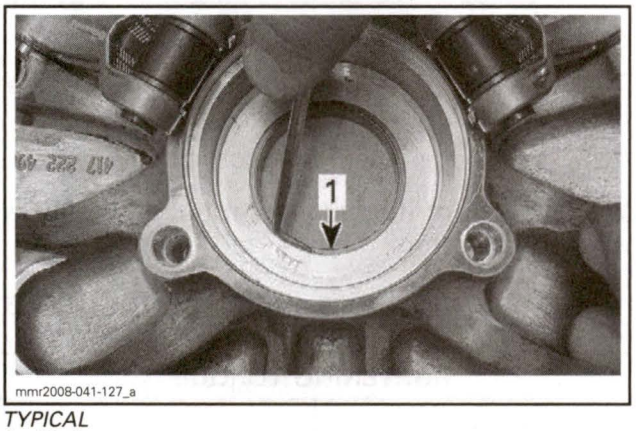
Sliding Sheave Bushing Replacement

Sliding Sheave Bushing Removal

NOTE: In case of worn out bushing, it is advisable to replace whole sliding sheave assembly as replacing just the bushing may reduce the drive pulley performance.

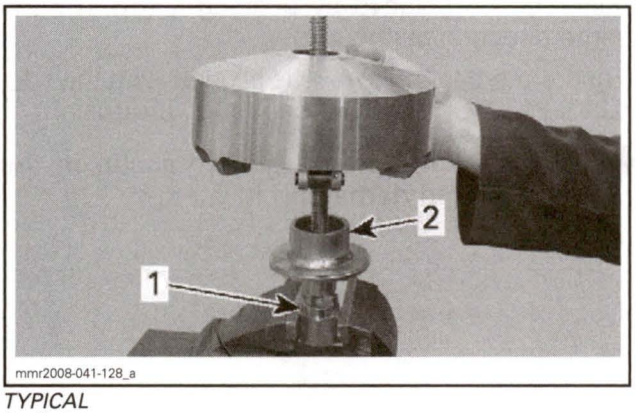
If bushing is out of specifications, remove it as follows:

1. Remove circlip from the sliding sheave.



TYPICAL
1. Circlip

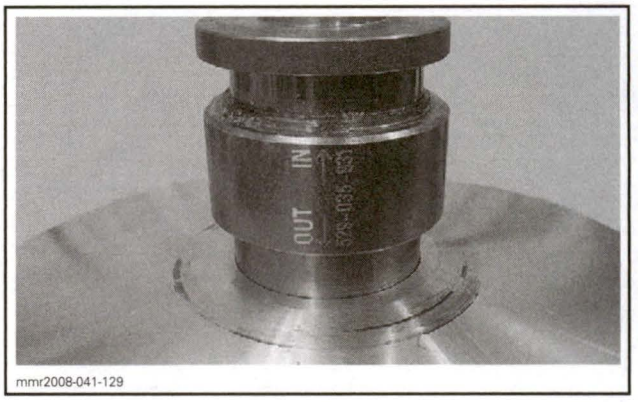
2. Secure the PULLEY SPRING COMPRESSOR TOOL (P/N 529 036 012) in a vice.
3. Mount the BUSHING PULLER/INSTALLER (P/N 529 031 200) and the sliding sheave assembly on it.



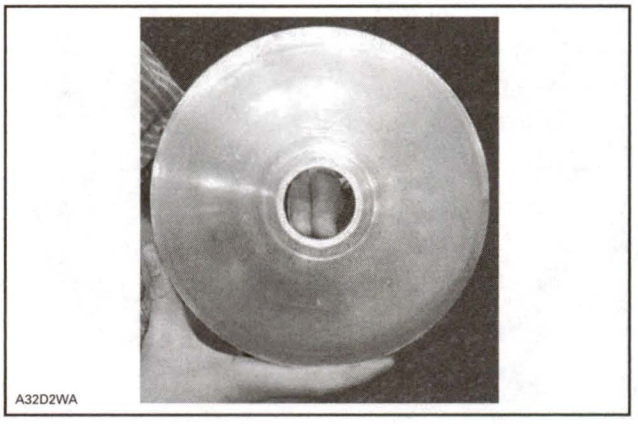
TYPICAL
1. Spring compressor
2. Bushing remover/installer

4. Use the BUSHING REMOVER/INSTALLER (P/N 529 035 931) to press out old bushing.

NOTE: Make sure to use the tool as marked; to remove the bushing press using the side marked "OUT", as shown below in the picture.



5. Use a soft sand paper to clean sliding sheave bushing mounting surface.



6. Clean sliding sheave bushing mounting surface with PULLEY FLANGE CLEANER (P/N 413 711 809).
7. Clean the circlip groove.

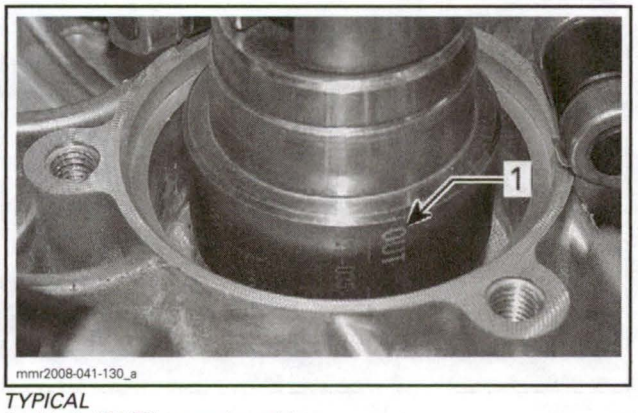
Sliding Sheave Bushing Installation

To install a **NEW** bushing, secure the PULLEY SPRING COMPRESSOR TOOL (P/N 529 036 012) in a vice and mount the sliding sheave.

Apply LOCTITE 680 (P/N 293 800 118) on the outside of bushing face.

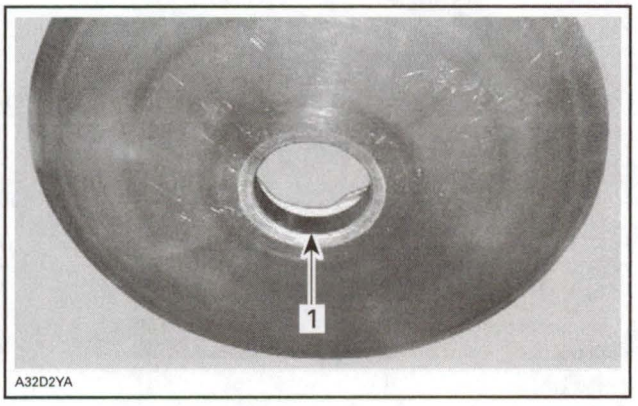
Insert the bushing from inner side of sliding sheave.

Mount the BUSHING REMOVER/INSTALLER (P/N 529 035 931) with side marked "IN" to press in a new bushing.



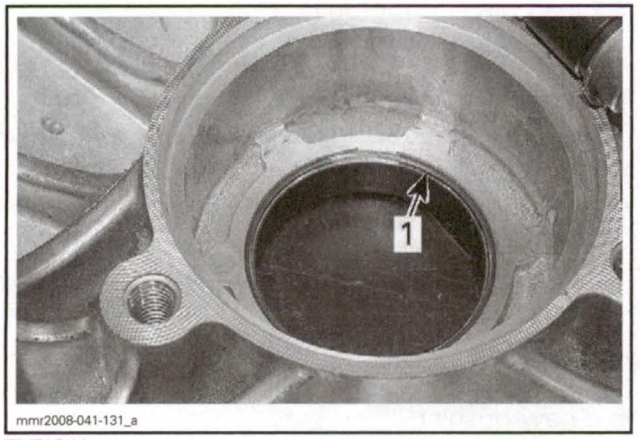
TYPICAL
1. Mark "OUT" toward outside

NOTE: Make sure that the bushing is well seated on the sliding sheave.



1. Bushing

Install the circlip.



TYPICAL
1. Circlip

NOTICE Make sure that the circlip is properly position in its groove.

Drive Pulley Assembly

Spring Cover Installation

The installation is the reverse of removal procedure, however pay attention to the following.

Tighten spring cover retaining screws to specification.

TIGHTENING TORQUE	
Spring cover retaining screws	10 N•m (89 lbf•**in**)

Centrifugal Lever Installation

The installation is the reverse of removal procedure, however pay attention to the following.

Install centrifugal levers with both thrust washers.

NOTICE Centrifugal levers must move easily after installation.

Tighten centrifugal lever pivot nuts to specification.

TIGHTENING TORQUE	
Centrifugal lever pivot nut	5 N•m (44 lbf•**in**)

Slider Shoes and Roller Installation

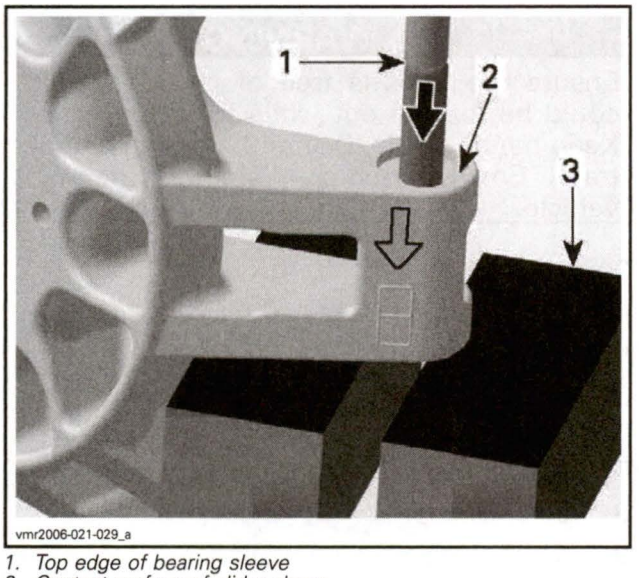
The installation is the reverse of removal procedure, however pay attention to the following.

Ensure that rollers move easily after installation.

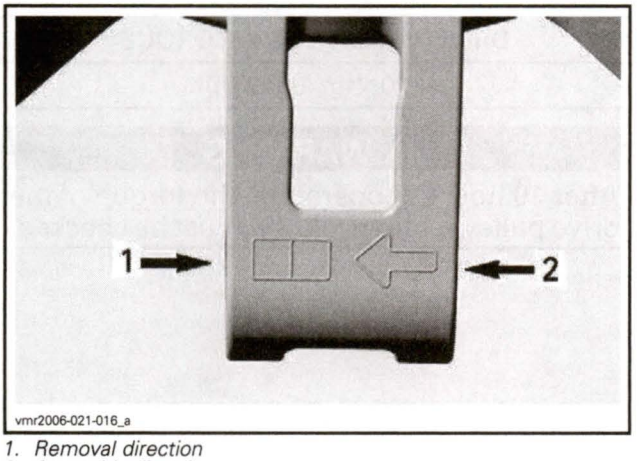
Install bearing sleeve by pushing it towards the same direction as the arrow.

Ensure the bearing sleeve is aligned with the contact surface of the slider shoes (no protrusion).

NOTICE Do not clamp governor cup in the vice to avoid to damaging it.

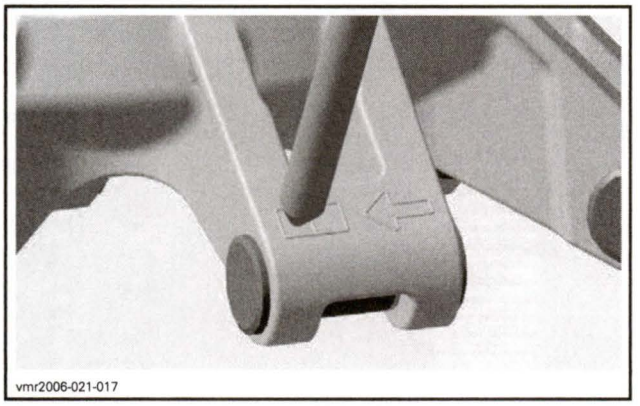


1. Top edge of bearing sleeve
2. Contact surface of slider shoes
3. Vice

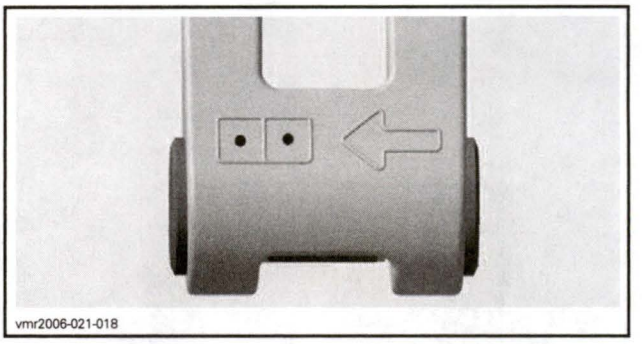


1. Removal direction
2. Assembly direction

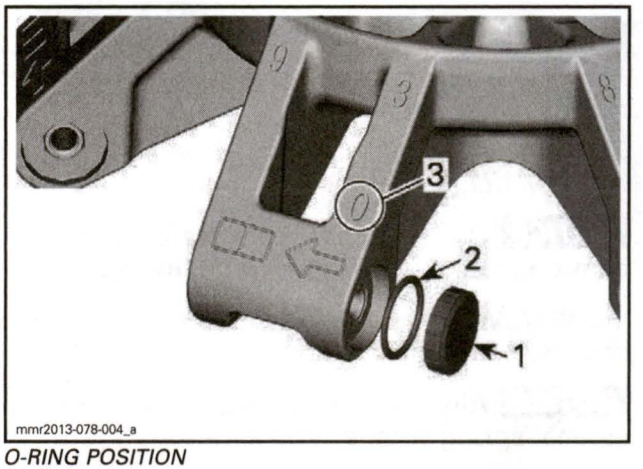
Carefully mark governor cup box using a punch.



NOTE: Never install a governor cup with two marks.



Install O-rings on slider shoes identified by an O on the governor cup. (total of 3 slider shoes with O-rings, position 1, 3 and 5)).



O-RING POSITION
1. Slider shoe
2. O-ring
3. O on governor cup

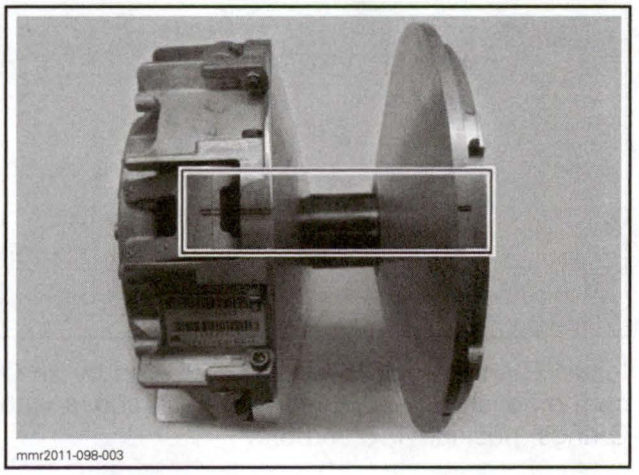
Governor Cup Installation

The installation is the reverse of removal procedure.

Fixed Sheave Assembly

The installation is the reverse of removal procedure, however pay attention to the following.

Align fixed sheave, sliding sheave and governor cup together using the index marks (index marks have been traced at the factory).


mmr2011-098-003

Drive Pulley Installation

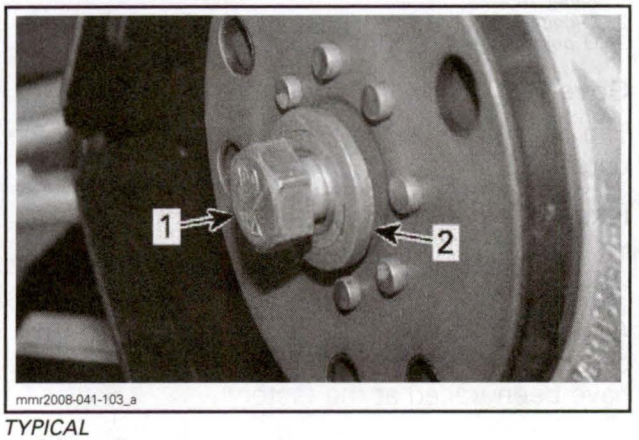
For installation, reverse the removal procedure. However, pay attention to the following.

Clean mounting surfaces as described in *DRIVE PULLEY CLEANING* above.

NOTICE **Do not apply antiseize or any lubricant on crankshaft and drive pulley tapers.**

Install **NEW** conical spring washer with its concave side towards drive pulley.

NOTICE **Always use BRP genuine parts for conical spring washer and screw.**



mmr2008-041-103_a

TYPICAL
1. *Drive pulley screw*
2. *Conical spring washer*

1. Tighten drive pulley retaining screw to specification.

NOTICE **Never use any type of impact wrench for drive pulley installation.**

DRIVE PULLEY FIRST TORQUE
120 N•m (89 lbf•ft)

2. Lift rear of vehicle and support it safely.

⚠ WARNING

Ensure 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.

3. Start engine.
4. Release parking brake.
5. Accelerate vehicle at low speed (maximum 32 km/h (20 MPH)).
6. Apply brake.
7. Repeat the above sequence 5 times.
8. Stop engine.
9. Lower vehicle back on ground.
10. Retighten drive pulley retaining screw to specification.

DRIVE PULLEY FINAL TORQUE
120 N•m (89 lbf•ft)

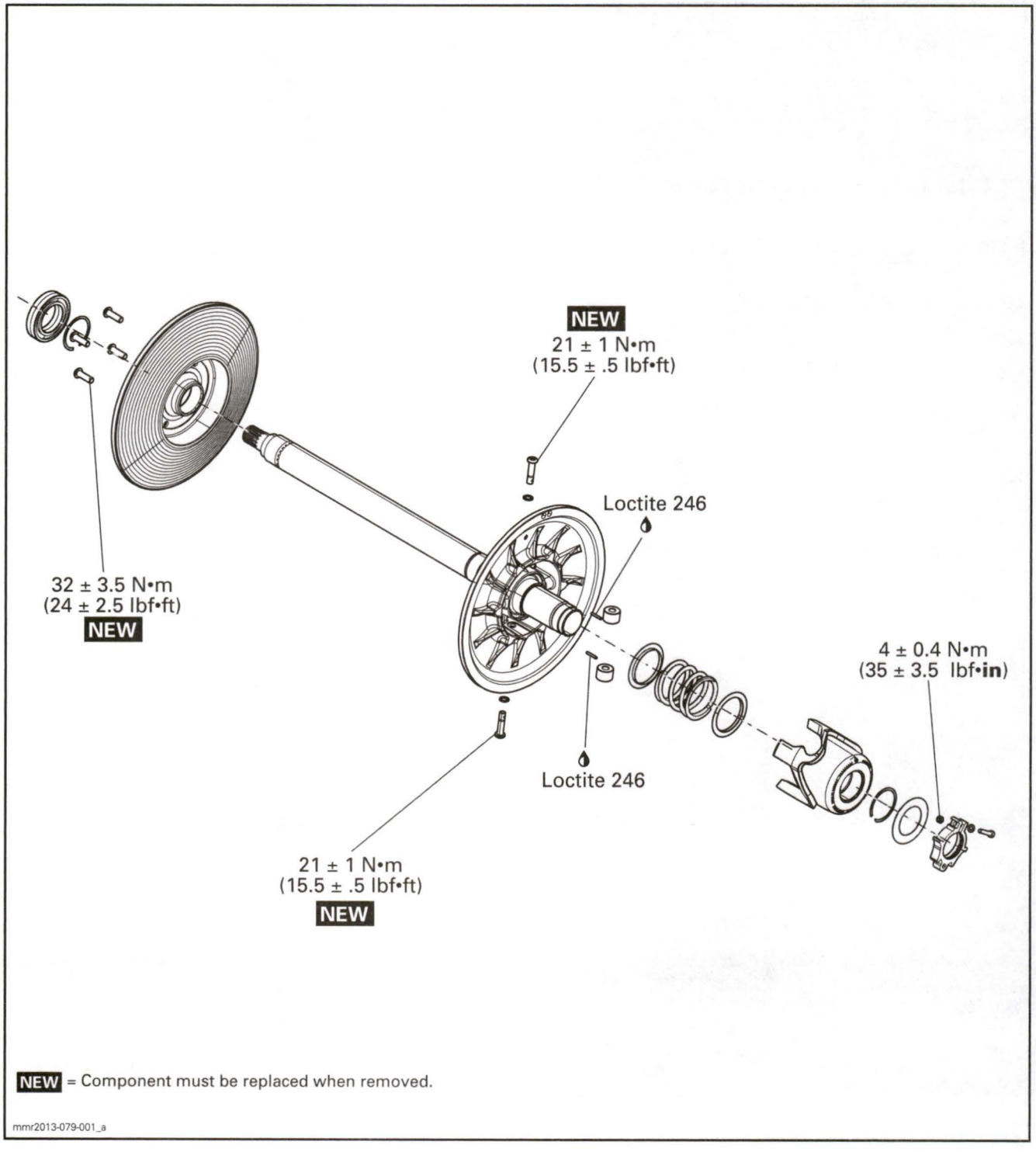
⚠ WARNING

After 10 hours of operation, the torque of the drive pulley retaining screw must be checked.

DRIVEN PULLEY AND COUNTERSHAFT

Overview of changes:
New configuration for all models.

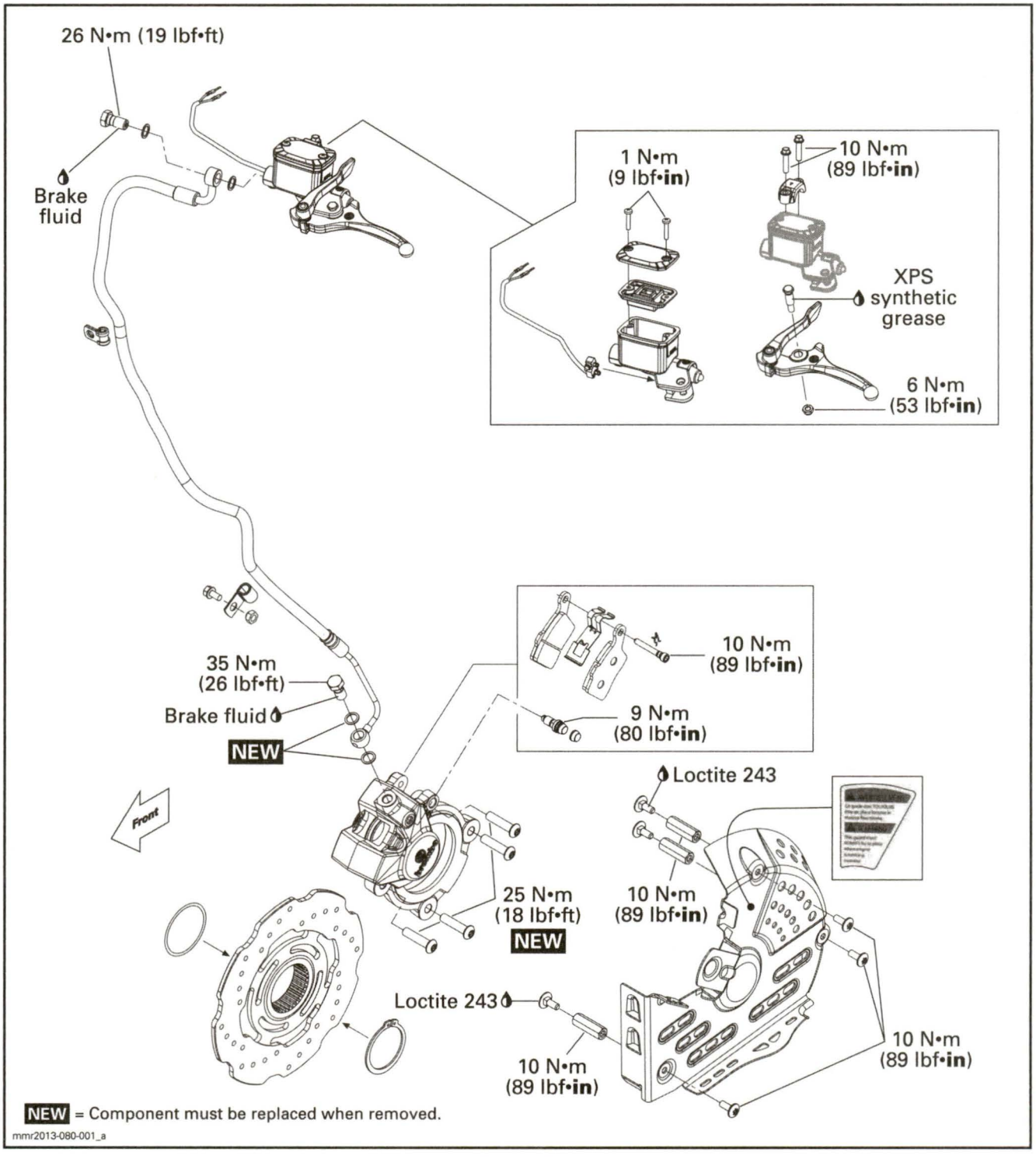
DRIVEN PULLEY



BRAKE

Overview of changes:

For all models, the banjo fitting tightening torque is now a unified value.



PROCEDURES

MASTER CYLINDER

Master Cylinder Installation

1. Torque Banjo fitting to specification.

TIGHTENING TORQUE	
All	26 N•m (19 lbf•ft)

REAR SUSPENSION (rMOTION)

SERVICE TOOLS

Description	Part Number	Page
HYDRAULIC ADJUSTER SOCKET	529 036 241	150–151
RMOTION MASTER CYLINDER KEY	529 036 254	152
RMOTION SOCKET	529 036 255	153
SHOCK ABSORBER SUPPORTS	529 036 186	156

SERVICE TOOLS – OTHER SUPPLIER

Description	Part Number	Page
SALTER BRECKNELL BENCH SCALE	PS 400	156

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 243 (BLUE)	293 800 060	154

PROCEDURES

NOTE: Parts can be replaced without suspension removal, unless otherwise noted.

SPRING PRELOAD QUICK ADJUSTER SYSTEM

Spring Preload Quick Adjuster System Disassembly

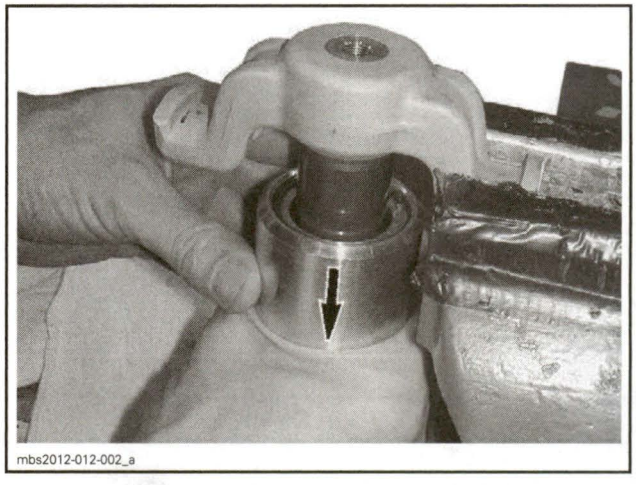
NOTE: System bleeding is required whenever the hose is disconnected.

NOTICE Thoroughly clean parts before disassembly. Work on a clean surface.

1. Set controller to the minimum preload.
2. Remove the banjo bolt retaining the hose to the actuator.
3. Drain fluid.

Spring Preload Quick Adjuster Actuator Disassembly

1. Carry out the *SPRING PRELOAD QUICK ADJUSTER SYSTEM DISASSEMBLY* procedure.
2. Fully extend actuator by pulling on the cylinder body as illustrated.

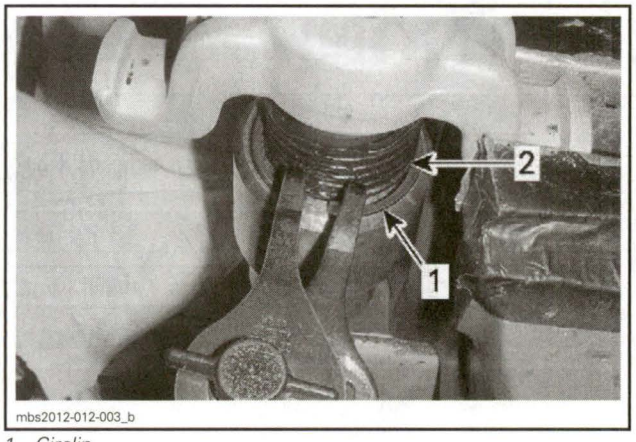

mbs2012-012-002_a

3. Insert corrugated tubing on the piston to protect it from any damage when removing the circlip.

CORRUGATED PROTECTOR	
Diameter	36 mm (1-1/2 in)
Length	25 mm (1 in)

4. Remove circlip.

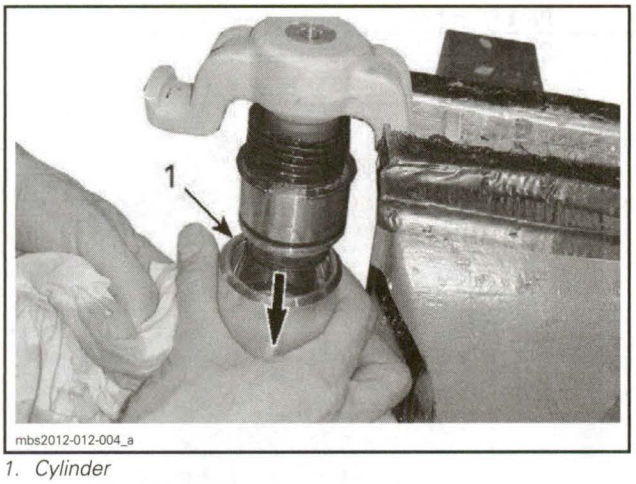
NOTICE Be careful not to damage piston while removing the circlip.



1. Circlip
2. Corrugated tubing protector

5. Remove cylinder.

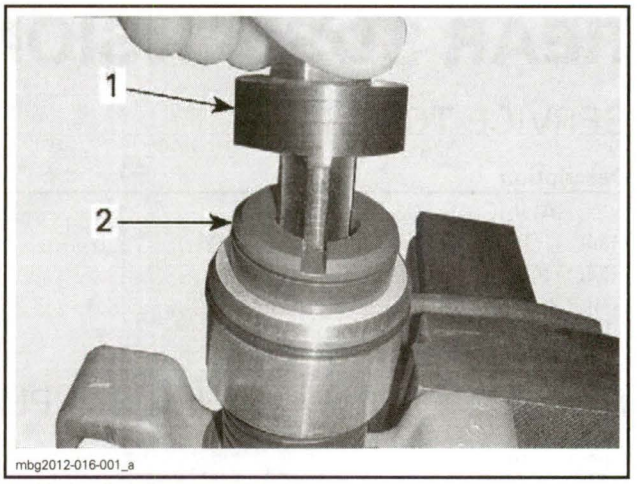
NOTE: Be prepared to catch residual oil with a rag.



1. Cylinder

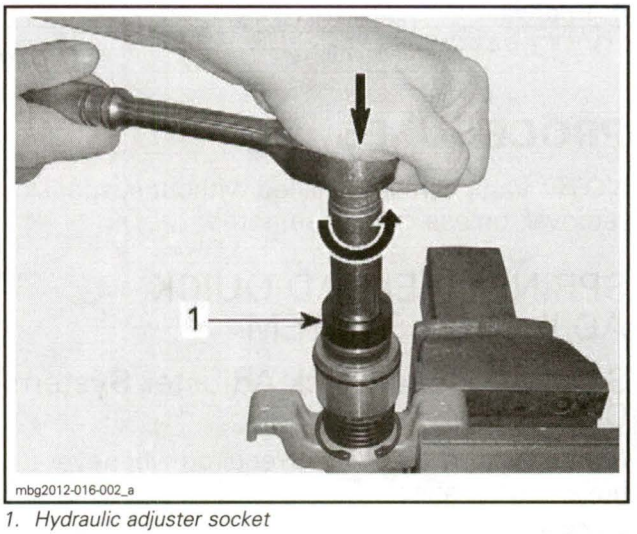
REQUIRED TOOL	
HYDRAULIC ADJUSTER SOCKET (P/N 529 036 241)	

6. Remove the suspension spring support from the piston:
   6.1 Hold the spring support in a vise (piston upwards).
   6.2 Place the HYDRAULIC ADJUSTER SOCKET (P/N 529 036 241) on the piston.



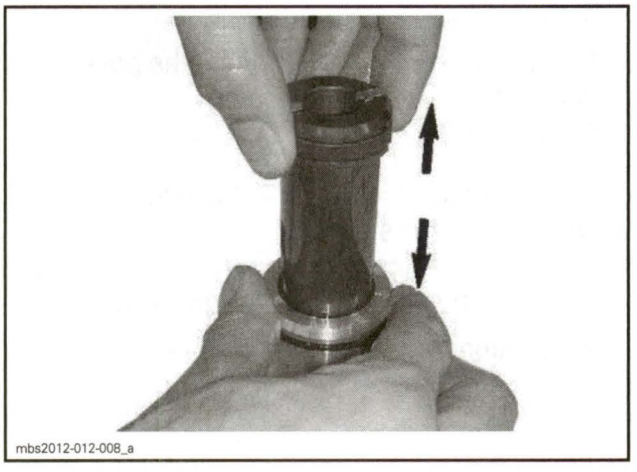
1. Hydraulic adjuster socket
2. Piston

   6.3 While pushing downwards, unscrew the piston from the spring support.



1. Hydraulic adjuster socket

7. Remove the seal carrier from the piston.



Spring Preload Quick Adjuster Actuator Inspection

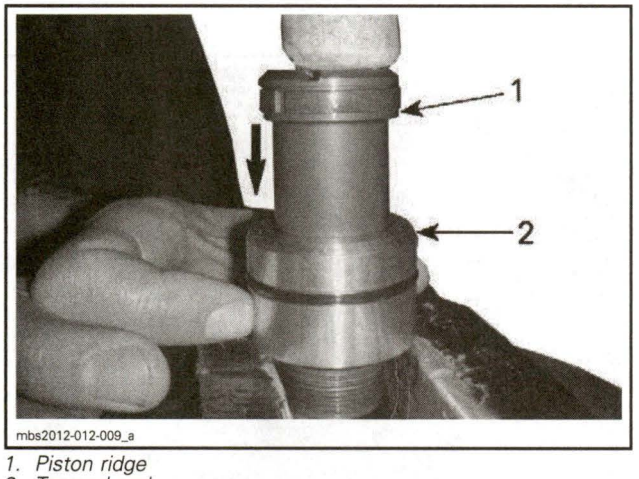
1. Inspect the O-ring seals on the carrier, piston and in the actuator body. Replace with new seals as required.
2. Inspect all machined surfaces of the carrier and piston for scratches and other damages which may result in oil leaks or carrier and piston binding. Replace the actuator as required.
3. Inspect the internal and external actuator body (cylinder) for cracks and other damages which may result in oil leaks or piston binding. Replace the actuator as required.

Spring Preload Quick Adjuster Actuator Assembly

1. Insert the seal carrier with the tapered end towards the piston ridge.

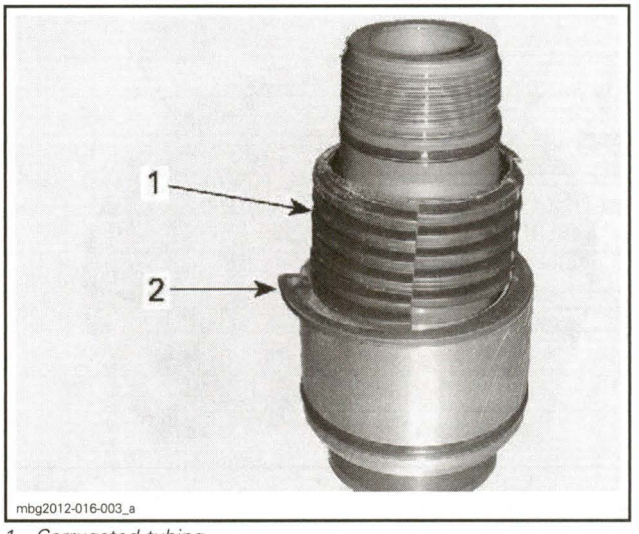
NOTICE **Avoid contact of the seals or aluminum machined surface with the piston threads.**

NOTICE **Be careful not to damage the piston.**



1. Piston ridge
2. Tapered end

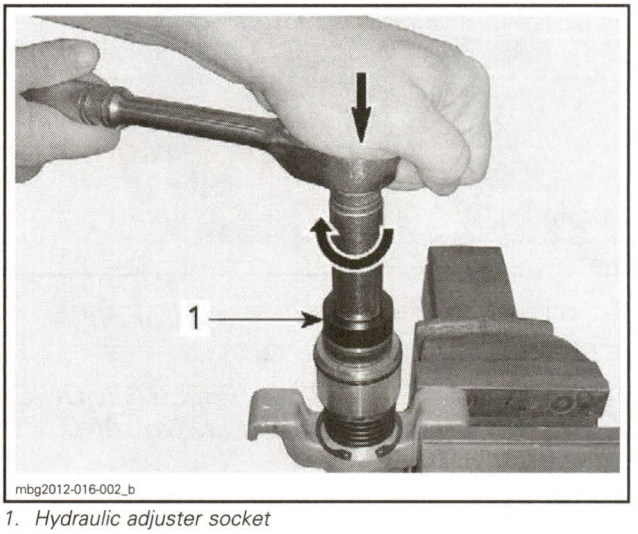
2. Insert the circlip and corrugated tubing on the piston.



1. Corrugated tubing
2. Circlip

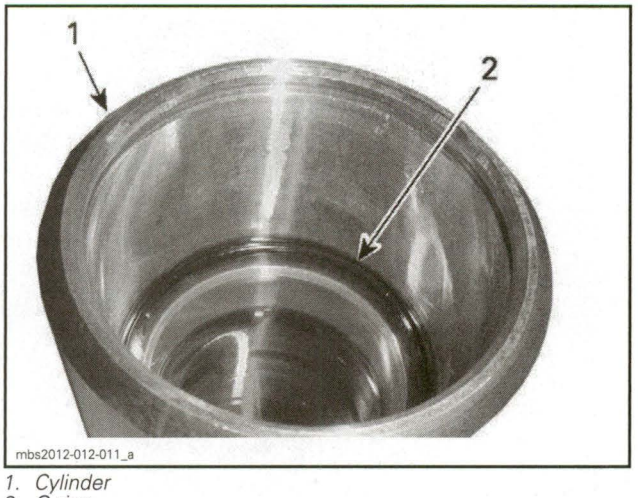
3. Install the piston on the suspension spring support using the HYDRAULIC ADJUSTER SOCKET (P/N 529 036 241).
4. Tighten to the specified torque.

TIGHTENING TORQUE	
Piston	85 N•m (63 lbf•ft)



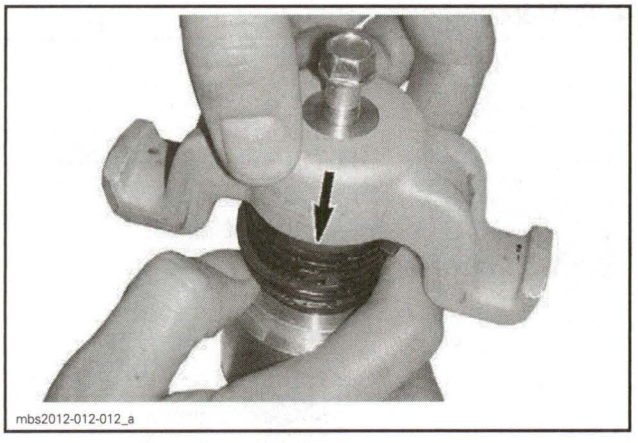
1. Hydraulic adjuster socket

5. Ensure the O-ring in the cylinder is properly positioned.



1. *Cylinder*
2. *O-ring*

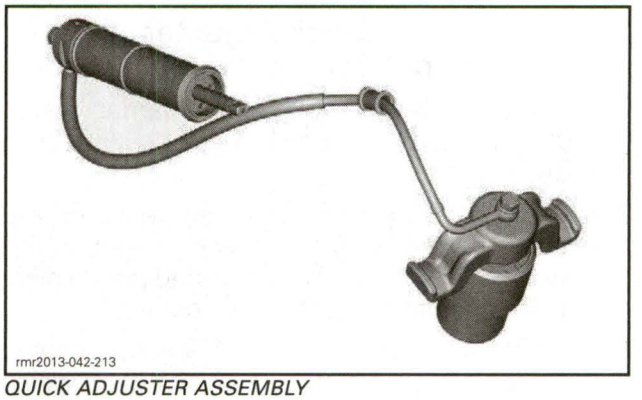
6. Temporarily install the banjo bolt on the suspension spring support to avoid oil being squirted out.
7. Install the piston and seal carrier in the cylinder.



8. Secure with the circlip.
9. Remove the corrugated tubing.
10. Carry out the *SPRING PRELOAD QUICK ADJUSTER SYSTEM BLEEDING AND REASSEMBLY* procedure.

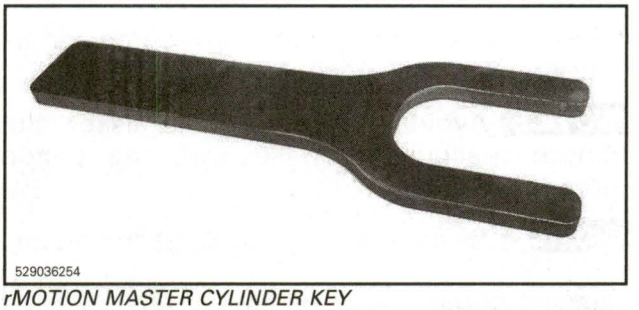
Spring Preload Quick Adjuster Master Cylinder Disassembly

1. Carry out the *SPRING PRELOAD QUICK ADJUSTER SYSTEM DISASSEMBLY* procedure.
2. Remove quick adjuster assembly from vehicle. Refer to *SPRING PRELOAD QUICK ADJUSTER CONTROL MODULE REMOVAL* in applicable shop manual.

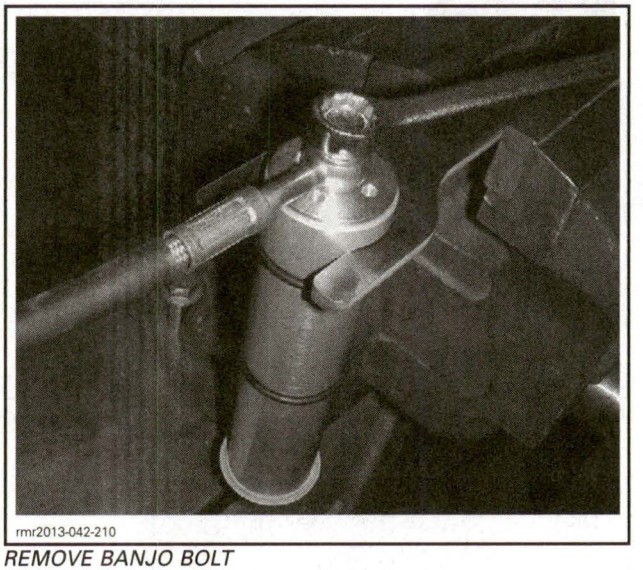


QUICK ADJUSTER ASSEMBLY

3. Using tool RMOTION MASTER CYLINDER KEY (P/N 529 036 254) in a vise to hold master cylinder, unscrew banjo bolt.

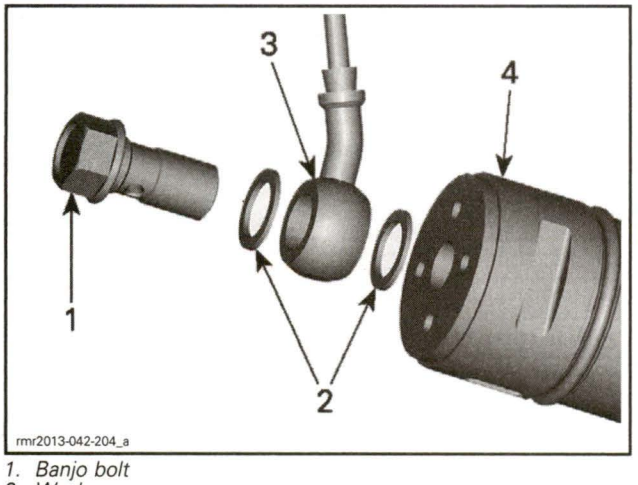


rMOTION MASTER CYLINDER KEY



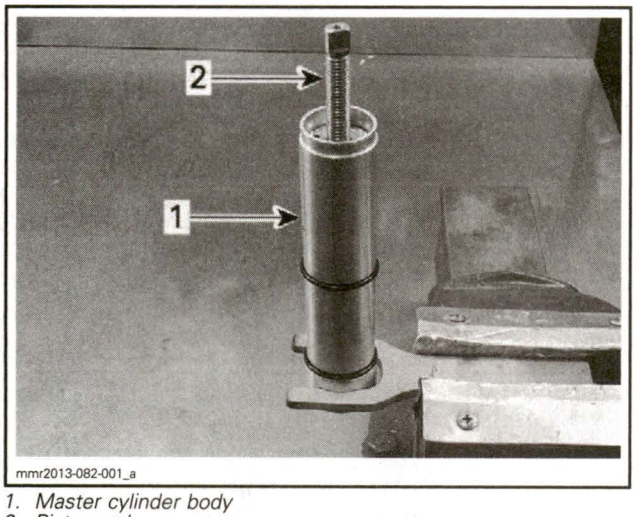
REMOVE BANJO BOLT

4. Remove banjo bolt, washers and hose from master cylinder. Discard washers.



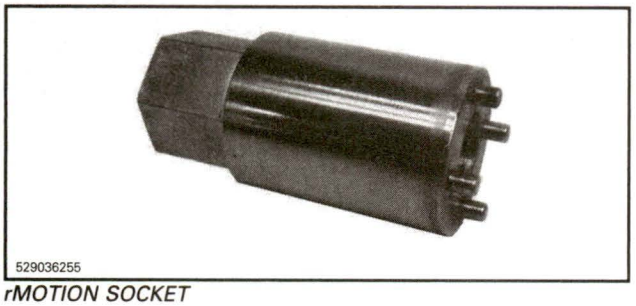
1. *Banjo bolt*
2. *Washers*
3. *Hose fitting*
4. *Master cylinder body*

5. Remove the master cylinder from the rMotion master cylinder key, and reinsert it with the piston rod facing upwards.

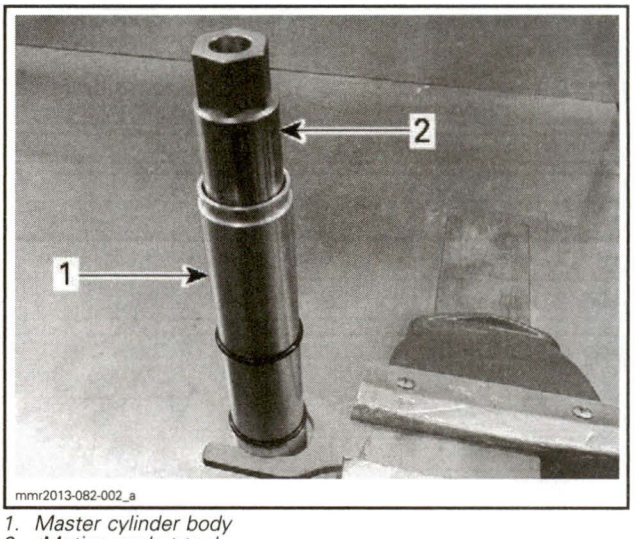


1. *Master cylinder body*
2. *Piston rod*

6. Remove piston rod using the RMOTION SOCKET (P/N 529 036 255) tool.

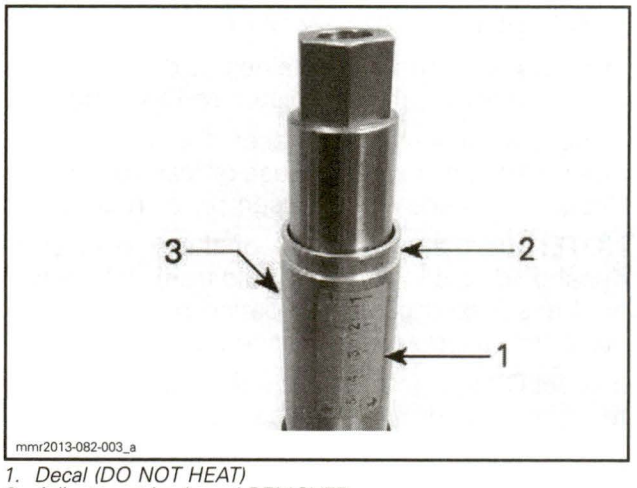


rMOTION SOCKET

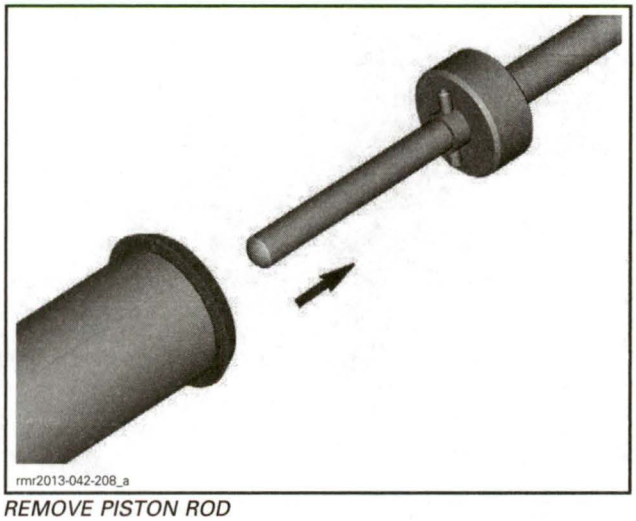


1. *Master cylinder body*
2. *rMotion socket tool*

NOTE: If piston rod is too difficult to unscrew, carefully heat the side of the master cylinder body to break the threadlocker hold. Be sure to remove the adjustment knob seal and apply the heat on the opposite side of the decal.



1. *Decal (DO NOT HEAT)*
2. *Adjustment knob seal REMOVED*
3. *Heat applied hear*



REMOVE PISTON ROD

NOTE: Do not remove the free floating piston from the master cylinder, or the end cap on the opposite side of the master cylinder. If they require replacement, the master cylinder must be replaced as an assembly.

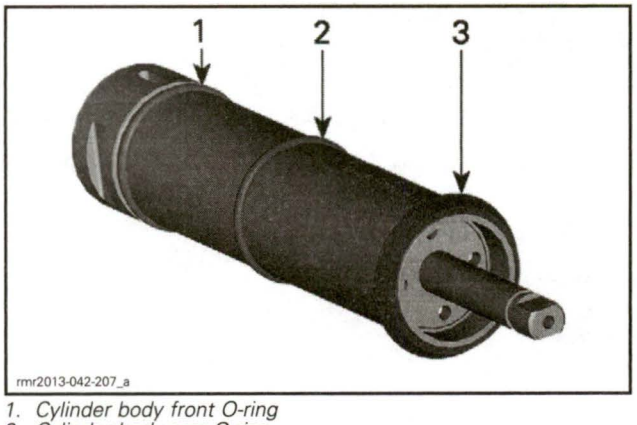
Spring Preload Quick Adjuster Master Cylinder Parts Inspection

Inspect piston rod and retainer. If damaged or if retainer is loose, replace piston rod assembly.

Inspect all machined surfaces for scratches or other damages that may cause oil leaks or binding. Replace master cylinder assembly as required.

NOTE: The piston rod side of the master cylinder should be dry (hydraulic fluid free). If hydraulic fluid has leaked past the floating piston seal, replace the master cylinder assembly.

Inspect O-rings and adjustment knob seal on master cylinder body. Replace as required.



1. *Cylinder body front O-ring*
2. *Cylinder body rear O-ring*
3. *Adjustment knob seal*

Spring Preload Quick Adjuster Master Cylinder Assembly

Assembly is the reverse of disassembly.

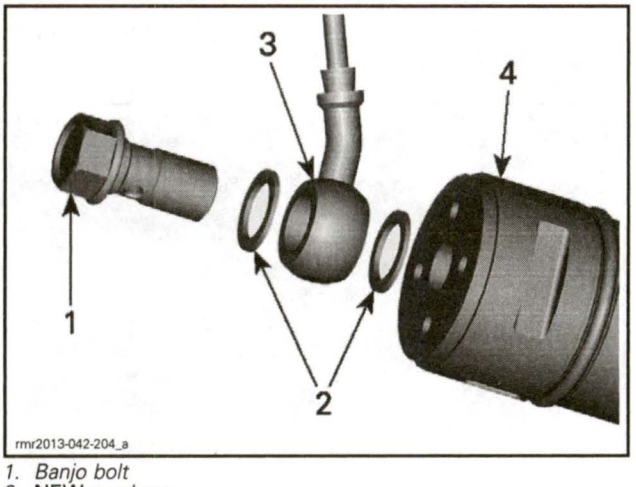
Ensure all seals are properly positioned when assembling parts.

Tighten piston rod cap as specified.

TIGHTENING TORQUE	
Piston rod cap	40 N•m to 50 N•m (30 lbf•ft to 37 lbf•ft)

Carry out the *SPRING PRELOAD QUICK ADJUSTER SYSTEM BLEEDING AND REASSEMBLY* procedure.

Ensure new washers are installed on either side of banjo fitting when installing hose fitting and bolt.



1. *Banjo bolt*
2. **NEW** *washers*
3. *Hose fitting*
4. *Master cylinder body*

TIGHTENING TORQUE	
Banjo bolt	21 N•m to 28 N•m (15 lbf•ft to 21 lbf•ft)

Spring Preload Quick Adjuster System Installation

Installation is the reverse of removal procedure, however, pay attention to the following:

Set the preload to the minimum using the control cylinder adjustment rod first.

Install **NEW** elastic stop nuts on control module support.

Install a **NEW** screw on the hose retainer (at shock absorber).

Apply LOCTITE 243 (BLUE) (P/N 293 800 060) on:
- The control module clamp screws
- The knob screw.

SHOCK ABSORBERS

Shock Absorber Inspection

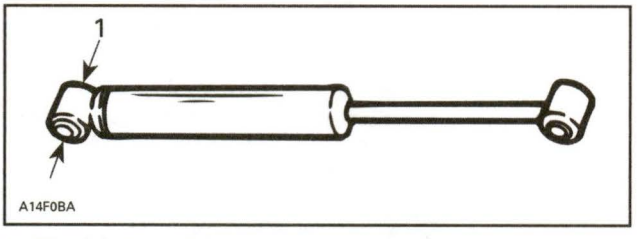
NOTE: All types of shock absorbers are covered in this topic, refer to *TECHNICAL SPECIFICATIONS* to identify the shock absorber relating to the vehicle model.

NOTE: Unless otherwise noted, shock absorber must be at normal room temperature (19°C to 23°C (66°F to 73°F)) during inspection.

MC Hydraulic Shock

1. Perform a visual inspection of the shock:
   - The shock must be exempt of any dent or scratch, especially on the rod.
   - Small dent on the shock body may not affect any performance or reliability of this shock.
   - Any defect on the rod, as small as it is, can lead to seal failure and oil leak.
   - If such defect (on rod) is detected, the shock must be replaced, and this will not be cover under warranty.
2. Secure the shock body end in a vise, clamping on eyelet, with its rod upward.

NOTICE Do not clamp directly on shock body.



1. Shock body eyelet

3. Examine shock for leaks. Extend and compress the piston at least 5 complete strokes with its rod upward.
4. Check that shock moves smoothly and with uniform resistance over its entire stroke.

NOTE: For the first 5 complete strokes, it could be normal to note uneven resistance.

5. Check 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 strokes.
6. If suspecting a shock is freezing, place shock in a freezer (temperature below 0°C (32°F)) for 4 hours.
7. Push down on rod and note its resistance. If shock is frozen it will be much more difficult to compress than one in normal condition.
8. If any faults are present, replace shock.

All HPG™ Shock (Including KYB PRO Series)

1. Perform a visual inspection of the shock:
   - The shock must be exempt of any dent or scratch, especially on the rod.
   - Any defect on the rod, as small as it is, can lead to seal failure and oil leak.
   - If such defect is detected, the shock must be replaced and this will not be covered under warranty.
2. Completely compress shock rod into the shock body and check result as per table.

HPG SHOCK	RESULT
All except 551 mm (21-11/16 in) rear shock	The rod should completely enter the shock body
551 mm (21-11/16 in) rear shock	The stroke must be at least 150 mm (5-29/32 in)

NOTE: The **HPG Variable Rate Shock** should be stiff for the first 25 mm (1 in) (approximately), then softer for about 50 mm (2 in), and stiffer again. This stiff/soft/stiff phenomenon shows the normal operation of VR shock.

3. Release shock from completely compressed position and check result as per table.

HPG SHOCK EXCEPT VARIABLE RATE
– The shock should extend unassisted. – The rod must come out at a steady speed.

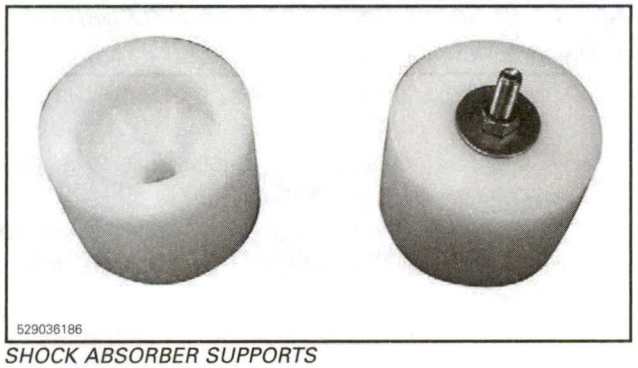
HPG VARIABLE RATE SHOCK
– The shock should extend unassisted. – Rod must come out slowly first, then faster and finally slow again for the last 25 mm (1 in).

4. Proceed with *SHOCK ABSORBER COMPRESSION TEST*. See procedure in this subsection.
5. If any faults are present, replace shock.

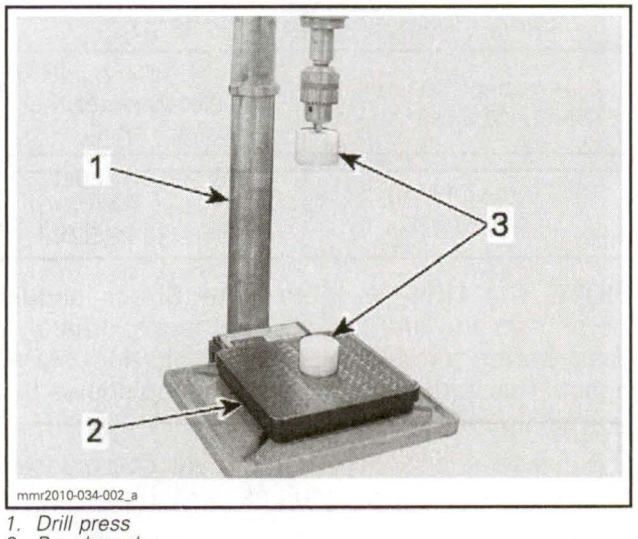
Shock Absorber Compression Test

1. Ensure shock absorber is at normal room temperature (19°C to 23°C (66°F to 73°F)).

2. Remove spring from shock absorber (if applicable).
3. Place a bench scale such as the SALTER BRECKNELL BENCH SCALE (P/N PS 400) (or an equivalent) on a suitable drill press.
4. Install SHOCK ABSORBER SUPPORTS (P/N 529 036 186) in the drill press.

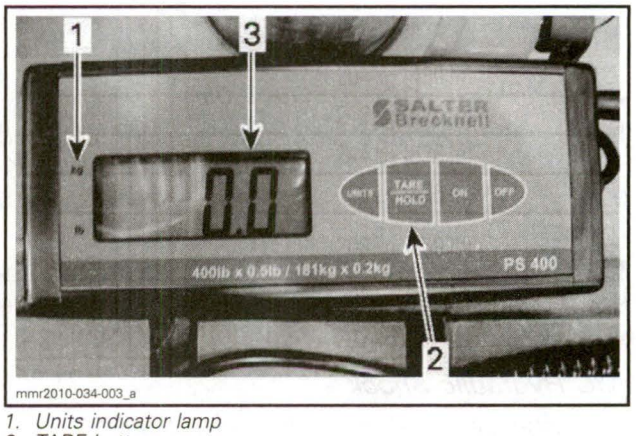


SHOCK ABSORBER SUPPORTS



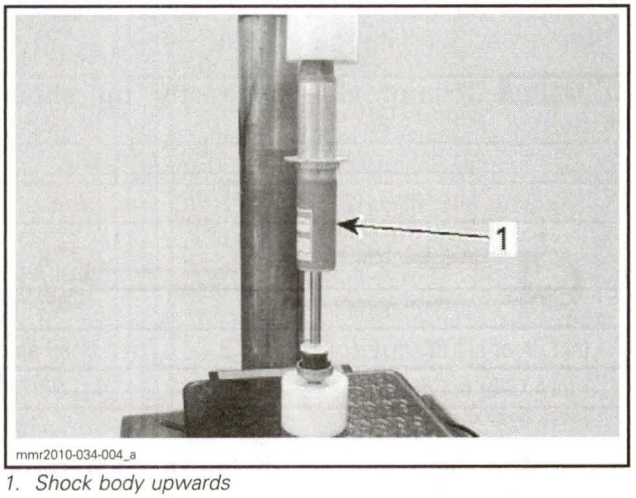
1. *Drill press*
2. *Bench scale*
3. *Shock absorber supports*

5. Set bench scale units to **kg** (or **lb**).
6. Press **TARE** to reset digits (must indicate (0) zero).



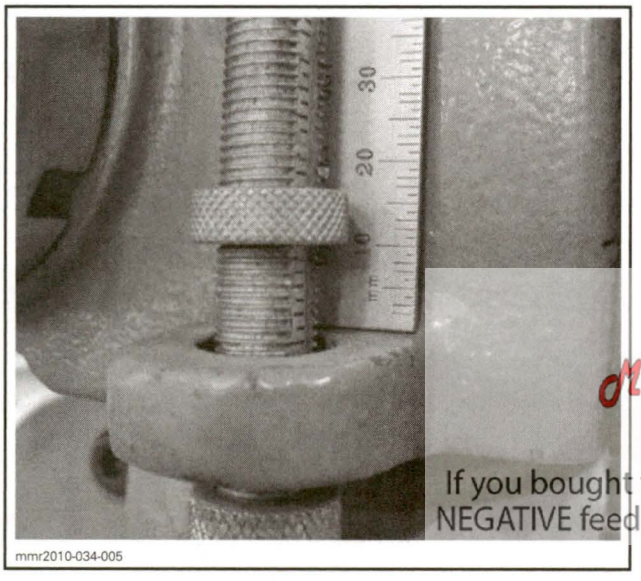
1. *Units indicator lamp*
2. *TARE button*
3. *Digits*

7. Install shock absorber between shock supports with shock body upwards.
8. Adjust drill press table height in order to set the upper shock support flush with the shock body end.
9. Ensure shock absorber is aligned with drill press axis.



1. *Shock body upwards*

10. Set the drill press displacement limiter to 10 mm (.394 in).



mmr2010-034-005

Midwest Manuals
Green Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

11. Compress shock absorber 10 mm (.394 in) and hold it in this position.
12. Read load recorded on the bench scale.



mmr2010-034-006

13. Ensure load reading is as per the following table.

MODEL	ROD DIAMETER	SERVICE RANGE
All HPG VR/Plus/Plus R	12.5 mm (1/2 in)	24 kgf ± 4 kgf (53 lbf ± 9 lbf)
All HPG KYB PRO	16 mm (5/8 in)	39 kgf ± 5 kgf (86 lbf ± 11 lbf)

ENGINE (550F)

ENGINE			
Engine type			552, Fan cooled (axial fan), cylinder reed porting
Number of cylinder			2
Bore		Standard	76.01 mm (2.993 in)
		1st oversize	76.26 mm (3.002 in)
		2nd oversize	76.51 mm (3.012 in)
Stroke			61.00 mm (2.402 in)
Displacement			553.40 cm^3 (33.77 in^3)
Compression ratio			9.66 ± 0.54
Combustion chamber volume			30.98 to 33.58 cc
Maximum power engine speed			6800 ± 100 RPM
Piston ring type		1st	Semi-trapezoidal
		2nd	Rectangular
Ring end gap		New	0.400 mm to 0.55 mm (.016 in to .022 in)
		Wear limit	1.0 mm (.039 in)
Ring/piston groove clearance		New	0.037 mm to 0.077 mm (.0015 in to .003 in)
		Wear limit	0.200 mm (.0079 in)
Piston/cylinder wall clearance		New	0.131 mm to 0.183 mm (.0052 in to .0072 in)
		Wear limit	0.200 mm (.0079 in)
Piston skirt wear		Wear limit	0.150 mm (.006 in)
Cylinder head warpage		Wear limit	0.150 mm (.006 in)
Cylinder taper		New (max.)	0.050 mm (.002 in)
		Wear limit	0.100 mm (.0039 in)
Cylinder out of round		New (max.)	0.010 mm (.0004 in)
		Wear limit	0.080 mm (.0031 in)
Maximum crankshaft end play		New (max.)	0.300 mm (.0118 in)
Crankshaft deflection	Maximum	MAG	0.030 mm (.0012 in)
		Center	0.080 mm (.0031 in)
		PTO	0.060 mm (.0024 in)
Connecting rod big end axial play		New	0.170 mm to 0.530 mm (.0067 in to .0209 in)
		Wear limit	1.200 mm (.0472 in)
AXIAL FAN			
Axial fan belt adjustment		Drive belt deflection	9.5 mm ± 1.5 mm (.374 in ± .059 in)
		Force	5.0 kgf (11 lbf)
N.A.: Not Available			

ENGINE (600)

ENGINE		
Engine type		Rotax 593 liquid cooled w/Reed valve, RAVE
Number of cylinders		2
Bore	Standard	76 mm (2.992 in)
	First oversize	76.26 mm (3.002 in)
Stroke		65.8 mm (2.591 in)
Displacement		597 cm^3 (36.43 in^3)
Compression ratio		11.65:1
Combustion chamber volume		26.7 to 29.4 cc
Maximum power engine speed		8100 ± 100 RPM
RAVE spring	Color	Brown
	Wire diameter	0.9 mm (.035 in)
	Minimum free length	48.5 mm (1.909 in)
Piston ring type		Semi-trapezoidal
Ring end gap	New	0.4 mm to 0.55 mm (.0157 in to .0217 in)
	Wear limit	1 mm (.039 in)
Ring/piston groove clearance	New	0.04 mm to 0.09 mm (.0016 in to .0035 in)
	Wear limit	0.2 mm (.0079 in)
Piston/cylinder wall clearance	New	0.104 mm to 0.156 mm (.0041 in to .0061 in)
	Wear limit	0.18 mm (.0071 in)
Piston projection		1.35 mm to 1.55 mm (.053 in to .061 in)
Piston skirt wear	Wear limit	0.15 mm (.006 in)
Cylinder head warpage	Wear limit	0.5 mm (.02 in)
Cylinder taper	New (max.)	0.05 mm (.002 in)
	Wear limit	0.1 mm (.0039 in)
Cylinder out of round	New (max.)	0.01 mm (.0004 in)
	Wear limit	0.08 mm (.0031 in)
Crankshaft end play	New	MIN.: 0.10 mm (.0039 in) MAX.: 0.30 mm (.0118 in)
Crankshaft deflection	Max.	MAG: 0.05 mm (.002 in) CENTER: 0.08 mm (.0031 in) PTO: 0.06 mm (.0024 in)
Connecting rod big end axial play	New	0.36 mm to 0.74 mm (.0142 in to .0291 in)
	Wear limit	1.2 mm (.0472 in)

ENGINE (600 HO E-TEC)

ENGINE			
Engine type			Rotax 593 E-TEC liquid cooled w/Reed valve, 3D-RAVE
Number of cylinder			2
Bore			72 mm (2.835 in)
Stroke			73 mm (2.874 in)
Displacement			594.4 cm^3 (36.27 in^3)
Compression ratio			12.25 ± 0.50
Combustion chamber volume			25.3 to 27.65 cc
Maximum power engine speed			8100 ± 100 RPM
3D RAVE spring	Compression spring	Color	Red
		Wire diameter	0.8 mm (.031 in)
		Minimum free length	45 mm (1.772 in)
	Valve springs	Color	Red
		Wire diameter	0.7 mm (.0276 in)
		Minimum free length	35 mm (1.378 in)
Piston ring type			Semi-trapezoidal
Ring end gap		New	0.4 mm to 0.55 mm (.016 in to .022 in)
		Wear limit	1 mm (.039 in)
Ring/piston groove clearance		New	0.05 mm to 0.1 mm (.002 in to .0039 in)
		Wear limit	0.2 mm (.0079 in)
Piston/cylinder wall clearance		New	0.108 mm to 0.152 mm (.0043 in to .006 in)
		Wear limit	0.2 mm (.0079 in)
Piston projection			0.9 mm to 1.1 mm (.035 in to .043 in)
Piston skirt wear		Wear limit	0.15 mm (.006 in)
Cylinder head warpage		Wear limit	0.5 mm (.0197 in)
Cylinder taper		New (max.)	0.05 mm (.002 in)
		Wear limit	0.1 mm (.0039 in)
Cylinder out of round		New (max.)	0.012 mm (.0005 in)
		Wear limit	0.08 mm (.0031 in)
Crankshaft end play		New	MIN.: 0.10 mm (.0039 in) MAX.: 0.30 mm (.0118 in)
Crankshaft deflection		Max.	MAG: 0.06 mm (.0024 in) CENTER: 0.08 mm (.0031 in) PTO: 0.06 mm (.0024 in)
Connecting rod big end axial play		New	0.28 mm to 0.68 mm (.011 in to .0268 in)
		Wear limit	1.2 mm (.0472 in)

ENGINE (600 ACE)

ENGINE			
Engine type			ROTAX® 602 ACE 4-stroke, Double Over Head Camshaft (DOHC), dry sump, liquid cooled
Number of cylinders			2
Number of valves			8 valves (self adjusting hydraulic valve lifters)
Bore			69.7 mm (2.744 in)
Stroke			599.54 cm^3 (36.586 in^3)
Displacement			600 cm^3 (36.61 in^3)
Compression ratio			12.0 : 1
Decompressor type			N.A.
Maximum HP RPM			7250 ± 100 RPM
Intake valve opening			3° BTDC
Intake valve closing			37° ABDC
Exhaust valve opening			44° BBDC
Exhaust valve closing			6° ATDC
Valve stem diameter	Intake	New	4.958 mm to 4.972 mm (.1952 in to .1957 in)
		Service limit	4.94 mm (.1945 in)
	Exhaust	New	4.956 mm to 4.970 mm (.1951 in to .1957 in)
		Service limit	4.94 mm to 5.012 mm (.1945 in to .1973 in)
Valve guide diameter		New	5.0 mm to 5.012 mm (.1969 in to .1973 in)
		Service limit	5.05 mm (.1988 in)
Valve spring free length		New	31.35 mm (1.2343 in)
		Service limit	29.50 mm (1.1614 in)
Valve seat contact width	Intake	New	1.05 mm to 1.35 mm (.0413 in to .0531 in)
		Service limit	1.7 mm (.0669 in)
	Exhaust	New	1.25 mm to 1.45 mm (.0492 in to .0571 in)
		Service limit	1.8 mm (.0709 in)
Piston measurement		New	73.95 mm to 73.966 mm (2.9114 in to 2.912 in)
		Service limit	73.92 mm (2.91 in)
Piston/cylinder wall clearance		New	0.037 mm to 0.067 mm (.0015 in to .0026 in)
		Service limit	0.08 mm (.0031 in)
Piston ring type		1st	Upper compression ring, rectangular
		2nd	Lower compression ring, tapered face
		3rd	Oil scraper ring
Ring end gap	Rectangular	New	0.20 mm to 0.35 mm (.0079 in to .0138 in)
		Service limit	1.2 mm (.0472 in)
	Taper-face	New	0.30 mm to 0.50 mm (.0118 in to .0197 in)
		Service limit	1.2 mm (.0472 in)
	Oil scraper ring	New	0.20 mm to 0.70 mm (.0079 in to .0276 in)
		Service limit	1.2 mm (.0472 in)

ENGINE (cont'd)			
Ring/piston groove clearance	Rectangular	New	0.030 mm to 0.066 mm (.0012 in to .0026 in)
		Service limit	0.12 mm (.0047 in)
	Taper-face	New	0.020 mm to 0.056 mm (.0008 in to .0022 in)
		Service limit	0.12 mm (.0047 in)
	Oil scraper ring	New	0.010 mm to 0.040 mm (.0004 in to .0016 in)
		Service limit	0.15 mm (.0059 in)
Cylinder bore		New	74.003 mm to 74.017 mm (2.9135 in to 2.9141 in)
Cylinder taper		Maximum New	0.030 mm (.0012 in)
		Service limit	0.05 mm (.002 in)
Cylinder out of round		Maximum New	0.008 mm (.0003 in)
		Service limit	0.03 mm (.0012 in)
Camshaft bearing journal diameter	PTO	New	25.947 mm to 25.960 mm (1.0215 in to 1.022 in)
		Service limit	25.92 mm (1.0205 in)
	MAG/Center	New	22.947 mm to 22.960 mm (.9034 in to .9039 in)
		Service limit	22.92 mm (.9024 in)
Camshaft holder bore diameter	PTO	New	26.00 mm to 26.021 mm (1.0236 in to 1.0244 in)
		Service limit	26.05 mm (1.0256 in)
	MAG/Center	New	23.00 mm to 23.021 mm (.9055 in to .9063 in)
		Service limit	23.05 mm (.9075 in)
Camshaft lobe height	Intake	New	38.70 mm to 38.90 mm (1.5236 in to 1.5315 in)
		Service limit	38.68 mm (1.5228 in)
	Exhaust	New	39.40 mm to 39.60 mm (1.5512 in to 1.5591 in)
		Service limit	39.38 mm (1.5504 in)
Crankshaft bearing journal diameter		New	35.990 mm to 36.006 mm (1.4169 in to 1.4176 in)
		Service limit	35.960 mm (1.4157 in)
Crankshaft radial play		Service limit	0.09 mm (.0035 in)
Crankshaft axial play		New	0.120 mm to 0.392 mm (.0047 in to .0154 in)
		Service limit	0.450 mm (.0177 in)
Crankshaft deflection	MAG	Maximum	0.050 mm (.002 in)
	Center	Maximum	0.050 mm (.002 in)
	PTO	Maximum	0.050 mm (.002 in)
Crankshaft plain bearing inside diameter		Service limit	36.08 mm (1.4205 in)
Connecting rod big end diameter		Service limit	36.06 mm (1.4197 in)
Connecting rod big end radial play		Service limit	0.08 mm (.0031 in)
Connecting rod big end axial play		New	0.100 mm to 0.352 mm (.0039 in to .0139 in)
		Service limit	0.450 mm (.0177 in)
Connecting rod small end diameter		New	17.010 mm to 17.020 mm (.6697 in to .6701 in)
		Service limit	17.060 mm (.6717 in)
Piston pin diameter		New	16.996 mm to 17.000 mm (.6691 in to .6693 in)
		Service limit	16.986 mm (.6687 in)
Connecting rod small end radial play		Service limit	0.04 mm (.0016 in)

ENGINE (800R POWER TEK)

ENGINE			
Engine type			Rotax 797, Power TEK, liquid cooled, 3-D RAVE
Number of cylinders			2
Bore			82 mm (3.228 in)
Stroke			75.7 mm (2.98 in)
Displacement			799.5 cm^3 (48.79 in^3)
Compression ratio			12.16 ± 0.50 :1
Combustion chamber volume			34.08 ml to 37.26 ml (2.08 in^3 to 2.274 in^3)
Maximum power engine speed			8150 ± 100 RPM
RAVE spring	Compression spring	Color	Red
		Wire diameter	0.8 mm (.031 in)
		Minimum free length	45 mm (1.772 in)
	Valve spring	Color	Red
		Wire diameter	0.7 mm (.0276 in)
		Minimum free length	35 mm (1.378 in)
Piston ring type			Semi-trapezoidal
Ring end gap		New	0.4 mm to 0.6 mm (.0157 in to .0236 in)
		Wear limit	1 mm (.039 in)
Ring/piston groove clearance		New	0.056 mm to 0.107 mm (.0022 in to .0042 in)
		Wear limit	0.2 mm (.0079 in)
Piston/cylinder wall clearance		New	0.128 mm to 0.148 mm (.005 in to .0058 in)
		Wear limit	0.2 mm (.0079 in)
Piston projection			1.65 mm to 1.85 mm (.065 in to .073 in)
Piston skirt wear		Wear limit	0.15 mm (.0059 in)
Cylinder head warpage		Wear limit	0.5 mm (.0197 in)
Cylinder taper		New (max.)	0.05 mm (.002 in)
		Wear limit	0.1 mm (.0039 in)
Cylinder out of round		New (max.)	0.01 mm (.0004 in)
		Wear limit	0.08 mm (.0031 in)
Crankshaft end play		New	MIN.: 0.10 mm (.0039 in) MAX.: 0.30 mm (.0118 in)
Crankshaft deflection		Max.	MAG: 0.05 mm (.002 in) CENTER: 0.04 mm (.0016 in) PTO: 0.06 mm (.0024 in)
Connecting rod big end axial play		New	0.23 mm to 0.62 mm (.0091 in to .0244 in)
		Wear limit	1.2 mm (.0472 in)

ENGINE (800R E-TEC)

ENGINE				
Engine type				Rotax 797 E-TEC liquid cooled w/Reed valve, 3D-RAVE
Number of cylinder				2
Bore				82 mm (3.228 in)
Stroke				75.7 mm (2.98 in)
Displacement				799.5 cm^3 (48.79 in^3)
Compression ratio				12.30 ±0.3 :1
Combustion chamber volume				34.46 cm^3 to 36.32 cm^3 (2.103 in^3 to 2.216 in^3)
Maximum power engine speed				8100 ± 100 RPM
3D RAVE spring	Compression spring	Color		Red
		Wire diameter		0.8 mm (.031 in)
		Minimum free length		45 mm (1.772 in)
	Valve springs	Color		Red
		Wire diameter		0.7 mm (.0276 in)
		Minimum free length		35 mm (1.378 in)
Piston ring type				Semi-trapezoidal
Ring end gap		New		0.4 mm to 0.6 mm (.016 in to .024 in)
		Wear limit		1 mm (.039 in)
Ring/piston groove clearance		New		0.056 mm to 0.107 mm (.0022 in to .0042 in)
		Wear limit		0.2 mm (.0079 in)
Piston/cylinder wall clearance		New		0.135 mm ± 0.161 mm (.0053 in ± .0063 in)
		Wear limit		0.2 mm (.0079 in)
Piston projection				1.82 mm - 1.92 mm (.072 in - .076 in)
Piston skirt wear		Wear limit		0.15 mm (.006 in)
Cylinder head warpage		Wear limit		0.5 mm (.0197 in)
Cylinder taper		New (max.)		0.05 mm (.002 in)
		Wear limit		0.1 mm (.0039 in)
Cylinder out of round		New (max.)		0.010 mm (.0004 in)
		Wear limit		0.08 mm (.0031 in)
Crankshaft end play		New		0.10 mm (.0039 in)
		Service limit		0.30 mm (.0118 in)
Crankshaft deflection		Maximum	MAG	0.05 mm (.002 in)
			CENTER	0.04 mm (.0016 in)
			PTO	0.06 mm (.0024 in)
Connecting rod big end axial play		New		0.23 mm to 0.617 mm (.009 in to .024 in)
		Wear limit		1.2 mm (.0472 in)

ENGINE (1200 4-TEC)

ENGINE			
Engine type			ROTAX® 1203 Liquid cooled, 4-stroke, Double Over Head Camshaft (DOHC), dry sump, with balancer shaft
Number of cylinders			3
Number of valves			12 valves (mechanical adjustment)
Bore			91 mm (3.58 in)
Stroke			60 mm (2.36 in)
Displacement			1 171 cm^3 (71.46 in^3)
Combustion chamber volume			37.5 cm^3 to 40.6 cm^3 (2.29 in^3 to 2.48 in^3)
Compression ratio			11.0 ± 0.40:1
Decompressor type			N.A.
Maximum HP RPM			7800 ± 100 RPM
Intake valve opening			0° BTDC
Intake valve closing			40° ABDC
Exhaust valve opening			60° BBDC
Exhaust valve closing			5° BTDC
Valve clearance	Intake		0.10 mm to 0.20 mm (.0039 in to .0079 in)
	Exhaust		0.30 mm to 0.40 mm (.0118 in to .0157 in)
Valve stem diameter	Intake	New	5.471 mm to 5.486 mm (.2154 in to .216 in)
		Service limit	5.450 mm (.2146 in)
	Exhaust	New	5.461 mm to 5.476 mm (.215 in to .2156 in)
		Service limit	5.440 mm (.2142 in)
Valve guide diameter		New	5.506 mm to 5.518 mm (.2168 in to .2172 in)
		Service limit	5.568 mm (.2192 in)
Valve spring free length		New	36.70 mm (1.445 in)
		Service limit	35.50 mm (1.398 in)
Valve seat contact width	Intake	New	1.6 mm to 1.8 mm (.063 in to .0709 in)
		Service limit	2.2 mm (.0866 in)
	Exhaust	New	1.4 mm to 1.8 mm (.0551 in to .0709 in)
		Service limit	2.4 mm (.0945 in)
Cam follower bore diameter		New	8.013 mm to 8.049 mm (.3155 in to .3169 in)
		Service limit	8.060 mm (.3173 in)
Cam follower shaft diameter		New	7.972 mm to 7.980 mm (.3139 in to .3142 in)
		Service limit	7.960 mm (.3134 in)
Piston measurement		New	90.950 mm to 90.966 mm (3.5807 in to 3.5813 in)
		Service limit	90.900 mm (3.579 in)
Piston/cylinder wall clearance		New	0.027 mm to 0.057 mm (.0011 in to .0022 in)
		Service limit	0.100 mm (.0039 in)
Piston ring type		1st	Upper compression ring, rectangular
		2nd	Lower compression ring, tapered face
		3rd	Oil scraper ring

ENGINE (cont'd)			
Ring end gap	Rectangular	New	0.25 mm to 0.40 mm (.0098 in to .0157 in)
		Service limit	0.60 mm (.0236 in)
	Taper-face	New	0.20 mm to 0.40 mm (.0079 in to .0157 in)
		Service limit	0.70 mm (.0276 in)
	Oil scraper ring	New	0.20 mm to 0.70 mm (.0079 in to .0276 in)
		Service limit	1.0 mm (.0394 in)
Ring/piston groove clearance	Rectangular	New	0.030 mm to 0.070 mm (.0012 in to .0028 in)
		Service limit	0.150 mm (.0059 in)
	Taper-face	New	0.020 mm to 0.060 mm (.0008 in to .0024 in)
		Service limit	0.150 mm (.0059 in)
	Oil scraper ring	New	0.010 mm to 0.180 mm (.0004 in to .0071 in)
		Service limit	0.250 mm (.0098 in)
Cylinder bore		New	90.993 mm to 91.007 mm (3.5824 in to 3.583 in)
Cylinder taper		Maximum New	0.030 mm (.0012 in)
		Service limit	0.090 mm (.0035 in)
Cylinder out of round		Maximum New	0.008 mm (.0003 in)
		Service limit	0.050 mm (.002 in)
Camshaft bearing journal diameter	PTO/MAG	New	23.967 mm to 23.980 mm (.9436 in to .9441 in)
		Service limit	23.950 mm (.9429 in)
	Center	New	32.959 mm to 32.975 mm (1.2976 in to 1.2982 in)
		Service limit	32.942 mm (1.2969 in)
Camshaft holder bore diameter	PTO/MAG	New	24.007 mm to 24.020 mm (.9452 in to .9457 in)
		Service limit	24.070 mm (.948 in)
Camshaft lobe height	Intake	New	38.12 mm to 38.32 mm (1.5008 in to 1.5087 in)
		Service limit	38.09 mm (1.4996 in)
	Exhaust	New	37.86 mm to 38.06 mm (1.4906 in to 1.4984 in)
		Service limit	37.83 mm (1.4894 in)
Crankshaft bearing journal diameter		New	35.984 mm to 36.000 mm (1.4167 in to 1.4173 in)
		Service limit	35.970 mm (1.4161 in)
Crankshaft radial play		Service limit	0.10 mm (.0039 in)
Crankshaft axial play		New	0.080 mm to 0.313 mm (.0031 in to .0123 in)
		Service limit	0.350 mm (.0138 in)
Balancer shaft bearing journal diameter		New	35.984 mm to 36.000 mm (1.4167 in to 1.4173 in)
		Service limit	35.970 mm (1.4161 in)
Balancer shaft radial play		Service limit	0.10 mm (.0039 in)
Balancer shaft axial play		New	0.10 mm to 0.23 mm (.0039 in to .0091 in)
		Service limit	0.350 mm (.0138 in)
Crankshaft pin diameter		New	37.984 mm to 38.000 mm (1.4954 in to 1.4961 in)
		Service limit	37.970 mm (1.4949 in)
Crankshaft deflection	MAG	Maximum	0.050 mm (.002 in)
	Center	Maximum	0.050 mm (.002 in)
	PTO	Maximum	0.030 mm (.0012 in)

ENGINE (cont'd)		
Crankshaft/balancer shaft plain bearing inside diameter	Service limit	36.100 mm (1.4213 in)
Connecting rod big end diameter	Service limit	38.060 mm (1.4984 in)
Connecting rod big end radial play	Service limit	0.08 mm (.0031 in)
Connecting rod big end axial play	New	0.100 mm to 0.352 mm (.0039 in to .0139 in)
	Service limit	0.400 mm (.0157 in)
Connecting rod small end diameter	New	22.010 mm to 22.020 mm (.8665 in to .8669 in)
	Service limit	22.040 mm (.8677 in)
Piston pin diameter	New	21.991 mm to 21.996 mm (.8658 in to .866 in)
	Service limit	21.985 mm (.8656 in)
Connecting rod small end radial play	Service limit	0.045 mm (.0018 in)

CHASSIS SYSTEMS REV-XP (550F), EXPEDITION (550F)

LUBRICATION SYSTEM		
Injection oil	Type	XPS MINERAL INJECTION OIL (P/N 413 802 900)
	Quantity	3.7 L (125 U.S. oz)
FUEL SYSTEM		
Carburetor type	MAG	VM30-218 (Green dot)
	PTO	VM30-219 (Blue dot)
Main jet	MAG	190
	PTO	200
Needle jet		P-8
Pilot jet		35
Jet needle identification		6BFY46
Jet needle clip position	MAG	3
	PTO	4
Slide valve cut-away		2.5
Idle throttle valve height		1.6 mm ± 0.1 mm (.063 in ± .004 in)
Float level		23.9 mm ± 1 mm (.941 in ± .039 in)
Air screw adjustment	MAG	1.25 (reference only)
	PTO	1.0 (reference only)
Idle speed		1650 ± 200 RPM
Fuel type		Unleaded
Minimum octane rating	Inside North America	87 ((R+M)/2) Fuel with NO ethanol) 91 ((R+M)/2) (Fuel which may contain up to 10% MAX ethanol)
	Outside North America	92 (RON) (Fuel with NO ethanol) 95 (RON) (Fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity		40 L (10.57 U.S. gal.)
ELECTRICAL SYSTEM		
Magneto generator output		340 W @ 6000 RPM
Ignition type		CDI
Spark plug	Make and type	NGK BR9ECS (2)
	Gap	0.45 mm ± 0.05 mm (.018 in ± .002 in)
Ignition timing BTDC @ 3500 RPM		2.77 mm ± 0.05 mm (.109 in ± .002 in)
		22°
Trigger coils		160 to 180 Ω
Magneto stator windings	Ignition	6.3 to 7.7 Ω
	Charging/lighting	0.145 to 0.175 Ω
Ignition coil (integrated in ECM)	Primary	N.A.
	Secondary	900 to 1100 Ω (without spark plug wires)
Battery (if applicable)		12 V, 18 A•h
Headlamp		60/55 W (H4)

ELECTRICAL SYSTEM (cont'd)			
Taillight and stoplight			21/5 W
Fuse		Starter solenoid	30 A (if applicable)
		Fuel level	0.25 A
DRIVE SYSTEM			
Chaincase oil		Type	XPS SYNTHETIC CHAINCASE OIL (P/N 413 803 300)
		Quantity	350 ml (11.8 U.S. oz)
Chain drive ratio		Grand Touring Sport	19/45
		All others	21/45
Chain		Pitch	9.53 mm (3/8 in)
		Type/links qty/width	Silent 102/13
Drive pulley type			eDrive
Drive pulley calibration	Clutch engagement	Expedition Sport	2600 ± 100 RPM
		All others	3200 ± 100 RPM
	Spring color		Red/Yellow
	Spring free length		90.4 mm (3.56 in)
	Pin		N.A.
	Ramp	Expedition Sport	700
		All others	730
	Screw position		N.A.
Driven pulley	Type		QRS-SS
	Spring color		Brown
	Cam angle	Expedition Sport	44°
		All others	47° - 44°
Pulley distance (before break-in period)		Z	21.00 mm (.827 in)
Offset		X	37.20 mm ± 0.50 mm (1.465 in ± .02 in)
Drive belt		Width	35.30 mm (1.39 in)
		Wear limit	32.9 mm (1.295 in)
Drive belt adjustment		Deflection	32 mm ± 0.5 mm (1.26 in ± .02 in)
		Force	11.3 kg (24.9 lb)
Track	Width	Expedition Sport Grand Touring Sport Renegade Sport (EUR)	406.4 mm (16 in)
		MX Z Sport Renegade Sport	381 mm (15 in)
	Length	MX Z Sport	3 051 mm (120 in)
		Renegade Sport Grand Touring Sport	3 486 mm (137 in)
		Expedition Sport	3 922 mm (154 in)
	Profile height	Expedition Sport	38.1 mm (1.5 in)
		All others	31.8 mm (1.25 in)
Track adjustment		Deflection	32 mm (1-1/4 in)
		Force (1)	7.3 kgf (16 lbf)

BRAKE SYSTEM			
Brake pad thickness		Service limit	1 mm (.039 in)
Brake fluid		Type	DOT 4
		Quantity	60 ml (2.03 U.S. oz)
FRONT SUSPENSION			
Suspension type			Rev XP
Suspension maximum travel		Expedition Sport	210 mm (8.3 in)
		All others	229 mm (9 in)
Shock absorber type		MX Z Sport (EUR)	HPG Plus
		All others	Motion control
REAR SUSPENSION			
Suspension type		Grand Touring Sport Renegade Sport	SC-5 M
		Expedition Sport	SC-5 U
		MX Z Sport	SC-5
Suspension maximum travel		Grand Touring Sport Renegade Sport Expedition Sport	34 cm (13.4 in)
		MX Z Sport	38 cm (15 in)
Shock absorber type	Center	MX Z Sport (EUR)	HPG Plus
		All others	Motion control
	Rear	MX Z Sport (EUR)	HPG Plus
		MX Z Sport (CA/US)	Motion control
		All others	HPG
Stroke limiter standard position			3
STEERING SYSTEM			
Ski type		Grand Touring Sport	Pilot 5.7 SL
		Expedition Sport	Pilot DS
		All others	Pilot 5.7
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Dry weight		Expedition Sport	234 kg (516 lb)
		Grand Touring Sport	225 kg (496 lb)
		MX Z Sport	192 kg (423 lb)
		Renegade Sport	199 kg (439 lb)
Length		Expedition Sport	3 329 mm (131.06 in)
		MX Z Sport	290.5 cm (114.37 in)
		Renegade Sport Grand Touring Sport	3 110 mm (122.4 in)
Width		Expedition Sport	1 159 mm to 1 204 mm (45.6 in to 47.4 in)
		Grand Touring Sport MX Z Sport Renegade Sport	121.7 cm (47.9 in)

WEIGHT AND DIMENSIONS (cont'd)		
Height	Expedition Sport Grand Touring	1 275 mm (50.2 in)
	All others	121 cm (47.6 in)
Ski width	Expedition Sport	165 mm (6.5 in)
	Grand Touring Sport (CA/US) MX Z Sport Renegade Sport (CA/US)	145 mm (5.7 in)
	Grand Touring Sport (EUR)	165 mm (6.5 in)
Ski stance (carbide to carbide)	Expedition Sport	975 mm to 1 018 mm (38.386 in to 40.079 in)
	All others	107.7 cm (42.4 in)
N.A.: Not Available		

(1) Measure gap between slider shoe and bottom inside track when exerting a downward pull to the track.

CHASSIS SYSTEMS REV-XP (600)

COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use BRP premix coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	G.T. Sport	5.93 L (6.27 qt (U.S. liq.))
		MXZ Sport	5.47 L (5.78 qt (U.S. liq.))
		SUMMIT Sport	5.36 L (5.66 qt (U.S. liq.))
Thermostat opening temperature			37°C (99°F)
Cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Injection oil	Type		XPS synthetic blend 2-stroke oil (P/N 293 600 100)
	Quantity		3.7 L (3.9 qt (U.S. liq.))
FUEL SYSTEM			
Carburetor type			2 x TM40
Main jet			390
Needle jet			P-0M
Pilot jet			17.5
Jet needle identification			9CEY2 – 58
Clip position number			2
Slide cut-away			2.0
Idle throttle slide height			1.5 mm ± 0.1 mm (.059 in ± .004 in)
Float adjustment			Not adjustable
Air or pilot screw adjustment			1.5 ± 1/16 turn
Idle speed			1600 ± 200 RPM
Fuel type			Regular unleaded
Fuel octane rating	Inside North America		87 ((R+M)/2) (fuel with NO ethanol) 91 ((R+M)/2) (fuel which may contain up to 10% MAX ethanol)
	Outside North America		92 (RON) (fuel with NO ethanol) 95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity			40 L (10.6 U.S. gal.)
Gas/oil ratio			Injection
ELECTRICAL SYSTEM			
Magneto generator output			360 W @ 6000 RPM
Ignition type			CDI
Spark plug	Make and type		NGK BR9ECS
	Gap		Not adjustable 0.7 mm to 0.8 mm (.028 in to .031 in)
Ignition timing BTDC @ 3500 RPM			2.49 mm (.098 in)
			20°
Stator			0 to 0.5 Ω
Trigger coil			190 to 300 Ω

ELECTRICAL SYSTEM (cont'd)			
Lighting coil			0.1 to 1.0 Ω
High tension coil	Primary		0.3 to 0.7 Ω
	Secondary		18 to 26 KΩ (with caps)
Battery			12 V, 18 A•h (with electric starter)
Headlamp			2 x 60/55 W (H4)
Taillight and stoplight			21/5 W
Fuse	Main		30 A (with electric starter)
	ECM		5 A (with electric starter)
	Headlamp		15 A
	Accessories/taillight		20 A
	Fuel level sensor		0.25 A
DRIVE SYSTEM			
Chaincase oil	Type		XPS synthetic chaincase oil (P/N 413 803 300)
	Quantity		350 ml (12 U.S. oz)
Chain drive ratio		GT Sport	23/45
		MX Z Sport	25/45
		SUMMIT Sport	19/49
Chain	Pitch		3/8
	Type/links qty/plate qty		Silent 104/13
Drive pulley type			TRA III
Drive pulley calibration	Clutch engagement	GT Sport SUMMIT Sport	3400 ± 100 RPM
		MX Z Sport	3800 ± 100 RPM
	Spring color	GT Sport	Blue/Purple
		MX Z Sport	Purple/Purple
		SUMMIT Sport	Blue/Pink
	Spring length	G.T. Sport	96.6 mm (3.8 in)
		MXZ Sport	107 mm (4.2 in)
		SUMMIT Sport	93.5 mm (3.7 in)
	Pin		Solid
	Ramp	GT Sport MX Z Sport	412
		SUMMIT Sport	417
	Screw position		3
Driven pulley type	Type		QRS
	Spring color		Black
	Spring preload		0
	Cam angle	GT Sport MX Z Sport	42°
		SUMMIT Sport	43°/47°

DRIVE SYSTEM (cont'd)			
Pulley distance	Z		Not adjustable 21 mm (.827 in)
Pulley distance	X	Summit Sport	39.4 mm ± 1.80 mm (1.551 in ± .071 in)
		All others	Not adjustable 36.4 mm ± 1.8 mm (1.433 in ± .071 in)
Offset	Y - X	New	Not adjustable 3 mm ± 93 mm (.12 in ± 3.66 in)
		After break-in	Not adjustable 2 mm ± .5 mm (.079 in ± .02 in)
Drive belt	Width		37.6 mm (1.48 in)
	Wear limit		35.2 mm (1.386 in)
Track	Width	GT Sport SUMMIT Sport	40.6 cm (16 in)
		MX Z Sport	38 cm (15 in)
	Length	GT Sport	348 cm (137 in)
		MX Z Sport	305 cm (120 in)
		SUMMIT Sport	371 cm (146 in)
	Profile height	GT Sport	31.75 mm (1-1/4 in)
		MX Z Sport	25.4 mm (1 in)
		SUMMIT Sport	57.2 mm (2-1/4 in)
Track adjustment	Deflection		32 mm (1-1/4 in)
	Force		6.0 kgf to 8.5 kgf (13 lbf to 19 lbf)
BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)
FRONT SUSPENSION			
Suspension type			REV-XP
Suspension maximum travel			229 mm (9 in)
Shock absorber type		GT Sport MX Z Sport SUMMIT Sport	Motion Control
Sway bar type			Link
REAR SUSPENSION			
Suspension type		GT Sport	SC-5 M
		SUMMIT Sport	SC-5 M 2
		MX Z Sport	SC-5
Suspension maximum travel		GT Sport	340 mm (13.4 in)
		MX Z Sport	381 mm (15 in)
		SUMMIT Sport	356 mm (14 in)

SUSPENSION (cont'd)			
Shock absorber type	Center	GT Sport MX Z Sport SUMMIT Sport	Motion Control
	Rear	GT Sport SUMMIT Sport	HPG
		MX Z Sport	Motion Control
Stroke limiter standard position			3
STEERING SYSTEM			
Ski type		GT Sport	Pilot™ SL
		MX Z Sport	Pilot 5.7
		SUMMIT Sport	Pilot DS
Toe-out			5 mm (.197 in)
Camber			0°
VEHICLE INFORMATIONS			
Mass (dry)		GT Sport	229 kg (505 lb)
		MX Z Sport	191 kg (421 lb)
		SUMMIT Sport	196 kg (432 lb)
Length		GT Sport	311 cm (122.4 in)
		MX Z Sport	290.5 cm (114.4 in)
		SUMMIT Sport	322.6 cm (127 in)
Width		GT Sport MX Z Sport	121.7 cm (47.9 in)
		SUMMIT Sport	116.1 cm to 120.4 cm (45.7 in to 47.4 in)
Height		GT Sport	127.5 cm (50.2 in)
		MX Z Sport	121 cm (48 in)
		SUMMIT Sport	130 cm (51.2 in)
Ski stance (carbide to carbide)		GT Sport MX Z Sport	107.7 cm (42.4 in)
		SUMMIT Sport	97.5 cm to 101.8 cm (38.4 in to 40.1 in)

CHASSIS SYSTEMS REV-XP/REV-XR (600 HO E-TEC)

COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use BRP premix coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	MX Z Series GSX LE	5.47 L (1.45 U.S. gal.)
		Renegade Adrenaline Renegade Backcountry GSX SE Grand Touring LE	5.93 L (1.57 U.S. gal.)
		Summit (154")	5.38 L (1.42 U.S. gal.)
		Summit (146")	5.36 L (1.42 U.S. gal.)
Thermostat opening temperature			37°C (99°F)
Cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Oil injection pump type			Electronic oil injection pump
Injection oil	Type		XPS synthetic blend 2-stroke oil (P/N 293 600 100)
	Quantity		3.7 L (125.1 U.S. oz)
FUEL SYSTEM			
Fuel delivery			E-TEC direct injection
Throttle body			Dell'Orto 46 mm
Fuel pump			In-tank electrical fuel pump
Idle speed (not adjustable)			1200 ± 200 RPM
Fuel	Type		Premium unleaded
	Octane rating	Inside North America	91 (R+M)/2) (fuel which may contain up to 10% MAX ethanol)
		Outside North America	95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity			40 L (10.6 U.S. gal.)
ELECTRICAL SYSTEM			
Lighting system output			1340 W @ 6000 RPM
Ignition type			Inductive
Spark plug	Make and type		NGK PZFR6F
	Gap		Not adjustable 0.75 mm ± 0.05 mm (.03 in ± .002 in)
Ignition timing BTDC @ 3500 RPM			28°
			5.38 mm (.212 in)
Crankshaft position sensor (CPS)			190 to 290 Ω
Stator			0.63 ± 0.03 Ω
Battery	Manual start models		No battery
	Electric start models		12 V, 18 A•h

ELECTRICAL SYSTEM (cont'd)			
Headlamp			2 x 60/55 W (H4)
Taillight and stoplight			21/5 W
Fuses	Start/RER		5 A
	Fuel level sensor		0.25 A
	Main (electric start only)		25 A
DRIVE SYSTEM			
Chaincase oil	Type		XPS synthetic chaincase oil (P/N 413 803 300)
	Quantity		350 ml (12 U.S. oz)
Chain drive ratio		GSX LE MX Z Series	25/45
		GSX SE GT LE (CA/US) Renegade Adrenaline (CA/US)	23/45
		Renegade Adrenaline (EUR) GT LE (EUR)	21/45
		Renegade Backcountry	21/49
		SUMMIT SP	19/49
Chain	Pitch		3/8
	Type/links qty/ plate qty	Renegade Adrenaline (EUR) GT LE (EUR)	Silent 102/13
		Renegade Backcountry	Silent 106/13
		GSX Series GT LE (CA/US) MX Z Series Renegade Adrenaline (CA/US) SUMMIT SP	Silent 104/13
Drive pulley type			TRA III

DRIVE SYSTEM (cont'd)			
Drive pulley calibration	Clutch engagement	SUMMIT SP	4000 ± 100 RPM
		All others	3400 ± 100 RPM
	Spring color	GSX LE	Yellow/Green
		GSX SE GT LE	Red/Green
		MX Z Series Renegade Series SUMMIT SP (146"-EUR)	Blue/Green
		SUMMIT SP (146"-CA/US) SUMMIT SP (154")	Purple/Green
	Spring length	Yellow/Green	94.61 mm (3.725 in)
		Red/Green	85.9 mm (3.382 in)
		Blue/Green	105.7 mm (4.161 in)
		Purple/Green	133.5 mm (5.256 in)
	Pin	SUMMIT SP (146"-CA/US) SUMMIT SP (154")	Hollow threaded + 16 mm set screw
		All others	Solid
	Ramp	GSX LE MX Z Series Renegade Series SUMMIT SP (146"-EUR)	412
		GSX SE GT LE	414
		SUMMIT SP (146"-CA/US) SUMMIT SP (154")	440
	Screw position		3
Driven pulley type	Type		QRS
	Spring color	SUMMIT SP	Black
		All others	Green
	Spring preload		0
	Cam angle	SUMMIT SP	41°/45°
		All others	48°
Pulley distance	Z		Not adjustable 20.9 mm (.823 in)
Pulley distance	X		Not adjustable 36.4 mm ± 1.8 mm (1.433 in ± .02 in)
Offset	Y - X	New	Not adjustable 3 mm ± 93 mm (.12 in ± 3.66 in)
		After break-in	Not adjustable 2 mm ± .5 mm (.079 in ± .02 in)
Drive belt	Width		38.5 mm (1.516 in)
	Wear limit		36.1 mm (1.421 in)
	Deflection		32 mm ± 5.0 mm (1.26 in ± .197 in)
	Adjustment force		11.30 kgf (24.9 lbf)

DRIVE SYSTEM (cont'd)			
Track	Width	GT LE (EUR) Renegade Series SUMMIT SP	406.4 mm (16 in)
		All others	381 mm (15 in)
	Length	GSX LE MX Z Series	3 m (120 in)
		GSX SE GT LE Renegade Series	3.5 m (137 in)
		SUMMIT SP (146")	3.7 m (146 in)
		SUMMIT SP (154")	3.9 m (154 in)
	Profile height	GT LE (CA/US)	25.4 mm (1 in)
		GSX LE GT LE (EUR) MX Z Series Renegade Adrenaline GSX SE	31.8 mm (1-1/4 in)
		Renegade Backcountry	44.5 mm (1-3/4 in)
		SUMMIT SP	57.2 mm (2-1/4 in)
Track adjustment	Deflection		32 mm (1-1/4 in)
	Force		7.3 kgf (16.1 lbf)
BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)
FRONT SUSPENSION			
Suspension type			REV-XP
Suspension maximum travel		Summit SP	200 mm (7.9 in)
		GSX LE GSX SE GT LE MX Z TNT Renegade Adrenaline	229 mm (9 in)
		Renegade Backcountry	210 mm (8.3 in)
		MX Z X-RS	241 mm (9.5 in)
Shock absorber type		GSX LE GSX SE GT LE SUMMIT SP	HPG
		MX Z TNT Renegade Series	HPG Plus
		MX Z X-RS	KYB PRO 40 R EA
Stabilizer bar type			Link

REAR SUSPENSION			
Suspension type		GSX LE GSX SE GT LE	SC-5
		MX Z TNT MX Z X-RS Renegade Series	rMotion
		SUMMIT SP	SC-5 M 2
Suspension maximum travel		GSX LE Summit SP (154")	381 mm (15 in)
		GSX SE Renegade Series	406 mm (16 in)
		GT LE	331 mm (13 in)
		MX Z TNT MX Z X-RS	394 mm (15.5 in)
		Summit SP (146")	356 mm (14 in)
Shock absorber type	Center	GSX LE GT LE	Motion control
		GSX SE Renegade Series Summit SP	HPG
		MX Z TNT	HPG Plus
		MX Z X-RS	KYB PRO 40 R EA
Shock absorber type	Rear	GSX SE	ACS
		Renegade Series Summit SP	HPG
		GSX LE GT LE	HPG VR
		MX Z TNT	HPG Plus
		MX Z X-RS	KYB PRO 40 EA
Stroke limiter standard position		GSX LE GSX SE GT LE Renegade Series SUMMIT SP	3
		MX Z TNTMX Z X-RS	1
STEERING SYSTEM			
Ski type		GSX LE GSX SE MX Z TNT Renegade Series	Pilot 5.7
		GT LE	Pilot 5.7 SL
		MX Z X-RS	Pilot 5.7 R
		Renegade Backcountry SUMMIT SP	Pilot DS
Toe-out			5 mm (.197 in)
Camber			0°

WEIGHT AND DIMENSIONS		
Mass (dry)	GSX LE	204 kg (450 lb)
	GSX SE	213 kg (470 lb)
	GT LE	244 kg (538 lb)
	MX Z TNT	195 kg (430 lb)
	MX Z X-RS Renegade Series	208 kg (459 lb)
	SUMMIT SP (146")	206 kg (454 lb)
	SUMMIT SP (154")	207 kg (456 lb)
Length	GSX LE MX Z TNT MX Z X-RS	291 cm (114.6 in)
	GSX SE Renegade Series	311 cm (122.4 in)
	GT LE	323 cm (127.2 in)
	SUMMIT SP (146")	322.6 cm (127 in)
	SUMMIT SP (154")	333 cm (131.1 in)
Width	Renegade Backcountry	115.9 cm to 120.4 cm (45.6 in to 47.4 in)
	SUMMIT SP	108.1 cm to 112.6 cm (42.6 in to 44.3 in)
	GSX Series GT LE MX Z Series Renegade Adrenaline	122 cm (48 in)
Height	GSX LE MX Z X-RS	120 cm (47.2 in)
	GSX SE	133.8 cm (52.7 in)
	GT LE	137 cm (53.9 in)
	MX Z TNT Renegade Series	121 cm (47.6 in)
	SUMMIT SP	130 cm (51.2 in)
Ski stance (carbide to carbide)	Renegade Backcountry	97.5 cm to 101.9 cm (38.4 in to 40.1 in)
	SUMMIT SP	90.7 cm to 95 cm (35.7 in to 37.4 in)
	GSX Series GT LE MX Z Series Renegade Adrenaline	107.7 cm (42.4 in)

CHASSIS SYSTEMS REV-XP/ EXPEDITION (600 ACE)

COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use BRP premixed coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	Expedition Sport	5.16 L (1.36 U.S. gal.)
		Renegade Sport	4.8 L (1.27 U.S. gal.)
		Grand Touring Sport (CAN/U.S.), Grand Touring Sport (Eur)	5.63 L (1.49 U.S. gal.)
		MX Z Sport	4.4 L (1.16 U.S. gal.)
Thermostat opening temperature			75°C (167°F)
Cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Lubrication	Type		Dry sump. Replaceable oil filter
	Oil filter		BRP Rotax paper type, replaceable
	Engine oil pressure	Minimum	60 kPa (8.7 PSI) @ 1400 RPM
			400 kPa (58 PSI) @ 4000 RPM
	Engine oil	Capacity (oil change with filter)	2.1 L (2.22 qt (U.S. liq.))
		Recommended	XPS Synthetic 4-Stroke oil (All climate) (P/N 293 600 112) or a SAE 0W 40 API service SM synthetic oil
FUEL SYSTEM			
Throttle body type			Dell'Orto 46 mm heated
Idle speed	Normal idle		1400 ±100 RPM
	Fast idle		2100 ±100 RPM
Recommended fuel			Unleaded
Minimum octane rating	Inside North America		87 ((R+M)/2) (fuel with no ethanol) 91 ((R+M)/2) (fuel which may contain up to 10% MAX ethanol)
	Outside North America		92 (RON) (fuel with no ethanol) 95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity			40 L (10.57 U.S. gal.)
ELECTRICAL SYSTEM			
Magneto generator output		Grand Touring Sport (CAN/U.S.)	650 W @ 6000 RPM @ 14 V
		All Others	420 W @ 6000 RPM @ 14 V
Magneto stator resistance (between any pair of yellow wires)			0.1 to 1 Ohm @ 20°C (68°F)
Ignition type			IDI (Inductive Digital Ignition)
Spark plug	Make and type		NGK MR7BI-8
	Gap		.70 mm to 0.80 mm (.028 in to .031 in)
Ignition timing			Not adjustable
Battery			12 volt 18 A.h. YTX20HL-BS
Headlamp LOW/HI beam			2 x 60/55 W (H4)
Taillight and stoplight			21/5 W

ELECTRICAL SYSTEM (cont'd)			
Fuses and relays	F 1	Battery charging (Main) and communication connector	30 A
	F 2	Start/RER button, relays, clock	5 A
	F 3	Fuel pump, starter solenoid	10 A
	F 4	Cooling fan	15 A
	F 5	Ignition coils, fuel injectors	10 A
	F 6	ECM, gauge	10 A
	F 7	Accessories, heating elements	15 A
	F 8	Headlights, taillight, brake light	20 A
	R1	Main relay	–
	R2	Lighting relay	–
	R3	Accessory relay	–
DRIVE SYSTEM			
Chaincase oil	Type		XPS synthetic chaincase oil
	Quantity		500 ml (16.9 U.S. oz)
Chain drive small sprocket	Teeth quantity	MXZ Sport	24
		All Others	21
Chain drive large sprocket	Teeth quantity	Grand Touring Sport, Renegade Sport (CAN/U.S.)	49
		Expedition Sport MXZ Sport Renegade Sport (Eur)	51
Chain	Pitch		9.53 mm (3/8 in)
	Type/links qty/ plate qty	MXZ Sport	Silent 108/13
		All Other	Silent 106/13
Drive belt	Width		36.30 mm (1.429 in)
	Wear limit		33.90 mm (1.335 in)
	Deflection		32.0 mm (1.26 in)
	Force		11.30 kgf (24.9 lbf)
Drive pulley	Type		eDrive
	Clutch engagement		2200
	Spring color	Grand Touring Sport (CAN/U.S.) MXZ Sport	Red/Yellow
		Expedition Sport Grand Touring Sport (Eur) Renegade Sport	Red/White
	Spring length	Red/Yellow	90.400 mm (3.559 in)
		Red/White	114.7 mm (4.516 in)
	Pin		N.A.
	Ramp	Grand Touring Sport (CAN/U.S.) MXZ Sport	712
		Grand Touring Sport (Eur)	715
		Expedition Sport Renegade Sport	716
	Screw position		N.A.

DRIVE SYSTEM (cont'd)			
Driven pulley	Type		QRS-SS
	Spring preload (New)		7.0 kgf ± 0.7 kgf (15.4 lbf ± 1.5 lbf)
	Spring preload (After break-in)		6.4 kgf ± 0.7 kgf (14.1 lbf ± 1.5 lbf)
	Spring color		Pink3
	Cam angle		41/45°
	Distance	Z	21.40 mm (.843 in)
	Offset	X	37.2 mm ± 0.5 mm (1.465 in ± .02 in)
	Difference	Y - X	1.90 mm (.075 in)
Track	Width	Grand Touring Sport (CAN/U.S.) MXZ Sport Renegade Sport (CAN/U.S.)	38.1 cm (15 in)
		Expedition Sport Grand Touring Sport (Eur) Renegade Sport (Eur)	40.6 cm (16 in)
	Length	MXZ Sport	3.05 m (120 in)
		Grand Touring Sport Renegade Sport	3.49 m (137 in)
		Expedition Sport	391 cm (154 in)
	Profile height	Grand Touring Sport (CAN/U.S.)	19 mm (.75 in)
		MXZ Sport Grand Touring Sport	25.4 mm (1 in)
		Grand Touring Sport (Eur) Renegade Sport	31.8 mm (1.25 in)
		Expedition Sport	38 mm (1.5 in)
Track adjustment	Deflection	MX Z Sport Grand Touring Sport Renegade Sport	32 mm (1-1/4 in)
		Expedition Sport	42 mm (1-21/32 in)
	Force		7.3 kgf (16.1 lbf)
BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)
FRONT SUSPENSION			
Suspension type			Double A-arm
Suspension maximum travel		All others	229 mm (9 in)
		Expedition Sport	210 mm (8.3 in)
Shock absorber type			Motion control
Stabilizer bar type			Link

REAR SUSPENSION			
Suspension type		MX Z Sport	SC-5
		Grand Touring Sport Renegade Sport	SC-5M
		Expedition Sport	SC-5U
Suspension maximum travel		Expedition Sport Grand Touring Sport Renegade Sport	34 cm (13.4 in)
		MX Z Sport	38.1 cm (15 in)
Shock absorber type	Center	Renegade Sport (Eur)	HPG
		All Others	Motion control
	Rear	MX Z Sport	Motion control
		Expedition Sport Grand Touring Sport Renegade Sport	HPG
Stroke limiter standard position			3
Coupling blocks standard position			2
STEERING SYSTEM			
Ski type		Expedition Sport	Pilot DS
		MXZ Sport Renegade Sport	Pilot 5.7
		Grand Touring Sport	Pilot 5.7 SL
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Dry weight		Expedition Sport	244 kg (538 lb)
		Grand Touring Sport	234 kg (516 lb)
		MX Z Sport	206 kg (454 lb)
		Renegade Sport	213 kg (470 lb)
Length		Expedition Sport	332.9 cm (131.1 in)
		MX Z Sport	290.5 cm (114.4 in)
		Grand Touring Sport Renegade Sport	311 cm (122.4 in)
Width		Expedition Sport	115.9 cm to 120.4 cm (45.6 in to 47.4 in)
		All Others	121.7 cm (47.9 in)
Height		Expedition Sport Grand Touring Sport	127.5 cm (50.2 in)
		MX Z Sport Renegade Sport	121 cm (47.6 in)
Ski stance (carbide to carbide)		Expedition Sport	97.5 cm to 101.8 cm (38.4 in to 40.1 in)
		All Others	107.7 cm (42.4 in)
Ski width		Grand Touring Sport (CAN/U.S.) MX Z Sport	140 mm (5.5 in)
		Expedition Sport Grand Touring Sport (Europe) Renegade Sport	164 mm (6.5 in)

CHASSIS SYSTEMS REV-XP (800R POWER TEK)

COOLING SYSTEM		
Coolant	Type	Ethyl glycol and distilled water (50%/50%). Use BRP premix coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	5.79 L (1.5 U.S. gal.)
Thermostat opening temperature		37°C (99°F)
Radiator cap opening pressure		110 kPa (16 PSI)
LUBRICATION SYSTEM		
Injection oil	Type	XPS synthetic blend 2-stroke oil (P/N 293 600 100)
	Quantity	3.7 L (125.1 U.S. oz)
FUEL SYSTEM		
Carburetor type		TM40
Main jet		480
Needle jet		P-0M
Pilot jet		17.5
Jet needle identification		9EGI04 – 58
Clip position number		Not adjustable
Slide cut-away		2.0
Idle throttle slide height		2 mm ± 0.1 mm (.079 in ± .004 in)
Float adjustment		Not adjustable
Air or pilot screw adjustment		1.5 ± 1/16 turn
Idle speed		1900 ± 200 RPM
Fuel type		Premium unleaded
Fuel octane rating	Inside North America	91 ((R+M)/2) (fuel which may contain up to 10% MAX ethanol)
	Outside North America	95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity		40 L (10.6 U.S. gal.)
Gas/oil ratio		Injection
ELECTRICAL SYSTEM		
Magneto generator output		360 W @ 6000 RPM
Ignition type		C.D.I.
Spark plug	Make and type	NGK BR9ECS
	Gap	Not adjustable 0.75 mm ± 0.05 mm (.03 in ± .002 in)
Ignition timing BTDC @ 3500 RPM		28°
		2.37 mm (.093 in)
Trigger coil		190 to 300 Ω
Lighting coil		0.1 to 1.0 Ω

ELECTRICAL SYSTEM (cont'd)		
Stator		0 to 0.5 Ω
High tension coil	Primary	0.3 to 0.7 Ω
	Secondary	18 to 26 KΩ (with caps)
Headlamp		2 x 60/55 W (H4)
Taillight and stoplight		21/5 W
Fuse	Headlamp	15 A
	Accessories/taillight	20 A
	Fuel level sensor	0.25 A
DRIVE SYSTEM		
Chaincase oil	Type	XPS synthetic chaincase oil (P/N 413 803 300)
	Quantity	350 ml (12 U.S. oz)
Chain drive ratio		19/49
Chain	Pitch	3/8
	Type	Silent
	Links qty/plate qty	106-13
Drive pulley type		TRA VII
Drive pulley calibration	Clutch engagement	3800 ± 100 RPM
	Spring color	Green/Purple
	Wire diameter/ spring length	5.54 mm (.218 in)/133.7 mm (5.264 in)
	Pin type	Hollow threaded long + 12 mm set screw
	Ramp	441
	Screw position	1
Driven pulley type	Type	QRS
	Spring color	Purple
	Spring preload	0
	Cam angle	43°/47°
Pulley distance	Z	Not adjustable 21 mm (.827 in)
Pulley distance	X	Not adjustable 39.4 mm ± 1.8 mm (1.551 in ± .071 in)
Offset	Y - X	New: Not adjustable 3 mm ± 93 mm (.12 in ± 3.66 in)
		After break-in: Not adjustable 2 mm ± .5 mm (.079 in ± .02 in)
Drive belt	Width	38.3 mm (1.508 in)
	Wear limit	35.9 mm (1.413 in)
Track	Width	406.4 mm (16 in)
	Length	392 cm (154 in)
	Profile height	57.2 mm (2-1/4 in)
Track adjustment	Deflection	32 mm (1-1/4 in)
	Force	7.3 kgf (16.1 lbf)

BRAKE SYSTEM		
Brake lining minimum thickness		1 mm (.039 in)
Brake disk minimum thickness		4.5 mm (.177 in)
Brake fluid	Type	DOT 4
	Quantity	65 ml (2.2 U.S. oz)
FRONT SUSPENSION		
Suspension type		REV-XP
Suspension maximum travel		200 mm (7.9 in)
Shock absorber type		Motion Control
Sway bar type		Link
REAR SUSPENSION		
Suspension type		SC-5M 2
Suspension maximum travel		381 mm (15 in)
Shock absorber type	Center	Motion control
	Rear	HPG
Stroke limiter standard position		3
STEERING SYSTEM		
Ski type		Pilot DS
Toe-out		5 mm (.197 in)
Camber		0°
WEIGHT AND DIMENSIONS		
Mass (dry)		206 kg (454 lb)
Length		333.5 cm (131.3 in)
Width		115.9 cm to 120.4 cm (45.6 in to 47.4 in)
Height		130 cm (51.2 in)
Ski stance (carbide to carbide)		90.7 cm to 95 cm (35.7 in to 37.4 in)

Midwest Manuals
Green-Manuals
Paperless Manuals
For a Better Tomorrow
If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com

CHASSIS SYSTEMS REV-XP/REV-XR (800R E-TEC)

COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use BRP premix coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	GSX SE Renegade Series	6.35 L (1.68 U.S. gal.)
		MX Z X-RS	6.09 L (1.61 U.S. gal.)
		Freeride 137"	6.37 L (1.68 U.S. gal.)
		Freeride 146"	5.74 L (1.52 U.S. gal.)
		Freeride 154"	5.79 L (1.53 U.S. gal.)
Thermostat opening temperature			37°C (99°F)
Radiator cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Oil injection pump type			Electronic oil injection pump
Injection oil	Type		XPS synthetic 2-stroke oil (P/N 293 600 132)
	Quantity		3.7 L (125.1 U.S. oz)
FUEL SYSTEM			
Fuel delivery			E-TEC direct injection
Throttle body			Dell'Orto 52 mm
Fuel pump			In-tank electrical fuel pump
Idle speed (not adjustable)			1200 ± 200 RPM
Fuel	Type		Premium unleaded
	Octane rating	Inside North America	91 ((R+M)/2) (fuel which may contain up to 10% MAX ethanol)
		Outside North America	95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity			40 L (10.6 U.S. gal.)
ELECTRICAL SYSTEM			
Lightning system output			1340 W @ 6000 RPM
Ignition type			Inductive
Spark plug	Make and type		NGK PFR7AB (engine and spark plug threads are indexed)
	Gap		Not adjustable 0.75 mm ± 0.05 mm (.03 in ± .002 in)
Ignition timing BTDC @ 3500 ± 500 RPM			28°
			5.63 mm (.222 in)
Crankshaft position sensor (CPS)			190 to 290 Ω
Stator			0.63 ± 0.03 Ω

ELECTRICAL SYSTEM (cont'd)			
Battery	Electric start models		12 V, 18 A•h
Headlamp			2 x 60/55 W (H4)
Taillight and stoplight			21/5 W
Fuses	Start/RER		5 A
	Fuel level sensor		0.25 A
	Main (electric start models only)		25 A
DRIVE SYSTEM			
Chaincase oil	Type		XPS synthetic chaincase oil (P/N 413 803 300)
	Quantity		350 ml (12 U.S. oz)
Chain drive ratio		GSX SE MX Z X-RS	27/45
		Renegade Adrenaline	25/45
		Renegade Backcountry Freeride 137" (with 44.5 mm (1-3/4 in) track)	23/45
		Freeride 137" (with 57.2 mm (2-1/4 in) track)	21/45
		Freeride 154" (CA/US)	19/49
		Freeride 146" Freeride 154" (EUR)	21/49
Chain	Pitch		3/8
	Type		Silent
	Links qty/ plate qty	Freeride 137" (with 57.2 mm (2-1/4 in) track)	102/13
		GSX SE MX Z X-RS Freeride 146" Freeride 154" (EUR)	106/13
		All others	104/13
Drive pulley type			TRA VII
Drive pulley calibration	Clutch engagement		3800 ± 100 RPM
	Spring color	GSX SE Freeride 146"(EUR) Freeride 154" (EUR)	Yellow/Green
		MX Z X-RS Renegade Adrenaline	Blue/Green
		Freeride 137" Renegade Backcountry	Purple/Blue
		Freeride 146" (CA/US) Freeride 154" (CA/US)	Purple/Pink

DRIVE SYSTEM (cont'd)			
Drive pulley calibration	Spring length	Yellow/Green	94.61 mm (3.725 in)
		Blue/Green	105.7 mm (4.161 in)
		Purple/Blue	114.6 mm (4.512 in)
		Purple/Pink	101.8 mm (4.008 in)
	Pin	Freeride 146" (CA/US) Freeride 154" (CA/US)	Hollow threaded + 16 mm set screw
		GSX SE MX Z X-RS Renegade Series Freeride 146" (EUR) Freeride 154" (EUR)	Solid long
	Ramp	Renegade Backcountry Freeride 137" Freeride 146" (EUR) Freeride 154" (EUR)	413
		Freeride 146" (CA/US) Freeride 154" (CA/US)	441
		GSX SE MX Z X-RS Renegade Adrenaline	414
	Screw position	Freeride 146" (CA/US) Freeride 154" (CA/US)	1
		Freeride 146" (EUR) Freeride 154" (EUR)	2
		GSX SE MX Z X-RS Renegade Series Freeride 137"	3
Driven pulley type			QRS
Driven pulley calibration	Spring color	Freeride Series **except** Freeride 137" (with 44.5 mm (1-3/4 in) track)	Blue
		GSX SE Freeride 137" (with 44.5 mm (1-3/4 in) track) MX Z X-RS Renegade Series	Green
	Spring preload		0
	Cam angle	GSX SE	50°/44°
		MX Z X-RS	47°/44°
		Renegade Series Freeride 137" (with 44.5 mm (1-3/4 in) track)	44°/42°
		Other Freeride Models	40°

DRIVE SYSTEM (cont'd)			
Pulley distance	Z		Not adjustable 20.9 mm (.823 in)
	X	Freeride Series	Not adjustable 39.4 mm ± 1.8 mm (1.551 in ± .071 in)
		All others	Not adjustable 36.4 mm ± 1.8 mm (1.433 in ± .071 in)
Offset	Y - X	New	Not adjustable 3 mm ± 93 mm (.12 in ± 3.66 in)
		After break-in	Not adjustable 2 mm ± .5 mm (.079 in ± .02 in)
Drive belt	Width		38.3 mm (1.508 in)
	Wear limit		35.9 mm (1.413 in)
	Deflection		32.00 mm ± 5.00 mm (1.26 in ± .197 in)
	Adjustment force		11.30 kgf (24.912 lbf)
Track	Width	GSX SE MX Z X-RS	381 mm (15 in)
		All other models	406.4 mm (16 in)
	Length	GSX SE Renegade Series Freeride 137"	3.49 m (137 in)
		MX Z X-RS	3 m (120 in)
		Freeride 146"	3.7 m (146 in)
		Freeride 154"	3.9 m (154 in)
	Profile height	GSX SE MX Z X-RS Renegade Adrenaline	31.8 mm (1-1/4 in)
		Renegade Backcountry with Powder Max track Freeride 137" (2 Powder Max track choices)	44.5 mm (1-3/4 in)
		Freeride 137" (2s Powder Max track choice)	57.2 mm (2.25 in)
		Freeride 146" and 154" with Powder Max II track	63.5 mm (2.5 in)
Track adjustment	Deflection		32 mm (1-1/4 in)
	Force		7.3 kgf (16.1 lbf)
BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)

FRONT SUSPENSION			
Suspension type			REV-XP
Suspension maximum travel		MX Z X-RS	241 mm (9.5 in)
		Renegade Adrenaline	229 mm (9 in)
		Renegade Backcountry Freeride Series	210 mm (8.3 in)
Shock absorber type		GSX SE	HPG
		Renegade Series	HPG Plus
		MX Z X	HPG Plus R
		MX Z X-RS Freeride Series	KYB PRO 40 R EA
Stabilizer bar type			Link
REAR SUSPENSION			
Suspension type		MX Z X-RS Renegade Series	rMotion
		GSX SE Freeride 137"	SC-5
		Freeride 146" Freeride 154"	SC-5M2
Suspension maximum travel		Freeride 146"	356 mm (14 in)
		Freeride 154"	381 mm (15 in)
		MX Z X-RS	394 mm (15.5 in)
		GSX SE Renegade Series Freeride 137"	406.4 mm (16 in)
Shock absorber type	Center	GSX SE Renegade Adrenaline Renegade Backcountry	HPG
		MX Z X-RS Freeride Series	KYB PRO 40 EA
	Rear	GSX SE	ACS
		Renegade Adrenaline Renegade Backcountry	HPG
		MX Z X-RS Freeride Series	KYB PRO 40 EA
Stroke limiter standard position		MX Z X-RS	2
		All others	1
STEERING SYSTEM			
Ski type		GSX SE Renegade Adrenaline	Pilot 5.7
		MX Z X-RS	Pilot 5.7R
		Renegade Backcountry Freeride Series	Pilot DS
Toe-out			5 mm (.197 in)
Camber			0°

WEIGHT AND DIMENSIONS		
Mass (dry)	GSX SE Freeride 137"	219 kg (483 lb)
	Renegade Backcountry	208 kg (459 lb)
	Freeride 146"	220 kg (485 lb)
	Freeride 154"	222 kg (489 lb)
	Renegade Adrenaline	211 kg (465 lb)
	MX Z X-RS Renegade Backcountry	210 kg (463 lb)
Length	MX Z X-RS	290.5 cm (114.4 in)
	Freeride 146"	322.6 cm (127 in)
	Freeride 154"	333.5 cm (131.3 in)
	GSX SE Renegade Series Freeride 137"	311 cm (122.4 in)
Width	Renegade Backcountry	115.9 cm - 120.4 cm (45.6 in - 47.4 in)
	Freeride Series	114 cm - 118.4 cm (44.9 in - 46.6 in)
	GSX SE MX Z X-RS Renegade Adrenaline	122 cm (48 in)
Height	GSX SE	133.8 cm (52.7 in)
	MX Z Renegade Adrenaline Renegade Backcountry	121 cm (47.6 in)
	MX Z X-RS	120 cm (47.2 in)
	Freeride Series	130 cm (51.2 in)
Ski stance (carbide to carbide)	Renegade Backcountry Freeride Series	97.5 cm - 101.9 cm (38.4 in - 40.1 in)
	GSX SE MX Z X-RS Renegade Adrenaline	107.7 cm (42.4 in)

CHASSIS SYSTEMS REV-XR (1200 4-TEC)

COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use BRP premixed coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	Grand Touring Series GSX SE	6.03 L (1.59 U.S. gal.)
		GSX LE MX Z Series	5.58 L (1.5 U.S. gal.)
		Renegade Series	5.8 L (1.5 U.S. gal.)
Thermostat opening temperature			65°C (149°F)
Radiator cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Lubrication	Type		Dry sump. Replaceable oil filter
	Oil filter		BRP Rotax paper type, replaceable
	Engine oil pressure	Minimum	60 kPa (8.7 PSI) @ 1100 RPM
			350 kPa (50.8 PSI) @ 7700 RPM
	Engine oil	Capacity (oil change with filter)	3.5 L (3.7 qt (U.S. liq.))
		Recommended	XPS Synthetic 4-Stroke oil (All climate) (P/N 293 600 112) or a SAE 0W 40 API service SM synthetic oil
FUEL SYSTEM			
Throttle body type			Dell'Orto 52 mm heated
Idle speed	Normal idle		1100 RPM (starting at 70°C (158°F) oil temperature)
	Fast idle		1500 RPM at -40°C (-40°F)
Fuel	Type		Unleaded
	Minimum octane rating	Inside North America	87 ((R+M)/2) (fuel with NO ethanol) 91 ((R+M)/2) (fuel which may contain up to 10% MAX ethanol)
		Outside North America	92 (RON) (fuel with NO ethanol) 95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity			40 L (10.57 U.S. gal.)
ELECTRICAL SYSTEM			
Magneto generator output			490 W @ 5000 RPM @ 14 V
Magneto stator resistance (between any pair of yellow wires)			0.1 to 1 Ohm @ 20°C (68°F)
Ignition type			IDI (Inductive Digital Ignition)
Spark plug	Make and type		NGK CR8EKB
	Gap		0.7 mm to 0.8 mm (.028 in to .031 in)
Ignition timing			Not adjustable 15°
Battery			12 volt 18 A.h. YTX20HL-BS
Headlamp			2 x 60/55 W (H4)
Taillight and stoplight			2 x P 21/5 W

ELECTRICAL SYSTEM (cont'd)			
Fuses (fuse box)	F 1	Gauge	15 A
	F 2	Fuel pump/Starter solenoid/CAPS	10 A
	F 3	Cyl. 3 Inj./Ign.	5 A
	F 4	Cyl. 2 Inj./Ign.	5 A
	F 5	Cyl. 1 Inj./Ign.	5 A
	F 6	Taillight/Heating elements/Air suspension/AC outlet	20 A
	F 7	Headlights	15 A
	F 8	E-Reverse	20 A
	F 9	Start button/Clock/Relays	5 A
	F 10	Rear accessories	15 A
	F 11	Fan	15 A
Fuse		Battery charging/Main fuse	30 A
DRIVE SYSTEM			
Chaincase oil	Type		XPS synthetic chaincase oil
	Quantity		500 ml (16.9 U.S. oz)
Chain drive small sprocket	Teeth quantity		24
Chain drive large sprocket	Teeth quantity	GSX LE MXZ	43
		Grand Touring LE Grand Touring SE (CAN/U.S.) GSX SE Renegade	45
		Grand Touring SE (Eur)	49
Chain	Pitch		9.53 mm (3/8 in)
	Type/links qty/ plate qty	Grand Touring LE Grand Touring SE (CAN/U.S.) GSX MXZ Renegade	Silent 104/13
		Grand Touring SE (Eur)	Silent 106/13
Drive belt	Width		38.5 mm (1.516 in)
	Wear limit		36.10 mm (1.421 in)
	Deflection		32.00 mm to 5.00 mm (1.26 in to .197 in)
	Adjustment force		11.30 kgf (24.9 lbf)
Drive pulley	Type		eDrive II
	Calibration	Clutch engagement	2200
		Spring color	Yellow/Orange
		Spring length	105.40 mm (4.15 in)
		Pin	N/A
		Ramp	735
		Screw position	N/A

DRIVE SYSTEM (cont'd)			
Driven pulley	Type		QRS
	Calibration	Spring preload (New)	8.3 kgf ± 0.7 kgf (18.3 lbf ± 1.5 lbf)
		Spring preload (After break-in)	7.5 kgf ± 0.7 kgf (16.5 lbf ± 1.5 lbf)
		Spring color	Pink 3
		Cam angle	47°/40°
	Offset	Z	21.40 mm (.843 in)
		X	36.90 mm ± 0.5 mm (1.453 in ± .02 in)
	"Y - X" Difference		1.90 mm (.075 in)
Track	Width	Grand Touring LE Grand Touring SE (CAN/U.S.) GSX MXZ Renegade X (CAN/U.S.) with Ice Ripper XT track	381 mm (15 in)
		Grand Touring SE (Eur) Renegade	406 mm (16 in)
	Length	GSX LE MXZ	3.05 m (120 in)
		Grand Touring GSX SE Renegade	3.49 m (137 in)
	Profile height	Grand Touring LE Grand Touring SE (CAN/U.S.)	25.4 mm (1 in)
		GSX Grand Touring SE (Eur) MXZ X (choice of Rip Saw or Ice Ripper XT track) MXZ TNT (Rip Saw track) Renegade Adrenaline Renegade X (CAN/U.S.) (choice of Rip Saw or Ice Ripper XT track)	31.8 mm (1.25 in)
		Renegade X (Eur)	44.5 mm (1.75 in)
Track adjustment	Deflection		32 mm (1-1/4 in)
	Force		7.3 kgf (16 lbf)
BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)
FRONT SUSPENSION			
Suspension type			Double A-arm
Suspension maximum travel			229 mm (9 in)
Shock absorber type		Grand Touring GSX	HPG
		MXZ TNT Renegade Adrenaline	HPG Plus
		MXZ X Renegade X	HPG Plus R
Stabilizer bar type			Link

REAR SUSPENSION			
Suspension type		GSX Grand Touring	SC-5
		Others	rMotion
Suspension maximum travel		GSX LE	381 mm (15 in)
		MXZ	394 mm (15.5 in)
		Grand Touring GSX SE Renegade	406 mm (16 in)
Shock absorber type	Center	Grand Touring LE GSX LE	Motion control
		Grand Touring SE GSX SE Renegade Adrenaline	HPG
		MXZ Renegade X	HPG Plus
	Rear	Renegade Adrenaline	HPG
		Grand Touring LE GSX LE	HPG VR
		MXZ TNT	HPG Plus
		MXZ X Renegade X	KYB PRO 36 EA
		Grand Touring SE GSX SE	ACS (Air Controlled Suspension)
Stroke limiter standard position			3
Coupling blocks standard position			2
STEERING SYSTEM			
Ski type		GSX MXZ Renegade	Pilot 5.7
		Grand Touring	Pilot 5.7 SL
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Dry weight		GSX LE	240 kg (529 lb)
		Renegade Adrenaline	241 kg (532 lb)
		GSX SE	249 kg (549 lb)
		Grand Touring LE	265 kg (584 lb)
		Grand Touring SE	272 kg (600 lb)
		MXZ TNT	228 kg (503 lb)
		MXZ X	232 kg (511 lb)
		Renegade X	237 kg (522 lb)

WEIGHT AND DIMENSIONS (cont'd)		
Length	Grand Touring (CA/US)	322.6 cm (127 in)
	GSX LE MXZ	290.9 cm (114.5 in)
	GSX SE Renegade (CA/US)	311 cm (122.4 in)
	Renegade (EUR)	3 177 mm (125.1 in)
	Grand Touring SE (EUR)	3 293 mm (129.6 in)
Width	Renegade X (EUR) Grand Touring SE (EUR)	1 241 mm (48.9 in)
	Others	121.7 cm (47.9 in)
Height	Grand Touring	137 cm (53.9 in)
	GSX LE	127 cm (50 in)
	GSX SE	133.8 cm (52.7 in)
	MXZ X Renegade X	113 cm (44.5 in)
	Renegade Adrenaline MXZ TNT	121 cm (47.6 in)
Ski stance (carbide to carbide)		107.7 cm (42.4 in)
Ski width	GSX MXZ Renegade X Renegade Adrenaline	140 mm (5.5 in)
	Grand Touring LE Grand Touring SE (CA/US)	141 mm (5.6 in)
	Grand Touring SE (EUR)	164 mm (6.5 in)

CHASSIS SYSTEMS EXPEDITION (600 HO E-TEC)

COOLING SYSTEM			
Coolant		Type	Ethyl glycol and distilled water (50%/50%). Use BRP premix coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
		Quantity	4.5 L (1.19 U.S. gal.)
Thermostat opening temperature			37°C (99°F)
Radiator cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Oil injection pump type			Electronic oil injection pump
Injection oil		Type	XPS synthetic blend 2-stroke oil (P/N 293 600 100)
		Quantity	2.9 L (98 U.S. oz)
FUEL SYSTEM			
Fuel delivery			E-TEC direct injection
Throttle body			Dell'Orto 46 mm
Fuel pump			In-tank electrical fuel pump
Idle speed (not adjustable)			1200 ± 200 RPM
Fuel	Type		Premium unleaded
	Octane rating	Inside North America	91 ((R+M)/2) (fuel with NO ethanol or Fuel which may contain up to 10% MAX ethanol)
		Outside North America	95 (RON) (fuel with NO ethanol or Fuel which may contain up to 10% ethanol
Fuel tank capacity			45 L (11.9 U.S. gal.)
ELECTRICAL SYSTEM			
Lightning system output			1340 W @ 6000 RPM
Ignition type			Inductive
Spark plug		Make and type	NGK PZFR6F
		Gap	Not adjustable 0.75 mm ± 0.05 mm (.03 in ± .002 in)
Ignition timing BTDC @ 3500 ± 500 RPM			28°
			5.38 mm (.212 in)
Crankshaft position sensor (CPS)			190 to 290 Ω
Stator			0.63 ± 0.03 Ω
Battery			12 V, 18 A•h
Headlamp			2 x 60/55 W (H4)
Taillight and stoplight			P 21/5 W

ELECTRICAL SYSTEM (cont'd)			
Fuses	F1: Battery		30 A
	F2: Start		5 A
	F3: Horn (optional)		10 A
	F4: Fan		15 A
Relays	Relay 1		Run relay
	Relay 2		Fan relay
DRIVE SYSTEM			
Gearbox oil	Type		XPS synthetic chaincase oil (P/N 413 803 300)
	Quantity		700 ml (24 U.S. oz)
Gear ration	1st		3.23 : 1
	2nd		1.98 : 1
	R		3.76 : 1
Drive pulley type			TRA III
Drive pulley calibration	Clutch engagement		3000 ± 100 RPM
	Spring color		Yellow/Red
	Spring length		94.61 mm (3.725 in)
	Pin		Solid (long)
	Ramp		600
	Screw position		2
Driven pulley type	Type		QRS-NTC
	Spring color		White/White
	Spring preload	New	7.5 kg ± 0.7 kg (16.5 lb ± 1.5 lb)
		After break-in	6.8 kg ± 0.7 kg (15 lb ± 1.5 lb)
	Cam angle		40°
Pulley distance	Z		21 mm (.827 in) (not adjustable)
Offset	X		36.4 mm ± 1.8 mm (1.433 in ± .071 in) (not adjustable)
Drive belt	Width		38.5 mm (1.516 in)
	Wear limit		36.1 mm (1.421 in)
	Deflection		32 mm ± 5.0 mm (1.26 in ± .197 in)
	Adjustment force		11.30 kgf (24.9 lbf)
Track	Width		500 mm (20 in)
	Length		3.9 m (154 in)
	Profile height		31.8 mm (1-1/4 in)
Track adjustment	Deflection		4.2 cm (1-21/32 in)
	Force		7.3 kgf (16.1 lbf)
BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)

FRONT SUSPENSION			
Suspension type			REV-XP
Suspension maximum travel			210 mm (8.3 in)
Shock absorber type			Motion control
REAR SUSPENSION			
Suspension type			SC-5U
Suspension maximum travel			340 mm (13.4 in)
Shock absorber type	Center		Motion control
	Rear	Expedition LE	HPG
		Expedition SE	ACS
STEERING SYSTEM			
Ski type			Pilot 6.9
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Mass (dry)		Expedition LE	278 kg (613 lb)
		Expedition SE	298 kg (657 lb)
Length		Expedition LE	323 cm (127 in)
		Expedition SE	324 cm (128 in)
Width			115 cm or 119.2 cm (45.3 in or 46.9 in)
Height			133 cm (52.4 in)
Ski width			175 mm (6.9 in)
Ski stance (carbide to carbide)			97.5 cm or 101.8 cm (38.4 in or 40.1 in)

CHASSIS SYSTEMS EXPEDITION (1200 4-TEC)

COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use BRP premixed coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity		6.6 L (1.74 U.S. gal.)
Thermostat opening temperature			65°C (149°F)
Radiator cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Lubrication	Type		Dry sump. Replaceable oil filter
	Oil filter		BRP Rotax paper type, replaceable
	Engine oil pressure	Minimum	60 kPa (8.7 PSI) @ 1100 RPM
			350 kPa (50.8 PSI) @ 7700 RPM
	Engine oil	Capacity (oil change with filter)	3.5 L (3.7 qt (U.S. liq.))
		Recommended	XPS Synthetic 4-Stroke oil (All climate) (P/N 293 600 112) or a SAE 0W 40 API service SM synthetic oil
FUEL SYSTEM			
Throttle body type			Multi point EFI, 52 mm heated Dell'Orto throttle body
Idle speed	Normal idle		1100 RPM (starting at 70°C (158°F) oil temperature)
	Fast idle		1500 RPM at -40°C (-40°F)
Gasoline type			Unleaded
Minimum octane rating	Inside North America ((R+M)/2)		87
	Outside North America (RON)		92
Fuel tank capacity			45 L (11.89 U.S. gal.)
ELECTRICAL SYSTEM			
Magneto generator output			500 W @ 5000 RPM @ 14 V
Magneto stator resistance (between any pair of yellow wires)			0.1 to 1 Ohm @ 20°C (68°F)
Ignition type			IDI (Inductive Digital Ignition)
Spark plug	Make and type		NGK CR8EKB
	Gap		.70 mm to 0.80 mm (.028 in to .031 in)
Ignition timing			Not adjustable
Battery			12 volt 18 A.h. YTX20HL-BS
Headlamp			2 X 55/60 W (H4)
Taillight and stoplight			2 X P 5/21 W

ELECTRICAL SYSTEM (cont'd)			
Fuses	F 1: HIC/CDI		5 A
	F 2: Fuel pump		10 A
	F 3: HIC		5 A
	F 4: HIC		5 A
	F 5: HIC		5 A
	F 6: Rear light		10 A
	F 7: Headlights		15 A
	F 8: Relay/Gauge		10 A
	F 9: Relay/Gauge		7.5 A
	F 10: Fan		15 A
	F 11: Rear power outlet		5 A (10 A with optional horn)
	F 12: Unused		–
	F 13: Charging		30 A
Relays	Relay 1		Load relay
	Relay 2		Fan relay
	Relay 3		Run relay
DRIVE SYSTEM			
Gearbox oil	Type		XPS synthetic chaincase oil
	Quantity		700 ml (23.67 U.S. oz)
Gear ratio	1st		3.23 : 1
	2nd		1.98 : 1
	R		4.06 : 1
Drive pulley	Type		eDrive II
	Calibration	Clutch engagement	2200
		Spring color	Yellow/Red
		Spring length	120 mm (4.724 in)
		Pin	N/A
		Ramp	735
		Screw position	N/A
Driven pulley	Type		QRS-NTC
	Calibration	Spring preload (New)	8.3 kgf ± 0.7 kgf (18.3 lbf ± 1.5 lbf)
		Spring preload (After break-in)	7.5 kgf ± 0.7 kgf (16.5 lbf ± 1.5 lbf)
		Spring color	Pink/Pink
		Cam angle	44°/40°
	Offset	Z	21.40 mm (.843 in)
		X	36.90 mm ± 0.5 mm (1.453 in ± .02 in)
Drive belt	Width		38.3 mm (1.508 in)
	Wear limit		35.90 mm (1.413 in)
	Deflection		32.5 mm ± 0.50 mm (1.28 in ± .02 in)
	Adjustment force		11.30 kgf (24.912 lbf)
Track	Width		500 mm (20 in)
	Length		3.92 m (154 in)
	Profile height		31.8 mm (1-1/4 in)

DRIVE SYSTEM (cont'd)			
Track adjustment	Deflection		4.2 cm (1-21/32 in)
	Force		7.3 kgf (16 lbf)
BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)
FRONT SUSPENSION			
Suspension type			Double A-arms
Suspension maximum travel			210 mm (8.3 in)
Shock absorber type			Motion control
Stabilizer bar type			Link
REAR SUSPENSION			
Suspension type			SC-5U
Suspension maximum travel			340 mm (13.4 in)
Shock absorber type	Center		Motion control
	Rear	Expedition LE	HPG
		Expedition SE	ACS
Stroke limiter standard position			3
STEERING SYSTEM			
Ski type			Pilot 6.9
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Dry weight		Expedition LE	301 kg (664 lb)
		Expedition SE	322 kg (710 lb)
Length		Expedition LE	323 cm (127 in)
		Expedition SE	324 cm (128 in)
Width			115 cm - 119.2 cm (45.3 in - 46.9 in)
Height			133 cm (52.4 in)
Ski stance (carbide to carbide)			97.5 cm - 101.8 cm (38.4 in - 40.1 in)

CHASSIS SYSTEMS TUNDRA (550F)

LUBRICATION SYSTEM		
Injection oil	Type	XPS MINERAL INJECTION OIL (P/N 413 802 900)
	Quantity	3.7 L (125 U.S. oz)
FUEL SYSTEM		
Carburetor type	MAG	VM30-218 (Green dot)
	PTO	VM30-219 (Blue dot)
Main jet	MAG	190
	PTO	200
Needle jet		P-8
Pilot jet		35
Jet needle identification		6BFY46
Jet needle clip position	MAG	3
	PTO	4
Slide valve cut-away		2.5
Idle throttle valve height		1.6 mm ± 0.1 mm (.063 in ± .004 in)
Float level		23.9 mm ± 1 mm (.941 in ± .039 in)
Air screw adjustment	MAG	1.25 (reference only)
	PTO	1.0 (reference only)
Idle speed		1650 ± 200 RPM
Fuel type		Unleaded
Minimum octane rating	Inside North America	87 ((R+M)/2) Fuel with NO ethanol) 91 ((R+M)/2) (Fuel which may contain up to 10% MAX ethanol)
	Outside North America	92 (RON) (Fuel with NO ethanol) 95 (RON) (Fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity		40 L (10.57 U.S. gal.)
ELECTRICAL SYSTEM		
Magneto generator output		340 W @ 6000 RPM
Ignition type		CDI
Spark plug	Make and type	NGK BR9ECS (2)
	Gap	0.45 mm ± 0.05 mm (.018 in ± .002 in)
Ignition timing BTDC @ 3500 rpm		22° 2.77 mm ± 0.05 mm (.109 in ± .002 in)
Trigger coils		160 to 180 Ω
Magneto stator windings	Ignition	6.3 to 7.7 Ω
	Charging/lighting	0.145 to 0.175 Ω
Ignition coil (integrated in ECM)	Primary	N.A.
	Secondary	900 to 1100 Ω (without spark plug wires)
Battery (if applicable)		12 V, 18 A•h
Headlamp		60/55 W (H4)
Taillight and stoplight		21/5 W
Fuse	Starter solenoid	30 A (if applicable)
	Fuel level	0.25 A

DRIVE SYSTEM			
Chaincase oil		Type	XPS SYNTHETIC CHAINCASE OIL (P/N 413 803 300)
		Quantity	350 ml (11.8 U.S. oz)
Chain drive ratio			19/45
Chain		Pitch	9.53 mm (3/8 in)
		Type/links qty/width	Silent 102/13
Drive pulley type			eDrive
Drive pulley calibration		Clutch engagement	2600 ± 100 RPM
		Spring color	Red/Yellow
		Spring free length	90.4 mm (3.56 in)
		Pin	N.A.
		Ramp	700
		Screw position	N.A.
Driven pulley		Type	QRS-SS
		Spring color	Brown
		Cam angle	44°
Pulley distance (before break-in period)		Z	21.00 mm (.827 in)
Offset		X	37.2 mm ± 0.50 mm (1.465 in ± .02 in)
Drive belt		Part number	(P/N 414 860 700)
		Width	35.30 mm (1.39 in)
		Wear limit	32.9 mm (1.295 in)
Drive belt adjustment		Deflection	32 mm ± 0.5 mm (1.26 in ± .02 in)
		Force	11.3 kg (24.9 lb)
Track	Width	Tundra Sport Tundra LT	406.4 mm (16 in)
	Length	Tundra Sport	345.6 cm (137 in)
		Tundra LT	392.3 cm (154 in)
	Profile height	Tundra Sport	31.8 mm (1.25 in)
		Tundra LT	38 mm (1.5 in)
Track adjustment	Deflection	Tundra Sport	32 mm (1-1/4 in)
		Tundra LT	42 mm (1-17/32 in)
	Force (1)		7.3 kgf (16 lbf)
BRAKE SYSTEM			
Brake pad thickness		Service limit	1 mm (.039 in)
Brake fluid		Type	DOT 4
		Quantity	60 ml (2.03 U.S. oz)
FRONT SUSPENSION			
Suspension type			LTS
Suspension maximum travel			150 mm (5.9 in)
Shock absorber type			Motion control

REAR SUSPENSION		
Suspension type	Tundra Sport	SC-5 M
	Tundra LT	SC-5 U
Suspension maximum travel	Tundra Sport	34 cm (13.4 in)
	Tundra LT	35.6 cm (14 in)
Shock absorber type	Center	Motion control
	Rear	HPG
Stroke limiter standard position		3
STEERING SYSTEM		
Ski type	Tundra Sport Tundra LT	Pilot DS
Toe-out		5 mm (.197 in)
Camber		0°
WEIGHT AND DIMENSIONS		
Dry weight	Tundra Sport	210 kg (463 lb)
	Tundra LT	219 kg (483 lb)
Length	Tundra Sport	306.9 cm (120.83 in)
	Tundra LT	332.9 cm (131.1 in)
Width		100.2 cm (39.4 in)
Height	Tundra Sport	127.8 cm (50.3 in)
	Tundra LT	132.5 cm (52.2 in)
Ski width	Tundra Sport Tundra LT	165 mm (6.5 in)
Ski stance (carbide to carbide)		81.3 cm (32 in)
N.A.: Not Available		

(1) Measure gap between slider shoe and bottom inside track when exerting a downward pull to the track.

CHASSIS SYSTEMS TUNDRA XTREME (600 HO E-TEC)

COOLING SYSTEM			
Coolant		Type	Ethyl glycol and distilled water (50%/50%). Use BRP premix coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
		Quantity	5.42 L (1.43 U.S. gal.)
Thermostat opening temperature			37°C (99°F)
Radiator cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Oil injection pump type			Electronic oil injection pump
Injection oil		Type	XPS synthetic blend 2-stroke oil (P/N 293 600 100)
		Quantity	3.7 L (125.1 U.S. oz)
FUEL SYSTEM			
Fuel delivery			E-TEC direct injection
Throttle body			Dell'Orto 46 mm
Fuel pump			In-tank electrical fuel pump
Idle speed (not adjustable)			1200 ± 200 RPM
Fuel	Type		Premium unleaded
	Octane rating	Inside North America	91 (R+M)/2) (fuel which may contain up to 10% MAX ethanol)
		Outside North America	95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity			40 L (10.6 U.S. gal.)
ELECTRICAL SYSTEM			
Lightning system output			1340 W @ 6000 RPM
Ignition type			Inductive
Spark plug		Make and type	NGK PZFR6F
		Gap	Not adjustable 0.75 mm ± 0.05 mm (.03 in ± .002 in)
Ignition timing BTDC @ 3500 ± 500 RPM			28°
			5.38 mm (.212 in)
Crankshaft position sensor (CPS)			190 to 290 Ω
Stator			0.63 ± 0.03 Ω
Battery			12 V, 18 A•h, YTX20HL-BS
Headlamp			2 x 60/55 W (H4)
Taillight and stoplight			21/5 W
Fuses		Start/RER	5 A
		Fuel level sensor	0.25 A
		Main	25 A

DRIVE SYSTEM		
Chaincase oil	Type	XPS synthetic chaincase oil (P/N 413 803 300)
	Quantity	350 ml (12 U.S. oz)
Chain drive ratio		21/49
Chain	Pitch	3/8
	Type/links qty/plate qty	Silent 106/13
Drive pulley type		TRA III
Drive pulley calibration	Clutch engagement	3400 ± 100 RPM
	Spring color	Red/Orange
	Spring length	91.20 mm (3.591 in)
	Pin	Threaded short + 16mm
	Ramp	417
	Screw position	3
Driven pulley type	Type	QRS
	Spring color	Black
	Spring preload	0
	Cam angle	44/42°
Pulley distance	Z	20.9 mm (.823 in) (not adjustable)
Offset	X	39.4 mm ± 1.8 mm (1.551 in ± .071 in) (not adjustable)
Drive belt	Width	38.5 mm (1.516 in)
	Wear limit	36.1 mm (1.421 in)
Track	Width	406.4 mm (16 in)
	Length	3.9 m (154 in)
	Profile height	57.2 mm (2-1/4 in)
Track adjustment	Deflection	4.2 cm (1-21/32 in)
	Force	6.0 kgf to 8.5 kgf (13 lbf to 19 lbf)
BRAKE SYSTEM		
Brake lining minimum thickness		1 mm (.039 in)
Brake disk minimum thickness		4.5 mm (.177 in)
Brake fluid	Type	DOT 4
	Quantity	65 ml (2.2 U.S. oz)
FRONT SUSPENSION		
Suspension type		LTS
Suspension maximum travel		150 mm (6 in)
Shock absorber type		Motion control
Stabilizer bar type		–

REAR SUSPENSION		
Suspension type		SC-5U
Suspension maximum travel		356 mm (14 in)
Shock absorber type	Center	HPG
	Rear	HPG
Stroke limiter standard position		3
STEERING SYSTEM		
Ski type		Pilot DS
Toe-out		5 mm (.197 in)
Camber		0°
WEIGHT AND DIMENSIONS		
Mass (dry)		225 kg (496 lb)
Length		333 cm (131 in)
Width		100.2 cm (39.4 in)
Height		129.6 cm (51 in)
Ski stance (carbide to carbide)		81.3 cm (32 in)

CHASSIS SYSTEMS TUNDRA (600 ACE)

COOLING SYSTEM			
Coolant	Type		Ethyl glycol and distilled water (50%/50%). Use BRP premixed coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
	Quantity	Tundra Sport	6 L (1.59 U.S. gal.)
		Tundra LT	5.87 L (1.55 U.S. gal.)
Thermostat opening temperature			75°C (167°F)
Radiator cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			
Lubrication	Type		Dry sump. Replaceable oil filter
	Oil filter		BRP Rotax paper type, replaceable
	Engine oil pressure	Minimum	60 kPa (8.7 PSI) @ 1400 RPM
			400 kPa (58 PSI) @ 4000 RPM
	Engine oil	Capacity (oil change with filter)	2.1 L (2.22 qt (U.S. liq.))
		Recommended	XPS Synthetic 4-Stroke oil (All climate) (P/N 293 600 112) or a SAE 0W 40 API service SM synthetic oil
FUEL SYSTEM			
Throttle body type			Multi point EFI, 46 mm heated Dell'Orto throttle body
Idle speed	Normal idle		1400 ± 100 RPM
	Fast idle		2100 ± 100 RPM
Recommended fuel			Unleaded
Minimum octane rating	Inside North America		87 ((R+M)/2) (fuel with no ethanol) 91 (fuel which may contain up to 10% MAX ethanol)
	Outside North America		92 (RON)(fuel with no ethanol) 95 (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity			40 L (10.57 U.S. gal.)
ELECTRICAL SYSTEM			
Magneto generator output			650 W @ 6000 RPM @ 14 V
Magneto stator resistance (between any pair of yellow wires)			0.1 to 1 Ohm @ 20°C (68°F)
Ignition type			IDI (Inductive Digital Ignition)
Spark plug	Make and type		NGK MR7BI-8
	Gap		.70 mm to 0.80 mm (.028 in to .031 in)
Ignition timing			Not adjustable
Battery			12 volt 18 A.h. YTX20HL-BS
Headlamp LOW/HI beam			2 X 60/55 W (H4)
Taillight and stoplight			21/5 W
Fuses	F 1	Battery charging (Main) and communication connector	30 A
	F 2	Start/RER button, relays, clock	5 A
	F 3	Fuel pump, starter solenoid	10 A
	F 4	Cooling fan	15 A
	F 5	Ignition coils, fuel injectors	10 A
	F 6	ECM, gauge and CAPS	10 A

ELECTRICAL SYSTEM (cont'd)			
Fuses	F 7	Accessories, heating elements	15 A
	F 8	Headlights, taillight, brake light	20 A
Relays	Relay 1		Main relay (fuses 3, 5, 6 and communication connector)
	Relay 2		Lighting relay (fuse 8)
	Relay 3		Accessory relay (fuse 10)
DRIVE SYSTEM			
Chaincase oil	Type		XPS synthetic chaincase oil (P/N 413 803 300)
	Quantity		500 ml (16.9 U.S. oz)
Chain drive small sprocket	Teeth quantity		21
Chain drive large sprocket	Teeth quantity		51
Chain	Pitch		9.53 mm (3/8 in)
	Type/links qty/plate qty		Silent 106/13
Drive pulley	Type		eDrivell
	Clutch engagement		2200
	Spring color		Red/White
	Spring length		108 mm (4.252 in)
	Pin		–
	Ramp		738
	Screw position		–
Driven pulley	Type		QRS-SS
	Spring preload (New)		7.0 kgf ± 0.7 kgf (15.4 lbf ± 1.5 lbf)
	Spring preload (After break-in)		6.4 kgf ± 0.7 kgf (14.1 lbf ± 1.5 lbf)
	Spring color		Pink 3
	Cam angle		41°/45°
	Offset	Z	21.40 mm (.843 in)
		X	37.2 mm ± 0.5 mm (1.465 in ± .02 in)
Drive belt	Width		38.50 mm (1.516 in)
	Wear limit		36.10 mm (1.421 in)
	Deflection		32.0 mm (1.26 in)
	Force		11.30 kgf (24.9 lbf)
Track	Width		406.4 mm (16 in)
	Length	Tundra LT	3 923 mm (154.449 in)
		Tundra Sport	345.6 mm (14 in)
	Profile height	Tundra LT	38 mm (1-1/2 in)
		Tundra Sport	31.8 mm (1-1/2 in)
Track adjustment	Deflection	Tundra LT	4.2 cm (1-21/32 in)
		Tundra Sport	3.2 cm (1-1/4 in)
	Force		7.3 kg (16 lb)

BRAKE SYSTEM			
Brake lining minimum thickness			1 mm (.039 in)
Brake disk minimum thickness			4.5 mm (.177 in)
Brake fluid	Type		DOT 4
	Quantity		65 ml (2.2 U.S. oz)
FRONT SUSPENSION			
Suspension type			XP-LTS
Suspension maximum travel			150 mm (6 in)
Shock absorber type			Motion control
REAR SUSPENSION			
Suspension type			SC-5M
Suspension maximum travel		Tundra Sport	34 cm (13.4 in)
		Tundra LT	356 mm (14.016 in)
Shock absorber type	Center		Motion control
	Rear		HPG
Stroke limiter standard position			3
STEERING SYSTEM			
Ski type			Pilot DS
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Dry weight		Tundra LT	229 kg (505 lb)
		Tundra Sport	219 kg (483 lb)
Length		Tundra LT	332.9 cm (131.1 in)
		Tundra Sport	306.9 cm (120.8 in)
Width			100.2 cm to 120.4 cm (39.4 in to 47.4 in)
Height			132.5 cm (52.2 in)
Ski stance (carbide to carbide)			81.3 cm (32 in)
Ski width			175 mm (6.9 in)

CHASSIS SYSTEMS SKANDIC WT/SWT

COOLING SYSTEM			***600 HO E-TEC, 600 ACE***
Coolant		Type	Ethyl glycol and distilled water (50%/50%). Use BRP premix coolant (P/N 219 700 362) or coolant specifically formulated for aluminum engines
		Quantity	5 L (1.32 U.S. gal.)
Thermostat opening temperature			37°C (99°F)
Radiator cap opening pressure			110 kPa (16 PSI)
LUBRICATION SYSTEM			***550F***
Injection oil		Type	XPS injection oil (P/N 293 600 117)
		Quantity	3.7 L (125 U.S. oz)
LUBRICATION SYSTEM			***600 HO E-TEC***
Oil injection pump type			Electronic oil injection pump
Injection oil		Type	XPS synthetic blend 2-stroke oil (P/N 293 600 100)
		Quantity	2.9 L (98 U.S. oz)
LUBRICATION SYSTEM			***600 ACE***
Lubrication	Type		Dry sump. Replaceable oil filter
	Oil filter		BRP Rotax paper type, replaceable
	Engine oil pressure	Minimum	60 kPa (8.7 PSI) @ 1400 RPM
			400 kPa (58 PSI) @ 4000 RPM
	Engine oil	Capacity (oil change with filter)	2.2 L (2.32 qt (U.S. liq.))
		Recommended	XPS Synthetic 4-Stroke oil (All climate) (P/N 293 600 112) or a SAE 0W 40 API service SM synthetic oil
FUEL SYSTEM			***550F***
Carburetor type		MAG	VM30-218 (Green dot)
		PTO	VM30-219 (Blue dot)
Main jet		MAG	190
		PTO	200
Needle jet			P-8
Pilot jet			35
Jet needle identification			6BFY46
Jet needle clip position		MAG	3
		PTO	4
Slide valve cut-away			2.5
Idle throttle valve height			1.6 mm ± 0.1 mm (.063 in ± .004 in)
Float level			23.9 mm ± 1 mm (.941 in ± .039 in)
Air screw adjustment		MAG	1.25 (reference only)
		PTO	1.0 (reference only)
Idle speed			1650 ± 200 RPM
Fuel type			Unleaded

FUEL SYSTEM (cont)		***550F***
Minimum octane rating	Inside North America	87 ((R+M)/2) Fuel with NO ethanol) 91 ((R+M)/2) (Fuel which may contain up to 10% MAX ethanol)
	Outside North America	92 (RON) (Fuel with NO ethanol) 95 (RON) (Fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity		45 L (11.9 U.S. gal.)
FUEL SYSTEM		***600 HO E-TEC***
Fuel delivery		E-TEC direct injection
Throttle body		Dell'Orto 46 mm
Fuel pump		In-tank electric fuel pump
Idle speed (not adjustable)		1200 ± 200 RPM
Fuel Type		Premium unleaded
Minimum octane rating	Inside North America	91 (R+M)/2) (fuel which may contain up to 10% MAX ethanol)
	Outside North America	95 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity		45 L (11.9 U.S. gal.)
FUEL SYSTEM		***600 ACE***
Throttle body type		Dell'Orto 46mm heated
Fuel pump		In-tank electric fuel pump
Idle speed	Normal idle	1450 ± 200 RPM
	Fast idle	2100 ± 100 RPM
Fuel type		Unleaded
Minimum octane rating	Inside North America	87 ((R+M)/2) (fuel which may contain up to 10% MAX ethanol)
	Outside North America	92 (RON) (fuel which may contain up to 10% MAX ethanol)
Fuel tank capacity		45 L (12 U.S. gal.)
ELECTRICAL SYSTEM		***550F***
Magneto generator output		340 W @ 6000 RPM
Ignition type		CDI
Spark plug	Make and type	NGK BR9ECS (2)
	Gap	0.45 mm ± 0.05 mm (.018 in ± .002 in)
Ignition timing BTDC @ 3500 RPM		22° 2.77 mm ± 0.05 mm (.109 in ± .002 in)
Trigger coils		160 to 180 Ω
Magneto stator windings	Ignition	6.3 to 7.7 Ω
	Charging/lighting	0.145 to 0.175 Ω
Ignition coil (integrated in ECM)	Primary	N.A.
	Secondary	900 to 1100 Ω (without spark plug wires)
Battery (if applicable)		12 V, 18 A•h
Headlamp		60/55 W (H4)
Taillight and stoplight		5/21 W
Fuse	Starter solenoid	30 A (if applicable)
	Fuel level	0.25 A

ELECTRICAL SYSTEM		***600 HO E-TEC***
Magneto generator output		1200 W
Voltage regulator output		2 x 12V and 1 x 55V
Ignition type		Inductive
Spark plug	Make and type	NGK PZFR6F[2]
	Gap	Not adjustable 0.7 mm to 0.8 mm (.028 in to .031 in)
Ignition timing BTDC @ 3500 ± 500 RPM		28°
		5.38 mm (.212 in)
Crankshaft position sensor (CPS)		190 to 290 Ω
Stator		0.63 ± 0.03 Ω
Battery		12 V, 18 A•h
Headlamp		2 x 60/55 W (H4)
Taillight and stoplight		P 21/5 W
Fuses	F1: Battery	30 A
	F2: Relay 2, start button, gauge	5 A
	F3: Horn (optional)	10 A
	F4: Relay 2 power (cooling fan)	15 A
	F5: Air suspension	15 A
Relays	Relay 1	Fuse 3, fuse 5, gauge and lighting system
	Relay 2	Cooling fan relay
ELECTRICAL SYSTEM		***600 ACE***
Magneto generator output		650 W @ 6000 RPM @ 14 V
Magneto stator resistance (between any pair of yellow wires)		0.1 to 1 Ohm @ 20°C (68°F)
Ignition type		IDI (Inductive Digital Ignition)
Spark plug	Make and type	NGK MR7BI-8
	Gap	.70 mm to 0.80 mm (.028 in to .031 in)
Ignition timing		Not adjustable
Battery		12 volt 18 A.h. YTX20HL-BS
Headlamp LOW/HI beam		2 X 55/60 W (H4)
Taillight and stoplight		2 X P 5/21 W
Fuses	F 1: Fuse 2, fuse 4, relay 1, relay 2, relay 3, voltage regulator, communication connector	30 A
	F 2: Relay coils (R1, R2, R3, R4), start button, gauge	5 A
	F 3: Fuel pump, starter solenoid	10 A
	F 4: Fan relay (R4)	15 A
	F 5: Fuel injectors, ignition coils	10 A
	F 6: Gauge, ECM, gauge	10 A
	F 7: 12-volt power outlet, heated grips, heated throttle lever	10 A
	F 8: Lights	20 A
	F 9: Horn (optional)	5 A
	F 10: Rear 12-volt power outlet (optional)	5 A

ELECTRICAL SYSTEM (cont)				***600 ACE***
Relays	Relay 1			Fuse 3, fuse 5, fuse 6
	Relay 2			Fuse 8, fuse 9, fuse 10
	Relay 3			Fuse 7
	Relay 4			Cooling fan
DRIVE SYSTEM				***ALL MODELS***
Gearbox oil		Type		XPS SYNTHETIC CHAINCASE OIL (P/N 413 803 300)
		Quantity		700 ml (24 U.S. oz)
Gear ratio		1st		3.86 : 1
		2nd		2.30 : 1
		R		4.06 : 1
Drive pulley		550F	Type	eDrive
			Engagement	2600 ± 100 RPM
		600 HO E-TEC	Type	TRA III
			Engagement	3000 RPM ± 100
		600 ACE	Type	eDrive
			Engagement	2200 RPM ± 100
Drive pulley calibration		550F	Spring color	Red/Yellow
			Spring free length	90.4 mm (3.56 in)
			Pin	N/A
			Ramp	700
			Screw position	N/A
		600 HO E-TEC	Spring color	Yellow/Red
			Spring free length	121.1 mm (4.77 in)
			Pin	Solid (long)
			Ramp	600
			Screw position	2
		600 ACE	Spring color	Yellow/Red
			Spring free length	121.1 mm (4.77 in)
			Pin	Solid (long)
			Ramp	600
			Screw position	2
Driven pulley type		550F		QRS-NTC
		600 HO E-TEC		
		600 ACE		
Driven pulley	Spring color	550F		White/White
		600 HO E-TEC		
		600 ACE		Pink/Pink

DRIVE SYSTEM (cont)				ALL MODELS
Driven pulley	Spring preload	550F	New	7.0 kgf ± 0.7 kgf (15.4 lbf ± 1.5 lbf)
			After break-in	6.4 kgf ± 0.7 kgf (14.1 lbf ± 1.5 lbf)
		600 HO E-TEC	New	8.3 kg ± 0.7 kg (18.3 lb ± 1.5 lb)
			After break-in	7.5 kg ± 0.7 kg (16.5 lb ± 1.5 lb)
		600 ACE	New	7.0 kgf ± 0.7 kgf (15.4 lbf ± 1.5 lbf)
			After break-in	6.4 kgf ± 0.7 kgf (14.1 lbf ± 1.5 lbf)
	Cam angle	550F		47° - 44°
		600 HO E-TEC		40°
		600 ACE		37°/45°
Pulley distance		Z	550F	21.0 mm (.827 in)
			600 HO E-TEC	21 mm (.827 in) (not adjustable)
			600 ACE	21.40 mm (.843 in)
Offset		X	550F	39.4 mm ± 0.50 mm (1.551 in ± .02 in)
			600 HO E-TEC	39.4 mm ± 1.8 mm (1.551 in ± .071 in) (not adjustable)
			600 ACE	37.2 mm ± 0.5 mm (1.465 in ± .02 in)
Drive belt		550F	Width	35.30 mm (1.39 in)
			Wear limit	32.9 mm (1.295 in)
		600 HO E-TEC	Width	38.5 mm (1.516 in)
			Wear limit	36.1 mm (1.421 in)
		600 ACE	Width	36.3 mm (1.43 in)
			Wear limit	33.9 mm (1.33 in)
Track	Width	WT		508 mm (20 in)
		SWT		600 mm (24 in)
	Length	WT		3 923 mm (154.4 in)
		SWT		3 968 mm (156 in)
	Profile height	WT		38.1 mm (1.5 in)
		SWT		31.8 mm (1.25 in)
Track adjustment		Deflection		40 mm to 50 mm (1.575 in to 1.969 in)
		Force[1]		7.3 kg (16 lb)

BRAKE SYSTEM		ALL MODELS
Brake lining minimum thickness		1 mm (.039 in)
Brake disk minimum thickness		4.5 mm (.177 in)
Brake fluid	Type	DOT 4
	Quantity	65 ml (2.2 U.S. oz)

FRONT SUSPENSION	ALL MODELS
Suspension type	XU-LTS
Suspension maximum travel	150 mm (6 in)
Shock absorber type	Motion control

REAR SUSPENSION			***ALL MODELS***
Suspension type			SC-5U
Suspension maximum travel			356 mm (14 in)
Shock absorber type	Center		Motion control
	Rear		HPG
STEERING SYSTEM			***ALL MODELS***
Ski type			Pilot DS (SWT with 9.8 in. liner)
Toe-out			5 mm (.197 in)
Camber			0°
WEIGHT AND DIMENSIONS			
Dry weight	WT	550F	269 kg (594 lb)
		600 HO E-TEC	285 kg (628 lb)
		600 ACE	284 kg (627 lb)
	SWT	600 HO E-TEC	303 kg (668 lb)
		600 ACE	302 kg (666 lb)
Length			3 240 mm (127.6 in)
Width			1076 mm (42.4 in)
Height			1 330 mm (52.4 in)
Ski stance (carbide to carbide, not adjustable)			900 mm (35.4 in)
Ski width			165 mm (6.5 in)
Liner width (SWT)			248.9 mm (9.8 in)
N.A.: Not Available			

(1) Measure gap between slider shoe and bottom inside track when exerting a downward pull to the track.

(2) **Notice** Do not attempt to adjust gap on this spark plug.

WIRING DIAGRAM INFORMATION

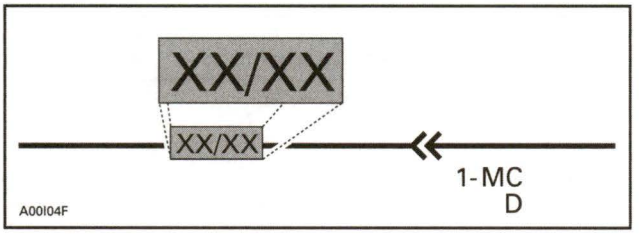
GENERAL

WIRING DIAGRAM LOCATION

Wiring diagrams are found in the *WIRING DIAGRAM BOOKLET*.

WIRING DIAGRAM CODES

Wire Colors



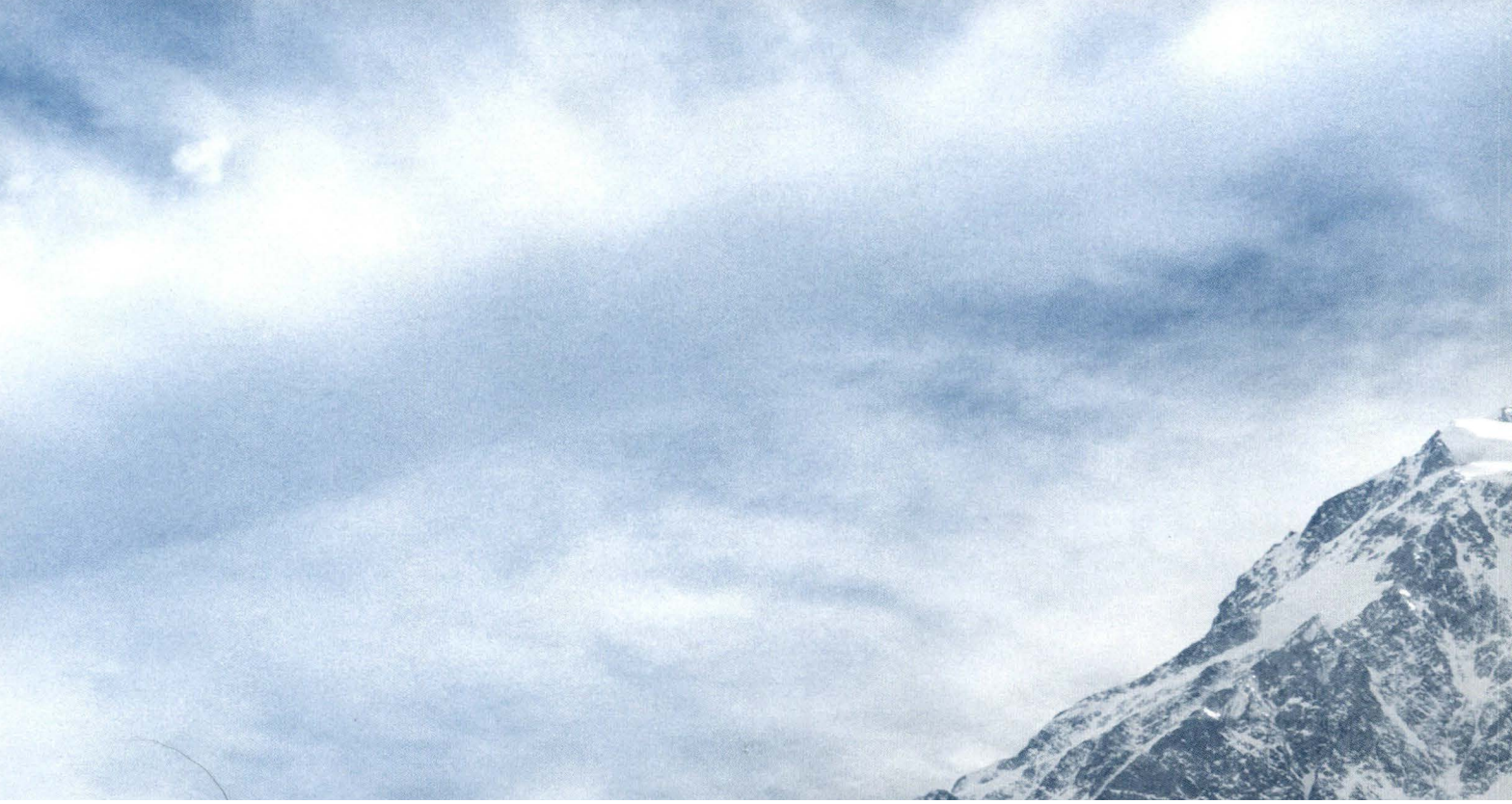
The first color of a wire is the main color, second color is the stripe.

Example: YL/BK is a YELLOW wire with a BLACK stripe.

COLOR CODE					
BE or BG	—	BEIGE	OR or OG	—	ORANGE
BK	—	BLACK	RD	—	RED
BU	—	BLUE	VI or VT	—	VIOLET
BR or BN	—	BROWN	WH	—	WHITE
GN	—	GREEN	YL or YE	—	YELLOW
GY	—	GRAY	PK	—	PINK

NOTES

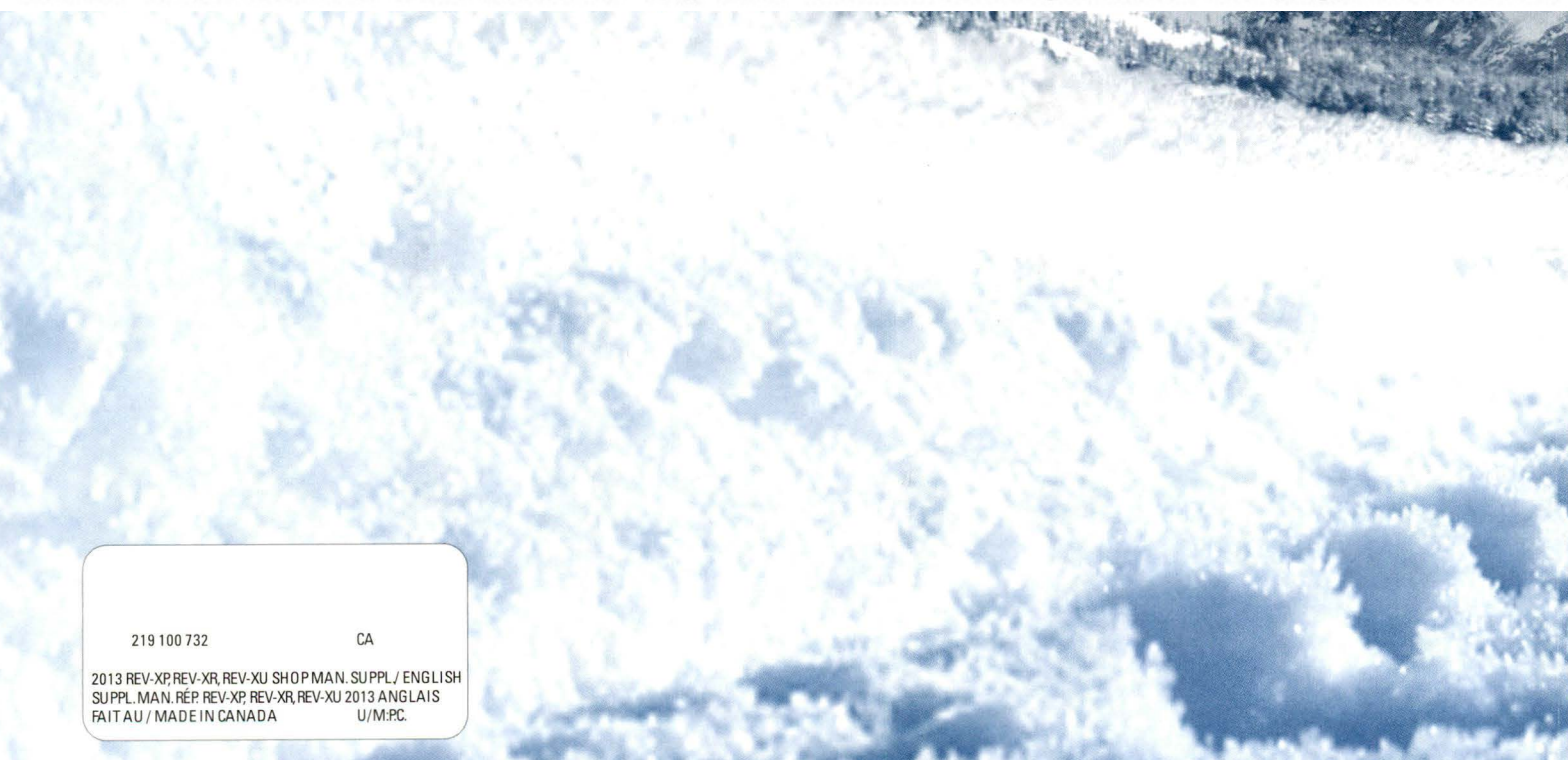
NOTES



Midwest Manuals

Green Manuals
Paperless Manuals
For a Better Tomorrow

If you bought this manual from any other seller please leave them NEGATIVE feedback and notify me at bestshopmanuals@gmail.com



219 100 732 CA

2013 REV-XP, REV-XR, REV-XU SHOP MAN. SUPPL. / ENGLISH
SUPPL. MAN. RÉP. REV-XP, REV-XR, REV-XU 2013 ANGLAIS
FAIT AU / MADE IN CANADA U/M:PC.